US Army Corps of Engineers®
Walla Walla District

REFLECTIONS OF MANY WATERS

A HISTORY OF THE WALLA WALLA DISTRICT, U.S. ARMY CORPS OF ENGINEERS, 1981-2000

PART 1 of 2
CHAPTERS 1-7

Issued 2013

Cover Photo: Clearwater River, ca. 1990

US Army Corps of Engineers®
Walla Walla District

REFLECTIONS OF MANY WATERS
A HISTORY OF THE WALLA WALLA DISTRICT, U.S. ARMY CORPS OF ENGINEERS, 1981-2000

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FOREWARD

The entire history of the U.S. Army Corps of Engineers, Walla Walla District, has been closely tied to the development of water resources and navigation on the Columbia and Snake Rivers. *Reflections of Many Waters* highlights the overall importance of our water resources and navigation mission and our close relationship with protecting and enhancing both natural and cultural environments as well as collaborating with local, state, tribal, regional, and other federal agencies. It is my pleasure to introduce this update to the history of the Walla Walla District, focusing on the years 1981-2000.

Establishment of the Walla Walla District coincided with the construction of McNary Lock and Dam on the Columbia River in November 1948, along the Washington-Oregon state boundary. The District has constructed and operated several other major hydroelectric and flood control projects since then, including four lower Snake River dams and navigation locks in Washington: Ice Harbor, Lower Monumental, Little Goose, and Lower Granite. The District went on to construct Dworshak Dam, the highest straight-axis concrete dam in the Western hemisphere, on the North Fork of the Clearwater River near Orofino, Idaho. Mill Creek Flood Control Project, including a dam and reservoir near Walla Walla, Washington, was built prior to the formation of the Walla Walla District, and another flood control project, Lucky Peak Dam, near Boise, Idaho, was one of the first projects designed and built by the District.

The District's work is primarily in the traditional areas of navigation and hydropower. During the two decades covered by this history, our nation's values and priorities changed considerably, requiring new responses from Congress, policy makers, and federal agencies; including the Corps of Engineers. In addition, we saw an explosion in information management technology. *Reflections of Many Waters* illustrates the Corps' newer missions, including recreation, responding to emergencies, regulating wetlands, environmental restoration, and our growth into a new age of information flow.

Throughout our history, the employees of the Walla Walla District have played an essential role – and this is a part of their story. *Reflections of Many Waters* documents our accomplishments during those important years, and encourages us to look forward to the possibilities and opportunities ahead.

Kevin L. Hostbjor
History Program Manager
Walla Walla District
2013

ACKNOWLEDGEMENTS

The author is indebted to the many current and retired employees of Walla Walla District who shared their perspectives and memories of the dynamic period in the District's history represented in this volume. Assistance in research and support for completing this volume was also received from the Walla Walla District Librarian, the Records Manager, and staff of the Public Affairs Office. Special thanks are due to the History Committee and its leader, Catherine M. Harrison, who formulated the vision of this history. They envisioned a detailed history including information on the evolution of the organization. They also wanted a history inspirited by the words of its employees. The author hopes this present volume fulfills the vision they outlined shortly after 2000.

Thanks also to all the current and former Walla Walla District staff members, especially chiefs, who gave input on sections of the history in draft. The author also appreciates the efforts of the staff of the U.S. Army, Corps of Engineers, Office of History in Washington, DC, who reviewed this volume. The publication of this volume was only possible with the support of the current Walla Walla District History Program Manager, Kevin L. Hostbjor. Last, but not least, thanks are due to a dedicated team of editors without whom this volume could not have been completed.

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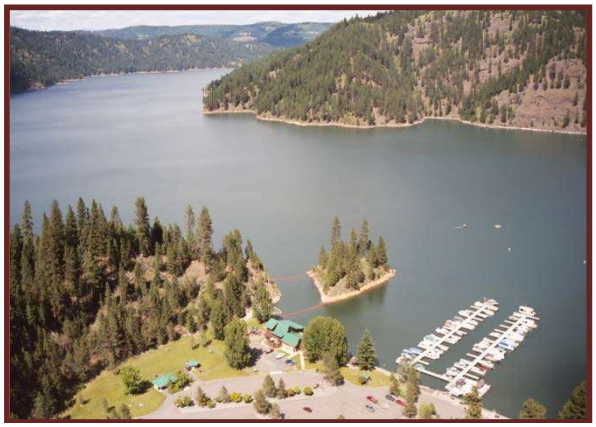
Chapter 1. Place of Many Waters

Many waters. We are told that the name "Walla Walla" means "place of many waters." The many waters of the Walla Walla District of the U.S. Army Corps of Engineers: The Columbia, the Snake, the Clearwater, the Boise, the Salmon, the Walla Walla, the Grande Ronde, the Palouse, the Payette, the Portneuf, the Teton, the Tucannon, the Touchet, the Big Wood, the Little Wood, the Lemhi, the Malheur, the Raft, the Umatilla, the Weiser, Henry's Fork, and Burnt Rivers; Lake Wallula, Lake Sacajawea, Lake West, Lower Granite Lake, Lake Bennington, Harney Lake, Mud Lake, Dworshak Reservoir, Lucky Peak Lake. Many waters joining many different groups of people: Indian nations, farmers, shippers, fishers, boaters, hunters, city planners, town dwellers, manufacturers, lovers of nature, producers of electricity, and the people of Walla Walla District. This history touches upon the concerns and interests of all the peoples of the many waters. This volume gives voice, in particular, to the engineers, the hydrologists, the environmental specialists, the biologists, the park rangers, the planners, the managers, the real estate specialists, and the other staff members of Walla Walla District who lived the history of this place of many waters.



"From its beginnings on November 1, 1948, the history of the Walla Walla District has been closely tied to the development of water resources and navigation (1)." This close relationship continued in the history of the District during the 1981-2000 period. Significant new themes appeared during this period as the District focused on protecting and enhancing the natural and cultural environment as well as collaborating with local,

state, tribal, regional, and other federal partners. Toward the end of the twentieth century, Walla Walla District assertively examined its own organizational structure and operating patterns in order to meet new and continuing goals and challenges.

The History Program

"The mission of the Corps, Office of History is to collect, document, interpret, and preserve the history and heritage of the U.S. Army Corps of Engineers (2)."

The History Program for the Corps states: "The history of the United States Army Corps of Engineers forms an important chapter in the history of the United States. No history of the nation would be complete without noting the development of internal transportation systems, fortifications, coastal defenses, flood control, military construction, and the space program. In all of these endeavors, the Corps has played an important and often critical role. For this reason, the Corps must take the lead in ensuring that an accurate, analytical record of these events is maintained (3)."

This volume was developed under the History Program and is intended to fulfill the requirements to produce "an update of the basic history covering all activities and organizational changes in the period since the basic history or last update (4)." This volume fulfills the basic purpose of the Corps' History program: "to support the civil works and military construction activities of the Corps through the appropriate application of historical research, analysis, and interpretation, particularly in the areas of policy, programs, and projects (5)." This volume also furthers the secondary objective of the Corps' History Program, which is "to make the public aware of the significant contributions of the Corps through American history (6)."

"While we read history, we make history."
—George William Curtis, *The Call of Freedom* (7).

Previous Histories of the District

Prior to this volume, Walla Walla District has issued several histories.

A History of the Walla Walla District 1948-1970

A History of the Walla Walla District 1948-1970 (8) was prepared by Howard A. Preston, a former employee of the District. The narrative details the first twenty-two years of the life of the District, presenting the opening of the "Inland Empire" in relation to development of water and hydropower resources in the region.

Walla Walla District History, Part II, 1970-1975

The first history update, *Walla Walla District History, Part II, 1970-1975* (9), also prepared by Mr. Preston, continues the story of the District with emphasis on construction and flood control. The author also reflects the importance of District activities that affected the environment and fish populations in particular.

Walla Walla District History, Part III, 1975-1980

Walla Walla District History, Part III, 1975-1980 (10), is the second update to the District's historical record. Historians affiliated with Washington State University completed this update. This history identifies the allocation of water resources as

the dominant theme in the life of the District. The update calls attention to the fact that major construction was limited in the District. This history is organized around the themes of hydropower, flood control, environment, water resources, recreation, dam safety, navigation, and cultural resources.

When the River Rises

When the River Rises: Flood Control on the Boise River 1943-1985 (11) by Susan M. Stacy, researched and written under a contract with the Corps, was published in 1993 jointly by the Institute of Behavior Science, University of Colorado and the College of Social Sciences and Public Affairs, Boise State University. The Boise area forms the largest population base within the Walla Walla District. This 1993 history analyzes the vulnerability of the flood-prone Boise area and is referenced particularly in chapter 6 of this volume.

Controversy, Conflict, and Compromise: A History of the Lower Snake River Development

While not strictly a history of the Walla Walla District, *Controversy, Conflict, and Compromise: A History of the Lower Snake River Development* (12) is an historical document that was commissioned by the District and prepared by historians Keith C. Peterson, Keith C. and Mary E. Reed, affiliated with Washington State University. The 1994 history covers how the lower Snake River was developed, from prehistoric geologic events through early settlement and commerce, and completion of the four dams that allowed commercial navigation from the Pacific Ocean to Idaho.

Saving the Salmon

Saving the Salmon: A History of the U.S Army Corps of Engineers' Efforts to Protect Anadromous Fish on the Columbia and Snake Rivers (13) was prepared in 1994 by Lisa Mighetto and Wesley J. Ebel of Historical Research Associates for the Portland and Walla Walla Districts, of the Corps. This work supplements the information given in chapter 7 of this volume.

Mission of the District

In the late twentieth century, the Corps' organizational vision was that it would be: "The world's premier engineering organization. Trained and ready to provide support anytime, anyplace. A full spectrum Engineer Force of high quality, dedicated soldiers and civilians: A vital part of the Army. The Engineer team of choice—responding to our Nation's need in peace and war. A values-based organization. Respected, Responsive, and Reliable. Changing today to meet tomorrow's challenges (14)."

Toward the beginning of the period covered in this volume, the District outlined its basic mission: "The primary mission of the Walla Walla District is to provide exemplary engineering and related services to our regional customers, the Army, and the Nation (15)." The District's vision was in keeping with the Corps' vision. The development of a customer-centered mission was indicative of trends within the Corps and within the world of business at large during this period.

Toward the end of this period, Walla Walla District developed a vision that further emphasized the District's role as a partner with other agencies and customers within the region. *NWW Direction 2000* calls upon the District to:

> "Provide efficient and effective benefits to public customers through environmentally sensitive planning, engineering, construction, and operational services.
>
> Quality service is accomplished by achieving balance between natural environment and economic need of our regional customers.
>
> Specialty expertise will be provided in the following areas: power generation, navigation, natural resources management, environmental stewardship, emergency response, flood damage reduction, and infrastructure rehabilitation (16)."

Moose near Chief Timothy Park, Snake River

Stewardship entails not only careful management, but also implies an application of democratic values to the decision-making process. This, in turn, implies a participatory organizational structure and openness to input. Stewardship also implies managing, as much as possible, for the good of all interests with a view to the long-range consequences of decisions. Stewardship has been particularly applied to the management of natural resources and the environment and so is particularly applicable to organizations, like the Corps, with responsibilities in those areas. Finally, stewardship calls on organizations to put service ahead of self-interest. The concept of stewardship of resources within the scope of activities of the Corps and within the geographic boundaries of the District is an important concept that will be further explored in later chapters of this volume.

SHORT BIBLIOGRAPHY ON STEWARDSHIP

Books and Reports on stewardship as applied to public organizations.

Peter Block. *Stewardship: Putting Service Ahead of Self-Interest*. San Francisco: Berrett-Koehler Publishers, 1993.

Michael Katakis (ed.). *Sacred Trusts: Essays on Stewardship and Responsibility*. San Francisco: Mercury House, 1993.

United States General Accounting Office. *The Public Service: Issues Affecting Its Quality, Effectiveness, Integrity, and Stewardship: Report to the President of the United States, the President of The Senate, and the Speaker of the House of Representatives*. Washington, DC: The Office, 1989.

Major Themes in District History, 1981-2000

Several major themes run though the history of the Walla Walla District during the 1981-2000 period.

Streamlining the Organization

Previous histories of the District do not explicitly cover organizational structure. The current volume, particularly in chapter 2, covers significant trends and changes in District organization and explains how these changes relate to developments within the District, the region, and the nation. During this period, the District workforce was reduced from 793 in 1980 to 627 in 2000. The number of major organizational units within the District has remained steady at approximately fifteen. However, a more detailed examination of the organization shows that reorganizations have reduced levels in the District hierarchy, producing, an overall "flatter" organization—one that is better able to respond to opportunities and problems as they arise.

Privatization of District Activities

In 1983, the Office of Management and Budget issued *Circular No. A-76* (17). This officially established an important policy regarding the performance of commercial activities by federal agencies. This policy is often referred to as privatization or outsourcing of government activities.

Walla Walla District, along with all federal agencies, was required to examine carefully whether its activities could better be accomplished by contracting with private firms. Cost-benefit analyses were performed and revealed that some activities should be contracted, while others should continue to be performed by District staff. The Corps had a long tradition of contracting. Also, the Corps, following the trend toward privatization and its own tradition of contracting for construction work, sometimes decided to contract for the performance of other nongovernment work even without a formal commercial activities study.

Walla Walla District privatized activities such as physical maintenance of recreation areas, janitorial services, printing and duplicating, audiovisual production, mailing services, computer desktop support, and technical editing of reports and other documents. Functions examined under formal "commercial activities studies," but not privatized were: computer network design and motor pool activities.

The trend toward privatization is discussed more fully as part of the District's organizational history in chapter 2. As a step toward privatizing, as reflected in chapter 3, the District purchased specific "off-the-shelf" products and systems from vendors. Chapter 4, 10, and 11 give specifics of how the trend toward privatization affected District civil works, cultural resources activities, and recreation projects.

Integration of Modern Information Management Technology

Reflecting monumental changes throughout the world, one of the most significant elements in the history of the Walla Walla District since 1981 was the integration of information management technologies into almost every activity. From building security to mapping, from operation of hydropower systems to property inventory, from initial engineering design to preparing final reports, from internal communication via Intranet

and electronic mail to external communications via electronic messaging and the publicly accessible District Internet—every aspect of the District's work was transformed by developing information technologies.

The story of the integration of information management technologies will be told in every chapter in this update because it affected every District unit, project, study, and operation. Chapter 3 outlines IT in detail.

Diminution of Military Works Projects

From its inception in 1948, Walla Walla District never had a heavy component of military works, but the decade 1951-1961 saw significant activity for the District in the realm of airbase construction. In 1961, Walla Walla District ended most of its involvement in the Corps Military Works program. At that time, Seattle District took over all military construction in the region. As recounted in chapter 4, Walla Walla District did do some military work during the 1981-2000 period, specifically for the Umatilla Army Depot and in the demolition of the District's own former headquarters.

Completion of Multipurpose Civil Works Projects

With the completion of Dworshak Dam in 1973 and Lower Granite Lock and Dam in 1975, the District's involvement diminished greatly in major new civil works construction projects. The civil work projects undertaken by the District were primarily for flood control and environmental restoration. This change from new construction to maintenance, operation, and mitigation of the environmental impacts of engineering projects required a significant refocusing of the District organization. Chapters 4 and 11 emphasize the operational mode of the District's large multipurpose projects, while chapters 7 and 8 address mitigation efforts related to these projects.

Flood Control, Disaster Response, and Disaster Preparedness

The public expects the Corps to be ready in an emergency, especially in a flood. During the period spanned by this historical update, the District continued to devote significant efforts to the tasks of preparedness and response to natural disasters and other emergencies. Meanwhile, plans and preparations for man-made disasters, as well as natural disasters continued to be upgraded and coordinated with other agencies.

From the flooding of the Boise River in 1982 and 1983 through the major regional floods of 1996, the District responded to numerous water-related disasters. In the last decades of the twentieth century as before, when the river rises, everyone knew that Corps staff would be there to help. Over and above actually fighting floods, the Corps worked with floodplain management and flood control—avoiding and preventing floods, rather than fighting them.

One Walla Walla District staff member aptly summarized the importance of flood protection in the public's perception of the Corps: "What the public wants is a sense of trust and a sense of safety derived from the fact that they believe someone is taking care of flood issues. Someone is paying attention to how much snow is up there. Someone is making sure that their community understands that they are in danger. So that, when they send their kids off to school that day, they are not afraid to have

them cross that river, because there is someone who cares and who is predicting the safety of them and their children and their house (18)."

Environmental Restoration and Stewardship of Natural Resources

One of the most significant developments in the history of the Walla Walla District in the past twenty years has been the increased emphasis on the Corps' vital role in the stewardship of natural resources.

Toward the end of the twentieth century, a significant change came about within the Northwest regarding natural resources. Natural resources were no longer viewed as being unlimited and plentiful. Water, for example, was seen as a precious commodity. Water was the habitat of fish and other aquatic species, irrigation for crops, a navigation way for shippers, a playground for boaters and recreational fishers, a vital resource that sustained commercial fisheries, a necessity of life for growing communities, a vital part of industrial processes, and the driving force that spun turbines generating abundant electricity. But not all of these uses were compatible. It was in this climate of conflicting water uses that the Walla Walla District operated.

Meanwhile, American society changed so that greater emphasis was placed on conservation and restoration of the environment. "The environmental movement" became a force to be reckoned with, as reflected in legislation and government policy. Clean air, clean water, and preservation of habitat for wildlife became national policy goals.

When the Corps of Engineers announced its Environmental Operating Principles in 2002, it was the result of several decades of increasing emphasis on environmental sustainability, a recognition that: "An environment maintained in a healthy, diverse, and sustainable condition is necessary to support life (19);" and that the organization should, "Proactively consider environmental consequences of Corps programs and act accordingly in all appropriate circumstance (20)."

During the period covered by this volume, Walla Walla District participated in projects for improvement of the environment, such as cleanup of the Umatilla Army Depot (chapter 4) and restoration of areas on the Hanford Nuclear Reservation (chapter 9). The District also implemented its own environmental compliance program (chapter 9) and studied the proposed and existing projects by producing formal environmental impact statements and environmental assessments (chapter 7).

Under Congressional authorities issued during this period and as discussed in chapter 7, the District studied and implemented projects to correct environmental damage caused by some of its existing projects and other projects to improve aquatic habitat. Mitigation for loss of wildlife was also a big part of the history of the District, especially salmon recovery efforts (see below) and work funded under the Lower Snake River Fish and Wildlife Compensation Plan (chapter 8).

Meanwhile, the Corps continued to protect the waters of the United States under its Regulatory Program, as discussed in chapter 9. During this period, Walla Walla District saw a change of jurisdiction in which it came to have regulatory responsibilities for the entire state of Idaho, relinquishing regulation in other states.

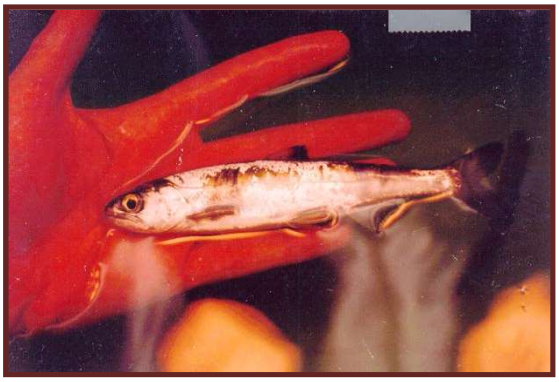
Under a process that one Walla Walla District staff member called “the greening of the District (21)” the composition of District staff changed to include a larger percentage of biologists and environmental resource specialists as compared to engineers. Furthermore, the attitudes of many District staff members, whatever their disciplines, came to reflect greater care for the environment.

Fish Recovery and Protection

During the latter part of the twentieth century, the status of resident fish populations became a significant concern for the Corps in the Northwest, including in the Walla Walla District. The last dam on the lower Snake River, Lower Granite Lock and Dam, became operational in 1975. Observers pointed to the dams as a barrier to the migrations of anadromous fish (primarily salmon) on their journey to and from the Pacific Ocean.

In 1980, Congress passed the Northwest Power Act (22) that brought fish and other wildlife concerns to the fore in the operation of the Federal Columbia River Power System, which includes the District’s major power-generating dams. The Endangered Species Act (23), passed by Congress in 1973, began to significantly affect operation of the power system and Walla Walla District activities in the 1990s when regional populations of salmon and bull trout were listed as threatened or endangered.

Salmon Smolt Examined



By law, regulation, Corps policy, and national policy, Walla Walla District became a major participant in the efforts to recover and preserve anadromous fish populations that traveled streams and encountered Corps-operated dams on their journey. During the 1980s, the juvenile fish transportation system, which in the 1970s was perceived as a temporary measure, became a permanent and prominent activity for the District. Meanwhile, sophisticated and innovative bypass systems and new turbine designs were invented for fish transportation around and through the barriers of the dams. The District participated in many research efforts related to the study of fish behavior and fish passage.

The history of the District’s participation in salmon recovery, “the nation’s largest effort to rebuild a biological resource (24)” is recounted in chapter 8 of this volume.

Stewardship of Cultural Resources

An important theme during the period covered by this volume was the Corps’ increasing awareness of the importance of stewardship of cultural resources. In carrying out this trust responsibility for land management, the District found itself contending with “colliding world views” that often intersect at the center of cultural resources in relation to land use. On the one hand, there is a scientific worldview that tends to seek investigation of cultural artifacts and that seeks to utilize land to promote social goals related to water resources development. On the other hand, there is a sacred

worldview that reveres landscapes and artifacts, particularly human remains, and seeks often to preserve them from disturbance. Increasingly during the last part of the twentieth century, Walla Walla District, in all of its activities, acknowledged and engaged these contrasting viewpoints.

The discovery of The Ancient One, also called Kennewick Man, on District lands in the Tri-Cities, Washington, was a monumental discovery. This discovery illustrates the importance of cultural resources for the District and the contrasting worldviews that affect the disposition of cultural resources. For a time, certainly, this one accidental discovery consumed a significant portion of the District's energies and brought the Walla Walla District notoriety in the cultural resources arena.

In other ways, however, the discovery and disposition of Kennewick Man was not typical. Much more typical was the continuing process of the District considering preservation of cultural resources in every one of its projects. More common, also, was the Districts growing efforts to cooperate with other agencies and, especially, with Indian nations to preserve cultural resources. Chapter 10 recounts cultural resource activities.

Stewardship of Recreational Resources

Another theme that was important for the District during this period was the stewardship of recreational resources, a story that is told primarily in chapter 11. At the end of the twentieth century and across the nation, the Corps was the largest single provider of outdoor recreational resources to the public. In administering the lands around its water resources projects, Walla Walla District provided the region with some of its most important parks, boating areas, fishing, and hunting sites.

During this period, the federal government, including the Corps, took steps to divest itself of land. Where appropriate, the District looked at turning over land to the ownership of agencies like the U.S. Fish and Wildlife Service or to entities such as the governments in the area of Tri-Cities, Washington. When actual ownership of land was not transferred from the Corps, the District worked to sublease recreational areas to agencies such as the Idaho Department of Parks and Recreation.

Meanwhile, the formalization of the role and the training of Corps park rangers increased during the 1981-2000 period. District efforts to provide interpretive services explaining Corps functions to the public increased while programs aiming to increase visitor safety were also given greater emphasis. Walla Walla District took on a special role in the national visitor safety efforts, becoming headquarters for the very active Corps National Water Safety Program.

Partnering

Partnering and cooperation was the final outstanding theme that runs through the history of the Walla Walla District during the final years of the twentieth century. The Corps and the District worked within a complex web of relationships. In deciding which projects to study, in determining how to operate existing projects, in obtaining funding, in meeting laws and regulations, in actual implementation—in almost every aspect of its work, the District consulted, coordinated, and cooperated to get the job done.

Increasingly during the period covered by this volume, the Corps sought public input as part of its decision-making process. Informal consultations, public meetings, and opportunities to submit written comments all became part of the study process for issues addressed and for reports being prepared by the District.

As discussed in chapter 2, new, more stringent, cost-sharing guidelines initiated by the Water Resources Development Act of 1986 (25) ensured that the District would work closely with local sponsors. Cost sharing establishes the fact that a project has strong local support—strong enough so that a nonfederal sponsor would contribute fifty to thirty-five percent of the costs of project feasibility studies, engineering, and design efforts.

Within the District, partnering to get the job done using cooperation and teamwork became the hallmark of the last decades of the twentieth century. Staff and management pursued the goal of developing a learning organization.

Reflections of Many Waters

The geographic area of Walla Walla District is truly a place of many waters. It is also a place of many people joined by the streams that flow through it. This history includes the reflections of those people and how they have changed and preserved this place of many waters. Particularly, this history reflects the web of relationships and the rule of law and national policy within which the Walla Walla District of the Corps of Engineers acted to change and preserve these many waters.

Note about style: This history was written following *The Chicago Manual of Style*, 14th edition (26). *The Chicago Manual* includes some guidelines that differ from the *GPO Style Manual (*27), which is normally used in the production of technical Corps of Engineers documents. When not contradicting *The Chicago Manual*, the *GPO Style Manual* was used as a guide to compound words.

Another feature affecting the style of this history is the extensive use of content from oral interviews with Walla Walla District staff members. This material is included to provide a flavorful sampling of the opinions, experiences, and personality of the District staff members who actually lived this history.

Note about photos: Unless otherwise noted, all photographs are from Walla Walla District photo collections.

Notes for Chapter 1

1. Walla Walla District. *History of the Walla Walla District: an Overview*, [1999]. INTERNET: http://www.nww.usace.army.mil/html/welcome/npwhist.htm.
2. USACE, Office of History. Welcome to the Headquarters, U.S. Army Corps of Engineers, Office of History. Washington, D.C.: The Office, 2000. INTERNET: http://www.hq.usace.army.mil/history/index.htm
3. USACE. *Historical Activities - Field Operating Activities Historical Programs*. Engineer Regulation 870-1-1. Washington, D.C.: USACE, 1990.
4. Ibid.
5. Ibid.
6. Ibid.
7. Quoted in: Bartlett, John. *Familiar Quotations*. 10th ed. 1919, number 7251. Online at Barleby.com. INTERNET: http://www.bartleby.com/100/.
8. Walla Walla District. *A History of the Walla Walla District, 1948-1970*. Walla Walla: NPW, [1971].
9. Walla Walla District. *Walla Walla District History, Part II, 1970-1975*. Walla Walla: NPW, [1976].
10. Walla Walla District. *Walla Walla District History, Part III, 1975-1980.* Walla Walla: NPW, 1980.
11. Stacy, Susan M. *When the River Rises: Flood Control on the Boise River 1943-1985.* Program on Environment and Behavior Special Publication, no. 27. Boulder: Institute of Behavior Science, Natural Hazards Research and Applications Information Center, University of Colorado; Boise: College of Social Sciences and Public Affairs, Boise State University, 1993.
12. Peterson, Keith C., and Mary E. Reed. *Controversy, Conflict and Compromise: A History of the Lower Snake River Development*. Walla Walla: NPW, 1994.
13. Mighetto, Lisa, and Wesley J. Ebel. *Saving the Salmon: A History of the U.S Army Corps of Engineers' Efforts to Protect Anadromous Fish on the Columbia and Snake Rivers.* Seattle: Historical Research Associates, prepared for the Corps, Portland and Walla Walla Districts, 1994.
14. This same vision was enunciated many times during the 1981-2000 period. This particular formulation is from: USACE. *Strategic Vision*. Washington, D.C.: USACE, [1997].
15. Walla Walla District. *District Management Model*. Walla Walla: NPW, 1992.
16. Walla Walla District. *NWW Direction 2000*. Walla Walla: NWW, 2000.
17. U.S. Office of Management and Budget. *Circular A-76.* Washington, D.C.: The Office, 1983 (revised 1999).
18. Pomraning, Allen N. Interview. Walla Walla: NWW, 24 January 2002.
19. USACE. Environmental Operating Principles. Washington, D.C: USACE, 2002. INTERNET: http://www.hq.usace.army.mil/cepa/envprinciples.htm.
20. Ibid.
21. Shelin, Sandra L. Interview. Walla Walla, NWW, 14 September 2001.
22 Public Law (PL) 96-501.
23. PL 93-205.
24. Truelove, Tom. Rebuilding fish runs a goal of 90s. *Tri-City Herald*, 10 March 1990, E8.
25. PL 99-662.
26. *The Chicago Manual of Style*. 14th ed. Chicago: University of Chicago Press, 1993.
27. U.S. Government Printing Office. *Style Manual.* Washington, D.C.: The Office, 2000.

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Chapter 2. District Organization and Organizational Culture

Introduction

The first part of this chapter outlines how Walla Walla District was organized at the end of 2000 with reference to major significant organizational changes that took place during the period covered by this volume. The latter half of this chapter covers the organizational culture and some of the management initiatives that affected the entire District throughout the 1981-2000 period.

At the end of 2000, the U.S. Army Corps of Engineers, Walla Walla District, was a full service, civil works engineering organization, responsible to the Northwestern Division of the Corps for execution of assigned programs. The District was one of forty-two geographically or functionally defined units within the Corps. Walla Walla, Portland, Seattle, Omaha, and Kansas City Districts comprised the Northwestern Division of the Corps (see map, page 15). Stretching from Missouri to Washington State and from Oregon to North Dakota, the Northwestern Division was geographically the largest division in the Corps.

The District was commanded by a Corps officer, assisted by his civilian and military deputies and, during the 1990s, a workforce made up of approximately 650 engineers, scientists, technicians, as well as special and administrative support staff. About three hundred of these civilians worked at the District Headquarters office in Walla Walla, Washington. The rest of the staff worked at area and project offices throughout the District.

In 1998, Walla Walla District celebrated its fiftieth anniversary with a gala luncheon and open house attended by current, former, and retired District staff members along with political, community, media, tribal representatives, and government agency leaders.

Scope of Activities

Included in Walla Walla District's mission were: planning, engineering, and constructing water resources projects; real estate administration; regulatory functions; operation and maintenance of projects for navigation, flood control, hydropower generation, recreation, and natural resources stewardship; environmental restoration projects and studies; and vital administrative activities.

The District provided a full range of civil engineering functions to customers.
The District was organized to accept the challenges of any additional programs in times of war, peace, natural disaster, or national emergency. As the Corps interacted with the region, the District made every effort to be a careful, efficient, and environmentally conscientious planner, builder, and maintainer of projects related to water resources.

As of 2000, Walla Walla District was the second largest hydropower producer in the Corps, with a total generating capacity of 4,413 megawatts from the Federal Columbia River Power System. The District maintained the federal navigation channel from

McNary Lock and Dam on the Columbia River, through the four lower Snake River projects, providing a navigable waterway four hundred miles inland to Lewiston, Idaho.

Dworshak Dam is a District flood control and storage reservoir on the North Fork of the Clearwater River. Walla Walla District operated two other flood control facilities, Lucky Peak Dam, near Boise, Idaho, and Mill Creek Dam near Walla Walla, Washington. Levees on the Snake and Gros Ventre Rivers in Jackson Hole, Wyoming, safeguard the river valleys. Protecting lives and property from flooding is a key mission for the District.

District disaster-related activities included emergency preparedness and flood fighting assistance to local governments within the District's boundaries.

Walla Walla District was responsible for regulatory functions governing activities affecting waters and wetlands in Idaho.

District staff members are also responsible for managing wildlife habitat management areas and recreation facilities at sites throughout the District's geographic area of responsibility.

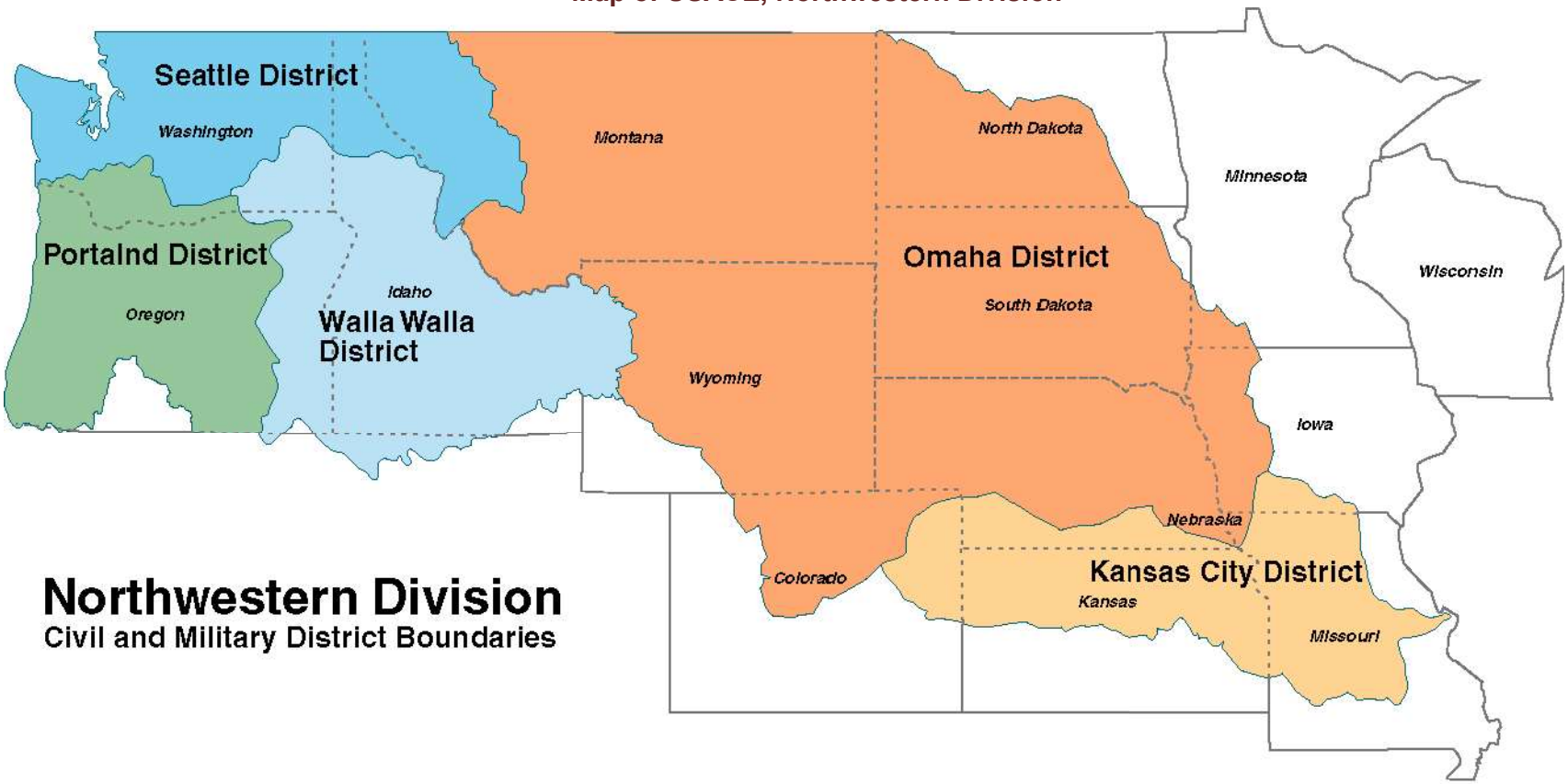
Location

Walla Walla District's civil works boundaries generally follow the Snake River drainage. The District includes approximately 107,000 square miles in six states. Walla Walla District includes a small portion of the reach of the Columbia River from the Snake River to the John Day Lock and Dam. The District's territory was primarily in the eastern part of Washington State, and in Idaho, with some areas in northeastern Oregon, extreme northern Nevada, and northeastern Utah included to follow the Snake River watershed. The map shows the District as it was at the end of year 2000.

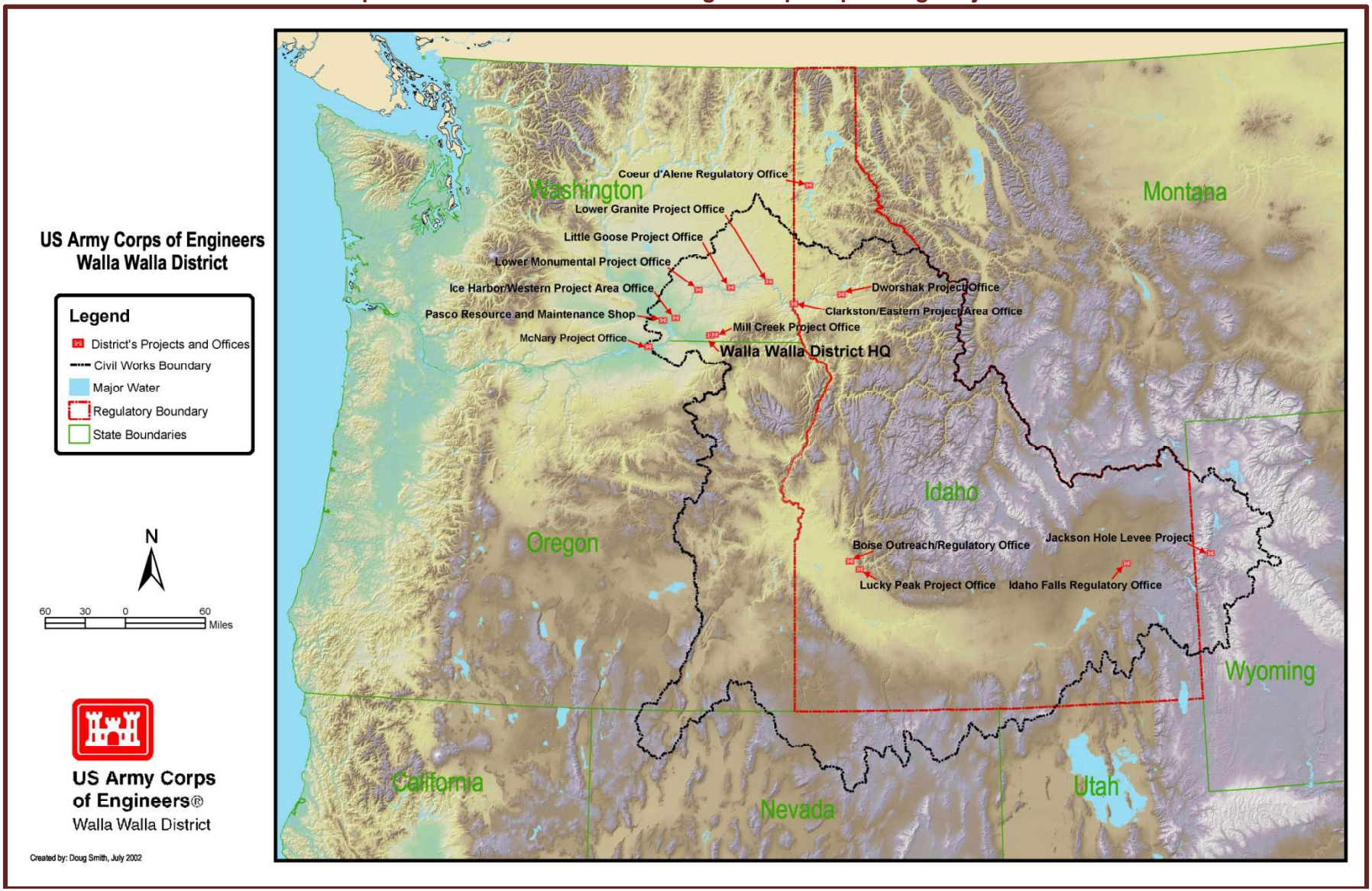
The Walla Walla District Headquarters building is located in downtown Walla Walla, Washington. Small District offices were found at operating project sites around the District, for example at Lucky Peak project in Idaho, Lower Granite Lock and Dam in Washington, and Dworshak project in Idaho. The District maintained an office in Clarkston, Washington, where field projects in the eastern part of the District are administered. Western field projects were managed from an office in Pasco, Washington. Boise, Idaho, and the surrounding area in Ada County formed the largest population center in the District. The Corps provided a local presence in this area by means of the Boise Outreach Office. There were also Corps Regulatory Offices in Boise, Coeur d'Alene, and Idaho Falls, Idaho.

During the early part of the period covered by this volume, the Construction Division maintained the Lower Snake River Resident Office at Lower Monumental Lock and Dam in Washington and, until the late 1990s, the Bunker Hill Resident Office, in Idaho. The Chief of the District's Construction Division commented: "We don't have any resident or area offices, and that makes us unique in the Corps (1)."

Map of USACE, Northwestern Division



Map of Walla Walla District Showing Principle Operating Projects



Funding and Budgets

In 1983, for the first time, Walla Walla District's operations and maintenance budget was larger than its construction budget (2). This signalized the end of a large construction era for the District.

As detailed in the appendix, table A-1, the District went from expending nearly $60 million in fiscal year 1980 to just over $113 million in fiscal year 2000. However, given inflation, this represents an absolute decrease in resources.

The requirements of the Water Resources Development Act of 1986 (3), affected the Walla Walla District, as it did every district in the Corps. The Act called for more stringent cost-sharing agreements with local sponsors required to fund up to fifty percent of the cost of some types of civil works projects. Many projects that local entities had requested of Walla Walla District were no longer desirable under the new terms of funding.

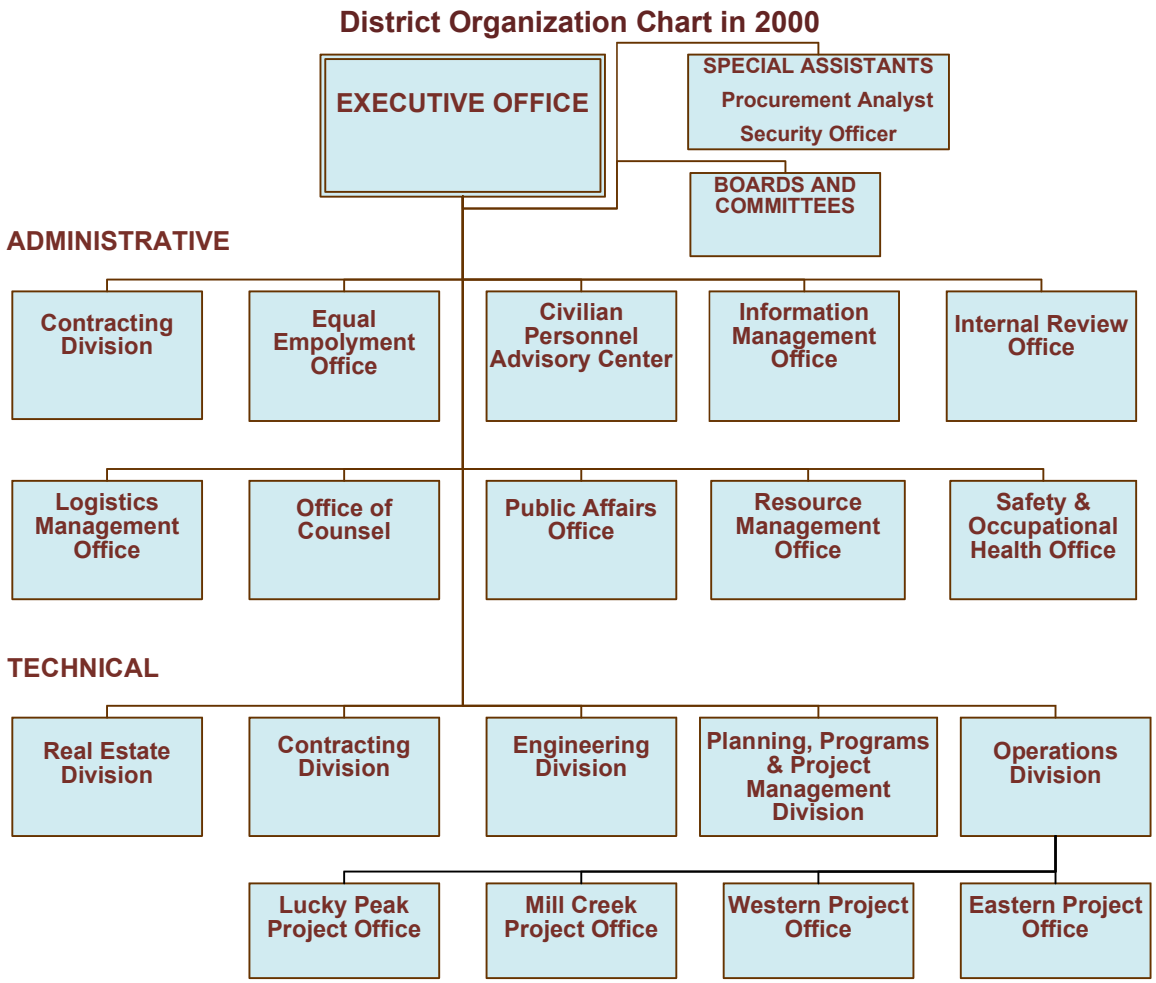
Walla Walla District, as Portland District, was dramatically affected by changes in the Bonneville Power Administration funding pertaining to the Federal Columbia River Power System projects. These were the hydropower projects along the Columbia River and its tributaries. In the Walla Walla District, this included McNary, Ice Harbor, Lower Monumental, Little Goose, and Lower Granite Locks and Dams. The beginning of Congressional authorization for direct funding goes back at least to Section 2406 of the 1992 Energy Policy Act (4), but actual funding was only realized later.

In late 1997, BPA and the Corps signed a Memorandum of Agreement under which the hydropower projects would be funded directly from the revenues they generated. The Memorandum of Agreement was to cover the ten years after 1998 (5). Previously, the BPA had returned all revenues from generating electricity to the U.S. Treasury. Prior to the change, hydropower project maintenance and improvements had been funded from the congressionally approved budget of the Corps. In addition to money for operations and maintenance, some direct funding via BPA was provided to support cultural resources activities.

The Corps actually began receiving direct funding in fiscal year 1999. This was a dramatic change for the projects managed by the Walla Walla District. As one Operations Division manager explained: "At Lower Monumental, it's 99.2 percent that BPA pays for [for example] … [Walla Walla District] got $16 million this year, probably eight or nine next year, ten or twelve, thirteen maybe, the year before. Those are numbers that are way beyond what we would have had under appropriations normally, and we need it now, because the infrastructure is wearing out (6)."

District Organization

At the end of 2000, Walla Walla District was organized into sixteen major units, including six divisions, nine offices, and one center. This chapter describes each major unit and discusses the unit's functions within the District as well as touching upon the evolution of the unit over the last twenty years.



A key concept and primary focus during the period 1981-2000 in Walla Walla District was the idea of a project. A project was conceived of as an activity or facility centered on an organizing element, often a structure or a task. A Corps project involved an administrative component, often designated as a project manager, who managed staff with diverse areas of expertise. The organizational structure of the District sometimes reflected projects; at other times, staff members from various units in the organization were assigned to work on a project.

This project focus included operating and maintaining already constructed water resources-related structures and facilities, often referred to as field projects, civil works projects, or, collectively, as “the projects.” The field projects included large multipurpose facilities such as McNary Lock and Dam, which provided hydropower, navigation, irrigation, recreation, and water level control. Other field projects were smaller and more limited in primary purpose. An example of a smaller project was the Lyman Creek project, near Rexburg, Idaho, which was operated chiefly for flood control purposes. The history of these civil works projects is more fully discussed in chapter 4. However, the organization of a large portion of the District was related to the larger physical, structural, and water resources projects.

Other activities in the Corps during the period covered by this volume were also conceived on a project basis, with project managers assigned. These activities included

building new structures such as the Zintel Canyon Dam near Richland, Washington, or study projects, such as completion of the Jackson Hole, Wyoming, Environmental Restoration Feasibility Study. Staff required for construction, planning, and study projects were drawn from various organizational units within the District.

Executive Office

The Executive Office was the managing unit of Walla Walla District (see organization chart on page 18). The District Commander, an officer in the U.S. Army, headed the Executive Office. The Deputy Commander, an Army Officer, assisted the Commander in directing, supervising, and managing the office and field activities of the District. The Deputy Commander provided coordination of the technical staff. The Commander was also referred to as the District Engineer, and the Deputy Commander as the Deputy District Engineer. During the 1981-2000 period, Commanders generally remained in the District for three years and Deputy Commanders for two years.

The Deputy District Engineer for Project Management was part of the Executive Office. This Deputy provided leadership for scheduling, budgeting, and executing projects. As the chief civil service position in the District, the Deputy fostered institutional continuity for projects beyond the tenure of District Commanders, throughout technical divisions, and with independent project managers. This manager was the primary point of contact for Congressional-District communications.

The Security and Law Enforcement Officer acted as special assistant to the Commander for security and law enforcement issues in the District. Until the mid-1990s, the security function was part of the Safety and Security office. Another special assistant, the Small and Disadvantaged Business Utilization Program Manager, administered federal programs that assisted qualified small businesses in obtaining contracts for District work. In the 1980s, Walla Walla District had an Environmental Resources Policy Assistant who advised the Commander on fish and wildlife and environmental laws, regulations, and policies.

Boards and Committees

Walla Walla District had a number of boards and committees to address cross-functional issues. Table 1, below, shows District Boards and Committees and their functions as they were in 2000.

Table 1 DISTRICT BOARDS AND COMMITTEES	
Program and Budget Advisory Committee	Reviewed and approved operating budgets and staffing requirements for District organizations.
Project Review Board	Reviewed and approved project management plans; evaluated project management performance; identified trends in projects.
HUMAN RESOURCES COMMITTEES	
Special Emphasis Program Committee	Assisted managers in identifying areas of concerns and/or problems and recommended solutions regarding Equal Employment Opportunity and the District's Special Emphasis Program.
Incentive Awards Committee	Assessed nominations for competitive and honorary awards. Monitored distribution of cash awards to ensure equality throughout the District. Assisted the Personnel Advisor in planning program activities, determining special emphasis, implementing and improving new techniques, and making recommendations to the Commander for special awards.
Safety and Occupational Health Committee	Addressed issues relating to safety policies, laws, and regulations, considering changes to District safety policy and procedures.
Water Safety Committee	Consolidated the District public water safety promotional effort for prevention of water-related accidents and fatalities.
Training Committee	Assisted in planning, coordinating, and evaluating the District training matters. Recommended the number and types of trainees to be recruited for training programs.
Hydroelectric Training Program Oversight Committee	Provided oversight to the training program content, reviewed hydroelectric powerplant personnel trainee performance and progress.
Association of Corps Employees	Managed the Association of Corps Employees' fund. Provided support for approved recreational, welfare, and service activities for District staff.
INFORMATION MANAGEMENT COMMITTEES.	
Information Management Coordination Committee	Formulated recommendations and procedures associated with the Information Technology Strategic Plan and Budget for the District.
Automation Security Committee	Formulated recommendations and procedures associated with the security of personal computers, automated systems, and the District network.
Geospatial Data and Systems Technical Committee	Managed the relationships between the user and support organizations and to establish responsibilities during the development of the District's Geographic Information System.
ENVIRONMENTAL COMMITTEE	
Environmental Compliance Steering Committee	Defined the District environmental compliance goals, plans for implementation of policy, and developed and reviewed compliance procedures.

Table 1 (continued) DISTRICT BOARDS AND COMMITTEES	
ENGINEERING BOARDS AND COMMITTEES	
Dam Safety Committee	Ensured compliance with federal guidelines for dam safety in order to strengthen the District's Dam Safety Assurance Program.
Architect-Engineering Responsibility Review Board	Determined whether cost recovery proceedings were warranted when government costs are increased significantly because of an error or deficiency by an Architect-Engineering contractor.
Architect-Engineering Preselection Board	Prepared a list of qualified Architect-Engineering firms for professional services.
Architect-Engineering Selection Board	Reviewed the qualifications and performance data of Architect-Engineering firms on the preselection list. Recommended firms for contract negotiations.

Planning, Programs, and Project Management Division

The Planning, Programs, and Project Management Division maintained Walla Walla District's Civil Works Program of engineering studies, projects, and related activities within available funding, staffing, and other resources. Many of these studies are discussed in chapter 4 in the sections on civil works projects and studies, and in chapter 7 in the sections on environmental studies. Major studies were led by staff in the Planning, Programs, and Project Management Division. These included the Columbia River System Operation Review (7), the Dredged Materials Management Plan (8), and the *Lower Snake River Juvenile Salmon Migration Feasibility Report* (9).

The Chief of this Division also acted as the Deputy District Engineer for Project Management, senior civil servant for the District. The Chief was responsible for implementing the Corps project management business process (discussed under management initiatives on page 53, below). The division was accountable for meeting schedules, minimizing costs, staying within budget, maintaining quality, and ensuring coordination with the customer for all projects and programs within the District. The Chief also defined the roles and responsibilities of project managers.

During most of the period covered by this volume, the District's planning function was administered by a separate planning office or division. A Project Management Office was established in 1989. Programs and Project Management Offices were consolidated in 1990. Finally, in 1999, Programs and Projects Management was merged with Planning to form the Planning, Programs, and Project Management Division.

Planning, Programs, and Project Management Division Organization Chart in 2000

As of the year 2000, the Planning, Programs, and Project Management Division was organized into a number of branches, and these branches were organized into teams.

Programs and Project Management Branch—Project Management Team

The Walla Walla District Project Management Team was the team that integrated project schedules into a comprehensive District schedule and analyzed the District workload. This team also supervised project managers and rated their performance. The branch conducted studies and managed new projects via project managers.

District project managers provided overall leadership for study, planning, design, construction, initial operation, and evaluation of projects. Each project manager acted as the leader of a project team and the point of contact for the life of a project. When a project was undertaken, the project manager worked with a technical manager in the development of the project study plan. The project manager also served as the primary point of contact for external project partners and/or customers, documenting and managing commitments agreed upon with customers.

Programs and Project Management Branch—Programs Management Team

The Walla Walla District Programs Management Team provided technical advice to project managers and to other District units on future funding, schedules, and staffing. This team served as the point of contact with Northwestern Division and Corps Headquarters on civil works funding matters. The team was responsible for preparing the District's overall civil works budgetary submissions and presentations to the Northwestern Division Commander. The Programs Management Team was responsible for the analysis of pertinent laws and current year civil works funds and schedules for the Civil Works Program and for reimbursable work.

Planning Branch

The planning function in Walla Walla District was originally placed in a separate Planning Office that became the Planning Division in the mid-1980s. In 1987, the Planning Division included the Plan Formulation Branch, Project Planning Branch, Environmental Resources Branch, and the Hydrology Branch (including functions later transferred to Engineering Division) (10).

The Planning Branch coordinated with other divisions within the District; higher authority; other federal, state, and local agencies; the Northwest Power Planning Council, other regional interest groups, and elected officials on all phases of planning that are applicable to Walla Walla District. The branch was composed of the Environmental Compliance, Environmental Analysis, and Plan Formulation Sections.

Staff in Walla Walla District Planning Branch addressed the following issues and areas: customer outreach and business development policies and programs; comprehensive environmental compliance and policy; civil works and special studies plan formulation and policies; economic analyses; fish passage research and implementation; cultural resources and archeological support; wildlife habitat restoration and mitigation; hazardous, toxic, and radiological waste and National Environmental Policy Act (11) environmental compliance; and automated geographical information systems applications.

Staff in Planning "are actually in the trenches doing the studies. The Planning people are the environmental people that do the environmental compliance as well as the studies. They're the ones that determine whether or not a project is feasible (12)." Planning Branch staff headed major studies, such as those discussed in later chapters, related to dredging, new construction, and fish and wildlife mitigation. Staff in the Walla Walla Planning Branch included planning experts, environmental compliance specialists, economists, fisheries biologists, wildlife experts, and biologists with expertise in environmental restoration.

Boise Field Office

Walla Walla District calls the Boise Field Office, "Idaho's first door to the Corps (13)." The office, often called the Boise Outreach Office, held its open house in November 1999.

A District coordinator talked about the Boise Field Office:

> "The Boise Office … I've been involved with helping them get established down there, helping them with … a big open house. … They invited all the local government and Congressionals and all these people to our little open house last year. They had several hundred people show up. ... [We were saying] here we are, we're trying to work with you and help you out.
>
> "They are having to overcome a lot of biases too. … Regulatory, especially, has to be … the law. They have to be adamant about things, so a lot of these [Idaho] people have clashes with Regulatory, and that's their feeling—that's the Corps. … The Boise Office has come up with some pretty good projects (14)."

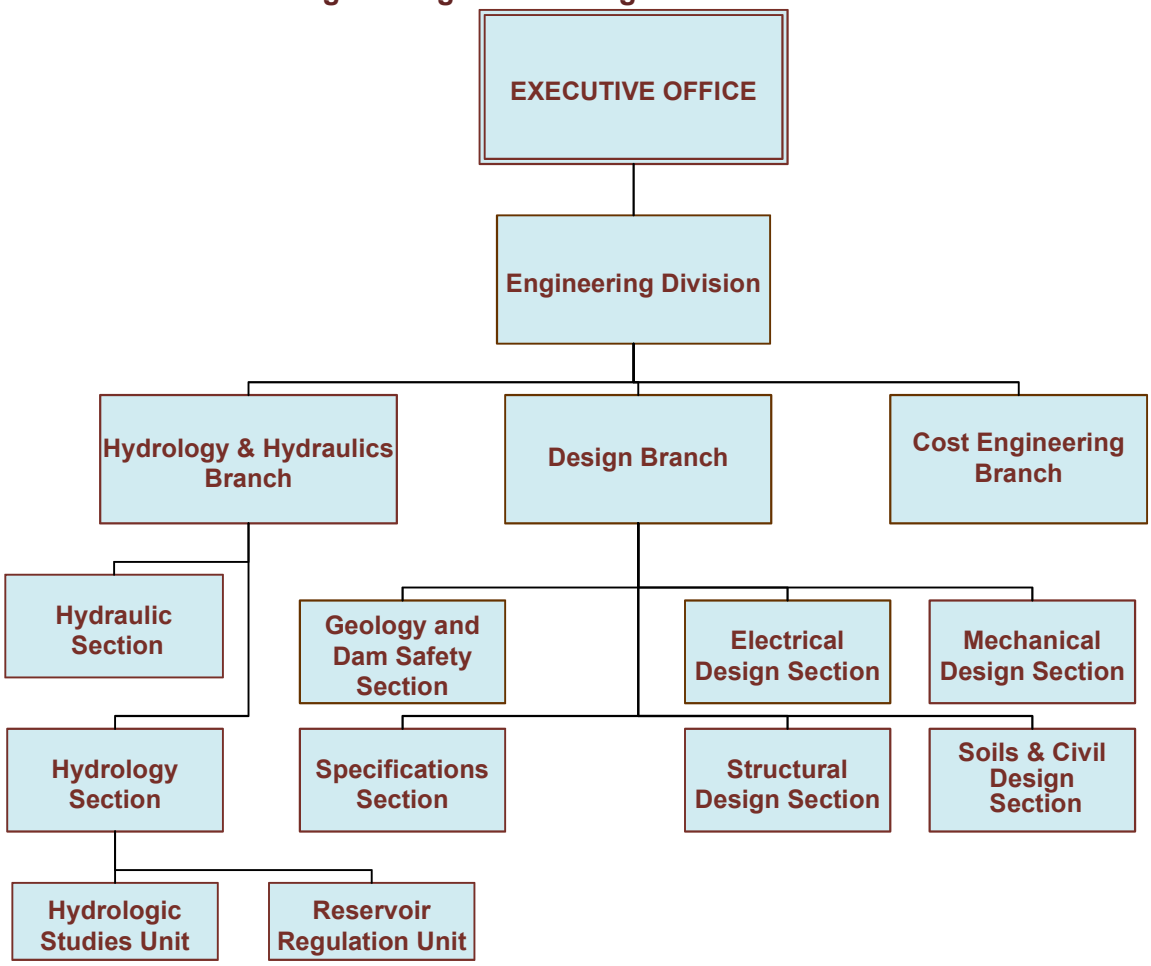
The Boise Field Office was looking at new projects with the Idaho Department of Parks and Recreation and with Idaho communities, such as Paradise Creek, Idaho. The office

was examining the possibility of projects in Boise and Pocatello, Idaho, to be funded under the National Brownfields Cleanup and Redevelopment Initiative (15) from the Environmental Protection Agency. A major initiative to cleanup abandoned mines in Idaho (discussed in chapter 9) came, in part, from contacts made by the Boise Field Office.

Engineering Division

At the end of 2000, the work of the Engineering Division included design and retrofitting of large multipurpose hydroelectric projects; navigation projects, multipurpose flood control projects, fish hatcheries, large bridges, fish and wildlife facilities, environmental restoration projects, maintenance work, and military design work. In its design work, the division placed heavy emphasis on environmental considerations. Additional work included study and design of toxic waste management and remediation facilities. The Engineering Division provided technical assistance and support for all aspects of projects assigned to project managers.

Engineering Division Organization Chart in 2000



The Engineering Division also implemented value engineering studies to ensure that systems and projects were designed at lowest overall cost consistent with requirements for reliable, high-quality products that are easily maintained.

In 1992, Walla Walla District made history by employing the first woman, Ms. Kristine Allaman, to head any Engineering Division within the Corps (16). Ms. Allaman left the District in 1995 after being promoted to a Senior Executive Service position within the Corps (17).

There were many changes in organizational structure in Engineering Division during the 1981 through 2000 period.

In 1980, Engineering Division consisted of four branches: Planning, Design, Foundations and Materials, and Service. Later, until the early 1990s, Engineering Division had a separate Geotechnical Branch that included a Materials Dam Safety Section and a Soils and Civil Design Section—functions that were later incorporated into the Design Branch as described below. From approximately 1990 to 1995, when Walla Walla District was heavily involved in projects at the Hanford Nuclear Reservation, Engineering Division had a special Environmental Engineering Branch largely devoted to these projects (see chapter 9).

Cost Engineering Branch

The Cost Engineering Branch supported all District units in evaluating project costs from initial planning through final design and contract awards. This branch was responsible for District construction estimates, including estimates for Architect-Engineer contracts. The Cost Engineering Branch developed estimates for supply and service contracts over $25,000 to determine fair and reasonable value for equipment, supplies, and services specified.

Corps Headquarters recognized Walla Walla District Cost Engineering Branch as the support center for the entire Corps for construction equipment costs. The District was known for expertise in estimating functions and as being leaders in innovation of the Microcomputer-Aided Estimating System that is used Corps-wide. The Cost Engineering Branch produced and maintained the twelve-volume Engineer Pamphlet, 1110-1-8, *Construction Equipment Ownership and Operating Expense Schedule* (18). The entire Corps, the Department of Defense, and other federal and state agencies use this publication. The branch developed a software program, CHECKRATE, to estimate hourly equipment rates. The branch also produced the Engineer Manual, *Civil Works Construction Cost Index System* (19). This index provided inflation factors to be used for various construction features as well as a composite of civil works construction costs indexed by state. The Cost Engineering Branch was also recognized Corps-wide as the estimating experts for computer-assisted dredge estimating.

Design Branch

This branch collected data, performed analyses, completed designs, and prepared plans and specifications for all contracts. In this branch, contract plans and specifications, studies, reports, design memorandums, shop drawings, and as-built drawings were reviewed.

The Design Branch coordinated technical design of projects through the design phase. Staff in this branch made recommendations about design and contract work to appropriate units and supervised construction reviews. Staff were responsible for

assigned projects' design memorandums, memorandums of understanding, and Architect-Engineer contracts.

The Design Branch included the Electrical Design Section, Geology and Dam Safety Section, Mechanical Design Section, Soils and Civil Design Section, Specifications Section, and Structural Design Section. Until the widespread use of computer-aided drafting and design in the mid-1990s, the District maintained a Drafting Section within the branch.

The Geology and Dam Safety Section was responsible for the District Dam Safety Program. For the program, the section performed inspections, prepared formal periodic inspection reports for all projects, and prepared Emergency Action Plans.

Hydrology and Hydraulics Branch

The Hydrology and Hydraulics Branch was responsible for developing, monitoring, and reviewing hydraulic, hydrologic, and water quality work for Walla Walla District. The branch coordinated fish passage design for all projects. The Chief of this section represented the Engineering Division in negotiations with federal and state fishery agencies regarding the design of fish passage facilities.

The Hydrology Section conducted investigations and prepared reports related to climate, streamflow, floods, floodplains, dam breaks, sedimentation, ice, evaporation, wind waves, snow hydrology, and water supply. The section also provided floodplain analysis, including flood hazard studies and floodplain technical service studies to federal, state, and local agencies. Staff in this unit prepared flood insurance studies for the Federal Emergency Management Agency. The Reservoir Regulation Unit within Hydrology Section monitored critical weather and streamflow conditions affecting public and the District activities, issuing flood reports on flood emergencies. The unit managed the District's participation in hydrologic data programs, including U.S. Geological Survey, Cooperative Stream Gaging Program, National Weather Service Data Program, and the Natural Resources Conservation Service snow measuring program.

Staff in the Hydraulic Section performed hydraulic analyses and designs for construction and supply contracts, reviewing the hydraulic design portion of plans and specifications prepared by the District. The section developed the conceptual designs for fish passage facilities.

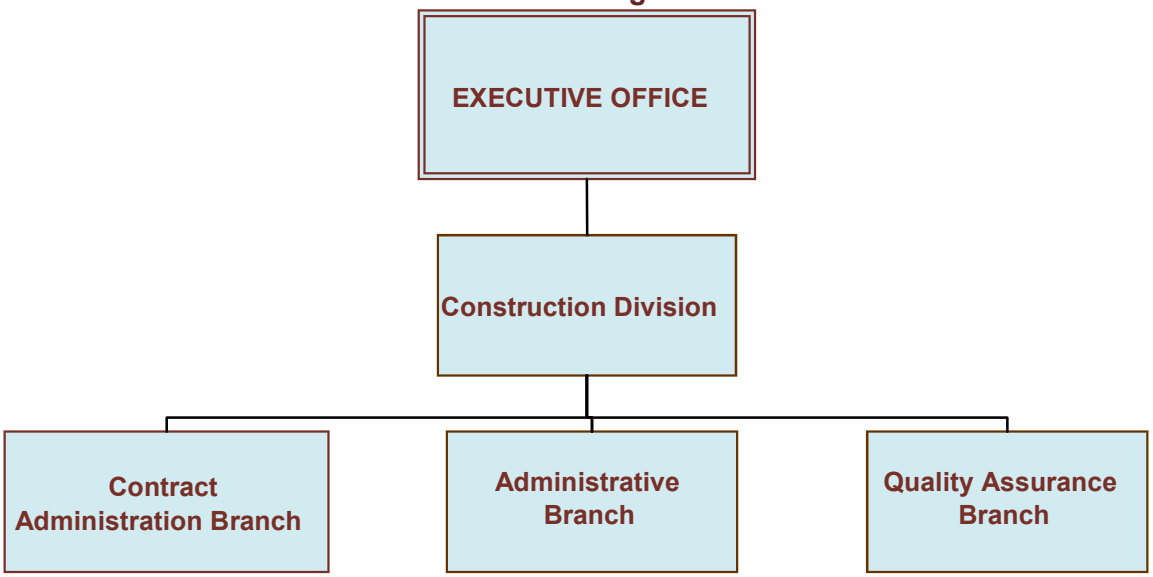
Construction Division

Walla Walla District Construction Division coordinated District construction activities, including scheduling and gathering data, to ensure that contracted construction activities conform to statutory and regulatory requirements as well as providing cost-effective, quality structures. The Construction Division was formed in 1987 with staff reassigned from Operations, Construction, and Readiness Division, and from the Snake River Area Office, which was located in Clarkston, Washington (20).

The Chief, Construction Division, describes his unit at the District:

> "Every project we assign a contract manager and a project engineer. The project engineer is primarily responsible for what goes on in the field on that project—the quality assurance, the safety, the coordination with the dam. The contract manager is responsible for technical review of contractor submittals to make sure they are in compliance with the contract. Resolution of any change orders. [The Corps' contract manager and project engineer handle] the paperwork end. Those two people have to work hand-in-hand. Those two people should know more about that project than anyone else. They have a face-to-face with the contractors, and they know the plans and specs. …
>
> "The other people that are out in the field are called QA [quality assurance] reps or QA inspectors, and their job is to inspect the contractors' work. Not so much in a typical sense, but from the standpoint that we now require contractors to do their own quality control. In other words, they're supposed to be their own inspectors. The responsibility of the QA reps is to make sure the contractor puts a program in place to do his own inspection (21)."

Construction Division Organization Chart in 2000



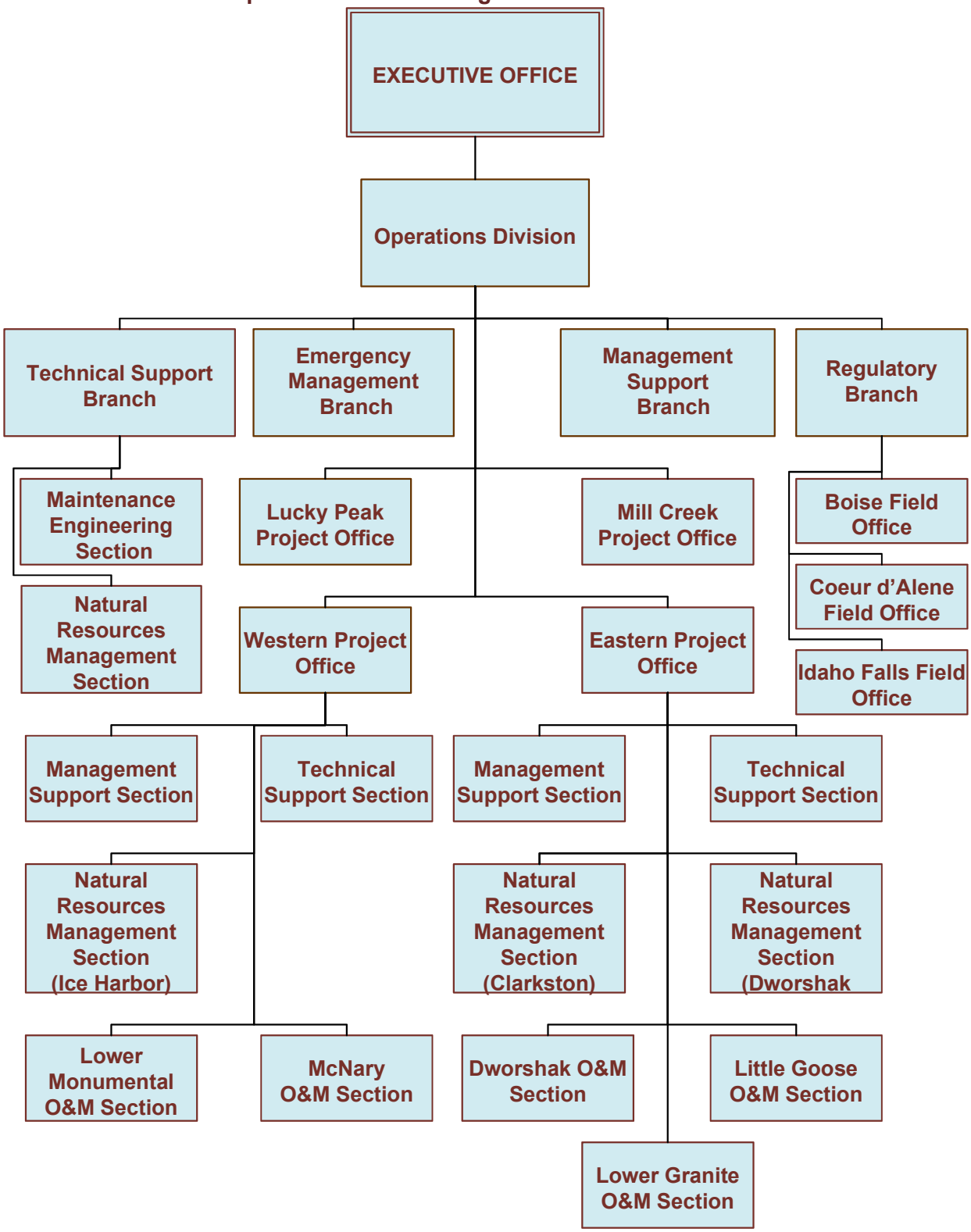
Operations Division

At the end of the year 2000, in terms of staff and budget, the Operations Division was the largest unit within Walla Walla District. This division managed all operations and maintenance of completed field projects, including multiple-purpose hydroelectric projects, flood control projects, waterways, public recreation areas, wildlife habitat and mitigation lands, levee systems, and pumping plants. The division inspected local flood control projects and emergency flood protection facilities. Operations Division was responsible for response to natural or technological disasters and emergencies. Finally, the division managed Walla Walla District's Regulatory Program, which issues permits for activities involving navigable waterways within the state of Idaho.

In 1980, the Operations Division consisted of five branches: Emergency Management, Project Operations, Plant (as in powerplant), Navigation, and Recreation Resources Management. Soon afterward and until 1987, the unit was titled the Operations,

Construction, and Readiness Division (22). In that year, a separate Construction Division was formed.

Operations Division Organization Chart in 2000



The Operations Division was divided into several branches, which, in turn, were divided into sections, as shown on the organization chart.

DISTRICT HEADQUARTERS AND FIELD PROJECTS

As time went on, Operations became bigger because we had more plants, hired more people. District got smaller at the same time. Now, half or two-thirds are all Operations people. Since we have the most money, the most people, the biggest projects, we tend to get attention that we simply did not get before. …

It's like a new car. You don't have a lot of problems with it. Then as time goes on it gets older and older and older and you gotta do this, you gotta do that. The District was very good at building new stuff, and hardly anybody knew anything about fixing old stuff. They had to learn about that and how to take care of some of the mistakes and messes that other people made that they didn't know were going to be messes and mistakes. The relationships have changed because of the circumstances. –Lawrence P. Walker (23).

Technical Support Branch

The Technical Support Branch of Walla Walla District Operations Division was divided into several sections.

The Operations and Maintenance Section of the Technical Support Branch supervised all operations and maintenance activities related to completed projects. Staff in this unit coordinated the repair and overhaul of project equipment and features to ensure the best overall utilization of personnel and materials. Branch staff also managed the District's Powerplant Training Program for developing hydroelectric powerplant personnel.

In the earlier part of the period covered by this volume, Operations Division included an Inspections and Studies Section that conducted continuing studies and tests to provide information to improve the operations and maintenance of District field projects. The Maintenance Engineering Section conducted or supervised the testing of major electrical and mechanical powerhouse equipment for the Seattle District of the Corps and for Walla Walla District.

Operations Division included a Navigation Section during the 1980s and early 1990s. This section distributed notices to the public regarding navigation of the waterways in the District and inspected navigation channels, navigation aids, and river and harbor structures. This section compiled statistics on the commercial use of waterways within the District.

The Natural Resources Management Section managed natural resources activities (including wildlife and habitat but excluding fisheries) that involved operating field projects within the District. Staff in this section determined the availability of lands for lease, and developed the conditions for operation and maintenance for these lands in accordance with principles of good stewardship and regulations. Staff in the Natural Resources Management Section also administered the Corps' National Water Safety Program.

The Natural Resources Management Section also included the Recreation Program, which coordinated activities that increased public involvement and understanding of

Corps field projects through visitor centers with interpretive facilities and services. (See chapter 11)

During the early part of the 1981-2000 period, Technical Support Branch included an Environmental Compliance Section. This section coordinated a comprehensive Walla Walla District program that ensured that all projects operating in the District complied with applicable federal, state, and local environmental laws and regulations.

At the beginning of the period covered by this volume, the Technical Support Branch included a Fisheries Management Section that served as the Operations Division's technical authority on fisheries management matters related to funding commitments, research, mitigation, fish facility operations, modifications, and policy. The section coordinated the District's Fish Facility Improvement Program and administered contracts for collecting fish passage information, and maintained records of fish runs and statistical data pertinent to fish populations, angler success, and the improvement or degradation of habitats within the reservoirs operated and maintained by the District. Staff in this section participated in the coordination of the Juvenile Fish Collection and Transportation Program and fisheries measures discussed by the Northwest Power Planning Council.

Regulatory Branch

The Regulatory Branch of the Operations Division was responsible for the Corps Regulatory Program in the state of Idaho. Staff in the Regulatory Branch piloted a permitting process that was designed to thoroughly evaluate proposed activities and structures, allowing ample input from citizens and other governmental agencies. The Regulatory function of Walla Walla District is fully discussed in chapter 9.

Management Support Branch

The Management Support Branch within Operations Division performed administrative work for the division including file maintenance, mail receipt, correspondence, cost analysis, personnel actions, travel reimbursements, *etc.*

Emergency Management Branch

The Emergency Management Branch was the unit within the Operations Division responsible for disaster preparedness and response to natural disasters and national emergencies. The branch prepared and maintains plans and procedures for response to natural disasters, national emergencies, hazardous materials spills, and operation of high frequency and very high frequency radio systems that may be critical in an emergency.

Western Area Projects

Through the end of 2000, the administrative center for Walla Walla District's Western Area projects unit was located at Pasco, Washington. Staff in the Western Area projects office performed quality assurance and contract administration functions and also provided safety, occupational health, and environmental protection support to personnel of the Western Area projects. Western Area project staff maintained and operated McNary, Ice Harbor, and Lower Monumental Lock and Dams.

The Western Area Natural Resources Management Section maintained grounds, reservoir operations, and maintenance on the Western Area projects, including those lands from Joso Bridge, on the Snake River, to the Umatilla Bridge on the Columbia River. The section implemented the natural resources management programs in areas relating to recreation, wildlife habitat, ecology, conservation, archeology, history, and public safety. Section staff also performed visitor assistance for the Western Area projects.

Eastern Area Projects

The Eastern Area project office unites operation of Little Goose Lock and Dam, Lower Granite Lock and Dam, and Dworshak Dam for power production, navigation, and fish passage. Staff in the Eastern Area project office, located in Clarkston, Washington, performed contract administration on construction and service contracts for Eastern Area projects and provided personnel administration for project staff. Staff from the Clarkston office assisted visitors and performed all maintenance activities at the projects.

Walla Walla District staff member located for most of his career at the Eastern Area office spoke about the need for an office at this location: "Initially they wanted somebody to do public relations in the [Clarkston] area. The Corps didn't have a real good reputation coming in there, and there was a lot of contention within the community about whether or not we should do this [the levees]. … The major reason we have an office there is because of the levee system and the need to operate and maintain that. It's like having managers at a dam. You've got a big structure, a lot of investment. The levees were something like $45 million. You got a big investment, you want to make sure that it's operated and maintained (24)."

A special section located at the office in Clarkston, Washington, managed the natural resources of the Eastern Area projects. Natural resources activities included programs for recreation, wildlife habitat, ecology, conservation, archeology, history, and public safety.

Dworshak Project

Staff at the Dworshak project were responsible for all aspects of project operation, including power production, steamflow regulation, and water quality regulation. Staff also performed quality assurance and contract administration functions on those construction and service contracts assigned to the project.

The Dworshak Natural Resources Management Section was responsible for natural resources-related operations and maintenance at Dworshak project. Staff implemented the Natural Resources Management Program in areas relating to recreation, wildlife habitat, ecology, conservation, forest management, fire protection, archeology, history, and public safety. Section staff also monitored special contracts to operate Corps lands (outgrants) and assisted in compliance inspections of leased areas to ensure proper use and care of government property. Staff performed visitor control, assistance, and security functions. Performing quality assurance and contract administration for construction and service contracts was another part of the section's

responsibilities. Staff also maintained communications with lessees, enforcement agencies, boat clubs, and other user groups.

Lucky Peak Project

The Lucky Peak project was administered out of a separate office within the Operations Division. Staff at Lucky Peak operated and maintained the project facilities (excluding private power generation facilities and outgranted areas) including streamflow regulation to meet flood control and irrigation requirements. Project staff observed and recorded data from instruments installed in structures that are in service, transmitting that data to Engineering Division in the performance of periodic inspection and evaluation of structures. Project staff implemented the natural resources program relating to recreation, fish and wildlife, range management, fire protection, safety, and conservation.

Mill Creek Project

The Mill Creek project was administered out of a separate office that reported to Operations Division. The Mill Creek project office managed flood control, recreation, and natural resource activities.

Real Estate Division

The long-time Chief, Real Estate Division, talked about this component of the District:

> "Real Estate Division has undergone a significant change over the last thirty years. During the construction of the Lower Snake River project, Real Estate had probably seventy-five employees because there was a lot of land acquisition going on at the time. As the lands were acquired, we went more into an operational maintenance mode. There was quite a bit of attrition in size.
>
> "Currently we have nine people on Real Estate staff, which is very small. We're probably one of the, I'd say maybe the third smallest in the country. Real Estate Divisions will run probably from a high of a hundred in the country, down to Albuquerque, which has about seven people in theirs. …
>
> "The major functions that we have within Real Estate are appraisal—so a lot of the larger districts will have what's called an Appraisal Branch. We only have one appraiser, so, obviously, we don't have a branch, we just have an appraisal component to our program.
>
> "Another [function] is management and disposal. That's one of our major undertakings; about eighty percent of our budget is associated with it. In bigger districts, you'd have a Management and Disposal Branch. We have what we call a Management and Disposal Unit. …
>
> "Larger districts would have an Acquisition Branch, we have, what we call our Acquisition and Planning Unit. … Being small, we're a matrixed organization. By that I mean, people wear several hats (25)."

Real Estate assisted Engineering Division in the preparation and negotiation of contracts and agreements for the proposed relocation of railroads, highways, roads, and utilities. Staff in the division reviewed real estate actions in general design memorandums and prepared specific real estate memorandums, including appraisals.

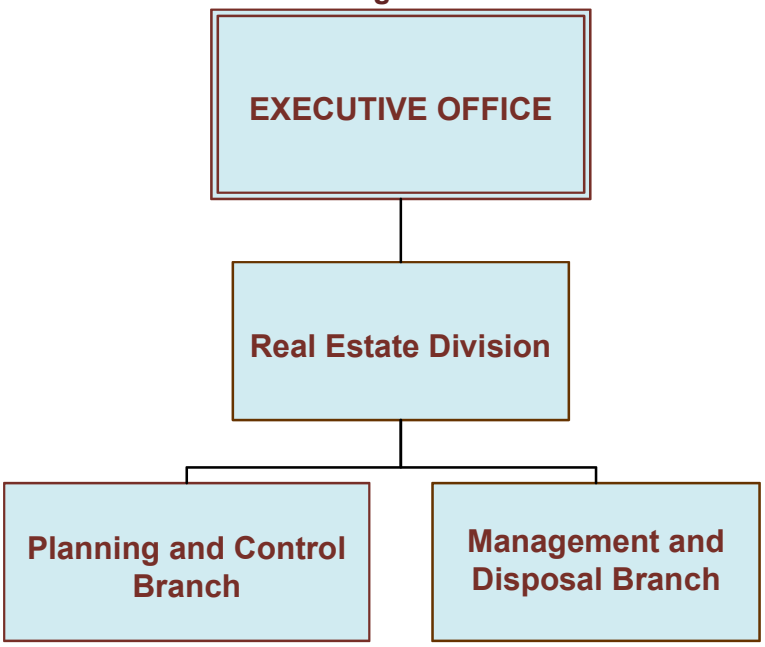
Staff in Real Estate investigated and prepared reports on litigation resulting from the use and occupancy of real estate, made recommendations regarding settlements, and

coordinated actions with the District's Office of Counsel. Real Estate also prepared lease instruments, for example for the many recreation areas that Walla Walla District leased to state and local government agencies. Real Estate staff inspected government real property utilized by others to ensure proper compliance with terms of occupancy agreements and took corrective actions to enforce compliance and/or terminate occupancy where appropriate. Real Estate Division employees developed plans and programs to dispose of real property determined to be excess.

Real Estate maintained the official real estate historical and statistical library of real estate owned, leased, and sold by the District. Real estate prepared various types of maps, plans, and legal descriptions relating to real estate acquisition, management, and disposal actions and also maintained the District's cartographic library.

Real Estate was instrumental in activities related to land acquisition for the Lower Snake River Fish and Wildlife Compensation Plan (see chapter 8). Real Estate was also heavily involved in arranging for land leases and mandated divestiture of land (see chapter 11). During most of the period covered by this volume, the Real Estate Division managed over 100,000 acres of land.

Real Estate Division Organization Chart in 2000



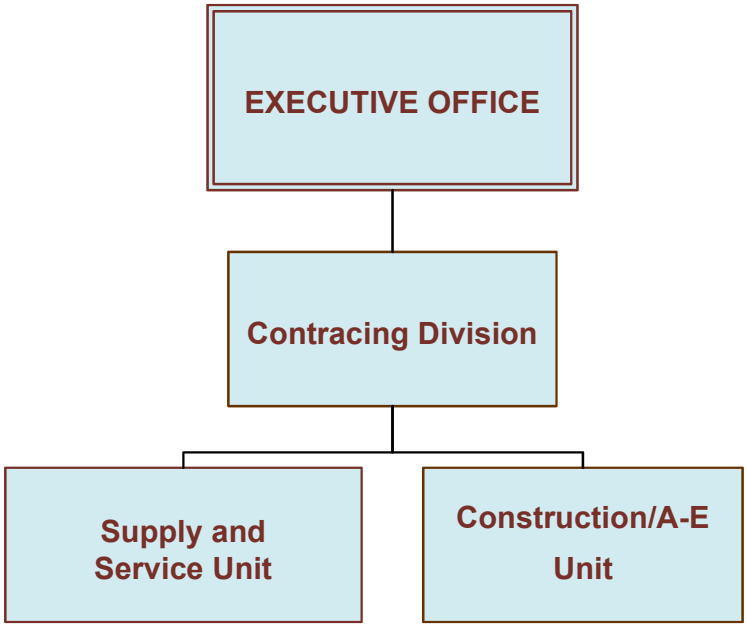
Throughout the period, Real Estate Division had two branches as shown above. As this division came to be greatly reduced in size, the distinction of separate branches became less important.

Contracting Division

The Contracting Division of Walla Walla District supervised all phases of acquisition and contract administration of the District, ensuring that contract execution complied with pertinent laws and regulations.

In the late 1980s, the District's Contracting Division experienced years of increased workload, which was up twenty percent from 1987 to 1989, while reporting requirements were increased, and staff was decreased by nearly twenty-five percent (26). In the era before universal wordprocessing, the Internet, and compact discs, just getting a solicitation for bid out to potential bidders was a mammoth undertaking, often involving the printing and distribution of hundreds of pages of specifications that were printed and collated at the District Headquarters (27).

Contracting Division Organization Chart in 2000



The activity in Contracting was increased during the 1990-1995 period when Walla Walla District let and administered many contracts related to the cleanup of the Hanford Nuclear Reservation. In fiscal year 1995, for example, the District issued Architect-Engineer contracts potentially worth over $68 million (28). In that same decade, the District was directed to increase targets for contracting-out work (see section below on Contracting for Work).

Supply and Service Unit

The Supply and Service Unit acted as the property coordinator for government property in the hands of contractors. The unit was responsible for contract administration from award to final payment. Staff also reviewed and negotiated subcontracting plans. The unit also arranged for inspection and acceptance of all materials, supplies, and equipment purchased by supply contract or transferred by the government, as well as for work performed under service contracts.

Simplified Acquisition Unit

The Simplified Acquisition Unit was responsible for acquisition of supplies, services, and construction valued at under $100,000. Acquisitions were made through Electronic Data Interchange procedures. The unit was the government credit card focal point for the District. The unit also acted as the flood fight coordinator for Contracting Division, coordinating with Operations Division to ensure the availability of personnel, supplies,

and materials when a flood alert was declared. This unit was phased out prior to 2000, and, therefore not reflected on the organization chart.

Construction/A-E Unit

Staff in this unit prepared request proposals for architect-engineer, construction, cost reimbursement, and survey and mapping contracts. If applicable, solicitations were issued via Electronic Bid Set (on compact disc). Staff in the unit conducted negotiations related to Architect-Engineer, construction, and survey and mapping contracts. Staff prepared abstracts, and documented pre-award surveys and proposal discussions necessary for negotiated acquisitions. The unit conducted bid openings, issued notices of award, negotiated subcontracting plans, and conducted audits. The unit administered applicable contracts to final payment and closeout. This unit was phased out prior to 2000.

Civilian Personnel Advisory Center

In 1981, the District had a fully staffed Personnel Office, which included several branches: Management and Employee Relations; Position and Pay Management; Recruitment and Placement; and Technical Services. In 1983, the North Pacific Division (of which Walla Walla District was then a part) proposed consolidated personnel operations. This was part of an effort in which personnel offices were reduced from forty-two to twenty-three throughout the Corps. Walla Walla District would lose half of its eighteen Personnel Office staff (29).

When the Corps underwent reorganization in 1992-94, the District lost more human resources management staff. In the late 1990s, the title of the unit was changed to Civilian Personnel Advisory Center. In the center, Walla Walla maintained a small local staff to provide personnel management functions to the District and act as an interface to Department of Defense and Army personnel programs and systems.

Center staff administered the District position management program, participating in reorganization plans to establish and maintain an efficient and economical position structure. The center administered the District performance appraisal and incentive award system. Employees of the center maintained a training program, providing assistance to District employees and management. The center also helped to administer Special Emphasis Programs (*i.e.*, upward mobility, summer employment, handicapped, and Veterans Readjustment Assistance Act (30) employment).

Center staff administered the District employee relations and labor management program. The head of the Civilian Personnel Advisory Center discusses this function:

> "Employee relations and labor relations was the one function when we went to regionalization that stayed, essentially, intact at the local level because of the nature of the work. Employee relations involves leave entitlements. … [It also involves] what policies … we establish for discretionary things in human resources. How do we handle performance systems? How do we handle performance problems? How do you counsel people? How do you train people? … I am involved in more often than I like … [in] the negative sides, the grievances. The discipline and those things all have to be handled locally (31)."

During the 1981-2000 period, Walla Walla District personnel function went from having a larger locally reporting Human Resources Office to the concept of an Advisory Center. The personnel function in the District was reduced predicated on the support of fully functioning automated systems at the regional and national level: "The staffing that we are allocated [is not adequate]. The formula is based on those systems being fully functional and working well, and they're not. When you have a lot of troubleshooting and a lot of helpdesk work for personnel, that takes away from the advisory services that we were otherwise intended to provide (32)."

The head of District Civilian Personnel Advisory Center discussed one of the last centralized systems implemented during the period covered by this volume. This is an example of the pros and cons of centralized personnel systems.

> "[ABC]—the Army Benefits Center and it was intended to be a central processing organization for all changes [in benefits]. They set up the ABC Center in Fort Riley, Kansas. They said we think we can do all the benefits. This certainly ought to be one area where everybody is saying the same thing all the time. There's nothing peculiar about the West, the Northeast, the South, whatever. I mean, benefits are benefits. …
>
> "They said, this is a perfect opportunity to centralize. … We're going to set up this Army Benefits Center system. We're going to have counselors. We're going to have a fully functional Web page. We're going to have links for employees. We'll have … an interactive voice response system. …
>
> "The system itself works, and the procedures work, most of the time, the vast majority of the time. The problem has been the accessibility of counselors under the system. What they didn't take into account was that some people, a lot of people, just like looking right across the table and doing something. They like at least hearing you say, 'yeah, okay, that's fine.' Or they like being able to ask you a question. It's very difficult to do with ABC, because they are severely understaffed in terms of the number of counselors. …
>
> "ABC as a system is not a bad idea … because, frankly, because staying up on … all the programs that exist out there was very, very difficult to do. … It was a highly specialized body of information, and a pretty large body of information. … It's also awful important to stay up on it, because you need to be able to advise employees accurately, what their entitlements are, what they need to do. I actually think ABC was a very good idea (33)."

Equal Employment Opportunity Office and Programs

The Equal Employment Opportunity Office managed the Equal Employment Opportunity/Affirmative Action Program and prepared, implemented, and monitored Walla Walla District Affirmative Action Plan. The office also assisted in maintaining productive relationships with community organizations that share concerns about Equal Employment Opportunity issues. The office promoted awareness of Equal Employment Opportunity issues to employees through seminars, workshops, publications, and assistance services.

A District staff member, now a Program Analyst, talked about the opportunity that opened up for her via the Upward Mobility Program: "There was a job that opened up … as a file clerk. … Up until that time, I'd been temporary. I got [a] permanent [position] as a file clerk. … Then they had an upward mobility [opportunity that] opened up in Engineering Division in an area called Graphic Data Processing. … There was a survey crew that would go out … and then they'd bring back all this tape and all this

data and that's where we processed them. I processed a lot of survey data [in that position] (34)."

The Equal Employment Opportunity Officer served as advisor to the Federal Women's Program, which was very active in the District during the period covered by this volume (see below on the role of Women Employees).

Special Emphasis Program

In 1996, Walla Walla District's Upward Mobility Program, Federal Women's Program, and other equal employment opportunity initiatives were consolidated into the Special Emphasis Program (35) under the Special Emphasis Committee. Through the Special Emphasis Program, the Equal Employment Opportunity Office furnished guidance and supervision in providing programs that foster development and upward mobility of women and minority group members in the workforce. The program arranged for in-house and external speakers and films to address issues relevant to employment and upward mobility of women, disabled, and minority employees.
Information Management Office

Information Management Office

The Information Management Office managed the Walla Walla District information mission area, which encompassed communications (voice and data), automation, audiovisual information (all levels), mail service, libraries, record management, publications, and printing.

The Information Management Office was established in 1986. Previously, individual District units accomplished computing and information management with some centralization in the District's Automated Data Processing Center. A variety of other functions were included in the Office of Administrative Services, which, in the early 1980s was comprised of three branches: General Services, Reprographics, and the Technical Library.

Specific systems and strategies for utilizing information technologies within Walla Walla District are discussed in chapter 3 as part of the history of information technology within the District. This section provides a general outline of the Information Management Office's functions as of the end of 2000.

Planning and Budgeting Functions

Within the framework of general policies set by higher authority, the Information Management Office formulated District plans, policies, and procedures for information management activities. Activities included: automation, desktop computing, communication systems, provision of visual information, record management, preparation of publications, printing, photocopy services, library services, and mailing services.

The office developed plans for the procurement and installation of new releases of operating systems, hardware, software, diagnostic tools, security systems, and information technology training; assuring that the District maintains conformity with the Corps hardware and software standards. The office coordinated plans with appropriate

security personnel for continuity of operations in the event of national emergencies or natural disasters.

The Information Management Office prepared budgets for the Walla Walla District related to information technology and managed the expenditure of funds within the approved program budget. Staff in the office also administered contracts for various elements of information technology support.

Procurement Function

The Information Management Office reviewed information technology procurement for the District to ensure compatibility with the District, Northwestern Division, and Corps Headquarters information systems and applications. Staff prepared software and hardware for distribution to end-users throughout the District.

Photocopy and Printing

The Information Management Office maintained photocopier maintenance contracts, planned for replacement of copiers, and maintained copier supplies. Information Management staff maintained working cooperation with the contracted Defense Automated Printing Service, with an office located at the District Headquarters in Walla Walla, to provide support for printing requirements of the District.

Library

The Library acquired, organized, and controlled library collections, including periodical and technical subscriptions. The Library cataloged its collection and created an online catalog available via the District Intranet. Library staff also maintained a large photo history collection.

Records Management

The various Walla Walla District units generated an enormous number of valuable records in the course of conducting their functions. Staff in the Information Management Office developed long- and short-range plans to meet the records management requirements for the District. Administrative and engineering documents were stored to ensure future retrieval for unforeseen requirements. District records management incorporated archival standards and changing technical specifications for the management of recorded information in all formats. Information Management Office staff provided training to District personnel on records management.

Publications Services

Staff in the Information Management Office managed contracts for publication services including: technical editing and writing, wordprocessing, research, organization, and assembly of documents. Staff coordinated publication of District office memorandums and other official communications defining District operations. Contract staff designed forms, brochures, presentations, graphics, and mailing systems while providing other services such as note taking and transcription, scanning, data conversion and entry.

Technical Services Section

The Network Operations Center within the Technical Services Section was responsible for Walla Walla District data administration, long- and short-range planning of system

optimization and the safeguarding of databases. The center managed District automation security systems, providing guidance to the staff on appropriate security practices in accordance with regulations established by Department of Defense, Department of Army, Corps Headquarters, Northwestern Division, and Walla Walla District.

At the end of 2000, staff in the Network Operations Center managed a multitude of systems and a host of equipment to facilitate District voice and data communications. These included: computer systems, routers, switches, T1 lines, frame relays, network servers, Internet servers, *etc.,* as well as storage, retrieval, and backup systems.

The Technical Support Section maintained District desktop computer hardware and software, maintaining a Help Desk, providing users a single point of contact for hardware and software problems. The section also maintained an in-house setup and repair shop stocking parts to easy repair desktop computers. The section supported electronic mail, the Internet, and District Intranet as well as developing databases and providing programming for the District. In addition, the section provided technical direction and management of District geographic information systems and computer-aided design and drafting systems.

Communication Systems Support

Information Management Office had staff that provides long- and short-range planning for all voice and data transmission requirements for Walla Walla District. This included managing the telephone system, assisting users with telephone problems, interfacing with vendors for communication support. Staff also managed the District radio frequency program, working directly with Corps Headquarters for overall guidance and management of a radio program. Radio communication could be crucial to the District, and, indeed, to the region in the event of a major natural disaster.

Internal Review Office

The Internal Review Office provided internal audit services based on risk analysis, management comments, and other relevant data. The office performed internal reviews based on an annual program or special request. Internal reviews took the form of financial audits; compliance audits; evaluation of economy and efficiency of operations; or program audits. Staff in the office followed up internal reviews (as required) to determine the effectiveness of corrective actions. The office also provided liaison and coordination with auditors/inspectors from the Inspector General's Office, General Accounting Office, Department of Defense, Department of the Army, and other external audit groups.

The Auditor of the Internal Review Office described his view of the unit's function upon his arrival in 1995: "I want to show that I can be an integral part of the team and use the taxpayers' money wisely (36)."

Logistics Management Office

In 1981, Walla Walla District organization included a Procurement and Supply Division with three branches: Procurement, Contracts, and Supply. The Logistics Management Office was created in 1988 under Corps guidance that called for consolidation and

streamlining of Corps logistical functions. Activities performed by Logistics included: all aspects of supply management, including warehousing, disposal, property accountability, and requisitioning; management of buildings; and responsibility for District travel, transportation, and vehicle management. Logistics was organized into a number of different teams that related to its functions.

Property/Building/Travel Team

Staff on the Property/Building/Travel Team interpreted and developed District policies, standards, and procedures regarding: supply management and government movable property; work area and conference room space management; transportation; and travel. Staff processed requests and authorizations for official travel and coordinated travel arrangements and contracts for the District.

Under a commercial contract, Logistics staff succeeded in barcoding all District property in 1992. Staff completed an inventory of all supplies and automated supply management in 1989, implementing the Federal Supply System in 1990.

Disposal/Warehouse Team

Staff on the Disposal/Warehouse Team performed movable property disposal functions, including reporting of excess property, storing, transfer, and donation of property. The team conducted several surplus property sales, including some very successful ones in the 1990s. This team was also responsible for managing Walla Walla District recycling program, initiated in 1992. This program included sale of recyclable white paper, cardboard, used batteries, steel, copper, brass, aluminum, used toner cartridges, and lubricants. It also included waste management, as well as promoting the procurement of recycled products. Staff performed warehousing functions including operation of the District supply rooms and the central receiving function for the District Headquarters.

Fleet Maintenance Team

The Fleet Maintenance Team dispatched vehicles to staff and operating units, including field offices. The group also performed preventive maintenance inspections, and obtained repair and maintenance on vehicles via contracts. The team also determines requirements and prepares requests for new vehicles. The team also managed the process that qualifies Corps employees to operate specific vehicles that may require special training.

Office of Counsel

Walla Walla District Office of Counsel provided advice and assistance to the Commander and all components of the District on legal and controversial issues particularly in the following areas:

- Procurement, contracts, contract claims, contract appeals.
- Labor relations, wage determinations, and equal employment opportunity matters and complaints.
- Environmental matters including the meaning, requirements, and intent of environmental legislation and regulations.

- Real estate functions.
- Freedom of Information Act (37) and the Privacy Act of 1974 (38).
- Corps Regulatory Program permitting activities and various applicable environmental laws.
- District ethics, advising on standards of conduct for government personnel and conducting mandatory annual ethics training.
- Emergency management mobilization and related issues.
- Requests for use of Corps personnel as witnesses.

Staff of the Office of Counsel acted as liaison with the U.S. Department of Justice in all District litigation. Cases involving the District during the period covered by this volume, generally involved environmental issues, contract claims, tort claims, personnel cases, labor relations, the Equal Employment Opportunity Office, constitutional cases, authorities of the Corps, Native American issues, and water rights.

In 2000, the Office of Counsel described their aspirations as a unit: "Ultimately, our goal is to practice preventative law—to get out in front in the planning and design phases of Corps projects to facilitate smooth and effective execution (39)."

THE CHANGING NATURE OF THE OFFICE OF COUNSEL

Back in the … early 70s … the District was finishing up Dworshak. It still had its remnants of the big, big construction. … At one point the Walla Walla District [was] the largest District in the country. We were building these dams. In the 70s you still had a lot of the people that cut their teeth on those dams. They were finishing up Dworshak, Lucky Peak, and we were still a construction-engineering organization. The lawyers that went along with that were what we call in the business, construction attorneys. There is a specialty of attorneys that work with land developers and work with engineers and architects and contractors … to resolve disputes that evolve from major, huge construction. …

We had a tragedy. … Our Chief of Counsel was killed, along with several other members of the organization. He was killed in an airplane crash. … [This] had a very sobering effect on the Office's history. … I did know some of the young attorneys that worked here. They have since grown up and become scholars of the Corps' legal community, and become [Corps] division counsels themselves and have since retired and some of them passed away. What I was told by them was that they didn't want to work here anymore after that. An empty office where a good friend had worked who was killed doing his job just was not a place that beckoned them to work every day.

They hired [the current head of the Office of Counsel in 1993 (40)]. Meantime, I was back in Washington, DC, and I was looking at this [situation, as was another attorney] from Walla Walla. He's a retired army colonel. He went to West Point and went to JAG. We came out here to provide some backup. … We have pretty much worked our way back in to the process.
–D. Anthony Weeks, General Attorney, Office of Counsel (41).

Public Affairs Office

In a statement published in 1987, the role of the Public Affairs Office was outlined:

> "No other office in the District is as curious as the Public Affairs Office. … While other segments of the organization concentrate primarily on individual missions, this office tracks activities, events, and "people news" in the entire organization. …
>
> "It is the policy of the Walla Walla District to be open and candid in responding to requests for information about our activities. The public has the right—and the need—to have all possible facts which are essential to create understanding and acceptance of our organization and its mission. …
>
> "This, a strategic function of PAO, is the responsibility to protect the Corps from any negative effects of misinformation. That is why it is a mistake to take a low profile and make no comment when we are asked a question about our activities (42)."

The Public Affairs officer and staff were responsible for media relations, community relations, and information marketing programs. The Office planned and executed programs intended to define the missions and actions of the District and earn public understanding and acceptance.

The Public Affairs Office also conducted Walla Walla District's community relations program, coordinating District participation in local and regional events, such as area fairs. The office managed the District Speakers Bureau for the benefit of local community groups interested in Corps missions and responsibilities. Staff coordinated public exhibits that portray the District's activities.

Major activities of the Public Affairs Office are discussed in detail in chapter 11.

Resource Management Office

In 1988, Walla Walla District Office of the Comptroller changed its name to the Resource Management Office. Manpower management analysis functions (see below) were transferred to the new office from the Special Assistant Personnel Advisor. Budget, finance, and accounting functions were consolidated and placed in Resource Management Office (43). The office assists the District Commander and staff in maintaining balance, economy, and efficiency in the accomplishment of programmed objectives.

Finance and Accounting Function

Staff in the Resource Management Office executed policies and procedures for accounting to track expenditure of public funds. This included developing timely and accurate accounting reports and reconciliations.

Resource Management staff expertise in accounting and financial management was applied to the various accounts that fund Walla Walla District activities, including the Revolving Fund. Staff monitored general and departmental overhead, established labor rates, and analyzed equipment and facility accounts.

Resource management staff supervised the civil works accounting activities of the District. Staff performed review and analysis of civil works project accounts to provide

guidance for operating officials, advising program managers on the cost-effectiveness of current programs.

Resource management staff served as liaison between the District and the Finance and Accounting Center at Corps, Portland District, working with center personnel to resolve any problems that result from automated data processing runs. Staff coordinated District data input, including payroll activities. In 1981, the North Pacific Division consolidated all finance and accounting activities within the center while retaining certain functions and staff in the districts (44).

Budget Function

Resource management personnel coordinated the preparation of workload, government cost projections, and District budgets in order to maintain balance and economy in the overall Walla Walla District program and adhere to government cost targets. Staff analyzed projections and budgets in relation to expenditures, furnishing data on the status of available funds. Staff prepared the annual financial plan coordinating with various District units to make changes due to financial considerations. Also included in this area was training and advising unit timekeepers who entered data in Corps automated systems for payroll, time, and attendance.

Management Analysis

Staff working in the area of management analysis provided Walla Walla District with a comprehensive management analysis capability, including conducting studies to design and improve management systems. Staff recommended organizational actions based on an analysis of workload, functional alignment, staffing, and related factors. Staff prepared, coordinated, and published organization and position charts and functional statements for the District.

Resource Management Office staff managed the District's Commercial Activities Program and coordinated total quality management initiatives (discussed below).

Staff in the Resource Management Office prepared manpower estimates and documentation of staffing levels utilized by all elements of the District and prepared and justified plans for changes in manpower distribution. The goal was to ensure that imposed constraints on the number of staff members were realized and that positions were distributed efficiently.

Safety and Occupational Health Office

The Safety and Occupational Health Office managed safety and occupational health operating procedures in accordance with policy, laws, regulations, and standards, with the District Safety Officer acting as an independent adviser and reviewer of all Walla Walla District safety efforts. Various areas addressed by the office included: construction safety; general industrial safety for operating projects; occupational medicine/medical surveillance; diving safety; hazardous waste and industrial hygiene; marine safety; workers compensation; accident investigation; fire protection; and safety training.

Until the mid-1990s, the security function was part of the Safety and Occupational Health Office. The District's safety program and record is discussed in chapter 4.

Awards

The Civilian Personnel Advisory Center administered the Walla Walla District Incentive Awards Program with responsibility for program planning and evaluation. The District routinely presented staff with a number of awards including the Distinguished Civilian Employee award, Equal Employment Opportunity awards, and Safety awards.

Relationship to National Headquarters

During the 1981-2000 period, the Corps pursued a goal of creating "one door to the Corps," a concept meant to serve customers better. Part of this concept was a Corps-wide effort to create more consistency in the way various districts worked and to take advantage of economies of scale by consolidating functions.

Consolidation was pursued particularly in the information technology area, where the Corps developed many nationwide systems such as the Corps of Engineers Financial Management System (called CEFMS), the Microcomputer-Aided Cost Estimating System (referred to as MCACES), and the Real Estate Management Information System (called REMIS). Several of these systems are discussed in chapter 3.

One example, which could be chosen from among many, of how Corps-wide policy and standard processes affected the Walla Walla District was in the area of quality inspections during construction. The process is controlled by published regulations issued by Corps Headquarters. "When I first came on board, I forget how the specs [for quality inspections] read, but we didn't have nearly the detail … that we do now. … It's been an evolutionary process and it's all in Engineer Regs [Regulations]. Most of what we do is tied back to some Engineering Reg. (45)."

The Corps also tried to consistently promote safety at its projects. Walla Walla District took on a leadership role in this national effort, initiating a major revision of Engineer Regulation 385-1-31, *The Control of Hazardous Energy* (46): "Over a period of about three and a half years, we met in different places all over the United States. We ended up with a national committee rewriting it. Ultimately, we rewrote the ER, which we're now using, which is now more consistent with the OSHA [Occupational Health and Safety Agency] requirements. … [The national effort] started in our District. That was one of our significant accomplishments (47)."

During the period covered by this volume, Corps Headquarters encouraged or required various management initiatives that had some commonalities: a process orientation, a team orientation, and a customer-satisfaction orientation. For example, in 1986, the Chief of Engineers, Lieutenant General E. R. Heiberg, III, proclaimed the theme of the year to be "customer care" (48). The 1980s saw a focus on total quality management and team building. For 1996/1997, the Corps issued a vision and strategic plan (49) that focused on effectiveness of business processes, developing a capable workforce, and a customer focus. These attempts to redefine the organization from within and from the highest levels profoundly affected the individual districts and were certainly taken to

heart by the Walla Walla District as described below in the section on management initiatives.

Walla Walla District and Northwestern Division

Walla Walla District is part of Northwestern Division, which is headquartered in Portland, Oregon. Prior to 1992, Walla Walla District reported to the North Pacific Division.

REFLECTIONS ON DISTRICT-DIVISION RELATIONSHIPS

I can recall when I started [1979] that there was great animosity, in general, between the [Walla Walla] District and the [North Pacific] Division. That was, in part, due to the fact that the District pretty much called the shots on what happened. We had some extremely competent people, and people who had fairly strong opinions. Where other districts seemed to acquiesce to Division demands, it was my observation that our District said, "No. You show us that what you're suggesting is a better way to go, and we'll consider it. But we won't do it just because you said so." That created some significant animosity, but we were this independent, almost maverick group. … We'd just come through a huge era of expansion and this District, and other Corps districts as well, had built quite a few projects. We built Dworshak starting in the early 60s, finishing in the mid-70s. That was a landmark project. It was the largest dam of its kind in the world, when it was done.
–Steven B Tatro, Civil Engineer (50).

As the Native American Coordinator I worked … on getting together with the other Native American Coordinators in the Division and working with the Division Native American Coordinator … [We were] trying to put together the Northwest Division policy.
–Lynda G. Nutt, former Native American Coordinator (51).

One major thing that has had a positive effect in the real estate arena is what is called the Real Estate Board. [This group includes] the chiefs of Real Estate in our different districts within our division. We usually meet quarterly to talk about issues. It's an outgrowth of the whole corporate regional business process with the idea that we need to start thinking corporately as a division, more than just as a district. … The Real Estate Board has been a good opportunity for all the district chiefs to better understand what the others are doing and how we might be able to not only help our own districts, but others as well.
–Richard Carlton, Chief, Real Estate Division (52).

Division Reorganization

In 1992-1994, the whole Corps of Engineers was reorganized and downsized. The Corps proposed cutting the number of divisions in the United States from eleven to six. Under the original proposal, Walla Walla District would have been part of a Western Division headquartered in Portland, Oregon. The Western Division, to be formed from the former North Pacific and South Pacific Divisions was to stretch from America's northwestern border with Canada to Texas, including Washington, Idaho, Oregon, California, Nevada, Utah, Arizona, and New Mexico (53).

"A 1991 plan proposing division and district closings was scuttled in the face of objections by lawmakers (54)." During this period, Walla Walla District was considered to be very vulnerable to possible closure in which case Portland District would take over administration of Walla Walla District responsibilities (see section below).

The 1992 proposal, to be implemented in late 1993, called for elimination of 2,600 positions from the Corps workforce. The new Western Division Headquarters was to have seventy fewer employees than the 299 in the North Pacific Division headquarters (55). Walla Walla District was to lose one-third of its staff. "Under the plan some of the administrative functions of the Walla Walla District would be consolidated at Corps division offices. The District's planning and engineering functions would be transferred to 'technical centers' created at other district offices (56)."

In actual implementation in 1994, the Corps reorganization plan was changed drastically. Instead of a Western Division, the Northwestern Division was created, encompassing the entire Northwestern quadrant of the United States, from the Pacific Ocean to the Missouri River basin. The new division was headquartered in Portland, Oregon, with another divisional office located in Kansas City, Missouri.

Walla Walla District did not have its staff cut by one-third and did not lose its technical and engineering functions, though it did lose some support functions, such as a complete Personnel Office. The greatest staffing effect was at the division level. A Walla Walla District planner expressed his opinion of the changes: "We've culled a great deal of our mid-management. When you look at the Corps of Engineers, our mid-management was often located at the division levels. Now we work directly with folks at Headquarters a lot. Because their [automated] tools are so much more powerful, they're able to do a good job for us. … It's very healthy, what's happened. It's allowed us to remain competitive (57)." Another Planning staff member commented on the working relationships within the new organization: "In some areas, like in Engineering, they used to have people who could review things technically and [now] they don't have nearly as many people. But there are still programs people [in Northwestern Division] that really help you, and you do have to work with them before [a plan] goes to Headquarters (58)."

The newly created Northwestern Division covered a huge territory; in fact it was geographically the largest division in the Corps. This created some problems:

> "How can you coordinate programs division-wide when you're so far apart? … How do you make it work when you've got people covering half the United States? … If we have a natural resources meeting at the division level, we can't get the people to come, because their boss won't pay for it. … We don't have consistency. … Portland, Seattle, Walla Walla [Districts]—we don't do it the same way and Kansas City and Omaha certainly don't do it the same way. It's a struggle because we put two different divisions, … parts of them, together. It's a real learning curve in trying to work together. Where there's economy in scale, but we're not doing it the same way, so we can't share the same training. We can't share the same ideas, because what we may have for a supplier in our part of the country—they may not be in the other part of the country. Or being in a rural area, we're entirely different from Seattle and Portland, which are urban areas. We do things differently and … they don't have the same problem[s]. It's an interesting process (59)."

Technical Review

One of the most significant effects of the downsizing of Corps divisions was in the area of technical review. Prior to downsizing, plans created at the district level were subject to review by technical experts at the divisions. Staff in Walla Walla District considered

this change to be very significant and had widely differing views of the result of eliminating divisional technical review as shown in the box below.

ELIMINATING DIVISIONAL TECHNICAL REVIEW

The downside of that is that without somebody with some technical background … when the general [heading the Northwestern Division] asks a question or his staff decides to make a decision, you need somebody there that knows what the impact is going to be. I'm talking from the Operations standpoint, but the same applies for Engineering, I'd say. Right now they're a pretty small staff [at Division], sometimes one person per section, if that person's gone who do you call, what do you do? That working relationship where you used to call Division and say, "Hey, here's my thoughts on this, what do you think?" You can't always get that feedback now.
–Steven W. Voss, Supervising Engineer, Operations Division (60).

We still have independent technical review but [it is a] smaller group. You've got to strive to maintain the resources and keep people independent and make them truly independent.
–Mark F. Lindgren, Chief, Hydrology and Hydraulics (61).

I would have to say that one on the greatest things I've ever seen this organization do was the approach that they took to downsizing … where the decision was made … that we're going to streamline from the top-down. Unprecedented. I thought that was a great, great thing. … With that came authorities down a lower level.

For the most part, [Northwestern] Division was transformed into a quality assurance role and more oriented to our proper application and adherence to policy, than to a technical role. The technical role was taken over by independent technical review within the [Walla Walla] District. That was a significant, major positive change for enhancing our ability to get work done. I would like to think it has not significantly impacted product quality.
–Carl J. Christianson, Supervisory Wildlife Biologist (62).

Walla Walla as a Viable Corps of Engineers District

Walla Walla District was founded primarily because of plans to construct large hydropower and navigation projects along the Columbia, Snake, and Clearwater Rivers. When Lower Granite Lock and Dam was completed in 1976, there came to be a belief among those people who had built dams from the 50s, that when the dams were done, there was no purpose for the Walla Walla District. The construction-oriented staff's concept of their mission was that the Corps of Engineers built dams (63). "For every dam built, there were others existing only on paper (64)," proclaimed a local newspaper.

During the Corps reorganization in the early 1990s, it was not clear that Walla Walla District would endure:

> "Colonel Voltz … came to the District … [as Commander, 1990-93.] He went around the District for two months or maybe three months and learned all he could about the District and then had his first town hall meeting [a general staff meeting]. The idea that the District did not have a future was still strong. … [Colonel Voltz] had … information that most of us didn't have. [He] stood up in front of the group and began his first town hall meeting with, 'It is my job to shut this District down. I am really sorry about this, but I have moved many times, and you will get used to it.' That's how he started his first town hall meeting. That is almost an exact quote. … He was a good colonel and

> he shared things honestly. He felt that that was what he was being told when he arrived. …
>
> "In fact, the future of the District for a long time depended on the Snake River Compensation Plan. That was the funding mechanism for this District through the 80s up until maybe 85. That was truly our bread and butter. It was what saw us through. …
>
> It appeared that we were being assaulted through our own chain of command. … We had one champion. And that man's name was Representative Tom Foley. He was more important to this District than any engineer realized. At the time, we maintained a certain political naiveté. We believe that if we built things and designed things and studied things with honesty and integrity and all the values, the scientific values that we brought to things, that that was sufficient. The reality is, this town and this region wanted the Corps to be here. Tom Foley made sure that there were programs that were appropriated. As he became the Speaker of the House, he became extremely powerful in making sure that the appropriations always flowed towards this District. …
>
> There was always an institutional memory down there that we were somehow a field office of the Portland District, because the Portland office is, in fact, much older. … We still struggle today with articulating a vision that is comprehensive enough to cause people to feel secure (65)."

District to District Relations

Traditionally in the Corps, districts have been very different from one another. "I see it within our own Division [*i.e.*, Northwestern Division], and it amazes me, because we have a lot of discussion about program management (66)."

Another staff member described an effort to utilize staff within the Northwestern Division across districts:

> "We were trying to do the 'One door to the Corps.' … If we had too many projects on our plate, and not enough folks to handle the coordination and Kansas City or Omaha District had some free people, could we go to them and have them help us out? We tried that. It wasn't extremely successful. Part of what happened is what we were afraid would happen. … We weren't sure that our district's project was going to get priority with them, and it didn't. …
>
> "Or they came out here to work … and they didn't understand the situation. They didn't have the same endangered species issues that we did. They didn't understand all the fish issues. They didn't understand all the cultural resources stuff, and the tribes that we deal with and how you deal with them. They could help to some extent, but unless they actually sat here and became part of our district for a while, it didn't work out as well as it should. We did finally meet some more of our counterparts in those other districts. But as far as them being able to help us, and take on some of our workload in [environmental] compliance, we decided that didn't work very well (67)."

However, during the period covered by this volume, Walla Walla District staff, particularly those with specialized engineering and fisheries expertise did work for other districts and with staff in other districts: A Walla Walla District hydrologist described his experience: "We typically work with our counterparts in Portland and Seattle a lot. This is both sharing of information [and] some sharing of projects. This is partly, also, in the reservoir regulation activities as far as working with Northwestern Division office too. Now it's in the water quality arena, helping each other, sharing information, that kind of thing. Typically, we don't do a lot of work with Sacramento. We haven't done much

with Omaha. We're starting to talk to Omaha a little bit more and Kansas City more since they've come into Northwestern Division. … Mostly [cooperation is] just within the Portland-Seattle-Walla Walla District arena (68)."

Virtual Teams

Cooperation among districts was greatly enhanced by the use of computer technologies such as electronic mail, the Web, and video conferencing, all of which were available to Corps staff by the late 1990s. The concept of virtual teams became possible. District staff from cost engineering and other areas of engineering participated in virtual team efforts. Walla Walla District led one of the most prominent virtual teams in the Corps. The National Water Safety Program Committee, described in detail in chapter 11, functioned as a virtual team.

Training and Staff Development

During the 1981-2000 period, Walla Walla District devoted considerable resources to staff training and development.

The District provided opportunities for local high school and community college students to gain work experience via the Cooperative Education Program. This program was particularly active in the 1980s when as many as twenty-eight school student aids, mostly high school students, worked in the District (69). In 1985, the District employed eleven students seeking Bachelor's degrees and one seeking a Master's degree (70). Some of these students returned to the District as permanent staff members.

The District participated in programs designed to help staff receive formal academic training such as the Engineer-in-Training Program, the Mission-Related Graduate Program, and the Army Research and Study Fellowship. At various times during the period, District staff could take courses from Washington State University and from Lewis and Clark College located in Clarkston, Washington.

Particularly in the 1980s, Walla Walla District sponsored extensive programs for Human Resources Development Week. These programs would bring in staff from other federal agencies in the region to attend sessions by prominent speakers. The Federal Women's Committee and the Human Resources staff were active in organizing these training opportunities. A 1981 Federal Women's Program training day on career planning featured a panel discussion on nontraditional Corps jobs and a session on how to obtain college credit for experience gained in daily living (71).

Human Resources Week, later called the Human Relations Development Week, was an annual event in the mid-1980s. In 1984, the emphasis was on learning about other cultures and conditions for the disabled. The keynote speaker that year was the regional director of the Office of Civil Rights, Department of Health and Human Services, who spoke about career goal setting. Another speaker represented a Hispanic organization. "Included in the week's activities was the dramatization of key managers using a wheelchair (72)." This exercise resulted in a number of recommendations regarding improved building access.

Human Relations Development Week
"Share the Dream" 1996

The tradition continued in 1985 when Harold Russell visited Walla Walla District. Mr. Russell was "a double Academy Award-winning actor, best-selling author, advisor to eight U.S. presidents, a much sought-after speaker on the subject of motivation, and chairman of the President's Committee on Employment of the Handicapped (73)." Mr. Russell, who lost both of his hands during World War II, was best known for his Oscar-winning performance in the film, *The Best Years of Our Lives*. He spoke to Walla Walla District staff as part of Human Relations Development week.

In 1988, the theme of Human Relations Development Week was promoting awareness of other cultures. District staff participated in a "Culture Bowl," competing to try to correctly answer questions about various world cultures (74).

Much training was conducted in relation to the multitude of new automated systems that staff needed to use to accomplish their jobs (see chapter 3). Over the years this training was provided in a number of ways: formal in-house training courses provided by computer specialists; intensive short-courses provided by subject experts from the Corps; training sessions offered by local colleges; or by staff attending courses off-site in the community or region.

The 1980s saw a high point for onsite training organized by local District staff. Walla Walla District had a formal training coordinator, who, in 1998, reported that 458 permanent employees of the District had received training, mostly provided in-house or locally (75). Because of high travel costs, the District looked at nontraditional training opportunities, such as purchasing an extensive collection of videotapes.

Toward the end of the 1981-2000 period, training time was becoming more difficult to obtain. This was related to the fact that more and more labor time needed to be charged to specific projects. Meanwhile training requirements needed for job advancement were becoming more formalized and expressed in writing individual development plans. Walla Walla District's long-time training coordinator commented on this trend, particularly in regard to training for supervisory skills.

> "We haven't done very much in-house here in the district [in recent years]. Part of the reason is that it's almost a false economy. There is so much concern about what we charge to here in the District—how do I account for my time? We can't afford to charge to a project. We can't afford to charge to overhead. … Every now and then we'll ask the Commander to demand, to basically require, supervisors to come to some kind of a

> session, if we have something that's that important. We can only invoke that authority rarely. We can't do it once a year, even. …
>
> "We almost do ad hoc training sessions. Somebody comes down [to the Civilian Personnel Advisor Center] and says, 'I'm having this kind of a problem, what do I do?' …
>
> "We have the Colonel [District Commander] … committed to new employee orientation for all employees. It has now been expanded to six hours … and we have it monthly. … If that new employee happens to also be joining us as a supervisor, they will get some additional information from us on the side, at the breaks, or after the class.
>
> "The Department of the Army requires that all employees, within thirty days after their entry on duty in a position, have the performance objectives established and communicated for that position. A part of that requirement is an individual development plan. …
>
> "We are developing … a Web page matrix showing what all the required training is for employees. [This is] particularly necessary for employees who are in a career program. [Training is necessary] if they are in the personnel career program, or engineering scientist, or if they are in the resource management career program, or public affairs—whatever career program they're in. Most of those career programs have some required or strongly suggested classes that you should have in order to advance to the next level in that particular career. … There will be a link to the new electronic individual development form, which we are currently establishing. A link … required a training matrix, so that it'd almost be like a shopping basket. You'll be able to take a class from here and add that to my individual development form (76)."

In the 1990s, the Corps offered the Proponent-Sponsored Engineer Corps Training Program (Prospect). Prospect featured short-term, classroom training sponsored by various elements of the Corps. For example, a Prospect course on the law pertaining to preservation of historic buildings would be held at Seattle District, but might be attended by staff from Walla Walla. The Corps Institute for Water Resources, for example, offered Prospect courses for new regulators. Walla Walla District real estate specialists had opportunities to take a sequence of real estate courses as part of Prospect.

Quite often staff would attend regional skill-specific workshops, such as those on hazardous and toxic waste management and emergency response procedures mentioned in chapter 9. Staff also attended conferences as part of their membership in professional organizations. For example, several Walla Walla staff members were active in such groups as the American Society of Civil Engineers and the American Concrete Institute.

Leadership Development Program

"This 1990 class of graduates never donned caps and gowns for its graduation ceremony, but they met all the requirements of a demanding graduate school academic curriculum. The graduates are twelve Management Interns, or MIs, who recently completed Walla Walla District's first Management Intern Program—a year-long intensive leadership and management development course. The interns completed a minimum of 200 duty hours to graduate, and a few spent an up to an additional 400 hours of their own time on the program (77). The program featured a kickoff retreat,

mentoring from existing managers, instructors from Seattle University, and teams to research various District problems in order to find solutions.

One participating staff member of the Management Intern Program, later renamed the Leadership Development Program, provided this description:

> "I was in the second class of the Management Intern Program, and I have to say that had the most significant influence to my outlook, to my career of any training I had taken up till that point or even since. This is the District-sponsored, year-long leadership training. At that time it was taught by Seattle University, since by Gonzaga, and now Portland State University. The programs, the objectives are very similar, almost identical. The ways in which they are achieved have changed somewhat, but not dramatically. …
>
> "Anyone in the District has been eligible to apply to the program. Though in the earlier years, when it first started, they started from the top-down. The first class was pretty much all branch chiefs. Then, as years went on, you started reaching deeper and deeper into the organization for interested applicants.
>
> "The Corps nationally has its own Leadership Development Program, but that involves several different components, including long-term training where you can go seek University class work, developmentals [*i.e.*, developmental assignments] at Division or at Headquarters—a little more time-intensive, commitment intensive, and away from your duty station.
>
> "The District's program runs a year long, but meets once a month with the University and do a day or two worth of classroom instruction, discussion, guest speakers. You do a front-end retreat and do your bonding with your fellow classmates. [You] identify goals and objectives and lay out projects that you divide up into two to four teams and work on a project for the given year. [You] usually take a field trip to various government and/or nongovernment organizations to share with and from them various methods of leadership. Two of the groups were able to finagle a trip to Washington, DC, to meet with Headquarters folks and even the current Chief of Engineers at the time (78)."

Volunteers

More than in any other area, the Corps has used volunteers to assist in its recreation programs. Both the Volunteer Program as well as the Visitor Safety Program gained emphasis because of the national "Take Pride in America" program initiated during the summer of 1986. In 1999, 70,000 people gave of their time and skill to assist the Corps in recreation and natural resources management.

In 1986, Walla Walla District's Volunteer Program was initiated with implementation of *Engineer Regulation* 1130-2-432 published in December 1985. The late 1980s was the height of volunteer activity in the District. Examples of projects undertaken in the District during 1986 included construction of bird boxes at McNary, workers involved in Water Fun and Safety Day at Ice Harbor, tree and shrub planting at Lower Granite-Little Goose, trail maintenance at Dworshak, and tree planting at Mill Creek. The total number of volunteers used in 1986 was 110, and the total number of hours was 941.

A Natural Resources Manager talked about the Volunteer Program in the Walla Walla District:

> "Initially about the only 'volunteers' you had is if the court called you up and said, 'Hey we got this teenager that ripped up fifty feet of your fence, do you have a project they can do?' We always said yes. We'd have them pick up litter, if nothing else. Over the years we made contact with schools. Maybe a high school biology class would go out and do some of the plantings at our wildlife habitat areas. You might have a Boy Scout who had a project that he had to do. He might build a bench, and we'd put it along the bike paths. One kid did a … [project] where he marked off starting the confluence of the Snake and Clearwater a proportional scale model of the universe. …
>
> "We might have a service organization that was looking for something to do. We would try to utilize them maybe in plantings, maybe some kind of a beautification project in one of the parks (79)."

In 1988, the total number of volunteers increased to 719, while the total number of volunteer hours increased to 3,689.5. Volunteer accomplishments included numerous Eagle Scout projects, various other Scout projects, and a major water safety campaign by a Columbia-Burbank High School 10th Grade English class. Federal Lands Cleanup Day activities with individual volunteers and civic organization participation took place at all of Walla Walla District's operating projects.

Use of volunteers more than doubled in Walla Walla District in 1989. The total number of volunteers increased to 1,829 in 1989 and the total number of volunteer hours increased to 5,500. The programs throughout the District in which volunteer participants were involved included numerous Eagle Scout projects, various other Scouting projects, and Federal Lands Cleanup Day.

After being nominated by Corps Headquarters in Washington, DC, Ice Harbor-Lower Monumental project received a 1989 National Take Pride in America award. Also, a Columbia-Burbank High School 10th Grade English class and the Blue Mountain Council of the Boy Scouts received National Take Pride in America awards in 1989, based on the volunteer work they had accomplished at the Ice Harbor and Lower Monumental projects.

In 1997, District Headquarters in Walla Walla began to look at its Volunteer Program. A Volunteer Coordinator was appointed to help find qualified volunteers who would not replace staff but who could "fill the gaps" for the District (80). One aspect of the program was to ensure that volunteers were given training. The Volunteer Coordinator "has done a tremendous job of recruiting from the schools, from various and sundry groups around town. Occasionally we'll have a walk-in … but, most of the time, you've got to recruit them to get what you really need (81)." From 1989 to 2000, volunteerism related to Walla Walla District recreation remained of the same general nature, but declined gradually.

Management Initiatives

During the 1981-2000 period, Walla Walla District staff participated in a number of management initiatives, mostly instigated by Corps Headquarters. However, the early and thoroughgoing adoption of several of these management philosophies and practices was indicative of a District organizational culture willing to try new things. The most important of these management initiatives are discussed below.

Total Quality Management

In the early 1990s, managers in every sector across the nation were talking about total quality management, called TQM for short. Motorola, Cadillac, and defense contractors such as TRW, Inc., were being lauded for their TQM activities, and staff at Walla Walla District were hearing about it (82). The Navy talked about TQL—total quality leadership—and used the philosophy to reduce backlogs and improve processes.

District employees participated in developing an action plan, "Ingredients for Success," that addressed implementation of the Northwestern Division's strategic focus plan that was released in November 1992. The Walla Walla District action plan was formulated by a Building Blocks Committee composed of representatives from throughout the District. Teams were formed to "establish the framework for the actual implementation of projects and programs that could generate a new and more diverse work load, improve effectiveness and efficiency and develop and nurture our workforce (83)." From this beginning, the District moved to a more formal TQM approach.

A District staff member who helped initiate the total quality management effort talked about the evolution of the program at the Walla Walla District:

> "Having graduated from that [Leadership Development Program], a lot of us felt that there was a certain sense of payback to the District for the opportunity to do that. … We put together a group that we ended up calling the Building Blocks Committee. It was an ad hoc group of interested people that wanted to do some good things for the District, on the side, voluntary. We laid out several goals, identified six areas to focus on.
>
> "That evolved into a TQM effort. We embraced that around 1994. We had a group of senior management folks embrace an interest in that. … We teamed up with the Chief of Engineers in Alaska and put together a core group of half a dozen or so and developed a TQM curriculum for Walla Walla District. … We concentrated initially on the District office and once every month or a couple of months would do a day-long TQM session with about twenty people or so (84)."

By 1995, Walla Walla District was increasing its focus on TQM. As defined at the District, TQM was the philosophy that the organization "should constantly seek quality improvement (85)."

Staff were involved at several levels to improve how they did their work:

> "If it is an action that does not affect anyone else and meets regulatory guidance, the individual employee is free to make the change. If it is an action that affects an office, employees are encouraged to bring the subject to the attention of the supervisor. If it is an action that affects more than one office but not all offices, a team may be formed to come up with a solution or recommendation for change. If the change causes changes across the District, the TQM proposal is submitted to the Quality Coordinator. … At this point a Process Action Team is formed to study the problem and make a recommendation on the resolution of the problem to the Quality Council. Based on the recommendation of the PAT, the Quality Council may implement or perform a pilot test (86)."

A structure for TQM implementation was formed in the District led by a Quality Council, chaired by the District Commander, and consisting of the District's division and office chiefs. A Quality Coordinator was named, and a TQM Steering Committee, an ad hoc

group, was formed to recommend TQM policy (87). Walla Walla District Staff members attended "TQM awareness" training under local staff instructors who had been certified in the process, and informal process action teams flourished (88).

By 2000, however, the TQM effort had dwindled. Several staff members spoke about this phenomenon:

> "We're not doing much in the District with total quality management. When I was out in the field, I was a big supporter of that. We didn't use all the statistics and stuff, but the communication with the employees, getting people's ideas. We had several total quality management teams to look at different problems. Just the fact that people are talking together [is an improvement]. Within Operations you end up with craft, administrative people, engineers, resource maintenance people, all different categories, so all of them have different ideas and perceptions. By putting them on these teams, you not only talk together, but they learn to work together a lot better (89)."
>
> "We were never as successful as I would have liked. A lot of the problem being that people, even those that are leadership oriented, are just so busy and bound by the work at hand [that it is impossible for them to participate in] … a discretionary extra effort. … As we would get changes in command, there would be [a] somewhat different philosophy and concern and priorities. TQM went by the wayside (90)."

Leadership Council and the Learning Organization

Although the District did not formally continue TQM efforts, that management initiative had several results including the establishment of a Walla Walla District Leadership Council. One of the staff members who participated, spoke about the council:

> "In 1998, [we established] what we were calling the Leadership Council. We joined thirty-five folks, mostly Leadership Development Program graduates with a shared purpose of wanting to give some payback, some meaningful activities in some areas that seemed to not get a lot of attention. …
>
> "A lot of what we were trying to address was centered on a healthy learning organization, along with that trying to address morale. What does a healthy learning organization look like? What are some things that we can do to contribute towards that? … We could be the go-betweens, maybe, between the workforce and the commander, so that he would have another avenue to sense what the real pulse of the District was without going through the various filters of the senior leadership, which can be pretty significant filters. So we got the blessings of [the Commander] at the time to go forth and do good things. …
>
> "As we started putting the organization together, there was a call from Headquarters for a recertification of the District as a voluntary center of expertise for fisheries technology. We put a lot of information together for that. That evolved into ... a first-class District Web page that features our expertise in fisheries engineering and technology. That effort is still underway. … It would be prudent for us to advertise our skills, 'cause you never know who's going to tap into your Web page from anywhere in the world [and] that can develop into very meaningful and long-term work efforts and collaboration. …
>
> "Another endeavor we were pursuing was trying to get the executive leadership [of the District] to undertake themselves, a self-evaluative leadership instrument of some type (91)."

Teams

TQM and the general familiarity with modern management philosophies prevalent in Walla Walla District helped spur the use of teams within various units or for specific projects. At the end of the period covered by this volume, it was common for the District to have such long-term groups as the Programs Management Team and the Property/Building/Travel Team shown on District Organization charts.

It was also standard practice in the District to organize a team to work together on a specific project. For example, there was the Walla Walla River Basin Feasibility Study team or the Jackson Hole, Wyoming, Environmental Restoration Study team working on their respective study projects.

Teams were also an essential part of the project management business process concepts discussed below.

DISTRICT TEAMS AT THE END OF THE CENTURY

Any team that calls itself a team may be one [or even] without calling itself such. … In the District or the Corps or any type of government or nongovernment business … [it's] very unusual to find someone that's going to go from concept to completed product on their own. If you are just engaging with one other person, you and that person are a team. … We've talked about synergy in Planning [Branch] since we were aware of its usage as a term. It's a very good, applicable term. The level of synergy you've got between people is going to dictate the effectiveness of your team and the quality of your end product.

The closest we've recently come to [standards in managing by teams] is through these efforts with the Project Management Business Process, PMBP, which is an attempt, and a good one, to address just that. ... The whole emphasis … [in] PMBP is a very team-oriented awareness. … We all have our specific jobs and understanding of our functions. We are all linked to others—whether it's input coming to us or our project going out to somebody else—whatever we're doing is affecting a team. A team can be concrete and easily identifiable or perhaps not. We work in teams. No two teams probably look alike, and certainly no two teams are alike because every team involves a different assemblage of individuals, and every individual brings to that team something different and unique. …

I like it [the team concept] because when we all get in one room. I don't have to tell twenty different people the same legal advice over again. I don't have to deal with twenty different stovepipes [branches of the hierarchy] to say, look—I have to go all the way up my stovepipe to have my stovepipe talk to your stovepipe. … We're all are here at the same meeting. If you have any questions, I'll be glad to work with you—here are your options, let me know what you want to do. It's a lot easier. –D. Anthony Weeks, General Attorney, Office of Counsel (92).

Teams make things happen. … First we had quality groups, and we had total project management, and we had zero defects. We've gone through all the programs that everyone's gone through. We're all dealing with better communication and how do you create a matrix organization that works. … Right now, we're trying to do it through a project management paradigm, where, theoretically, on one side you have project managers, but pull their resources from your traditional stovepipe resource owners—to try to get projects done. –Allen N. Pomraning, Outreach Coordinator (93).

Project Management

A management approach that has a long history within the Corps and within the Walla Walla District is project management.

A long-time staff member talked about his experience as the manager of a major study, the Walla Walla River Basin Reconnaissance Study in 1982:

> "I took one of the first project management courses when I was a study manager. What we did as study managers was almost exactly the same as what project managers do. … As a study manager, or if you want to call it PM, you need to be sure that all the work is going to be completed. You certainly have a focus or a goal. Whether it be a design or a hard, physically completed product, or a report—you have a focus and objective that you need to accomplish.
>
> "How are you going to do that? Who are you going to get to do that for you? In terms of study management … you have to organize the team that's going to do the work, because you can't do it yourself. You need to pull in designers. You need to pull in the environmental people. You need to pull in cost estimators. Planning can't do the estimate; it's done by Cost Engineering. You have to pull all of these skills together and everyone needs to know what work they are going to do. How much money are they going to have available to do it, and when are they going to do it?
>
> "As product manager, you have to know the funds that you've got, build [a] schedule … and identify the … tasks. … As a manger, you meet with the team. E-mail those folks. You have to meet with the team on a regular basis, even if it's thirty minutes. You update and manage the funds and maintain schedules. To me it has always happened (94)."

With this type of project management background, Walla Walla District was primed to respond when the Corps introduced "Initiative 88." This was a Corps-wide 1988 management initiative with six elements: "streamlined project approval procedures, project management, defining organizational roles, managing overhead, construction productivity advancement research, and a civil works strategic plan (95)." Initiative 88 was designed to reduce the average total project time within the Corps to seven years.

The Corps' emphasis on project management evolved into a philosophy and practice whereby the Corps would manage all of its activities according to a project management business process. This culminated in 2001 when the Corps issued *U.S. Army Corps of Engineers Business Process,* Engineer Regulation 5-1-11 (96). According to the regulation, "The fundamental … business process used to deliver quality projects and services … within USACE [*i.e.*, the Corps], is the Project Management Business Process (PMBP) (97)."

The Corps outlined its Business Process Imperatives:

"1. One project, one team, one project manager.

2. Plan for success and keep commitments.

3. The PDT [project development team] is responsible for project success.

4. Measure quality with the goals and expectations of the PMP [project management plan].

5. Manage all work with the PMBP, using corporate automated information systems.

6. Build effective communications into all activities and processes.
7. Use best practices and seek continuous improvement (98)."

In 1998-2000, before the formal Project Management Business Process regulation was published, however, Walla Walla District was working to create a PMBP culture in the District. Workshops were conducted for project managers who were given greater responsibility for fund management. In a major effort in 1999-2000 the District outlined and prepared flowcharts covering all of its standing business processes.

The District was also working on integrating lessons learned from one project to another. The East Birch Creek Restoration project was a pilot project for implementing the Project Management Business Process in the District, including documenting lessons learned from that project.

THE PROJECT MANAGEMENT BUSINESS PROCESS IN WALLA WALLA DISTRICT

Virtually everything now is being looked at as a project. Just about everything is going to have a project manager. [We are training on a] work request system, for example … and working on a master schedule, which is something we drastically need to have in the District, so we know what's going on with projects. –Richard Carlton, Chief, Real Estate Division (99).

The other big change that's occurring right now is this project [management] business process. [This gives] more authority to the project managers. They will use the District almost like contractors—call on us [other District staff] for services that they deem appropriate.
–Mark G. Eastman, former Park Ranger (100).

Who's ultimately responsible for it [the project] now? Evidently the project manager. It's a totally different thing. It takes the supervisor—I won't say it takes the supervisor out of the picture, but it takes the office, the skill, the chain of command—it takes that out.
–David L. Reese, Chief, Hydrology (101).

Project management, in theory, is great. The person, the people up here are actually turning out to be more program managers than project managers. … You get with the project in the infancy, such as a study, which is where these things start, and you go through studies, funds, back to construction. The theory is that you get this person here in the trenches who stays with that program and becomes vitally aware and familiar with every aspect of that program—the dollars, as well as the schedules.

You also have the relationships with the team people, the technical people. … We have technical people who are highly skilled, but they may not have the ability to be the project manager because they don't have some of the skills that are needed there. They are working that process, trying to evolve these people, train them. They're working hard on it, and it probably will be a good thing when it's completed. –Diane J. Davis, Program Analyst (102).

I'm aware that we are doing more training than almost any other district in the Corps. I'm very proud of our District for undertaking all the training that we're doing. … They're being assaulted with all these new ideas and these new concepts constantly, and yet, they're being asked to perform work at the same time, and, yes, it's tough.
–Allen N. Pomraning, Outreach Coordinator (103).

Organizational Culture—Walla Walla District

Many Walla Walla District staff members believed that the District has some special attributes when compared to other Corps of Engineers districts. Many pointed out that the District is unique in being located in a small town. Others remembered the District as innovative, constantly involved in cutting-edge projects, as witnessed by the innovations described in chapter 5 of this volume. Some staff members saw the District as moving from a hierarchical, work-driven organization to an organization that is more communicative, more reflective, and more planned, taking thought for the importance of people's family and community lives.

In the box below, staff members reflected on the type of organizational culture they experienced while working for the Walla Walla District.

WORKING AT THE WALLA WALLA DISTRICT

It's been my experience that this District has never been afraid to try anything new. I don't mean to say that we're cavalier about that, but it seems like we're always on the edge of having to do something in a way that we've never been able to do it before. It's been that way for a long time. –Steven B. Tatro, Civil Engineer (104).

[Walla Walla District is] unique in job opportunity. … Where else can you find fish modeling work, numerical models, surface collector research, computer modeling and technology, where you can live in a small town or a rural environment? For the people who want to work in that environment and want that technical challenge—there's not a lot of choices. They end up here and there is not a lot to draw them away. There's not an AE [architect-engineer firm] across the street that says, "Hey, I'll pay you $15,000 more." We'll have guys like myself [working here for] up to twenty-five years now. Offering unbelievable work, challenging opportunity, in an environment that's a small one. –Mark F. Lindgren, Chief, Hydrology and Hydraulics (105).

The group that I came on board with [in 1979], we had a little office [in which] all the engineers were about the same age. We developed our habits and outlooks and skills at the same time. … The old guy that ran the office was really conservative and demanding and really had high expectations. [He] micromanaged the office. I mean, micromanaged! He'd keep track of who came into the office and if he thought people were there bothering you when you should be getting work done. … It was expected that you come to work, that you would really be focused, that you'd get a lot done. …

Now [in 2001], we've got a lot more human-oriented type of philosophy toward management. It's people-focused, and we worry about, well maybe people should have time off because they have to take care of their family. It's something that just wasn't there before. I think that's quite a shift. … For nine months out of the year, they worked overtime in that Cost Engineering room. Every weekend and then every night for months and months and months on end. That was the work ethic that was pervasive in some of the offices.
–Wendell L. Greenwald, Project Engineer (106).

I guess every other district in the Corps is largely an urban district—and that is that people came in from different places. They worked there, and they enjoyed each other's company, I hope, and all that, [but] then they left and didn't see each other till they came back [to work again].
–Allen N. Pomraning, Outreach Coordinator (107).

Certainly the staff seemed to agree that Walla Walla District moved from being more set apart to becoming more integrated into the town and region. Many staff members talked about how the District moved away from being a tight-knit community of co-workers that fulfilled social functions as well as the primary work function in their lives. Changes in organizational culture for District Headquarters staff were, significantly, also related to the move to a Headquarters building (see separate section below).

District Headquarters/Walla Walla Outlying Projects

Walla Walla District staff members perceived that the relationship between District Headquarters and the outlying field projects had grown closer during the period covered by this volume. This was primarily due to easier and quicker communication via electronic mail and phone.

Closer working relationships also arose from a more participatory management style that began to permeate the District. A District Operations manager described how closer working relationships, coupled with a team philosophy, can lead to a better outcome, in this case in the design of a new automated control system:

> "There was a time when I first came to work for the Corps that Chiefs of Engineering, Chiefs of Hydraulics and Design would make statements like, 'We'll give you what you need,' rather than ask. So what happened is, they designed something that wouldn't work. Structural would build it, and it still wouldn't work. …
>
> "Even before the Project Management Business Process, you [at the field project are the customer, controlling the money. …
>
> "So you got … to the latest generation … where they actually start off with a team that includes Hydraulics and Design; [and] people from the projects, operators. … They built [a remote control powerplant operating system] from the ground up. So we're going to get, probably for the first time ever, a system that an operator helped design, or that somebody who maintained it helped design. Where in the past there would have been a designer, one or two people, figuring, here's the best system for you. It wasn't necessarily the best system (108)."

Social Functions

During the 1980s such organizations as the Engineers' Wives Club still existed within Walla Walla District for planning social functions. By the mid-1980s, such functions came under the Association of Corps Employees, or ACE. According to a 1987 article, "ACE sponsors a number of social activities during the year including the annual Christmas dinner-dance, a Christmas party at the mess hall, Engineers Day picnic, as well as coffees and other get-togethers for employees (109)." At that time, ACE sent out cards and flowers in cases of extended illness or death of an employee's immediate family member. The Association also managed the staff food service.

One staff member recalled some of these social functions: "ACE used to have some great dances. … We would go out and rent the hall out at the fairgrounds, and we would decorate it. I remember one year … [a local business] donated twenty or thirty Christmas trees, and we hauled them all in and put white lights on them and put balloons on the ceiling and hired a band and had people come in and cook food for us. Two hundred or three hundred people would show up for things like that (110)."

Women Employees

In 1980, by and large, most women employed by Walla Walla District were working in a secretarial capacity. Although certain sections of the District workforce, such as the Engineering Division and project maintenance, were still heavily male, by the 1990s, more women were found in the trades and in professional capacities on staff (111).

WORKING AS A WOMAN IN THE WALLA WALLA DISTRICT

One of the challenges in Kristine's career has been dealing with the stereotypes held by her co-workers. It has been a struggle at times to overcome the stereotypes of woman managers. Kristine works to foster the understanding that there are differences between all individuals and that one should work with, between, and around, if necessary, the cultural and social relationships that exist in our society. "One should recognize these relationships and use them to enhance the working process." –Kristine Allaman, Chief, Engineering Division quoted in "Women in Management," in the *Intercom* (112).

Nan Riddle, Chief of Logistics, rose to her position through several years of hard work and varied experiences. She began her 23 years in government service in a traditional woman's position at Libby Dam as a GS-2 clerk. … The experience that offered her the most growth was the opportunity and challenge of setting up an administrative office at Willow Creek Dam. … She held several positions through the District before she settled into her current position in Logistics. –Profile of Nan Riddle in the *Intercom* (113).

She is concerned with the underlying anger many women hold toward the male-dominated hierarchy. This anger is because of the feeling women are not heard or appreciated as leaders and that is all too familiar to many working women. However, the energy used for anger lessens a woman's work potential. Women and men need to work together to avoid the traps of resentment (expressed or unexpressed) which occur routinely in the workplace.
–Profile of Joree Brownlow, District Counsel, in the *Intercom* (114).

Her philosophy is simple: "It is my belief that what limits people most is their own vision of what they are capable of. I never let anyone else's opinion about my abilities stop me from achieving the goals I set for myself." –Profile of Delores Owen, Powerplant Shift Operator, *Intercom* (115).

I finished all my college credits in December 1980 and came to work full time in January of 81. Sometime in that first year that I was working here, I got a call from city directory … and they said, "You work with the Corps of Engineers." I said, "Yes." They said, "Are you a secretary?" I went, "NO." But that was the stereotype. If you were a female and working for the federal government (it was not just the Corps), you were secretarial staff. …

I remember being one of the few women in the Corps and it bothered me a little. … Back in 78-80, there were not that many of us here. What bothered me was that later on the Chief of Planning Branch was calling me his EEO [equal employment opportunity] project. I thought, jeez, did I get hired because of my grades and my potential or just because I was female. That bothered me later on. I never did figure out which way it was. …

The environmental side started hiring more professional women first. … I got to looking around and saw that darn near everybody in Environmental Compliance was female. … Contracting [also] had a lot of women.

I was a little intimidated at first because I had two strikes against me. … I remember going out and working on, when we were trying to do something with the Umatilla Chemical Depot, when they were going to start building the incinerator. The Corps was asked to look at some of the pipelines to get water from the Columbia River and some of the roadways. We wanted to put a pipeline across a wetland area. I'd been looking at the regulations, and you are not supposed to be out there destroying wetlands. There were already some pipeline crossings. Our engineers were … [saying, we are] going to put another one right down the middle. … [I asked] why can't you move it closer to where they've already disturbed the wetland and leave this alone? I was feeling about two inches high, mentioning this to the engineers, because they didn't think too much of me—besides I was also young. …

It's not as intimidating any more to sit in a room even if I'm the only female there. I don't worry about it as much anymore. I've been here long enough that those guys know that I know what my job is, and I'm not afraid of them anymore. Some of them have gotten used to the idea that women are professionals. It took a while, but most of them pretty much accept it. I did see that change. –Sandra L. Shelin, Environmental Compliance Specialist (116).

That was an interesting experience for me. That was the first time I'd ever worked with all men. I can remember that when our supervisor left … we had a big party for him. … He was a great guy. He had a robust sense of humor, and he was really an interesting guy. So we threw a big St. Patty's Day retirement party for him, since he was an Irishman. The guys went together, and they put something about [him] getting his ducks in a row. They made this card with all these ducks lined up, and there was one duck that was out of synch. That was the one I had to sign my name on. –Diane J. Davis, Program Analyst (117).

Federal Women's Program

One of the most active equal employment opportunity programs in the District during the period covered by this volume was the Federal Women's Program: "Every two or three months, we would have big seminar[s]. … We had some great turnouts. We would have a couple hundred people show up for one of these seminars that we would throw. … We would have motivational-type speakers come in and talk to us. … Every fall we would have a multigovernment agency women's fall seminar. It would be a two-day seminar. … The men would go too (118)."

'It really hasn't seemed that long' for 39-year employee

Elizabeth Johnson, the senior active District employee, has completed almost four decades of service.

She started working here in March 1949 and is looking ahead to retirement next March.

When she began working for the District, she thought it would be for only nine months. Prior to Corps employment, she had worked as a secretary for the Walla Walla County prosecuting attorney, married and decided to come to work for the federal government. She had been raised on her parent's farm above Ice Harbor.

"When I first started, we were all crammed into one building and working conditions were crude," said Johnson.

She said the District's first employees were working on apple boxes, obtaining supplies from cardboard boxes and using manual typewriters. Occasionally, the carriages would fall out of the typewriters.

Air conditioning was not provided during the District's beginnings and Johnson can recall one worker wrapping his arms in material to prevent perspiration from flowing on the linen drafting sheets.

While some employees including Johnson were housed in Army surplus buildings, the administrative office was headquartered in the old Union Bulletin building in downtown Walla Walla at First and Poplar.

Elizabeth Johnson
senior active employee

It was a busy time for workers in those first years. Johnson recalled that for several years she worked overtime and as late as 10 p.m. with a break for dinner at a cafeteria in the building now housing a sealant factory on the fringes of the current District airport complex.

"There were drawers of work to be completed," she added.

She began her employment as a secretary for the survey section, then became a draftsman. One of the first projects she worked on was the design of Zintel Canyon.

Interestingly enough, the project has seen new life during the past year.

"Never say die," says Johnson.

One of the most impressive projects for her was the design and construction of Dworshak Dam, but early in her civilian career she was interested in the placement of tetrahedrons at McNary Dam, closing up the structure's coffer dams.

The visit of President Dwight Eisenhower to dedicate McNary Dam in 1954 was one of the highlights in her memories, said Johnson, because her brother, Bill Lilley, a Walla Walla Union Bulletin photographer at the time, took her to see the room at the Whitman Hotel where the president would be staying the night before the dedication.

She was also able to photograph the president near the city post office and recalls he upset some of the Secret Service agents protecting him by standing up in his bubble-top car, designed to protect the nation's leader.

Her first impressions of Col. Whipple, first commander, was that he was "very military and formidable," but noted he always had a smile and spoke to employees even if he might not always know their names. Col. Tom Tandy, who had seen service directing troops in Korea, was regarded as a tough taskmaster and Johnson said his military experience of barking out orders continued at Walla Walla.

Her first supervisor was Jack Brokenshire, former chief of surveys, who later left for the Seattle District where he retired, then Oliver Smith, chief of surveys, and Claude Waggoner, chief of survey and drafting branch and her current boss, Ken Pomraning. Her first drafting supervisor was William J. Van Wyk.

Waggoner is given much of the credit in Volume I of the District History for conceiving and developing an accurate and sophisticated system for obtaining mass topography and measurement of earthwork quantities.

Johnson said Waggoner had tremendous foresight and brilliance in developing original ideas to undertake projects. If he had been here during the installation of the CADD computers, Johnson said he would have been right in the middle of the new technology. Asked why she has worked so long at the District, Johnson said, "It really hasn't seemed long."

Greening of the District

Walla Walla District, during the 1981-2000 period, saw a significant increase in the number of biologists and environmental compliance specialists employed. This followed a Corps-wide trend. The full extent of the District's involvement with the environmental restoration and stewardship of natural resources is recounted in chapters 7 and 8.

One District staff member described the "greening of the District" in the following words:

> "When I came here [1980], I believe there were one or two biologists, and there was one archeologist. Any of the nonengineering sciences were either nonexistent or had a token person who signed off [on projects].
>
> "If you look at the organization today, biologists and the environmental sciences and fish and things like that, represent half of the District's work and work load. It is also the kind of people that we now have. It's changed who we believe we are. I have a T-shirt at home, and … it's green, and it has three leaves growing out of a Corps castle. Today, I have worn that a few times and people go, oh, environmental work at the Corps. At the time that T-shirt was created by someone here in the District—that was an enormous project against the engineering culture. It was bitterly [resented]—and if it hadn't been privately funded, it would have never existed (119)."

Military-Civilian Interface

Change of Command Ceremony, 2000, at McNary Lock and Dam

Walla Walla District, like other units of the Corps, is a hybrid organization in that a military officer heads it, but the staff members are civil service employees.

Beginning in 1990, the District saw a change in military leadership in that it began to be commanded by officers at the rank of lieutenant colonel rather than at the rank of full colonel. The normal tour of duty for District commanders was reduced from three years to two years.

DISTRICT STAFF COMMENT ON THE MILITARY-CIVILIAN INTERFACE

We don't have full bird colonels any more [in Walla Walla District]. We have light colonels. They have a different attitude. … They seem to be out there too busy trying to make a name, a splash for themselves. … We're not getting the expertise, the maturity, the leadership skills, or whatever, that we got, in some cases, with full birds.
–Sandra L. Shelin, Environmental Compliance Specialist (120).

When you change somebody every two years, there's no drive, there's no reason. They're gone before they implement. We're working on budgets two years from now. This man [the Commander] is making determinations on what's going to happen two years from now. Guess what? Two years from now, he won't be here. He won't even see those determinations. … [The District felt] the impact of going from a full colonel to a light colonel. They had a whole lot more experience. They weren't younger than we are. That's changed—as I get older, they've gotten younger. But we no longer wield the stick that we used to have in our Division [*i.e.*, Northwestern Division]. We're light colonels, and the other people are full colonels. It's a pecking order. We don't get the budgets we used to get. We don't get the manpower we used to get. We don't get the programs we used to get.
–Jimmie L. Brown, Environmental Resource Specialist (121).

I see very little value added in having military people in our District. At our [Northwestern] Division conference, I brought that up as one of the issues we need to talk about. What is the value added? They come in here and they're here for two years and there again they are trying to make a name for themselves. … It's absolutely unique, the military-civilian interface, and [tenures of] such short periods. –Phil L. Hixson, Supervisory Outdoor Recreation Planner (122).

So we've got younger Commanders coming in, but they're sharp. So, they have to get up to speed probably within the first sixty days, 'cause they give them information ahead of time. If they have any major changes they want to make, one, they have to make sure that whatever they have in mind doesn't mess up the District, and the other one is, again in the last six months no one's going to listen to you anyhow. So you have about a year, maybe a year and a few months to put your plan into action. So you have to analyze the District, find out where the greatest need is, what you can do to help them, and make those changes, and they've got to be short term. –Steven W. Voss, Supervisory Engineer, Operations Division (123).

I've heard the Army's side of the story, but it's difficult on two counts. One is that the military-civilian interface is as difficult to accommodate to both sides of the fence—needs, attitudes, philosophies, motivational techniques, and vice versa. [It's difficult] for the civilian side to accept the inherent profiles, attitudes, standards, and norms of certain military personnel. So there's learning that has to happen on both sides. Certainly each individual [commander] comes in with … [a] set of goals and objectives. I'm not so sure that those individuals are always weighing the long-term ramification of some decisions that are made that the rest of us have to stay and live with long after they're long gone. …

I have a real difficult time in discussions with people like new commanders who maybe don't recognize the sensitivity and don't have the tribal history, who say, "Well, we have a project to run and we took over the land." They just aren't on board. Someone like Colonel Wagenaar [the then current commander] is totally on board and came in prepared, knowing what the laws were, and that really does make a [difference]. What we're seeing is [that] commanders [are] becoming more and more educated. I would hope if they are sending them to Walla Walla or anywhere in the Northwest, they would put them through tribal 101.
–Lynda G. Nutt, former Native American Coordinator (124).

The military's leadership training and style is changing. It's evolving a lot. It's because they're dealing with a different kind of soldier. They're dealing in a different technology environment. … In the end it will be leadership that will evolve the organization. So, yes, we're training leaders. The Army is involved in that process—with training our leadership.
–Allen N. Pomraning, Outreach Coordinator (125).

Internal Promotions versus External Recruiting

At the beginning of the period covered by this volume, a very significant and noticeable characteristic of the Walla Walla District was the fact that there were many, many staff members who had been here ten-years or more. It was also notable that most of the middle and upper civil service managers had risen through the ranks by service at Walla Walla District.

By 2000, the District still had a large percentage of staff that had been with the organization over ten years and a large proportion of staff that had never worked in another branch of the Corps. However, there was significant movement toward recruiting branch and division chiefs from outside the District.

A District staff member commented on this trend:

> "In Walla Walla, when I came in [1976], we had a lot of original District people. … There were certain ways of doing things, and over the last twenty years, there's been a real transition in terms of newer, different [staff]. The inter-relationships [were] interesting—a younger, more broad-spread, less unified group had to learn how to work together. … [Things became] a little more chaotic. [At one time] there was a very comfortable zone. Now you've changed all that. …
>
> "As newer people came in, the newer people reflected society's wants. A lot of them wanted to solve environmental problems. I don't think it happened overnight. … One thing I like about the Corps—they tend to look at things objectively: here's a benefit, a benefit, a benefit, cost, cost, cost. Put in what we think is the smartest thing to balance them all out. That [was the] general attitude of the Corps with this new blood

> that tended to be fairly environmentally oriented. … The Corps had a fairly objective, 'let's do this right attitude,' and, as new people came in, it ended up with some fairly good relationships (126)."

The Chief, Civilian Personnel Advisory Center, gave more perspective on this trend: "I mentioned that those branch chiefs or division chiefs left—those jobs were filled from within. Starting about the late 1980s, we began to see from USACE some instruction and from commanders [on external recruiting]. The result was [that] beginning about the mid-80s we changed. We looked at outside candidates. We brought in different kinds of views. So I'd say now … an outside candidate has every expectation, a legitimate expectation of being selected (127)."

Another staff member talks about this change and how he sees it as reflecting and causing changes within the District's organizational culture:

> "The Corps is often seen as a government agency, and I believe sometimes, people come to government agencies because they're looking for security. They're looking for a stable retirement system. They're looking for a relatively stable job. I believe that, being a government agency, we tend to attract people who are looking for high stability. We attract low risk people.
>
> "The downside of that is the Corps is an extremely dynamic organization. We, because of our constant change of military leadership, are constantly changing focus. That's the best and the worst of the Corps. It's the worst because it causes people to feel unstable. It's the best because it makes us a very agile and dynamic organization with extraordinary ability to change to suit the times and to meet new missions. …
>
> "We have adopted a value that you can always get better and more insightful and broader people from the outside. The downside of that value is that … you begin not to train people to become leaders in the future. Yes, we have our programs and Leadership Development Program, and there are people in Engineering who attend certain … [programs] that have to do with leadership. … Do we do them as robustly as we used to? No, we do not. It comes down to our value around hiring. If people want to climb the career ladder, they almost have to choose to move (128)."

Recruiting Difficulties

In trying to recruit staff from outside the organization and from outside the area, the District faced a major challenge. A staff member talks about the particular challenge of filling positions at remote, rural field project locations:

> "Historically, since about 1985 on, [it was] more difficult to find people. Lower Monumental is a fairly remote location. We didn't have a lot of trouble getting people into Ice Harbor—near the Tri-cities. [We had the] same difficulty [at] [Little] Goose and [Lower] Granite. …
>
> "Another issue that came up too—more and more employees had a spouse that worked. In a little area like Lower Monumental, there were not a lot of opportunities there, so when you are hiring people, lots of times, you are hiring a spouse too.
>
> "[We] started struggling in the 1980s and are still struggling (129)."

Retirements

The Walla Walla District workforce, as throughout the federal workforce, saw an increasing percentage of retirements as the 1981-2000 period progressed.

The attractiveness of retiring was compounded in 1993 when, in an effort to reduce the government workforce, the Office of Personnel Management, offered attractive buyout options, equal to $25,000 or the employee's earned severance payment. More than 30,000 Department of Defense employees opted to take advantage of the buyouts in 1993-1994 (130).

Contracting for Work

The Walla Walla District, and indeed the Corps of Engineers, has a long history of contracting for work. In the 1990s, the District was directed to increase targets for contracting-out work. For example, the target for 1996 was to contract out forty percent of engineering design work and over sixty percent of planning work (131).

Working with Architect-Engineer Firms

The District had a strong tie to architect-engineer firms, referred to as "AEs." The Corps, with its technical expertise, was able to engage in a type of partnership relationship with these firms more so than would be expected from other contractors: "It's interesting work. They [the AEs] like being involved in it. Private AEs don't usually work with an engineering organization. … The Corps comes in, and we bring a lot of expertise to [the process]. … Some AEs take a little time to get used to that, but after they get comfortable with it—it's like an added resource. The Corps can provide a lot of direction, where maybe a city would have no idea what's going on (132)."

Another staff member commented on the basis of Corps relationships to AE firms: "We [of the Corps] are highly respected by the AE firms, not just in the United States, but in the world because we have this wonderful combination of technical expertise and the ability to project manage—and particularly to cost estimate and contract. … We do that with all the Army values. Most important in the international realm, is integrity. We do it in a straightforward and truthful manner. We do not engage in bribery or subversion or government skewing of politics or things like that (133)."

Staff in Walla Walla District were also able to work with smaller, less experienced companies: "The way we work in Construction [Division], if we get a contractor who has no fault except in experience, we can work with that. We may have to take them by the hand and lead them through the process. You never know, they may turn out to be your star contractor in ten years (134)."

Sometimes the remote location and the special requirements of the District made it difficult to find a contractor: "I guess the other interesting part about the Lower Snake Comp Plan program was some of the locations. We built these hatcheries and hatchery satellite facilities all over the state of Idaho and northeast Oregon and southeast Washington (135)."

Contracting for Other Services

Besides contracting for design and engineering work and for construction, Walla Walla District contracted for many other types of work during the 1981-2000 period.

Sometimes contracting out was done routinely, other times it was done to cover an unusual and temporary increase in workload: "We do contract for [real estate

appraisals. … If we needed to, we could contract for negotiators and things of this nature. If we got into a situation where we … a major workload change … it would probably be desirable to look at some temporary assistance, assuming our sister districts couldn't provide it. Because it doesn't make any sense to bring anybody in on a permanent basis when you've got short-term requirements (136)."

By the end of the period covered by this volume, Walla Walla District contracted for many services, such as law enforcement, trash disposal, and custodial services, related to recreation areas and facilities. The District also frequently contracted for the production of major reports or sections of reports. Farming on wildlife mitigation areas was also contracted. As of 2000, a good part of information technology, such as the District help desk and hardware and software support was, at least in part, provided through contracted services.

Commercial Activity Program

In 1983, the Office of Management and Budget issued *Circular No. A-76* (137), which established a policy regarding the performance of commercial activities by federal agencies. Functions within agencies were studied to determine if they were "inherently governmental." Within the context of the Corps, such functions as the following were generally considered inherently governmental: cost estimating for projects; assuring that Corps activities and projects complied with environmental rules and regulations; supervision of other government employees; overseeing government purchases and other expenditures; and administering government contracts.

Under OMB Circular A-76, Walla Walla District looked at many of its activities that were not inherently governmental. Beginning in 1985, "commercial activity studies" were performed regarding the following functions: the mailroom; audiovisual services; management of Habitat Management Units (see chapter 8); and operation of recreation areas. In 1991, the District motor pool and facilities management were studied.

The studies at the District's field projects often did not lead to privatization. Either there were no bidders, for example for the management of a particular recreation area, or the government cost was lower than the lowest bid. A Walla Walla District staff member describes the recreation area studies: "We did A-76 studies … in the early 80s. We hired specifically people in the comptroller's shop to make sure we did it right. I hate to say it, but I worked on them for two or three years. … We kept everyone in house. We didn't lose any of them (138)."

Another District staff member commented on his frustrating experience with a commercial activity, or CA, study: "In about 1990 … we did our CA study out at Clarkston. … We paid $64,000 for the contractor [to help with the study] from Washington, DC, to send three people out here and, essentially, take any notes I gave them and type up anything I told them and put it in [their report]. … We did a study at McNary and Ice Harbor combined [for operating the projects] into one study and we actually had to write the specs and then you bid. We had one bidder, and they were a million dollars more than what the Corps said we could do the job for. Then we went to Dworshak, Granite, and Goose. They had no bidders for actually operating [the projects]. … [There were only bidders for managing] the parks and recreation (139)."

At Walla Walla District Headquarters, the result of commercial activities studies was more mixed. Mailroom services, audiovisual services, and reprographics were contracted out. The motor pool and facilities management functions were retained under Corps staff.

WALLA WALLA DISTRICT STAFF SPEAK ABOUT PRIVATIZATION

The privatization is one thing that bothered me. … [The idea is that] a private company, can do a better job than the Corps, [that] they'd be more efficient. I don't always think that's true. … We [government employees] become nothing more than glorified contract administrators. We spend all our time doing accruals and obligations and writing scopes of work and negotiating and paying somebody else to get the expertise while we just sit here and push paper around. I've done it. I've had to do it. Sometimes it's helpful, if we don't have the in-house folks, we can contract out. But you have to figure out, how much time is it going to take me to get a contract, a delivery order, a task order put together. How much time am I going to have to spend babysitting these people and getting them to do what I need them to do because they are not federal employees, they don't know the rules and regulations, they don't know how I need it done. …

We're running into that sometimes with dredging EIS [environmental impact statement], which we did have a contractor, which helped us get through the preliminary draft. They are sitting in Bellevue; they're sitting in Portland. … They're sitting at Pasco. They are not sitting here next to us. … It was hard to keep track of what they were doing, plus all the other work we were doing. … We're reading it, realizing, in some cases they did a great job; in other cases they missed the mark, because … they don't understand the nuances and the subtleties. They are not here with the changes in policy that are being made as we're working with the agencies. It takes time to feed that back to your contractors so they can plug it back into what they are doing. Right now, we are trying to fix everything with in-house people because we felt like we didn't have the time to write another task order to get these people back on board to fix all … that needs to be done. …

It's more layers you have to go through. We have some great people who are contractors, but the process doesn't always work. Less timely response is part of it. Sometimes you can go to a contractor quickly, but other times you cannot go to them quickly. It's faster if you can do it in-house. … We're already here. We're already paid. You don't have to negotiate with us. …

They are … [assuming] the government people are wasteful and give it to the private folks. I don't always think that's true. I don't think that we are that wasteful, other than that is part of the way the bureaucracy is set up. We are also not a business.
–Sandra L. Shelin, Environmental Compliance Specialist (140).

That's one thing everybody agrees on from all around the Corps: … because we're government, we can do things. … We have a special role that is a nonprofit role. We're trying to do good things for the country here. … Whenever people say we need to be more like private enterprise or industry, I say, [expletive], because, hopefully, we're special. We're different. Hopefully we can fill a role that nobody else out there can fill.
–David L Reese, Chief, Hydrology (141).

Work for Others and Customer Outreach

The Business Development Team within the Planning Branch managed the Business Development program, coordinating Walla Walla District Customer Outreach Program. This included identifying potential customers, leading and supporting customer efforts

to support nontraditional customers, and tracking program success. The Boise Field Office, described above under the section on Planning Branch, was a part of this outreach effort.

During the twenty years covered by this volume, District staff worked on many projects in support of other federal agencies. The District, for example, supported cleanup of the Hanford Nuclear reservation and the Umatilla Army Depot (see chapter 9); lighting of airport runways for the Federal Aviation Administration (chapter 4); cost accounting by the Department of Energy and the Environmental Protection Agency (chapter 4); environmental compliance work of the Emergency Management Agency following widespread flooding in the Northwest in 1996 (chapter 4); and building of the roller-compacted concrete dam at Los Alamos after the Cerro Grande Fire (chapter 5).

A staff member describes another project for a sister agency: "We looked at EPA's [the Environmental Protection Agency's] cost-estimating process at all of their regions. So we traveled across the country. We here in Walla Walla were selected to head that up because we had the experience of working with another agency on a nationwide level. The team was spread across the country. So we were a natural pick to do that process evaluation for EPA. That developed quite a few contacts (142)."

In chapter 4, the District's Outreach Coordinator discusses some of the distinctions and interpretations of work for others in the District (see feature box, "Work for Others").

Employee Suggestions

Beginning in 1986 until 1988, Walla Walla District participated in a Productivity Gain Sharing test. The Corps was looking at Productivity Gain Sharing as a program to "encourage development of innovative productivity and cost reduction ideas (143)." Productivity Gain Sharing gave employees monetary grants for improving productivity. Under the test, every supervisor established an operating budget. In offices that realized a surplus at the end of the year by operating more efficiently than budgeted, employees would share a part in the surplus. This test program was not implemented Corps-wide.

The District did, however, continue to administer a strong suggestion program through the Employee Incentives and the Army Ideas for Excellence Programs. In 1990, Washington, DC, Headquarters recognized the District as having the best suggestion program in the Corps. In that same year, a District employee also received an award as Suggestor of the Year for the entire federal government, while the District received a national honor from National Association of Suggestion Systems.

Old District Headquarters

Walla Walla District was established in 1948. After several physical relocations within the city, the entire staff was consolidated in a single location at the Walla Walla Airport. The facility was built during World War II (1941-42) as an airbase and temporary hospital facility. At the time it was built, the facility was intended to be used for a period of fifteen to twenty years.

Surplus Airport Buildings in 1949 (144)

A cold snowy day greets employees housed in the surplus airport buildings in 1949, the same structure occupied today 40 years later on the District's 40th anniversary.

Intercom
October 1988 **5**

Old Walla Walla District Headquarters, 1990s

By the 1980s, officials found that "most buildings lack the structural adequacy to accommodate their required function (145)." The buildings were wood-framed with asbestos shake siding. All roofs were surfaced with rolled asphalt. Though regular maintenance was performed, the roofs leaked in numerous places. "Care must be taken to locate heavy filing cabinets and other equipment, in special reinforced floor areas. … Recently, one floor settled 6 inches and had to be jacked up and supported. … Building security is minimal. There is currently no fencing at the office complex, which would prohibit unauthorized access to the buildings after hours. There are over

50 active building entrances (146)." The old Headquarters was also totally inadequate to house modern desktop and other computing equipment and wiring. Maintenance of the facility was beginning to be prohibitively expensive, and energy costs were rising at an alarming rate due to inefficient building configuration and lack of exterior insulation.

In March 1986, the General Services Administration did a survey of the Walla Walla District Headquarters complex and found at least eight major fire and safety violations, including no automatic sprinkler system in six of the 27 buildings (147). The Administration determined that it would take $7 million to rehabilitate the facility, and this would still not bring the complex up to standards for federal office buildings. An additional inspection by the Federal Protection and Safety Division generated another list of safety and fire hazards and found that the facility was under "extreme risk" with danger to life and property (148).

In 1986, the District began the long process that led to a new Headquarters building located in downtown Walla Walla (see next section).

OLD DISTRICT HEADQUARTERS—MEMORIES AND REFLECTIONS

The move downtown—for me that was a significant change. Out at the airport, we were in World War II Army airbase hospital buildings that were only temporary, should never have lasted forty-some years. We had a unique situation out there. … We're in these lousy quarters, by gosh, [and] we are going to come together and have this great group. It had character out there. Okay, so the roof leaks. The windows leak when they are shut. The snow blows in. You deal with it. Everybody had windows. You could adjust your temperature. Okay, it was chilly in the winter. I do like this [new] building because it's warmer in the wintertime. … To me it was just a whole different atmosphere.

We had the mess hall. We didn't have e-mail. I don't know how much would have changed as technology changed. I just know that at the time that we were out there, I felt that I knew more people than I do in this building. I saw them more. You had to walk down the hallways to get to the photocopier. Walk to get to the restrooms. Walk to get wherever. We had a volleyball court out there. You got to play. They told us we couldn't have [a court at the new building] because it would be a bad image. …

I realize that it was a security nightmare. With all the open windows, open doors. But … we had a great view of the mountains. … Gorgeous sunsets, gorgeous sunrises. Watch the snow on the mountains. We had wildlife. We had trees. … We didn't have all the vandalism [that has occurred at the new building]. We're at the airport. Nobody bothered us. …

I wasn't the least bit interested in coming down to a new building, to be very honest with you. If we … [had to have] a new building, I would have just as soon had it up there [at the airport] because that's what we considered to be home. You could … walk out around the fields. … It isolated us to where it drew us together. We'd have our Christmas parties, and we'd have our other … [celebrations]. It used to be, we were all the Walla Walla District. Now, it's: you're IM; I'm Hydrology; you're Engineering. We've lost it. We don't have the bond, in my opinion, any more. –David L. Reese (149).

When we were in the old building, yeah you could see out through the cracks in the walls. … When it blew outside, it blew right through the middle of the building. Cold as hell in the winter—but, you know what?—we all went to the lunchroom. We all had lunch together. You knew everybody in the building. Not anymore. Nobody leaves their cubbyholes. It just made us different. –Jimmie L. Brown (150).

Way back when, we were out at the airport. Those buildings were … ultimately transferred from the Army to General Services Administration for maintenance and operation, and then we occupied the buildings for our District under an occupancy agreement with General Services Administration. They were in terrible condition. They were hard to heat, hard to cool, hard to get from one organization to another, going through the hallways. They were a real fire safety concern. … [Fire safety] was the real driver. That was one of the main drivers in getting authority to get out of that building. –Richard Carlton (151).

The mess hall was just a dump, but we did go there for coffee—and that was big. A lot of people took coffee breaks [together]. We'd all sit in the mess hall and have coffee, and you'd see other people. That's when you would interact with other people during that period. As a matter of fact, I formed some wonderful friendships that I've maintained to this day with retirees because of the coffee room. That's an interesting sociological thought here. Maybe that's one of our issues here. We aren't doing coffee anymore. We're all staying [at our desks]. We're not doing coffee; we're not going anywhere for lunch. We used to eat our lunch at the mess hall. You wouldn't eat your lunch at your desk. You would move and go into the mess hall. …

We started the big turkey dinners back in those years. We had the big turkey dinners in the mess hall, and that was always a big thing. That's where we'd always have our seminars with our people, our special speakers, and we'd go up to the mess hall with chairs.
–Diane J. Davis (152).

The building was condemned, annually, by the fire marshal. They were World War II barracks, and, although they had put up some asbestos door fire stops between them, there was a lot of honest fear [of fire]. … We had a demonstration across the airport where they purposely burned one of the buildings. They thought it would burn in about fifteen or twenty minutes. The entire building was engulfed in about two minutes. The buildings were very dry, very old wood. … Because they had these nice hollow round ceilings up above, they made perfect chimneys for fire distribution. …

If you look back into the fifties, there were, I believe … [over a] thousand people working here at our high point. … By the time I came to work in 80-81, the District was down around four hundred people in those buildings. Everyone was distant, remote, secluded. For those who are truly introvert and liked very quiet, unbothered space, there was space. That is the one thing the old buildings offered. –Allen N. Pomraning (153).

New District Headquarters

"The project that changed the District more than anything else during that period [1981-2000] was the creation of this building, because it changed our self-image as to who we were as an organization. It also, at the same time, allowed the implementation of some major and wonderful IT [information technology] tools that everyone here uses and takes for granted. …

> "Although we never spoke of it, the architects, at least had the vision that this building would give employees pride. I see people come to work, and you'll say, where do you work, and people with pride will say, 'I work at the Corps of Engineers (154).'"

Clearly, by the late 1980s. Walla Walla District was in need of a new Headquarters facility. In 1985, the District received authority to build a new building (155) and by June 1990, the District had developed its *Concept Design Report* (156). Uncertainty about the continuation of the District (see above section) caused some delay in building the new Headquarters. The process for designing and relocating the District to downtown Walla Walla was complex, as described in the box below.

New Walla Walla District Headquarters Building

THE NEW BUILDING—VISION AND PROCESS

Although it appears that we are randomly thrown into the building, the truth is that a great deal of thought and a lot of negotiation was put into who sat where. Part of it had to do with who would interact with whom. In the old building, each group had their own little wing. … What we were trying to do in this building was to create more of a team culture. At the time that the building was being designed, teams were just blossoming in the corporate leadership culture. …

There was one man with a vision. His name was Carl Shott, and he was the lead architect for the building. In the end, let's see. It was Leonardo DaVinci who said—and he was speaking of the creation of chapels at the time—but he said, "The best designs come from a single man." … He was speaking to the fact that someone has to have a grasp of everything, so that, as the committee's work and the details are ironed out, the details don't overwhelm or skew the overall design. In this case, that man was Carl Shott who not only designed the building, but, I believe, understood the function of all the groups and committees; worked continuously with the chiefs and the branch chiefs, and spent a great deal of time with the Information Management group and the Construction group. …

We had a design-construction project manager, and … we also had an IT [information technology] project manager who did nothing but take care [planning the] phone systems, and … the LAN systems, and … the planning for all of the software and the hardware that would go into this building. … To the ordinary citizen working on the floors, the microcomputers came down [to the new building], but what they didn't see was everything behind that microcomputer was new and different, completely different. …

[There was a design for a new building that would have been built out at the airport.] We looked to the Bonneville Power Administration building in Portland, Oregon. … It's a half-round cylinder, and it is, I believe, seven stories tall. We looked at that building, and it had wonderful energy efficiency. It had great office layout.

However, when it got to [national Corps] Headquarters and the Army, they looked at it and said, "We don't create round buildings. We want something square." So, based strictly on the architectural, the exterior design, that building was rejected. …

At the same time, across the nation there was a real concerted effort to begin to place Corps facilities downtown. So, as a result of our difficulties, we ended up teaming, actually partnering with the City of Walla Walla. [The District] got a lot of assistance, both lobbying assistance as well as political assistance, from the City of Walla Walla, who wanted to keep the District here, who was concerned that the rejection of this other design meant that the Army had other plans for this District. They insisted that it was important to the economic health of this town and this valley to maintain the District's presence.

So, in the lobbying effort, they also became involved with wanting the building not only in Walla Walla, but downtown. [City officials] felt that, by being downtown, we would shop a little more. We would go to more lunch places, which has turned out to be very true. We would be here and be more of a part of the community. This particular place where we are today was a lumberyard and a combine repair facility, and generally an eyesore. … So, by cleaning up the lot and building this great facility here, they've actually improved the downtown a lot.
–Allen N. Pomraning (157).

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In hindsight, it was a very wise decision. It proved to be beneficial to both the Corps and the local entities. The thinking of the locals was that by having the Corps come down, that would be a core area in the business district that, hopefully, would improve the development of the City. …

The new facilities themselves led themselves to a more professional attitude and environment. To be honest, a lot of people were embarrassed about our facilities at the airport. They hated to have customers come in because it looked so terrible. I don't think we presented or represented the Corps of Engineers well in that other building.
–Richard Carlton, Chief, Real Estate Division (158).

Site Environmental Cleanup

The site that the City of Walla Walla offered the District was the site of the old Whitehouse-Crawford lumberyard. Unfortunately the site required some extensive environmental cleanup work:

"In the area where we are right now [Salmon Room, north end, central] was their paint storage. … You had underground tanks. Also, the paint building at some time burned and all the material went into the ground. The City [of Walla Walla] was going to make this site available to us. One of the requirements was to make sure the land was clean. We did have some underground tanks that they did have to remove. They did find some solvents in one area, very close to here, that had to be removed (159)."

The Move to New District Headquarters

Prior to the move, Walla Walla District engaged in a massive cleanup, eliminating the forty-year accumulation of unused material. "We used to have mountains of stuff," said one staff member. "We moved, and all the stuff was thrown away 160."

Another staff member described what he perceived as a loss of information with the move:

> "We made some mistakes. It was like: we are not going to have any room in that new building, ditch everything. We threw away records, documents, anything. … The big push was: cleanup days, office cleanup days, clean out everything, get rid of everything. Everything's going to go to electronic. We don't want hard copies of anything. Get rid of it all. We dumped a lot of important documents in history because we keep looking around going, 'Has anybody seen this report?' You can't find them now. Where did they go? I don't know where all the aerial photographs went. We have some of them. I don't know where they all are (161)."

A contractor did the move. As described by a staff member, the move went relatively smoothly: "The move itself went fairly quickly. I thought it went fine. One day you are in the building up there, the next day you're down here (162)."

Files Stored at the Old Headquarters

Notes for Chapter 2

1. Opbroek, Dave A. Interview. Walla Walla: NWW, 5 December 2001.
2. President's budget includes $74.3 million for NPW in FY 84. *Intercom*, 18 February 1983, p. 6.
3. PL 99-662.
4. PL 102-486.
5. Bonneville Power Administration. BPA, Corps applauded for cutting red tape. News release. [Portland]: The Administration, 27 January 1998.
6. Voss, Steven W. Interview. Walla Walla: NWW, 26 June 2001.
7. Bonneville Power Administration, Bureau of Reclamation, and USACE, North Pacific Division. *Columbia River System Operation Review, Final Environmental Impact Statement*. Summary, main report, 20 technical appendixes. Portland, OR: The Agencies, 1995.
8. USACE. Walla Walla District. *Interim Dredging and Disposal of Dredged Materials: Snake and Clearwater Rivers (2000-2001), Washington and Idaho*. Walla Walla: NWW, 26 September 2000.
9. USACE, Walla Walla District. *Lower Snake River Juvenile Salmon Migration Feasibility Report/Environmental Impact Statement.* Final. Walla Walla: NWW, 2002.
10. Planning Division. *Intercom*, 30 December 1987, p. 14.
11 PL 91-190.
12 Davis, Diane J. Interview. Walla Walla: NWW, 21 October 2001.
13. USACE, Walla Walla District. Boise Office. Walla Walla: NWW, [2000]. INTERNET: http://www.nww.usace.army.mil/boise/outreach.html.
14. Davis interview.
15. Brownfields are abandoned, idled, or underutilized industrial and commercial facilities where expansion or redevelopment is complicated by real or perceived environmental contamination. For more on Corps involvement with the National Brownfields Cleanup and Redevelopment Initiative see: USACE. Environmental Community of Practice: Brownfields. Washington, DC: USACE, 2002. INTERNET: http://hq.environmental.usace.army.mil/programs/brownfields/brownfields.html.
16. First woman to head Engineering. *Intercom*, September 1992, p. 9.
17. Hackett, James S.. Engineering chief picked for SES slot at MRD. *Intercom*, fall 1995, p. 5, 12.
18. USACE. *Construction Equipment Ownership and Operating Expense Schedule,* Engineer Pamphlet 1110-8. Washington, DC: USACE, published annually.
19. USACE. *Civil Works Construction Cost Index System*, Engineer Manual 1110-2-1304. Washington, DC: USACE, published annually.
20. Construction Division. *Intercom*, 30 December 1987, p. 18.
21. Opbroek interview.
22. Construction Division. *Intercom*, 30 December 1987, p. 18.
23. Walker, Lawrence P. Interview. Walla Walla: NWW, 18 June 2001.
24. Hixson, Phil L. Interview. Walla Walla: NWW, 10 July 2001.
25. Carlton, Richard. Interview. Walla Walla: NWW, 24 October 2001.
26. Twenty percent increase in Contracting workload. *Intercom*, December 1989.
27. Two divisions help get the word out on Sawtooth. *Intercom*, 27 January 1983, p. 2.
28. 1995 accomplishments. *Intercom*, winter 1995-96, p. 6.
29. Personnel move proposed, timing uncertain. *Intercom*, 27 June 1983, p. 1.
30 United States Code 38 § 4212.
31 Quinn, Raymond R. Interview. Walla Walla: NWW, 21 September 2001.
32. Quinn interview.
33. Quinn interview.
34. Davis interview.
35. FWP evolves into the Special Emphasis Program. *Intercom,* winter 1995-96, p. 17.
36. New IR head wants to change auditors' image. *Intercom*, fall 1995, p. 9.
37 United States Code 5 § 552.
38 United States Code 5 § 552a.
39. Focus on the Walla Walla District: Office of Counsel. *Information Bulletin*, September 2000.
40. New chief counsel reports from St. Paul. *Intercom,* December 1993, p. 4.
41. Weeks, D. Anthony. Interview. Walla Walla: NWW, 18 June 2001.
42. Public Affairs Office. *Intercom*, 30 December 1987, p. 20.
43. Reorganization and name change. *Information Bulletin*, June 1988.

44. F & A to move. *Intercom*, 1 December 1981, p. 1.
45. Opbroek interview.
46. USACE. *Safety and Occupational Health - The Control of Hazardous Energy*, Engineer Regulation 385-1-31. Washington, DC: USACE, 1994.
47. Walker interview.
48. Heiberg speaks out on "customer care." *Intercom*, 29 April 1986, p. 1.
49. Curtis, Lt. Col. Donald R., Jr. Commander's Corner. *Intercom*, September 1997, p. 2.
50. Tatro, Steven B. Interview. Walla Walla: NWW, 7 February 2002.
51. Nutt, Lynda G. Interview. Walla Walla: NWW, 20 September 2001.
52. Carlton interview.
53. Corps proposes a reorganization. *Engineering News Record*, 30 November 1992.
54. Ibid.
55. Ulrich, Roberta. Corps of Engineers pares 430 jobs. *Portland Oregonian*, 20 November 1992.
56. Kramer, Becky. Corps staff may be cut one-third. *Walla Walla Union-Bulletin*, 19 November 1992.
57. Pomraning, Allen N. Interview. Walla Walla: NWW, 24 January 2002.
58. Davis interview.
59. Brown, Jimmie L. Interview. Walla Walla: NWW, 23 July 2001.
60. Voss interview.
61. Lindgren, Mark F. Interview. Walla Walla: NWW, 22 June 2001.
62. Christianson, Carl J. Interview. Walla Walla: NWW, 26 June 2001.
63. This impression was enunciated in many staff interviews, including those by Shelin, Walker, Reese, and Pomraning.
64. Alford, A. L., Jr. For every dam built, there were others existing only on paper. *Lewiston Morning Tribune*, 4 March 1994.
65. Pomraning interview.
66. Nutt interview.
67. Shelin, Sandra L. Interview. Walla Walla: NWW, 14 September 2001.
68. Reese, David L. Interview. Walla Walla: NWW, 23 October 2001.
69. NPW cited for support to students. *Intercom*, 25 May 1983, p. 4; and Summer aids. *Intercom*, 17 September 1984, p. 1.
70. Co-ops: College students learn while they earn. *Intercom*, 5 August 1985, p. 2.
71. Federal Women's Program Committee sets training schedule. *Intercom*, 1 July 1981.
72. Human Resources Week. *Intercom*, 6 June 1984, p. 5.
73. Oscar-winning actor to speak April 19. *Intercom*, 8 March 1998, p. 5.
74. HRD week activities planned. *Information Bulletin*, 3 February 1988, p. 1.
75. Training program changes expand employee opportunities. *Intercom*, 8 February 1988, p. 3.
76. Quinn interview.
77. Twelve management interns graduate. *Intercom*, December 1990, p. 6.
78. Christianson interview.
79. Hixson interview.
80. Volunteers provide extra support in time of need, fill in gaps. *Intercom,* November 1997, p. 1.
81. Hixson interview.
82. Testimonials laud TQM benefits. *Intercom*, November 1991, p. 4.
83. District unveils strategic focus plan. *Intercom*, December 1992, p. 4.
84. Christianson interview.
85. District focus on TQM increases. *Intercom,* winter 1995-96, p. 17.
86. Ibid.
87. District on the move with continuous quality improvement. *Intercom,* fall 1995, p. 4.
88. Weller, Lt. Col. James S. Commander's Corner. *Intercom*, winter 1995-96, p. 2.
89. Voss interview.
90. Christianson interview.
91. Christianson interview.
92. Weeks interview.
93. Pomraning interview.
94. Clausen, Gareth M. Interview. Walla Walla: NWW, 19 September 2001.
95. Walter, Lt. Col. James A. Initiative 88. *Intercom*, December 1988, p. 2.

96. USACE. *U.S. Army Corps of Engineers Business Process*, Engineer Regulation 5-1-11. Washington, DC: USACE, 17 August 2001.
97. Ibid, p. 2.
98. Ibid, p. 2.
99. Carlton interview.
100. Eastman, Mark G. Interview. Walla Walla: NWW, 25 June 2001.
101. Reese interview.
102. Davis interview.
103. Pomraning interview.
104. Tatro interview.
105. Lindgren interview.
106. Greenwald, Wendell L. Interview. Walla Walla: NWW, 17 September 2001.
107. Pomraning interview.
108. Voss interview.
109. Association of Corps Employees. *Intercom*, 30 December 1987.
110. Davis interview.
111. For more information see the series of articles, Spotlight on Women, *Intercom*, March, June, and September 1993.
112. Spotlight on women. *Intercom*, March, 1993, p. 7.
113. Ibid.
114. Ibid, p. 6.
115. Spotlight on women. *Intercom*, September 1993, p. 8.
116. Shelin interview.
117. Davis interview.
118. Davis interview.
119. Pomraning interview.
120. Shelin interview.
121. Brown interview.
122. Hixson interview.
123. Voss interview.
124. Nutt interview.
125. Pomraning interview.
126. Lindgren interview.
127. Quinn interview.
128. Pomraning interview.
129. Walker interview.
130. OPM establishes buyout hotline. *Intercom,* 30 December 1987, p. 12.
131. Curtis, Lt. Col. Donald R., Jr. First quarter starts out busy; Requirement to contract out flattens workload. Commander's Corner. *Intercom*, November 1996, p. 2.
132. Lindgren interview.
133. Pomraning interview.
134. Opbroek interview.
135. Opbroek interview.
136. Carlton interview.
137. U.S. Office of Management and Budget. *Circular A-76.* Washington, DC: The Office, 1983 (revised 1999).
138. Brown interview.
139. Hixson interview.
140. Shelin interview.
141. Reese interview.
142. Clausen interview.
143. Productivity gain sharing test up for approval. *Intercom*, 25 July 1986, p. 4.
144. 40 years of history chronicled. *Intercom*, October 1988, p. 5.
145. USACE, Walla Walla District. *Concept Design Report: Walla Walla District Headquarters Building*. Walla Walla: NPW, June 1990, p. 1-3.
146. Ibid.

147. Ibid, p. 1-4.
148. Ibid.
149. Reese interview.
150. Brown interview.
151. Carlton interview.
152. Davis interview.
153 Pomraning interview.
154. Pomraning interview.
155. PL 99-88.
156. *Concept Design Report.*
157. Pomraning interview.
158. Carlton interview.
159. Brown interview.
160. Brown interview.
161. Greenwald interview.
162. Shelin interview.

Chapter 3. Information Management

Introduction

"Will someone please tell me, the bright red advertisement asks in mock irritation, WHAT A PERSONAL COMPUTER CAN DO (1)?" This was the opening sentence in the 1982 *Time* magazine article naming the computer as "Machine of the Year." At that point in time, Walla Walla District employees might have asked the same question. Indeed, a District staff member (2) tells about the introduction of computers into one District office in the early 1980s:

> We had the opportunity to get a terminal in the back of the office in Project Planning that was connected to the mainframe. We were playing around with the mainframe and running programs and learning spreadsheets. Nobody knew what they were when we started. The supervisor came through the office and he saw one of us sitting at the terminal typing information. He immediately called us all in to the office, and he told us he had hired us as engineers and not typists. The wordprocessor group right across the hall from us would do all of the typing. I'm pretty certain that we were the first office in the District to have a computer on everyone's desk—one year after that.

By the end of our period, in 2000, virtually every District desk had a computer and staff relied on a fleet of nearly fifty laptop computers to provide access to computing in the field. It is fair to say that during this period few District activities were unaffected by the spread of computing. Many tasks were completely revolutionized.

Early Systems

The year 1980 was by no means the beginning of Walla Walla District's involvement with computers and other information technologies. By 1980, the District had a fully established Automated Data Processing Center that had been functioning since 1973.

The Automated Data Processing Center had a group of staff members dedicated to wordprocessing (3). This group was known as the "Textwriter Group." Staff members in this group used IBM-360/50 computers with the TEXT-360 text-processing package. Particularly noteworthy is the affect that this group had on the preparation of design specifications, which had fully moved from mimeographed copies in the early 1970s to wordprocessed copies to produce these lengthy documents. Over the ten-year period leading up to 1983, the Automated Data Processing Center had produced approximately 40,000 pages of specifications per year. By 1983, wordprocessing was being applied to operations manuals, recreation facilities guides, inspection reports, and a variety of other documents. It was only after the spread of desktop computing that this centralized group was disbanded.

In the early 1980s, the District's primary computer was a Harris 500 minicomputer (4), run by the Automated Data Processing Center. The Harris hosted a number of programs that aided engineers, for example the CORPS program, which provided a variety of common and specialized engineering calculations. The Harris also ran generalized programs, such as INFO, a relation database management system, and SEARCH, a specialized program designed to locate and catalog information on contract

drawings of all District projects. In 1992, the District's Harris computer was replaced by the personal computer.

In the 1980s, other computer systems existed in various District offices outside of the Automated Data Processing Center. Examples of decentralized systems include the Jacquard Word Processing System and a Unisys computer system located in the District's Contracting Division. A multitude of small computer systems came and went during the 1980s. For example, in 1981, the District was linked to an airline reservation system via a DART terminal (5). Staff experimented with a system called ENCORE for capturing information on their expertise, skills, and experience (6). This early foray into knowledge management was sponsored by the District's Federal Women's Committee. The system was designed to help employees document the relevancy of their life experiences to the job.

In reflecting back on early systems, District staff made the point that while time was "lost" in learning the specifics of each system, they developed a familiarity with computers that helped them as the District entered the era of universal desktop computing.

The Spread of Desktop Computing

IBM began manufacturing of DOS-based microcomputer systems in 1981. The total number of personal computers in use more than doubled from two million in 1981 to 5.5 million in 1982 (7). Ten years later, sixty-five million personal computers were in use.

Typical Desktop Computing Configuration 1990

In the early 1980s, Walla Walla District offices began purchasing personal computers from IBM and companies, such as Zenith, who began to market IBM "clones."

At first, the expectation was that only one or perhaps a few microcomputers would be necessary in each office. Some staff used early microcomputers as glorified calculators, programming them in BASIC to perform computations. On the other hand, an office's one desktop computer was frequently designated for the use of the unit secretary or administrative assistant. It was envisioned that the microcomputer would displace networked text-processing systems such as those described above. At this point, desktop computers were not capable of performing specialized functions such as design or mapping.

Eventually procurement of desktop computers became more centralized as the government developed large consolidated contracts. One of the more memorable of these was the contract with Zenith Corporation. In 1986, the District purchased forty microcomputers from Zenith, while in 1989 alone, ninety microcomputers were

purchased, bringing the total number of desktop systems in the District up to 350 units. In the late 1980s, deployment of a microcomputer to each desk became a goal. This set the stage for networking these computers; this, in turn, radically changed work habits and communication in the District as outlined below.

THE INTRODUCTION OF PC'S

Before I came to work for the federal government, I had been a computer programmer. That was back in the keypunch card days. I did FORTRAN and COBAL and those kinds of things. I was very familiar with computers and they weren't scary. I came to Ice Harbor project [in 1983]. They had one computer in the office. It sat, not turned on. The ladies sat at typewriters and didn't use the computer.

Finally one day, I had to do contracts as a park ranger, and I didn't want to sit at a typewriter and make a mistake. I went over and said, "I never see anybody use this [computer]. Do you have any problem if I get on?" They said, no. That simplified my world immediately. Then they became curious about it. The problem was nobody had ever trained them or they had trained the admin. officer and she hadn't had time to train the staff. I ended up training the people at the project. They finally got one person [working] on it, and the workflow became much simpler for everybody.

I remember the day they announced that everybody gets their own PC. It was like, whoa! Unbelievable! It was, yes! I definitely felt like I came out of the dark ages into the light.
–Lynda G. Nutt (8).

District users of desktop computers, along with microcomputer users worldwide, migrated through a number of different operating systems during this period. Much individual and collective effort at the District and the Corps-wide levels was expended in developing DOS-based applications on early personal computers. Microsoft Corporation released Windows 1985. Staff members working with the Bonneville Power Administration on a joint environmental impact statement project were among the first District employees to experience Windows and the strange new device associated with it called a "mouse." The adoption of Windows NT in 1986 was the last major operating system upgrade in the period covered by this volume.

Networking

In 1986, Walla Walla District implemented a local area network, or LAN. In 1989, this IBM token ring LAN was taken District-wide and thus became a wide area network, or WAN. By 1990, all staff offices and major projects were connected via the WAN and in 1991 the network was completed.

District networking, along with dispersal of microcomputers to virtually every staff member and certainly to every office District-wide, set the stage for new developments in external and internal communications, including use of electronic mail and the Web. The TCP/IP communications protocol was established in the District in 1994 to transmit data over networks and allow connectivity to the Internet. Also in 1994, an X.400 Gateway was implemented that gave users access to cc:Mail.

Networking allowed easy file sharing and access to sophisticated shared programs housed on servers locally and at regional centers (such as the Corps of Engineers Time, Attendance and Labor System, and, later, the Corps of Engineers Financial Management System). Digital lines to outlying project offices were established in 1994.

Among other things, digital lines allowed District-wide integration of computer-aided design and geographic information systems. Finally, in 1999, the LAN backbone in the Walla Walla District Headquarters building was upgraded to an optical fiber ring (OC3) allowing Ethernet connectivity to replace token ring technology, which provided faster, more reliable network/internet connections.

DO IT YOURSELF? OR MAYBE NOT

Probably from 1981-1982, when the PCs first started, to keep up and be able to use our machines and actually program our machines was pretty simple. As soon as we got the compilers, the FORTRAN complier, and then we had some Pascal compilers and so forth, [it was possible] because pretty well all of the engineers had programming in college. It was pretty easy to do the programming, do our conversions, do the things that we needed to do. ...

This was under DOS. As soon as the operating systems hit Windows, then we were in a totally different environment. With some of the object orientated programming and other things that were starting to come into effect, individuals didn't have that much time to devote [to computers]. … Most of us that were working with the PCs were actually doing it at home. We'd bought our own PCs. We were doing most of our computer programming and other things at home so it didn't interfere with our job. …

Most of us got to the point where we couldn't keep up. Things had become too complicated. You've got the LAN system. You've got all of the communications. … For most of us, it's—we just don't want to spend the time and the effort and the dollars that it would take to try to keep up on our own time, because that's not a part of our job. … Now, for all of our software support, our LAN support, and so forth, we, like everybody else, turn to IM [Information Management Office], and we have to. That's the way we should do it.
–David L. Reese, Chief, Hydrology Section (9).

The New District Headquarters Building and Information Technology

When the Walla Walla District was created in 1948, it occupied Army hospital buildings from World War II. These facilities were built in 1942 and had a design life of five years. In 1980, the District occupied the same buildings it had occupied since its inception.

As explained by the former Head of the Information Management Office, conditions for computing were not ideal in the old District Headquarters complex:

> "We had whole wings that were so cold that you couldn't get enough heat in them in the mornings to boot up computers, people had to wait, sometimes for an hour, before their computers would boot. We had wings that were so hot on summer afternoons that we had to move all the computers to the north side of the building because the south side was far too hot, and you couldn't keep enough cold air on them (10)."

Old District Headquarters Buildings—Not the Ideal Environment for the Spread of Computing

Planning for a new District building began first in the mid-1980s. However, the contract for a new District Headquarters building was not awarded until 1994. Many of the advances in District network architecture during 1994 reflect the wiring of the new building.

Communications Technologies

Other changes in technology lead to new and improved communication channels for the Walla Walla District during the 1981-2000 period.

In 1988, the District, following a general trend in the Corps and in federal government, experimented with privatizing District telecommunications. A savings of approximately forty percent was expected when the District switched from the Federal Telecommunications System supplied by AT&T and another private company, PNB. Because of service and cost concerns, in 1989 the Corps returned to the Federal Telecommunications Service as provided by the General Services Administration.

Provision of phone service to outlying projects has been a challenge for the District. In 1986, the District implemented the technology that allowed it to utilize the Bonneville Power Administration's microwave radio transmission system. In 1988, the phone

system at Dworshak project was completely replaced in an effort requiring coordination between project staff, U.S. West, and the Bonneville Power Administration (11).

During our period, Walla Walla District used a number of different phone systems. Prior to 1984, staff used ringer, dial-type phone instruments, and not every staff member at District Headquarters had a phone on the desk. Touchtone phones were installed in the District in 1984. Ten years later, in 1994, an SRX telephone system and voice mail system was installed in the new District headquarters building. In 1999, a new PBX phone switch was installed, which tied the voice mail system into the District's electronic mail system.

In 1988, the District's telecopier machine was replaced by a telefacsimile (fax) machine. The next year saw the Public Affairs Office using fax dissemination of news releases. Use of fax allowed Public Affairs to communicate with greater immediacy with regional news media that, almost universally, had embraced this technology.

Emergency Communications

Walla Walla District participates in planning for both military and civil emergencies. Part of the District's preparedness includes planning for an emergency situation when normal channels of communication might be inoperative.

During 1988 and 1989, significant improvement to the District's emergency communication capability was made by the addition of a high-frequency, single sideband radio system. This one-million-plus-watt radio was tied to computerized communication, coupled with the District's existing radio system (12). Secure telephone access through Army-provided telephones and secure teletype message capability were added to the District's array of communications channels.

In the late 1980s, the District's Operations Division installed microwave repeater stations in outlying areas. This allowed use of mobile radio phones in District vehicles. By the end of the 1981-2000 period, commercial cell phone and pager services were available to District staff. Such services greatly increased security and lessened the isolation of District park rangers and other staff members in the field.

OUT THERE ALL ALONE

Communication was very poor from Little Goose to Clarkston on the phone, the radio. If you were in the field, you were pretty much out there by yourself. Sometimes you had radio contact with the sheriff's department, sometimes you didn't. We did upgrade it with cellular satellite telephones. That took a long time getting straight, because they weren't very reliable. We had trouble with providers. ... There was this initiative coming nationally for safety for park rangers. We also had to do personal protection training, judo or philosophical things, verbal skills—twenty hours each year. Safety equipment on vehicles—that was driven by a national mandate. –Mark G. Eastman, Park Ranger (13).

As the popularity of cell phone service grew, the District's Real Estate Division was receiving requests from companies to lease land for cell phone towers. As the Chief of the District Real Estate Division said, "It raises a lot of different issues that we need to look into, from interference, to aesthetics, to what we need to charge them to use our lands (14)."

Presentation Technologies

During this period, Walla Walla District began to rely on an array of equipment and computer programs that promoted swift and accurate communication within the District, with partner agencies, and the community.

Audiovisual equipment such as computer projectors, portable and permanently installed sound systems, equipment for recording meeting dialog, and videotaping events became available to District staff. PowerPoint®, a commercial program for producing slides to be displayed by computer became a much favored means to get the word out. By the end of our period, it was a rare project that did not have a set of PowerPoint® slides produced in conjunction with public meetings or for presentations to Northwestern Division or Corps Headquarters.

Scanning, color copying, digital photography, photo editing programs, and programs for editing audio and video were available within the District and via in-house contracted services. In 1986, the District produced its first videotape. Such facilities enhanced District publications and audiovisual presentations and helped "get the message out."

In 1997, Walla Walla District received two national-level awards from the National Association for Interpretation (15). The first award was for the *McNary Training Manual for Interpreters* (16), a document that provided orientation for staff meeting the public at the McNary Visitors Center. The second award went to an interactive presentation that explained the navigation system on the Columbia and Snake Rivers. The District's history of excellence in the application of presentation technologies continued when the Pacific Salmon Center at McNary Lock and Dam was opened in 1994.

As the 1981-2000 period drew to a close, the sophistication with which graphics were used by District staff was shown by a presentation prepared in 2000 to describe a major proposed environmental restoration along the Snake River near Jackson Hole, Wyoming. Enhanced graphics embedded in a PowerPoint® presentation were developed for this project. Animated depictions of no-action and action alternatives, in the form of computer .avi files, could be run as part of the computer slide show to display dramatically how restoration techniques could turn gravel-sand bars into revegetated riparian habitat.

Desktop Computer Applications

The deployment of hundreds of personal computers to the desktops of District staff members allowed for widespread use of commercially available software packages that had multiple uses. This trend brought the power of computing to virtually every task in the District.

Wordprocessing

At the beginning of this period, as outlined above, there were several text-processing systems in place. In addition to the centralized IBM-360/50 TEXT-360 text-processing package and Contracting Division's Jacquard wordprocessing system, beginning in 1982 other offices, such as the Clarkston Area Office, used the standalone Harris AZ7 wordprocessing systems which had one of the first display screens, used eight-inch

floppy discs, printed on noisy daisy-wheel impact printers, and cost thousands of dollars for limited functionality (17). As late as 1988, Walla Walla District implemented a Sperry 5000/80 system because it would accept and use the Standard Army Automated Contracting System.

By the mid-1980s, however most offices were using microcomputer software for wordprocessing, with WordStar® the early favorite among software packages. Up until 1995, WordPerfect® was widely used until, at the end of our period, Microsoft Word® became the only supported standard for wordprocessing.

With the rise of microcomputer-based wordprocessing, the whole issue of "to type or not to type" arose. In 1988, typing support was contracted out.

WORDPROCESSING: PROGRESS AND PROBLEMS

When I came here [1978], electric typewriters were the big thing. If you had a correcting IBM Selectric—wow. Only secretaries had a correcting Selectric. If you could get a typewriter, you were doing good. Other than that, everything was written out by hand—for which the secretaries would hate me, because I can't even read my own handwriting. That was how we did business. You wrote it out by hand, and you gave it to the secretary and they typed it up. ... Wordprocessing was great, especially for those of us who write documents. I would never want to have to go back to using a typewriter or writing it by hand. Wordprocessing is wonderful. –Sandra L. Shelin (18).

Along with the spread of wordprocessing came the notion of desktop publishing. Specialized programs such as Adobe PageMaker® and InDesign®, along with graphics capabilities for producing illustrations, allowed offices to produce high quality publications in-house. As early as 1989, the Public Affairs Office discussed how its in-house newsletter, *Intercom*, was being produced using desktop publishing: "No longer will we send copy to the Reprographics Branch of Information Management for typesetting by layout artists before printing. … [An] editorial assistant lays out the newspaper on an IBM-PC monitor and produces individual camera-ready pages using a laser printer. Articles appearing in the publication and Walla Walla District *Information Bulletin* are generated and edited on a PC (19)." Shortly after the end of the period covered in this volume, in 2003, when the *Intercom* was revived, most printed copies were dispensed with and the publication was distributed almost exclusively via computer.

Spreadsheets

As with wordprocessing, spreadsheet programs available on microcomputer found widespread use among District staff. Again, Walla Walla District went through a series of programs, including the DOS-based VisiCalc®, Lotus 1-2-3®, and MultiPlan® before settling on standard use of Microsoft Excel®.

The District records a great deal of data—everything from data used to monitor contracts in the field to data about wildlife habitat. District employee Phil L. Hixson provides an example of the value of spreadsheets: "It's been a real help in the fish field where so much of the information that you have is data. It's anything from how many pounds of fish per gallon of water per minute you have flowing through your facility to how many [fish] you have there, how many you load on the barge later. Keeping track

of those records over time. Being able to go back and analyze those and see what kind of trends you had (20)."

As told by David L. Reese, the effect that the introduction of spreadsheets had in the work of the division's Hydrology Section was extremely striking:

> "We would prepare what's called a duration curve to do our hydropower analysis, a flow duration curve, a power duration curve. We would have to input a whole set of data and send that to the mainframe. That would be sent to a computer in Portland, which would do the number crunching. That would be anywhere from three to six minutes of calculation time. That information was sent back to the mainframe computer at Walla Walla. We had to take that information and send it over to Survey, which had a big plotter over there. They would plot all these curves. We would have that tabulated information and the curves to put into our reports. Each time we did that … the computer costs were $50, $60. After we started spreadsheets, we realized it was just a simple spreadsheet calculation. We could duplicate that whole effort on a spreadsheet and produce exactly the same curves in less than thirty seconds. …
>
> "Typically what we do in Hydrology, we typically handle a lot of data. We are doing a lot of data analysis. We're doing a lot of computations, heavy engineering computations. We typically utilized … about forty percent within Hydrology of the District's computer capability. At that point in time, for instance, our bill that we were looking at each year was somewhere in the neighborhood of $400,000-$500,000 a year—is what that cost us for our computations, our modeling, and so forth (21)."

For Hydrology, the advent of computation via microcomputer obviously produced a tremendous savings both in time and money.

Database Management Programs

Database management software was the third major application type that desktop computing made generally available throughout Walla Walla District. As with wordprocessing and spreadsheets, various programs were used early on, primarily DBase®, before Microsoft Access® became the standard software package.

The District uses databases to maintain everything from mailing lists to records of equipment maintenance to an index of engineering and construction drawings. Later in our period, Microsoft Access® was used as a front-end user interface to data actually maintained on a central server using Oracle® database management software. The Corps has used such databases to maintain large numbers of records, such as in tracking the over 150,000 public comments the District received in 2000 to the draft *Lower Snake River Juvenile Salmon Migration Feasibility Report* (22).

Electronic Mail

One of the most dramatic applications that the spread of desktop computing, software development, and networking made possible was electronic mail. E-mail changed the face of communication within the District and provided a whole new method for District staff to keep in touch with people outside the organization.

In the mid-1980s, the Corps of Engineers first developed a system called "Corps Mail." In 1989, Walla Walla District became the first outlying District to implement the cc:Mail system. External networking at that time was achieved by modem systems that allowed

users to send messages via modem connectivity. In 1991, Walla Walla District achieved access to the North Pacific Division via cc:Mail.

It was only in the mid-1990s, after universal networking from the desktop to the outside world, that e-mail's true effects began to be evident. In interviews with District staff members, there is no more controversial issue related to information technology and communication than e-mail. Some people love it; some hate it. To one person, e-mail is fast, easy, and convenient. Another sees it as impersonal, confusing, and time consuming. The following issues arose at Walla Walla District in relation to e-mail: staff wasting time reading unnecessary messages; employees filling computer storage by saving excess e-mail; infected messages threatening the security of computer systems; and staff failing to retain official records when e-mail is the vehicle.

The District is not alone in its mixed reaction to the perils and possibilities of electronic mail. Sylvia Lanz writes of these issues in "The Rise and Fall of Corporate Electronic Mail (23)." Originally, electronic mail was heralded as an advanced communication tool for organizations. Later, the many pitfalls of e-mail were discovered. Pitfalls included miscommunication due to the overly informal and often hastily prepared style of e-mail, as well as the common tendency for staff members to be inundated by e-mail. Tim Richardson (24) calls "cyberslakers" the curse of the workplace and includes abusers of e-mail among the forefront of this classification. Wendy E. MacKay (25) studies the marked diversity that exists in the way professional office workers use e-mail. These different styles in the way e-mail is used add to the complexity of the communications (or miscommunication) scenario in an organization.

Walla Walla District staff experience, as revealed in oral interviews, could easily have written the articles mentioned above. The box below gives a sample of the lively and insightful comments that District staff members made related to their experience in using e-mail.

WHAT E-MAIL MEANS TO ME

Probably one of the biggest things that has helped us is e-mail. Much as a pain in neck it can be, e-mail has made communication very convenient and very easy and very fast. … First, it created new associations. People began to work together in curious ways. You saw people who were trying to accomplish the same things team up for the first time. …

[An example involves] one of the first sets of photos I saw come in from the projects. … We had some severe cavitation—that's eroding of the turbine blades and the turbine walls in one of the big turbines at one of the projects. Those photos [showing the problem] came in. … The money, then, almost came from Headquarters instantly because they could see the problem. Within a couple days, a project was created and approved which would have taken, I believe, months before that. Such a simple tool … but it changed the way we did business. It made us much quicker. It made us more agile. It made us work together better.
–Allen N. Pomraning (26).

I used to teach communications, and I used a sentence, “He went to town with her.” Does that mean the same as, “He went to town with HER?” “HE went to town with her?” “He went to TOWN with her?” ... “He WENT to TOWN with HER.” Every one of those has a different meaning, and you can’t tell which one I meant if I put it in a sentence on a screen. It doesn’t work. I’m not sure it’s communication. … Communication implies there’s a listener and that a message is being received. ...

Now, the first thing I do when I get to work is boot up the computer turn on Outlook. It stays on all day, because we have switched and rely on that to get a lot of information out to people. We used to put out flyers, we used to call people, we used to go talk to people, and now sometimes we find it easier to just send an e-mail. We don’t have to actually touch anybody. It’s helpful for some things, because if you can’t get ahold of them, you can at least leave an e-mail. You leave that little message in the bottle for them to find later. If you are trying to put together a meeting or trying to get to a whole lot of people at one time, e-mail is handy. But there are other times, I’m thinking, why don’t you just pick up the phone, why do you sit there and use your technology to do these things? There’s good, and there’s bad about it. –Sandra L. Shelin (27).

Imagine this: a key is found in a District office. No one nearby knows to whom the key belongs. Three weeks later, in the monthly District newsletter, a small blurb about the key is published (“Key Found in Hallway” (28)). The patient owner finally is reunited with the key. This is a different world from today's electronically enhanced world. Today, the discovery of such an item would be publicized instantaneously to all District staff via e-mail. Whatever the consensus, or lack of it, related to the use of e-mail by the Walla Walla District, one thing is certain: e-mail is here to stay.

Internet, Intranet, and the Web

Beyond the personal communication represented by e-mail, computer networking in the 1990s allowed for development of communication methods undreamed of in earlier eras. The growth of the Internet (29) from 213 hosts (individually addressed computer systems) in 1981 to 126 million hosts at the end of 2000 was truly phenomenal. The World Wide Web, which provides a graphical user interface to the Internet, began in 1991. By the end of 2000, there were approximately 7.4 million Web sites online and an estimated 369 million people had access to the Internet.

In 1993, Walla Walla District implemented its first domain name server linking to the Internet. This server was used for computer-aided design and geographic information system (CAD/GIS) utilization testing. In 1994, the District established TCP/IP communications connectivity to the Internet. This allowed file transfer over the Internet (FTP) and access to the Net for a growing number of staff members.

As the number of information sources and commercial entities represented on the Internet grew, and as the graphical user interface to the Internet that we call the World Wide Web took shape, staff began to use these information sources to help them do their jobs. For example, staff in the District’s Cost Engineering Branch used the Web to access catalogs of parts and products and schedules of rental rates. This allowed extremely up-to-date project cost estimates to be prepared. Another example was the streamflow data provided by the U.S. Geological Survey. This data, used by District staff in Hydrology, Operations, and other branches, is automatically updated and posted every fifteen minutes from stream gages via satellites to the Web. When floods are

thought imminent or when work is to be done on an in-water project, such timely information is invaluable.

Walla Walla District became more than a consumer of Web-based information; in the late 1990s, it became a creator. In 1999, the District developed its own Intranet. The District Intranet is a secure Web site available only to authorized District staff. By the end of the 1981-2000 period, the Intranet was used to convey a wide variety of information including: technical reports, District operational rules and guidelines, a staff phone directory, procedure and process information from every District unit, the District newsletter, a master calendar and conference room scheduler, links to sites of importance regarding staff training and benefits, and District, Corps, and Army vision and mission statements.

Even more important than the Intranet, was the District's use of the Web to develop a new "public face." Starting in 1995, Walla Walla District led the Corps of Engineers in establishing its own site on the Internet. Lt. Col. James S. Weller, the District Commander at that time, wrote: "Walla Walla District now has an INTERNET Home Page. One of the key pieces of information included is the project information data, which is fully automated. This is a first for USACE [the Corps of Engineers] (30)." The site, located at http://www.nww.usace.army.mil/, allowed the District to provide the public information about ongoing and current activities.

Important reports, such as the annual *Report of the Secretary of the Army on Civil Works Activities: Extract Report of Walla Walla District* (31) and the draft of the *Lower Snake River Juvenile Salmon Migration Feasibility Report/Environmental Impact Statement* (32) were available to the public on the District Internet. Information about Corps recreation resources—parks, boat ramps, camping, fishing, and hunting areas—was available online. The District Internet provided access to information about navigation, regulatory matters, employment with the Corps, and the mission of the District.

At first, the Walla Walla District Web site was a one-way communication channel flowing from the District to the general public. By the very end of our period, however, the District began to use technologies that allowed users to interact with our Web site. Staff in the District Information Management Office implemented online forms that allowed users to communicate with the District about high priority issues. For example, during the public comment period on the draft *Lower Snake River Juvenile Salmon Migration Feasibility Report/Environmental Impact Statement,* Web users could submit an online form to comment on the report.

An example of the District's expertise with Web design is shown in the site developed in 2000 for the Corps' National Water Safety Program (33). The program, administered from Walla Walla District, had its site at http://watersafety.usace.army.mil/. The site featured not only information to be read on the Web, but also downloadable teachers' guides related to water safety. In line with its mission, the program developed posters, videos, and other products related to water safety publicity and instruction. When the site was first developed, it featured online ordering of water safety products, but only by members of the Corps of Engineers. Staff at Walla Walla District worked out a sophisticated means whereby the site responds to the Web users' Internet protocol

address (IP address) and routes the user to a Corps or a non-Corps ordering system. According to Lynda Nutt, director of the National Water Safety Program (34), the solution developed by District staff was an innovative one that would help not only the program but also the government supply depot that actually ships orders.

Computer-Aided Design and Drafting

Most of the software and systems discussed thus far in this chapter have been ones utilized by many District staff members. In this section and the sections below, we will explore some of the more specialized information technologies utilized within the Walla Walla District.

In November 1983, the District completed a study with a justification for future lease of a computer-aided design and drafting system (CADD for short) (35). The proposed system was implemented in 1985. Software literally replaced the drawing board for those engineers who "learned to draw all over again (36)," climbing the steep learning curve in a three to six month training process.

The District's CADD system was purchased at a time when CADD was the fastest growing form of computer graphics. The CADD software allowed engineers to design buildings, circuitry, mechanics, and other construction features. Displays allowed designing in three dimensions with the ability to rotate and move imaginary objects in space. The system allowed users to keep a running bill of materials in support of cost estimates. Working with CADD produced more accurate drawings and allowed engineers to quickly investigate a wide range of design alternatives while shortening design times.

As originally implemented by Walla Walla District, the computer-aided design and drafting system was a fully contained system that ran on a dedicated VAX 751 minicomputer. In 1988, the CADD system was moved to a VAX 252 minicomputer that also supported a Geographic Information System. Originally, the District leased the software and seven workstations from the Intergraph Corporation. Each station was provided with dual screens, and a tablet (digitizer) for electronic drawing. The tablets featured touch pad menus, an electronic pen, and a mouse—at that time a new and unfamiliar device to many users. Even with its first CADD system, the District implemented high quality printing devices called plotters. Plotters could process large volumes of information and produce large size printouts and drawings.

In the 1980s, expensive workstations, along with the computing power of the VAX were needed to support graphics-intensive applications like CADD. This mainframe supported the computer-aided design and drafting system as well as geographic information systems. By 1993, the CADD function was moved into a client-server environment running under a UNIX-based system on three dedicated network file servers. High-end microcomputers could be used as workstation clients. It was also in 1993 that the Drafting Section in Engineering Division was abolished. Later in the 1990s, stand-alone windows-based CADD software was introduced, again for use on high-end microcomputers. Walla Walla District continued to use CADD software derived from Intergraph Corporation, which was succeeded by the Bentley Corporation.

Computer Modeling

POWER TO THE ENGINEERS

When I came to work for the District in the 80s, I came into the very last of the Civil Design Section. In Civil Design, you had people still using slide rules. The modern ones had a desktop calculator, and a few of the new folks actually had desktop calculators that did things, as opposed to just multiplying.

One of the projects out at Lower Granite was a railroad realignment. We hadn't done something quite right, and it had some problems. ... It took a small team, two or three engineers in that group, about three or four months to come up with a realignment and a set of realignment calculations. The way they did it was, first they looked at some photos of the area, and they drew an alignment by hand they thought might work. Then they went out, and they walked, and they staked the site, and they said, this will work. The day they went out there and walked and staked the site—that was a permanent design. No changes could be made from that design from that day forward. They came back to the office and did all the calculations for the alignment, the cut and fill calculations, all the road access. All of it was done once. … That design went to contract and construction and was executed and it was wrong. There were some mistakes made … because there was no opportunity to make a change.

I saw a similar roadway design done about ten years later. In that design, we took the same types of photographs of the site. [We] laid out a preliminary, detailed design with all the cut and fill calculations. Within a week, [we] went out and looked at that alignment, staked it on the ground. Then [we] came back and did about three or four alternative designs with the cost calculations for all the cut and fill, because in that sort of design, cut and fill is usually where you run your expenses up. Then [we] gave those alternatives to the Engineering senior staff for the selection. They selected it then—the best one. ... [We] came back and polished off that better design. That entire … [process] with the alternatives, in a design that could have been edited right up until it was being built, took about six weeks. Two people were involved in it: the computer guy, and the engineer. ...

The result of that is that the District's Design function has slowly shrunk and shrunk and shrunk. People will look at that sometimes—usually Chiefs of Engineering—and … [say] the District is not the way it used to be, it's a bad thing, and we have got to get more engineering work. But I believe that what has happened is that the engineers have become all-powerful with their CADD systems, their flood control calculation systems, the wonderful automated systems we have today to do topology mapping. ... Engineering is continuing to shrink, but it's not because they do less work; in fact, I would suggest they do a lot more work than they did. They're simply so powerful. The same thing is true of your biologists, your economists, your accountants.
–Allen N. Pomraning (37).

Engineers were supported by developments in mathematics and modeling software as well as increased computing powers. At the beginning of our period, when Walla Walla District wished to test the biological or hydrological response to various design options, actual scale models were built. For example in 1989, a 1:25 model of the McNary powerhouse intake was built to study the biological effects of design changes. By the middle of the 1990s, fewer physical models were being constructed as engineers relied more and more on computer simulations. For example, in 1994 a drawdown of the Lower Granite reservoir was planned. Instead of building a physical model to predict the effects of the drawdown, District staff developed a three-dimensional flow/velocity model of Lower Granite using commercial Calc3D software. By the end of the period, staff could use a wide array of computer-modeling software on their desktops to manage engineering and biological models. The District was backed up by systems at

the Corps' national laboratories. For example, in 1999, when Walla Walla District decided to "fast track" the design of a removable spillway weir (see chapter 5), District staff were supported by the computer expertise and modeling systems at the Corps Waterways Experiment Station in creating the design.

OKAY, TURN THE WATER BLUE

We do physical hydraulic modeling. Actually build a model to scale. One of the questions the hydraulic engineer is constantly facing as technology to model with computers gets better and better—can you do it with a computer and save yourself money and be more efficient? ...

About four years ago, as part of our surface collection testing [tests ways to aid the migration of fish past dams], we went down a path working with the University of Iowa, which has sophisticated numerical models. … [Numerical modeling is] pretty cheap compared to a physical model test. Let's use it to highlight our options. Let's look at four, five, six different options before we go to the physical model. ...

We got to working with a biologist out of WES [the Corps Waterways Experiment Station], who said: I have a model of fish. If I overlay it with the database you've produced on the hydraulics, I can tell this little virtual fish [to swim through the system]. Here is everything, you see. If you monitor the data as fish approach the surface collector and give that to me, I can trial and error with rules that the fish follow. … Sounds pretty magical, we said.

We've had some significant breakthroughs in finding what the fish react to. [This has] really helped in terms of design directions. We have changed some of our designs. The long-term idea would be—if this is successful, take the biology [fish] model on the numerical [hydraulic] model, we can do twenty-seven different modifications and say: these are the top three. Optimize design for what fish really sense.

The strength of a numerical model is the fact that you can show such impressive graphics. Not necessarily the computation stuff, but that you can take it and say, "I want to look at the water that's coming into this [fish collection] entrance. Okay, turn it blue."
–Mark F Lindgren, Chief, Hydrology and Hydraulics (38).

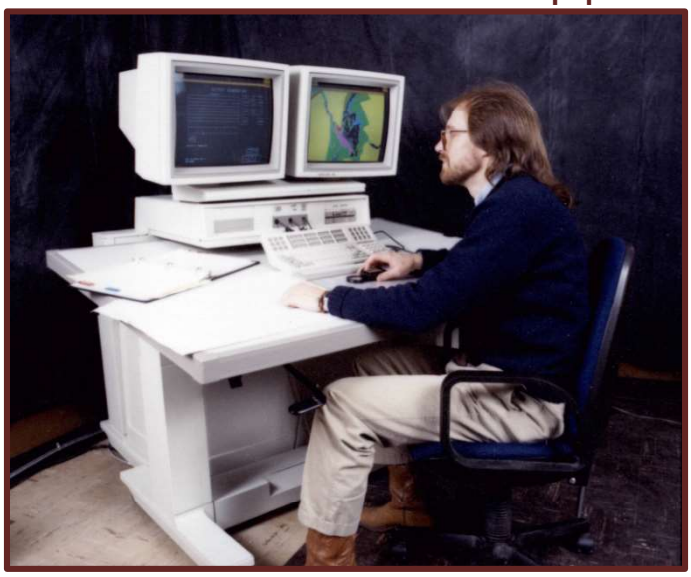
Geographic Information Systems and New Technologies for Gathering Field Data

As early as 1982, Walla Walla District staff were able to "'measure' the area of any particular photograph or footage of videotape by comparing the areas and distances in the photo with known maps of the same territory (39)." The District's measuring unit was a system consisting of a "tabletop" computer, two videotape cameras, a color TV, a printer, and a linear measuring set. This system could be used, for example, to detect changes between past and recent photos or to determine the area of various types of vegetation. The system could perform an array of computer manipulations to photos and related mappings.

Walla Walla District's geographic information system, or GIS, Web pages (40) give several definitions of a geographic information system including one from the National Science Foundation which says that a GIS is "a computer-based system for capture, storage, retrieval, analysis, and display of spatial (locationally defined) data (41)." A GIS system features a database management component to organize numerical data associated with locations. The GIS system can take that organized numerical data and represent it graphically—on a map. For example, data on roads, hydrology,

boundary lines, vegetation, climate, precipitation, habitat, and topography may all be represented in the GIS database for a particular area. When a map of the area is generated, the GIS numerical data can be used to create a map “overlay” to graphically represent area precipitation or area vegetation, *etc.*

GIS Equipment in 1990



Walla Walla District covers a large geographic area of approximately 114,000 square miles (the same size as the country of Italy).
With such a large area to cover, District mapping of sometimes rapidly changing spatial data was labor intensive. Building on the measuring unit’s pioneering use of computers and maps, the Walla Walla District was well positioned to be become one of the first districts in the Corps of Engineers to implement a fully functional Geographic Information System (GIS) (42). In a 1987 study produced under the District’s Productive Gain Sharing Program, two Walla Walla District staff members recommended implementation of a GIS system as a cost-saving and efficiency measure.

In 1988, the District implemented a state-of-the-art geographic information system from Intergraph Corporation, an industry leader and the company that had previously supplied the District’s computer-aided design and drafting system software.
The decision to use Intergraph for GIS allowed the District to support both CADD and GIS on one hardware platform. The District purchased a VAX 252 dual processor minicomputer that supported both functions. The original system included two workstations and a black and white plotter, which was upgraded to a high-density electrostatic color plotter in 1990.

In 1993, GIS system software was moved to three UNIX-based file servers separate from the CADD system server. In that same year, all GIS data was converted to an Oracle® relational database. Also in 1993, the District’s many thousands of map files were placed on their own server, which featured ample disk storage space. As of the year 2000, the District’s GIS system was supporting thirteen workstations.

The Walla Walla District geographic information system utilized Intergraph's Modular Geographic Systems Environment, or MGE, which was vector-based software that used Intergraph's CADD platform for drawing maps. Each map element of data in the MGE system has a linkage that connects it to an entity, table, and record in an Oracle® database. Both maps and GIS database records can be queried to find certain attributes (for example, to see where a particular type of vegetation might exist). As our period came to an end, District staff were using a networked version of the popular ARC/INFO software in parallel with the MGE system. Beginning in 1989, the Corps of Engineers developed its own Geographic Resources Analysis Support System (GRASS), a system that is still popular with some sectors of the Corps and the general public. Walla Walla District, however, rarely used the "homegrown" GRASS system, relying instead on commercially developed GIS products.

District staff continued to be leaders in development of GIS conceptualization, standards, and planning as evidenced by District representation on the Corps Ad Hoc GIS Committee (active 1988-89, helped the Corps understand GIS); the Corps CADD Center Single Discipline Task Group for GIS (active 1988-92, reviewed GIS standards for the Corps); and the Department of Defense CAD/GIS Field Working Group, chaired by District staff (starting in 1993, worked on standards and data transfer issues).

As of the year 2000, the District's Environmental Resources Branch within the Planning Division was the heaviest user of the geographic information system. Planning utilized GIS for master plans, environmental impact studies, cultural resource inventory and monitoring, fish passage analysis, terrestrial habitat studies, and feasibility studies.

Engineering Division was the next heaviest user of the District's GIS system. Engineering used the geographic information system for creating new maps, maintaining base maps, digital map acquisition, and integration of field data collection tools. Engineering used the Zeiss C120 analytical stereo plotter to transfer aerial mapping into digital data useable with both CADD and GIS. The stereo plotter was used to transfer detailed information on the Tri-Cities area of Washington, which would be used for internal drainage studies as well as by the cities of Richland and Pasco, Washington.

The third major user of the Walla Walla District GIS system was the Real Estate Division. Real Estate uses GIS in land acquisition and disposal, for mapping outgrants of land, encroachment detection, and acreage analysis.

The District's Operations Division uses GIS for updating operation master plans for the field projects in the District, and for wildlife, navigation, and emergency management purposes.

In its implementation of an automated geographic information system, Walla Walla District took a holistic approach to spatial data gathering, display, and mapping. The District worked on developing a "corporate database" of geographic information that could be used to support almost all of its various projects and activities whenever maps or spatial data were needed. As the century rolled to a close, the District was examining issues related to displaying geographical data on the Web and data sharing among federal, state, and local agencies.

ADVENTURES IN GIS

[In order to make a best guess of habitat lost because of building the Snake River dams, we used] aerial photographs from the 50s and early 60s. ... This project broke ground on the utilization of GIS. It was our first application of GIS on a project in the District. The methods that we used then were pretty crude, compared to what we have available now, which [shows] how computer technology has taken off since we did this. ...

We have reached a stage where I don't think anybody can function in the environmental, biological, natural resource arena, without some knowledge of GIS and GPS. The technology we have right now for mapping and analysis of environmental and biological situations is phenomenal. I wouldn't trade that in for anything.
–Carl J. Christianson, Supervisory Wildlife Biologist (43).

The analysis defines the area of study and the importance of ecological, cultural (manmade), and aesthetic factors of the region and the project. The digital base map used by the District was originally digitized on a CADD system in Portland District, at a 1:250,000 scale, for the Columbia River and Tributary Study. The Walla Walla District edited the base data and reorganized the information. Regional data themes were digitized directly into the system. Examples of regional data themes are physiography, geology, vegetation, precipitation, hydrologic basins, big game, upland game, waterfowl, fisheries, population, access, land use and cover, land ownership, and recreation. The project base map used for the Mill Creek Master Plan was compiled from aerial photography, using the Zeiss stereo plotter. The operator, through the plotter, was able to enter different data themes on digital tape. This information was digitized directly onto the District's GIS. The Bennington Lake base map is composed of various data themes: hydrology, transportation, topography, and project boundary. Project data themes mapped include slope and pool elevation, aspect, soils, vegetation, wildlife habitat, land ownership, outgrants, existing developments, and visual resources. ...

The synthesis overlay process used by GIS is an automated method of overlaying data themes for analysis. The overlay process is not new, and was first used as early as 1912 by Warren Manning, a landscape architect. … The model maps are produced by GIS from overlays from the data themes. Attractiveness maps are developed for the most attractive or best-suited location for a particular land use. Vulnerability maps identify areas vulnerable to impact (either negative or positive). Compatibility maps are created by combining the attractiveness and vulnerability maps for each land use. ...

The ability of GIS to overlay different data themes gives the [planning] team greater opportunity to make intelligent decisions. In the past, the synthesis step used a manual overlay process that was very labor intensive and did not allow easy development of the alternatives. Updates and reruns of models were also difficult. The automated GIS allows for easier entry, the development of alternatives, easy updates, and the rerunning of alternatives. In addition, a database lies behind the spatial data. The use of the system for analysis/synthesis is more systematic and less labor intensive than the manual system. Using the automated GIS, the process can be better documented and is, therefore, more repeatable and credible.
–Blaise Grden, GIS technician (44).

> On the Salmon River at Chalice [Idaho] … we are taking all this historic data about alignment of the river. We have a physical survey that was done in the conventional sense of the Salmon River in the Chalice area. We've got an alignment of where it ran and what it looked like in 1893. We've got air photographs from 1947 of the same area. We've accumulated five or six different sets of photographs from 1977 to current. We are overlaying all these different alignments so we see how the river's changed over time. ...
>
> In ArcView, we can view these river alignments and put one on top of the other over time, and see how has that changed over time, and draw some conclusions about how the river has behaved under different kinds of conditions. –Wendell L. Greenwald, project Engineer (45).

Another aspect of information technology often related to geographic information systems is the development of sophisticated systems for gathering and collecting data. Excellent examples of this are the U.S. Geological Survey systems for gathering data on river levels and snow accumulation. The USGS collection devices are automated and now linked, for the most part, to satellite systems. Once received, this hydrologic data is automatically updated on the Web. Staff throughout the Corps benefit from access to such up-to-date data.

Global positioning systems are used in Walla Walla District. In completing a new map of the Boise area floodplain in the late 1990s, District staff heavily utilized global positioning with laptops in the field to complete the project.

Remote sensing devices were of great interest to District archeologists and other staff members. For example, in relation to studying sedimentation deposition along the Snake River, staff needed more data about the location of fisheries and the physical contours beneath reservoirs. The District obtained this data in 1994 from National Oceanic and Atmospheric Administration Doppler soundings. The District then manipulated this data with a variety of Corps software and commercial terrain-mapping software to produce a three dimensional picture of the situation in the reservoirs it managed (46).

Corps Developed Automated Systems

The Corps of Engineers uses many of the same application programs used in every modern office, but the Corps has also developed a multitude of specialized software programs to support its particular functions.

Engineering

One area in which the Corps has developed many of its own software programs is in support of engineering functions. Many of these programs were developed at the Corps Hydrologic Engineering Center, referred to as HEC. Hydrologic modeling and flow calculation programs, HEC2 and HEC Remote Access System (HEC-RAS), were widely used in Walla Walla District for a multitude of water resources projects, including floodplain mapping. The HEC2 program, which was stable and excellent for performing the tasks for which it was designed, ran solely under DOS rather than under the Windows operating system.

The Corps developed MCACES (short for, Microcomputer-Aided Cost Estimating System), an application program for cost engineering. In 1986-87, the "gold" version of

MCACES was introduced. This version ran under DOS and was used extensively in Walla Walla District. With this program, cost estimators could produce all levels of estimates from very rough budget estimates to detailed cost estimates for particular contract awards. The twofold effect of the introduction of MCACES is typical of many Corps-wide software packages. First, the use of MCACES helped to standardize the process of cost estimating across the Corps. Secondly, the software greatly increased efficiency, flexibility, and reliability of cost estimates prepared by the District. Cost estimates prepared using this software are highly respected by contractors and commercial engineering firms.

The District's Cost Engineering Branch used several Corps-wide databases to provide input for the MCACES programs. One of these databases is contained in Engineer Manual 1110-2-1304, *Civil Works Cost Index System* (47), and Engineer Pamphlet, 1110-1-8, *Construction Equipment Ownership and Operating Expense Schedule* (48). The latter is commonly called the "Equipment Manual." Beginning in the late 1980s, Walla Walla District's Cost Engineering Branch maintained the equipment database for the entire Corps of Engineers. The District used automated systems to create the twelve-volume manual, which is published every two years and used by the whole Corps, as well as by the construction industry.

Interestingly, a Windows-based version of MCACES was introduced in 1995. However, that version did not have all the functions available in the DOS-based version. Therefore, District staff continued to use the DOS-based cost-estimating software. Going into the new millennium, District Cost Engineering personnel were looking forward to the implementation of a new suite of programs called MTOOLS, which would be fully Windows compatible. As the period covered by this volume came to a close, District staff members were participating in the Corps' Cost Field Activities CADD group. This group was working on integrating cost estimating into the computer-aided design arena. With such integration, as pieces and parts are included in a design, estimated costs would be tracked.

Walla Walla District often works with consultants, sponsors, and researchers. One of the engineers discussed one such a situation and its effect on selection of software:

"The consultant that we've been working with for the Salmon River at Chalice, the University of Idaho, [likes] MIKE11. We had a long debate about, should we stay with this traditional program that the Corps has maintained, that they know, that they trust the results of. Or do we utilize this MIKE11. The thing is, the MIKE11 has some advantages. It does some things that the other [Corps software] doesn't. But then you've got a learning curve. You've got maybe not as much trust in it. ... It takes a lot of effort to even make a decision about which program you should use if you're thinking about trying something new. [There are] a lot of issues to lay to rest, a lot of cost that goes along with it (49)."

Corps-developed software is not commonly available to those outside the Corps. As Walla Walla District partnerships grew and as commercial software continued to develop, technical elements of the District had to increasingly look at pros and cons of using commercial software versus that developed in-house.

Operations

Walla Walla District hydropower projects utilized automated systems to control the processes of running turbine generators, locks, and other hydropower equipment. In 1988, the Corps introduced the Data Acquisition and Control System, which controlled Snake River hydropower powerhouses from a central point at McNary Lock and Dam. Onsite powerhouse operators can view data from the DACS system. The DACS data is transmitted from District hydropower projects to a control center in Portland where all Columbia River basin Corps hydropower projects are monitored. In addition to the standard information about reservoir levels, water flows, and electricity generation, the DACS system was also used to collect data for the *Dissolved Gas Abatement Study* (50), an effort that seeks to understand the effect of dissolved gases on anadromous fish populations.

Such control systems continue to be refined and developed. A new system, the Generic Data Acquisition and Control System, was being implemented for projects along the Columbia and Snake Rivers. As of the year 2000, McNary was the first project to have installed the GDACS system. Significantly, this automated control system was designed by a team that included staff with expertise in hydraulics and design. The team included operators who actually worked at Corps hydropower projects and would be using the system.

Preventative maintenance of facilities and equipment is a great part of work of the District's Operations Division. In order to help maintenance schedules, both for individual pieces of equipment and staff, the Corps purchased an off-the-shelf product called MAXIMO®. Prior to the implementation of MAXIMO® in the 1980s, maintenance information was kept on index cards filed by feature of each District dam or other project.

At the end of our period, there was a Corps-wide effort to develop a Facilities Equipment Maintenance System (referred to as FEMS), which, unlike MAXIMO®, would interface with other Corps automated systems. One District engineer was contributing his experience to this national effort. The FEMS will be an undated version of MAXIMO® that has been customized especially for the Corps of Engineers. At the end of 2000, the system was still under development. The goal was to make FEMS the only administrative system used at all field projects. Initial implementation was scheduled for June 2001 in Portland District to be followed by Walla Walla District implementation. Portland and Walla Walla Districts were to be the first two districts in the Corps to implement the new system.

In addition to hydropower facilities and other physical plants, Walla Walla District's Operations Division manages functions relating to natural resources on Corps lands. The Natural Resources Management System was a database program that was written by a Corps contractor for use throughout the Corps. The database shows the physical characteristics of natural resource sites, including such data as acreage, miles of shoreline, and number and type of buildings.

The Natural Resources Management system interfaces with the Visitor Estimation Reporting system. Operations Division uses this Corps-wide reporting system to collect

and distribute data about the number of visitors at recreation and other publicly accessible sites.

In the late 1990s, the Corps began developing the Operations and Maintenance Business Information Link (called OMBIL). The OMBIL software is an Internet-based, Oracle®-reliant program for data input and reporting of all Corps operations and maintenance activities. Eventually, OMBIL will interface with such systems as the Data Acquisition and Control System and the Corps Financial Management System. The OMBIL programs and data reside on a major computer at the Engineering Research and Development Center in Vicksburg, Mississippi. In its efforts to tie many systems together and its use of the Internet, OMBIL was typical of trends in software development being felt by the District at the end of the twentieth century. Internet access meant that apparent response time for OMBIL was extremely variable. One staff member in Operations commented about interfacing multiple databases as it related to the implementation of OMBIL in the Walla Walla District:

> "We're switching from having, maybe, six or seven different databases—ultimately the goal is just to have one. It's a grandiose scheme, and I don't know if we can get there from here. We've been working into about our third year of that. One of the difficulties is having separate databases. Real Estate uses REMIS [Real Estate Management Information System]. Regulatory uses their own database. Operating projects use MAXIMO®. None of this stuff interfaces. If we need information, we don't have access to their database; they don't have access to our database. Everybody had made their own little kingdom (51)."

Project Management

Throughout the period 1981 to 2000, the Corps and, consequently, Walla Walla District placed a strong and ever-growing emphasis on managing tasks and activities in line with project management concepts. Project management concepts include oversight by a project manager who, with team input, controls project budgets, schedules, and other resources.

In order to manage activities as projects, District staff, by the end of our period, had access to the generic project management software, Microsoft Project®. However, the Corps developed the Programs and Project Management Automated Information System. The PROMIS was implemented in the Walla Walla District in the mid-1990s and had capabilities of tracking project scopes, schedules, costs, and contracts. The PROMIS allowed data from various projects to be "rolled-up" into summary reports useful at the Northwestern Division or Headquarters level within the Corps.

In the very late 1990s, Walla Walla District embarked on an intensive effort to manage most, if not all of its activities as projects. This effort, referred to as the Project Management Business Process, or PMBP, raised issues related to project management software: "I'm sitting on the [District's] ad hoc group for PMBP training. We are now looking at what the needs and requirements are for continued training, mostly for project managers. One of those areas bubbling up is the need for more detailed, time-intensive training in the use of Microsoft Project®, PROMIS—those softwares (52)."

Financial Management

Financial management within Walla Walla District has been one of the activities most heavily affected by automation:

> "In the early 80s, ledger sheets were still being done—books and books and books. You'd go into the Accounting Department, the Resource Management today, and they would dig out [a figure] from the fourth book down on the 512th page. They would dig out a ledger for answers, and say, well, you have this much money left. ... Through the 80s, that became COEMIS [Corps of Engineers Management Information System] printouts. After a while, those ledgers were still the ledgers, but they simply were reprinted every month. You went [to Accounting], and you asked for help, and you would still get the big books, but they were all printed by computers. Today, with the introduction of CEFMS [Corps of Engineers Financial Management System], … it's a true accounting system. ... If you look at the need to have two or three dozen accountants just to keep putting constant entries in [a ledger or a database], the need simply does not exist [anymore] (53)."

The introduction of CEFMS, the Corps of Engineers Financial Management System, (pronounced "sea foams") deployed in the District in 1997, was one of the most all-encompassing implementations of a Corps-developed automated system. CEFMS interfaces with many other Corps automated systems, from the payroll system to the Resident Management System used to administer construction contracts. Implementing CEFMS involved not only automation, but also a change in business practices.
As alluded to in the quotation above, accounting and financial control activities were decentralized at the same time that the new system was deployed. Some staff members did not agree with this decision, feeling that they were required to "play accountant," however, decentralization placed "the responsibility for financial transactions squarely in the hands of the managers, rather than those of Resource Management staffers (54)."

In order to follow through on the decision to put CEFMS into many hands, the District entered into an interagency agreement with the U.S. Forest Service to make use of a portion of a downtown office space leased by the Service. In early 1997, a CEFMS training center was established in this space to train approximately four hundred District staff members (55) prior to the switch to CEFMS, which took place in November 1997.

Human Resources Systems

In the management of human resources, the period 1981-2000 saw the implementation of a multitude of systems. In 1986, the Corps of Engineers Time, Attendance, and Labor System, or CETALS, was first introduced with an implementation that lasted through 1989 (56). In 1989-1990, Walla Walla District fully implemented the Electronic Data Transfer system for transmitting pay vouchers and other payroll-related data from the District to processing centers at Northwestern Division headquarters. As with CEFMS, the implementation of CETALS involved centralized programming and processing of data input by a decentralized cadre of District staff, in this case, unit timekeepers. In the late 1990s, CETALS was replaced by the Defense Civilian Payroll System, which captures data from the CEFMS system and processes it to actually produce payroll results.

The pattern of centralization of programming and database maintenance with decentralization of input continued into the late 1990s in the human resources area with implementation of the RESUMIX and the Defense Civilian Personnel Data System. Walla Walla District uses the Personnel Data System to process all types of personnel actions. In the RESUMIX system, federal employees maintain their resumes and indicate their interest in promotions and transfers. The RESUMIX system works along with the Personnel Data System so that when a Corps unit wants to fill a vacancy, lists of potential candidates are produced from RESUMIX.

In some ways, according to District staff, the automation of the process of filling vacancies has proved problematic. Even several years after implementation, at the end of our period, there were some problems with the RESUMIX system. Sometimes staff members who wished to be considered for a particular position found that their names did not appear on the lists automatically produced from the RESUMIX database. The problem seemed to be that the system did not recognize equivalent descriptions of experience.

Another automated human resources system is the Army Benefits Center, referred to as the ABC system, which was introduced in the year 2000. This system featured a secure Web portal where District employees could access information about benefits and where benefit selections could be changed during appropriate "open season" times. In addition to the interactive Web portal, ABC featured an interactive voice response system.

The Civilian Personnel Advisory Center in Walla Walla District has been drastically decreased in size during the past twenty years, in part because many functions it served are being done at central points. RESUMIX and ABC are part of an effort to centralize many human resources functions at central processing centers. At the end of our period, automated human resources systems were working well for the District. However, local and central human intervention was often still necessary to successfully complete the functions these systems supported.

For individual employees filing resumes or changing benefits, these centralized automated systems are meant to be largely self-service and self-explanatory. Some users found such systems easy to work with while others did not. According to a District personnel officer:

> "It's one of those things where you have another password to remember … and because of security, you actually have to have two passwords in ABC. Some folks—the instructions weren't quite as clear as they should have been on how to create that other password. Some folks tried to create one and it didn't work. … It was like locking the keys in the car. They couldn't get in. As a result, we've had to work with them a little bit. ...
>
> "The system itself works. The procedures work, most of the time, the vast majority of the time. The problem has been the accessibility of counselors under the system. … They are trying to add some now (57)."

Because of this situation, human resources or information services staff at the District level often needed to step in and assist employees in using these systems.

Construction

The most important system implemented by Walla Walla District in the construction arena was the Resident Management System, RMS, in use beginning in 1999. The Chief of the District's Construction Division provided a good commentary on this system:

> "The biggest impact it [automation] has had on Construction, and we're still in the implementation phases, is RMS, the Resident Management System. This is a program that's been developed by the Corps so that everything we do in the process of administering a [construction] contract goes into a database.
>
> "I'll give you an example. Part of the quality control requirements of a contract are that a contractor does three-phase inspections, and each one of those has a name. Another part of the contract says that, if a contractor hasn't performed all of his quality control functions, we don't have to pay him, at least in full, for some feature. What this program does is, when a contractor requests a payment, it will tell you immediately which features of the project have had those three phases of quality control done on them. Before that, we would be relying strictly on the memory of the project engineer or quality control/quality assurance rep in the field, who typically signs off on those payment requests. You'd be going strictly from memory, and, if you didn't happen to be there, you'd be relying on somebody else's memory. …
>
> "[RMS] brings all the data together. For example, the program knows that there is a connection between progress payments and the three-phase inspection, and it links them, so that when you're making those [payments], you immediately have that information. ... [The inspectors] have to write a daily report. It used to be that they'd write it by hand every day. … Now they just go to their computer, and they take the previous day's report and say, what's changed today, and they go in and change it. Then it's immediately available through RMS for everybody to look at. …
>
> "We really got serious about it [*i.e.*, implementing RMS] about three years ago. We're implementing it slowly. We started out just using the stuff that pertained to quality assurance in the field. Now we're trying to get the contractor's schedule fed into it and all the progress payments. The last thing we will try to do … is to implement the contractor's side of it. In other words, put a requirement in the contract, so that the contractor uses it [*i.e.*, RMS] also (58)."

Real Estate

In the 1980s, Walla Walla District's Real Estate Division began automating with one computer. This computer ran a proprietary system called PACUMS, Planning and Control Unit Measurement. The system electronically traced real estate activity—costs and units of land acquired and disposed.

By the end of our period, all staff in Real Estate had access via their desktop computers to the Real Estate Management Information System, or REMIS. This Corps-wide system interfaced with CEFMS (Corps of Engineers Financial Management System) as part of the Corps plan to create systems for managing business processes.

Unlike some other systems that can just be implemented after a cutoff date with current data, REMIS would be useful only if most of the data on land holdings was represented in the system. Around 1995, the Real Estate Division began the task of manually "back loading" a large volume of land holdings information into REMIS. The Chief of the

District's Real Estate Division commented on the system: "Some of the main advantages of REMIS are real property inventory and accountability. Yes, we are able to pull up information on outgrants and acquisitions. ... But it does take quite a bit of time to feed the beast, so to speak (59)."

Contracting and Procurement

The history of automating Walla Walla District's contracting and procurement process is a complex one; only a few of the highlights will be covered here. In 1988, Walla Walla District automated the acquisitions process using the Standard Army Automated Contracting System, referred to as SAACONS. Early on, Contracting Division found SAACONS to be helpful in the small purchase arena but requiring substantial improvement in the contracts arena (60). Still, electronic records, such as request for quotations and purchase orders were part of this system.

Unlike some of the specialized systems developed for engineering or even financial management, the Corps adopted Department of Defense systems for contracting and procurement functions. In the 1990s, the Department adopted standards for electronic data interchange, known as EDI. Walla Walla District followed the Department of Defense in using these standards. By the 1990s, the District, along with the rest of the Corps, was using EDI to advertise most requests for quotations over the World Wide Web. Businesses could sign up with secure value added networks and submit quotes back to the District via EDI.

In 2000, Contracting Division implemented the new Standard Procurement System. This system was standardized throughout Department of Defense facilities. It is a modified off-the-shelf application. Walla Walla District's procurement database was located on a computer in the Corps Western Processing Center in Portland, Oregon. Staff in Walla Walla interacted with the database via terminal server architecture. The implementation of the new system within the District was a rough one. Users in Walla Walla experienced significant downtime, delayed response time, some lost data, and some inefficiently programmed processes. However, the Standard Procurement System did support all phases of procurement in a Windows environment, utilizing applications such as Microsoft Word®—in this case for wordprocessing—to make the system easier to learn and use.

Nowhere was the effect of automation more evident than in the way the District's Contracting Division provide specifications to potential bidders. In 1983, prior to desktop computer-aided design systems and desktop publishing, prior to high speed collating photocopiers, here is how the process of "getting the word" out for contracting on a major fish hatchery was described:

> "When Specifications Section is satisfied with the hatchery design, they contact Supply Unit [then part of Logistics Management Office] for the final printout of specs from ADP's [the Automated Data Processing Unit's] computers [*i.e.*, wordprocessing minicomputers]. Supply adds their "boiler plate," the standard list of contractual conditions, to this. ...
>
> "Repro [Reprographics] then mobilizes into an assembly line that would make Henry Ford proud. Two men work the copy camera. One loads the designs; the other loads the camera. [A third person] mans the stripping table. Printing plates are made. Getting a contract ready actually involves two printing jobs—one for the [hand drafted] blueprints

and one for the specifications. Each "lift" of prints for a single blueprint is trimmed and prepared for collating as the next lift comes off the press.

"Meanwhile, supply collates the specifications, almost as quickly as they come off the presses. Then it's back to repro for binding. …

"The mammoth task of mailing the plans and specs to the list of respondents is handled by OAS [Office of Administrative Services] (61)."

Thousands of pages of paper were mailed out in this process. Contrast this to the situation in 2000 when the District produced specification documents via desktop wordprocessing systems. Engineering and design drawings produced on the computer-aided design system were incorporated with the text and saved in Adobe® portable document format (pdf). Contracted staff in Information Services would create self-opening files including the Adobe® .pdf reader on hundreds of compact discs that would be mailed to the list of potential bidders maintained electronically. Even mailing labels for the compact discs were be produced via computer.

Logistics Management

Logistics Management has implemented many automated systems and services in the twenty-year period covered by this volume. As early as 1981, Walla Walla District was ordering airline tickets onsite via a dedicated terminal. In 1988, the District was a test site for the Automated Personal Property Management System. In 1990, the District implemented the online Federal Supply System for ordering supplies. By 1992, Logistics Management had placed barcodes on one hundred percent of all District property. The District contracted with Strategica, Inc., to complete the Automated Personal Property Management System in 1992.

Organizing Information

Walla Walla District staff generated, and continue to create, a large number of records and files. In 1993, the District instituted a formal Records Management Program using the Modern Army Record Keeping System, or MARKS.

BIG RED DELIVERS

District headquarters offices in Walla Walla are being serviced by a new sort of mail clerk. This clerk is guaranteed never to go on sick leave or say nasty things about the boss. Since May 11 [1981], deliveries of interoffice mail have been conducted by a robot. ... Described by one wag as a "hyperactive filing cabinet," it moves down the halls on a mile-long track in the floors which is invisible to the human eye. ... It is fed electricity at night to charge up. ... [It] rolls down the halls at about a mile an hour, slower than most people walk, and stops if it detects an object in its path. It uses a low-power radio transmitter to open doors for itself and sounds a chime to alert some secretaries that it has arrived with their mail. …

The robot's first few trips through the halls seemed to stimulate Corps employees to come up with humorous comments about the machine. ... The robot has returned at the end of its run bearing a sign saying, "feed me" and another time sporting a tail. An unidentified Corps employee tied a child's bumblebee pull toy to the machine one morning.
–*Intercom*, 15 May 1981 (62).

Big Red made his?/her? last run when Walla Walla District left its old headquarters complex in 1995.

The building of a new District headquarters drastically affected staff members' ability to store quantities of paper documentation. As Walla Walla District prepared for a new, smaller headquarters in 1986, it sponsored a massive cleanup. The District Deputy Commander at that time put it this way: "I fully realize we are a highly technical organization, and that files are essential tools for your respective trades. I also realize that the Walla Walla District has occupied the same buildings since 1949 and many employees are retaining records and files dating clear back to that time (63)." Before the cleanup, 2,351 linear feet of files, 3.235 linear feet of reference material, and 204 linear feet of forms—a total of one-and-one-quarter miles of material was measured. Clearly, it would be prohibitively expensive to retain all this material. Some members of the District staff recalled this memorable cleanup with regret, even fifteen years later, believing that valuable material had been lost in the transition.

A good example of a corporate effort to organize information by Walla Walla District was the treatment of its invaluable collection of engineering design and construction drawings. In the 1980s, the District began an effort to microfilm all the thousands of large drawings, which represent all projects as bid and as constructed. In order to access these drawings efficiently, the District implemented an aperture card system. Aperture cards were like computer punch cards, but with a piece of microfilm inserted in each card. By means of specialized electronic equipment, numerical codes could be entered to retrieve a specific aperture card containing one engineering drawing. In the early 1990s, the District created a Microsoft Access® database with records for every drawing and aperture card.

In the 1990s, however, Walla Walla District began a project to digitize all of its engineering drawings. By the year 2000, a large percentage of the District's Engineering drawings, current and retrospective, had been scanned to graphic file format (.tiff) in conjunction with further development of the database for searching these drawings.

Records kept in support of litigation are another example of how advances in technology affected the organization of information in Walla Walla District. Starting in 1994, the Information Management Office supplied records on optical disc to the District's Office of Counsel. This effort involved scanning paper documents and creation of a database to help easily retrieve pertinent documents. One of the advantages of such a method of organizing information is its portability—copies of the disc were supplied to the U.S. Department of Justice, which was representing the District in court.

The District's Library has been transformed by information technology. While the physical footprint and the staffing of the Library shrank as the decades passed, its access to electronic information via compact disc and online grew. Several major collections, including the print law library and a special collection on Hanford were weeded in the mid-1990s. In the 1980s, the Library maintained over 200 subscriptions to magazines and journals, expending a great deal of effort in routing these periodicals to interested staff members (64). By 1995, the District decided to decentralize the acquisition and management of periodicals, so that individual offices and divisions would maintain their own subscriptions. In 1993, the Library contracted cataloging. Online cataloging records were prepared for the collection so that, by the end of our

period, the Library was poised to introduce an online catalog that would be accessible from every District desktop computer.

Training for and Acceptance of Information Technology

“People make or break automated systems (65),” said one former head of Walla Walla District’s Information Management Office. He went on to say that in its early efforts to automate, sometimes systems were not designed to fit the requirements of staff:

> "Over the years, I have seen a number of truly wonderful automated systems fielded in this organization and absolutely killed by the people who passively—because they’re required and forced to use them—that they passively make them fail. Some of these were incredibly expensive and enormous corporate investments— ... some of the early preventative maintenance systems. The field people didn’t believe in them. Instead of training people and then giving them a need and a requirement, what we did is, we provided them an automated system and what we said is, you will use it, and you will get training on it. They said, well, we’ll take the training, but we’re not going to do it. These things [*i.e.*, automated systems] again and again have died a slow, painful death because they just don’t quite work. There are always problems with them that are not quite, but almost insurmountable. They become inefficient. They become consumers of resources. Eventually they just die (66)."

Contrast this to an automated system such as the new powerhouse control system, the Generic Data Acquisition and Control System, which was developed by a team that included actual users. At the beginning of our period, efforts to automate processes were often met with skepticism or resistance. With the vast improvements in technology, the proven nature of automated solutions, and the universal application of automation to problems, there is virtually no resistance on the part of District staff when automated solutions are suggested. Staff do, however, retain some skepticism about the efficiency and practical value of some of the “top-down” automated systems (for example, the Facilities Equipment Maintenance System or the Real Estate Management Information System) being developed centrally by the Corps of Engineers.

Keeping up with advances in information technology during the 1981-2000 period required quite an investment both on the part of individual staff members and the District. At first, individuals often sought computer training or instruction in programming on their own time. Walla Walla District or another unit of the Corps would frequently provide training in the use of specialized systems as they were being implemented (*e.g.*, the Corps of Engineers Financial Management System or the Standard Procurement System). The District, at times, turned to local educational institutions, especially Walla Walla Community College, for training in the fundamentals of desktop computing.

In the late 1990s, the District reestablished a program of in-house training. The District devoted one full-time staff member and a training room with a dozen computers to the training effort, which focused on commonly used applications such as Microsoft Word®, Excel®, Web design, *etc.* Staff used outside commercial training sources, Web-based training, peer on-the-job training, or self-instruction to augment this training when necessary.

Structure and Operation of the Information Management Organization

District Organization

Prior to 1986, management of information technology was fairly dispersed throughout the various units of the Walla Walla District. Thus individual units made their own choices about hardware and software procurement and implementation. However, the Automated Data Processing Unit had existed even prior to 1980. ADP managed the District's mainframe computer, the Harris, and provided a variety of programming and text-processing services.

In 1986, the Information Management Office, or IMO, was created as a new organizational unit within Walla Walla District. Functions that had been the responsibility of ADP and the Office of Administrative Services and others offices were integrated into IMO. When it was formed, IMO included fifty employees with responsibility for communications, office automation, audiovisual resources, records management, the Library, technical information processing (publications), the photo lab, and printing.

By 1987, Automated Data Processing was disbanded as a unit and IMO took over its functions in regard to maintaining the mainframe Harris computer. Still later, functions such as a help desk with applications and hardware support, GIS support, computer support, the District's centralized servers and the network, and the mailroom were added to the responsibilities of IMO.

The Harris Computer

Up until the mid-1990s, the Planning Branch of IMO was a very active unit. This unit helped plot the District's direction in the then very confusing ocean of information technology. In 1999, the Planning Branch of IMO was disestablished. At that time, IMO was streamlined and supervisory positions were reduced. Also in 1999, the IMO instituted a combination of charge back for special services with flat-rate charges for general computer/network support. These budgeting systems helped to clarify how the District was using and paying for information technology.

By the end of the millennium, such managerial changes, and the expertise of staff in Information Management, helped to make the District IMO an acknowledged leader among peer units throughout the Corps.

Trends in District Information Management

One important trend within Walla Walla District information management pertains to the degree of centralization and decentralization of functions. The beginning of our period was the era of centralized mainframes (the Harris) and proprietary systems (*e.g.*, the Jacard wordprocessing system) where few staff members actually had access to a computer system. Following that, there was a period during the early to mid-1980s of relative decentralization where organizational units purchased their own stand-alone desktop computers and used whatever software came their way. This trend toward decentralization was, however, tempered by the development of Corps-wide software programs that were still being used by technical elements of the District staff.

Beginning in the late 1980s and continuing to the year 2000, the trend went toward greater centralization. The District, along with the rest of the computerized world, entered the era of networking and client-server architecture. Once again, computer experts were needed to maintain the functionality of complex networked systems.

The Corps, with its need for corporate information sharing, has continued to develop large-scale systems, often dependent on centralized processing centers. In 1990, the Corps of Engineers Automation Plan called for centralization of major information systems at three processing centers. Walla Walla District was served by the Western Processing Center in Portland, and the transition to that center went smoothly.

In the area of software development, there has been a consistent, if not universal, trend for the Corps to go from in-house programming, to contracting for development, to the purchasing of off-the-shelf software. An example of in-house software development heavily used in the District is the Corps' hydrologic modeling software (HEC-RAS). Contracted software is exemplified by the cost-estimating software, MCACES. While many newer Corps-wide systems, such as RESUMIX, are customized from off-the-shelf products.

Another strong trend within information management is the Corps' desire to interface systems. Thus, the Corps of Engineers Financial Management System interfaces with many other Corps systems. Plans for the future include further steps in this direction; eventually data from a number of Corps systems will feed into one database.

The history of information technology in Walla Walla District shows an increasing awareness of the need for development and use of hardware, and, more particularly, software standards. Purchase of desktop computers from government contracts helped to ensure that IBM-type, not Apple, computers became standard. This minimized the number of different brands of computers to be found in District offices. Eventually, there was standardization in which software was supported and authorized for use on District microcomputers. For example, in 1992, Microsoft Office®, including Microsoft Word® became District standards. With the development of the District local area network and wide area network, operating systems and e-mail systems were standardized.

One of the most pronounced trends relating to information management in the Walla Walla District during the 1981-2000 period is the privatization of and contracting for services.

In the early days, Walla Walla District, along with other governmental entities, had to procure computer hardware and software from individual suppliers. By 1989 however, half of the District's computer hardware/software procurement was supplied via a General Services Administration (GSA) contract. In this way, the memorable wave of desktop computers purchased from the Zenith Corporation surged to the desks of District workers, as well as to the offices of thousands of other U.S. government workers. In 1992, the District awarded a microcomputer contract to the Southside Computers, Virginia, who supplied the District with more desktop computers bundled with software. Again in 1993, seventy-three microcomputers were purchased by the District via a General Services Administration contract. By the end of our period, almost all standard desktop software and hardware could be purchased under government contract or under a special government rate offered by suppliers.

The 1980s were prime time for commercial activities studies. In these studies, government agencies examined whether certain functions could be more efficiently and cost-effectively contracted out to private companies. Commercial activities studies affected the Information Management Office more than many other District units. In 1986, the mailroom and audiovisual services were studied. Eventually, these services were outsourced. Following that, the computer support and help desk functions were privatized. A number of different companies were awarded contracts for various mixes of services.

In 1988, the District downgraded its printing plant to a duplicating plant. This was possible mainly as a result of advances in wordprocessing and duplicating technology. Under a Department of Defense contract in 1990, the Defense Automated Printing Service became the District's duplication and graphics service.

Walla Walla District privatized the mailroom function in 1988. In 1993, Technical Information Support Section was created in response to a need for documentation and record keeping for the District's involvement in the multimillion-dollar cleanup of the Hanford Nuclear Reservation. Technical Information Support Section stayed on with the District after involvement in the Hanford project diminished, supplying technical editing for the numerous reports and other documents as well as management of District administrative record sets related to litigation. In 1999, the District adopted reimbursement funding and placed graphics, photography, and compact disc publishing under Technical Information Support Section.

Another trend within District information management was the growing concern over network security. Especially in the late 1990s, the District, along with the rest of the Corps and the Army implemented new virus detection and firewall systems to protect the integrity. The District took proactive action to discover and correct possible computer problems that might result from going to the new millennium, or Y2K. Prior preparations were so effective that the click of the second hand leading into Y2K produced absolutely no problems for District computer users.

Status of Information Technology in 2000

The status of information technology in Walla Walla District in the year 2000 may be demonstrated by looking at how one of the District's projects uses automation to do its work. The Walla Walla River Basin Feasibility Study was a joint effort of District staff

and the Confederated Tribes of the Umatilla Indian Reservation. The study was looking for ways to augment and stabilize the flow of water in the Walla Walla River, a tributary of the Columbia River, in order to help fish populations. At various times, the project team needed to communicate with the sponsor, general public, scientists and staff of other agencies, Corps employees who are not part of the project, and with each other. The current state of information technology in the District facilitated this communication.

The project used a networked hard drive to store documents and other computer files for access by all team members. Project staff heavily utilized wordprocessing software to prepare text-based documents such as minutes, proposals, timelines, and draft reports.

Recording technology was used to tape record selected meetings, which were later transcribed as minutes. Sometimes project staff brought laptop computers to meetings in order to record important ideas and decisions. Project teams used computer display technology to project the contents of a computer screen—usually pictures or slide shows in Microsoft PowerPoint® featuring both text and graphics—so that everyone at a meeting could "be on the same page." Team members or others could "attend" meetings via speakerphone.

E-mail was the primary tool that allowed the sponsoring organization, located in a different town from Walla Walla District, to keep up-to-date as well as sharing advice and feedback on project developments. E-mail was also used to keep in contact with many other agencies that were working on water resources and natural resources issues in the Walla Walla watershed.

The project manager for the Walla Walla River Basin study used the Corps of Engineers Financial Management System to track project funds. The project manager worked with staff in the District's Contracting Division to advertise and manage any project-related contracts that were to be let for bid. Staff in Contracting used the automated Standard Procurement System and other information technologies to support project contracts. Individual project team members used spreadsheets to estimate project costs. The project manager tracked schedules and assignments in the Corps Programs and Project Management Automated Information System. Using the Corps of Engineers Financial Management System, timekeepers in the various District units recorded the hours spent on the project by staff members so that the project could be charged accordingly.

Meanwhile, members of the project team used specialized technologies to assist them with their tasks. The hydrologists fed data into computer-based modeling systems in an effort to understand the "flow regime" within the Walla Walla watershed. Engineers on the Walla Walla River basin study team used computer-aided design system and modeling programs to help determine where and how big reservoirs would have to be and how pipelines might be laid out in order to keep the Walla Walla River adequately flowing year-round. Engineering staff routinely performed complex calculations using Microsoft Excel® spreadsheets that they had designed.

Data about the entire watershed was needed—such things as precipitation, vegetation, runoff, and habitat had to be well understood and documented. Walla Walla District

staff members gathered facts about the watershed. Data sources included previous studies, agency Web sites, phone calls, one-on-one meetings set up via e-mail, and conferences that had been organized and publicized with the help of information technology. District staff completed physical surveys of the watershed using global positioning systems, laptop computers, and digital photography. The project team contracted with a firm to fly over the watershed and complete up-to-date aerial mapping. Comparable aerial photographs taken decades ago were transferred to digital form.

Computer files with maps and data were received by project staff from other agencies via e-mail attachments, compact disc, or in paper format. Standards for information content, especially for maps, became an issue at this stage. Maps coming from outside sources and older Corps maps had to be "realigned" and placed on standard coordinates. Geographic information system technologies became a major component of this area-based project, which, eventually, would need to present large amounts of data in ways that were easy to understand.

The team printed and mailed newsletters and notifications to interested individuals and organizations, area elected officials, and other agencies. For this purpose, the team maintained a mailing list database in Microsoft Access®. Another means that the study team used to communicate with the general public was the District's publicly accessible Internet Web site. The Web pages provided project-related overviews, pictures, progress reports, and contact information. The project team discussed the desirability of placing some interim data on the Web as the project progresses. By showing the world "how the Corps is doing it," by making data available on the Web, the District promoted greater standardization in the way watershed-related data is gathered and presented.

The project used the Web for more than broadcasting information. During the designated period, the public could use an interactive form to leave comments about the proposed nature and scope of the study. Comments solicited at public meetings, as well as Web-submitted comments, were then posted on the project's Web pages.

The Walla Walla River Basin Feasibility Study project staff used a wealth of information technologies to enhance the advertising and content of public meetings, educating the attendees about the project while capturing issues raised by participants. Staff used presentation software, especially Microsoft PowerPoint®, to prepare informative slide shows with text, graphics, and even embedded audio clips and movies. Computers could also show individual pictures or maps. During meetings, staff members could dial-in to the District network via telephone to access computer files or as a portal to the Internet, allowing public display of Web pages. Large graphical displays related to the public meeting were set up in the meeting room. Displays usually featured large color photographs and maps along with text, all printed in-house on high quality color printers.

Project members were able to supply meeting attendees with printed materials that included black and white or color graphics. Such printed products were generally written, edited, and formatted via computer before being reproduced at the District's in-house copy center. Alternatively, the public could be given copies of longer documents on compact disc. Project staff used sound speakers and portable microphones to allow meeting participants to hear speakers. Audio recording systems,

mobile computers, and flip charts were used to capture the essence of the meeting. Participants could sign-up at public meetings to be included in later mailings and distributions of project-related information.

When the study team was ready to distribute a report, many team members wrote sections of the report on computer; some team members hand-inscribed their text and input it later into a wordprocessing program. Writers could insert spreadsheets, digital photos, and charts or graphs to enhance their reports. By sending text as attachments via e-mail, team members were able to share the task of writing the report and could distribute drafts to sponsors, advisors, or technical experts wherever their location.

Sometimes the Corps contracted with a technical firm to write sections of a report, in which case the firm delivered computer files containing the report via e-mail or by file transfer protocols (FTP) to a publicly accessible District server. More commonly, the project manager assembled the sections of the report and delivered them to a contractor for final editing and formatting via computer. Staff finalized wordprocessing documents and transferred them to .pdf for posting on the Walla Walla District Internet and for easy use on CD. Wordprocessing versions of reports were sent to the District's Reprographics Unit for photocopying and binding. Interested parties were sent paper or CD copies of reports. As many as several hundred copies of CDs and printed documents were sometimes made by in-house contractors.

The study team was heavily support by contracted services, mainly contractors housed at District Headquarters. These included the computer support technicians who maintained the District network and Internet connections, kept software up-to-date and running properly, and repaired broken computer systems. Contractors provided web design, graphics, photography, mass mailings, document editing, desktop publishing, media duplication, and print reprographics to the project.

Information technology for its own sake might be of little interest to the members of a project team like those involved in the Walla Walla River basin study. However, as outlined above, in the year 2000, information technology helped to support almost every individual task that was needed to pull a project together. In fact, by the end of the millennium, very little work was actually done within the District that was not, in some way, supported by information technology.

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Notes for Chapter 3

1. Machine of the year: The computer moves in. *Time*, 3 January 1983.
2. Clausen, Gareth M. Interview. Walla Walla: NWW 19 September 2001.
3. ADP Center handles specifications for military, civil projects. *Intercom*, 4 November 1983, p. 1.
4. ADP adds three programs to district computer. *Intercom*, 6 July 1983, p. 8.
5. Reservations plus. *Intercom*, 15 June 1981, p. 1.
6. Encore gets high marks from social critic. *Intercom*, 20 August 1982, p. 2.
7. Computers: History and development. *Jones Telecommunications & Multimedia Encyclopedia*. INTERNET: www.digitalcentury.com/encycolopedia/comp_hd.html.
8. Nutt, Lynda G. Interview. Walla Walla: NWW, 20 September 2001.
9. Reese, David L. Interview. Walla Walla: NWW, 23 October 2001.
10. Pomraning, Allen N. Interview. Walla Walla: NWW, 24 January 2002.
11. Keeping the phones running. *Intercom*, June 1988, p. 7.
12. Ibid.
13. Eastman, Mark G. Interview. Walla Walla: NWW, 25 June 2001.
14. Carlton, Richard. Interview. Walla Walla: NWW, 24 October 2001.
15. District receives national honors for interpretive program. *Intercom*, February 1997, p. 1.
16. USACE, Walla Walla District. *McNary Training Manual for Interpreters*. Walla Walla: NPW, 1996.
17. Project engineers discuss productivity and computers. *Intercom*, 10 May 1982, p. 2.
18. Shelin, Sandra L. Interview. Walla Walla: NWW, 14 September 2001.
19. A new way of publishing. *Intercom*, February 1989, p. 16.
20. Hixson, Phil L. Interview. Walla Walla: NWW, 10 July 2001.
21. Reese interview.
22. *Lower Snake River Juvenile Salmon Migration Feasibility Report/Environmental Impact Statement*. Draft. Walla Walla: NWW, 2000.
23. Lanz, Sylvia. The rise and fall of corporate electronic mail. *Ubiquity*, 2001.
24. Richardson, Tim. Cyberslackers are curse of workplace. *The Register (U.K.)*, 19 April 2001.
25. MacKay, Wendy E. Diversity in the use of electronic mail. *ACM Transactions on Office Information Systems*, vol. 6, no. 4 (October 1989), p. 381-397.
26. Pomraning interview.
27. Shelin interview.
28. Key found in hallway. *Intercom*, 8 March 1985, p. 2.
29. For the history of the Internet growth and statistics see: (1) Gregory R. Gromov. History of the Internet and WWW. Gromov, 2002. INTERNET: www.netvalley,com/intval.html. (2) Internet Software Consortium; Internet Domain Survey. Redwood City, Cal: The Consortium, 2003. INTERNET: http://www.isc.org/ds/host-count-history.html. (3) OCLC Online Computer Library Center, Inc., Office of Research. Web Characterization Project. Columbus, Ohio: OCLC, 2003. INTERNET: http://wcp.oclc.org/.
30. Weller, Lt. Col. James S. Commander's Corner. *Intercom*, winter 1995-96, p. 2.
31. *Report of the Secretary of the Army on Civil Works Activities: Extract Report of Walla Walla District*. Annual. Walla Walla: NWW, 1981-2000.
32. The *Lower Snake River Juvenile Salmon Migration Feasibility Report/Environmental Impact Statement* in draft from 2000 and the final 2002 version were both made available on the District Internet,
33. USACE, National Water Safety Program. National Water Safety Program. Walla Walla: The Program, 2000. INTERNET: watersafety.usace.army.mil/.
34. Nutt interview.
35. Computer assisted drafting proposed in District. *Intercom*, 17 September 1984, p. 3.
36. CADD training. *Intercom*, 9 September 1985, p. 4.
37. Pomraning interview.
38 Lindgren, Mark F. Interview. Walla Walla: NWW, 22 June 2001.
39. Measuring unit is talented. *Intercom*, 30 September 1982, p. 3.
40. USACE, Walla Walla District. What is a GIS?. Walla Walla: NWW, 26 June 2000. INTERNET: www.nww.usace.army.mil/gis/definition.htm.

41. The attribution of this definition to the National Science Foundation is commonly encountered and traced to a workshop on GIS held in January 1999 at the NSF.
42. GIS outlook: Strides made in acquiring new computerized map-making. *Intercom*, 8 February 1988, p. 4.
43. Christianson, Carl J. Interview. Walla Walla: NWW, 26 June 2001.
44. Grden, Blaise. The interrelationship of geographic information systems with master plans and operational management plans. Walla Walla, NWW, 11 April 2001. INTERNET: www.nww.usace.army.mil/gis/interrelatonship.htm.
45. Greenwald interview.
46. USACE, Walla Walla District. Annual Summary of Accumulated Historical Material: Calendar Year 1994. Walla Walla: NPW, 1995.
47. USACE. *Civil Works Construction Cost Index System.* Engineer Manual 1110-2-1304. Washington, D.C.: USACE, published annually.
48. USACE. *Construction Equipment Ownership and Operating Expense Schedule.* Engineer Pamphlet 1110-1-8. Washington, D.C.: USACE, published annually.
49. Greenwald interview.
50. *Dissolved Gas Abatement Study: Phase I, Technical Report*. Portland and Walla Walla: The Districts, 1996. *Dissolved Gas Abatement Study: Phase II, Technical Report*. Portland and Walla Walla: The Districts, 2002.
51. Brown interview.
52. Christianson interview.
53. Pomraning interview.
54. CEFMS: New financial management system to revolutionize Corps' business practices. *Intercom*, November 1997, p. 7.
55. CEFMS: District moves towards Corps Electronic Funds Management System. *Intercom*, February 1997, p. 6.
56. Corps of Engineers Time, Attendance and Labor (CETAL) system. *Intercom*, December 1989, p. 16.
57. Quinn, Raymond R. Interview. Walla Walla: NWW, 21 September 2001.
58. Opbroek interview.
59. Carlton interview.
60. Walla Walla District. *Annual Summary of Accumulated Historical Material: Calendar Year 1988.* Walla Walla: NPW, 1989.
61. Two divisions help get the word out on Sawtooth. *Intercom*, 27 January 1983, p. 2.
62. Robot mail service starts. *Intercom*, 15 May 1981, p. 1-2.
63. District offices plan massive cleanup. *Intercom*, 29 April 1986.
64. Magazine speed-up asked. *Intercom*, 15 October 1981, p. 4.
65. Pomraning interview.
66. Ibid.

Chapter 4. Civil and Military Works

Walla Walla District's Civil Works Mission

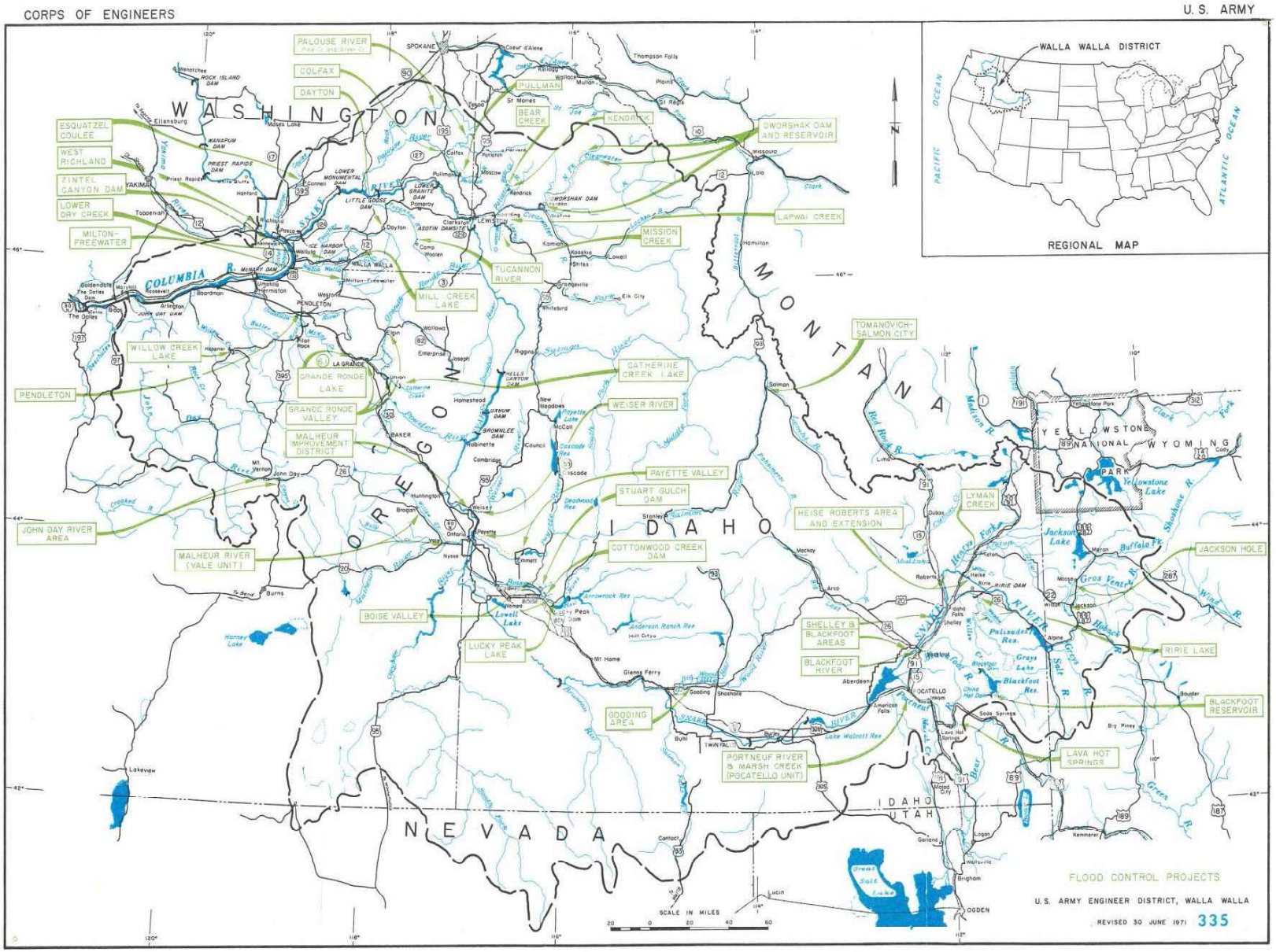
While few have questioned why the U.S. Army should have a Corps of Engineers for undertaking military works, the civil works mission of the Corps has been continually scrutinized. In 1981, at the beginning of the period covered by this history, Walla Walla District's newsletter, *Intercom*, stated it this way: "Several U.S. presidents and many private citizens have wondered why the U.S. Army and the Corps of Engineers are involved in a civil works mission. In each case, the Corps has countered with an explanation of the importance mobilization assistance capability is to national security and the need to keep our nation's military engineering expertise sharply honed in case it is needed in a national emergency (1)." Though Walla Walla District was not directly responsible for a large military works mission, the District did assist the Corps in maintaining readiness for mobilization.

In 1982, the Corps Office of Future Directions looked at a "thirty-year perspective on water and the Corps (2)." The study pointed out that international projects and military work would be growing. This growth pattern was not, however, reflected in Walla Walla District. The study also pointed out that "domestic civil works are focusing more on operations and maintenance and less on construction." This statement reflected the situation in Walla Walla District from 1981-2000.

The purposes for which civil works projects were constructed and operated in Walla Walla District were similar to those in other districts. First, there were projects whose primary purpose was flood control. These projects will be discussed fully in chapter 6. A second purpose for District water resources-related projects was hydropower production. Navigation was a third important purpose for civil works projects undertaken by the Corps. Irrigation, though not normally the sole or primary purpose in civil works projects managed by the Corps of Engineers, may be considered a secondary purpose. Recreation, discussed in detail in chapter 11, was also an acknowledged purpose for Corps civil works projects. Finally, an increasingly important part of Corps of Engineers civil works projects was environmental management and restoration. Environmental restoration and stewardship aspects of civil works projects are discussed in chapters 7 and 8.

The boundaries of Walla Walla District generally follow the watershed boundary of the Snake River drainage, and include approximately 107,000 square miles in six states: Washington, Oregon, Idaho, Wyoming, and small parts of Nevada and Utah. In Walla Walla District, most civil works projects were projects having to do with streams rather than swamp areas or marshes. Certainly, being landlocked, the District had no part in Corps efforts related to ocean beach erosion. Principle rivers of concern for the District include the Columbia and its tributaries; the Walla Walla, which in turn is fed by Mill Creek; the Snake River and its tributaries; and the Clearwater; Grande Ronde; Boise; and Salmon Rivers. For a map of District river basins and operating projects, see below

Map of Walla Walla District Showing Rivers and Operating Projects



Water and the West

Water is at a premium in many parts of the United States. The western part of the United States has been called a "semidesert with a desert heart (3)."

In his famous analysis, *Cadillac Desert*, author Marc Reisner outlines the nature of the precarious civilization built in the water-limited West:

> "If you begin at the Pacific rim and move inland, you will find large cities, many towns, and prosperous looking farms until you cross the Sierra Nevada and the Cascades, which block the seasonal weather fronts moving in from the Pacific and wring out their moisture in snows and drenching rains. On the east side of the Sierra-Cascade crest, moisture drops immediately—from as much as 150 inches of precipitation on the western slope to as little as four inches on the eastern—and it doesn't increase much, except at higher elevations, until you have crossed the hundredth meridian, which bisects the Dakotas and Nebraska and Kansas down to Abilene, Texas, and divides the country into its two most significant halves—the one receiving at least twenty inches of precipitation a year, the other generally receiving less. Any place with less than twenty inches of rainfall is hostile terrain to a farmer depending solely on the sky. ... Everything depends on the manipulation of water—on capturing it behind dams, storing it, and rerouting it. … Were it not for a century and a half of messianic effort toward that end, the West as we know it would not exist (4)."

Whether you look at this "messianic effort" to optimize the use of the West's limited water as foolhardy and shortsighted (as does Reisner) or as visionary and in the best spirit of human endeavor (as most policymakers did up until at least the 1970s), the fact remains that Walla Walla District is situated firmly in the semiarid West and is participating directly in the "manipulation of water." During the 1981-2000 period, the District was part of a great balancing act. In this balancing act, the District, along with other agencies and groups, tried to be good stewards of a legacy of water resources development that supported an irrigated and hydropowered way of life. At the same time, the District acknowledged and even embraced changes in society's perceptions and goals, which emphasized the scarcity of water in the West and the need to preserve and restore our natural environment.

Water in the West, and notably in the Walla Walla District, has been used for many purposes. Some of these purposes work synergistically to enhance the other uses; some purposes detract from the full realization of others, as we shall see in the remainder of this chapter.

Hydropower

As the nation's primary agency for water resources development and management, the Corps of Engineers has played a significant role in meeting the nation's power needs by building and operating hydropower plants in connection with its large multiple-purpose dams. Water has been used as a great engine for fueling the development of the Northwest via the generating capacity of water running against the turbines of dammed rivers.

Dams operated by Walla Walla District that produce significant amounts of electricity are: McNary, Ice Harbor, Lower Monumental, Little Goose, Lower Granite, Dworshak,

and Lucky Peak. All of these projects have other purposes in addition to hydropower. All of these dams were completed prior to the beginning of the historical period covered in this volume.

Bonneville Power Administration and the District

Walla Walla District is not in charge of planning needed facility output in terms of demand for electricity, nor does the Corps have to distribute or market electricity. Instead, power produced by the hydropower projects operated by the District is distributed and marketed as part of the Federal Columbia River Power System by Bonneville Power Administration. BPA was established in 1937 by Congress to provide these functions for the Corps and Bureau of Reclamation projects on the Columbia River system. By 2000, the system included 31 hydroelectric facilities, including McNary, Ice Harbor, Lower Monumental, Little Goose, Lower Granite, and Dworshak Dams operated by Walla Walla District. The system also included other Corps facilities operated by the Corps' Seattle and Portland Districts, as well as Bureau of Reclamation facilities (5).

Bonneville Power Administration is authorized by law to sell power preferentially to electric cooperatives and other publicly owned utilities of the region. As long as electricity from the Federal Columbia River Power System was abundant in comparison with demand, all went well. In the 1970s demand increased, and BPA became an agent in coordinating output of regional electricity resources. The hydroelectric dams began to be operated to follow the fluctuation of energy needs throughout the season and even throughout the day.

Despite a somewhat systematic approach to development of the region's generating resources, and due to the financial failure of several thermal projects, the Bonneville Power Administration and the region found itself losing ground to the growing demand for power by the region. Demand for delivery of electrical power via the intertie to the Southwest United States also grew.

Meanwhile, environmental concerns related to the operation of the Federal Columbia River Power System surfaced. The various instabilities and demands related to Northwest electricity generation prompted Congress to pass the Pacific Northwest Power and Conservation Act (6) in 1980. Following enactment of this law, hydropower production came to be seen in the much wider context discussed below. (See section, Regulating a System Under Stress.)

Hydropower as a Renewable Resource

In 1983, the Corps published a comprehensive, twenty-three-volume study, the *National Hydroelectric Resources Study* (7). The study recognized that most new electric capacity in the United States through the year 2000 would come from nonhydropower sources, but the study projected more of a growth in hydropower than was the case. Walla Walla District, for example, had identified many potential sites for new multipurpose dams that would produce hydropower.

The District also had plans to install additional generating units in several existing dams. In other districts, the Corps had built pumped storage facilities as a means of helping to meet peak electricity demands. In 1981, Walla Walla District identified 530 possible

sites for this type of peak electricity demand project. Some planned additional generating units were installed, but no new multipurpose or storage projects were constructed during the 1981-2000 period in the District.

In the 1990s, the conception of dams as a clean, environment-friendly, source of renewable energy came to be questioned by some members of the public and some policy makers. In place of the old “clean” paradigm, there came a newer concept in which dams were seen as having harmful side effects, particularly on fish and on naturally occurring habitats. This new concept of dams can be seen, for example, in the World Commission on Dams report, *Dams and Development* (8), published in 2000. This new paradigm had a big effect on Walla Walla District where the connection between dams and a decline in salmon populations came under intensive debate. (See chapter 8.)

Also beginning in 1990, the availability of equipment for power generation in the Federal Columbia River Power System began an overall downturn. "By 1995, total system availability had declined to 82 percent, compared to an average industry average of 90 percent (9)." This decline was due to limited funding available for operation and maintenance on an aging infrastructure, as well as by the increased demands for fish protection measures. The situation began to turn around after 1998 when direct funding of operations and maintenance began to be available for Federal Columbia River Power System projects (see section below).

Deregulation of the Electric Power Industry

During the 1990s, some consumers, the electricity industry, and various government entities looked at the structure of the electricity industry. These geographic-based utilities would have a monopoly in a certain region and would generate, transmit, and distribute electricity to end-users. However, by the 1990s, the situation was extremely complex, with only a small fraction of the nation’s over 3,200 electric utilities performing all three functions. The vast majority of utilities serving the end-user relied on power purchased from others (10). The Bonneville Power Administration was one of the major generating and transmitting entities in the Northwest from whom other utilities purchased power.

Many factors powered the movement to deregulate the electricity industry (11). Some of these factors were: the successful deregulation of the natural gas industry, renewed belief in the power of properly managed free markets, technological innovations that made small generating pants more feasible, the trend for some industries to generate their own power, and the high electricity rates experienced by consumers in some parts of the United States. The Northwest was experiencing some instability with regard to electricity supply, but its electric rates were still comparatively very low. Thus, there was no great regional desire to deregulate the electric power industry in the Northwest.

In 1996, the Federal Energy Regulatory Commission issued regulations that promoted the development of wholesale power markets and the opening of transmission systems to all qualified users. In December 1999, the FERC issued Order 2000 calling for electric utilities to form Regional Transmission Organizations, a step in decoupling transmission of electricity from generation and from distribution to end-users. It became

clear that deregulation would require profound changes in the way Bonneville Power Administration was structured and the way the Federal Columbia River Power System was managed. To prepare itself to work in this new world, in 1998 BPA restructured itself into a power-producing and marketing side that was decoupled from the power transmitting side.

This mandated division within the organization made it more difficult for the Corps of Engineers to deal with Bonneville Power Administration. One Walla Walla District staff member discussed the situation:

> "Up till a few years ago, BPA was one entity. They have the side that took care of the transmission lines, the power distribution. Then they had the group that took care of the power marketing and the sales. But they were basically one group. We dealt with dispatchers and schedulers at BPA's Control Center in Vancouver, Washington. We still do, but they no longer deal with the marketing side—in fact they don't even talk to them—they are specifically forbidden to talk to them. If you know when a line is scheduled to be out, that means that you may have to buy power from some other source, and that would give you an unfair advantage in the market.
>
> "Yet in here [in the Walla Walla District], we talk to the marketing side—that's what they call the Power Business line. They're the ones that provided the funding for our power side, what's called the joint-costed side; we share costs with them. Yet the operators at the [Corps hydropower] projects deal directly with the Transmission Business Line—the schedulers, the dispatchers, and those that control the river system. It's totally different from the way we used to do business. … It's going to be interesting to see how that relationship works out. It's still pretty new (12)."

Restructuring of Bonneville Power Administration to prepare for deregulation brought one very large benefit to Walla Walla District. In the late 1990s, BPA began to retain some of its profit for the express purpose of funding upgrades and nonroutine maintenance on the hydroelectric projects. This was a change from the previous situation where BPA turned money back into the U.S. Treasury, and the Corps of Engineers paid for all operations and maintenance from its own budget as authorized by Congress.

Direct Funding via Bonneville Power Administration

As discussed in greater detail in the Funding and Budgets section of chapter 2, Walla Walla District saw a dramatic change in 1998 when it began to receive direct funding via Bonneville Power Administration. Revenues realized from power generation were directly channeled back to support operations and maintenance and some cultural resources activities at the federal hydropower projects. Repairs to aging equipment helped to increase levels of power generation while major modernization efforts, such as the one at McNary, could be implemented. (See chapter 5 section on turbines.)

The Nuts and Bolts of Hydropower Operation

During most of the 1981-2000 period, the Technical Management Team coordinated operation of the Federal Columbia River Power System. The team is an interagency group with a chair from the Corps and members from Bonneville Power Administration, National Marine Fisheries Service, the Bureau of Reclamation, the U.S. Fish and Wildlife Service, and various state agencies in Washington, Oregon, and Montana.

The team was also designed to help halt and reverse the declines of threatened or endangered Columbia River basin salmon and other declining fish species.

The Technical Management Team made decisions about the operation of Corps and other federal dams and reservoirs in the Columbia River basin. The team drafted annual water management and fish passage plans. The decisions of the Technical Management Team are implemented at the Corps of Engineers Reservoir Control Center in Portland, Oregon. Decisions on impounding or releasing water through the turbines or over the spill gates of the federal hydropower projects are implemented by means of a sophisticated automated system.

The Reservoir Control Center, the RCC as it was called, was located at the Corps Northwestern Division office. The RCC performed the day-to-day operation and coordination of Dworshak, the four Lower Snake River projects (Lower Granite, Little Goose, Lower Monumental, and Ice Harbor) as well as McNary. Walla Walla District Reservoir Regulation Unit coordinated with the RCC, but did day-to-day regulation of Mill Creek and Lucky Peak projects. The District also performed reservoir regulation on thirteen "Section 7" projects, discussed in chapter 6, under flood control (13).

Although the hydropower plants were remotely controlled, each hydropower facility was staffed at all times by a powerplant operator who observed the functioning of all hydropower equipment at the project and who can override remote controls. One night operator took care of the spillways, the lock, and the powerplant. Powerplant operation could be a lonely job, given the remote location of Walla Walla District projects and solitary night shifts.

The District implemented a Power Plant Training Program to develop operators. One District staff member described the program:

> "We hire from the outside, from related fields. We try to get someone with powerplant experience, not necessarily hydro, but some kind of powerplant experience. We have a training program—have had for a long, long time. Right now, it's down at McNary. During that period [of the update] that was the first time we had trainees on the lower Snake River. We [generally took] twenty to twenty-five people though the program [at a time].
>
> "Briefly, the way that works [the program]. You bring in a group. For the first two years, they go through the same training process. [Trainees are] fully integrated into operations, mechanical maintenance, electrical maintenance. Then, at the end of two years, they can say, 'I want to be an operator, or mechanic, or electrician.' They go over [their preference] with the Training Committee [and then] specialize in the next two years. Then they work with the crews and complete all requirements.
>
> "[The program takes four years.] They've had some accelerated programs from time to time, but it's generally best if the person takes the time and the opportunity, because you can't go back and [train] again (14)."

Navigation

In the late twentieth century, the system of harbors and waterways maintained by the Corps was one of the most important parts of the nation's transportation system. The 12,000 miles of inland waterways maintained by the Corps carried one-sixth of the

nation's intercity cargo. The replacement value of the nation's inland waterways system was calculated as over $1.25 billion as of 1999. Where they operated, commercial barge lines provided by far the most efficient and economical mode of transportation for bulk commodities such as coal, grain, and chemicals—goods often bound to U.S. ports for export around the world. One barge could carry about as much freight as fifteen railroad cars or sixty tractor-trailer trucks. A barge could move this cargo at a cost per ton per mile about half that of rail transportation or one-tenth that of trucking.

Barge navigation on the Snake River to Lewiston became a reality when a series of four dams with locks, originally authorized by Congress in 1945, were completed in 1975. The four locks and dams were: Ice Harbor, Lower Monumental, Little Goose, and Lower Granite. When, in February 1975, the reservoir filled behind Lower Granite Lock and Dam, a new, deepened, slackwater channel was formed, and Idaho was linked with the sea. The waterway provides a minimum fourteen-foot-deep commercial navigation channel, 465 miles from the Pacific to the Ports of Wilma and Clarkston in Washington and to the Port of Lewiston in Idaho. Traffic through the navigation lock consists primarily of grains and other agricultural produce, petroleum products, fertilizer, wood products, and miscellaneous cargo.

After traveling about 145 miles upstream from the mouth of the Columbia River, barges encounter Bonneville Lock and Dam. From this point, the barges are lifted about 340 feet by the four Columbia River locks at Bonneville, The Dalles, John Day, and McNary and about 398 feet by the four Snake River locks—a total lift of 738 feet. The history of the waterway through 1994, with emphasis on Walla Walla District's Snake River portion, is covered in the historical volume, *Controversy, Conflict and Compromise: A History of the Lower Snake River* Development (15).

Creating the waterway required building huge locks with unique designs. As we shall see below under the sections pertaining to the individual projects, these locks sometimes required repairs that required tight scheduling and ingenious design efforts on the part of Walla Walla District staff.

In the 1990s, there was widespread discussion of breaching the dams of the Lower Snake River. The ports and port-users along the river were among those who most vigorously opposed this concept. The Pacific Northwest Grain & Feed Association sent delegations to Capitol Hill in Washington, D.C., to lobby against the idea. "Farmers say breaching the Snake River dams would make the river unnavigable for the barges that carry much of the region's wheat crop downstream to Portland for export to Japan, Korea, Taiwan, Pakistan, Egypt, and Sri Lanka. Without barge traffic, farmers say they would be forced to rely on more expensive rail and truck transportation, adding to their costs when they already are hard-pressed financially (16)."

As early as 1991, port officials in the geographic area covered by the Walla Walla District put forward plans to deepen the inland river channel from its current forty feet—at least in the lower reaches of the Columbia-Snake River Inland Waterway (17). Deepening would allow navigation of the waterway by newer, larger ships, especially those carrying containerized cargo. As of 2000, the public debate on the value of the waterway and its effect on the environment continued with the National Wildlife Federation and Taxpayers for Common Sense listing the Corps' continued operation

of the four lower Snake River dams as among the “25 most wasteful water projects” in the nation (18).

The slackwater lakes have attracted a large number of boaters to the waterway. Lockages (cycles of raising and lowering the water in the lock to pass watercraft through) became an issue with the public and the Corps. Each lockage diverts water that could be used for power generation as well as using electricity to operate the huge lock gates. The District instituted a five lockage per day schedule on the lower Snake River to conserve energy, except for McNary, which went to a three lockage per day schedule.

Walla Walla District Navigation Lock

Dredging and Sedimentation

“Silt! Mud! Sediment! We’ve got it all. Most people in NPW [Walla Walla District] are well aware of the fact that Lower Granite Lake receives more than its fair share of the stuff deposited by the Snake and Clearwater Rivers. The accumulation is not only a

threat to project navigation and flood control functions, but also creates problems at two marinas: Chief Looking Glass Park, in Asotin, [Washington], and at Hells Gate State Park (near Lewiston [Idaho]) (19)." This was the situation in 1986 when the area at Hell's Gate State Park could easily accumulate 2,000 to 6,000 cubic yards of silt during a single year. Throughout the Columbia-Snake River Inland Waterway, the District is obliged by law to maintain a fourteen-foot navigation channel in areas under federal jurisdiction.

Walla Walla District coped with this accumulation of sediment by instituting dredging operations. In 1986, a "Mud Cat" was used to remove unwanted material from Lower Granite Reservoir. "The Mud Cat comes out of hibernation after the high flow season has passed. … Mud Cat operations are relatively simple. First the auger, working at depths up to 15 feet, picks up the silt. A pump with a 2,000-gallons-per-minute capacity then sends the sand and water about 1/4 mile through an 8-inch line to a large primary settling basin. Any excess water flows into a secondary basin in order to maintain water quality in the river (20)."

In 1988, the District employed a newer technology to remove a larger amount of sediment from the Lewiston-Clarkston area (behind Lower Granite Lock and Dam). "Under a District Contract, Smith-Rice Company used a large mechanical 'clam' to remove 20 cubic yards of sediment per scoop, 3,000 cubic yards per scow load. Named 'Super Scoop,' the clamshell dredge ... scooped its way on the 15-25 foot deep bottom of the river and a massive crane hauled the sediment up. A crane operator located high atop a round steel turret raised and lowered the 30-ton clamshell-teethed bucket. After bringing the bucket up to the surface of the water, the operator lifted the bucket high overhead and spun the turret around to drop the sediment in a scow or disposal barge moored alongside the crane barge (21)." The next year, 1989, a million cubic yards of sediment was dredged from the area near the confluence of the Snake and Clearwater Rivers. In the 2000-2001 dredging season, the District proposed removing a little over 244,000 cubic yards from the Lower Snake and Clearwater Rivers.

While the massive scoop created local attention in Walla Walla District, disposal of the removed sediment created more significant issues for the District in terms of environmental efforts. Throughout the 1990s, the District studied ways to use dredged materials for beneficial uses. Beneficial uses might include depositing the material in water or upland to enhance environments or re-use of dredged materials (such as for fertilizer or fill dirt). In 1992, the Corps used dredged material to convert three rock piles near the confluence of the Columbia and Snake Rivers into habitat attractive to nesting avocets and Canada geese. In-water disposal of dredged materials was also studied and proposed by the District.

While interim dredging continued, in 1989, the District's Plan Formulation Branch began a feasibility study to develop a long-term management plan for sedimentation in Lower Granite Reservoir. Later, McNary Reservoir was included in the plan as it was being formulated. At the end of the 1981-2000 period, the issue of dredging became critical. In 1997, one Corps document summarized the situation: "The chance of the Snake and/or the Clearwater River overtopping the Lewiston Levee System during a major flood event is increasing each year due to sedimentation. … Nearly all of the upland dredged material disposal sites in the Lewiston/Clarkston area have been utilized,

making transport of material to other locations very expensive. … The potential for use of relatively inexpensive in-water disposal is good, once a plan is approved. When completed, the DMMP [Dredged Material Management Plan] will benefit both Navigation and SPF [standard project flood] levee protection for Lewiston, Idaho (22)."

Planning efforts resulted in Walla Walla District issuing the final *Dredged Material Management Plan and Environmental Impact Statement—McNary Reservoir and Lower Snake River Reservoirs* (23) in July of 2002. The District had earlier determined that suitable sand/silt mixtures of dredged materials placed in-water would "mitigate for lost shoreline and shallow bar rearing habitat utilized by juvenile Snake River fall chinook salmon and should result in long-term benefits to anadromous fish production and survival within the lower Snake River migration corridor (24)." The innovative aspects of using dredged materials for habitat restoration are discussed further in chapter 5.

Irrigation, Municipal, and Industrial Water Needs

Another important purpose for water resources projects in the arid region of the Walla Walla District is irrigation. Irrigation is never the first or sole purpose of Corps of Engineers' projects, but it is often a secondary purpose. Once agricultural patterns have been established that rely on irrigation, it becomes a consideration when decisions are made regarding flow targets and reservoir operating levels.

The area covered by the Walla Walla District experienced a decade-long period of drought in the late 1980s and early 1990s. For example, in 1992, the Boise River in Idaho experienced the lowest flows in fifteen years, while the Snake River flow hit an all-time low (25). In that year, the State of Idaho banned new water resources development and drilling of wells that were depleting the Snake River Aquifer (26). Only the careful management of water in the region's many reservoirs allowed conserving farmers to avoid disastrous crop failures.

This prolonged drought was an important factor in bringing water budget issues to the fore in the region. Questions such as these began to be widely discussed: To whom does the water flowing in streams belong? Who says how they should be managed? Which of the calls for water takes precedence? In an area where water is used for hydropower generation, navigation, recreation, and fisheries, where do the needs of irrigators rank?

Irrigators and other users of water began efforts to establish clarity with regard to their legal water rights—their rights to remove water from streams flowing through or by their land. Snake River water rights and other regional water rights date back to the 1890s. In the 1990s, the State of Idaho went through a massive water rights adjudication process, clarifying the rights of over 20,000 water users in the state. The basic legal principle of water rights is "first come, first served." Federal laws such as the Clean Water Act and the Endangered Species Act call for water to remain in streams (in-stream flow). At the end of the twentieth century, the relationship in the Northwest between landowner's water rights and in-stream water rights was still unclear.

Farmers and political representatives, particularly in Idaho, were extremely concerned about plans for flow augmentation—release of more water—designed to speed juvenile salmon on their migration to the sea (see chapter 8). Irrigators perceived this as water

for fish as opposed to water for farms. Meanwhile, Indian tribes in the region, such as the Confederated Tribes of the Umatilla Indian Reservation, asserted their treaty-reserved fishing rights as calling for minimum in-stream flows to take precedence over non-Indian "water spreading" (irrigation) rights.

Although the need for water by municipalities and industries did not figure largely into the planning for Walla Walla District water resources development projects, these uses must be balanced in the whole scheme of the regional water management. Often municipal and industrial users are involved with issues of water quality and temperature, which, in turn, can affect fisheries. At the end of our period, one municipal planner put it this way: "Anything … that in any way impacts the watershed puts you at risk. Every ordinance that we have is going to have to be looked at from a different perspective. … Storm water, waste water, drinking water, parks, marinas, road maintenance – virtually everything a city does is now viewed as a potential liability, if not from federal agents, then from an outside group that sees the ESA [Endangered Species Act] as a good way to slow down a disliked project (27)."

Meanwhile, perceived possible uses for regional water went farther afield. In 1991, Metropolitan Water District of Southern California approached federal water resource managers regarding selling some of the water stored in northwest regional reservoirs. Some in the region, notably retired Senator James McClure from Idaho, felt that the threat of marketing water was very real and that it would prove disastrous to agriculture in his state (28).

Regulating a System Under Stress

In early times, few people along the Columbia and Snake Rivers thought in terms of water budgets, a plan for parceling out water according to needs.

Among Walla Walla District projects and the region's water resources projects, there is an interrelationship and sometimes a conflict between functions. Here are a few examples of competing needs related to the District's main water resources projects:

- Recreational boaters would like to proceed up and down the rivers at will, but the need for energy dictates that locks only be operated according to limited schedules.
- Recreational boaters, fishers, and campers want reservoirs full during prime summer use seasons, but reservoirs may need to be lowered for fish migration, hydropower production, irrigation, or flood control purposes.
- Those interested in optimizing hydropower production wish to run water through electrical turbines, while some environmentalists wish to send water over spillways in the hopes of speeding migrating fish on their way to the ocean.
- Irrigators may wish to retain water in storage reservoirs for later use, especially in dry years, while environmentalists may urge that water be released to assist fish in their migrations to the sea, by increasing water flows and/or lowering water temperatures.

- Environmentalists may urge drawdowns of reservoirs to assist fish migration while flood control experts may fear undermining of flood control structures while utilities see loss of electrical generating capacity in such a measure, and some observers even fear dewatering of previously submerged cultural resources.
- The need for more water by growing municipalities and industries competes with the need for water by irrigators and for recovery of fisheries.

When, in 1980, the U.S. Congress enacted the Pacific Northwest Power and Conservation Act, they created a new entity, the Northwest Power Planning Council. According to most authors writing about water management in the Northwest, the law and the creation of the council were of utmost significance in the history of hydropower and water management in the Northwest:

> "The Northwest Power Act, in theory, spelled out a revolution in western water management. It put long-time inmates of the engineered river—Indian tribes and fish agencies—in a position of power. To administer the revolution, the Power Act created a novel bureaucratic creature. Not quite a federal agency, not a state agency, the Northwest Power Planning Council was made up of two gubernatorial appointees from each of the four states in the Northwest. The Council had powers (rather vaguely defined powers, as it turned out) to change the behavior of the federal agencies that managed the hydrosystem (29)."
>
> "The Northwest Power Act forged a link between regional energy development and fish and wildlife recovery. At a conceptual level, the Act aimed for a power system that would meet energy demands through measures that impose the least economic and environmental cost on the region, while taking pressure off Columbia River fish and wildlife. For the power system, moving ahead would require modified operation of the Columbia River dams and financing for measures to offset the dams' effects on fish and wildlife. For fish and wildlife interests, mitigation would require a healthy hydropower system capable of generating sufficient revenues to finance energy and fish and wildlife conservation measures. Perhaps neither fish nor power interests perceived the connection clearly, but it is apparent in hindsight: Under the terms of the Northwest Power Act, neither fish and wildlife conservation nor power development could proceed without the other (30)."

Much of the history of this synergy between hydropower and other goals is told in chapter 8, where wildlife and fisheries issues are covered. From the perspective of hydropower production, the important point is how decisions were made regarding the operation of the system.

With so many competing functions and interests, any specific action taken in regulating the water levels, spill, drawdown, and factors related to the Columbia-Snake River water resources system comes under multifaceted scrutiny. The Columbia River System was seen as a "system under stress (31)." "Growth in the Northwest has put steadily increasing pressure on the river system, and there is no longer enough water to meet all of the demands (32)." In an attempt to assign priorities to river uses, Bonneville Power Administration, the Corps of Engineers, and the Bureau of Reclamation undertook a massive Columbia River System Operation Review, or SOR (33). The review began in 1990.

By 1992, the SOR group had developed a set of ten alternatives to take to the public in a series of meetings. The alternatives described different strategies for system

operation and were widely publicized (34). Alternatives included: continuing to operate the system as it was; radical drawdowns of the reservoirs on the lower Snake River to create spring conditions that mimic river flow; modest spring drawdowns, balancing power generation and salmon recovery by guaranteeing a certain amount of water for each purpose; setting monthly flow targets, putting restoration of salmon above all other priorities; mimicking natural flows for salmon while holding the lower Snake River reservoirs at a constant level for recreation, resident fish, and other uses; optimizing power generation by returning to operations in effect prior to the passage of the Northwest Power Act of 1980.

In 1995, the agencies issued a summary report, and a final environmental impact statement contained in a main report with twenty technical appendixes. In the summary report, the SOR characterized its effort as follows:

> "In the final analysis, the SOR is a story about the Pacific Northwest's desire to restore prehistoric salmon runs to healthy levels and the Federal government's role in advancing that goal. It is also a story of how Federal agencies, with discrete mission in managing and operating the Columbia River hydro system, pooled their staffs and resources to find a way to operate that puts high priority on anadromous fish recovery.
>
> "But it didn't necessarily start out that way.
>
> "The SOR began in 1990 with a focus on all river and reservoir uses. The Federal agencies responsible for river management decided after years of trying to accommodate the growing demands on the system that it was time for a top-to-bottom review. The agencies began drawing up a plan. …
>
> "The Endangered Species Act (ESA) began to overtake the review in November 1991, when the Snake River sockeye was declared endangered. In the spring of the following year, several stocks of Snake River chinook were listed as threatened. With the National Marine Fisheries Service (NMFS) responsible under the ESA for determining biological consequences of river operations, the SOR took on a different character. The SOR began to focus on the role system operations could play in salmon recovery, and NMFS became a key player (35)."

The Systems Operation Review issued an environmental impact statement with a preferred alternative for a system operating strategy. That alternative was "adaptive management; operations can be modified to meet changes in the natural environment, as well as in other arenas (36)."

"What has really happened is that in preparing all 22 SOR EIS volumes, the SOR lead agencies have strengthened their commitment to fish and wildlife, and determined to preserve together with other Federal agencies, Indian tribes, state agencies, and local and regional interests to realize common goals (37)." The outcomes of the massive Columbia River System Operations Review were not consensus, nor an end to studying the system; rather, they signaled a shift in emphasis to the environmental issues covered in chapter 8 of this volume.

The End of the Era of Large-Scale Construction

In the 1970s, with completion of Lower Granite Lock and Dam, Ririe Dam, and some major upgrades to the power generating capacity of existing projects, the era of large construction of multipurpose water resources projects came to an end for the Walla

Walla District. Operations and maintenance of the existing large multipurpose projects on the Columbia and Snake Rivers (and tributaries) became the District's largest concern. Construction in the period after 1980 was associated primarily with flood control and environmental mitigation or restoration projects.

Life at the Projects

The word "project" is of central importance in the vocabulary of the Walla Walla District, as it is in the vocabularies of other Corps districts. Within the District, a "project" can mean any scheduled and managed effort to complete a goal. There are projects that result in studies—such as the Walla Walla Watershed Study discussed in chapter 3. There are District projects that result in structures, such as those that built many fish hatcheries along the lower Snake River (see chapter 8). However, within the Walla Walla District the word project is also preeminently used to refer to those already constructed flood control and multipurpose facilities operated by the District. The notable field projects of this sort within the District include: McNary, the Lower Snake River projects, Dworshak, Lucky Peak project, and Mill Creek. Each project has its own history and culture, but there are commonalities to be found in "life at the projects."

Isolation

The primary aspect that many staff members stressed about life at the projects was that it involved isolation from District Headquarters as well as from other projects. As discussed in chapter 3, new and more efficient forms of communication, such as electronic mail and cell phones, helped to remove some of the isolation during our historical period.

The isolated nature of Walla Walla District's projects, located far from population centers, presented some difficulties for District management. Says one long-time project staffer:

> "Years ago, we would attract people from the Midwestern projects because of weather there and better pay in the District. Somewhere along in the late 70s, early 80s, they revised how they determined wages for TC [trades and crafts] people. All of the projects people—operators, electricians, mechanics, utility workers—work under a Northwest Power Rate schedule. It's determined by a survey of USBR [Bureau of Reclamation], BPA [Bonneville Power Administration], and other utilities. Once we achieved pay comparability that set the base, once they did that in the Midwest too, it became harder to attract people here. … [We] started struggling in the 1980s and are still struggling (38)."

This difficulty in attracting new staff to the projects was mitigated only by the fact that project staff tended to stay in their positions for a long time. Another general characteristic of life at the projects during the 1981-2000 period was that:

> "You tend to take a long view of things. For example, when you do a major turbine inspection, you only unwater one unit per year. Just to get through your plan, that's six years. McNary is on a nine-year cycle. … The project work is pretty predictable. They operate real-time, round-the-clock, 365 days a year, forever. One operator at night operates the locks, takes care of the spillways, takes care of the powerplant. They are there by themselves. Normally, the plant is remotely controlled for adjusting load and so forth. The maintenance people have a regular schedule for every feature that's in the

dam. They do routine servicing. If it's an emergency, you call someone out. The lock—you simply never want to have it out of service. You call someone to have it fixed. The generator, if it's a major burnup, it might take six months to fix. If it's a minor control problem, someone comes down [immediately to repair it] (39)."

Safety and Security

Although safety and security are concerns throughout all units of the Walla Walla District, it is of vital importance at the outlying projects where staff are isolated from medical and police assistance; where personnel routinely work with large, complex, and potentially dangerous equipment; and where workers use government vehicles to travel long distances over sometimes difficult roads.

During the early 1980s, the District hit an all-time safety "slump" registering twenty-two disabling injuries to employees in 1981 (40). Analysis of those accidents revealed that almost all of them were attributable to "people failure" (unsafe acts) and not equipment failure (41). Quite a few of these accidents happened to contractor staff working at Corps field projects. What type of accidents happened to create lost work days? Here are a few examples from July and August 1982:

- A contractor employee was stacking form panels. The bottom panel slipped causing the stack to shift and settle on his feet.
- Two different Corps employees at McNary injured their backs while removing fish bypass screens for cleaning.
- A contractor employee fell sixteen feet from a ladder at the construction site for Willow Creek Dam.
- A Willow Creek employee was using a roller with a hydraulic line. The line ruptured. This caused the roller to crash into some panels cracking them causing over $4,000 worth of damage.
- A contractor employee operating a hydraulic crane backed into a pickup truck.

During the 1980's the District organization included a Safety and Occupational Health Office. In 1985, the District instituted a Safety Conference, which was held annually until the late 1990s. Workshops with outside speakers and audiovisual presentations emphasized "the human factors that have a tremendous impact on safety" and recognized "that safety overlaps many other aspects of organizational life, such as quality, productivity, and teamwork." This office instituted an Accident Prevention Program that became active by 1987. Staff became involved. In the early 1990s, for example, a supervising worker at Ice Harbor Lock and Dam instituted a program with a "Thanks for Being Safe" card. The District began intensive job activity analyses to discover potentially unsafe areas of job responsibility. A "Near Miss Program" was instituted to share information about accidents that had been averted (42).

By fiscal year 1993, Walla Walla District safety was improving. In that year there were no government vehicle accidents resulting in over $2,000 of damage (43). In fiscal year 1995, the District experienced its safest year in ten years (44). Thereafter, to the end of the period covered by this volume, the District retained an excellent safety record.

Many emergencies occurred at the projects, many of them involving visitors to Corps lakes or lands. These will be covered in chapter 11.

Accident prevention was only one aspect of Walla Walla District safety and security activities. Despite extensive testing and debugging, there was concern that some of the District's computer systems would not function properly when the "Y2K" rollover happened at the end of 1999. The concern was particularly focused at the hydropower projects, controlled as they are by complex remote computer systems. The District created a response plan and put staff on alert for the transition. As it turned out, all the District's systems moved smoothly into the new millennium.

Physical security was also a concern for the District, one that grew throughout the 1981 through 2000 period. The bombing of the Federal Building in Oklahoma City in 1995 and moving to a new headquarters building in downtown Walla Walla prompted increased levels of commitment to security by the District. A contract with a security company was put in place for the headquarters building, while the field projects increased security via contracting with local area law enforcement agencies.

Outsourcing

The Corps had a long history of contracting with private enterprises for construction of its projects. During the 1981-2000 period, however, there were several initiatives that encouraged federal agencies to examine permanent, recurring activities to determine if these should be contracted out to private firms. The Commercial Activities Program, conducted under directives from the Office of Management and Budget (OMB) was one of the most far reaching of these initiatives. *Circular A-76* (45), issued by the OMB in 1983 (revised in 1999) reaffirmed the federal government's general policy of relying on the private sector for goods and services while it recognized special defense requirements and cost considerations.

The Corps' Civil Works Program had previously been exempt, but in 1983, elements of the program' agencies were required to do a "commercial activities study." "The goal of the study is to determine if some of the work currently done by government employees can be accomplished by private contractors (46)." Although units at Walla Walla District Headquarters undertook some commercial activities studies, the outlying projects were heavily affected by such initiatives.

In 1983, the District studied the warehousing operations at McNary; recreation area maintenance at the projects; recreation area operations; fish counting; and fish trapping and transportation (Operation Fish Run, discussed in chapter 8). Each commercial activity study, which took as much as a year to complete, involved forming a team to study the activity. The team interviewed government employees to develop a clear description of activities. Activities were then put out to bid. If a private firm submitted a bid for performing to specifications at lower cost than the existing government operation, the private company would be awarded a contract for the service. Under the process, existing government employees would be given first opportunities at the jobs created in the private sector.

In the case of some of Walla Walla District's more isolated projects, sometimes no bidders came forth to answer the call for bids produced as a result of these commercial

activities studies. One Walla Walla District staff member involved in studies related to the fish facilities at Lower Granite and Little Goose Locks and Dams talked about the upshot of one commercial activities study and the discontinuity caused when no bids were received:

> "We got zero bidders on ours [the commercial activity study for the fish handling facilities] after we had spent many, many, many hours on it. We had a real struggle that year, in fact—this was 1990. We weren't allowed to hire any temporaries for about a two or three-month period in the spring. We had the two fish facilities, one at Granite, one at Goose, that we ran with park rangers, wildlife biologists, my maintenance crew from Clarkston, and volunteers from the District, from Engineering, from the survey crew, and Construction had some people out there helping. We had people from the powerhouse, mechanics, and so on who volunteered at that time. We operated both those facilities twenty-four hours per day, seven days a week for the first two and a half months of the season with no temporary employees—and it takes about twenty-five to thirty people to run each one of those [facilities] (47)."

Eventually, private companies were found to perform some of the studied activities at the projects, including much of the recreation area maintenance. However, other activities, such as warehousing, fish handling, and recreation area operation, were retained with staffing by government employees (of the Corps or other agencies) due to high bids or lack of any bids at all by private firms.

Operational Management Plans and Master Plans

Each of the Walla Walla District field projects was operated according to an operational management plan. Each project's water and land resources were developed according to a master plan. In 1989, for example, the Lucky Peak Master Plan was distributed. The District was an innovator in using automated geographic information systems to help develop master plans. Master plans are developed after consultation with the public and in coordination with federal, state, local, and tribal governments.

The Aging Infrastructure

"The dams are all getting older and somebody needs to pay for replacing the parts, but we are so money-hungry in this country—nobody wants to pay a dime to do anything. BPA [Bonneville Power Administration] just wants to generate power. They don't want to pay for it either. But sooner or later somebody has to pay for fixing these things or they are going to break and they are not going to work anymore (48)." This was the viewpoint of a Walla Walla District staff member shortly after the turn of the new century.

McNary Lock and Dam became operational in 1947, Ice Harbor Lock and Dam in 1961, Lower Monumental Lock and Dam in 1969, Little Goose Lock and Dam in 1970, and Lower Granite Lock and Dam in 1975. By the end of the period covered in this volume, these projects were showing their age. Major repairs (as detailed in the section on individual projects) to navigation locks, turbines, and fish passage facilities were needed more frequently. Walla Walla District was not alone in facing this issue of "the aging infrastructure." It was felt throughout the U.S. by agencies responsible for transportation, flood control, and electrical generating structures built over the years.

Funding Issues

Financing Water Resources Development: A Brief History (49), issued in 1983 by the Historical Division of the Corps, provides an excellent overview of the situation regarding funding water resources development projects up to that time. Essentially, the federal government assumed financial responsibility for maintaining open channels of navigation while multiple-purpose projects were expected to pay for themselves. The financing situation for the Walla Walla District's multiple-purpose projects has been discussed above in the section on hydropower. Most of the District's continuing budget was received via the biennial Water Resources Development Acts and Energy and Water Appropriations bills.

The situation with regard to funding flood control, environmental restoration, and other Corps civil works projects was far from clear at the beginning of the period covered by this volume. In the mid-1980s, most districts of the Corps of Engineers had long lists of potentially beneficial water resources development projects, many of which had been studied at the request of municipalities, state government entities, and various citizens groups.

There was no funding available for even one-tenth of all potential projects. The Water Resources Development Act of 1986 (50) was signed into law in September 1986. "The legislation forges a new and realistic charter for future federal water projects and assures continued water resources development in spite of continuing fiscal austerity necessary to eliminate projected [federal] budget deficits, Dawson [Richard K. Dawson, then Secretary of the Army for Civil Works] said. The omnibus bill, he said, breaks the long-standing impasse over user fees, cost sharing, and the appropriate federal role in future water resources development. It also establishes new cost-sharing requirements as well as national and local user fees, thus guaranteeing that nonfederal interest will play an important role in planning, financing, and marinating Corps of Engineers water projects (51)." WRDA '86 translated into cost-sharing requirements at the twenty-five to fifty percent level for many civil works projects. Thus, working with a "local sponsor" became even more important to the Corps.

In 1983, for the first time in its history, Walla Walla District's budget for operations and maintenance was larger than the budget for construction activities. From 1977 to 1986, the construction budget for the District shrank by more than fifty percent, while operations and maintenance funding doubled. During this period, Walla Walla District received much funding related to the Lower Snake River Fish and Wildlife Compensation Plan, the Columbia River Fish Mitigation Project, and other fisheries mitigation efforts (see chapter 8).

At various points from 1981-2000, Walla Walla District experienced funding uncertainties. For example, it was reported in 1995: "District employees came to work on the morning of November 14 with the threat of being furloughed with thousands of other federal employees. They were informed by District Commander Lt. Col. James Weller that the president had signed the Energy and Water Appropriations bill the night before, and the Corps' civil works missions were fully funded for fiscal year 1996 [which had begun in October 1995] (52)." Thus a funding crisis was narrowly averted that year, but similar budget situations were experienced throughout the late 1990s.

These, then, were the budgetary and general societal situations under which Walla Walla District's projects operated. Below, this section outlines some of the events and particular situations at individual filed projects.

McNary Lock and Dam

McNary Dam, on the Columbia River, near Umatilla, Oregon, is 7,365 feet long and 180 feet high. The dam is a concrete, gravity-type, spillway dam. McNary Lock and Dam is a multipurpose project that aids in irrigation. The project includes a powerplant, navigation lock, fishways, and a levee system. The project was completed in 1947, except for modifications to the fish bypass facilities and levees.

The McNary powerhouse has fourteen electrical generating units, each of which produces 70,000 kilowatts for a total capacity of 980,000 kilowatts. Walla Walla District engaged in a major study outlining the feasibility of installing a second powerhouse at McNary. The Water Resources Development Act of 1986 (53) authorized the addition of six to ten power generator units in a second powerhouse. However, plans for a second powerhouse were suspended when Congress automatically deauthorized the project in 1991.

McNary Lock and Dam

The Corps of Engineers has done extensive tests related to installing new, more efficient turbines at McNary Dam. Extensive testing of turbine models for McNary was done at the Corps Waterways Experiment Station throughout the 1990s.

Instead of installing a second powerhouse at McNary, Walla Walla District began to look at upgrades to the fifty-year-old turbine design. "They're studying a second powerhouse at McNary," said a staff member of the District, "but not very seriously because they can upgrade the units down there a lot cheaper, and the environmental impacts are a big problem (54)."

Another staff member talked about the generating units at McNary:

> "[At] McNary they can upgrade those [units] substantially and use the same openings where they are now and generate more power. Just the new windings alone, for example, [could improve generating capacity]. The old windings at McNary and Ice Harbor on Ice Harbor's first three units are asphalt-type windings, cloth, and [other material]. They can go with these epoxy-impregnated windings. Going to what they call a hard winding, gives you a ten percent increase in your power right away. If you do that at McNary instead of seventy-eight million watts, you're up there to almost eighty-five. … Fourteen units times that—it's a pretty significant impact. Plus they can go with what they call a fish-friendly turbine, better for fish (55)."

Lower Snake River Projects

The four projects on the lower Snake River are, like McNary, run-of-the-river dams. That is, these dams are not particularly high and the reservoirs that they impound are designed to operate within a relatively narrow margin of elevations, providing water depths just adequate to create the slackwater necessary for navigation. The lower Snake River projects are all multipurpose projects, providing navigation, hydropower, and incidental irrigation.

The projects were originally constructed and managed from the Lower Snake River Resident Office. In 1987, this office was disbanded, and Walla Walla District became the only district within the Corps of Engineers to operate without a resident engineering/construction office.

Ice Harbor Lock and Dam

Ice Harbor Lock and Dam, a multipurpose project that began operation in 1961, provides for navigation, hydropower, and incidental irrigation. The dam is approximately 2,700 feet long and 130 feet high. The powerhouse was originally outfitted with three 90,000-kilowatt electrical generating units. The facility was upgraded in 1994 with three additional 111,000-kilowatt units, bringing the total power generating capacity up to 603,000 kilowatts.

Ice Harbor had more than its share of repairs over the years. This project is a prime example of the challenges Walla Walla District encountered in maintaining efficiency in the face of an aging infrastructure. To give a flavor for such challenges, this volume will relate, in detail, some of the maintenance efforts undertaken at Ice Harbor.

As the electrical generating units, the turbines, spin round, they wear out. Here is how a District staff member explains some extensive repairs at Ice Harbor:

> "One of the things we did at Ice Harbor, [in the early 1980s was] repair turbines in [generating units] 4-5-6. It has to do with the draft tube liner. [The] turbine [sits] in a hole below the draft tube. [This is a] steel liner. The cavitation (56) was so bad [the

liner] was nearly worn through. This is an inch and a quarter thick material. … Normally, in past years, you would have to take out the generator, the turbine, and it's extremely expensive and time consuming. [The contracting company] has a different process. They hook up grinders and welders and other machine tools on the blades of the turbine itself. Then they have a device that slowly turns the turbine in place. … It acts like a great boring bar. They anchor it again and weld it back up again and reestablish the contours. It's rather a clever proprietary process. So far [it's been] very successful. It had been done in other places, but never as big as Ice Harbor. [We] also did it at Lower Monumental [on] units 3-4-5-6—this was even bigger. The Corps approved the process. [Later it was used at] Harry S. Truman Dam [in Missouri] and in Georgia (57)."

Ice Harbor Lock and Dam

In addition to repairs to the electrical generating units, the navigation locks at Ice Harbor project also required extensive repairs. A staff member from Walla Walla District told about one of the outages that affected the lock: "Way back in 1988, the equipment in the navigation lock at Ice Harbor was replaced. … Originally it [the repair work] was scheduled to be done in a thirty-day schedule. … Before the equipment arrived, it [the navigation lock gate] actually failed more significantly, and, so, the lock was shut down after being able to get a few of the barges through (58)."

Replacement machinery for Ice Harbor had been ordered when the first signs of deterioration had appeared, but the lead time for manufacturing such specialized equipment was long, and the delivery date was to be late spring 1989. The failure occurred on August 31, 1988, at the busiest time of year for commercial traffic.

Turbine Lifted for Repair

With 4.8 million tons of grain coming through the lock in 1988, as well as other cargo, an extended outage for the lock was unthinkable. Yet, according to Walla Walla District Commander at that time, Lt. Col. James A. Walter, "without immediate repair work, the lock could have a 'catastrophic breakdown' that could end Snake River barge traffic for a year (59)." The District had to find a way to repair a 300-pound gear with seventeen broken teeth in a short period (60).

Walla Walla District contracted with a private company to repair the lock. At first the work did not go well: "When project employees began to dewater the lock, a cable connected to a bulkhead broke, delaying the contractor. Faced with this problem, the contractor jacked up two counterweights to free the tension on the lift gate cables (61)." By employing such ingenuity and by working round the clock, the Ice Harbor repair project proceeded.

The project manager for this repair effort continues the story:

> "[We were] able to negotiate that thirty-day schedule down to a twenty-day schedule. Then they added incentives for the contractor. For every hour that they finished early, up to four days worth, he could get almost $1,600 an hour for that. For every hour that he finished late, beyond the twenty days, he would be penalized, something like $600 an hour. In the end, he got his maximum. …
>
> "The last part of the job was to adjust all these cables to get the right tension on them. The guy that had designed this [system] set it up so that it was shown on computers. When you tightened up this cable you could see how the others were being affected by the loads on them. But [the designer] went off on some trip up toward Alaska, and his technician was there and couldn't get the thing to work.
>
> "Here we are on a Saturday night, and the contractor's all done except [for testing the cables]. … [So] we lifted the cables off the drums. We haven't adjusted any of them. It's no different than when we started this job, so if you want to go back in service, test the tension a little bit later. So that is what we did (62)."

The saga of Ice Harbor's lock repairs, however, was far from over. In early 1994, more than two hundred small cracks were discovered in the steel members that crisscrossed the lock gates (63). Most of the problems occurred between June and August of 1994 when the lock was closed for fifteen full days and forty-one half-days while welders

repaired the cracks temporarily by installing steel plates. A regional newspaper ran an extensive article (64) about the situation, quoting a barge company spokesman, “These cracks are that first sign of a deterioration that alarms all river users.” According to the newspaper, “the cracks have complicated the scheduling for barges carrying grain, paper products, lentils, peas, bentonite clay, and video games on the Columbia and Snake Rivers."

Walla Walla District engineers, two independent contractors, and a structural engineering chief from Corps of Engineers Headquarters examined the situation and determined the causes of the cracks. The newspaper outlined the causes of the cracks for concerned citizens: “water pressure inside the lock, the force of two 350-ton counterweights that have lifted the gate up and down 65,000 times during its 32 years of operation and stresses of the gate expanding and contracting as it was pulled from cool water into the hot air of summer, or from cold water into the much colder air of winter (65)."

Walla Walla District kept the lock in operation, but determined that a permanent solution would involve replacement of the gate at a cost of approximately $13 million.
The installation of the gate required a two-month shutdown during January and February of 1996. The newly fabricated gate was barged from Bellingham, Washington, through the Straits of Juan de Fuca to the Pacific Ocean, down the coast to the mouth of the Columbia River, and up the Columbia to Ice Harbor on the Snake River (66).

REPLACING THE BIG GATE

The interesting thing about that project was the crane lifts that they had to make. That gate, the whole gate weighs about 750 tons. The difficulty with it is that you can’t get a crane up on the deck [of the lock]. What the contractor did—it was Lampson Cranes— [was to] set up a crane on the downstream side of the navigation lock, on the north side. … That crane is so big, it took fifty truckloads of equipment that they hauled out just to build the crane on site.

I don’t know if you remember hearing about the crane, the Lampson crane that failed in Milwaukee when they were building the baseball stadium? That is the same crane, the same type of crane. … The gate came to the site in three pieces. On the average, each piece was 250 tons. That crane had about a hundred and—let’s see—it had close to two hundred feet of boom in it. … They had to pick it up [the gate] and then turn it and get it down—a 250-ton weight. With the wind—you know the way the winds are down in the river— …I lay in bed at night thinking about all the things that could go wrong. …

The contractor set the bottom of the gate down in position in the navigation lock, in the guide slots, and then they prepped it, and then they had to bring the second piece down on top of it and then weld it together. They had to get it all spaced right. … [You've] got one 250 ton piece sitting on top of another 250-ton piece. You had to get this weld joint just right, all the way around. Then they welded it. This was in January-February timeframe. … You had freezing rain and ice … [with] those guys crawling up and down that one hundred feet of scaffolding every day. …

When you take the navigation lock system out for an extended period, like we did then, that timeframe is determined by numerous meetings with the grain growers and the barge companies and the folks who run the stern wheelers up and down the river. People will try to get a consensus on what is the best time to take this out of service and typically they say the January-February-March timeframe. –David A. Opbroek, Chief, Construction Division (67).

Meanwhile, Ice Harbor's maintenance worries were not over. Even before the big gate could be replaced, another incident occurred: "A barge struck the side of a guidewall at Ice Harbor, September 20 [1995] and caused extensive damage. The tugboat, 'Sundial,' operated by the Tidewater Barge lines, had four barges in its load heading downstream through the lock. Three of the barges carried wheat and one had wood chips. … As the tow approached the lock entrance, the wind was blowing from the northeast at about 20 miles per hour. The tugboat and its barges began to set toward the south floating guidewall. In order to correct this and prevent a collision with the south guidewall, the tug operator 'twin screwed to the left' in an attempt to bring the tow into alignment with the lock chamber (68)." The speed was too great to stop the forward momentum and the barge collided with the wall, resulting in no injuries, but in approximately $250,000 worth of damages.

Partly as a result of this incident, in 1985 major channel work was undertaken downstream of the navigation lock at Ice Harbor. Crosscurrents and high water velocities downstream of Ice Harbor lock required barge tows to negotiate the channel crossways. "With the length of the tows sometimes in excess of 600 feet, a high potential for grounding existed along the edges of the channel, said the planning officials who studied the problem (69)."

Tests were conducted to study alternative solutions to the problem. In the year 2000, such testing would be accomplished using computer simulations. In 1980, however, actual hydraulic models were constructed. One of these was 150 feet long, built on a scale of one to one hundred. The model included Ice Harbor Lock and Dam and the entire river channel downstream for a distance of about 2.5 miles. A radio-controlled model tugboat was used with two barge models in the tests.

The optimal solution was determined, and the navigation channel was widened for a distance of 2,500 feet. This widening required that the riverbed be drilled and blasted. The work was done during the "in-water work window" (generally December through March) when impact on fisheries would be minimized.

Lower Monumental Lock and Dam

Lower Monumental Lock and Dam is the next project on the lower Snake River upstream from Ice Harbor. Lower Monumental, affectionately called "LoMo" by Walla Walla District staff members, became operational in 1969. The dam is a concrete, gravity-type structure, 3,791 feet long and approximately 100 feet high. The powerhouse has six 135,000-kilowatt electrical generating units for a total capacity of 810,000 kilowatts.

LoMo had repairs to its navigation locks, though none as extensive as those at Ice Harbor Lock and Dam. However, at LoMo, the turbines had to be removed and overhauled because of an inherent problem with the mechanism that tilted the blades. LoMo, Little Goose Lock and Dam, and John Day Dam, built by Walla Walla District and now operated by Portland District, all had generators built under the same contract. According to a staffer who worked at the projects, "Over time, they [the generators] were all removed, and that problem was corrected (70)."

Lower Monumental Lock and Dam

There was yet another significant problem with the turbines at LoMo. In 1988, Unit No. 2 had to be repaired. "A fault in the generator winding while it was running had blown a hole in the stator the size of a baseball. During the last several months, both the turbine and generator had been disassembled, and repair work was underway. Since the unit is composed of hundreds of parts ranging in size from small to extremely large, during the period that the entire unit was disassembled, it seemed as if turbine and generator parts were lying everywhere in the powerhouse. As turbine reassembly progresses, there is free floor space again (71)."

Toward the end of the period covered by this volume, Walla Walla District was involved in a risk assessment related to the emergency head gates at Lower Monumental Lock and Dam. This study was undertaken under a contract with Battelle Pacific Northwest Laboratories and potentially involved "a huge significant change in the way we did business," according to one District staff member (72).

SAVING THE FISH IN DEWATERED UNIT 2

We had to let the thing [*i.e.*, the generator] sit there for almost two years before we got the money to fix this thing. Before you take the turbine out, you have to put these gates in the front, these gates in the back, and dewater the whole thing. We did that and started pumping. … There were fish swimming in there like you would not believe. That's down in this big old bottom part [of the generator housing]. There were huge sturgeon. Panic. Panic. Panic. Panic.

[A supervisor came] out to take a look at that. "We're going to have to get those fish out of there," he says. The only way into that [housing is by] a little old door, three feet by three feet. From that door to the bottom is about eighty feet. What you have to do is rig up … a little boatswain's chair. You put it down there. Then you have to put these fish in a basket on a crane and take them up. To make a long story short, we had 360 or so sturgeon in there. … [The fish were from one foot] to over six feet. Our people figured out a way to get enough people down safely [in the boatswain's chair] with the right kind of tubs to get those fish up, transfer them to … a pickup tub, and get them back to the river. …

We started early in the morning—this is like four-thirty, five o'clock. Everybody was absolutely worn to death, and it was a miserable, dangerous job, and nobody even scratched a finger. [We did it] for the fish. – Lawrence P. Walker, Operations Division supervisor (73).

The situation exemplifies the complexity of operating the large water resources projects and the balancing act between various requirements, in this case, potential flood control as balanced against the wellbeing of migrating fish. The situation was described as follows by a Walla Walla District employee:

> "You have turbines with wicket gates for shutting water off and controlling the water flow. … Looking from the top, there are actually three of these slots. Before the big change, there was a gate hanging on a hydraulic cylinder that came clear up to the top—one [gate] in each one of the three slots. If something went wrong down here, [if] something broke, if the top broke out of the turbine, in a flood, if a wicket gate got jammed and wouldn't shut down, the operator would go to a gallery in the dam, flip a couple of levers, and these gates automatically came down and shut off water flow. They were called head gates or emergency head gates.
>
> "Then there is another slot where you can install a bulkhead. Each project has a huge bulkhead that you have to install with a crane. This is the slot that they installed the fish screens in. … They found through experiment that by raising the head gate about twenty feet higher they had better upwelling of this water [in the fish slot and] more efficient passage. In order to raise this thing [*i.e.*, the head gate] twenty feet, you had to take the cylinder off of it—which means you no longer had an emergency gate. … There is an engineering requirement that every machine be capable of being shut down in an emergency condition in ten minutes. That's why these things [*i.e.*, emergency head gates] were put in there in the first place. They had to get an exemption in order to take these things out. We're still operating under that exemption. …
>
> "[We felt] we better do a study and see what the risks really are. If these things [*i.e.*, the regular gates] will never stick in ten thousand years, then there is not a lot of point in going back and putting different cylinders up here and different [emergency] gates in order to meet that ten-minute requirement because it will never happen in ten thousand years. The Corps and Battelle have been doing this study, and it's slowly coming to a closure here. … Expense here is $4 million to put cylinders in. It's pretty significant. … The risk is very low, but the consequences are very, very high. It's like you could fly most airplanes on one engine very nicely, but it's nice to have that second one (74)."

Little Goose Lock and Dam

Little Goose Dam is 2,655 feet long and 98 feet high. The dam is a concrete, gravity-type structure. The project includes a navigation lock, an eight-bay spillway, and a fish passage facility. The Little Goose powerhouse has six 135,000-kilowatt electrical generating units for a total capacity of 810,000 kilowatts. In addition to navigation and

hydroelectric generation, the project provides recreation and incidental irrigation. The project became operational in 1970.

Little Goose Lock and Dam

As of 2000, Little Goose and Lower Granite, as well as Dworshak, were administered from Walla Walla District's Eastern Area project office, located in Clarkston, Washington. The Lower Granite and Little Goose projects, particularly, worked very closely together over the years. In 1991, District staff member, Jesse Smiley, received the Secretary of Defense Productivity Excellence award. Mr. Smiley became the first civilian employee of the Corps of Engineers to receive this award. Mr. Smiley received the award for proposing an alternate method of providing emergency closure of hydroelectric turbines at Lower Granite and Little Goose. "Under the multimillion-dollar [$35 million savings] suggestion, the intake gates at the dams, which are used for emergency closures and maintenance, would be raised 20 feet to improve juvenile fish collection, and the wicket or head gates would be used for emergency closure. This eliminates the need to build an expensive hydraulic system to quickly move the head gates in times of emergency. After extensive testing, Smiley's suggestion was approved by the Office of the Chief of Engineers (75)." In 1995, Lower Granite and Little Goose jointly, were named one of ten "agencies" in the state of Washington to receive a pollution prevention award from the governor.

Lower Granite Lock and Dam

Lower Granite Lock and Dam is the farthest upstream of the four locks and dams on the lower Snake River. Lower Granite Dam backs up water to the Lewiston-Clarkston area, providing slackwater navigation and increased commercial traffic to this area of the Snake River. Congress authorized the Lower Granite project in 1945 for navigation and power generation. Other authorized project purposes include recreation, irrigation, and fish and wildlife management. The dam is thirty-two miles west of Lewiston, Idaho, and 107.5 miles upstream from the confluence of the Snake and Columbia Rivers. Construction started in 1965, and the lock and dam became operational ten years later. All general construction at the dam itself, at the recreation sites, and along the Lewiston levee system was completed in 1984.

The dam has a structural height of 254 feet and its total crest length is 3,200 feet. The combined structure consists of a single-lift navigation lock, spillway, powerhouse, and adult and juvenile fish bypass facilities. Power from the first of three 135,000-kilowatt, turbine-driven generators went online in April 1975. Installation of three additional units of equal capacity was completed in 1978, bringing the total powerplant capacity to 810,000 kilowatts.

One of the long-standing issues related to Lower Granite was the lack of a road to the area. "When Lower Granite Dam was constructed in 1975, direct access to the dam and the surrounding region from Lewiston was wiped out (76)." Adding the 3.6-mile section of road replaced a 35-mile detour and provided a continuous route from Lewiston to the Port of Almota. "A number of groups worked to get the project authorized [in 1992], including the Corps (77)."

THE GREAT WOOD CHIP TIP OF 1993

While most people were enjoying Memorial Day Weekend, the Corps' crew at Lower Granite Dam were working to re-open the waterway that was closed down when two barges overturned in the lock May 20.

The barges became wedged when a Tidewater tug with four barges entered the lock at approximately 10 p.m. for a downstream lockage. As water was being released from the lock, a log became wedged between one of the four barges and the navigation lock wall.

The front two barges wedged against each other and the log in the lock. As soon as the lock operator saw the barges tipping, the valves releasing water from the lock were closed.

No one was injured in the incident. The two other barges and the tug were unaffected.

The cargo on one barge contained 1,000 tons of wood chips. Thirty cargo containers were on the other and included paper products, peas, lentils and clay. ...

By removing some of the cargo, salvage officials hoped that the barges could be righted and freed from the lock.

Unfortunately, it wasn't that easy, and on the next evening, May 21, the two barges folded together, dumping their loads into the lock. Some of the wood chips and five of the containers had been removed before the barges overturned. …

A crane was used to recover the wood chips. Another crane was used to recover floating containers. …

The barges had to be stabilized to move them out of the lock chamber, over the 15-foot clearance of the lock sill.

Salvage crews repaired and pumped air into the overturned container barge. Fortunately, it had only turned on its side, and crews were able to right the barge May 26.

The overturned wood chip barge wasn't as easy to right. The decision was made to leave it in the upside down position, drill holes into the hull, and pump air into it to lift it. The container barge and tug were used to stabilize and remove it from the lock. …

The challenge was the amount of wood chips left in the lock, approximately 1,300 cubic yards. A front-end loader was lowered into the lock and the last of the wood chips were removed.

On June 1, the lock was re-opened to river traffic. –Nola Conway, *Intercom* (78).

Lower Granite Lock and Dam

Lower Granite lock required repair when a blown fuse caused one of the gates to come to an abrupt halt and to be jammed into position underwater. The enormous gate was "wracked"; that is, its south end was discovered to be two feet and eight inches higher than its north side. This displacement snapped twenty-five-pound bolts in half. "It's hard to imagine the forces involved that would stretch a steel bolt that is as wide as a man's forearm, until it snapped (79)," said one project staff member. The "wrack" prevented the gate from operating smoothly. During three weeks in February 1983, the gate was examined by a staff member dangling in an aluminum basket suspended from a modified fort lift. Walla Walla District engineers used the data from the examination to determine a course of repair that involved a contractor cutting the gate from the swing arms and repositioning it.

One Walla Walla District employee commented on lock repair projects: "The reason those have been significant in my career in the Corps, is because of the nature of the work. You are under a microscope with the whole navigation lock system shut down. You get a lot of attention. It's very intense because you are going seven days a week, twenty-four hours a day, and it's never done at a good time of year. … They were very memorable projects (80)."

Southway Memorial Bridge

The Southway Memorial Bridge crosses Lower Granite Lake (the Snake River) linking Lewiston, Idaho, and Clarkston, Washington. In the late 1970s, increased river traffic, because of the Lower Snake River locks, dams, and lakes, caused greater use of the lift span on the existing bridge linking the two cities. This, in turn, caused numerous interruptions to highway traffic. Since the cities of Lewiston and Clarkston depend on one another for fire and ambulance service and numerous other services, an alternate access route between the two cities was needed. In the Water Resources Development Act of 1976, Congress authorized expenditures for the project; Congress provided additional authorization and funding in 1981 under Public Law 97-140 (81). The project included the four-lane bridge, Lewiston North Ramp, and 16th Street extension, allowing for a future bypass around the two cities. The bridge was built by the Corps, but has been owned, operated, and maintained by nonfederal interests since its completion.

"You've heard the expression, 'we'll cross that bridge when we come to it?' Well today we came to it (82)." Thus began the 1982 opening ceremonies for the Southway Bridge. However, some murky water had "gone under the bridge" prior to this happy day. In March 1981, labor disputes slowed work on the bridge (83). Then, in August 1981, another temporary setback was encountered. After successful stress testing of 112 bridge cables, testing of more cables showed slippage in twenty out of thirty-three. Engineers overcame this defect and stayed on schedule for the opening. After the successful opening, happier days were ahead for Walla Walla District in relation to this project. In 1986, the District won a national award from the Federal Highway Administration for "excellence in highway design" for the Southway Bridge project. The bridge is notable for its high aesthetic value and free flowing form (84).

Dworshak Dam and Reservoir

Dworshak Dam and Reservoir are located on the North Fork of the Clearwater River in Idaho. The dam is celebrated by a Walla Walla District staff member in a limerick that stresses the safety concerns prevalent throughout the Corps and especially at outlying projects:

> There was a young man from Dworshak
> Who died when he fell on his back.
> He said as he fell,
> A depth greater than hell,
> "Had I slipped the other way I could swim back (85)."

Dworshak Dam and Reservoir

Actually, it is doubtful if the young man of the verse could survive even a fall to the water side of Dworshak, the Western Hemisphere's highest straight-axis concrete dam, which looms above its valley at a maximum height of 717 feet. The dam, completed between 1965 and 1973, is the largest ever designed by the Corps of Engineers and is 3,287 feet long at the crest. Approximately fifty employees operate the multipurpose Dworshak project that provides flood control and hydropower.

The powerhouse at Dworshak has two 90,000-kilowatt generating units and one 220,000-kilowatt unit for a total capacity of 400,000 kilowatts. Dworshak Dam was constructed with room for three additional 220,000-kilowatt electrical generating units. Congress deauthorized units 5 and 6 in 1990, while unit 4 was deauthorized in 1995.

Dworshak Dam is designed to hold back nearly 3.5 million acre-feet of water. However, in the early 1980s the dam came under intense public scrutiny. The "crack in Dworshak" was even covered by a crew from the CBS Evening News (86). Although the integrity of the dam was never threatened, there was public concern over the leakage of up to 7,700 gallons per minute of water from the dam.

Videotape technology was used to remotely inspect the dam to a depth of three hundred feet below the water's surface, determining that the main problem was a single large crack. Pressure on the crack was relieved by drilling drain holes from the interior gallery system of the dam. Next a "traveler" bar was designed and built by Walla Walla District to clean the crack. Then a roller was installed on the bar to help place two lengths of 25-millimeter thick nylon reinforced curtains. Divers assisted with the

installation of the curtain to a depth of 190 feet below the water surface. Final crack closure was completed using a filler material of volcanic cinders covered by vinyl epoxy. By January of 1982, the District had sealed the 230-foot-long crack and received a Bronze Chief of Engineers award from the Corps for engineering innovation for 1981 (87).

In the late 1990s, the problem of cracks in Dworshak Dam again arose. Walla Walla District mounted a program to replace material that was used to seal natural cracks in the dam structure. In the fall of 1996, the reservoir behind the dam was lowered 1,500 feet to allow a private contractor to pump grout to seal the cracks between bedrock and the bottom of the dam. District staff met with the people of Orofino, Idaho, which is near the dam, to share the plan to keep the dam safe. The District used an informal approach, even participating in a radio call-in show, which worked well to address the concerns of local residents (88).

Situations occurring at Dworshak Dam during this period offered excellent examples of retrofitting a design. One long-time staff member of the Walla Walla District pointed out that designing and engineering to solve problems with existing structures can sometimes be challenging. “Cavitation [was a] problem at Dworshak. You are stuck inside this dam with these hydraulic conditions. You can't start from scratch (89).” Cavitation appeared here as a concentrated swirling of water that scoured out holes in the riverbed just below the dam. Left unchecked, cavitation could have undermined the dam. Design and installation of a new aeration lip (a strategically placed piece of metal) corrected the Dworshak cavitation problem.

Besides flood control and hydropower purposes, the Dworshak project created a recreational resource that is highly valued by local residents. However, the balance between recreation uses and drawdown for electrical generation or for flood control is particularly pronounced at Dworshak. A further call on water is for providing the flow deemed necessary to sustain anadromous fish on their migration to the Pacific Ocean. The drawdown of the Dworshak reservoir can be significant during years of drought, such as those experienced in the area during the late 1980s and early 1990s.

A multiagency group, including the Corps and the Federal Columbia River Power System Technical Management Team, annually creates an operational plan for Dworshak Reservoir. In 1990, for example representatives of the Corps and Bonneville Power Administration met with dissatisfied fishing enthusiasts who were unhappy with the previous year’s high flows, which had hampered angling for a record run of steelhead in the Clearwater River (90).

The same issues were still being debated in 2000. When asked how long the boating season lasts, a local resident told the newspaper, “about two weeks (91).” Boaters and campers had learned to hurry out early in the season to take advantage of Dworshak Reservoir’s limited window of opportunity for recreation, but they were not happy about it. State representatives, state senators, the Idaho Department of Water Resources and the Nez Perce Tribe were all dissatisfied with the operational plan for the reservoir for the year 2000 (92) (93). In addition to the adverse effect of drawdown on recreation, there was also concern over the fact that water vigorously spilled from Dworshak

Reservoir might be supersaturated with gases, which could adversely affect fish populations (see chapter 8).

Besides the debate about having water levels high for recreation, there is an ongoing debate about exactly when water should be released from the reservoir to best benefit fish. Observers call attention to the fact that drawdowns can have adverse effects on wildlife habitat. As one Walla Walla District biologist put it: "The biggest impact is not so much on the Snake River or the Columbia River mainstem reservoirs, which are run-of-the-river dams, but the storage reservoirs like Dworshak and … and those where you've got a large drawdown factor. You end up with what we call the bathtub ring or denuded areas of no habitat value whatsoever. There's really not a whole lot you can do with that (94)."

Lucky Peak Dam and Lake

Lucky Peak Dam and Lake is a Corps project in the mountains of southwestern Idaho on the Boise River, ten miles southeast of the City of Boise. Lucky Peak Dam was constructed primarily for flood control along the main stem of the Boise River. In conjunction with two upstream reservoirs, Arrowrock and Anderson Dam, Lucky Peak project provides a high degree of flood protection in a sixty-mile area extending from Lucky Peak downstream through the City of Boise to the mouth of the Boise River. However, irrigation and production of hydropower, as well as recreation, are now included in project purposes at Lucky Peak.

Lucky Peak Dam is a rolled earthfill structure about 340 feet high and 1,700 feet long. The structure was originally completed in 1955 with major additions completed in 1988. It has an intake tower, two outlet tunnels, a powerhouse, and a 600-foot spillway. During a detailed investigation of the outlet capacity and the potential for adding hydropower to the original 1955 Lucky Peak project, the need for a second outlet became apparent. The Corps was authorized to construct such an outlet.

In 1980, the Federal Energy Regulatory Commission issued a license to the Boise Project Board of Control to construct an 87-megawatt powerplant at the existing Lucky Peak project. The licensee completed the construction of the powerhouse project and the first power came online in 1988. The Board of Control project included relining of the original outlet tunnel and construction of a second outlet for Lucky Peak Dam.

The construction project included measures to improve recreation and operational facilities. Through an agreement with the Board of Control, Seattle City Light operates the 101,250-kilowatt-capacity powerhouse and markets the power. Controlled discharge of impounded water is accomplished by means of two outlets. In 1986, during construction of the powerhouse and relining of the original outlet, a second, 22-foot-diameter, steel-lined outlet was bored through the downstream left bank abutment. Following construction of the second outlet by the Boise Board of Control, the Corps project to construct a second outlet, being unnecessary, was deauthorized.

Lucky Peak Dam

Lucky Peak Lake storage is regulated in conjunction with Arrowrock and Anderson Ranch Reservoirs upstream on the Boise River. These two projects were built by the Bureau of Reclamation before construction of Lucky Peak Dam by the Corps. The three reservoirs are operated as an integral system under the guidelines of the joint 1985 *Water Control Manual for Boise River Reservoirs, Boise River, Idaho* (95). It is the intent of the flood control regulations to limit river flows near Boise to 6,500 cubic feet per second for all but the largest flood discharges. The operating plan is designed to keep a full pool at Lucky Peak Lake as long as possible during the summer recreation season.

A Walla Walla District employee talked about the beneficial effect of the Lucky Peak project: "[During the significant flood events of 1996, we estimated that the winter operation [at Lucky Peak] saved well in excess of $100 million of damage. … Back in the early 80s, we had a series of very, very large flows on the Boise River—1982, 1983, 1984, 1983—we took the Boise River down below Boise up to about 9,500 cubic feet per second. That's the largest amount that's been there since the project has been in, but even at that, it's well below what's considered to be a 100-year event. There's been so much development within the floodplain that we see minor damages even at the small flows. It's been very interesting. It's been very much a challenge (96)." Chapter 6 features more information on flood control in the Boise River basin.

Other Civil Works Projects

Other Walla Walla District flood control projects will be discussed in chapter 6 and projects related to environmental restoration in chapter 7.

Work for Others

As Walla Walla District moved further from the era of large-scale construction projects, it found itself with a pool of highly trained and experienced staff members whose talents needed to be utilized. As the District's newsletter proclaimed in a 1987 article about workload, "Busy engineers = happy engineers (97)."

Work for Other Corps Districts

During the 1981-2000 period, the District took on work from several other districts of the Corps of Engineers. In 1987, the Walla Walla staff did design work on military projects for the Alaska District. This involved design of a containment levee around a petroleum storage tank farm at Fort Wainwright. Thirty-seven different staff members of the District's Geo-Technical Branch assisted in working on the $1 million project (98).

Other Corps districts, notably by Seattle and Sacramento Districts, utilized Walla Walla District's expertise in designing fish hatcheries and fish passage systems. Walla Walla staff, for example, led in designing the Chester Diversion on the Feather River in California in 1987 (99). In 1991, the District assisted Seattle and Los Angeles Districts with engineering services, including construction inspections, contract administration, shop drawings, and onsite quality assurance (100). Walla Walla District helped Portland District design updated features, including tainter gates, for Bonneville Lock and Dam.

During the 1980s and 1990s, in addition to completing work for other Corps districts, Walla Walla staff also worked on projects for numerous other federal agencies.

Blackfoot Dam

The Bureau of Indian Affairs owned and operated the Blackfoot Dam and Reservoir, forty miles southeast of Blackfoot, Idaho. Water stored in the reservoir was used for irrigation on the Fort Hall Indian Reservation. The Flood Control Act of 1962 authorized the Corps to make modifications to the eighty-year-old Blackfoot Dam for safety, but primarily to incorporate flood control as a project function.

From 1969 to 1978, the Corps completed various design studies related to the Blackfoot project. In a 1978 report, the Corps revised the modification plans in a manner that met with approval from the sponsor (the Bureau of Indian Affairs) and local interests. However, Corps higher authority disapproved construction since the modifications would be essentially only a correction for dam safety rather than for flood control as authorized. The Bureau of Indian Affairs then successfully pursued funding on its own (101).

In 1982, the Corps agreed to accept the Bureau of Indian Affairs' request to design and construct the proposed Blackfoot Dam modifications. Under an interagency agreement, Walla Walla District designed modifications that increased spillway capacity, incorporated outlets into the spillway, increased stability of the dam itself, and raised a small dam nearby a few feet to help prevent leakage into Blackfoot Reservoir. Construction work under the supervision of the District was completed in 1986 at a cost of $7.4 million (102), resulting in a much safer and more effective dam and reservoir system.

Design of Airport Features

In 1986, Walla Walla District executed a small ($12,000) contract to design the runway lighting for the Walla Walla City-County Airport. Soon the District found itself designing the approach lighting system for Portland International Airport. The system had to avoid then existing problems where aircraft could be damaged by hooking their landing gear on the approach lights. The approach lighting system designed by Walla Walla staff involved a breakaway feature, a stress point that will snap if touched by an aircraft. "If an airplane catches [on the new system], it most likely will not cause an accident (103)," said one of the Walla Walla staff members involved in this design effort.

Work for the Federal Aviation Administration, including design and quality inspection of construction, was plentiful in 1986-1987 under a memorandum of agreement between Walla Walla District and the FAA's Northwest Mountain Region (covering Washington, Oregon, Idaho, Montana, Colorado, and Utah) and the FAA's Western Pacific Region (California, Nevada, and Arizona) (104). One District contribution under this agreement was the design of wind shear velocity meters slated for airports in Salt Lake City, Utah, Colorado Springs, Colorado, and Billings, Montana.

Utilizing Fisheries Expertise

Walla Walla District's expertise with fisheries issues led to work for the U.S. Fish and Wildlife Service. In 1986, for example, the Service utilized the expertise in the District to design a fish ladder at Redlands Diversion Dam in Colorado. The ladder was based on the design at the District's Mill Creek Diversion Dam. This was part of a conscious effort with the District "to establish ourselves and build a reputation in fish hydraulics among customers, not just within our immediate geographical area (105)."

In 1992, the District designed the $8 million Umatilla Fish Hatchery for the Bonneville Power Administration.

This effort to utilize District fisheries expertise continued up to 2000 and beyond. For example, in fiscal year 2000, the District received funding from the Bonneville Power Administration and the Department of Energy to modify the electrical and communication systems in fish passage facilities to accommodate changes in radio frequencies used in tracking passive integrated transponder tags (PIT-tags) inserted in migrating fish for research purposes.

Work for Other Agencies

During the period covered by this volume, Walla Walla District did a great deal of work for the Department of Energy. Much of this work falls under the category of hazardous materials remediation and will be covered in chapter 9.

Another instance of work for other federal agencies was when the District's cost engineering staff studied the Department of Energy's cost-estimating procedures, producing a comprehensive review in 1999 (106). One interesting aspect of the EPA study was that it was not an independent outside review, but a joint effort of the Corps and EPA staff. The study identifies tools and procedures that may be useful to all regions of the Environmental Protection Agency.

In addition to working for other federal agencies, Walla Walla District also performed services for state and local agencies. For example, in 1992, the District worked on a project for air route surveillance radar for Seligman, Arizona, including the administration of a $1.1 million contract and providing onsite quality assurance for the project. In 2000, the District was assisting the Washington Department of Transportation by performing the route design and environmental compliance activities for the expansion of a section of U.S. Highway 12. A section of the highway traversing the McNary Wildlife Refuge near Pasco, Washington, was to be expanded from two lanes to four lanes.

WALLA WALLA DISTRICT'S CONCEPT OF WORK FOR OTHERS

There are some basic missions that the Corps has. One is to support the military and military construction. Another is to support the region through civil works. Therein lies the O&M program, as well as things like our Continuing Authorities Program, where we do environmental work for states and regional groups and cities. There is also the idea that those programs are relatively stable and stagnant even. We need to constantly re-energize those programs. The concept of outreach at [Corps] Headquarters is called … "international or interagency support." What that means is that we need to have people who look at things beyond the traditional civil works borders.

Congress has given us some very specific authorities to assist states and communities under the Continuing Authorities Program, which takes us to stream restoration and certain things like that. With those programs, Congress wants us to cost share. That gives the local entity veto and control authority because they can control their cost share. They can create it or they can cut it off. They can manage us through the cost share, because we have to match up. ...

One of my legalistic responsibilities is to make sure that we are complying with the Thomas Amendment (107), which is the law that says, basically, we won't go out and compete with private AEs [architect-engineer firms]. You have to have someone involved in the outreach process that has high sensitivity to our legal constraints. … This District has not [had problems related to the law.] Many districts have, which is why the law exists. The law is specific to the Corps of Engineers. It just appeared a few years ago. Fortunately, we've made a number of decisions to not pursue something based on the idea that this law exists. We have preemptively used it to avoid problems. –Allen N Pomraning, Outreach Coordinator (108).

Military Works

In 1961, Walla Walla District ended most of its involvement in the Corps Military Works Program. At that time, Seattle District took over all military construction in the region (109). Therefore, the story of the District's role in military works from 1981-2000 is a short one, centering around two well-defined spheres of activity.

Umatilla Army Depot

The first sphere of military works activity for the Walla Walla District was related to the chemical demilitarization of the large weapons stockpile at the Umatilla Army Depot, located in northeastern Oregon. Under provisions of the 1986 Defense Authorization Act, Congress required that obsolete unitary chemical weapons stored at the Umatilla Army Depot and seven other sites around the U.S. be destroyed by 1994. In 1987, the Army was planning to build a large state-of-the-art incineration facility at the Depot to comply with this law.

Old Building at Umatilla Army Depot

In 1987, Walla Walla District was engaged to oversee the site adaptation portion of the cleanup project that was expected to take twenty-nine months. Site adaptation for the project was estimated to cost $10.5 million out of a total project cost of $300 to $400 million. Site adaptation included designing roads, parking areas, sewage systems, water supply, electrical power, and telecommunications networks for the incinerator facility (110). In addition to design work, District personnel were to administer the construction contracts. Late in 1987, the District sent a team of engineers to the South Pacific to tour the then recently completed Johnson Atoll Chemical Agent Disposal System.

The Corps brought a team approach to this design project, including the growing contribution of environmentally knowledgeable staffers. A District environmental compliance specialist talks about some of the synergy she was able to bring to the project:

> "We were trying to do something with the Umatilla Chemical Depot when they were going to start building the incinerator. The Corps was asked to look at some of the pipelines to get water from the Columbia River and some of the roadways. We wanted to put a pipeline across a wetland area. I'd been looking at the regulations, and you are not supposed to be out there destroying wetlands. There were already some pipeline crossings—already a couple of them. The engineers were going, nope—they were going to put another one [pipeline] right down the middle. I'm going, why can't you move it closer to where they've already disturbed the wetland and leave this alone (111)?"

Design on the Umatilla Army Depot chemical stockpile disposal program stopped in January 1988 due to lack of funding but was restarted in August 1989 with delays again in 1990. By 1993, the first design phase was completed, and Walla Walla District staff proceeded to phase two. Finally, in 1994, the design work was completed. As of 2000, the District had undertaken no further work on this project.

Not until 1997 was a contract actually let for the construction of the Umatilla Army Depot chemical disposal facility by the Raytheon Corporation. The incinerator was completed in 2001. Walla Walla District was not involved in the construction or overseeing contracts for construction.

Demotion and Environmental Cleanup of Old District Headquarters

From its inception in 1948 until 1995, Walla Walla District Headquarters occupied buildings at the Walla Walla Regional Airport. Until 1947 these buildings had been a U.S. Army bomber training crew facility. The General Services Administration

assumed administration and maintenance of the District Headquarters facility in 1965 with the District occupying the premises under a lease agreement. In 1985, GSA determined that the facility had severe safety and structural deficiencies that would require $4.5 to $5 million for correction (see chapter 2 for further details). This was not surprising since the planned useful lifetime for the structures had only been five years when they were originally built. The GSA determined that if the corrections were made, the useful life of the facility would not be appreciably extended (112). The District acquired another site and designed and constructed a new District Headquarters facility in downtown Walla Walla (see chapter 2).

The Corps vacated the old District Headquarters facility in 1995, with the exception of the motor pool. Remediation had begun in the early 1990s in order to correct the effects of a leaking underground gasoline storage tank. In a project that cost over $500,000, thirty fuel tanks were dug up and removed. This project was funded under the Defense Environmental Restoration Program from the Department of Defense (113). The motor pool vacated the old facilities in 1997 after completion of environmental remediation of the site.

In 1991, Congress had given Walla Walla District authority to conduct a disposition study for the demolition of the old Headquarters facilities. The Corps's study, published in 1992, examined various alternatives and determined that complete demolition was the favored alternative. One element strongly leading to the recommendation for complete demolition was the fact that most of the facility's structures had been constructed using large amounts of asbestos, while high levels of lead were also found in shingles and exterior paint samples.

After the District had vacated the old Headquarters site in 1995, the title to the property had been transferred to the Port of Walla Walla. This was done as part of a "land swap" in which the Port traded downtown property (to house the new District Headquarters) to the Corps while the federal government gave the Port the airport property (site of the old Headquarters). In the late 1990s, the cost of cleanup and demolition of the old Corps facilities was estimated at $2.8 million.

It was unclear which governmental entity would pay for the demolition and cleanup of the thirty World War II era buildings still remaining on the property. The City Manager of Walla Walla at that time even acknowledged, "The federal government has no legal responsibility for cleaning up the site (114)." With the particular support and intervention of U.S. House Speaker Tom Foley, funding for the project was secured from Congress. In the year 2000, Walla Walla District received over $600,000 in military program funds for the complete demolition of the former District Headquarters facility.

WHERE DID ALL THAT GASOLINE GO?

When we were in the old building ... they had gasoline out there, and we filled our own vehicles—the motor pool did. At that time, we owned our own vehicles; we didn't use GSA [General Services Administration] vehicles. Periodically, on a monthly basis, they had to make the books match on how much gas they had purchased versus how much the tank said it pumped out. They were always off [and] never could understand it. They always thought somebody was stealing gasoline. It turns out they weren't stealing gasoline at all; it was leaking out through the bottom of the tanks.

The tanks were used tanks when they were installed at the old facility. We may have gotten them from Hanford. But at that time, we did not have testing [methods] to test that they were leaking, and we did not have overfill protection, so it was not unusual that they overfilled the tanks. It [the gasoline] would run down alongside the tanks. We never gave any consideration that the gas was leaking out the bottom of it. When the law required that we do testing on an annual basis, it became apparent. …

Engineering was doing some work for others and Seattle District had come down to remove tanks from the airbase. At the same time we decided we would pull a couple of abandoned tanks that we had. When we pulled the tanks … that's when they found—the leakers.

It was an interesting process to then go through remediation. They dug a hell of a hole. They were chasing the plume. We had three large tanks and two small tanks. … The unleaded tank had been leaking for some time. They dug a hole that was probably about thirty-five feet deep and perhaps, seventy or eighty feet long. All that material was hauled out and placed on the ground while they chased it down. It was very interesting. We did water monitoring for a long time. It probably took from start to finish, maybe four years to resolve the issues. It all had to be resolved before we could turn the land over to the Port of Walla Walla who wanted our building, who actually wanted to use the facility.
–Jimmie L. Brown, Environmental Resource Specialist (115).

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Notes for Chapter 4

1. Primary function of Corps being reemphasized. *Intercom*, 1 September 1981, p. 1.
2. Study examines what the future holds for the Corps. *Intercom*, 17 December 1982.
3. Webb, Walter Prescott. *Harper's*, 1957. Quoted in Marc Reisner, *Cadillac Desert: The American West and Its Disappearing Water* (New York: Penguin Books, 1987), p. 3.
4. Reisner, Marc. *Cadillac Desert: The American West and Its Disappearing Water*. New York: Penguin Books, 1987.
5. Bonneville Power Administration, USACE, and Bureau of Reclamation. Federal Columbia River Power System. Brochure. [Portland, Or.:] The Agencies, August 2003: INTERNET: http://www.bpa.gov/power/pg/fcrps_brochure_17x11.pdf.
6. Public Law 96-501.
7. USACE *National Hydroelectric Resources Study.* Washington, D.C.: USACE, 1983.
8. World Commission on Dams. *Dams and Development.* Final Report: Executive Summary. London: The Commission, November 2000.
9. Federal Columbia River Power System brochure.
10. U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. *A Primer on Electric Utility Deregulation, and Restructuring of U.S. Electricity Markets*. Version 2.0. Washington, D.C.: The Office, May 2002.
11. For a detailed overview of changes in the electric power industry, see: U.S. Department of Energy, Energy Information Administration. *The Changing Structure of the Electric Power Industry 2000: An Update*. Washington, D.C.: The Administration, October 2000.
12. Walker, Lawrence P. Interview. Walla Walla, NWW, 18 June 2001.
13. Reese, David L. Interview. Walla Walla, NWW, 23 October 2001.
14. Walker interview.
15. Peterson, Keith C., and Mary E. Reed. *Controversy, Conflict and Compromise: A History of the Lower Snake River Development*. Walla Walla: NPW, 1994.
16. Blumenthal, Les. Northwest farmers head to Capitol Hill to battle breaching. *Tri-City Herald*, 23 March 2000.
17. Knutson, Kate. River links cities, port official says. *Tri-City Herald*, 25 April 1991.
18. Frommer, Frederic J. Snake River dams on "most wasteful" list. *Associated Press*, 10 March 2000.
19. Hixson, Phil. Mud cat extracts Snake River silt. *Intercom*, 24 October 1986.
20. Ibid.
21. Scoop digs up tons of sediment. *Intercom*, April 1988, p. 6-7.
22. USACE, Walla Walla District. *FY 98 O&M Program Concerns, Including Dredged Material Management Plan Preliminary Assessment*, memorandum for Commander, North Pacific Division. NWW, 2 May 1996.
23. USACE, Walla Walla District. *Dredged Material Management Plan and Environmental Impact Statement—McNary Reservoir and Lower Snake River Reservoirs*. Final. Walla Walla: NWW, July 2002.
24. USACE, Walla Walla District. *Interim Dredging and Disposal of Dredged Materials: Snake and Clearwater Rivers (2000-2001), Washington and Idaho*. Walla Walla: NWW, 26 September 2000.
25. Snake River flow hits all-time low. *Boise Idaho Statesman*, 6 June 1992.
26. Englert, Stuart. Irrigators question moratorium. *Idaho Falls Post-Register*, 31 May 1992.
27. Dennis Rhodes, West Richland, Washington, Community Development Director quoted in: Lee, Mike. Cities lost in wake of regulation. *Tri-City Herald*, 19 March 2000.
28. Vollmer, Elizabeth. McClure: Water threat is real. *Pocatello Idaho State Journal*, 7 February 1991.
29. Harden, Blaine. A River Lost: The Life and Death of the Columbia. New York : W. W. Norton, 1996.
30. Volkman, John. *A River in Common: the Columbia River, the Salmon Ecosystem, and Water Policy: Report to the Western Water Policy Review Advisory Commission*. Denver: The Commission, 1997.
31. Geranios, Nicholas K. Any change will strain river users, report says. *Walla Walla Union-Bulletin*, 1 September 1992.
32. Ibid.

33. Bonneville Power Administration, Bureau of Reclamation, and USACE, North Pacific Division. *Columbia River System Operation Review, Final Environmental Impact Statement*. Summary, main Report, 20 technical appendixes. Portland, Or.: The Agencies, 1995.
34. Titone, Julie. Columbia River plans go on tour. *Spokane Spokesman-Review*, 7 September 1992.
35. Bonneville Power Administration, Bureau of Reclamation, and USACE, North Pacific Division. *Columbia River System Operation Review, Final Environmental Impact Statement*. Portland, Or.: The Agencies, 1995. Summary, p. 2-3.
36. Ibid. Summary, p. 3.
37. Ibid.
38. Walker interview.
39 Walker interview.
40. District safety is slack. *Intercom*, 23 July 1982.
41. Hewitt, Bob. Accidents are plaguing NPS. *Intercom*, 1 December 1981.
42. Foreman lauds safety-conscious workers. *Intercom*, September 1994, p. 14.
43. Weller, Lt. Col. James S. Reflections on 1993 challenges. Message from the Commander. *Intercom*, December 1993, p. 2.
44 Weller, Lt. Col. James S. Commander's Corner. *Intercom*, fall 1995, p. 2.
45. U.S. Office of Management and Budget. *Circular No. A-76*. Washington, D.C.: The Office, 1983 (revised 1999).
46. District studies contracting of warehousing. *Intercom*, 8 August 1983, p. 1.
47. Hixson, Phil L. Interview. Walla Walla, NWW, 10 July 2001.
48. Shelin, Sandra L. Interview. Walla Walla, NWW, 14 September 2001.
49. Reuss, Martin, and Paul K. Walker. *Financing Water Resources Development: A Brief History*. Washington, D.C.: USACE, Historical Division, July 1983.
50. PL 99-662.
51. President signs omnibus bill. *Intercom*, 21 November 1986.
52. Weller, Lt. Col. James S. Commander's Corner. *Intercom*, winter 1995-96, p. 2.
53. Public Law 99-662.
54. Walker interview.
55. Voss, Steven W. Interview. Walla Walla, NWW, 26 June 2001.
56. Cavitation is a technical scientific term for a condition that may occur in a fluid system. Cavitation occurs when the local static pressure in a fluid drops below the vapor pressure of the liquid—the liquid will then become a vapor. This may happen when the fluid accelerates in a control valve or around a pump impeller (such as within a turbine). Cavitation can cause serious wear and tear and damage, reducing a component's lifetime dramatically. The vaporization itself does not cause the damage. The damage happens when the vapor almost immediately collapses after evaporation when the velocity of the fluid is decreased and pressure increased within the system.
57. Walker interview.
58. Voss interview.
59. District overcomes lock crisis. *Intercom*, December 1989, p. 10-11.
60. District combats lock problems. *Intercom*, December 1988, p. 6-7.
61. Ibid.
62. Voss interview.
63. Ice Harbor Dam: Cracks in downstream lock lift gate force emergency outages. *Intercom*, September 1994, p. 5.
64. Stang, John. Locked down: Ice Harbor Dam's cracked lock gate makes prisoners of river users. *Tri-City Herald*, 22 September 1994.
65. Ibid.
66. 1995 accomplishments. *Intercom*, winter 1995-96, p. 4-16.
67. Opbroek, Dave A. Interview. Walla Walla, NWW, December 2001.
68. Barge strikes Ice Harbor north guidewall. *Intercom,* fall 1995, p. 7.
69. Channel work to Improve Ice Harbor navigation. *Intercom*, 23 January 1985, p. 1.
70. Walker interview.
71. Ryan, Randall. Reassembly: Turbine unit expected to return to service in next two months. *Intercom*, October 1999, p. 12.
72. Walker interview.

73 Walker interview.
74. Walker interview.
75. Smiley wins national award for Suggestion. *Pomeroy East Washingtonian*, 13 February 1991.
76. Bailey, Julie. Road from Lewiston to Lower Granite Dam may be funded. *Lewiston Tribune*, 16 October 1992.
77. Ibid.
78. Log causes lock outage. *Intercom*, June 1993, p. 8.
79. Blown fuse "wracks" Granite's tainter gate. *Intercom*, 18 March 1983, p. 1, 3.
80. Opbroek interview.
81. PL 97-140, authorizing small flood control project appropriations
82. Southway Bridge topping ceremony would make good documentary. *Intercom*, 15 March 1982.
83. Labor trouble slows work on Snake River bridge. *Intercom*, 15 April 1981, p. 1.
84. District captures national award. *Intercom*, 19 February 1987.
85. Hewitt, Bob. Of Indian chiefs and limericks. *Intercom*, 1 January 1982, p. 3.
86. CBS Evening News. Dworshak Dam Leak. News broadcast (Videotape). New York: CBS News, 18 June 1980.
87. NPW tops all districts in Chief of Engineers awards. *Intercom*, 1 January 1982, p. 1.
88. Curtis, Lt. Col. Donald R., Jr. Commander's Corner. *Intercom*, September 1997, p. 2.
89. Walker interview.
90. Loftus, Bill. Corps, BPA get an earful on Dworshak water levels. *Lewiston Morning Tribune*, 21 March 1990.
91. Barker, Eric. Twisting by the full pool. *Lewiston Morning Tribune*, 29 June 2000, p. 4D.
92. State and tribe angered over summer flow at Dworshak Reservoir. *Boise Idaho Statesman*, 23 May 2000.
93. O'Bryant, Mike. Nez Perce, Idaho ask for limits on Dworshak. *Bend (Or.) Columbia Basin Bulletin*, 21 April 2000.
94. Christianson, Carl J. Interview. Walla Walla, NWW, 26 June 2001.
95. USACE and Bureau of Reclamation. *Water Control Manual for Boise River Reservoirs Boise River, Idaho: Boise River Project.* Walla Walla, USACE, 1985
96. Reese interview.
97. Maierhofer, Lindsay. Workload increases. *Intercom*, 19 February 1987, p. 1, 3.
98. Ibid.
99. Ibid.
100. Work for others. *Intercom*, winter 1992, p. 15.
101. USACE, Walla Walla District. *Water Resources Development in Idaho, 1999.* Walla Walla: NWW, 2002.
102. NPW will rehab Blackfoot. *Intercom*, 30 September 1982, p. 1.
103. District designs runway lighting. *Intercom*, 21 November 1986.
104. Work for others program. *Intercom*, 30 December 1987.
105. District expertise extends to Colorado. *Intercom*, 29 April 1986, p. 7.
106. U.S. Environmental Protection Agency and USACE, Walla Walla District. *EPA/USACE Assessment of Cost Procedures: Comprehensive IGCE Review*. Walla Walla: The Agencies, December 1999.
107. Thomas Amendment to the Water Resources Development Act of 2000. The amendment states, in part, that "The Corps of Engineers may provide specialized or technical services to a Federal agency (other than a Department of Defense agency), State, or local government of the United States … only if the chief executive of the requesting entity submits … a certification that includes adequate facts to establish that the services requested are not reasonably and quickly available through ordinary business channels." (See the applicable sections of the law at: http://hq.environmental.usace.army.mil/minutes/p01a.pdf).
108. Pomraning, Allen N. Interview. Walla Walla, NWW, 24 January 2002.
109. The first 50 years, Walla Walla District 1948-1998. *Intercom,* Special Edition, November 1998, p. 5.
110. Engineers tour Johnston Island disposal system. *Intercom*, 30 December 1987, p. 1.
111. Shelin interview.
112. USACE, Walla Walla District. *Demolition of the Former District Headquarters Facilities*. Walla Walla: NWW, March 2000.

113 Hartman, Carrie. Tanks but no tanks. *Walla Walla Union-Bulletin*, 30 January 1992, p. 1-2.
114. Hartman, Carrie. Cost of Corps' cleanup $2.8 million. *Walla Walla Union-Bulletin*, 11 March 1992, p. 1.
115. Brown, Jimmie L. Interview. Walla Walla, NWW, 23 July 2001.

Chapter 5. Civil Works Studies, Engineering Innovations, and Research

Civil Works Studies

One of the most important functions of Walla Walla District during the 1981-2000 period was to study the water resources-related environment in the District. During this period, studies were coordinated by Planning Division, which later became the Planning, Programs, and Project Management Division.

The Corps of Engineers has legal authority to study floodplains (see chapter 6) and river basins to assist local communities with no specific projects in mind (see below under the "basin studies" section). However, most Corps studies are undertaken with a particular water resources project in mind.

The Corps is authorized, as part of its civil works mission, to investigate projects related to navigation, flood damage reduction, ecosystem restoration, and coastal storm damage prevention. In examining potential projects, the Corps is authorized and encouraged by executive order to consider multipurpose projects with benefits related to hydroelectric power, recreation, and water supply (primarily irrigation). However, regulations state these latter objectives must not be the sole purpose for a Corps project.

The Corps approaches studying a project from a problem-solving perspective. Alternative solutions must be proposed and studied. The "no-action alternative" must be studied, defining consequences and costs if no project is implemented. Over the years, Walla Walla District completed a large number of project studies—a much larger number than were actually constructed or implemented.

The Corps funds projects that are in the federal interest under several different programs (1). Smaller projects may be undertaken under the following Continuing Authorities Programs: Emergency Streambank Protection; Small Navigation projects; Beneficial Uses of Dredge Material for Ecosystem Restoration; Flood Damage Protection; Aquatic Ecosystem Restoration; and Modifications for Improvement in the Environment. General investigations studies examine projects outside the Continuing Authorities Program.

The Corps is authorized to support comprehensive floodplain management planning under the Floodplain Management Services Program. Finally, the Corps can provide Planning Assistance to states and tribes to help with water resource problems. All of these programs can generate reports and may (or may not) lead to actual water resources projects.

Each of these programs has different requirements for cost sharing. During the 1981-2000 period, cost sharing requirements were spelled out more clearly compared to earlier periods. Cost sharing means that an entity other than the Corps contributes to the cost of the project. These "project sponsors," or "local sponsors," as they are called, are typically cities, counties, tribal nations, port commissions, or state governmental agencies. The Water Resources and Development Act of 1986 (2) was a landmark in

legislation relating to defining cost sharing for general investigations projects. Cost sharing establishes the fact that a project has strong local support—strong enough so that a nonfederal sponsor would contribute thirty-five to fifty percent of costs of project feasibility studies, engineering, and design.

The Lifecycle of a General Investigations Project

"What happens between the time there is a gleam in someone's eye and the day [a] … fish hatchery or dam is beside the Snake, reflecting the summer sun (3)?"
What happens is the Corps initiates an intensive study process.

A large Corps project most often starts with local interest groups who may contact their U.S. Congressional representatives asking that a particular problem be solved. In other cases, local leaders may approach the Corps directly.

Congress may then authorize the study of a particular problem or the problem may be studied under one of the general or continuing authorities (laws and regulations governing the Corps) related to flood control or environmental restoration. Typically, the Corps will first complete a study called a "reconnaissance study." A reconnaissance study defines whether there is or is not a federal interest in studying the problem or project further.

Federal interest in a project was clarified in 1983 in *Economic and Environmental Principles for Water Related Land Resources Implementation Studies*, approved by Executive Order of President Ronald Regan (4). The principles are further explained in the *Planning Guidance Notebook*, Engineer Regulation 1105-2-110 (5). The *Notebook*, revised in 2000, is the outcome of planning practices that were evolving all during the period covered in this volume.

Federal interest in a project is indicated when water and related land resources project plans "contribute to national economic development consistent with protecting the Nation's environment (6)." "Contributions to national economic development (NED) are increases in the net value of the national output of goods and services (7)." Contributions are also measured in terms of costs avoided, as with losses not sustained from floods due to flood control projects.

At an early stage, a general investigations project must elicit local participation. There is typically a local prospective project sponsor. Stakeholder and general public meetings are held to help define the scope of a prospective project.

District Projects Studied but Never Constructed

Over the years at the Walla Walla District, many more projects have been studied than actually constructed. Some projects stop at the first stage, after an initial reconnaissance study. One reason for discontinuing further study might be loss of a local sponsor. For example, in March 1989, the Corps published, *Reconnaissance Report, Palouse River Basin, Idaho and Washington* (8). The report considered a variety of alternatives for water resources development on the Palouse River ranging from upstream storage dams to water supply pipelines. It appeared that pumping water from the Snake River was the least costly plan for meeting water supply needs, but a multipurpose reservoir built upstream near Laird Park, east of Moscow, Idaho, also

appeared feasible. However, no local sponsor was prepared to support feasibility studies. Therefore, no further study by the Corps took place.

There are other examples of reconnaissance reports completed by Walla Walla District where projects were never pursued. For example, the District studied the Salmon River in the vicinity of Lemhi, Idaho, for a potential flood control project and Big Lost River, near Moore, Idaho. The former study was completed in 1983, but no action was taken, while the latter study was terminated in 1992. A reconnaissance report was completed in 1991 for the Burnt River in the vicinity of Huntington, Oregon, but not pursued due to negative findings regarding federal interest in a project.

Other potential projects proceeded to the feasibility study stage. For example, in 1997, the District completed a study on the alternatives for flood control to protect the Fort Hall National Historic Landmark on the Snake River near Pocatello, Idaho. As of 2000, the Corps was awaiting a formal letter committing the sponsor to cost-sharing requirements. The District had quite a few projects considered feasible but in this inactive phase, awaiting local sponsorship to move forward.

Other projects may have been considered feasible at one time, but were later deauthorized by Congress. One example of such a project in the Walla Walla District was a storage reservoir on the Grande Ronde River in Oregon. There were objections to this project by fisheries interests, and it was deauthorized in 1990. Another project, for a dam on Catherine Creek, eight miles above the town of Union, Oregon, was deauthorized following some local opposition and questions about the economic benefits of the project raised by the General Accounting Office. The project was deauthorized in 1990.

One project that was never constructed by the District received a great deal of regional attention during the time span covered by this volume. This was the proposed Galloway Dam on the Weiser River near Weiser, Idaho. The chief purpose of the dam was “to store water to help flush juvenile steelhead and salmon toward the Pacific Ocean in the spring. Additionally, the multipurpose project would have provided irrigation and hydropower benefits.

According to a news report in January 1989, “Weiser City officials, who see the [Galloway Dam] project as a remedy to its depressed rural economy, hope federal and state officials move quickly in the upcoming months to get the project rolling (9).” Local sentiment, however, was not unanimous in favoring the project, which would have inundated eight ranches in the area. Later in 1989, the District published a preliminary feasibility report (10).

By 1990, the Corps determined not to pursue federal involvement in building the Galloway Dam because the project could feasibly be constructed by a nonfederal entity. The Galloway Dam project findings and methodologies were controversial and much scrutinized by proponents and opponents of the dam; in the end, the dam was never constructed.

Basin Studies

Corps of Engineers studies may require study of an entire river basin with detailed analyses of navigation, flood protection, erosion control, water supply, water quality control, hydroelectric power, major drainage, irrigation, recreation, or other purposes that may be deemed necessary to promote national welfare within that river basin. During the 1981-2000 period, Walla Walla District completed several basin-wide studies. One significant basin study was the *Snake River & Tributaries Basin Summary* (11) published by the District in 1987. This study re-examined the opportunities for water resources development throughout the Snake River basin.

The most significant, comprehensive, basin-wide study produced during the era covered by this volume, was the *Columbia River System Operation Review, Final Environmental Impact Statement* (12). This 1995 study, discussed in chapter 4, was coordinated by the Northwestern Division of the Corps with participation by Walla Walla District. The study looked at the entire gamut of federal operations on the Columbia River for hydropower, fisheries, irrigation, navigation, and all other purposes.

Continuing Authorities, Floodplain Management, and Other Studies

Walla Walla District produced a large number of studies for projects authorized under the Continuing Authorities, Floodplain Management, and other programs. Some of these will be discussed in chapter 6, under flood control and floodplain management and in chapter 7 where environmental restoration projects are covered.
A comprehensive look at District projects and studies is provided on the District's Web site under the Digital Project Notebook (13).

Organization of the Planning Function

Walla Walla District was organized to facilitate the project study and planning process. During much of the period covered by this volume, the District maintained a Planning Division. In 1987, the structure of the Planning Division included a Plan Formulation Branch, which conducted reconnaissance and feasibility studies, as well as coordinating production of basin-wide reports. Planning Division at that time included a Project Planning Branch that developed projects past the feasibility report stage.

In addition, the District was organized with a Programs Branch. One District program analyst described the function of the branch:

> "Programs has always been involved with the big picture, money. They are the people that put together the packages that go forward to Congress to get the funding for the year. We have to provide the justification, and we have to show what we're going to use the money for, and we have to show how we're going to use it. Programs' job has always been to compile all that information and send it forward to the Programs people in [Northwestern] Division who then go forward to the Programs people in Headquarters with the Division's package. All of our projects and all the things we say we're going to do are included in this budget request.
>
> "People at Division, then, go through it, and they may cut it ten percent across the board or whatever, or say you can have it, or you can't have it. … Then you have to go in for your final submission. Then you have to go through your execution of it, which ends in September.

> "Right after September, you're back into the next budget cycle. You've got to get your budget ready, not for that year, but for the next fiscal year. You're always working on money (14)."

Later in our period, the Planning Division became the Planning, Programs, and Project Management Division. The name "Planning" was then applied to a branch within this larger Division. By 2000, the Planning Branch consisted of three sections: Plan Formulation, Environmental Compliance, and Environmental Analysis (15). The latter two sections reflect the growing concern for environmental stewardship within the Corps and the District.

Evolution of Technical Expertise

In the military and, especially, the civil works mission of Walla Walla District during the 1981-2000 period, there was an upward evolution of technical expertise. This growth of expertise can be seen in many areas. The growth in expertise related to design and operation of fish passage facilities and fish hatcheries will be covered in more detail in chapter 8, but some of the highlights will be covered in this chapter. The District participated in many innovations used in studies, related to automation, particularly in the arena of geographic information systems. These innovations are covered in chapter 3.

In addition to Corps expertise residing in the Districts, the Corps maintains national laboratories. These laboratories served as a powerful research and development center that served the Corps, the Army, and the nation. Walla Walla District, for example, called upon the expertise of the Cold Regions Research and Engineering Laboratory in solving problems related to ice jams. In creating models to study hydropower dams, Walla Walla District utilized the expertise of the Waterways Experiment Station in Vicksburg, Mississippi.

WORKING WITH CONTRACTORS

The Corps has been doing [construction] contracting for many years, so we have a lot of clauses to help us, but some of the smaller public entities or the private sector don't have [this expertise].

The way we work in Construction, if we get a contractor who has no fault except in experience, we can work with that. We may have to take them by the hand and lead them through the process. You never know, they may turn out to be your star contractor in ten years. It's the ones that are unethical [who are] difficult to deal with.
–David A. Opbroek, Chief, Construction Division (16).

Roller-Compacted Concrete

Willow Creek Dam

In 1903, Heppner, Oregon, experienced one of the most devastating floods in the history of the United States. Two hundred forty-seven people perished in a flashflood. In an advisory ballot in 1979, the City of Heppner voted in favor of building Willow Creek Dam. Thereafter, the local citizens marshaled political support from Senator Mark Hatfield of Oregon, and others, to fully fund the project. Four years later, in 1983, Senator Hatfield spoke at the official dedication of the new and innovative structure.

Under Willow Creek Dam Fills

Prior to the dedication, however, much work had to be done to complete the Willow Creek project. The dam, designed and constructed by Walla Walla District and now operated by Portland District, is very special in that it is the world's first roller-compacted concrete, or RCC, dam. Further, as the District newsletter stated, "More goes into a project than just a dam. At Willow Creek near Heppner, the project requires two bridges and some roller-compacted test fills (17)."

Willow Creek Dam—Concrete Plant at Construction Site

Willow Creek Dam was constructed as a multipurpose project to be used for flood control, irrigation, recreation, and to promote fish survival. Willow Creek Dam is 160 feet high and 1,780 feet long.

THE WORLD'S FIRST ROLLER-COMPACTED CONCRETE DAM

Prior to Willow Creek, the [Walla Walla] District had done some design on Zintel Canyon Dam for the past five years or so. Zintel Canyon would have been the first roller-compacted concrete dam in the world. Funding disappeared [for Zintel Canyon] and Willow Creek became a project, and we did a lot of work on Willow Creek. ... That was landmark stuff. … No one had done that before on this scale. We did all kinds of testing and evaluation and arguing and cussing.

Roller-compacted concrete had been used before, and it's not unlike cement-treated base, which is a technology that's used for airfield pavements and some highways. In 1970, at a conference, a guy named Jerry Rafael proposed a concept that he called the optimum gravity dam. What he was trying to do was envision a material that could be placed like embankment material, but have shear properties approaching concrete. That was his premise, that we could revolutionize embankment placement using this method.

That was ... in the early 70s. The Corps of Engineers jumped on that, and we did some of the early test fills. [For example at] Lost Creek Dam, Portland District, we did an early test fill. … Lost Creek test fill started and some other evaluations were done. ... Some RCC [was] placed at Lower Granite that you can still see today. There are two small groins that are adjacent on the river side of the navigation lock that are probably some of the earliest RCC placements done, at least since Rafael's paper. ...

Willow Creek was the first [large application of RCC for a dam]. It was slow starting. People were a little afraid of RCC. Is it really concrete? Will it hold up? ... We, the Corps, weren't the only ones experimenting with RCC. ...

Depending on how you design it, it [RRC] can be as much as a third of the cost of conventional concrete. By and large, the whole world now considers roller-compacted concrete [to be preferred] over conventional concrete for most dams.

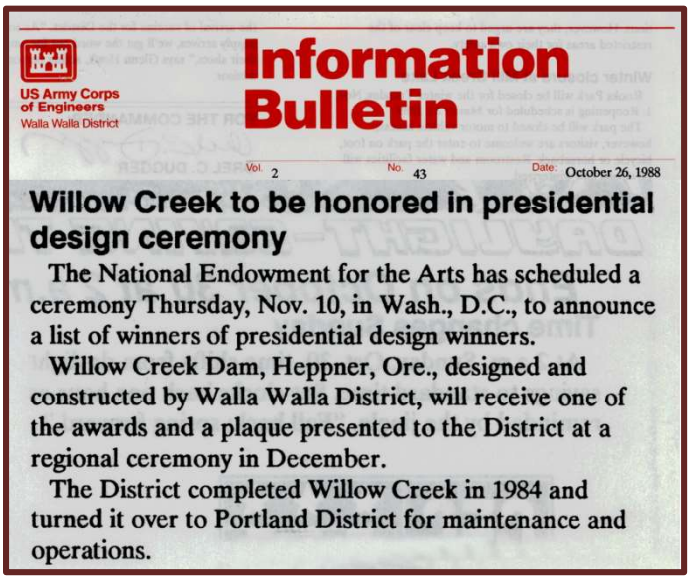
When we did Willow Creek, there was worldwide attention. … I took dozens of groups to Willow Creek during and after construction, showing them what was done. ... It's been my experience that this District has never been afraid to try anything new. ...
–Steven B. Tatro, Civil Engineer (18)

For his work in designing Willow Creek Dam, a landmark structure, the Corps named Walla Walla District employee Ernie Schrader, Engineer of the Year in 1983 (19), and the project was awarded the prestigious Federal Design Achievement Award in 1988 (20). Mr. Schrader published numerous professional papers and lectured internationally about the use of roller-compacted concrete. His expertise was utilized on the U.S. Commission on Large Dams and on numerous committees of the American Concrete Institute. The American Society of Civil Engineers gave Mr. Schrader their highest award for the article he published in *Civil Engineering* describing the Willow Creek project and the use of roller-compacted concrete (21).

Ironically, in the same year that the Willow Creek project received the Federal Design Award (1988), the dam's structural integrity was called into question in a story circulated by United Press International (22). It was suggested that chemical reactions in Willow Creek Lake were causing the concrete to deteriorate rapidly creating a potential hazard that could cause a breach in the dam. It appears that concerns related to the dam were magnified because of the innovative use of roller-compacted concrete in the structure. A safety team of Corps officials and an independent safety expert inspected the dam (23). Meanwhile, the Corps held a meeting in Heppner, Oregon, to address the

concerns of local citizens (24). The safety inspection team's finding that the dam was "safe and reliable" was reported to local citizens in another meeting in November 1988 (25).

Willow Creek Dam Showing Typical "Unfinished" Look of RCC Dams



US Army Corps of Engineers
Walla Walla District

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Willow Creek to be honored in presidential design ceremony

The National Endowment for the Arts has scheduled a ceremony Thursday, Nov. 10, in Wash., D.C., to announce a list of winners of presidential design winners.

Willow Creek Dam, Heppner, Ore., designed and constructed by Walla Walla District, will receive one of the awards and a plaque presented to the District at a regional ceremony in December.

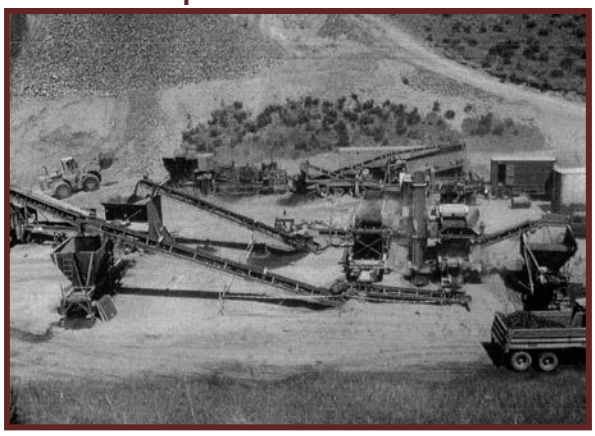
The District completed Willow Creek in 1984 and turned it over to Portland District for maintenance and operations.

Zintel Canyon Dam

Another Walla Walla District use of this innovative technology was at Zintel Canyon Dam near the City of Kennewick, Washington. "It was interesting from the standpoint of how fast it went up, because we are used to a dam taking years, and, in effect, we built that one in about three months (26)." In the Zintel Canyon project, roller-compacted

concrete proved its potential for allowing projects to be constructed very quickly. Zintel Canyon Dam, a flood protection project, is discussed further in chapter 6.

Crusher Setup for of Rock Products at Zintel



Zintel Canyon Dam

WIDER APPLICATIONS OF ROLLER-COMPACTED CONCRETE

Roller-compacted concrete (RCC) not only is a boon to the dam construction industry, but may revolutionize construction of highways and airfield runways. … [Mr. Schrader's research shows] that sandwiching a layer of RCC between two layers of fibrous concrete produces a superior highway or airfield surface."
–*Intercom* article based on information from Ernie Schraeder, Civil Engineer (27).

[This technology has applications besides dams]. There's a lot of [RCC] roadway construction: log-hauling roads, log yards, container yards. There have been ponds, sludge ponds, made [from RCC]. Airfield taxiways and parking aprons, all the pavement applications, especially low-speed pavements—many have been done that are RCC. I'm working on a project right now where we're using RCC for a roadway embankment because if you used a rock or earthfill, the footprint would be too large and there're too many houses in close proximity. It's up in Ketchikan [Alaska]. There are other applications: some foundation mats and buttressing and overflow protection for dams, some channels and canals. –Steven B. Tatro, Civil Engineer (28).

In the year 2000, Walla Walla District's expertise in using roller-compacted concrete continued to be recognized nationally. Following the devastating Cerro Grande Fire at the Los Alamos National Laboratory in New Mexico, a District staff member was among the Corps employees who helped design and construct a flood diversion structure. "The structure holds back high volumes of precipitation runoff and sediment discharge predicted after the denudation caused by the fire and prevents further destruction of the environment, buildings at the Laboratory, and nearby Indian pueblos. Using roller-compacted concrete was essential in quickly constructing the 70-foot-high, 215-foot-

long Pajarito Canyon flood retention structure, which was completed at lightning speed in just over 90 days—in time to hold back monsoon rains (29)."

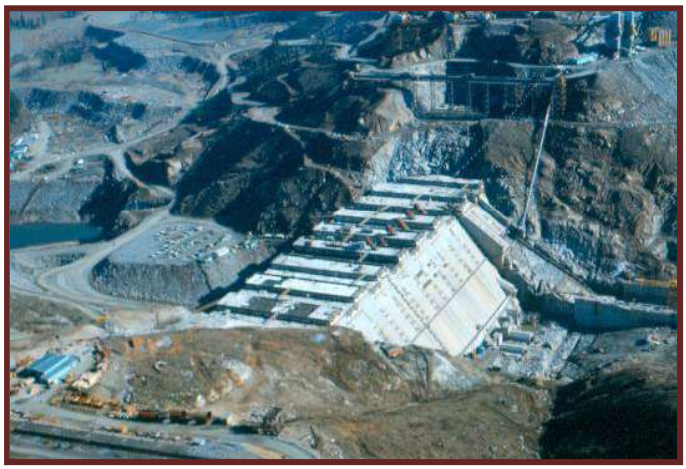
Finite Element Analysis

Finite element analysis is "based on the idea of building a complicated object with simple blocks, or dividing a complicated object into small and manageable pieces (30)." Everyday applications of the basic idea can be found everywhere. Examples include building with Lego® or the methods for approximating the area of a circle by dividing it into a given number of triangles and adding the areas of those triangles. The Legos or the triangles are the "finite elements" of an approximation.

The application of finite element analysis to structures proceeds as follows:

- Divide the structure into pieces (elements).
- Mathematically describe the physical quantities or the physical behavior of each piece (element).
- Connect (assemble) the mathematical descriptions of each piece, showing how the pieces go together at the "nodes," forming an approximate system of equations for the whole structure.
- Solve the equations involving unknown quantities at the nodes (*e.g.*, displacements between the pieces).
- Calculate the desired quantities (*e.g.*, strains and stresses) for selected elements.

Dworshak Dam's Monoliths--Elements from which the Structure is Built



Division of a whole into a large (but finite) number of pieces and figuring equations on those pieces can mean that a large number of equations must be solved. The mathematical foundations of finite element analysis were laid back in the 1960s, but only with the advance of equation-solving computers did finite element analysis emerge as a practical tool for engineering. Dworshak Dam, the highest straight access gravity dam in the Western Hemisphere was the first dam to use the finite element method in design, stress analysis, and thermal analysis. At Dworshak, finite element analysis was also used in concrete temperature control during construction (31). The far-reaching

significance of the use of finite element analysis in construction of the Dworshak was recognized during the period covered by this volume.

THE FINITE ELEMENTS OF DWORSHAK

We built Dworshak starting in the early 60s, finishing in the mid-70s. That was a landmark project. It was the largest dam of its kind in the world, when it was done.

Some of the analysis techniques that were developed just for that project [were significant]. … We contracted with U.C. [the University of California] Berkeley for some analysis, and they essentially developed finite element analysis. … The work on Dworshak had a lot to do with [developing finite element analysis]. Finite element analysis is a method that's used all over the world for structural analysis.

The people who were working on the projects were world-recognized people—Roy Carlson, Milos Polifca, Ed Wilson. These were giants in the industry. They were all involved in our work. The Bureau of Reclamation—I guess, in my opinion—during that era they were the world leaders in dam technology, and the Corps was runner-up, if you will. This District, because of its approach and the projects that it had—I don't think that it was in a runner-up category. We had very knowledgeable people and very interesting projects.
–Steven B Tatro, Civil Engineer (32).

Upon retiring in 1992, long-time Chief of Walla Walla District's Engineering Division, Marv Bremer expressed the fact that, "One of the things he's most proud of is developing the 'finite element analysis' for the structural design of Dworshak Dam. It was a team effort. … They worked closely with two University of California professors, Drs. Clough and Wilson (33)." By the end of the twentieth century, finite element analysis was used worldwide in many different engineering sectors.

Lunar Concrete

In 1988, the Corps engaged in an initiative designed to streamline processes and increase the efficiency of technology transfer. This program was called, "I-88."

> "The Construction Productivity Advancement Research [CPAR] objective of I-88 recognizes that the private sector construction industry in America needs help in retaining its competitive edge. The Corps of Engineers laboratories are among the world's finest, and the Chief of Engineers sees a cooperative effort between the construction industry and our labs as a means to foster that competitive edge. Although the main effort in CPAR lies between the labs and private industry, there are opportunities for the Walla Walla District.
>
> "Dick Kaden's involvement in lunar concrete through the American Concrete Institute is an example. We can all contribute to the success of this initiative by suggesting ideas on how to improve construction productivity (34)."

In the late 1980s, the cutting edge of the construction industry was asked to turn its collective wisdom to the problem of construction on the lunar surface. How would one actually go about building "Luna City" one hundred years from then (35)? Which lunar soils would produce the best concrete? How could concrete be produced in such a dry environment as the moon? Instead of water, could substances such as sulfur, relatively abundant on the lunar surface, be used to bind the solid ingredients of concrete?

The concrete for most of the District's large dams was produced on the spot. Mr. Kaden and his co-workers at Walla Walla District turned their minds to the issues

of how concrete could be produced on the lunar surface from materials available onsite. Mr. Kaden's book, *Lunar Concrete*, published in 1991 (36) offered solutions to the problem of production of concrete on the moon from locally available ingredients. At the end of the twentieth century, Kaden's volume was still recognized and cited in works on the topic of lunar construction.

Videotaping Boreholes

Walla Walla District staff developed expertise in remote data gathering technologies. One of these was a new technology of international significance developed by two District employees (37), a geologist and a geologic engineer, in 1987. They pioneered a method to videotape boreholes—deep holes drilled in the ground to obtain visual information on the angles and orientation of fractures in a geologic formation. Previously, film cameras were used with the associated waiting period for the film to be developed. The new field method allowed real-time analysis of the videotape via computer while in the field. District staff transferred this technology by assisting three other Corps Districts in implementing the system.

Waterstops and Underwater Work

A Walla Walla District civil engineer commented on one special area of expertise in the District: "Waterstops is an issue that this District pioneered." The District broke new ground in "using chemical grouts and replaceable waterstop technology. We exported that expertise to several other districts." The engineer continued: "In a concrete structure—structures are usually blocks of concrete—so between each block is a joint where these blocks butt up against each other. Those [joints] would leak, if you didn't have a gasket between the two of them. Those are usually waterstops that are cast when the monoliths are constructed. Some of those fail, in time, and then the problem is how do we put that gasket back in. We evolved some techniques to do that (38)."

These waterstop techniques were used to repair the crack in Dworshak Dam (see chapter 4). Another significant use of this technology was proposed to solve the seepage problem at the Corps' Mill Creek Storage Dam, near Walla Walla, Washington. In 1987, continued erosion and deterioration at the dam's foundation caused changes in the operation of the dam meaning that the structure could be used to hold back water only for necessary flood control purposes. The dam had been built in 1940 primarily to prevent the periodic floods that had inundated the town of Walla Walla, Washington. From the time Mill Creek project's pool was first raised in 1941, an unacceptable seepage rate had occurred whenever the pool was filled. This left the community with a dry lakebed for much of the year.

The proposed solution to the problem was an innovative one. The lake would be lined up to an elevation of 1,215 feet—three feet higher than the design level of the pool. The heavy-duty polyethylene plastic liner would then be covered with approximately one foot of soil to provide for plant growth and fish and wildlife habitat. Special studies were done in relation to this project, which helped to develop Walla Walla District expertise. As of the writing of this volume, lining the lake behind Mill Creek Storage Dam had not been implemented.

Said one District staff member: “We have done an awful lot of underwater concrete and in-water work and underwater anchors and a whole series of things that, while it may not be landmark, it’s certainly very difficult working conditions. I know, we’ve started building structural systems underwater, which is a little beyond the norm (39).”

An instance of this type of work took place in 1991 at Lyons Ferry Fish Hatchery. Operations at the hatchery had to be suspended when it was discovered that 13,000 gallons of water per minute were being lost though a damaged pipe. Divers had to replace a section of pipeline with newly manufactured sections. The District’s underwater work expertise was used again in 1996 when Walla Walla District installed the surface bypass collector at Lower Granite Lock and Dam (see chapter 7).

Ice Jams

For over one hundred years, ice jam floods became a winter’s nightmare for the residents of Salmon, Idaho. Once every three years, on average, the Little Wood River would become clogged with ice, resulting in flooding. In February 1982, a jam caused a flood that cost an estimated $1 million in damages to Salmon. Ice jams and floods returned in 1984. The Corps had to regrade local levees. All told, $1.8 million was spent to protect the town (40).

Walla Walla District had been studying the flooding problem since the inception of the District in 1948. The first field studies were completed in 1951, and the first levees were constructed in Salmon in 1954. Emergency work in 1955 included cutting a pilot channel through the Dump Creek debris cone, which acts as an obstruction to the Salmon River downstream from the town of Salmon. However, additional sediment soon refilled the pilot channel. Reports in 1957 and 1961 concluded that further channelization or levee work to control ice jam flooding was not economically feasible. Data from studies by the U.S. Forest Service were used in a 1981 Corps reconnaissance study that reviewed the overall ice-jamming problem. Again, the Corps concluded that a channelization project at Dump Creek was not economically justified.

In 1982, after experiencing one of the more damaging ice jam floods on record, Lemhi County, Idaho, requested that the Corps re-examine the situation. At this point, the advantage of the extensive resources of the Corps was put to work. Walla Walla District called on the services of the Corps Cold Regions Research and Engineering Laboratory in Hanover, New Hampshire, in an attempt to gain a better understanding of the ice jam phenomenon.

Salmon River Ice Jam, 1982

Investigators needed to learn much more about the different types of ice and the dynamics of ice jams before a solution was attempted. “In 1983, planners started examining the mechanics behind the particular type of ice jams affecting the city [of Salmon]. The study area includes a thirty-mile stretch of the river from a point upstream from the city to twenty-six miles downstream at the Dump Creek alluvial fan.

It's there that deposits from Dump Creek have created a mile-long stretch of slow moving water called Deadwater Reach. The low velocities that exist in this reach – combined with low winter temperatures – make conditions ideal for the start of ice jams. … [These conditions] allow frazil or slush ice to appear immediately with the arrival of subzero temperatures in the area. Accompanying this natural phenomenon … is the development of shore ice along the river where the current is sluggish. As the frazil flows 26 miles downstream to the lake-like body of water at Deadwater Reach, the flow of ice congeals, forming an ice dam. Often, the ensuing ice jam backs upstream through the City of Salmon (41)."

Icy Flood Waters, Lemhi River, January 1984

The results of the Corps' investigation were published in 1984 as *The Salmon River Flood Reduction Study* (42). That report is the basis for a 1986 detailed project report and environmental impact statement. For the Salmon River ice jams, several alternatives were studied: offset levees; waterproofing utilities and basements; permanent evacuation of the floodplain; channelizing the river; and heating the river with a wood boiler. All these alternatives were rejected because they did not meet the technical objectives or because of gross economic infeasibility. For example, adequate levees would have cost $8 million. As for heating the river, planners said, "It would take a small nuclear plant to melt all the ice (43)." Channelization of the Dump Creek alluvial fan and the nearby Deadwater slackwater area was found to be feasible and was favored by Lemhi County officials, but was in conflict with the Wild and Scenic Rivers designation of the proposed work area.

Flooded Trailer Park, near Salmon, Idaho, January 1984

Walla Walla District and the Cold Regions Research and Engineering Laboratory conducted further research to determine whether a low cost structure, an ice boom, would be technically possible. The boom would collect ice crystals and force an ice jam to form at a chosen location.

A test boom was installed in March 1989, eight miles upstream from the City of Salmon. This boom, a long

steel cable stretched across the river and anchored by twenty-foot sections of lumber, performed well during the winters of 1989-90 and 1990-91. Computers and television monitors were installed at the boom site.

During the testing, many residents were skeptical, fearing that it was just a matter of time before the ice would rip out the boom, making the whole project a "$500,000 boondoggle (44)." A Corps employee responded publicly to concerns: "People keep thinking this boom is about ready to break here with five miles of ice backed up, but that's not the case at all (45)." At that time, the ice load was holding steady, and the boom was working.

The Corps researchers determined, however, that this innovative structure would be only about fifty percent effective, due to the high velocity of the river. The boom would have to be used in conjunction with a five-foot-high concrete weir to be placed just downstream of the boom.

Information from this innovative study of ice jamming on the Salmon River was later used in other ice jam situations. Walla Walla District used another floating timber and cable boom to prevent a massive buildup of ice within the concrete channels of the Portneuf River just upstream from Pocatello, Idaho. Since the research had already been done, the Portneuf boom was installed in 1991 for only $3,000 (46).

Other Innovations

For Walla Walla District innovations in automated geographical information systems, see chapter 3. Also, as discussed in detail in chapter 4, in 1991, District staff member, Jesse Smiley, received the Secretary of Defense Productivity Excellence award for proposing an innovative system for emergency closure of hydroelectric turbines at Lower Granite and Little Goose, saving $35 million.

Fisheries Technologies

Certain fish passage structures were incorporated into Walla Walla District projects as early as 1951, and, in 1968, some major efforts to improve fish migration began. However, it was only in the late 1980s that funding began to flow to the District to undertake major new improvements discussed below. At the time, this effort was called the Columbia River Fish Bypass Program.

With the strong support of Senators James McClure of Idaho and Mark Hatfield of Oregon, the Energy and Water Development Appropriation Act of 1988 provided $18.3 million over two years to the District. "This resulted in the Department of the Army's recommendation that Walla Walla District: Proceed with the design, testing, and construction of fish bypass facilities at Lower Granite, Little Goose, Lower Monumental, and McNary, as recommended. Fish bypass facilities include fish-holding and loading facilities, screens and fixed deflectors, bypass facilities, improvements to project gantry cranes, gate-raising improvements, and fish barges and barge moorage facilities at Lower Granite (47)." The District was given the green light to proceed with a separately funded design and construction of a bypass system for Ice Harbor Dam. By 1991, Walla Walla District had spent over $50 million on fish passage improvements (48).

At Corps dams on the Columbia and lower Snake River, juvenile fish can pass three ways: through the juvenile fish bypass system, through the spillway, or through the turbines. Funding was a prerequisite, but the challenge of designing unique structures and devices to assist fish around or through the dams then faced the Walla Walla District. One District staff member comments on the unique nature of this engineering effort:

> "[Fisheries technology is] an area where we, the District, have done some landmark work. There are a lot of structures out there on the river that don't exist anywhere else in the world. … A number of the fish facilities and the flumes and the screens and all those [devices] … are innovations that started here. That'll probably be long forgotten. These are things that someone had an idea might work and, by and large, they have. …
>
> "We find ourselves always, because of the fish windows (49), with these almost impossible schedules [and] working in very adverse conditions. We have been very lucky that we have been able to pull off as many of these projects as we have. I don't think the average person out there understands the high risk of failure that we've had to work with here. It's worked because a lot of people here have gone the extra mile to make it work (50)."

Modeling

In the early 1990s, Walla Walla District, with the assistance of Corps national laboratories, developed models of its multipurpose hydropower projects on the Columbia and lower Snake Rivers (51).

Physical models were created, such as a three-bay sectional model used to test fish screens at Little Goose and Lower Granite Dams. The Corps developed a 1:25 scale, three-bay model of McNary Dam to study extended-length submerged bar screens (see below). A three-bay turbine model for McNary was created to study power generation loss with the installation of the extended fish screens. Investigators also developed a 1:80 general model of Lower Granite Dam used to evaluate the long-term effects of proposed lowering of the reservoir behind the dam (drawdown).

These models involved computer-assisted data collection, but physical models were built in the laboratory. However, this was the last era in which the Corps would build such large physical models. Such efforts have been continued by using less expensive mathematical modeling software programs.

Bypass Facilities

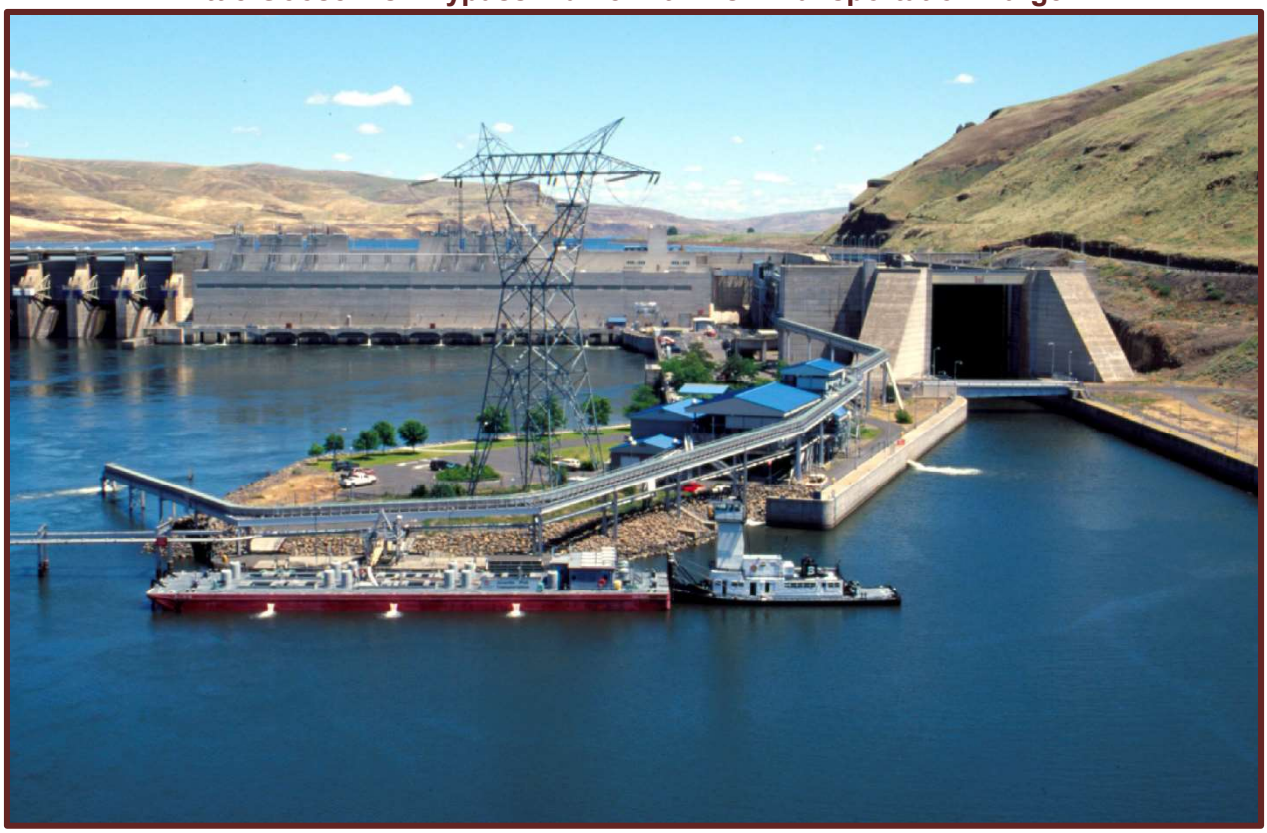
In 1984, Walla Walla District proposed a major project at Little Goose Dam. As described in 1984:

> "[The] purpose of the project is to improve the fish collection and bypass facilities for juvenile salmon and steelhead trout as the present facilities have not provided the requirement of a safe and efficient system. … The main problems experienced by the current facility are the high water velocities in the pipeline used to transport the fish downstream. … The new facility is expected to reduce the mortality rate of steelhead and salmon smolts at Little Goose which … run significantly higher than at Lower Granite and McNary. The mortality rate at Little Goose in 1982 was 1.1 percent of the combined total of steelhead and salmon. This compares to .45 at Lower Granite and .37 percent at McNary (52)."

For two years, University of Idaho researchers, with the involvement of Walla Walla District staff, tested open flume designs at Lower Granite Dam. Following successful trials, District engineers designed the world's first operational fish flume for Little Goose Dam. The 2,250-foot-long flume was made of corrugated steel, open to the air, but covered by a vinyl sunscreen. The flume reduced the stress to young fish with the goal of improving their survival.

Before the development of this innovative structure, fish were transported past the dams via pressurized pipelines. The flume operated by gravity, transporting the fish from the top of the dam down to a collection/release facility on a peninsula jutting out into the Snake River. An unusual feature of the flume was a loop designed to maintain a constant slope and flow velocity.

Little Goose Fish Bypass Flume with Fish Transportation Barge



Concrete had to be "mined" from the interior of Little Goose Dam to allow the flume to pass through the dam. Walla Walla District staff had experience with preparing concrete "galleries" for fish. District engineers were recognized by Corps Headquarters for their innovation in lining the gallery at Little Goose with a smooth coating of "shotcrete" (a form of concrete) that prevented harmful fish descaling during passage (53).

The project at Little Goose included concrete raceways designed to hold up to approximately one million young chinook. These would be used as collectors for the Corps juvenile salmon transport operation. (See section on Operation Fish Run below.) The Little Goose project also provided an up-to-date, 4,400-square-foot laboratory to

facilitate fish research. The total cost of the project was approximately $9 million, and it was completed in 1990.

In 1994, a new juvenile fish facility was completed at McNary Dam. The facility featured state-of-the-art improvements for the collection and transportation of juvenile fish. "Current is what attracts the salmon and steelhead to the ladders," said a District's fish biologists stationed McNary Dam. "We create swifter currents by the ladder entrances to draw the fish there (54)." The new McNary facility included a fish collection channel, a pipeline to transport fish from the collection channel to a holding area for loading onto barges. In the new $23 million McNary facility, as with the Little Goose fish flume, the facility was designed to create a more gradual descent to the river below as compared with previous bypass facilities.

As the period covered by this volume came to a close, there was engineering activity related to fish passage on streams other than the Columbia and Snake Rivers. For example, in 2000, Walla Walla District, with significant input from the Confederated Tribes of the Umatilla Indian Reservation, the Oregon Department of Fish and Wildlife, and the U.S. Fish and Wildlife Service, designed a new fish ladder on the Walla Walla River near Milton-Freewater, Oregon. Previously, migration of salmonids upriver in the spring had only been assured by a time-intensive salvage operation in which fish were caught below the obstruction and then released upstream. The ladder had to incorporate the latest design features to ensure that it would work under a wide range of flows.

Fish Transport and Fish Separators

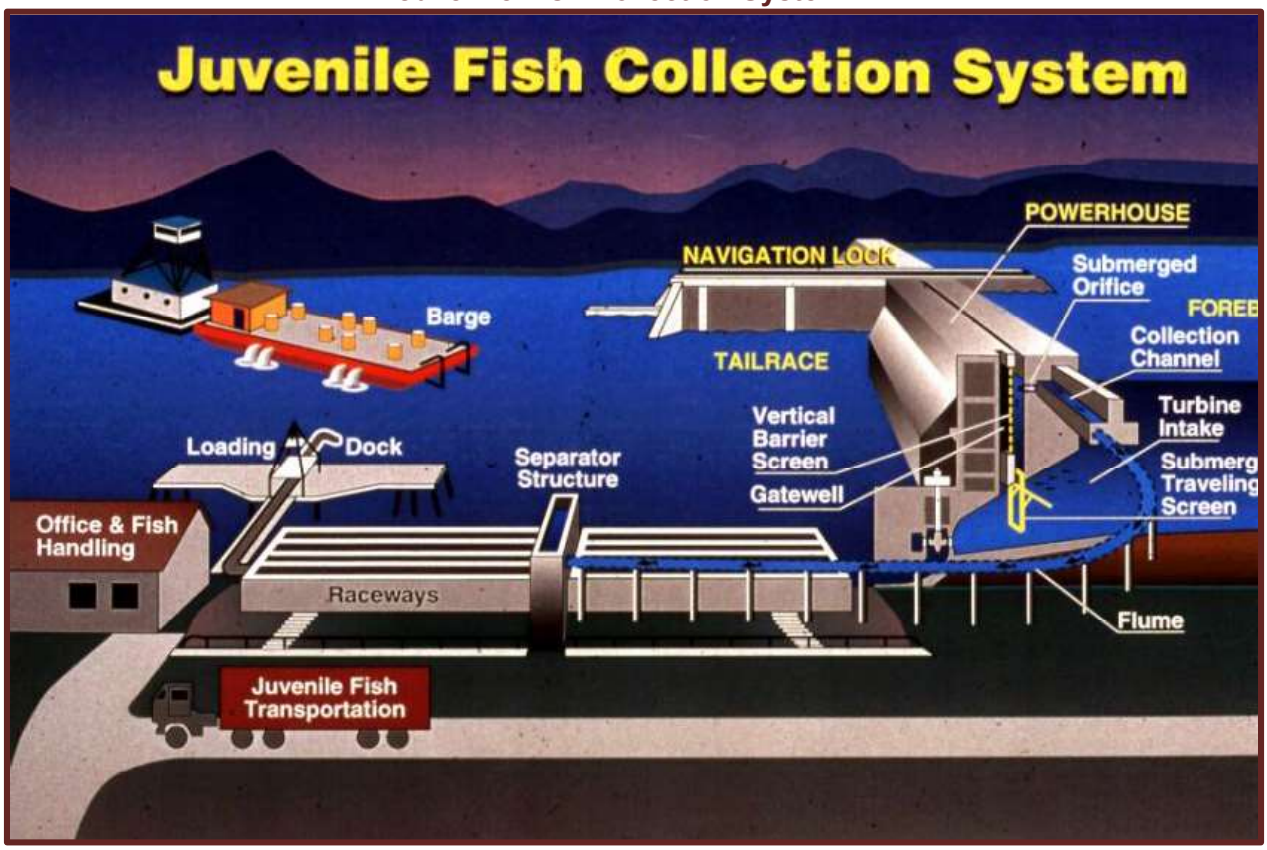
In 1965, the National Marine Fisheries Service experimentally trapped juvenile salmon and steelhead at Ice Harbor Dam and shipped them by trucks to the lower Columbia River, bypassing the dams. By 1977, the Corps was cooperating in this effort and transport barges had been introduced. This method of transport proved so successful in the eyes of the federal agencies involved that it became a permanent program, formally called the Juvenile Fish Transportation Program and informally known as "Operation Fish Run."

Fish Transportation Barge

Operation Fish Run was a unique operation requiring specially designed barges. River water was continuously circulated though the barges' fish holding tanks allowing the fish to imprint the chemicals and smells of the water during the trip downriver. The barges have a closed-circuit recirculation system that can shut off intake of water in case of contamination in the river. The barges have pumping systems that can help de-gas the water in areas where gas supersaturation is a problem. The transportation program went from two barges to three in 1981 and then

to four in 1982. By 1990, seven barges were operating. Trucks were not totally abandoned for transport, but typically at the end of our period, over 95 percent of the fish transported were carried by barge.

Juvenile Fish Collection System



By the end of our historical period, fish transport facilities were operating at three of the lower Snake River dams (Little Goose, Lower Monumental, and Lower Granite) and at McNary Dam on the middle Columbia River. Annually, over twenty million juvenile salmonids were transported and released in the lower Columbia River.

One of the innovative technologies that went along with Operation Fish Run was the development of fish separators. When confined together (as in transport barges or trucks) the presence of adult and larger juvenile fish causes stress to smaller juveniles. Thus, separation by size of migrating fish is a necessary part of the biological requirements of the Juvenile Fish Transportation Program. Walla Walla District developed and evaluated (in the field) different types of devices for separating fish by size. The low velocity separators in use at District fish-handling facilities caused low-stress on fish, but were not as effective as desired. As the 1990s were ending, District staff were testing an innovative design for a high velocity separator (55).

Operation Fish Run involved solving a number of difficult design, biological, and logistics challenges. As will be discussed in chapter 8, the practice of barging fish became a controversial issue in the 1990s. Still, in the view of many Walla Walla District staff members, the program was a success. John McKern, a retired District fish

biologist and noted expert on fish passage issues, commented on his view of the results of Operation Fish Run and other Walla Walla District efforts to improve fish passage:

> "In 1977, prior to the work we did on improving fish passage and transportation programs, it was the worst flow year on record and returning fish numbers were at an all-time low. In 2001, it was the second-worst flow year on record, but the retuning fish numbers were higher than ever recorded. Even the numbers of returning wild salmon were greater than in the 1960s. The numbers speak for themselves. It's very satisfying to know the work we did on those fish programs had a direct impact on these recent years' record runs (56)."

Traveling Fish Screens

One of the major fish bypass issues the Corps examined was the area of diverting migrating fish away from the hydropower turbines. Though at the time precise studies did not exist (see below, under turbines), it was believed that between three to ten percent of fish passing though turbines did not survive. "All the fish facilities put in fish screens to guide the fish away from the turbines. That is a first for Walla Walla District. ... Ice Harbor, actually, in the very late 60s, early 70s—they had a test screen. They moved on up the river [putting in screens] (57)."

Turbine-screening systems invented by the Corps for use on the Columbia and lower Snake River systems include as a primary component, extended-length submerged bar screens, called ESBSs, also known as submerged traveling screens. All Walla Walla District ESBSs are of similar design and configuration. The basic arrangement includes a forty-foot-long diversion screen supported within an outer support frame, as illustrated below. The ESBSs are approximately fifty feet long by twenty feet wide and weigh approximately 114,000 pounds. The bar screen panels provide the physical diversion surface to guide juvenile fish upward away from the turbines, while allowing flow to pass through the turbine intake (58).

The first prototype extended-length submerged bar screens were installed in 1991 at McNary Dam. In 1993, three prototypes were installed at Little Goose, and, in 1995, one prototype screen system was installed at Lower Granite. Following testing, eighteen ESBSs were installed at Lower Granite (1996) and Lower Monumental (1997). By 1997, a total of thirty ESBSs were installed at McNary. Testing showed that Ice Harbor and Lower Monumental dams might not need ESBSs; these projects were outfitted with slightly different and shorter submerged traveling screens. More information on the use of fish screens in the context of the District's salmon efforts is given in chapter 8.

Experience with the extended-length submerged bar screens showed that debris collection was accelerated with the screens. Debris that becomes stuck to the surface of a screen could cause injury to fish, alter flow patterns, and, ultimately, increase loading on the screen structure. A sweep brush was installed to clean the bar screen surfaces. The ESBSs were effective in diverting fish from turbine intakes but require some significant maintenance investments. For this reason, the Corps and Walla Walla District searched for other diversion systems.

Surface Bypass Collector

In 1996, an innovative structure was installed at Lower Granite Dam. The structure was completed on a "fast track" in only 13 months (59). This floating steel structure was called a surface bypass collector (SBC for short), surface guidance device, or behavioral guidance device. The structure floated upstream of the powerhouse at the dam and was restrained by guides anchored to the powerhouse. The SBC had an overall length of four hundred feet, a maximum height of about sixty feet, and a maximum top width of about thirty-four feet. Under normal conditions at the project, the bottom of the SBC is at the same level as the top of turbine intakes.

Fish and water enter the SBC channel through three fishway entrances on the upstream face of the structure. Each of the entrances consists of six pairs of air-operated gates that can be individually opened or closed. The pattern of open and closed entrance gates determines where fish can enter the SBC and the volume and velocity of water flowing into the SBC. Once in the 20-foot-wide by 55-foot-deep channel, fish and water are drawn toward spillbay 1 (to the north). The fish and water pass under the spillbay tainter gate and over the spillbay to the reservoir downstream of the dam.

The Corps evaluated the prototype SBC during late April through May 1996.

GUIDING THE FISH

At Lower Granite, they built what they call the surface guidance device. … From the time they designed it, to constructing it and making it operational was something like one year's time. They had millions of tons of metal. That was a first for the Corps.

Construction had designed it in such a way that each of the modules was to be assembled underwater. … You can imagine a diver trying to tie all these bolts underwater [to anchor the SBC]. … In Construction, when they saw that we're not going to get there on time, they actually took the modules, put them together above the water where you could get a lot of people working on it easily. As much as the crane could hold, about three sections, they put them in the water and then only had to bolt a quarter's worth [underwater].

I remember they got hammered in the press because they were two weeks behind schedule, but they had a flood that lasted over two weeks where there was high water, and they had to move equipment out to protect [it]. When you throw away the flooding, they were on schedule. It's just phenomenal. They had to go all over the United States and even the world [to get expertise] to be able to build that thing. That was a first.
–Steven W. Voss, Operations manager (60).

One interesting aspect of the surface bypass collector was that it relied on an understanding of fish behavior to operate. Migrating fish reacted to the SBC as if it were shoreline. Salmonids normally do not dive deeply under the surface. Therefore, most of the fish do not swim under the device. The SBC was deemed an interesting experiment and not eliminated from the tools used for bypass technology, but, as of this writing, it seems that other devices, such as that described in the following section, appear more useful in assisting fish past the Columbia and lower Snake River dams.

Removable Spillway Weir

As will be described in chapter 8, one of the major ideas that emerged in the 1990s regarding migratory success of juvenile salmonids had to do with sending them more

quickly on their journey to the sea. “Spill for fish” was widely advocated. Meaning that the spill gates in dams would be opened, allowing the fish to travel with the plunging water on its way to the sea. However, “Juvenile fish tend to be surface oriented and surface flow is thought to be a more effective method to pass fish than existing pressurized fifty-foot-deep flow under current spillgates (61).”

To avoid deep plunges for fish, Walla Walla District designed the removable spillway weir, or RSW. “The expected advantages of the RSW are improved passage conditions for fish by reducing injury and passage delays at the dams. It is anticipated that the surface flow will result in more efficient juvenile fish passage rates (more fish per unit of flow) than conventional deep gates at the spillway, as well as potential for lower dissolved gas levels in the river by more efficient use of water to bypass juvenile fish to below the dam (62).”

Spilled water was “lost” for power generation because it did not travel through the turbines and “lost” from storage in reservoirs for flood control or irrigation. In run-of-the-river dams, where reservoir levels were intended to remain relatively stable, spill gates were designed to allow for large releases of water in a flood situation. The RSW essentially blocked part of the spillgate, passing less water through. The flow with the weir would, however, be sufficient to speed fish on their migration as they followed water over a raised spillway crest, similar to a waterfall.

In case of a flood, however, dam operators would need to spill more water over the dam. Therefore, the RSW was “a hinged structure designed to be ‘removable’ using water ballast systems to rotate it upstream and out of the spillway to the bottom of the reservoir. This allows the capability to return the spillway to original flow capacity during major flood events (63).”

The design and construction of the huge removable spillway weir was completed on a remarkably fast schedule. Modeling and preparation for design began in November 1999. Fabrication of the two-million-pound device took place October 2000 through June 2001 in Vancouver, Washington. During four memorable days in June 2001, the huge RSW rode a barge through the Columbia-Snake River Inland Waterway from Portland, Oregon, to its destination at Lower Granite Dam.

Drawings of RSW as Parked (left) and Deployed (right)

WEIRING OUT LOWER GRANITE

Another [project] that's really been interesting, and one that we're now trying to finish, is the removable spillway weir. Personally, I underestimated how difficult that project would be. … It was hard by looking at the drawings to get a concept of what we were going to be building. ...

When they finally finished the fabrication, and went to putting all the pieces together, they moved them out in their yard with this big, heavy moving equipment. They just started stacking one piece on top of another and welding them together. This structure is two million pounds and … 115 feet long and eighty-some feet wide. … It's a huge structure.

The next challenge was the logistics of getting it here. The contractor struggled with that for quite a while. What he struggled with was—we will use this heavy moving equipment to get it to the dock of the fabricator in Portland. But then what do you do with it? Do we put it on a barge and take it all the way up on a barge and, if we do that, how do we get it off the barge?

At one point, they were talking about putting it on a barge and taking it as far as Lower Monumental and then getting in the Lower Monumental nav [navigation] lock and then sinking the barges out from under it, basically sinking the barges so they'd sit on the bottom and then this thing would just float. Then tow it off and bring the barges back to the surface. We actually had meetings in the building here with Operations about how to do that. … We didn't want to damage our nav lock. They studied that for a couple of months, and then they finally decided, no, we're not going to do that.

Instead, what they did was they put it [*i.e.*, the removable spillway weir] on a barge and then floated it to a company that has a big drydock in Portland and took it into the drydock and floated it off the barge and put it in the water. Then [they] floated it the entire distance up to Granite.

The next challenge was how to get it from a floating horizontal to floating vertically, because that's the way it had to be connected to the dam … [while keeping] it under control at all times. This thing's got big chambers in it. The whole thing moves by filling or emptying those chambers of air. … As you start lowering a chamber that is full of air … it gets filled with water; the more compressed it becomes, the less lifting capacity that air has. It's a physics nightmare. Things are constantly changing.

The first time they … [lowered it, the weir] went from … [horizontal] to about forty-five degrees, seemingly under control. Then it kind of bobbed. …

The contractor says this thing has to be limbered. That was a new term I had never heard before. Limbering means: you have to put holes on interior members of the structure so that the air inside the structure can move freely, because you got these big H-beams [inside]. If you don't have these holes, the air will get trapped up against one of those [beams] as it's moving, and it won't go where you want it to go.

We debated with the contractor for about six weeks, because he was saying, that's not our responsibility to figure that out. We said, yes it is. We went back and forth. Finally [the contractor hired] a marine architect. We had a marine architect. We put them all in a room and said, okay, you guys figure out how to limber it. And they did. We finally got it so that we could go from horizontal to vertical under control and hooked it to the dam.

Now the thing we're dealing with is how to write the program, the PLC, the programmable logic controller to [move the weir]—because this thing is removable. It's hinged at the dam, but it has to go down, sit on the bottom, and be able to come back up, under very controlled [circumstances]. To try to get all the logic figured out so that we're sure it will do that before we try it the first time—it's just been a tremendous job.

–David A. Opbroek, Chief, Construction Division (64).

Biological tests in the spring of 2002 showed that the removable spillway weir, which cost approximately $11 million to fabricate and install, was much more efficient than conventional spillways, passing more fish while using less water with reduced juvenile fish migration delays under conditions of lower harmful dissolved gases (see chapter 8).

Removable Spillway Weir Photos from 2001

RSW Being Transported

RSW Coming through Lock

RSW Delivered

RSW Installation

Looking Down the Weir

Water over the Weir

Rainbow from Water over the Weir

The design of the removable spillway weir was recognized as being so innovative that the structure has been called an “engineering marvel (65).” For their work, the Walla Walla District team, headed by Project Manager Kevin Crum, and the design firm of Jacobs Civil, Inc., of Bellevue, Washington, won an award from the American Council

of Engineering Companies. Beating out such projects as the design of the new Seattle Seahawks Stadium, Boston's downtown Bunker Hill Bridge, and the Milwaukee Art Museum, the RSW project received the award in 2003 as "Nation's Best Engineering Achievement." Mr. Crum and colleagues donned tuxedos to participate in a ceremony described as "the Academy Awards of engineering."

Spillway Deflectors (Flip Lips)

In 1996, Ice Harbor Dam was the last Walla Walla District dam on the lower Snake River to be fully outfitted with spillway deflectors. In that year, six of the dam's ten spillway bays were modified to include these "flip lips." "The purpose of the spillway deflectors is to decrease the amount of gases – such as nitrogen, oxygen, argon, carbon dioxide, neon, and helium – being dissolved in the water. Fish in supersaturated water may contract what is known as gas bubble trauma [see the section below on the Dissolved Gas Abatement Study]. … The spillway deflectors direct the water that passes over the spillway to stay near the tailwater surface, reducing the amount of gases being dissolved. Spill deflectors have already been installed at McNary, Lower Monumental, Little Goose, and Lower Granite Dams (66)."

ROCKS ROLLING IN THE STILLING BASIN

Flip lips … redirect the flow off the spillway … [so that] that the water goes out horizontally and not deep. … [This creates] a low pressure point that pulls the jet back down and it comes back on itself. That energy down below the stilling basin caused rocks probably one foot, six inches, to two feet to get pulled back into the basin.

Because of the fish problems [we were] worried that the jetting flows on the outside [bank sides of the dams] would keep adult fish from being able to find the ladders, so they left those [flip lips] off [on the outside]. There we have a normal flow, plus we have these flows in the middle that are pulling rock in. We ended up causing a hole in our stilling basin that's into the bedrock.

How do you fix a major stilling basin hole? [This is] a major engineering challenge that we are currently working on. … That's a very interesting problem that nobody, when they put in the flip lips, had picked up because they had not done any movable models. They had done hydraulic models, but they hadn't looked for any type of rock to come back [into the stilling basin].
–Mark F. Lindgren, Chief, Hydrology and Hydraulics Branch (67).

Turbine Improvements

For many years, the Corps and others had been considering the issue of what happens to fish who do pass through the turbines at the hydropower projects along the Columbia and lower Snake Rivers. A basic outline of the effects of turbines on fish is provided in chapter 7.

In 1994, the Corps completed the System Configuration Study (see chapter 4) to investigate various improvements to the Columbia and Snake River hydrosystems. Two major items corresponding to turbine passage survival resulting from the SCS were the Turbine Passage Survival Workshop and the turbine base case report, *Turbine Passage Survival Baseline Report* (68).

The Turbine Passage Survival Workshop was held in Portland, Oregon, in 1995. The workshop featured a twenty-member panel of engineering and biological experts from government, industry, and universities, along with over fifty general participants.

Walla Walla District staff attended this regional workshop. The major goals of the workshop were to (1) determine how to deliver fish from the turbine to the river in a state in which they are ready to cope with their environment; (2) focus on uncertainties that prevent closure on developing biological turbine designs; and (3) identify and prioritize the causal agents of turbine fish mortality. The general conclusion from the workshop was that there are physical and operational modifications to turbines that have already been identified that could possibly increase the survival of fish passing through the turbine environment.

The base case report was completed on January 19, 1996. The purpose of the base case report was to gather data on physical attributes of turbines and the ability to perform prototype tests for eight prospective sites. Data from the report were used to select a site to perform engineering and biological prototype tests. A number of factors were evaluated in determining which site would be selected, including powerhouse capacity and the ability to use the selected unit without largely interfering with hydrosystem operations. McNary's Unit 5 was selected by the Corps as the base case prototype test site. This decision was made in coordination with regional fishery agencies, tribes, and the Bonneville Power Administration.

Meanwhile, the Portland District of the Corps was conducting major studies at Bonneville Dam on the Columbia River to test survival rates of salmon through re-engineered turbines as compared to the standard Kaplan turbines used on most of the Federal Columbia River Power System dams. Kaplan turbines have adjustable blades. Computers automatically adjust the angle of the blades so the machine will operate at its best efficiency. But when the blades are slanted at certain angles, gaps form between the blades and other parts of the mechanism. "Scientists believe fish can get caught in those gaps and be killed or injured. … It appears that closing these gaps would be better for fish. … The new design is called a minimum gap runner, or MGR, turbine. It eliminates gaps by making the corners of the blades longer and milling out notches in the [turbine] hub for the longer corners to fit into when the blades are tilted at a steep angle (69)."

Survival rates inside the tested newly designed turbines varied depending on the location of the fish at hub, tip, or midblade of the turbine. For example, survival rates for fish released at the turbine hub were similar for both minimum gap runner (MGR) and traditional Kaplan turbines. But for fish released at the blade tip, survival rates with MGR turbines were from 93.8 to 97.5 percent as compared to between 90.8 to 95.6 percent with the older Kaplan turbines. The MGR turbines were originally designed because they increased power output but were found to increase fish survival rates by an estimated two to three percent, overall (70).

At the end our period, Walla Walla District was preparing to follow up on the base case report and the Bonneville Dam studies by conducting a major turbine survival test at McNary Dam. McNary was ideal because its generating equipment had been installed between 1954 and 1957. Typically, turbine life is only twenty-five to thirty years. To maintain reliability, the aging turbines and associated equipment needed to be replaced or upgraded. "This project has great potential," said the District's project manager. "We have a tremendous opportunity. While we have to upgrade aging turbines and the associated equipment, we have an opportunity to improve turbine passage for fish

and increase power output. We are going to take advantage of the technology and information that has become available since the installation of the dam more than 50 years ago (71)." This project, referred to as the McNary Modernization Project, had the potential for resulting in replacing all fourteen generating turbines at McNary with an estimated increase in output by ninety megawatts—enough to serve more than 50,000 homes while increasing fish survival (72).

In the late 1990s, Walla Walla District engaged in a major study, the *Lower Snake River Juvenile Salmon Migration Feasibility Study* (see chapter 8). As part of this study, the District examined how turbines could be used to draft the water out of reservoirs should major drawdowns (lowering of the water in reservoirs) be an option that would come out of the study (73). The Voest-Alpine Machinery Construction Engineering Company was contracted to study Lower Granite Dam's turbines using a 1:25 scale model (74). At the same time, the Corps Waterways Experiment Station in Vicksburg, Mississippi, conducted tests using a bladeless turbine in a 1:25 scale model of a Lower Granite turbine. From these studies, the District derived knowledge about the operation of turbines at low water. The study made precise recommendations on how turbines and operations should be altered should major drawdowns occur.

Fish Hatcheries

One of Walla Walla District's major efforts during the 1981-2000 period was the Lower Snake River Fish and Wildlife Compensation Plan (see more in chapter 8). As part of that effort, District staff became experts in designing state-of-the-art fish hatcheries.

Clearwater Hatchery, Raceways under Construction

Many of these hatcheries were built in areas where no facilities previously existed. This presented design and construction challenges in terms of bringing utilities and road access to these facilities, but it also required designers to have an eye for blending structures into the landscape.
In 1982, the McCall Fish Hatchery on the Payette River near McCall, Idaho, won the Corps' top landscape design award. A style was chosen that harmonized with the rustic private houses located across the street from the hatchery. Steeply pitched roofs, cedar siding, and earth tones were used on the hatchery buildings. The buildings were designed to fit the topography and minimize tree removal. Walkways meandered through an existing stand of Douglas fir (75).

Blending in with the natural surroundings was by no means the biggest design and construction challenge related to hatcheries. Obtaining a reliable, high quality source of water for these facilities led the District into some innovative design efforts as described below.

The $37 million Clearwater Hatchery, dedicated in 1992, was the largest and possibly most complex hatchery ever built up to that time. It featured seventy-two raceways and sixty rearing tanks designed to raise 350,000 pounds of steelhead and 91,300 pounds of spring chinook salmon. The opening of this major facility was widely reported in the regional press (76).

NO FISH OUT OF WATER

The difficult part of locating any hatchery and getting that hatchery functional is the water supply for the fish. It's got to be just the right temperature. It's got to be in the proper amount. You … [must] have all kinds of emergency systems in place in the event that equipment fails, so that you don't kill a whole hatchery of fish because of the water. …

At Lyons Ferry, [Washington, on the Snake River] it was done in three phases. The first phase was to go about two miles or a mile and a half up the Palouse River and sink a bunch of deep wells and then pipe out of those wells. Actually, the piping was installed underwater on stands. We drove piles with crossmembers and then laid the pipe on them. That whole pipeline is about five feet below the surface of the water in the mouth of the Palouse. …

They were interesting from the standpoint that in the construction, there was a lot of concrete and piping. Just getting the contractors to understand the sensitivity of, for example, the raceway walls [was an effort]. … They had to be smooth. We had a term that we used. We say—it's not in the specs, but any contractor who's built a hatchery knows that we want everything to be "baby butt" smooth. That's the criteria—unwritten.

You had a lot of different crafts involved because you had electricians and plumbers and laborers and carpenters and equipment operators. That's unusual for contracts that were that small dollar amount. They typically ran $3 to $5 million per contract. The coordination effort to bring all of those crafts together and meet the schedule [was enormous]. …

One thing that was very challenging was that at the Clearwater Hatchery [at Ahsahka, Idaho, on the Clearwater River], our water supply came out of Dworshak Dam. Clearwater Hatchery is located right across from the North Fork of the river from Dworshak Hatchery and immediately below Dworshak Dam. Dworshak Dam is six hundred feet high. When Dworshak Dam was built, there was a hole in the downstream face of it to an interior gallery called an adit. What the contract required is that we go into that adit. This adit was located about three hundred feet up the face of the dam. It was probably another one hundred feet up to the top of the dam from there. The contract provided that we take a pipeline up the face of the dam, through the adit and then drill a hole through the upstream face of the dam. My memory tells me that it was ten feet of concrete that we drilled through, and then we went into the reservoir.

In the reservoir, we were seventy or eighty feet below the surface. You are dealing with very high pressures. Safety was really a concern, because this work that had to be done on the downstream face of Dworshak Dam, [which] was very steep and [had] all the potential for falls and accidents.

> What was really memorable was when we tried to fill this pipeline. … This pipeline, once it got off the dam, was buried down under the road. At the road, we had to cross underneath the river, and then it went up into the hatchery. What was very tricky about that whole operation was, before that whole pipeline was put into service, the state had to chlorinate it. We had to fill it in a very controlled manner. … If you opened the valve and all of a sudden that pipe saw one hundred feet of pressure and a big slug of water slamming down through that pipe, you would have torn it apart. Plus trying to get the chlorine in it in a controlled manner. You are right next to the North Fork of the river, so any leaks are going to be an environmental disaster. Plus you are going underneath the river.
>
> I spent two weeks up there trying to work through that process of getting the pipe filled and getting the chorine to pass through the whole pipeline in sufficient dosage to do what it was supposed to do, and then dealing with that chlorine when it came out the other end. We couldn't let any of it escape. You are talking thousands of gallons of water. That was an interesting job. –David A. Opbroek, Chief, Construction Division (77).

Research on Fish Behavior and Biology

Anadromous Fish Evaluation Program

Continuously since 1952, the Corps has sponsored biological studies related to anadromous fish populations in the streams of the Northwest. The Anadromous Fish Evaluation Program, or AFEP (formerly known as the Fish Passage Development and Evaluation Program) was a set of Corps-funded evaluation and monitoring studies designed to give the region better biological information and insights related to fish passage and survival at hydropower dams. The Corps-commissioned history, *Saving the Salmon* (78), lists 222 reports funded by North Pacific Division (later Northwest Division). The AFEP studies were carried out in the Portland and Walla Walla Districts of the Corps. Studies included such topics as effects of juvenile fish transportation, evaluation of fish guidance devices and surface collection, effects of gas supersaturation on fish, and adult fish passage at the dams.

Periodically, seminars to review research were held, with participants from the Corps, National Marine Fisheries Service, Columbia River Inter-Tribal Fish Commission, U.S. Fish and Wildlife Service, state fisheries and wildlife agencies, and researchers from area universities and laboratories. For example, sixty-four papers on a wide gamut of regional fisheries topics were presented at the AFEP Annual Review of Research held at Walla Walla in the year 2000 (79).

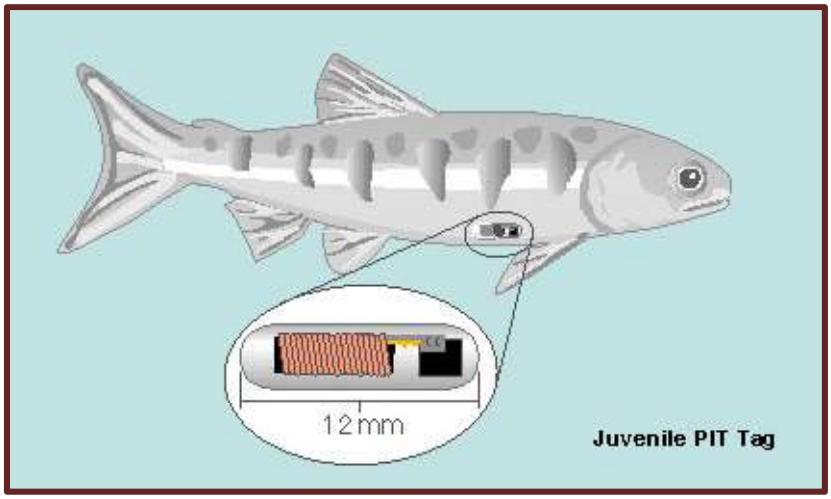
At the end of the period covered in this volume, Walla Walla District fisheries researchers developed AFEP reports such as the following: *Migration of Adult Steelhead Past Dams and Through Reservoirs in the Lower Snake River and into Tributaries (1991-95)* (80); *Spillway Survival for Hatchery Yearling and Subyearling Chinook Salmon Passing Ice Harbor Dam*, 2000 (81); *Identification and Enumeration of Steelhead (Oncorhynchus Mykiss) Kelts at Little Goose Dam Juvenile Bypass Separator, 1999* (82); *Estuarine Recovery of PIT-Tagged Juvenile Salmonids From Lower Granite Dam Transportation Study, 1998* (83).

Fish-Tracking Technologies

In fisheries research, it is often very important to track the movement of fish. One way to do this is to use a passive integrated transponder, or PIT-tag. A PIT-tag is a very

small (12 millimeter by 2.1 millimeter) glass tube containing an antenna and an integrated circuit chip. The tag is inserted into the juvenile fish's body cavity. The tag remains inactive inside the fish for its lifetime, until activated at a PIT-tag-monitoring facility located at a dam. As the tag is read, data about that particular fish is fed into computers, for use in research studies. The migration of the PIT-tagged fish can be tracked through the river system as it passes through smolt-monitoring facilities at various dams. Each PIT-tag carries a unique code to enable identification of individual fish; so smaller sample sizes can be used to obtain good results in fisheries research.

PIT-Tag



Juvenile fish can be detected as they move through the monitoring facility at a dam and can be directed to the river or to a transport barge as needed for a particular study. One limitation is that, to read the PIT-tags, the fish must pass within eighteen centimeters—about seven inches—of the monitor.

A coded-wire tag is a small piece of wire inserted into the nose of a juvenile fish. Coded-wire detectors can tell whether a returning adult fish has a coded-wire tag, but to remove and read the tag, the fish must be sacrificed. Coded-wire tags are still used for studies in river reaches where PIT-tag detectors are not yet installed.

Balloon tags contain small, deflated plastic balloons attached to juvenile test fish that are then released. The balloons gradually inflate, bringing the fish to the surface where they can be recaptured. This method is useful for retrieving fish shortly after release.

Radio tags, which transmit a distinctive signal or frequency, are used in salmon. The fish are tracked using radio antennas, which can be mounted on dams, in boats, or even on a truck. In hydroacoustic monitoring, instruments, called "transducers" are strategically placed to record movements of objects in the water and to send those messages to a computer. Researchers are able to deduce whether large or small numbers of fish are attracted through various passage routes.

During the period covered by this volume, regional fisheries researchers, including biologists in Walla Walla District, have been primary innovators in the development of the above fish-tracking technologies and large-scale implementation of fish-tracking programs.

Dredging-Related Biological Studies

As detailed in chapter 4, Walla Walla District has responsibility for maintaining a navigation channel along the Snake River to Lewiston, Idaho. Due to the sediment that

builds up at various places in the river, dredging is required. Walla Walla District has cosponsored or facilitated a number of dredging-related studies (84).

Some of the most significant of these studies, from the District's perspective, were those by Dr. David H. Bennett and his students and colleagues at the University of Idaho. Bennett's studies, such as 1988's *The Use of Dredged Material to Enhance Habitat in Lower Granite Reservoir, Idaho-Washington* (85) and the Lower Granite Reservoir in-water disposal tests of 1989 and 1990 (reported in 1991 and 1993) (86), pointed to the possibility of underwater disposal of suitable dredged materials to develop or restore spawning and rearing areas for salmon.

Dissolved Gas Abatement Study

Gas bubble disease is well described in *Saving the Salmon: A History of the U.S. Army Corps of Engineers' Efforts to Protect Anadromous Fish on the Columbia and Snake Rivers* (87).

As water plunges down a dam's spillway, the churning motion causes gas, mostly nitrogen, to be pressurized in the stilling basin and dissolved in the river. Entrained air that occurs naturally, such as in a waterfall, quickly returns to the atmosphere, just as dissolved nitrogen in a fast moving river is rapidly freed. Dams, however, create slackwater, low velocity pools that do not purge dissolved nitrogen picked up from entrained air. Supersaturation emerged as a major problem when dams were constructed so closely together that excess nitrogen could no longer escape into the open river. Fish absorbed the dissolved gas, which caused harmful, sometimes fatal, emboli, or air bubbles in the bloodstream.

The Dissolved Gas Abatement Study commenced in 1994 and was an element of the Columbia River Fish Mitigation Program. This major study was completed by the Walla Walla and Portland Districts. The study was initiated when a panel of experts recommended to the National Marine Fisheries Service that structural and operational changes would be needed to reduce total dissolved gas in the river produced by spillway operations on the eight Corps dams on the lower Snake and Columbia Rivers in order to mitigate harm to endangered fish species.

The Phase I of the Abatement Study, issued in 1996 (88), focused on collecting relevant historical data about the operation of spillways. Information about the natural behavior of fish and gas tolerance was compiled. A numerical model was developed to analyze effects of gas abatement alternatives. Corps researchers conducted field studies in order to adequately model the river system. Phase I of the study analyzed the fixed monitoring system from which the Corps derives its data on dissolved gases.

At the end of the period covered by this volume, District staff were working on phase II of the Dissolved Gas Abatement Study, documented in a report issued in 2002 (89]. Phase II included (1) a description of the total dissolved gas (or TDG) problem; (2) descriptions of each of the dams and their current TDG performance; (3) a description and evaluation of potential structural and operational alternatives for reducing supersaturation and the potential for implementation at specific projects; (4) identification and evaluation of system-wide alternatives; and (5) a summary of pertinent findings.

Figure from the *Dissolved Gas Abatement Study: Phase I, Technical Report* (90)

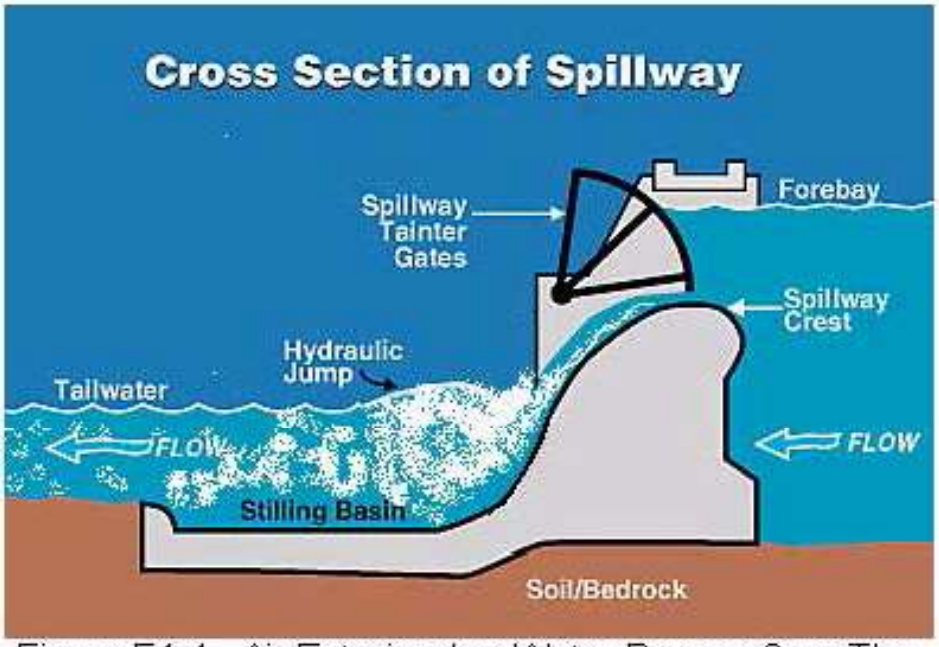


Figure F1-1. Air Entrained as Water Passes Over The Spillway is Forced into Solution by Hydrostatic Pressure.

General Studies and Programs Related to Fisheries and the Hydropower Systems

During the 1981-2000 period, Walla Walla District worked on several major general studies related to fisheries and the hydropower system. These include the *1992 Reservoir Drawdown Test: Lower Granite and Little Goose Dams* (91) and the *Lower Snake River Juvenile Salmon Migration Feasibility Report/Environmental Impact Statement* (92). These general studies will be discussed in chapter 8.

Value Engineering

In 1966, Walla Walla District, following Army regulations, had established an active value-engineering program and submitted all major projects to the program. At the end of our period, projects budgeted at over $2 million for new construction or $1 million for operations and maintenance construction qualified for value engineering. Projects to be examined were sent to a value-engineering team who were independent of the original design team.

Value engineering in the District was approached as a methodology as described in a book by William L. Kelley, a former value engineer from Walla Walla District and later a noted consultant on value engineering:

> "Value engineering is a systematic approach for problem identification and solving. … Value engineering is a methodology which is elastic enough to cover any problem of any dimension, without embellishments. … Creativity and its obstructions are studied. Creativity is applied to provide innovative, futuristic solutions … Finally, the results are presented to decision makers in a formal manner that stresses communications,

> understanding the decision-making environment, and the importance of alternative solutions. … My condensed definition of value engineering: Value engineering is an organized team study of functions to creatively generate alternatives which will satisfy the user's needs at the lowest life cycle cost (93)."

Value engineering may look at materials to be used in a project, processes and scheduling of project construction, or design features. In addition, value engineering may suggest that a project not be undertaken.

In 1990, for example, the District's value-engineering program claimed $1.7 in savings, primarily due to revisions in design of the water supply for the Clearwater Fish Hatchery. In that same year, a workshop was hosted in Walla Walla to train Corps employees in value-engineering methodologies. Savings claimed by the District from value engineering for 1996 through 2000 give an idea of the positive impact of this methodology: 1997, $1,454,676; 1998, $888,208; 1999, $530,00, and 2000, $862,948.

Examples of value engineering by Walla Walla District include $3 million savings in the design of the juvenile bypass facilities at Lower Monumental Dam. In 1991-92, value engineers suggested two major revisions to the system. The first was to eliminate about 1,500 feet of the flume system and related walkways, replacing the flume with pipes. The second change was to eliminate about 1,200 feet of fish transport pipe, discharging the fish into the river sooner than originally planned. In 1992, a value-engineering team saved $724,000 by suggesting that an existing barge moorage facility at Lower Granite Dam be updated rather than building a new one.

A repair to a device (the Wagner Horn closure) at Lower Granite Dam in 1995 is an example of savings realized by a change in process. Value engineering examined the process whereby fifty-four units would be repaired underwater. Since a diver had only forty minutes for each 100-foot dive needed for the work, it was essential that the productivity of each dive be maximized. By maximizing prefabrication out of the water, value engineering saved an estimated $569,000 on this project.

By simply not painting the surface bypass collector that was tested at Lower Granite Dam, the value-engineering team in 1996 saved $498,000. The device was a prototype and might not be used long-term. After six years (when repainting would have been necessary), the device could be painted in order to preserve it, if necessary. Value engineering recommended changes to the Ice Harbor spillway deflector project, installed in 1996 (see above), that amounted to over $1.8 million in savings.

In 1998-99, value engineering examined the scheduling on a project to work on the navigation coffer cells at Ice Harbor Lock and Dam. By rescheduling work to a time of year when water flow was lower, savings of over $1 million were realized. This was achieved because the size and position of construction templates and other elements could be reduced or eliminated if no high water flows needed to be anticipated (94).

Cost Engineering

One important aspect of the Corps' civil works mission involves effective cost-estimating and cost-accounting procedures related to engineering projects. In 1993, the District's Cost Engineering Branch was recognized by the Corps of Engineers as the Cost Engineering Technical Center of Expertise for construction equipment. Since 1988,

the District had been involved in maintaining and updating the construction equipment cost index for the entire Corps.

This effort continued through the year 2000 and beyond. Every two years, Walla Walla District produced a twelve volume edition of *Engineer Pamphlet 1110-1-8, Equipment Ownership and Operating Expense Schedule* (95), showing rates for various areas in the United States, as well as for selected foreign locales where the Corps was supervising construction efforts (such as Saudi Arabia). The pamphlet was used by other federal agencies such as the Navy, Department of Transportation, and Forest Service.

In addition, the District maintained an automated, *Civil Works Construction Cost Index System* (96), a database system available Corps-wide.

During the 1980s, the District's Cost Engineering Branch was recognized as a Technical Center of Expertise for dredge estimating. This was due, in part, to District staff designing a computer program that facilitated dredge estimating. This program was adopted later by the entire Corps. District staff served on the Corps Dredging Steering Committee, which developed regulation and guidance for the entire Corps related to dredging.

Sharing the Expertise

Over the years, several delegations from foreign countries have visited Walla Walla District's dams and fish bypass facilities.

In 1982, a delegation of thirty-three Korean engineers and administrators visited Willow Creek Dam and McNary Lock and Dam. At McNary, the group viewed the powerhouse and was briefed on the communication system that tied Federal Columbia River Power System dams together (97).

Flying from Walla Walla in two Army Huey helicopters, a nine-person Chinese delegation visited District projects in 1983 (98). The group was particularly interested in two aspects of dam construction—deep canyon projects and accelerated projects. Dworshak Dam fit their first interest while Willow Creek was an example of a dam built on a short schedule and for lower than previous cost.

Fish passage was the primary interest of five Russian scientists and engineers who toured McNary Lock and Dam in 1994. The group was from the Kamchatka Peninsula on the northwestern rim of the Pacific Ocean. The area is being faced with some economic problems, so it is looking toward hydroelectric dams to help them generate revenue (99). A member of the delegation explained that, "The Russian dams will be smaller than those along the Columbia, but they are especially interested in maintaining their fish runs on rivers on the peninsula. … The group is grateful that the American people are showing them both the positive and negative effects of Columbia River dams (100)."

Notes for Chapter 5

1. These programs are outlined in some detail in: USACE, Walla Walla District. Assistance programs of the Corps of Engineers. Walla Walla: NWW, 2001. INTERNET: www.usace.army.mil/html/pug/ap/appage.htm.
2 PL 99-662.
3. Start to finish, the life of a project. *Intercom*, 1 September 1981.
4. Water Resources Council. *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*. Approved by Executive Order 11747 *(Federal Register* 38:30993, February 3, 1983).
5. USACE. *Planning Guidance Notebook. Engineer Regulation 1105-2-100.* Washington, DC: USACE, 2000.
6. Ibid, p. 1-2.
7. Ibid.
8. USACE, Walla Walla District. *Reconnaissance Report, Palouse River Basin, Idaho and Washington.* Walla Walla: NPW, March 1989.
9. Stuebner, Stephen. Galloway Dam on Weiser draws support. *Boise Idaho Statesman*, 21 January 1989, p. 1C-2C.
10. USACE, Walla Walla District. *Galloway Dam and Reservoir, Weiser River, Idaho: Preliminary Report: Weiser River Basin Interim, Upper Snake River and Tributaries*. Walla Walla: NPW, 1989.
11. USACE, Walla Walla District. *Columbia River and Tributaries Study: Snake River and Tributaries Basin Summary Report*. Walla Walla: NPW, August 1987.
12. Bonneville Power Administration, Bureau of Reclamation, and USACE, North Pacific Division. *Columbia River System Operation Review, Final Environmental Impact Statement*. Summary, main report, 20 technical appendixes. Portland, OR: The Agencies, 1995.
13. USACE, Walla Walla District. Digital project notebook. Walla Walla: NWW, 2000. INTERNET: www.nww.usace.army.mil/dpn/.
14. Davis, Diane J. Interview. Walla Walla: NWW, 21 October 2001.
15. Focus on the Walla Walla District—Planning Branch. *Information Bulletin*, September 2000.
16. Opbroek, Dave A. Interview. Walla Walla: NWW, 5 December 2001.
17. Willow Creek Dam construction proceeds in several ways. *Intercom*, 15 March 1982, p. 3.
18. Tatro, Steven B. Interview. Walla Walla: 7 February 2002.
19. Schrader named Engineer of the Year. *Intercom*, 18 February 1983, p. 1.
20. Willow Creek wins presidential design achievement award. *Information Bulletin*, 23 November 1988, p. 1.
21. ASCE honors Schrader. *Intercom*, 7 March 1984, p. 1.
22. Engineer comes to defense of Willow Creek construction. *Information Bulletin*, 28 September 1988, p. 1.
23. Willow Creek report to be released Monday, Nov. 21. *Information Bulletin*, 16 November 1988, p. 1.
24. Willow Creek report expected Nov. 16. *Information Bulletin*, 9 November 1988, p. 1.
25. Willow Creek wins Presidential Design Achievement Award. *Information Bulletin*, 23 November 1988, p. 1.
26. Opbroek interview.
27. How about an RCC sandwich? *Intercom*, 7 March 1984.
28. Tatro interview.
29. Tickner, Capt. Tom. Corps builds flood control structures for Los Alamos. *Engineer Update,* November 2000.
30. Liu, Yijun. Lecture notes: *Introduction to Finite Element Method*. Cincinnati: University of Cincinnati, 1998.
31. Gee whiz!!! *Intercom*, 30 December 1987.
32. Tatro interview.
33. Hackett, James S. Engineering Division chief retires. *Intercom*, September 1992, p. 8.
34. Walter, Lt. Col. James A. Initiative 88. *Intercom*, December 1988, p. 2-3.
35. Bennett, Gregory. What Luna City will be like in 100 years. [Plano, TX:] The Artemis Project, 2002. INTERNET: www.asi.org/adb/01/02/future-luna-city.html.

36. Kaden, Richard A. *Lunar Concrete*. Special Publication 125. Farmington, MI: American Concrete Institute, 1991.
37. District employees revolutionize borehole filming process. *Intercom*, 8 October 1987.
38. Tatro interview.
39. Tatro interview.
40. Corps tests ice jam flood barrier. *Intercom*, November 1991, p. 6.
41. Ice jam floods: Engineers look for ways to prevent them. *Intercom,* 31 January 1986, p. 4.
42. USACE, Walla Walla District. *Salmon River Flood Reduction Study*. NPW, 1984.
43. Ice jams: Floodfighters battle winter phenomenon at Little Lost River. *Intercom,* 8 March 1985, p. 1.
44. Burns, Candace. Boom: Boon or boondoggle. *Idaho Falls Post-Register*, 7 January 1991.
45. Ibid.
46. Myers, Dan. Innovative ice boom proves successful in breaking up Portneuf River jamming. *Pocatello Idaho State Journal*, 18 December 1991.
47. Columbia River fish bypass program. *Intercom*, December 1989, p. 7.
48. Loftus, Bill. Corps plans massive dam repair project. *Lewiston Morning Tribune*, 29 March 1991, p. 1B.
49. In-water work windows, commonly called "fish windows," are timeframes in which work can be performed in the rivers. Specific time frames are chosen to minimize impacts on salmon and other species listed under the Endangered Species Act.
50. Tatro interview.
51. Described in: USACE, Walla Walla District. *Annual Summary of Accumulated Historical Material.* Walla Walla: NPW, 1990-1994.
52. Relocation of fish bypass facilities proposed. *Intercom*, 3 July 1984, p. 1.
53. NPW tops all districts in Chief of Engineers awards. *Intercom*, 1 January 1982, p. 1.
54. Eby, Brad, quoted in Fenton, Jonnie. Corps looks for ways to ease fish passage. *Hermiston (OR) Herald*, 22 September 1992, p. 6.
55. USACE, Walla Walla District. *Evaluation of Juvenile Fish Separators Technical Report*. Walla Walla: NWW, March 2002.
56. McKern, John. Update on fish survival. Ephrata, WA: Save Our Dams, July 1999. INTERNET: http://www.saveourdams.com/update_fish_survival_rev1.doc.
57. Voss, Steven W. Interview. Walla Walla: NWW, 26 June 2001.
58. Information in this section is largely derived from: USACE, Walla Walla District. *Lower Snake and Columbia Rivers Extended Length Submerged Bar Screen (ESBS) System-Wide Letter Report*. Walla Walla: NWW, August 2002.
59. Program and project management. *Intercom*, winter 1995-96, p. 8.
60. Voss interview.
61. USACE, Walla Walla District. Lower Granite Removable Spillway Weir (RSW). Walla Walla: NWW, [2000]. INTERNET: http://www.nww.usace.army.mil/rsw/.
62. Ibid.
63. Lower Granite spillway weir designer wins national award. *Bend (OR) Columbia Basin Bulletin*, 4 April 2003.
64. Opbroek interview.
65. Ibid.
66. Spillway deflectors installed at Ice Harbor Dam. *Intercom*, November 1996, p. 5.
67. Lindgren, Mark F. Interview: Walla Walla: NWW, 22 June 2001.
68. Summit Technology Consulting Engineers. *Turbine Passage Survival: Baseline Turbine Report*. Seattle: Summit Technology, 1996.
69. Thomas, Sarah. Evaluating technologies for improved fish passage. *Salmon Passage Notes*, January 1998, p. 1-2.
70. USACE, Portland District. Can a new turbine design be safer for juvenile fish? Portland, OR: The District, 7 March 2000. INTERNET: www.nwp.usace.army.mil/PA/NEWS/archive/2000/00-29.htm.
71. Quoted in: Prototype turbine to be tested at McNary Dam powerhouse. *Information Bulletin*, 19 April 2002, p. 1.
72. Prototype turbine to be tested at McNary Dam powerhouse. *Information Bulletin*, 19 April 2002, p. 1.

73. USACE, Walla Walla District. *Lower Snake River Juvenile Salmon Migration Feasibility Report/Environmental Impact Statement.* Final. Annex A, Turbine Passage Modification Plan. Walla Walla: NWW, 2002.
74. Voest-Alpine Machinery Construction Engineering (MCE). *Model Test Report on Lower Granite Dam Project: Model Test Phase II for Turbine Model Development and Testing.* Vol. 1-7. Linz, Austria: Voest, 1998-2000.
75. NPW tops all districts in Chief of Engineers awards. *Intercom*, 1 January 1982, p. 1.
76. See, for example: Loftus, Bill. Multimillion-dollar project is about to hatch. *Lewiston Morning Tribune*, 16 January 1992; and: Clearwater Fish Hatchery opens. *Idaho Wildlife*, Hunting 1992, p. 26.
77. Opbroek interview.
78. Mighetto, Lisa and Wesley J. Ebel. *Saving the Salmon: A History of the U.S. Army Corps of Engineers' Efforts to Protect Anadromous Fish on the Columbia and Snake Rivers.* Seattle: Historical Research Associates, 1994, p. A-12-A-21.
79. USACE, Walla Walla District. 2000 AFEP Annual Review abstract. INTERNET: https://www.nww.usace.army.mil/planning/ep/fishres/reports/book-abstract.pdf.
80. Bjorn, Theodore. *Migration of Adult Steelhead Past Dams and Through Reservoirs in the Lower Snake River and into Tributaries (1991-95).* Walla Walla: NWW, 2003.
81. Eppard, M. Brad. *Spillway Survival for Hatchery Yearling and Subyearling Chinook Salmon Passing Ice Harbor Dam*, 2000. Seattle: Northwest Fisheries Science Center, Fish Ecology Division, 2002.
82. Evans, Allen F. and Roy E. Bealy. *Identification and Enumeration of Steelhead (Oncorhynchus Mykiss) Kelts at Little Goose Dam Juvenile Bypass Separator, 1999*. Portland: Columbia River Inter-Tribal Fish Commission, 2000.
83. Ledgerwood, Richard D. *Estuarine Recovery of PIT-Tagged Juvenile Salmonids from Lower Granite Dam Transportation Study, 1998*. Seattle: Northwest Fisheries Science Center, 2000.
84. Including works by Bennett, David H., et al., listed in the bibliography to this volume.
85. Bennett, David H., et al. *The Use of Dredged Material to Enhance Habitat in Lower Granite Reservoir, Idaho-Washington.* Walla Walla: NWW, 1989.
86. Bennett, David H., James H. Chandler, and Gwynne Chandler. *Lower Granite Reservoir In-Water Disposal Test: Results of the Fishery, Benthic and Habitat Monitoring Program - Year 2 (1989).* Walla Walla: NWW, 1991; Bennett, David H., et al. *Lower Granite Reservoir In-Water Disposal Test: Results of the Fishery, Benthic and Habitat Monitoring Program - Year 3 (1990).* Walla Walla: NWW, 1993.
87. *Saving the Salmon*, p. 88-90.
88. USACE, Walla Walla District. *Dissolved Gas Abatement Study: Phase I, Technical Report*. Walla Walla: NPW, 1996.
89. USACE, Walla Walla District. *Dissolved Gas Abatement Study: Phase II, Technical Report*. Walla Walla: NWW, 2002.
90. *Dissolved Gas Abatement Study: Phase I, Technical Report*, appendix F, figure F1-1.
91. USACE, Walla Walla District. *1992 Reservoir Drawdown Test: Lower Granite and Little Goose Dams*. Walla Walla: NPW, 1993.
92. USACE, Walla Walla District. *Lower Snake River Juvenile Salmon Migration Feasibility Report/Environmental Impact Statement.* Final. Walla Walla: NWW, 2002.
93. Kelly, William L. You and Value Whatnot. Rev. ed. Walla Walla, WA: The Author, 1986, p. 7-9.
94. Information on specific value engineering projects and cost savings was derived from the files of the District value engineer, documented for each project on Engineer Form 4607-R, "Value Engineering Action."
95. USACE. *Construction Equipment Ownership and Operating Expense Schedule.* Engineer Pamphlet 1110-8. Washington, DC: USACE, published annually.
96. USACE. *Civil Works Construction Cost Index System.* Engineer Manual 1110-2-1304. Washington, DC: USACE, published annually.
97. Koreans tour McNary. *Intercom*, 30 June 1982, p. 1.
98. Chinese delegation visits projects. *Intercom*, 1 December 1983, p. 1-3.
99. Sandberg, Jill. Russians study fish passage. *Pendleton East Oregonian*, 21 September 1994.
100. Ibid.

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Chapter 6. Flood Control and Emergency Operations

SOMEONE IS PAYING ATTENTION

Emergency operations are widely publicized [and] are at the very heart and soul … of why they [the public] support us [the Corps of Engineers]. We offer the region engineering services, and leadership services, and project management, and construction services, and things like that, but that's not what the public wants. What the public wants is a sense of trust and a sense of safety derived from the fact that they believe someone is taking care of flood issues. Someone is paying attention to how much snow is up there. Someone is making sure that their community understands that they're in danger. So that, when they send their kids off to school that day, they are not afraid to have them cross that river, because there is someone who cares and who is predicting the safety of them and their children and their house. …

When nature, gets bigger than our control mechanisms, then emergency management comes in—protects people, informs people, keeps them safe. We do it again, and again, and again. … In the end, people want us to exist because they know we keep them safe. The other things we do are nice, but when you look as Maslow's hierarchy of needs, the need for safety and security are right at the bottom. We provide one of those [basic needs], which is safety from water threats. …

Emergency Management is very, very important to our agency, and very important to our public perception. It's a small group, small funding, but high prestige in the public eye. They're a very important piece of who we are. –Allen Pomraning, Planning staff member (1).

Flooding and Floodplains

"Flooding occurs when an existing stream (such as a river or creek) can't handle the waterflow. The cause of high waterflow varies, but generally comes from high amounts of precipitation or from snowmelt. The existing channel is overwhelmed, and the water 'comes out of bank' to enter what is termed the *floodplain* (2)."

Flooded Farms near Waitsburg, Washington, 1996

The floodplain, then, is part of the terrain adjacent to the channel where water doesn't normally flow. "Flood events are defined by the probability that a certain amount of water is possible any one year. For example, the infamous '100-year flood' is in fact the level of water with a 1 percent chance (1 in 100) of occurring any one year. The term does ***not*** mean that a flood occurs every 100 years, but that it has a chance of 1/100 of occurring any one year. The amount of water actually varies from river to river. In fact, that amount can vary along a river (3)."

Flooding of U.S. Highway 12 at Waitsburg, 1996

Floodplain Management Services Program

Flood control structures (*i.e.,* dams and levees) alone, cannot protect against all damaging floods for both financial and physical reasons. Therefore, they cannot provide total protection. Solutions to flooding problems may include planning to guide and limit development in floodplains. The Floodplain Management Services Program is authorized by Section 206 of the Flood Control Act of 1960 (4), as amended.
The objective of this program is to limit future flood damages through comprehensive floodplain management. The program includes providing technical services and planning guidance to encourage prudent use of floodplains.

MANAGING THE FLOODPLAINS

Within Hydrology, we have what's called the Floodplain Management Services Program. … We can directly work with small communities … maybe a community over in Idaho—we've got a whole bunch of them—the little community of Eagle, down below Boise, Idaho City, up above Boise, Kamiah, over in Idaho, here in Walla Walla. We've done all kinds of studies defining their floodplains for them. That's something we do on a routine basis. … To be able to give a community information that they don't have about their floodplain, for the streams going through their community, so they can do their land use planning, their zoning, and other things—I consider that to be a very, very, important thing; very, very significant. … We usually do several of those studies each year. We get special funding for it. …

What happens is, the community typically will contact myself or someone within my office. Then they'll write a letter requesting that we do some special studies for them. We've been fortunate in that the funding that we've been able to get still is not cost sharing. A lot of the programs that the Corps has now are cost-sharing programs, but this particular one is meant to be a technical one. … We don't build anything from it, but we provide them [*i.e.*, communities] with technical information. A lot of the communities are very small, and they may not have [any engineering staff of their own at all. We're providing information that they just can't get anywhere else. …

> The Floodplain Management Services Program … emphasis … is in protecting and maintaining the floodplain and the values of the floodplain. … You go back to 1977, and President Jimmy Carter put in at that time what is called an Executive Order 11988, which said that federal agencies … need to consider the floodplain and consider the impact of that project on a floodplain. Don't go out and do things that destroy the floodplain. Don't do things that mess up the channel carrying capacity. Don't mess up the environmental values of the floodplain. We've actually been into trying to look at the impact of a project, the impact of work, the impact of people on the floodplain for a long time. …
>
> We work with each community's Planning Department, as far as our Floodplain Management Services Program. We work with the state floodplain coordinators. We work with a whole group of local, state, other federal offices, and people. It's typically a different group than what you'd be working with under the normal Planning cost-share [agreements] where they're a sponsor type of a group. –David L. Reese, Floodplain Management Services Program (5).

One of the tasks of the Corps Floodplain Management Services Program is to define where in a floodplain the 100-year, 50-year, 10-year, or 5-year flood is likely to occur. The Corps often uses floodplain maps to graphically show how likely floods are to occur in various locations near a stream.

In the 1980s and 1990s, Walla Walla District produced many floodplain information reports and flood insurance studies under agreement with the Federal Emergency Management Agency. These included reports on the flowing areas: Ada, Benewah, Blaine, Canyon, Latah, Nez Perce, and Washington Counties, Idaho; Bingham, Boise; Cambridge, Carey, Midvale, Mountain Home, Moscow, Sugar City, and Weiser, Idaho; Umatilla and Union County, Oregon; Canyon City, LaGrande, Mount Vernon, Pendleton, Pilot Rock, Prairie City, and Weston, Oregon; Asotin, Chelan, Columbia, Kittitas, and Whitman Counties, Washington; Asotin, Dayton, Kennewick, Lind, Ritzville, Starbuck, and Washtucna, Washington.

The Boise, Idaho, area has long been an area of particular concern for Walla Walla District in relation to actual and potential floods. The Corps commissioned the book, *When the River Rises* (6), which outlined in detail flood control issues in the Boise area up through 1985. The basic problem in the area in the late twentieth century was the urbanization of the Boise River floodplain around the city. Projects upriver of the town, such as the Lucky Peak project, helped in flood situations (such as the high flood of 1983, discussed below). However, even at the end of the millennium, flooding was still an issue. As one 2002 newspaper headline stated, "Flood in heart of Boise a matter of when, not if (7)." As discussed in several sections below, the District continued to study the flood control situation around Boise and to work to forecast and mitigate flood flows in the area.

Into this environment of conflicting objectives—property owners wanting development, citizens looking for environmental protection, flood insurance officials wanting accurate data, irrigation interests wanting to maximize reservoir storage, and everyone wanting to be protected from floods—stepped the Walla Walla District, intending to issue a new Boise area floodplain. Using state-of-the-art global positioning technologies and high-end geographic information system computer programs, the District produced the new map, issued in draft form in early 2000. Although requested by Boise planning officials, the new map was controversial because it showed floodways. Floodways are

portions of the floodplain that must be left undeveloped, so water can flow freely. The new map altered the position of the 100-year floodplain, where development required flood insurance and elevation of structures above the predicted height of a 100-year flood. More than 5,055 residents, 1,065 homes, and 121 other buildings were mapped in the 100-year floodplain on the new Boise area map (8).

"There will be a lot of homeowners surprised to find that they are in the floodplain" said one local Boise developer. Several developers and property owners had hired a local engineering firm to challenge portions of the proposed new Boise floodplain map. As of the end of 2000, the issues had not been resolved.

Planning Assistance to States

The Corps of Engineers is authorized to help state and local entities implement or meet the following requirements: floodplain regulations; flood warning and emergency preparedness; flood-proofing measures; permanent floodplain evacuation and relocations; and the National Flood Insurance Program. Under this authority, in 1991, for example, Walla Walla District signed an agreement with the Idaho Department of Water Resources to assemble, evaluate, and analyze data on recreation visits for use by the State of Idaho in comprehensive water plans for the Boise River basin.

Flood Control Authorities

Corps flood control studies and projects are authorized under various Flood Control Acts (1934, 1936, 1946, 1948, 1950, 1965, *etc.*). The Flood Control Act of 1950, often referred to as "House Document 531(9)", for example, approved a general comprehensive plan for the Columbia River basin for flood control and other purposes. This authorization often applied to flood control projects within Walla Walla District since the Snake River and its tributaries are part of the Columbia River basin.

Cost-sharing arrangements for flood control projects were defined in Flood Control Acts, particularly the Flood Control Act of 1936 (10). The Water Resources Development Act of 1986 (11) provided guidance on cost sharing for the later part of the period covered by this volume. Various Water Resources Development Acts provide funding for specific flood control studies, projects, and programs.

Flood Control Studies

Chapter 5 discusses the various types of Corps studies. These various levels of studies—preauthorization, reconnaissance, and feasibility—apply to flood control projects as well as other types of projects. Flood control studies undertaken by Walla Walla District in the 1981-2000 period are covered in this section.

Preauthorization Studies

During the 1981-2000 period, the District performed many "preauthorization" flood control studies. Most of these were small studies which cost $10,000 or less. These studies were undertaken to determine whether a flood-related problem warranted further study that might lead to action to solve the problem.

There are many reasons that studies ended at the preauthorization stage. There may be no federal interest in the issue (see chapter 4 for an explanation of federal interest);

it may become apparent that solutions to potential flooding problems did not appear feasible; local interest in a potential project might have wavered; the problem might come to be perceived as a rare occurrence; *etc.* All of these preauthorization studies, however, produced information that may prove useful to the Corps or to other entities at a later time.

The flood-related preauthorization studies listed below ended with no action and were completed by Walla Walla District during 1981-2000:

Mill Slough, Middleton, Oregon, 1981; Baxter Creek, Oregon, 1982; Boise River flood control in the vicinity of Garden City, Idaho, 1982; Salmon River in Lemhi County, Idaho, 1983; Burnt River in Baker County, Oregon, 1984 and 1987; Malheur River throughout Malheur County, Oregon, 1984; Little Wood River in Lincoln County, Idaho, 1985; South Fork Boise River in Elmore County, Idaho, 1985; Squaw Creek in the vicinity of Bancroft, Idaho, 1985; Salmon River in the vicinity of Salmon, Idaho, 1987; Ririe, Idaho, 1988; Teton River in Idaho, 1988; Boise River, Ada and Canyon Counties, Idaho, 1989; Oakley Westside Channel, Idaho, 1989 (a larger study at the $75,000 level); Walla Walla River near Milton-Freewater, Oregon, protection of Joe West Bridge, 1989; Ririe, Idaho, groundwater study, 1990; Soldier Creek in Camas County, Idaho, 1993; Portneuf River near Pocatello, Idaho, 1994; Jarbridge River, Nevada, 1997; Palouse River, Washington,1997; South Fork Palouse River, Washington, 1997.

Below are details on some of the more complex preauthorization studies that Walla Walla District completed during the span of years covered by this volume. Again, as of 2000, these studies have not progressed beyond the preauthorization stage.

❖ Lapwai Creek, Lapwai, Idaho (preauthorization study 1982)

A Corps investigation considered the construction of an 8,700-foot-long, 6-foot-high levee along the left bank of Lapwai Creek adjacent to the existing railroad. The study determined that the existing railroad embankment already provided ninety-eight percent protection from all flooding. The District determined that construction of levees at a cost of $650,000 to provide the small amount of additional protection was economically unjustified.

❖ Big Wood River, Hailey, Idaho (preauthorization study 1984)

A small flood control project was proposed in June 1957 to provide levee and channel work at critical reaches along the Big Wood River from Magic Reservoir to above the City of Hailey, Idaho (approximately thirty-seven miles). The project report was completed in fiscal year 1957. A project was authorized by Congress, but was never completed due to the lack of a local sponsor. Actual work was limited to channel clearing and emergency flood fights. A new study was completed in 1984.

- **Lawyers Creek, Kamiah, Idaho (preauthorization study 1984)**

Lawyers Creek originates near Craigmont, Idaho. It flows in an easterly direction for about thirty-five miles before it joins the Clearwater River at Kamiah, Idaho. The largest recorded flood occurred in 1948, with an estimated peak flow of 5,500 cubic feet per second. Many floods of damaging proportions have since occurred on the creek.

As Lawyers Creek emerges from the canyon under flood conditions, it carries a considerable amount of debris, sand, and gravel. Prior to construction of a channel in 1960, the river experienced flooding many times in the upper reaches. This channel was constructed with a V-bottom, but the materials used during construction are unstable at velocities occurring even at low flows. During high water periods, the stream moves riverbed materials and erodes into the levees over the entire length of the existing project.

The plan of improvement for the Lawyers Creek project involved altering the existing channel by creating a channel capable of withstanding high-velocity flows and stabilizing riverbed movement. Walla Walla District's plan proposed reshaping the channel to a twenty-foot bottom width and providing levees with adequate slopes. Riprap protection was to be provided for both sides and the channel bottom. The study proposed that the channel be widened under the county bridge, with a gradual transition to a forty-foot bottom width immediately above the railroad bridge.

This study is interesting because, in 1964, the District produced a reconnaissance report on the flood control situation in the area but no action followed. The situation was re-examined in a study completed in 1984. The City of Kamiah, Lewis County, and Idaho County have indicated their willingness to sponsor the project, but as of 2000, no further study or action had taken place. The estimated cost for this project was $321,570, federal, and $5,750, nonfederal.

- **Bully and Willow Creeks, Malheur County, Oregon (preauthorization study 1985)**

The proposed project consisted of a dam and reservoir at the Hendrix site on Bully Creek and a feeder canal to divert water from the main river to the reservoir during seasons when irrigation is not needed, thus complementing the flow of Bully Creek. Bully Creek, by itself, would not fill the reservoir in dry years.

As proposed, Hendrix Reservoir would have a maximum live storage capacity of 30,000 acre-feet. Outlet works would provide optional discharge of stored water, either to the irrigation canal or the streambed below. The lower 20,000 acre-feet of storage would be used primarily for irrigation, while the upper 10,000 acre-feet would be principally reserved for flood protection. The estimated cost of the proposed project was $250,000.

- **Raft River, Idaho (preauthorization study initiated 1985, never completed)**

The Raft River joins the Snake River about fourteen miles above Minidoka Dam in Idaho. Flooding sometimes occurs in the vicinity of Bridge, Idaho, where the stream gradient is relatively flat. Several tracts of land are irrigated. The runoff from Raft River and its tributaries was adequate for the irrigation of large areas of land. There were

large undeveloped tracts of land in the basin where water could be used if an adequate water supply could be assured. Flood problems could be partially solved by the conservation of flood runoff.

Several possible storage and flood control projects were considered, such as a dam on the river about forty miles above its mouth; channel improvement to prevent flooding to the low-lying area in the vicinity of Bridge, Idaho, construction of Otley Dam on Cassia Creek; and a Cassia Creek flood control project to protect fertile lands along the creek. These proposals were not considered economically justified at the time of the study was being conducted.

- **Henry's Fork River, Fremont County, Idaho (preauthorization study 1986)**

In the area under study, major floods inundated thousands of acres of highly developed land (the flood of 1894 inundated nearly 20,000 acres). Henry's Fork River flows on a steep gradient, and erosion was severe. Floods of extreme proportions could damage many urban properties, roads, and bridges throughout the valley. Floodwater that could be used downstream escapes from the basin without being put to use.

The study found that adequate storage capacity in the basin would solve the water use problem and alleviate flooding problems somewhat, but some problems could only be solved by the construction of local flood control works. As of 2000, seven sites were under consideration: four storage sites (Bechler Meadows, Mountain Ash, Tetonia, and Teton Canyon) and three proposed local flood control projects (Henry's Fork, Teton River, and Moody Creek).

- **Goose Creek Watershed, Idaho (preauthorization study)**

The Oakley Reservoir, formed by an earthen dam on Goose Creek, was constructed in 1911 and had a usable capacity of 77,400 acre-feet. The reservoir did not have a channel to convey and release water from the emergency spillway to the Snake River. This created a flooding hazard for the towns of Oakley and Burley, Idaho.

Flooding in 1984 nearly resulted in the loss of the dam and was avoided only by drastic flood fighting measures, including excavation of a twenty-mile-long channel. After the emergency was over, the channel was filled in and is no longer available for use in future flood events. The potential for flooding occurred again in 1997.

In addition, low water yields and heavy sediment loads from the loss of erosion-controlling vegetation in the upper watershed have severely degraded the natural wetland and riparian areas of the Goose Creek drainage. As of this writing, the Corps was working with potential sponsors to determine federal interest and to develop an analysis of the project. The Oakley Canal Company and Cassia County requested assistance from the Corps. The Oakley Flood Control District is another potential sponsor.

Reconnaissance Studies

If a flood control problem is found to warrant a study more detailed than a preauthorization study, the Corps may undertake a reconnaissance study to clarify the problem and possible solutions. Generally, projects that move on to the feasibility study stage or to actual implementation have previously been given reconnaissance-level

scrutiny. Project studies were sometimes terminated after the reconnaissance phase. Common reasons for no further study beyond the reconnaissance stage included: finding of no federal interest in the project or lack of local sponsorship for a cost-shared feasibility study.

The most significant of Walla Walla District's flood control reconnaissance studies are covered below, roughly in chronological order.

- **East Fork Owyhee River at Skull Creek near Owyhee, Nevada (reconnaissance study 1985)**

This reconnaissance study investigated the construction of a new dam on the Owyhee River near Owyhee, Nevada, about one-fourth mile upstream from the confluence of Skull Creek and the Owyhee River. The proposed project was a power generation facility that would be capable of flood control. The spillway would accommodate a 25,000-cubic-feet-per-second design flood.

Three separate storage capacities were evaluated during this study: 50,000 acre-feet, 75,000 acre-feet, and 100,000 acre-feet. Because of variable flows from the uncontrolled spillway at Wild Horse Dam upstream, construction scheduling and diversion would be important considerations; and a large section of the highway, telephone lines, and electrical transmission lines would require relocation.

- **Palouse River, Idaho and Washington (reconnaissance study 1989)**

The purpose of the reconnaissance study was to evaluate various alternatives for providing municipal and industrial water for Moscow, Idaho; Pullman, Washington; Washington State University; and the University of Idaho. The study also considered opportunities to reduce flood damages in the communities of Pullman, Moscow, Potlatch, and Palouse. Findings indicated no federal interest in continuing the study into the feasibility stage. However, a preauthorization re-examination of the Palouse River in Washington was initiated in 1997 (listed above).

- **Esquatzel Coulee, Connell, Washington (reconnaissance study 1990)**

The study examined channel deepening and widening as well as low levee and intermittent revetments along the existing Esquatzel Coulee (completed in 1966) and along the Burlington Northern Railway through Connell, Washington. The project was designed for 4,600 cubic feet per second, with three feet of leeway.

- **Mud Lake (reconnaissance study 1990)**

The Mud Lake area is a closed basin on Camas Creek, twenty miles west and fifty miles north of Idaho Falls, in Jefferson County, Idaho. A ten-mile-long embankment constructed years ago by local farmers forms Mud Lake. The embankment was constructed to confine the lake and make it possible to farm the surrounding lands, as well as provide water elevation so that irrigation canals could deliver water to farms.

The reconnaissance study determined that four alternatives were economically feasible. In 1990, a meeting was held with Mud Lake water users and the Jefferson Soil and Water Conservation District on the subject of project sponsorship. Local people expressed considerable interest in the Lone Tree Dam alternative. Around 1920, a dam

was built on Camas Creek to store irrigation water, but could not hold water due to fractures or lava tubes in the basalt under the reservoir. The dam was breached in 1924. The dam could be rebuilt, as the proposed Lone Tree Dam, and water could be impounded during high runoff years. Further action on this study has not taken place due to lack of local sponsorship.

- **Kahlotus Creek, Kahlotus, Washington (reconnaissance study 1990)**

A reconnaissance-level flood control study for Kahlotus Creek was completed in 1990. No further action was taken.

- **Prairie Creek, in Enterprise, Oregon (reconnaissance study 1990)**

A reconnaissance study was completed in 1990, but no further action was taken following the reconnaissance report.

- **Burnt River in the vicinity of Huntington, Oregon (reconnaissance study 1991)**

The reconnaissance report produced negative findings, and Walla Walla District did not pursue this project any further.

- **Willow Creek below LaCrosse, Washington (reconnaissance study 1996)**

The head of Willow Creek below LaCrosse, Washington, began to cut a new channel in the mid-1980s. This was never a critical concern until spring 1993, when above average runoff caused the head to move about 150 feet further upstream. It will soon threaten two railroad bridges and a county road, and will eventually threaten a state highway as well.

Funds to examine the Willow Creek situation were received in March 1996. The Corps met with Whitman County and various landowners in May and July 1996. Field surveys were performed in July 1996. In September 1996, alternatives, cost, and schedules were reassessed. As of 2000, the Corps awaited a letter from the sponsor terminating the study.

- **Walla Walla River Watershed, Oregon and Washington (reconnaissance study 1997)**

The Walla Walla River Watershed study's objectives were riparian and wetland restoration, fish and wildlife restoration and enhancement, flood damage reduction, water quality improvements, water supply improvements, erosion control, low flow augmentation, and recreation.

The project had three potential areas for future feasibility studies. The first area was levee removal on the mainstem of the Walla Walla River. The Washington Department of Fish and Wildlife would be the likely sponsor for this effort, as the project lies on lands owned by them. The second potential area was construction of a set-back levee with riparian buffer strip along the upper Touchet River. A local government (city, county, or flood control district) would be the likely sponsor. The third possible area was salmon reintroduction, in which the Corps' role would be to increase mainstem flows in the spring during the adult spring chinook migration period. This latter project is moving forward with the sponsorship of the Confederated Tribes of the Umatilla Indian Reservation and will be discussed in chapter 7.

- **Boise River studies: Boise River in the vicinity of Boise, Idaho (reconnaissance study, 1990); Lower Boise River and Tributaries (reconnaissance study 1995); Boise River Flood Damage Prevention Reconnaissance Study, Boise, Idaho (reconnaissance study, ongoing)**

The Boise area has been under constant scrutiny by Walla Walla District, because it has long been an area of concern for potential flooding. As mentioned above in the section on Floodplain Management Services, the Boise area flood situation was detailed in a special 1993 monograph prepared for the Corps (12). The Boise River studies are prime example of the District's efforts to examine holistically a complex set of water resources problems. Each study builds on past investigations as well as incorporating new facts and techniques. The Boise River Studies will be covered here in some detail as a prime illustration of the nature of District study activities.

The City of Boise is located on the Boise River, a snow-fed river with high flows in the early summer months resulting from melting snowpack. The city, as well as the surrounding communities, was experiencing rapid growth and development at the end of the twentieth century. Land use within the Boise River basin was changing from agricultural to urban. As of 2001, the Ada County-Canyon County area was the fourth fastest growing urban area in the United States. In such circumstances, the potential for a flood in the area became of even greater concern. Meanwhile, problems of water supply and water quality became crucial for the area.

The purpose of the lower Boise River and Tributaries reconnaissance study was to review the water resource problems, needs, and opportunities in the Lower Boise River basin. The study was pursued through 1995 until it was put on inactive status. The study area encompassed the entire Boise Valley, from Walla Walla District's Lucky Peak Dam to the mouth of the Boise River and included the Mores Creek sub-basin. It focused primarily on problem areas along the main river channel and side drainages northeast of Boise, Idaho.

This reconnaissance study identified several problems. The first problem area related to flooding. Minor flooding typically began to occur at the Glenwood Bridge when Boise River flows were in excess of 4,500 cubic feet per second. Major flooding was taking place at 7,200 cubic feet per second. The 100-year flood event is 16,600 cubic feet per second. Target flow for the Boise River in the area of Boise City is 6,500 cubic feet per second. Because of unseasonably warm weather conditions during the spring, the target flow has been exceeded thirteen times since construction of Lucky Peak project in 1954. Seven emergency flood fights and five rehabilitation projects have occurred since 1971. (Further discussion of Boise area flooding is included in the flood forecasting and flood fighting sections below.)

Natural flows in the Boise River were drastically modified by three existing storage projects upstream from the City of Boise: Anderson Ranch, Arrowrock, and Lucky Peak projects. These reservoirs were operated as a system for flood control, irrigation, and recreation. A series of noncontinuous, nonfederal levees lined the Boise River below Lucky Peak Dam through developed areas in downtown Boise and in Garden City, Eagle, Middleton, and Caldwell, Idaho. Local landowners, Ada and Canyon Counties, and local flood control districts built these levees. The reservoirs and levee system provided flood protection well below the 100-year flood level. In addition, low flow

conditions in the river led to the growth of trees and brush in the channel, and this has significantly reduced the river's capacity to carry water in a flood.

In the Boise foothills area, a series of seven dry-gulch tributaries in the Boise Front Range drain into the Boise River within the City of Boise, creating large areas subject to flooding and common flash floods.

High groundwater was another problem highlighted in the Lower Boise River and Tributaries reconnaissance study. The area's sanitary sewer systems are serving as drains by keeping the summer groundwater table beneath the surface of the ground. To meet effluent standards, it would be necessary to seal the sewer systems to prevent the intrusion of groundwater. As the sewer system is sealed, both groundwater seepage and surface water pooling problems will probably continue to appear in a much more severe form than ever experienced previously.

The Lower Boise River and Tributaries Study also attempted to quantify the loss of irrigated cropland, determined the use of surface water once associated with these lands, and determined where and how irrigation delivery systems had changed since their initial development.

Since only a minimal rise in water surface was required for irrigation in the Boise River, it was common for low, temporary gravel dams to be placed across the river downstream of irrigation intake structures. Although these dams were considered temporary, such diversions were usually left in the river year-round. Water-based recreation was extremely popular on the Boise River and was hampered by such obstacles. During spring runoff, these gravel dams caused the upstream water surface to rise, thus increasing the potential for flooding. A standard, generic-type diversion dam was needed that would meet the needs of the area.

Over twenty-five canals and ditches diverted water from the Boise River for irrigation. Water returning to the river was of poor quality. There was no single municipal water supply in the area. Groundwater was the primary source of supplied water. Boise County experienced water shortages, especially during low-water years. Interest was expressed in obtaining water from Lucky Peak Lake for part of the municipal water supply. United Water Idaho, Inc., in fact, requested that their share of irrigation storage in Lucky Peak Lake be reallocated from irrigation to municipal and industrial supply. There is a critical need for conservation measures and/or new surface water sources for municipal and industrial purposes.

In the reconnaissance study, Walla Walla District staff screened the above water resource problem areas and identified areas for further study including flood control, environmental restoration, and water supply.

The alternatives chosen for in-depth study of the flood problems in lower Boise were (1) no action and (2) diversion into the Snake River. The latter plan involves diverting flood flows from the Boise River through an existing irrigation system into the Snake River to reduce flows in the Boise River. The proposed plan is limited to a modification of the existing Fargo Wasteway. The report found that the diversion of 500 cubic feet per second of water into the Snake River was economically justified. It would substantially reduce flood damages on the Boise River and could possibly result in

improved wildlife habitat. However, such a plan would probably have only limited support from individual landowners in the floodplain.

Four possible alternatives were identified as having potential environmental restoration benefits in the study area:

(1) Purchasing easements along the Boise River to preclude development. In addition to being able to clear improvements from flood-prone areas, this would increase the amount of available wildlife habitat, thus securing it for the future. Such easements may improve overall water quality in the river by providing vegetation to act as filters to clean the water as it passes through the easement.

(2) A large, sustained flow from Lucky Peak Lake, on an irregular basis, could be released to provide a “flushing flow” through the Boise River channel. This would have to be used in conjunction with the purchase of easements in order to limit downstream flood damages, since flooding would likely occur as a result of higher flows. This flushing flow would remove debris and live growth in the channel without causing environmental damage (such as would be caused by mechanized removal of debris and growth). By simulating unregulated flows, conditions for spawning for anadromous fish would be improved, as would cottonwood regeneration.

(3) Portions of the floodway could be recontoured as a way of inducing floodwaters to spread out, particularly in the Barber Pool area. Land next to the river would be lowered and replanted with cottonwood trees. Old, abandoned flow channels could be excavated and reinstated.

(4) A fourth alternative involved periodically raising the water level of Barber Pool, along with replanting cottonwood trees. The existing Barber Dam, however, would have to be raised, at a minimum, and probably replaced. This plan would provide periodic flooding of certain areas and assure a continued viable habitat.

Three options for reallocation of irrigation water from Lucky Peak for use in municipal supplies were also examined in the reconnaissance study.

The estimated cost for any alternative involving diversion of water into the Snake River was nearly $43 million. This project was placed in an inactive status while sponsorship for a feasibility study was coordinated.

As it turned out, however, the Corps decided to study the situation further, rather than moving to focus on any of the already developed alternatives. Thus, Walla Walla District began the Boise River Flood Damage Prevention Reconnaissance Study, active in 2000. This study was to focus on flood control on the Boise River in Boise, Idaho. The Corps was working with potential sponsors, including Boise City, the Community Planning Association of Southwest Idaho, and the Idaho Department of Water Resources. Local flood control districts were also interested in the study.

- **Payette River Reconnaissance Study (reconnaissance study authorized 1999)**

The Payette River basin is located in west-central Idaho and covers approximately 3,240 miles. High flows in the basin normally resulted from snowmelt in the late spring and overtopped streambanks in the lower valley about every two years. The two largest floods occurred in December 1964 and January 1997. Both occurred under general winter rainstorm and snowmelt with frozen ground conditions. Most flood damages occurred within the thirty-five miles between the cities of Emmett, Idaho, and Payette, Idaho. The 1997 flood was estimated as close to a 150 or 200-year flood event, with about $6 million of damage to farmland and $3 to $4 million in damage to infrastructure and housing. There were some existing levees around the town of Payette, but the dike system had worn down tremendously since construction in the 1960s.

This effort was a general investigation study to examine alternatives for flood protection and possible environmental restoration opportunities. Walla Walla District was working with potential sponsors including the City of Payette and Payette County.

Feasibility Studies

Other than for emergencies, Walla Walla District generally completed feasibility studies prior to construction of water resources development projects. Feasibility studies examine in detail the effects of implementing particular alternative solutions to water resources-related problems. These alternative actions have usually been identified in previous reconnaissance studies.

Sometimes, feasibility studies were completed and no specific project resulted. Oftentimes, the cost of any solution in relation to the economic benefits was too high. In this case, the project was said to be "not economically justified." Other times, the benefit/cost ratio for one or more alternative was high enough to justify the project under federal guidelines, but the project's sponsor might still be unable to provide their share of the cost. In the latter situation, the District might keep the project "on the books" in an inactive state while a sponsorship was sought.

This section covers the District's most significant feasibility studies related primarily to flood control completed or ongoing during the 1981-2000 period. Studies that resulted in actual projects are covered later in this chapter, while chapter 7 discusses environmental restoration studies.

- **Little Wood River Project, Vicinity Gooding and Shoshone, Idaho (feasibility study 1976; project terminated 1991)**

Following a 1976 feasibility study, the Water Resource Development Act of 1986 (13) authorized the Little Wood River project. The proposed project consisted of a channel and two ponding facilities to divert flood flows from the Little Wood River into adjacent lava fields via the Dietrich and Milner-Gooding Canals for the purpose of reducing flood damages in the Gooding and Shoshone, Idaho, vicinities.

Preconstruction engineering and design activities were initiated in 1990 to review and update the project formulation development for the 1976 feasibility report. A coordination meeting was held in Gooding, Idaho, in May 1991 with the project sponsor, who indicated that it no longer had the capability to finance the project. As a

result of lack of local sponsorship, the project was terminated in 1991. Walla Walla District prepared a limited reevaluation paper and submitted this to Corps' higher authority.

In 2000, however, a new reconnaissance study for the area was initiated and completed. The study determined that there is a federal interest in restoring and repairing the Lava Rock Little Wood River Containment System. A feasibility study was to be initiated in 2001.

❖ Malheur and Harney Lakes, Oregon (feasibility study 1987)

The goal of this feasibility study was to plan, engineer, and design structural and nonstructural measures to prevent flood damage resulting from rising lake levels at Malheur and Harney Lakes, Oregon (both terminal lakes). In the past, approximately 100,000 acres had been flooded above the typical historical lake surface area of 40,000 to 60,000 acres. The high lake flood damage occurs to private land, ranches, roads, highways, utilities, and a railroad branch line.

The interim feasibility report and environmental impact statement for this project was completed in June 1987. The report found no acceptable solution to the flooding problem. The three major alternatives were the Virginia Valley Canal, land purchase, and railroad relocation.

The Virginia Valley Canal was a structural alternative to divert water from Malheur Lake to the Malheur River. This alternative did not have support from the State of Oregon or Malheur County, and is opposed by the majority of the public that commented on the draft report. The local sponsor, Harney County, was opposed to the second alternative, the federal purchase of flooded private lands. The County also noted that this plan alone would provide very limited benefits in relation to the total flood problems. The feasibility report recommended not implementing a major federal flood control project at this time; however, railroad relocation was pursued under the continuing authorities program (see below under flood control projects).

This study received a Corps-wide Outstanding Planning Achievement Award in 1986. The Walla Walla District Commander at the time commented, "In spite of the diverse interest of environmental groups on one extreme and farmers whose way of life had been destroyed by flooding at the other extreme, this report was completed in 18 months (14)." The interdisciplinary team developed innovative models for basin hydrology, economic effects, power benefits, and wildlife responses to various water level changes in the study area.

❖ Big Lost River, Arco, Idaho (feasibility studies 1991, 1995)

Damaging floods occurred frequently in the 28-mile reach between Mackay Dam and the town of Arco, Idaho, when Big Lost River flows exceeded channel capacity. The flood of May-June 1967 was the largest on record and inundated some 7,000 acres. It caused $800,000 in damages. Smaller, frequent floods damaged agricultural lands, bridges, roads, and Idaho National Engineering Laboratory property downstream of Arco. Twelve major floods have occurred since 1943. In 1983, the Borah Peak Earthquake, a major earthquake of 7.3 magnitude, was centered in the Big Lost River basin. The earthquake caused land subsidence and increased the potential for future

flooding problems. In 1986 and several other years, losses from floods exceeded $1 million.

In November 1986, a citizens group requested Corps involvement with local interests to study flooding and water resources issues in the Big Lost River basin. The citizen's groups included the U.S. Soil Conservation Service, the Butte Soil Conservation District, Butte County Commissioners, Custer County Commissioners, and the Big Lost River Irrigation District. The Idaho National Engineering Laboratory was also interested in the study.

In addition to flood control, Walla Walla District's 1986 Big Lost River basin study considered the potential for benefits due to increased water supplies and hydropower generation with each alternative solution. The flow of the Big Lost River is often erratic due to loss of water into two major sink areas along the channel (Chilly and Darlington Sinks). Irrigation water delivery is sometimes undependable due to time lag through the sink areas. Some 24,000 acres would be available for irrigation if additional water supplies were developed. Increased water supplies could be used for streamflow maintenance, fish and wildlife enhancement, and recreation.

A 1986 reconnaissance study investigated the following alternatives: enlarge the capacity of Mackay Reservoir; enlarge the emergency spillway capacity of Mackay Dam; regulate the existing capacity of Mackay Reservoir for flood control; construct a new dam on Antelope Creek (a tributary of the Big Lost River); examine the opportunities for upstream storage above Mackay Dam; divert flood flows into the Chilly Sinks and Barton Flats areas; divert flood flows into an irrigation channel, the U. C. Canal, and extend the canal to desert areas of the Snake River plain, building levees to protect specific sites. The study showed that diversion of flood flows into the Chilly Sinks and Barton Flats areas would be the most economical solution.

Based on the favorable results shown in the 1986 reconnaissance study, the Corps initiated a feasibility study in May 1989. On January 8, 1990, Butte County signed a letter of intent to enter into a local cooperation agreement, subject to definition of an acceptable project in the feasibility phase.

A final feasibility report was released in September 1991. The project was terminated in September 1991 as no local protection, storage, or diversion alternative was found to be economically feasible or justified. However, another feasibility study was initiated in 1993 and completed in 1995. The estimated construction cost for the project defined in the latter feasibility study was $6,118,000, and annual costs with fish bypass and screen facilities were estimated at $1,000,000. No further action was taken on flood control for this area of the Big Lost River.

- **Little Weiser River, vicinity of Gladhart Lane, Idaho (feasibility study started 1994)**

A feasibility study was required to evaluate streambank protection measures in the vicinity of Gladhart Lane, Idaho, on the Little Weiser River. The feasibility study was initiated in 1994, and was listed as active as of 2000. Local interests are divided, with some preferring a larger, more comprehensive solution to flooding and water resources problems for the Weiser River and the Little Weiser River, while others prefer an

approach focused only on this vicinity. Therefore, the smaller flood control project developed in this feasibility study has not been pursued.

- **Little Weiser River, vicinity of Cambridge, Idaho (feasibility study 1995)**

A feasibility study was initiated in 1993 to determine the need for flood protection on the Little Weiser River in the vicinity of Cambridge, Idaho. The feasibility study was completed in 1995. Due to lack of local support, no further action has resulted from this study.

- **Snake River, Fort Hall Landmark (feasibility study 1996)**

For more than ten years, the Snake River has been threatening the Fort Hall National Historic Landmark located on the left bank of the Snake River near Pocatello, Idaho. The river will eventually destroy the site unless it is adequately protected. The Shoshone-Bannock Tribe, Bureau of Indian Affairs, Bureau of Reclamation, National Park Service, and the Corps were all involved in the project.

A study was initiated in 1996. In 1997, Walla Walla District presented the details of the alternatives being considered, along with the study costs, to tribal representatives at Fort Hall. Tribal representatives indicated that they wanted to continue supporting the project and were willing to commit funds to satisfy the local sponsor contribution requirement. As of 2000, the Corps was awaiting a letter confirming this commitment from the Shoshone-Bannock Tribe.

- **Negro Creek, Sprague, Washington (feasibility study initiated ca. 1997)**

The purpose of this project is to significantly reduce flood damage from Negro Creek in the town of Sprague, Washington. Sprague experienced considerable flood damage in 1996 and 1997, as well as in past years, due to high flows from the creek. Negro Creek originates in Spokane County, Washington, and flows south through the town of Sprague into Sprague Lake, less than two miles downstream of town.

This feasibility study was to look at regulating the flood events that have historically inundated several homes, downtown businesses, grain elevators, and the railroad. Although the creek flows intermittently much of the year, the watershed upstream of the town is in excess of 150 square miles and produces a significant amount of runoff. The feasibility phase was underway in 2000, but awaited the execution of a cost-sharing agreement. Lincoln County, Washington, is the sponsor for this project.

- **Upper Grande Ronde River Restoration, Oregon (feasibility study initiated 1996)**

The Upper Grande Ronde River Restoration project reach runs through the City of LaGrande, Oregon. The work area begins two hundred to three hundred yards downstream of Spruce Street Bridge and extends to the outskirts of Island City. The river's channel in this area is cut too deeply and has an extremely poor width-to-depth ratio. Raw vertical banks of up to twenty-five feet exist in some parts of the reach.

Walla Walla District received funds for the feasibility study in late November 1996, and the initial site visit was held in January 1997. The Union County Soil and Water Conservation District is sponsoring this project.

- **Coppei Creek in the vicinity of Waitsburg, Washington (feasibility study initiated ca. 1997)**

In February 1996, as swollen streams raged out of their banks throughout the Walla Walla Valley, the town of Waitsburg was cut off from the outside by flooding of the Touchet River and Coppei Creek, tributaries of the Walla Walla River, that surround the town. Two hundred of the five hundred homes in Waitsburg were flooded, the sewage treatment plant was compromised, and downtown businesses and basements were filled with water, mud, and debris (15).

Waitsburg regularly experienced significant, short flood events. A reconnaissance study of the area was completed in 1990. It was only after the 1996 floods, however, that a feasibility study was pursued. A project manager with Walla Walla District, commented, "Memories of flooding quickly fade, and it is difficult to picture the normally quiet streams as a threat. But the Coppei has caused significant damage and could continue to do so (16)." In 1999, Waitsburg requested the Corps' assistance to develop a flood reduction project for Coppei Creek. This led to a feasibility study, which was just beginning as of the end of the period covered in this volume.

During the 1996 flood, an unquantified portion of Coppei Creek flooded over the right bank, upstream of the Coppei Creek Bridge onto U.S. Highway 12. The discharge flowed north through the fairgrounds and residential property, and along U.S. Highway 12, combining with Touchet River floodwaters in downtown Waitsburg. If the 100-year flood event does occur without the proposed levee and channel dredging, substantial damage to the City of Waitsburg is expected. The proposed plan is to construct about 4,000 linear feet of levee and 800 linear feet of floodwall on the Coppei Creek right bank. The U.S. Highway 12 Bridge and a portion of road would be replaced or relocated.

Deauthorization of Projects

Starting in the mid-1980s, Congress and the Corps of Engineers began to make an effort to define the status of many projects that had been authorized but never moved to completion due to lack of funding, lack of local sponsorship, or for other reasons.

Congress, under the Water Resources Development Act of 1986 (17), deauthorized many projects. Another cluster of projects were deauthorized in 1990. A cumulative list of deauthorized projects is published each year in the *Walla Walla Extract* of the *Report of the Secretary of the Army on Civil Works Activities* (18).

Flood Control Projects

This section describes flood control and related projects actually constructed or modified by Walla Walla District during the 1981-2000 time span.

Dams and Associated Structural Solutions

❖ Ririe Dam and Lake, Willow Creek, Idaho (modifications 1980)

The Flood Control Act of 1962 (19) authorized the Ririe Dam project. The project is located on Willow Creek in southeastern Idaho, northeast of the City of Idaho Falls, Idaho. The project was designed and constructed by Walla Walla District. The project provides storage space for flood control, irrigation, recreation facilities, and the construction or improvement of the Willow Creek channel downstream from the dam to the Snake River.

Ririe Dam is a rockfill dam, 253 feet high and 1,070 feet long at the crest. Main dam construction was completed and the lake was filled in 1975. In 1976, the project was transferred for operation to the U.S. Bureau of Reclamation. A contract to correct miscellaneous deficiencies was completed in fiscal year 1980. Total federal cost of the project was $39,677,448.

❖ Willow Creek Dam, Heppner, Oregon (1983)

This landmark project, designed and constructed by Walla Walla District, was the first dam constructed using roller-compacted concrete. The project became operational with initial water impoundment in 1983. In 1984, the project was transferred to the Corps' Portland District for operation and maintenance. Willow Creek Dam is discussed in chapter 5 in the section on engineering innovations.

❖ Blackfoot Dam and Reservoir Modification (1986)

Blackfoot Reservoir is on the Blackfoot River about forty miles southeast of the City of Blackfoot, Idaho. The project is owned and operated by the Bureau of Indian Affairs. The main dam, which extends about fifty-five feet above the streambed, is a rockfill structure with a concrete core. China Hat Dam, an earthfill structure, closes an arm of the reservoir near its upstream end to minimize storage loss due to seepage. Because of seepage losses from the southern end of the reservoir, the operating level of the reservoir was severely limited. Water stored in the reservoir was used to irrigate lands of the Fort Hall Indian Reservation in the vicinity of Blackfoot.

The Flood Control Act of 1962 (20) authorized the Corps to make modifications to the Blackfoot Dam in order to incorporate flood control as a project function. Walla Walla District completed a design in 1969 that proposed modifying the spillway and outlet works at Blackfoot Dam, raising the operating pool elevation, and also raising the upstream China Hat Dam ten feet. By 1974, intense local opposition developed as it became evident that the higher operating pools proposed in the dam modification plans would inundate summer homes recently constructed in the area. The local sponsor then withdrew support for the modifications.

In a 1978 report, the District revised the modification plans proposing that the spillway and outlet be reconstructed so the normal operating pool could be maintained at its historic level. The reconstruction would serve the need to improve dam safety, but new flood control capability would be reduced as compared to previous plans. These modified proposals gained public acceptance from the concerned agencies and private groups. However, Corps higher authority disapproved construction since the

modifications would be essentially a correction for dam safety rather than for flood control, as authorized.

The Bureau of Indian Affairs then pursued funding on its own, and the Corps agreed to accept the Bureau's request to design and construct the proposed modifications. Construction work was completed in 1986 at a cost of $7.4 million.

❖ Zintel Canyon Dam, Kennewick, Washington (1993)

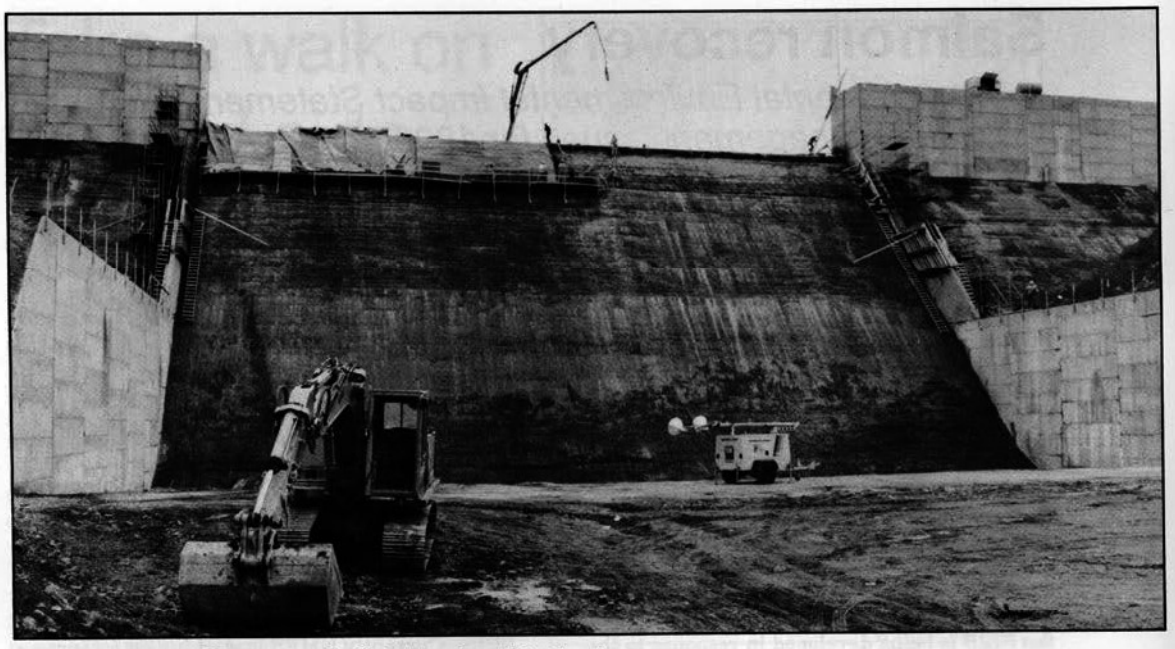
The Flood Control Act of 1965 (21) authorized the Zintel Canyon Dam project. The project was a local flood protection project that provides flood protection to portions of the City of Kennewick, Washington. The project consisted of a 90-foot-high, 520-foot-long, roller-compacted concrete detention dam, which became operational in December 1992.

The project has an uncontrolled spillway and fixed-release outlet works at the mouth of Zintel Canyon. The project includes a 78-inch round buried conduit of 400-cubic-feet-per-second capacity and 4,165 feet in length. It also features an improved channel and culverts to carry discharges from the outlet works and flood inflows below the dam. The discharge-carrying conduits, channel, and culverts run through the developed section of Kennewick to the Columbia River. The dam has a retention capacity of 1,260 acre-feet to provide protection for a 100-year flood for a 19-square-mile watershed behind the dam, and a 50-year protection through the city. A permanent reservoir was not maintained behind Zintel Canyon Dam.

During the review period for this flood control project, it became apparent that a roller-compacted concrete dam might be the most cost-effective way to build the structure. Local support for the project diminished because of financial considerations, and General Design Memorandum No. 2 (22), describing the project and originally issued by the Walla Walla District in 1974, was never implemented.

In February 1982, the City of Kennewick, Washington, submitted a letter agreeing to sponsor the project. Walla Walla District initiated a reevaluation of the project. A Post-Authorization Change Report reduced the flood control storage of the authorized project and added a railroad floodgate. Corps Headquarters approved these changes in 1990. Plans and specifications were developed in fiscal year 1991. Construction of the dam and channel began in fiscal year 1992. Major construction contracts were completed in 1993.

The nonfederal sponsor, the City of Kennewick, Washington, paid twenty-five percent of the total cost. Federal cost for the dam was $7,275,000. The nonfederal cost-sharing portion for the City of Kennewick was $2,425,000.



Shotcreting the spillway was the finishing touch to the dam.

Zintel Canyon

Roller compacted concrete dam nears completion

Story by James S. Hackett
Photos by Tom Holt

Property damage from flooding at Zintel Canyon may be a thing of the past as construction nears completion on the Zintel Canyon Flood Control Project.

The project is a cost-share partnership of the Walla Walla District and the city of Kennewick to provide protection from flash floods. As recently as 1991, floodwaters from Zintel Canyon caused flooding in Kennewick.

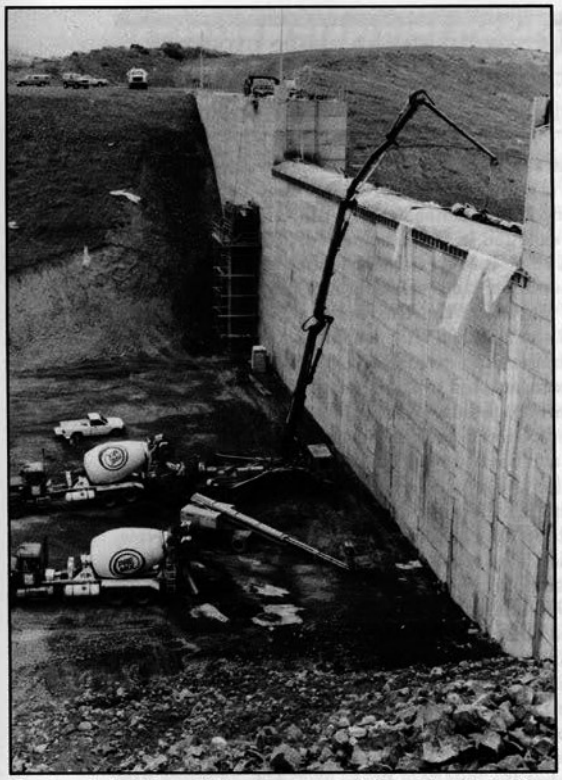
Once completed, the 90-foot-high dam will slow down and divert floodwaters from homes and businesses in the Kennewick area. It's designed to provide 100-year flood protection at the dam site and 50-year protection is provided by a newly buried 78-inch conduit through the city.

Zintel Canyon Dam has been on District drawing boards since the District first began in the late 1940s. One of the District's early employees, Elizabeth Johnson, now retired, recalled that Zintel was one of her first drafting projects. Local interests contacted the Corps for flood control assistance in 1953, and the first study was completed in 1957.

Delhur Industries, Port Angeles, Wash., the contractor for the main dam construction, completed the placement of roller compacted concrete (RCC) for the dam on Oct. 15.

Roller compacted concrete is a mixture of aggregate and cement and is less expensive than conventional concrete dam construction. Walla Walla District pioneered the use of RCC in 1984 with construction of Willow Creek Dam for Portland District. A 1980 design memorandum on the project before Willow Creek was built, reveals that the Zintel Canyon was considered at one time as the "first prototype for a cement-enriched dam using RCC principles."

Steve Tatro, project engineer for the dam design and construction, Engineering Division, said the RCC process employed at Zintel isn't much different than that applied at Willow Creek, but has a higher cement paste content. He said the intake



Shotcrete for the spillway is pumped from trucks to the top of the dam.

structure should pass all the water that accumulates behind the dam, and noted the spillway crest was added in case of a 100-year flood.

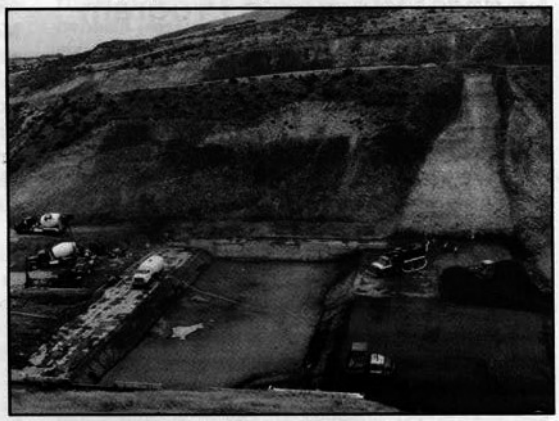
Conventional concrete was applied to the spillway crest by compressed air called shotcreting, said Dave Opbroek, project engineer, Construction Division. The shotcreting is intended to provide a stronger, less corrosive top to the spillway structure.

The new flood control dam contains an intake structure which is designed to funnel flood waters from the canyon through the dam in a 48-inch diameter steel pipe leading to a flood control channel below the dam.

The Corps expects nearly all of the construction to be completed by the middle of this month. The contractor will return in six months to perform core and pressure tests on the RCC concrete, and by April 1993, all work should be completed.

The flood control channel portion of the project was constructed under a separate contract by Pape and Sons, Gig Harbor, Wash. Randy Chong, Engineering

Jim Moyer, Zintel project manager (right), points out features of the project during a tour of the site by District employees in July.



Construction of the stilling basin was completed before the dam was constructed.

Division, served as project engineer on the channel design and construction. A 78-inch pipe runs below city streets for approximately three-fourths of a mile to the Tri-City Country Club Golf Course.

Construction of the 4,200-foot buried flood control channel involved extensive relocation of water, gas, telephone and other utility lines through the city of Kennewick. All channel work is estimated to be completed in December 1992.

According to Jim Moyer, Zintel Canyon project manager, the total cost of the project is currently estimated at $10.9 million, of which 25 percent will be shared by the city of Kennewick.

REAL ESTATE HELPS BUILD ZINTEL CANYON DAM

The other most memorable project we [Walla Walla District, Real Estate Division] were involved in [during the 1981-2000 period] was the Zintel Canyon project in the Tri-Cities. This was a very large, locally sponsored flood control project. It was what we refer to as a dry detention dam, as opposed to retention. Detention meaning that, in a flood event, it would hold water temporarily and release it over time, but with the main intent that it would be dry any other time than when a flood occurs. … There was a lot of real estate acquisition [for this project]. We worked very closely with the City of Kennewick. Under the cost-sharing agreements or contracts, the nonfederal sponsor is required to provide the lands, easements and rights of way, and disposal areas for the project. We [*i.e.*, Corps staff members] do the planning. We assist them in accomplishing their goals. Make sure everything is done according to federal requirements and so forth. On that project, there were over one hundred tracts involved. It took a lot of coordination with the city. Several … real estate, and legal issues evolved concerning mineral rights where the dam site is located. Flowage easements … [were an issue because] the dam itself … is immediately adjacent to the golf course there. Being a detention dam, it releases water continuously during the flood event. There's an open outlet. It's about six feet square. Since we were going to be letting more water through that golf course than would normally occur over a longer period of time, we thought that there was a "taking," meaning, a significant interruption in the use of the land. We acquired, or had the city acquire, flowage easements through the golf course to allow for that. It involved a lot of discussions, negotiations with the City. There again, that was a very memorable project from the standpoint that it was our largest locally sponsored project during my tenure here [at Walla Walla District]. It worked out very well and everyone's very satisfied with the results. We're still waiting for a major flood though. –Richard Carlton, Chief, Real Estate Division (23).

- **Mill Creek Projects (modification 1982, lake name change 1992; levee extension)**

The Mill Creek Flood Control Project, located near the City of Walla Walla, Washington, consists of two main units: (1) the Mill Creek Channel; and (2) Virgil B. Bennington Lake, an off-channel reservoir, with associated federal lands.

Bennington Lake (renamed from Mill Creek Lake in 1992) contains the diverted floodwaters of Mill Creek. The reservoir has a maximum storage capacity of 8,300 acre-feet at elevation 1,265. The reservoir is the only public lake within forty-five miles of the City of Walla Walla. Construction of the dam was completed in 1942. An auxiliary outlet channel and the construction of additional drainage facilities were completed in 1944. The paving of Mill Creek Channel, through the City of Walla Walla, was completed in 1948.

A plan of rehabilitation was initiated in fiscal year 1978 to correct seepage and internal erosion that had occurred during periodic fillings of the reservoir during flood control use of the project. The rehabilitation plan included a concrete cutoff wall at the upstream toe of the dam, a compacted silt face on the embankment, new trash racks, riprap at the downstream end of the diversion structure, replacement of cracked slabs in the intake canal, and wildlife habitat and improved fish facilities for anadromous fish. The plan modified the outlet works by constructing a two-way drop inlet over the existing sluice gate. The storage dam rehabilitation contract was awarded in 1981, and was completed in 1983. Mill Creek channel is owned, operated, and maintained by the Mill Creek Flood Control Zone District (Walla Walla County, Washington).

Total federal expenditures through September 1997 were $34,176,920 ($17,714,102 for the rehabilitation and $2,258,495 for the original project) and $14,204,323 for operations and maintenance. In addition, local interests contributed $80,000 towards the construction of the channel through Walla Walla, Washington.

The Mill Creek Right Bank Levee Extension was authorized by the Flood Control Act of 1948 (24). The purpose of this project was to protect Walla Walla County and the City of Walla Walla, Washington, from flooding over the right bank of Mill Creek. The Mill Creek project facilities were designed to protect Walla Walla from a flood with a 100-year recurrence interval. However, in February 1996, Mill Creek experienced a flood discharge equivalent to a 70-year flood. Discharge escaped from the creek upstream of the flood control project, in the reach proposed for levee extension. The flood discharge entered the Walla Walla Community College campus. Flood fighting efforts returned at least a portion of the flow through the campus to the Mill Creek channel, and damage to the college was minimized. However, if a 100-year flood had been experienced, discharge as high as 1,000 cubic feet per second could have flooded over the banks of Mill Creek at the proposed project location, avoiding the Corps-constructed flood control project downstream. Major property damage to Walla Walla Community College and the City of Walla Walla could have resulted had this occurred. The levee extension project is in the plans and specifications phase. Walla Walla County is the local sponsor for this project.

Levees

❖ Jackson Hole Levees

The federal Jackson Hole Levee project was authorized as a local flood protection project under the Flood Control Act of 1950 (25). The project is located in Jackson Hole, Wyoming, and consists of twenty-two miles of levees on both sides of the Snake River, as well as on two and one half miles of the Gros Ventre River. In addition, a series of federally and nonfederally constructed levees, with a total length of approximately five miles, are interspersed along both banks of the Snake River from the U.S. Highway 26 Bridge to four miles downstream of the Jackson-Wilson Bridge.

The operation, maintenance, modifications, and additions to all the federally and nonfederally constructed Jackson Hole levees became Walla Walla District's responsibility under the Water Resources Development Act of 1986 (26). This action was supported and documented in the 1990 study, O&M Decision Document, and EIS (27). The study identified the physical, economic, and environmental factors associated with operation and maintenance of the existing levees and determined that federal operation and maintenance of the project would reduce maintenance costs, finding an annual benefit-to-cost ratio of 7.3 to 1. The report stated that all of the levees, both federal and nonfederal, are economically justified for federal operation and maintenance.

As specified in the enabling legislation, the nonfederal sponsors must pay the initial $35,000 of any costs incurred in any one year. A Local Cooperation Agreement was signed in September 1990 with Teton County, Wyoming.

Emergency repairs of the 1986 spring flood damage in the Jackson Hole area began in summer 1986, and were completed in June 1987. Teton County, under their Local Cooperation Agreement, worked with the Corps during spring runoff performing emergency levee maintenance. Fiscal year costs for emergency repairs were $864,762.

In 1988, after the Corps had taken over responsibility for the entire Jackson Hole Levee system, Walla Walla District began a reconnaissance study to analyze the existing levee system to determine the modifications necessary to maintain system integrity, reduce operation and maintenance costs, and minimize future emergency repairs. The study looked at the potential for improving the system with levee raises, extensions, or relocations. A draft report was completed in 1990. The final reconnaissance study was combined with the Jackson Hole fish and wildlife restoration study and was completed in 1993 (28). The environmental impact statement identified significant changes in habitat diversity that appeared to be caused by the construction and operation of the levees.

The feasibility study cost-sharing agreement was signed with Teton County. During negotiation of the agreement, the scope of the study was reduced to a range within the sponsor's fiscal ability. This revised scope sought to determine the feasibility of providing environmental restoration to areas situated between the flood control levees. The Jackson Hole, Wyoming, environmental restoration project arising from this study will be discussed in chapter 7.

A long-term source of riprap and adequate access to all of the levee sections has been an ongoing concern for operation and maintenance of the Jackson Hole Levees. Public meetings, environmental studies, and solicitation of comments from interested parties were undertaken in January 1993. Three of the quarry sites proposed were located on National Forest lands. Due to public controversy, the Corps eliminated those sites from further study.

The District then pursued the concept of non-rock alternatives for riprap and potential quarry sites outside of a 25-mile radius of Jackson Hole. Eventually, approximately 12,000 cubic yards of riprap were stockpiled for future use, mostly from an area ski resort. The Sewell Levee was repaired to its original shape and dimensions. In 1994, the Corps enacted a rental equipment and service contract to rehabilitate and maintain the levees, with some work in-kind by Teton County.

Total federal expenditures for the Jackson Hole Levees through September 1997 were approximately $8.5 million, including just over $2.5 million for new work since 1986 and $5.7 million for operation and maintenance. Nonfederal sponsors had contributed almost $318,000 through September 1997. As of 1997, estimated savings from potential flood damage were over $47 million.

❖ Lewiston Levees

The Lewiston Levees (also called the Lower Granite Levees), near Lewiston, Idaho, were finished in 1975 as part of the Lower Granite Lock and Dam project and were one of the first levee systems to be landscaped as a public park area (see chapter 11).

Construction, however, was far from the end of the District's involvement with the levees.

DOWN ON THE LEWISTON LEVEES

[The Lewiston Levee system] is really an earthen dam. It has a cutoff wall in it like any other earthen dam would have, and it has to be maintained or the City of Lewiston's downtown area would be under about fifteen feet of water. [Maintenance includes] inspections [of] pump plants [and] the underground conduit system between the ponds and pump plants. [It also includes] inspecting the levees for leakage. It's an eight-mile-long dam. …

Any time you build a structure that's protecting millions of dollars of businesses and homes, there's going to be concern by somebody that there could be a leak there. A leak doesn't take long to cause a big problem. As an example, there are eight-inch water lines on the levee that are used to irrigate the trees and so on. When one of those lines breaks, if it's only on for two or three minutes, flowing, leaking out through the ground, it'll wash out a hole just about big enough to put a little Datsun pickup in. We've had that happen on several occasions. Since then, we've improved our water pressure shutoff system, so that if the pressure drops, it shuts the pump off, and all you get [leaking out] is whatever is in the pipe right then. …

Potlatch [Corporation, a forest products company] has a 48-inch effluent line that goes from their mill underneath [U.S.] Highway 12, the truck bypass, to Fifth Street in Lewiston. Then it crosses the levee and goes out to the confluence of the Snake and the Clearwater. That's where it spills its effluent. … Even though it was buried ten feet deep, [with a leak] after a little while, it surfaces. One time a semi-truck dropped into it *[i.e.*, the hole created by the leak]. Other times, it broke, and people noticed it before any vehicle accidents. But all of a sudden you get about two million gallons of effluent spilling into the levee ponding and ditch system that you have to deal with. You have to coordinate the release of that water on out into the river with Fish and Game folks [and] DEQ [Idaho Department of Environmental Quality]. ...

You might have a thunderstorm in the area. With a thunderstorm, you're going to get a lot of runoff. You also get lightning bolts that sometimes knock out your power. We may have a pump plant that goes out at the very time it's needed to pump the water out of the ponding areas into the river. I can only remember one time over at North Lewiston where we actually got water on the football fields. It was from a thunderstorm that knocked out the power to the pump plant. There are two pump plants on that side of the river. They collect all the water that comes off of that North Lewiston hill. You can get tremendous volumes. It's about 2,000 feet high.

We learned lessons over time—we used to think we had to clean out all the dirt out of those conduits every year because the water backs up from the Clearwater River into those conduits a couple of hundred feet. … We used to do a big effort every year and take two or three months to get all that muck out of there. We had a little sports model front-end loader, a German made front-end loader that was low to the ground. It probably wasn't more than about three feet high, a one-yard loader. Guys would spend weeks going down in there getting one yard of this muck out of there at a time after we'd spent probably a week or more trying to stop all of the leakage of the Clearwater River back into the tunnel so it was safe to get into. Plus you had air quality problems you had to deal with to keep the air moving through so the diesel fumes wouldn't overcome the workers. It was a real hazard. We said, [the sediment is] not going to stay there if we have a flood—why worry about it? –Phil L. Hixson, long-time staff member at the Clarkson Area Office (29).

In 1992, Walla Walla District realized that there was another problem on the Lewiston Levees—a major marmot problem. The population of small rodents had gone through a population explosion in the spring of that year, and the Corps estimated that four hundred of them were at work burrowing into the dikes, undermining them.

The Corps had little luck trapping the yellow-bellied marmots and in May of 1992 announced that it would poison the animals with carrots laced with zinc phosphide (30). Public outcry was swift, “Does anyone realize that the poison the Corps of Engineers plans on using, zinc phosphide, is the same poison prisons use in the gas chamber? “I have to ask,” wrote one citizen to the editor of the *Lewiston Morning Tribune*, “does, the Corps of Engineers derive great pleasure in watching these animals writhing in a lot of pain and agony (31)?” A local veterinarian advised the Corps in the newspaper about the use of anticoagulants, which might cost much more and require a special permit, but which would avoid the inhuman death by zinc phosphate (32).

Recreation on the Lewiston Levee

Marmot on Levee Riprap

In deference to strong public sentiment, the Corps abandoned notions of poisoning the marmots and by the end of August was looking at plans to trap the creatures and find suitable habitat in which to release them (33). With further investigation, Walla Walla District discovered that none of the rodent burrows was deeper than five feet into the levees. This was a situation that could be lived with by the Corps. In July, the animals hibernated and lack of suitable food supplies the next spring kept the population down to acceptable numbers.

In 2000, another problem emerged with the embankments at Lewiston. The problem was clearly linked to the drawdown test of 1992 (discussed in chapter 8). Since that test, the Lewiston Levees had been experiencing significant episodes of seeping through the levee. Fixing the levee could include such measures as injecting grout into the embankment or simply removing and replacing areas where seepage is occurring.

❖ McNary Levee System

The Corps built the levees in the Tri-Cities, Washington, area as part of the McNary Lock and Dam project in the 1950s. The levees were essential for the protection of the Tri-Cities, holding back water at all levels of normal reservoir fluctuation and in the event of high flows during floods.

In 1987, the Tri-Cities Rivershore Enhancement Committee was formed by citizens of the Tri-Cities of Kennewick, Richland, and Pasco, Washington. The purpose of the committee was to evaluate the river shore and seek changes that would enhance the economic climate within the Tri-Cities. "Tri-Citians want the levees reduced so they can have easier access to the water for recreation and commercial development on the shoreline (34)."

The Corps responded that upstream storage developed since the construction of the McNary Levees might provide an opportunity to reduce levee heights for the purpose of land enhancement and recreation, perhaps allowing a reduction in levee height by three to four feet. The Rivershore Enhancement Committee hired a consulting company to evaluate the situation and develop alternatives, which were presented in a 1989 report.

Political interest in this project was intense. The situation was further complicated because $2 million for Tri-Cities levee beautification had been included in a proposal to construct a second powerhouse at McNary Lock and Dam. "Beautification money was included because anytime the Corps does something that changes the environment, it is allowed to request money for beautification (35)," reported the local newspaper. When McNary's second powerhouse was not funded in 1991, the possibility of beautification funds disappeared.

In 1992, Walla Walla District completed a reconnaissance study of a proposal to lower the levees in Kennewick, Pasco, and Richland, Washington. Although the District wished to cooperate with this improvement plan (36) the study had to follow national guidelines for determining federal interest in a project—guidelines that gave low budgetary priority to recreation and land enhancement (37). The study found that there was not a federal interest in lowering levees. However, the reconnaissance study did show that levee lowering in the Tri-Cities would be possible in terms of maintaining flood protection. The Tri-Cities Rivershore Enhancement Committee attempted unsuccessfully to secure funding from Congress for the plan despite the finding of no federal interest.

This controversy over the lowering of the Tri-Cities levees set the stage for later developments related to federal lands along the river in the Tri-Cities area. The Water Resources and Development Act of 1996 (38) called for transfer of these Corps lands to the local governmental entities in the Tri-Cities. This topic is discussed fully in chapter 11.

At the end of the period covered in this volume, the Tri-Cities Visitor and Convention Bureau continued to pursue levee lowering. Another development in regard to the Tri-Cities levees emerged from proposals that the four dams along the lower Snake River be breached (see chapter 8). In 2000, the Corps expressed concern that Tri-Cities levees should not be lowered until a firm decision about dam breaching was reached. "The Corps believed that there was potential for heightened backwater behind McNary Lock and Dam if the four dams above Pasco are removed (39)."

Stream Channelization

❖ Palouse River, Colfax, Washington (1986 addition)

This Palouse River project was authorized by the Flood Control Act of 1944 (40). Located at the main stem of the North and South Forks of the Palouse River, it also included a portion of Spring Flat Creek, a tributary stream. The entire project was within the City of Colfax, Washington. The project consisted of 3,740 feet of concrete-lined channel, 4,910 feet of revetted channel (41), and 2,330 feet of unrevetted channel and drainage structures. The channel provided flood control at Colfax, Washington, using channel enlargement and modifications, levees, and floodwalls. The project included a concrete lining in the Palouse River, South Fork Palouse River, and Spring Flat Creek. Construction was started in January 1962 and completed in December 1965.

Two small additions were made to the project during the period covered by this volume. The first addition was a gravity storm sewer from 7th Street to 12th Street, emptying into the channel. The concrete intake slab and some neighborhood fencing were repaired. Construction of this addition began in August 1984 and finished in December 1984. The second addition was a drainage system for the channel slab at the foot of 6th Street. The system consists of perforated piping and two pumping stations to eliminate water trapped below the channel slab and behind the channel retaining wall. Construction on this addition began in July 1985 and completed in September 1985.

The City of Colfax secured the necessary right-of-way and other sponsorship requirements. At the time of this writing, total federal expenditures were $5,810,240. Total contributed funds were $44,500.

Other Structural Solutions

❖ Ice boom on the Salmon River, Lemhi County, Idaho (1991)

Walla Walla District has many streams that are prone to ice jams. In 1986, for example, there was a large ice jam on the Snake River from Brownlee Reservoir to the area of Homedale, Idaho, that resulted in some flooding of tributaries in Oregon and Idaho.

Other areas were subject to periodic ice jams and flooding. That was the case on the Salmon River in Lemhi County, Idaho. The Corps' innovative engineering solution to these floods on the Salmon River was an ice boom, discussed in chapter 5 of this volume.

❖ Cottonwood Community Church, Culdesac, Idaho (1983)

The Cottonwood Community Church project was authorized by the Flood Control Act of 1946 (42). This project is located one mile upstream from the mouth of Cottonwood Creek on the Clearwater River, near Myrtle, Idaho. A levee was built for flood protection by local entities some years past. Heavy spring runoff in 1983 damaged the levees and caused extensive erosion. Quarry tailings, overlaid by placed riprap, were placed along three hundred feet of eroding streambank adjacent to the Cottonwood Community Church property. The completion of bank protection work was accomplished in fiscal year 1983. Local entities provided rights-of-way and other sponsorship requirements. Total federal funds expended were $23,400.

❖ Burnt River, Huntington, Oregon (1986)

The Burnt River flood control project was a small project authorized by the Flood Control Act of 1946 (43). Because of heavy rainfall in eastern Oregon in 1982 through 1984, Burnt River accelerated its natural bank and bed erosion process. In 1965, the City of Huntington, Oregon, built its sewage lagoons less than one hundred feet from the bank of the Burnt River. The river eroded toward the upstream lagoon, and bank protection became necessary. The downstream end of the lower lagoon is also in jeopardy. Revetments along both lagoons do not provide protection from scouring by the river. The plan of improvement was to place riprap on the entire riverward embankment. This required six hundred cubic yards of gravel fill to be placed as filter and bedding for 2,400 yards of riprap. Riprap was placed along the entire riverward embankment in 1986. The City of Huntington, Oregon, sponsored the project. The total federal cost for the project was $88,500.

❖ Clear and Burnt Rivers, Oregon (1988)

Located at the City of Huntington wastewater lagoon, in Malheur County, Oregon, this small flood control project involved placing roughly eight hundred feet of riprap along three cells of the lagoon system to protect the sewage treatment plant. The project was authorized by the Flood Control Act of 1946 (44) under the clause for protection of public works. Construction took place during the summer of 1985. The rock originally approved for the project proved to be too soft, and a new source was not found until after wire mesh and ground staples had been procured. These materials were subsequently placed in storage at a federal facility. The City of Huntington sponsored the project. Total federal expenditures were $99,500.

❖ Malheur Lake Project, Oregon (1990)

Following a 1987 feasibility study which examined flood control for Malheur and Harney Lakes (see above), the Corps pursued one alternative as feasible—relocation of a railroad line. The railroad in this vicinity was out of service for at least five years in the 1980s because of flooding. An exception to the policy of no federal participation in projects that are of benefit to only a single owner was granted in May 1988. The exception was granted because of substantial benefits that would accrue to the U.S. Forest Service through increased timber sales and receipts should the railroad be made operable. Implementation of the railroad relocation project was being pursued under the Continuing Authorities Small Flood Control Projects Program. Approximately

6.3 miles of flooded railroad in the vicinity of Burns, Oregon, were raised. Construction began and was completed in 1991 at a total federal cost of $3,414,848.

Dam Inspection and Safety

Routine Dam Safety Inspections

Walla Walla District conducted regular dam safety inspections of dams and flood control structures. Each year during the 1981-2000 period, a number of structures were formally inspected onsite. For example, in 1988, the following structures were examined: Lower Granite Lock and Dam, Lewiston Levee system, Tri-Cities Levees, and Dworshak project. In 2000, District staff inspected McNary Lock and Dam, Lucky Peak Dam, the Dworshak low level outlet, and the stilling basin at Lower Monumental Lock and Dam.

Periodic examinations of stilling basins involved diving inspections and, beginning in the 1990s, use of multibeam bathymetric survey techniques. These techniques use sonar to provide a rapid means of determining the morphology and nature of the sediments and other features in the stilling basin. Multibeam techniques give many (30-150) individual soundings of the water depth and echo strength for each "ping." Automatic computer-tracking programs determine depths and echo strengths for each beam, correct for motion, and calculate a precise geographic coordinate for each individual sounding. Several stilling basins, including the McNary basin, as outlined in a 1990 report by Walla Walla District (45), required major repairs.

Nonfederal Flood Control Project Inspections

In accordance with nationally established criteria, Walla Walla District conducted continuing field inspections of nonfederal flood control projects. Ratings for each structure were given in accordance with the "Non-Federal Flood Control Inspection Guidelines" provided in *Engineer Regulation 500-1-1* (46).

In 1990, for example, the District reported that the Non-Federal Levee Evaluation Program was completed. During the previous three years, Walla Walla District had completed inspection of all nonfederally constructed levees on which the Corps had provided emergency assistance. More than two hundred nonfederal levees throughout the District were inspected (47).

Earthquake Inspection

In 1981, the Puget Sound area was rocked by the Nisqually Earthquake, a tremor that registered 6.8 on the Richter scale. In 1983, the Borah Peak Earthquake, a major earthquake of 7.3 magnitude and the 14th largest ever recorded in the contiguous United States, was centered in the Big Lost River basin in Idaho, within the boundaries of Walla Walla District. The earthquake caused land subsidence and increased the potential for future flooding problems. The vicinity of Walla Walla, Washington, experienced earthquakes of 4.3 in November 1991, 4.1 in July 1992, and 2.8 on the Richter scale in September 1992. The Challis, Idaho, area—about fifteen miles from Borah Peak—experienced a level 5.0 quake in 1994.

In such an earthquake-prone environment, the ability of dams and other structures to stand up to earthquakes was a real concern for the Walla Walla District. In 1980, the District revised an already existing fault and earthquake hazard evaluation of its major projects: McNary, Ice Harbor, Lower Monumental, Little Goose, and Lower Granite Locks and Dams (48). Thereafter, dam seismic analysis became an ongoing District activity. In 1989, for example, the District was involved in seismic safety analyses of Lucky Peak Dam, Ririe Dam, McNary Lock and Dam embankments, and the Tri-Cities Levees. These studies continued into the early 1990s (49). The late 1990s found the District continuing seismic assessments of flood control structures. In 2000, for example, walk-through inspections of Mill Creek, McNary, and Ice Harbor projects were performed (50).

SHAKE IT UP BABY, OR WOBBLE-PROOFING DAMS

We were involved with earthquake effects on the dams. We had to evaluate various embankment dams, or embankment-abutment tie-ins for the dams within the District. I got to be involved with a couple of those. …

In 1989, we had the San Francisco earthquake and shortly after that the one in L.A. Leading up to that, there was a big earthquake in China. That was maybe about 1985. Then, in 1983, we had the earthquake over in Challis, the Borah Peak Earthquake. Those were … larger earthquakes.

That spawned a lot of focus within the Corps to get these things [*i.e.*, structures] evaluated. Having the Borah Peak earthquake within our District made for a lot of interest within our District. … I found it to be interesting, state-of-the-art type of work. …

Particularly with Ririe Dam. … We had our Waterways Experiment Station doing testing with gravels. Gravels are really hard to evaluate for liquefaction. They had three-foot-diameter tri-axial tests done on these [materials]. Normally the tri-axial tests you do are on inch-and-a-half samples. But these were three-foot-diameter samples that they put into enormous machines and applied seismic loads to. That was a unique thing. I don't think there have been more than a handful of cases where they will try to analyze the foundation of a dam that way. Those were pretty unique, not only within the Corps, but nationwide. That was pretty neat, to get to be part of that.
–Wendell L. Greenwald, Project Engineer (51).

Flood Preparedness

Forecasting Floods and Reservoir Control

Walla Walla District had responsibility for regulating several reservoirs in the area for the purposes of flood control. A District staff member involved with this work describes it below.

REGULATING THE RESERVOIRS AND FLOOD FORECASTING IN THE WALLA WALLA DISTRICT

A lot of people don't know about the reservoir regulation activities that go on within the District here. For instance, some of the activities we get involved in here are working on flood control of non-Corps of Engineer projects. We've got thirteen projects that are what they call Section 7, Flood Control [Act of 1944] (52) projects. Most of them belong to the Bureau of Reclamation, primarily, over in Idaho. We work hand-in-hand with them on volume forecasting, determining what [flows] to release from the projects. … That would include Jackson Hole, Wyoming, Jackson Lake, [and] Palisades. Over in Idaho, [there is] Ririe, which the Corps of Engineers built. After it was built, it was turned over to the Bureau of Reclamation to own and operate. [We monitor] a small project near Cary, Idaho—Little Wood River Reservoir.

Then, on the Boise [River], Lucky Peak is Corps of Engineers. We do the day-to-day reservoir regulation on that, plus we work with the Bureau of Reclamation on the two upstream projects that are owned by the Bureau—Anderson Ranch and Arrowrock. Over on the Malheur Reservoir, there are three projects that the Bureau has that we work with them on the flood control portion of it—Willow Creek, Warm Springs, and Agency Valley projects. Then, near Baker, Oregon, on the Powder River, there's Mason Dam, Phillips Lake. …

Then, also, we get involved in Idaho Power Company projects, the Hells Canyon projects—Brownlee, Oxbow, and Hells Canyon Dams. According to their FERC [Federal Energy Regulatory Commission] license, there's required flood control storage in Brownlee and there's navigation requirements from Hells Canyon. We work with them on a regular basis. We get special O&M [operations and maintenance] funding for that particular function. …

We do runoff, long-term forecasting. We do streamflow forecasting—work with the Natural Resources Conservation Service on snowpack [estimation]. We work with other agencies on that. That's on a regular ongoing basis.

We've had quite a number of [flood] events [involving] Mill Creek, the last [major] one being 1996. [There was] a smaller event back in 1997 also. Some were back in the early 80s where we've had to divert water over to the reservoir and then get the water out from the lake after the event is over with. The '96 event, for instance, the operation there—that was the most water we'd ever put in Mill Creek Reservoir. We came within five feet of filling it totally to the top. The operation actually, we estimate, saved about $10 million worth of damage to downtown Walla Walla. … All of us within Hydrology and across the District were pretty proud of that operation.

We can say the same thing down at Boise, down at Lucky Peak, and [with] Boise system operation. [In] the '96 [flood] event there, we estimated that the winter operation saved well in excess of $100 million of damage. Those are just two examples. …

Back in the early '80s, we had a series of very, very large flows on the Boise River—1982, 1983, 1984. [In] 1983, we took the Boise River down below Boise up to about 9,500 cubic feet per second. That's the largest amount that's been there since the project has been in, but even at that, it's still well below what's considered to be a 100-year event. Even at that, there's been so much development within the floodplain that we see minor damages even at the small flows. It's been very interesting. It's been very much a challenge.
–David L. Reese, Chief, Hydrology (53).

The primary flood forecaster for the District elaborated further regarding the Boise River flows of 1983, which he considered his most challenging flood-forecasting situation. "We nearly lost the flood. We normally keep our water level at 6,500 cubic feet per second, according to our water regulation manuals, but the level of water in the Boise River crested to 9,500 record feet. It was one of our closest calls. [A District hydrologist] had just completed a new method of forecasting streamflows which

gradually helped our regulation of that one (54)." These experiences are one of the reasons that the Boise River continued to be intensively studied by Walla Walla District (above). The Boise flood of 1983 is discussed further in the flood fighting section below.

As described in chapter 4, operation of the Federal Columbia River Power System is controlled at the Reservoir Control Center in Portland, Oregon. Flood control issues, along with the needs of fisheries and hydropower, were considered by an interagency Technical Management Team, which included representation from Walla Walla District. The U.S. Geological Survey and the Corps provide the TMT with runoff forecasts.

Throughout the era, the need to "draft deep" or lower reservoirs in the Columbia River system was an issue (55). The Corps generally took a conservative stance, asking that water levels at dams such as Hungry Horse and Libby in Montana and Walla Walla District's Dworshak Dam be kept low in the spring to accommodate possible large flows of water from melting snowpacks and spring rains. In February 1990, for example, the District increased Dworshak outflows, lowering the reservoir: "The rising water flows now will help prevent a real flood later, maintains the U.S. Army Corps of Engineers, which operates the dam. Steelhead fisherman started calling the Corps shortly after water levels on the North Fork [of the Clearwater River] rose dramatically last weekend, more than doubling from Saturday to Sunday. … 'It makes it more difficult to fish,' said [an] Idaho Fish and Game regional fishery manager at Lewiston (56)." Similar issues continued to arise in 2000, when Technical Management Team fish managers blamed early flood control releases for the low flows available later in the year for migrating juvenile salmon (57).

Advance Measures

When situations arise that can reasonably be expected to lead to flood, the Corps of Engineers can use its authority to take advance measures to reduce flooding. Two such projects are described below.

❖ Oakley and Burley, Idaho (1984)

High runoffs in 1984 nearly resulted in a flood in the area of Oakley Dam, near Oakley, in Cassia County, Idaho. This disaster was avoided only by drastic flood fighting measures by the Corps and the local communities. One Walla Walla District hydrologist describes the situation and the measures taken:

> Over at a little town in Idaho, Oakley, in southern Idaho, they had a small municipal project there, privately owned by an irrigation district. … That particular project in 1984 filled, and it was going to spill. Previously they'd farmed over the old channel. There was really not a main channel down below there [below the Oakley Dam].
>
> It was quite interesting what the Corps of Engineers, Walla Walla District, did. [We] dug 26 miles worth of channel in two days. [The emergency channels] went across roads, farms, whatever, to get the water from Oakley down to Burley and the Snake River. The Corps had the help of the State of Idaho, the National Guard, and local landowners, as far as equipment and other things. It was quite an operation.

> I felt very, very proud that we in Hydrology were putting forth the channel size requirements, the timing—when we expected it to fill and spill—the conditions. We were providing all the support information that was needed by the rest of the District for a successful operation. (58)."

"If the canals hadn't been constructed, it would have cost Cassia County an estimated $3.5 million in damage, rutting fields which are expected to produce a healthy potato crop this season and destroying irrigation canals leading to fields within the immediate area (59)." This advance measures project was "One of the quickest flood control efforts in District history. … It was estimated that 75,000 yards of dirt were moved in a day, using 19 bulldozers, two front-end loaders, a dragline, and a backhoe. At one point during the canal construction, 41 dump trucks were driven by Idaho National Guardsmen recruited for the massive earth-moving operation. The equipment was in operation 22 hours a day, with NPW [*i.e.*, Walla Walla District] personnel usually working 12-hour shifts and at times 12 to 18 hours (60)."

❖ Weiser River in Washington County, Idaho (1984)

Since as early as 1894, damaging floods have occurred in the area of the Weiser River in Washington County, Idaho. The 1984 problem was caused by six gravel bars in the Weiser River from its mouth upstream to Galloway Diversion Dam. These gravel bars reduced flow capacity and encouraged ice jams. The project removed the six problem gravel bars. In five of the locations, the gravel was placed behind the existing levees and in the sixth location gravel was used to repair a damaged levee. All work was completed in 1984. Washington Flood Control District #3 sponsored the project and complied with all sponsorship requirements. The cost for this project was $108,000 federal and $1,000 nonfederal.

❖ Rapid Creek, in the vicinity of Inkom, Idaho (1985)

This project involved the removal of gravel, brush, and small trees from the creek to increase its capacity to convey future floods. The removal of debris from the lower 1.5 miles of Rapid Creek was completed in fiscal year 1985. The City of Inkom sponsored the project, contributing lands, easements, rights-of-way, and a disposal area for dredged sand and debris. Total federal expenditures were $19,500.

❖ Atlanta, Idaho (2000-2001)

Another such advance investment by the federal government of $106,000 was made in the area of Atlanta, Idaho, in the winter of 2000-2001. The area had experienced devastating forest fires in the summer of 2000, which "left communities like Atlanta, northeast of Boise, exposed and unprotected from possible floods next spring when snowpack melts in the Sawtooth Mountains. Flames consumed virtually all the protective vegetation that absorbs the runoff and slows potentially destructive flood water (61)." Advance measures near Atlanta involved installing several trash racks in the streambed of Quartz Creek and improving water passage by tearing out old 36-inch-diameter culverts and replacing them with new 54-inch culverts to better manage the volume of flow expected. Meanwhile, the U.S. Forest Service and the Corps worked to restore natural vegetation to the hillsides.

Flood Warning Systems

The Corps can assist communities in developing flood warning systems. For example, in conjunction with building the Willow Creek Dam, the Corps installed a flash flood warning system for Heppner, Oregon. The Corps bought and installed the system in 1982 under an agreement that the city would maintain the warning system. The system consisted of fourteen rain and snow gauges and three stream gauges in area drainages. "City officials praised the system, saying it would increase the amount of time available to evacuate the town in case of impending flood (62)."

In 1992, as part of a pilot project, Walla Walla District produced a Boise Flood Warning Preparedness Plan (63), one of only five such produced in the nation.

Snagging and Clearing

The Corps is authorized to undertake snagging and clearing of rivers under the Flood Control Act of 1954 (64). Often, snagging or clearing appears necessary after a large flood event or in anticipation of possible flooding brought on by accumulation of debris in a stream. Sometimes a snagging and clearing study was completed, but no action was taken.

The District performed the following snagging and clearing studies during this period: Salmon River, Lemhi County, 1981; Cassia Creek, Cassia County, Idaho, 1985; Grande Ronde River, Union County, Oregon, 1985; Pine Creek, Halfway, Oregon, 1985; South Fork of the Teton River, Madison County, Idaho, 1986; Boise River, Ada County, 1989; and South Fork, Boise River, Elmore County, Idaho, 1989.

Actual snagging and clearing operations carried out by Walla Walla District included the following: Salmon River, Idaho, 1981; Boise River, Ada County, 1983; Lapwai Creek, Nez Perce County, Idaho, 1983; Lostine and Wallowa Rivers, Enterprise, Oregon, 1983; Tucannon and Touchet Rivers, Washington, 1983; Walla Walla County, Washington, 1983; Salt River, Wyoming, 1984; Snake River, Teton County, Wyoming, 1988; Walla Walla River, Umatilla County, Oregon, 1988; and Malheur River, Vale, Oregon, 1990.

Flood Preparedness Exercises and Training

Walla Walla District engaged in many flood simulation exercises and training sessions. One of the largest was High Water 89 conducted over a period of five days in 1989. "The whole District participated along with the other districts in the North Pacific region. They had a planned exercise to try to figure out what would happen if one of the dams in Montana failed and what dams would be taken out. It was what they call a tabletop exercise. We actually had people calling in and running through scenarios … [showing] how high the water would be in the Tri-Cities, where the levees had to be beefed up. That was fairly significant (65)."

Again in 1992, Walla Walla District participated in a flood response exercise, this time simulating the effects of a breach in Idaho Power Company's Brownlee Dam on the Snake River. In 1995, the District conducted another exercise, which simulated a major flood on the Boise River. All offices and divisions in the District participated in this exercise that is related to a geographic area considered to have high potential for flooding.

Flood Flights and Rehabilitation of Flood Control Works

Walla Walla District stated its responsibilities regarding flood emergencies in the following paragraphs:

> "The first responsibility for protecting homes and property from flood damage rests with the individual. Local governments and agencies, such as flood control districts, may share in this responsibility and together form the community's first line of defense in preventing flood damages.
>
> "Occasionally, however, local resources are not able to control or contain a flood emergency situation. The U.S. Army Corps of Engineers' flood disaster assistance program is intended to supplement and assist local governments, institutions, and special purpose districts when more help is needed (66)."

The Corps was authorized to render emergency assistance under the following categories: flood fight assistance; rehabilitation of existing flood control structures; advance measures (discussed above); and emergency water supplies.

Flood fighting included strengthening existing flood control works, construction of temporary works such as earthen dikes and mud boxes, or sandbagging low lying areas. Rehabilitation and restoration work was limited to flood control works damaged or destroyed by a flood. The rehabilitated structure was normally designed to provide the same degree of protection as the original structure, and the repair work must be economically justified. A sampling of Walla Walla District's flood fights and flood rehabilitation projects during the 1981-2000 period, including the major efforts, is provided in this section.

The next few pages reproduce pages from a flood assistance brochure, *Assistance Programs of the Corps of Engineers*, issued by the District in 1990 (67).

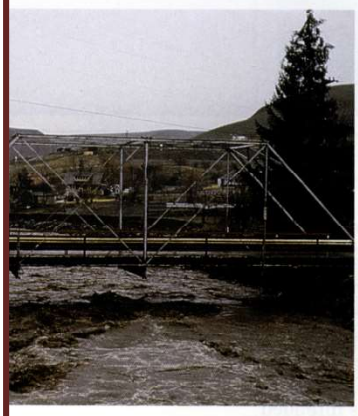
FLOOD EMERGENCY ASSISTANCE

FLOOD EMERGENCY RESPONSIBILITIES

The first responsibility for protecting homes and property from flood damage rests with the individual. Local governments and agencies, such as flood control districts, may share in this responsibility and together form the community's first line of defense in preventing flood damage.

Occasionally, however, local resources are not able to contain or control a flood emergency situation. The Corps flood disaster assistance program is intended to supplement and assist local governments, institutions, and special purpose districts when more help is needed.

When an impending disaster is greater than the capability of local or state agencies, the Corps has authority under Public Law 84-99 to provide emergency flood protection of limited scope. We can provide assistance for flood emergency preparation, flood fighting, the repair and restoration of flood control works threatened or destroyed by a flood, or emergency



water supplies. Assistance may also include providing technical assistance, equipment, sandbags, pumps, or other materials for an imminent or actual flood emergency.

Our assistance is intended to be supplemental and not a replacement for community self-help, and requires a written request for assistance from a local sponsor. No assistance can be provided directly to individuals.

The sponsoring agency can be a state, county, or city or other entity fully authorized to provide requirements of local cooperation and to pay any local share of the costs. Since most emergency work is to provide protection for an immediate situation, our authority does not extend to the

reimbursement of flood fighting expenditures incurred by state or local authorities, or flood and debris cleanup, or the removal of temporary flood control structures.

The sponsoring agency can request a flood emergency declaration and retain full control of a flood fight or request us to work in an assigned sector. Federal regulations preclude Federal employees from working under the direct supervision of the sponsoring agency. On request, we may assume a leadership role and direct flood fighting efforts.

EMERGENCY ASSISTANCE AVAILABLE

The Corps can provide emergency assistance under the following four categories.

- Flood fight assistance
- Rehabilitation of existing flood control structures
- Advance measures
- Emergency water supplies

Flood Fight Assistance

Flood fighting includes strengthening existing flood control works, construction of temporary works such as earthen dikes and mud boxes, or sandbagging low-lying areas. We maintain a limited stockpile of sandbags and other flood fighting materials intended to augment the stocks of local jurisdictions during actual flood emergency situations.

It is the responsibility of local governments and flood control districts to maintain a supply of sandbags adequate to cover anticipated emergencies. In the event we issue sandbags to a local government, unused stocks must be returned as soon as the emergency condition is over. Consumed supplies must be replaced in kind or be paid for by local interest.

Rehabilitation of Existing Flood Control Structures

Rehabilitation and restoration work is limited to flood control works damaged or destroyed by a flood. The

damage cannot have been as a result of poor or deficient maintenance. The rehabilitated structure will normally be designed to provide the same degree of protection as the original structure, and the repair work must be economically justified. Local interests must submit requests for rehabilitation assistance to repair damaged flood control projects within 30 days after the flood event that caused the damage.

The Corps will bear 100 percent of the construction costs to rehabilitate federally authorized and constructed projects. The Corps will bear up to 80 percent of the construction costs to rehabilitate non-Federal projects (not authorized by Congress). The remaining costs will be the responsibility of the local sponsor.

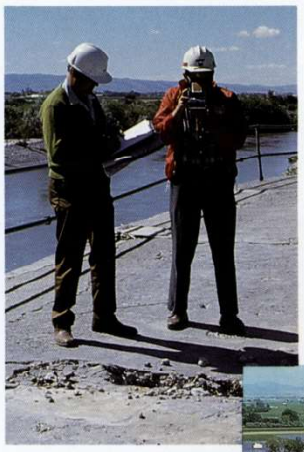
Advance Measures

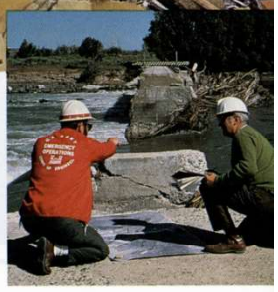
When a flood is forecast or predicted and a written request is received from the Governor, the Corps can initiate work to protect against loss of life or to prevent damages to improved property. Advance measures can be taken to protect against the threat of possible flooding caused by failure of flood protective works, channel obstructions (ice jams, snags), potential dam failure, or abnormal snowpack.

We can also provide technical assistance to state and local agencies, loan stockpiled supplies and equipment, construct temporary dikes, sandbag, or assume operational control or direction of the emergency work.

Emergency Water Supplies

Upon receipt of a written request from the Governor, the Corps may provide emergency supplies of clean drinking water to any community with a source of contaminated drinking water causing, or likely to cause, a substantial threat to the public health. The contamination may be accidental, deliberate, or caused by natural events. Our authority is limited to emergency supplies of drinking water and does not include other municipal or commercial water uses.





Emergency water assistance is intended as a temporary measure until the locality is able to assume responsibility. In certain cases, we can also provide assistance to farmers and ranchers for stock water within a designated drought-distressed area. This drought assistance does not include providing water for crop irrigation.

PERIODIC INSPECTION OF COMPLETED WORKS

The Corps conducts inspections at no cost to the local interests to assess the level and effectiveness of protection provided by flood protective works such as levees and pump stations. The inspections serve an important purpose of acquainting local officials and Corps personnel with potential problem areas, maintenance deficiencies, and borrow material sources for use during emergency conditions. Special onsite inspections may be conducted at any time during the year, such as immediately following a period of high water or upon request from the local flood control officials.

HOW TO OBTAIN ASSISTANCE

If a flood problem is beyond state and local capabilities, local officials may request assistance by either calling the Walla Walla District, Emergency Management Branch, at (509) 522-6730; or, by writing to the following address:

District Engineer
Department of the Army
Walla Walla District, Corps of Engineers
ATTN: Emergency Management Branch
Walla Walla, WA 99362-9265

When the request is received, the sponsor will be contacted and promptly advised if Corps assistance is appropriate. If the problem is within our authority, personnel may be sent to investigate and recommend appropriate action.

❖ Boise River, Ada and Canyon Counties, Idaho (1982 and 1983)

Because of the high flows in 1982 and 1983, releases were regulated from Lucky Peak Dam to maintain system control. Releases caused the highest flows since Lucky Peak Dam was completed in 1955. The 1982 flow was a 29-year event, while the 1983 flow was a 40-year event.

In May 1983, these high flows resulted in severe bank erosion, bed movement and deposition, and the undermining of many trees along the bank. Barber Park along the river was inundated. Area buildings lay in the path of the engineered auxiliary floodway and were in serious jeopardy. Seepage from the river produced water on roadways. The municipal golf course and the fairgrounds were partially flooded. Twice a day helicopters flew over the area so that a representative of Walla Walla District and other officials could monitor the situation. The flood damage, estimated at about $150,000, was low in comparison to what could have occurred had the waters risen higher (68). With cool temperatures (slowing the snowpack melt) prevailing over the area in June, the inflow of water into the Boise River and its reservoirs slowed, and the crisis was over for the year (69).

The situation is further described in *When the River Rises*:

> "The 1983 flood was not caused by what might in other kinds of disasters be referred to as 'human error.' Rather it was a reminder to the community that natural forces could still confound the highly controlled river system. ... The 100-year flood on the Boise is defined as a flow of 16, 600 cfs or more [much higher than the 1983 flood]. This flood will possibly occur when conditions are similar to those of 1983. … The floodplain is studded with commercial and residential buildings worth millions of dollars. With their first floors one foot above the 100-year flood elevation, the buildings were safe behind levees and special channels in the event of a 50-year flood in 1983 (70)."

The implication is that these buildings will not be safe in the event of a 100-year flood.

❖ Idaho and Wyoming Flood Fights (1983)

In May 1983, flood fights were declared at two locations near Middleton and Notus, Idaho, as a result of the weakening of levees along the Boise River. A representative of the District with flood fighting experience was sent to evaluate the situation. Approximately $60,000 was spent shoring up the weakened levees with riprap.

At the same time, in May 1983, the Teton River, Ray's Lake above Mud Lake, Big Wood River, and Gros Ventre River in Wyoming were problem areas requiring various flood fighting operations.

❖ South Fork Boise River, Pine, Idaho (1985)

The South Fork Boise River above Anderson Ranch Reservoir reached a 40-year flood peak in May 1983. This flood severely damaged a bridge, breached a spoil bank levee, seriously eroded banks, and deposited voluminous amounts of debris in the river. The project area was located in Elmore County, Idaho, near the village of Pine, Idaho, and upstream of the village of Featherville, Idaho. The plan of improvement included snagging and clearing a ten-mile section of the Boise River. In addition, channel alignment was restored, and the existing levee near the Ballentyne Subdivision was repaired. Gravel deposits near the subdivision were removed to reduce

flooding potential. Because the region receives heavy recreational use in the late summer months, work was restricted to the nonpeak recreation season, but was completed in fiscal year 1985. Elmore County, Idaho, sponsored the project.

❖ Teton County, Wyoming (1987)

Urgent requests for assistance were received from Teton County, Wyoming, in June of 1987. Three Walla Walla District staff members supervised the use of thirty-five pieces of equipment in a flood fight lasting twenty-two days. Flood fighters worked seven days per week, twelve hours per day to help prevent flood damage in the area. The District spent a total of just over $335,000 in this emergency.

❖ Whitman County, Washington, and Enterprise, Oregon (1989)

The Federal Emergency Management Agency requested that Walla Walla District complete flood assessments for more than one hundred sites in Whitman County, Washington, following flooding in 1989. Total damages were approximately $250,000. Damages of about $140,000 were assessed for Enterprise, Oregon, which had experienced flooding of Prairie Creek in the same year.

❖ Teton County, Wyoming (1991)

In 1991, the District conducted a flood fight and repairs on the Jackson Hole Levees in Teton County, Wyoming. The approximate cost of the operation was $285,000.

❖ Weiser River, Idaho (1993)

The Weiser River project was authorized the Flood Control Act of 1948 (71), which, in an emergency, gives the Corps of Engineers the authority for “repair or restoration of any flood control work threatened or destroyed by flood.” Repairs to a levee along the river were completed in 1993. As of 1994, total federal expenditures were $293,739.

❖ Pataha Creek at Pomeroy, Washington (1993-94)

Emergency bank protection for Pataha Creek took place during the summer of 1993. In addition to the rock ballast placed against the failing retaining wall, the creek bed was displaced fifteen feet to the north, and riprap was extended over a portion of the freshly cut bank to prevent erosion. The remaining bank was reseeded with native grasses. Students from nearby Pomeroy High School replanted the upper banks with indigenous shrubs and trees. The project was completed in 1994. Total federal funds expended were $318,511, and nonfederal funds expended were $91,170.

❖ Snake River above Blackfoot, Idaho (1996)

The Snake River parallels and then crosses Interstate-15 several miles upstream of Blackfoot, Idaho. During the spring and summer of 1993, the river eroded approximately forty feet into the bank threatening to reopen an abandoned streambed and force water over the freeway. Funding for this project was received in March 1996, work was initiated in April, and the project was completed in December. Bingham County acted as the local sponsor.

❖ The Floods of 1996

CORPS COMES TO AID OF REGION IN FLOODS OF 1996

Roaring rivers raged out of their banks and inundated homes, roads, businesses, sewer systems, and railroads throughout the Walla Walla District in the flood of February 1996.

Strategically placed inland, Walla Walla District was able to assist several communities in the region with their efforts to save their towns. Though the rising waters cut off access to major highways, the Corps still found ways to get much needed assistance and more than 129,000 sandbags to the beleaguered towns.

In eastern Washington, local citizens were praising the value of Corps-constructed flood control projects. In Colfax and Walla Walla, Wash., rivers roared through the flood control channels, saving millions of dollars of damages to those cities. Corps hydrologists predicted that without those flood control projects, those cities would be inundated with several feet of water in the heart of their downtown sections.

In Washington, heavy flooding was occurring in the cities of Waitsburg, Dayton, and Palouse. Flood fight teams from Walla Walla District assisted several of those communities by providing technical assistance and sandbags. More than 94,000 sandbags were provided by the Walla Walla District to Washington state cities and counties. ...

In Idaho, Walla Walla District provided more than 23,000 sandbags to the Nez Perce Tribe, Nez Perce County, and Clearwater County. Dworshak Dam project personnel assisted in keeping limited road access near the project to nearby towns cleared of mud slides. ...

Dworshak [Reservoir] rose eight feet in one day during the February flooding, according to Randy Ryan, project manager. Ryan reported that this had been a wet winter, with a deluge of water in December that raised the reservoir almost nine feet in one day. The damage experienced in February was far greater, said Ryan. There were a tremendous number of slides that kept closing roads and access to the project. Project personnel were to be commended said Ryan for going to great lengths to get to work. Several roads were cut off and it took some employees three to four hours just to get to the project.

The rock quarry at Dworshak was in great demand by the area during the flooding. Rock was used as riprap and to repair flood damaged roads. There were more than 40 dump trucks in the quarry during the height of the flooding and more than 10,000 yards of rock was provided to the local communities for the flood fight. ...

More than 70 Walla Walla District personnel were involved in the flood fight of February 1996. Many more volunteered their time and labor to the local communities during and after the flooding, giving up weekends and evenings to assist residents in protecting their property and cleaning up the damage.

As flood waters receded, buckled roads, damaged bridges, homes, and water systems were left ravaged by the raging waters. Walla Walla District Commander Lt. Col. James S. Weller toured the devastated communities with the Director of the Federal Emergency Management Agency, James Lee Witt, local politicians, and other Corps officials. Early damage estimates placed the cost of the flood at more than $22 million in southeastern Washington alone.

President Clinton signed a Federal Emergency Proclamation, declaring 18 Oregon counties, 13 Washington counties, 14 Montana counties, and nine Idaho counties disaster areas, eligible for federal assistance.

The Walla Walla District FEMA cadre received a mission on Feb. 16 to deploy a damage survey report team to support flood recovery efforts in southeastern Washington. Approximately 30 employees of the District were trained to assist FEMA.

Walla Walla District was also tasked by FEMA to repair levees along the Touchet River in areas from Dayton through Waitsburg, Wash., at four identified sites. This mission includes sites that have been identified for levee rehabilitation. A survey of the condition of federal and nonfederal levees was immediately began by Walla Walla District as the flood waters began to recede. ...

Estimates of property and lives protected by the District's four Snake River projects, Dworshak project on the Clearwater River, Bennington and Lucky Peak Lakes, is estimated to be in the tens of millions of dollars.

This estimate should be much higher, including the protection dams holding back water protected cities all the way to Portland, said Randy Ryan, Dworshak project manager.
–Nola Conway, *Intercom* (72).

Following the floods, the federal government provided grants to communities to help clean up flood damage. The District was involved with this too, as described below.

CLEANING UP AFTER THE FLOODS OF 1996

You had the Mississippi floods, and you had the flooding here in the Northwest in '96. Congress made money available in the Mississippi area to help those communities rebuild. I believe the legislation was set up so that if the levees had failed, the government would go back in and rebuild the levees—reestablish the same level of flood protection those people had prior to the '96 floods. These were especially going after the small communities which didn't have the funding to go out and redo all this stuff. At that time, Dirk Kempthorne was a senator for Idaho, and he says, wait a minute—Idaho's got a similar situation. We have all these small communities that don't have a whole lot of money and, by gosh, we need aid for them too. Money was made available … In the state of Idaho … they had $6 million, and they split it. … Those projects that fell within Seattle District's boundaries, they dealt with, and [we in] Walla Walla District got ours. …

The various communities submitted their requests for the money, what projects they wanted to do, and how it related. The Corps was asked to quickly review those. We did environmental, economic, and engineering analyses of those [grant proposals]. … [We reviewed projects for] Orofino, Kendrick, and Julietta, [Idaho]. Two projects were on the Potlatch River, and one was on Orofino Creek. –Sandra L. Shelin, Environmental Compliance Specialist (73).

As a result of these floods, as of 2000, the District was actively studying several projects including the Coppei Creek project and an extension of the Mill Creek right bank levee, as discussed above in the sections on studies.

❖ The Floods of 1997

Though not quite as severe as the flood conditions experienced in the Pacific Northwest in 1996, the following year again found District personnel responding to area flooding. Around 1 a.m. on New Year's Day of 1997, emergency managers in Walla Walla received their first call and activated the Emergency Operations Center at 6 a.m. that day. Emergency responders went out into the field to get a close look at flood damage in Dayton and Waitsburg, Washington, in Milton-Freewater, Oregon, and in Weiser, Idaho. Meanwhile, in Walla Walla, water was being released from Mill Creek Reservoir and projects on the lower Snake River began spilling water to provide space for the snowmelt that was causing rivers to rise (74).

Equipment was mobilized to shore up weakened levees that had experienced extensive flooding in February 1996 and community requests for sandbags were filled. On the

Boise River, the Corps and Bureau of Reclamation projects held back more than 100,000 acre-feet of floodwater on January 1, averting an estimated $100 million in damage to the Boise Valley.

Rural residents in the Weiser and Payette River systems in southwestern Idaho didn't fare so well. The Weiser River reached an all-time record high. Vice President Al Gore came to review damage in what had been formally declared a disaster area. Ten million dollars in aid was approved for the area. Repairs had to be made to levees and roads all over Walla Walla District.

Emergency Preparedness

In addition to flood preparedness (discussed above), during the 1981-2000 period, Walla Walla District engaged in many emergency preparedness activities. Not the least of these was the preparation and continual updating of the District's natural disaster procedures, Federal Disaster Response Plan, and Emergency Communications Plan. The District is prepared for natural, technological, and national security emergencies.

In the 1980s, a primary mission of the Corps of Engineers—to assist the nation in mobilization readiness—was emphasized. "Mobilization is the process by which military, industrial and financial institutions of a nation gear up to prepare and sustain support for a national emergency—either caused by a natural disaster or internal or international conflict (75)." The Teton Dam disaster in 1976 and the eruption of Mount St. Helens in 1980 were two disasters in the Northwest, which helped to bring disaster preparedness to the fore. In 1978, the Chief of Engineers met with President Carter and emphasized the intricate role the Corps plays in national mobilization planning.

In 1980, MOBEX 80 was initiated on a national level to test the nation's ability to respond to several hypothetical emergencies. MOBEX 80 lasted twenty days. Walla Walla District practiced solving theoretical problems in relation to support of a "lead district" (Sacramento District) and in support of other Army facilities. Exercises related to the physical security of facilities often involved working with a management structure with significantly shorter chains of command than in normal times.

In 1985, the Corps participated in a followup exercise, MOBEX 85. This was a two-week national emergency readiness exercise conducted by the Department of Defense, including the Corps. Walla Walla District activated its Emergency Operations Center. "Throughout the exercise scenario, which involved simulated international tension gradually leading to full mobilization of U.S. military forces, the EOC was the [District] Commander's primary communication link to agencies outside the District while serving as a message handling and emergency information center for the six NPW [Walla Walla District] divisions (76)." Six Walla Walla organizational units (divisions)—Administration, Management, Construction, Engineering, Real Estate, and Operations—were activated during the exercise. Simulated tasks with very short deadlines were assigned in relation to specific District goals of supporting Gowen Field in Boise, Idaho, and the Umatilla Army Depot in Hermiston, Oregon. Communication systems, training, and reorganization were identified as issues during the exercise.

In 1991 and 1992, Walla Walla District participated in several Emergency Regional Reporting System tests that were designed to assess communications systems in

the event of a national or regional emergency. Over the period covered by this volume, the District worked actively to maintain and upgrade its communication technology and training. During two disaster simulations in 1995, for example, three teams of District radio volunteers operated high frequency radios at District Headquarters in Walla Walla and at field locations around the District. Walla Walla worked with Seattle and Portland Districts to simulate response to a major earthquake disaster and a bridge disaster. "Because the Walla Walla District was the first to conduct such a comprehensive program, other districts have already expressed an interest in doing similar training (77)."

Another area in which Walla Walla District staff received special training (in 1989 and 1990) was in the handling of hazardous and toxic waste. This was related mostly to District tasks involving the cleanup of hazardous materials sites (see chapters 4 and 8). However, the training also provided a core of expertise in the District should a hazardous or toxic waste emergency occur in the region. Radiological hazard training was also conducted for District Staff.

In 1996, the District participated in a joint training event with the Department of Energy's Hazardous Materials Management and Emergency Response Team (78). This exercise simulated federal, state, and local agency response to a radioactive spill. Once again, the District activated its Emergency Operations Center and involved a cadre of trained staff members.

Security concerns have also led the District to take preparedness action. Concern about "Y2K" problems or other millennial activities, for example, led the District to close McNary, Dworshak, and the four lower Snake River dams to the public for four days as the new millennium approached (79).

Nonflood Emergencies in Walla Walla District

During the period covered by this volume, there were no earthquakes in Walla Walla District that constituted emergencies to life or property. The biggest effect of earthquakes in the region was to encourage the District to implement a program of dam seismic inspection (discussed above).

There were many emergencies at the District's outlying projects. One of these, the 1993 incident where a barge struck the guidewall of the Ice Harbor lock causing extensive damages was discussed in chapter 4. Recreation-related emergencies will be covered in chapter 11.

In 1983, there was a huge windstorm along the North Fork of the Clearwater River in Idaho. Numerous trees were blown down in lands belonging to the Dworshak project. By 1985, timber sales totaling over ten million board feet of lumber had been conducted by the Corps through the Bureau of Land Management. Through 1987, the Corps was still completing many additional small timber removals to ensure public safety and fire hazards were removed from Dworshak lands.

Mudslides and landslides were an all-too frequent occurrence on property within the Walla Walla District. Two such occurrences are described in the box below.

WHEN THE LAND IS SLIPPING AWAY

We had quite a few large landslides on the Dworshak Reservoir. That was still a relatively new dam when I first came on with the Corps [in 1979]. It had already been built, but was still having some break-in and adjustment … [issues]. Part of that involved these landslides on the reservoir. One of them was a really big one [in 1989]. It was one of these landslides where you have a circular failure. You've got the top of the slide up here that slides down and you see a scarp that forms there. The toe slides along this big circular plane. … In that case, the height from the top of it to the bottom was probably three hundred or four hundred feet. It was a good-size slide. It was on the main road as you go into the back part of the reservoir. It slid enough that it really disrupted and caused problems for the road. ...

I don't think that there was any direct reservoir link to that [slide on Dworshak land] because we were way high above the reservoir. There are a lot of slides that take place. Because of the reservoir, they'd rebuilt that road, and put a new bridge down below. … [It was] associated with the reservoir, but it was not induced by the reservoir. Anyway, we had a landslide there and then at Dent Acres [near Dworshak Reservoir]. … It's fascinating to see such massive … [natural events] occur. We try to change them. –Wendell L. Greenwald, Project Engineer (80).

Boise had a big mudslide that came down the hill. The Corps, some of the people down in Engineering, actually went down there to provide some assistance with how to construct barriers to keep the mud from sliding down into downtown Boise. … Many times the trees and [other vegetation] were taken off [by floods] and then there is nothing to hold the soil and they get a tremendous amount of water. –Steven W. Voss, Supervising Engineer (81).

The Emergency Operations Branch coordinated Walla Walla District's response to a 1988 chemical spill upstream of McNary Lock and Dam. A train derailed and spilled approximately 20,000 gallons of sodium hydroxide into the Columbia River.

During the prevailing drought conditions of the late 1980s and early 1990s, which hit Idaho particularly hard, Walla Walla District received several requests for drought assistance. In 1988 and 1991, the District prepared reports on requests from Idaho counties for stock water. These requests were disapproved by national Corps Headquarters. As a direct consequence of considering these reports, a revision was made to the Corps' nationwide Natural Disaster Procedures (82). The revision deleted the authority to provide water for livestock.

In 1994, the water supply on the Fort Hall Indian Reservation of the Shoshone-Bannock Tribes in eastern Idaho became contaminated. The District responded to a request for assistance from the reservation.

Disaster Relief outside the District

Corps staff members with their expertise in engineering, environmental compliance, public affairs, construction, real estate, contracting, and office administration are well qualified to help the nation in the aftermath of disasters. Furthermore, the Corps often works under agreements with the Federal Emergency Management Agency to help with disaster relief.

Walla Walla District staff have been part of response teams reacting to earthquakes. The 1989 Loma Prieta Earthquake near San Francisco called forth District volunteers (see box below). Another such instance was the Northridge Earthquake in California

in 1994. Ten District employees were part of a team of more than 345 Corps of Engineers staff who assisted with emergency power assessments, structural inspection, technical support, urban search and rescue, Metrolink rail station construction, and bulk water delivery following the Northridge quake (83).

AFTERMATH OF AN EARTHQUAKE

I was involved with the earthquake in San Francisco [Loma Prieta Earthquake, 1989]. That was a real interesting experience. I'm glad that I did it and got to be part of it. … Every day the scope of what you're doing changes, and the people that are managing it change, and the goals change. It's really fluid. If you were somebody that wanted to have everything laid out and be told specifically what you are going to do today and what you'll be doing next week, it would be a hard situation for you. …

We got to feel earthquakes while we were down there. We had a magnitude five earthquake while I was there. We were up in this hotel. … It looked like it was masonry block. The day we showed up, there were all these cracks running up and down it [the motel] from the big earthquake. That makes you nervous. You are sleeping up on the fourth floor, and you get this earthquake that is strong enough—it just wakes you up out of a dead sleep. Your first impulse is—get out of there. Should you jump out of the window and hope you survive or just stay in the room and hope it doesn't get worse? That was a really interesting thing to experience, that kind of emotion. ...

There were amazing things to see. One of the overpasses on the highway had dropped down during the earthquake. You could stand there on the edge of the highway and look at where it had fallen. This deck of this overpass had fallen onto the structural pilings, and they punched up right through the deck of this overpass. It didn't smash all to pieces; it stayed pretty much intact. … [Pilings] stuck up through … [the deck] just like prongs of a fork if you stuck it up though a piece of paper. … There were skid marks right in front of these … [pilings]. It's like somebody had been on the bridge when it fell, and once the falling stopped, they survived that, but they were still traveling forward because the car had momentum, and they had to slam on their brakes to avoid these beams that popped up in front of them. We saw some really interesting things. –Wendell L. Greenwald, Project Engineer (84).

Staff members from Walla Walla District also assisted with necessary cleanup following in the wake of hurricanes and typhoons. Sometimes, staff travelled far from Walla Walla to help out. In 1991, for example District staff traveled to the small island of Pohnpei, which lies in the Pacific about halfway between Hawaii and the Philippines. Following World War II, control of Pohnpei and other Pacific islands passed to the United States in the form of the United Nations Trust Territory of the Pacific Islands. Today, the islands of Micronesia, including Pohnpei, are independent but still closely tied to the U.S. Hence, when a rare typhoon hit the island, the Corps of Engineers was there to help. Walla Walla District staff did their part by performing damage assessments.

In 1992, the infamous and destructive Hurricane Andrew hit south Florida leaving behind $20 billion in property damage, 82,000 destroyed or damaged businesses, and 160,000 people homeless. More than 1,500 Corps staffers moved to the area and immediately began patching together the homes of thousands of victims. Walla Walla District volunteers described the scene, "Television didn't even come close to showing the devastation (85)." "When I first got there, I thought I was going into a combat zone. The buildings looked like they had been hit by explosives—debris everywhere (86)."

An industrial hygienist from Walla Walla District supervised the pits where massive amounts of debris were burned. The huge pits—twenty feet long and eight feet wide—were designed with smoke blowers to make them environmentally safe. Another staff member, a civil engineer, conducted structural surveys while other District employees assisted by using their design, contract, secretarial, communications, and administrative specialist skills. The ten volunteers from Walla Walla assisted the Corps with missions that included: debris and garbage removal; provision of emergency sanitation, water; electricity; damage survey reporting; school restoration; and temporary housing and roofing.

In 1993, "Rivers in nine states soaked a Midwestern flood zone 800 miles long and in places 500 miles wide, what hydrologists say was the greatest lower Missouri River flood since the continent was colonized (87)." During the "Great Flood of '93, volunteer workers from Walla Walla District helped in the Kansas City and St. Louis, Missouri, disaster response effort. One staff member worked twelve to sixteen hours per day flying a helicopter over five flooded reservoirs to help disaster workers keep abreast of the dynamic situation. A District engineer assessed damage to the Corps' Tuttle Creek and Milford Dams near Manhattan, Kansas—pressing problem areas where water had to twice be released during the crisis. Another Walla Walla staffer helped the St. Louis District Public Affairs Office with responding to numerous national media inquiries about the flooding. Another volunteer from Walla Walla served as the engineer in charge of the Emergency Operations Center in the Kansas City District.

Closer to home, several Corps staff members used their skills to help save lives. Ken McNaughton was commended for heroism for rescuing a family from flood waters in 1996 (88). In the same year, a rigger at McNary saved the life of a Pendleton man by using CPR skills (89). These were just two of many acts by which Walla Walla District staff showed themselves to be good neighbors over the years.

Staff members continue to volunteer their skills as needed in the wake of disasters:

> "Last year, when I spent a month in Albuquerque … that was related to my work. I went as the Native American Coordinator, and I spent maybe a week and a half doing very intensive work with the tribes, conducting public meetings for them.
>
> "The fire had devastated and vitrified the soil to where the monsoon rains would just run off. There could be pueblos at stake. They've got all their cliff dwellings that are historic for them. The Corps was coming in to protect those. … [At] the first meeting … I was standing there and the tribal chair came up to me—there were governors there—and introduced himself. I said, 'I'm Lynda Nutt and I'm doing the tribal coordination for this exercise,' and he hugged me. I just laughed. He said, 'Well, we're so happy. We love the Corps.' It was pretty nice. (90)."

Notes for Chapter 6

1. Pomraning, Allen N. Interview. Walla Walla: NWW, 24 January 2002.
2. USACE, Walla Walla District. What is a 5-year flood event? Walla Walla: NWW, 2000. INTERNET: http://www.nww.usace.army.mil/html/offices/op/em/5yrflood.htm.
3. Ibid.
4. PL 86-645, Section 206.
5. Reese, David L. Interview. Walla Walla: NWW, 23 October 2001.
6. Stacy, Susan M. *When the River Rises: Flood Control on the Boise River 1943-1985.* Program on Environment and Behavior Special Publication, no. 27. Boulder: Institute of Behavior Science, Natural Hazards Research and Applications Information Center, University of Colorado; Boise: College of Social Sciences and Public Affairs, Boise State University, 1993.
7. Quintana, Craig. Flood in heart of Boise a matter of when, not if. *Boise Idaho Statesman*, 16 January 2002.
8. Barker, Rocky. Draft Boise River flood map already changing landscape. *Boise Idaho Statesman*, 29 April 2000.
9. PL 81-516, Title II.
10. PL 74-738.
11. PL 99-662.
12. Stacy, Susan M. *When the River Rises: Flood Control on the Boise River 1943-1985.* Program on Environment and Behavior Special Publication, no. 27. Boulder: Institute of Behavior Science, Natural Hazards Research and Applications Information Center, University of Colorado; Boise: College of Social Sciences and Public Affairs, Boise State University, 1993.
13. PL 99-662.
14. Study group wins Corps-wide award. *Intercom*, 6 August 1987, p. 1.
15. USACE, Walla Walla District. Coppei Creek flood control project proposed for Waitsburg, Wash. News release. Walla Walla: NWW, 31 January 2003.
16. Ibid.
17. PL 99-662.
18. USACE, Walla Walla District. *Report of the Secretary of the Army on Civil Works Activities: Extract Report of Walla Walla District.* Annual. Walla Walla: NWW, 1981-2000.
19. PL 87-874, Section 201.
20. PL 87-874, Section 201.
21. PL 89-298, Section 201.
22. USACE, Walla Walla District. *Zintel Canyon Dam, Kennewick, WA*. General Design Memorandum No.2. Walla Walla: NPW, 1974, rev. 1989.
23. Carlton, Richard. Interview. Walla Walla: NWW, 24 October 2001.
24. PL 80-858, Section 205.
25. PL 81-516.
26. PL 99-662
27. USACE, Walla Walla District**.** *Jackson Hole, Wyoming, O&M Decision Document and EIS*. Walla Walla: NPW, May 1990.
28. USACE, Walla Walla District**.** *Jackson Hole, Wyoming, Flood Damage Reduction and Fish and Wildlife Restoration Reconnaissance Study*. Walla Walla: NPW, 1993.
29. Hixson, Phil L. Interview. Walla Walla: NWW, 10 July 2001.
30. Loftus, Bill. Corps to poison levee-dwelling marmots. *Lewiston Morning Tribune*, 31 May 1991.
31. Showers, Susan. Cold-hearted, uncaring. Letter to the Editor. *Lewiston Morning Tribune*, 10 June 1992.
32. Roen, David T. Here's my solution to the marmot problem. Guest column, *Lewiston Tribune*, 15 June 1992, p 7A.
33. Loftus, Bill. Corps looks at trapping marmots. *Lewiston Tribune*, 29 August 1992.
34. Rexus, Celia. Tri-Citians won't drop fight to cut levees. *Tri-City Herald,* 15 March 1990.
35. Levee improvements may sink with McNary powerhouse. *Tri-City Herald*, 13 April 1990, A3.
36. Rexus, Celia. Lower levee plan worth altering rules, says Corps. *Tri-City Herald,* 30 March 1990, A1-A2.
37. USACE, Walla Walla District. *Annual Summary of Accumulated Historical Material: Calendar Year 1993.* Walla Walla: NPW, 1994, p. 7.

38, PL 104-303.
39. Lee, Mike. Corps concerned about flooding if dams breached. *Tri-City Herald*, 22 August 2000.
40. PL 78-534, Section 10.
41. A revetted channel has embankments retained with a lining material other than concrete, such as with stone or wire mesh.
42. PL 79-526, Section 14.
43. Ibid.
44. Ibid.
45. USACE, Walla Walla District. *Annual Summary of Accumulated Historical Material: Calendar Year 1990.* Walla Walla: NPW, 1991.
46. USACE. *Natural Disaster Procedures.* Engineer Regulation 500-1-1. Washington, DC: USACE, 1991, appendix E.
47. USACE, Walla Walla District. *Annual Summary of Accumulated Historical Material: Calendar Year 1990*. Walla Walla: NPW, 1991., p. 22.
48. USACE, Walla Walla District. *Fault and Earthquake Hazard Evaluation of Five U.S. Corps of Engineers Dams in Southeastern Washington*. Revised edition. Walla Walla, NPW, 1980.
49. USACE, Walla Walla District. *Annual Summary of Accumulated Historical Material: Calendar Year 1989-1994.* Walla Walla: NPW, 1989-1994.
50 USACE, Walla Walla District. *Annual Summary of Accumulated Historical Material: Calendar Year 2000.* Walla Walla: NWW, 2001.
51. Greenwald, Wendell L. Interview. Walla Walla: NWW, 17 September 2001.
52. PL 78-534, Section 7.
53. Reese interview.
54. Forecaster leaves weather behind him. *Intercom*, April 1988, p. 4.
55. O'Bryant, Mike. River operators offer overview of difficult year. *Bend (OR) Columbia Basin Bulletin*, 3 November 2000.
56. Loftus, Bill. Corps increases Dworshak flow to prevent flood. *Lewiston Morning Tribune*, 17 February 1990, p. 9A.
57. O'Bryant, Mike. Fish managers blame flood control on water troubles. *Bend (OR) Columbia Basin Bulletin*, 12 May 2000.
58. Reese interview.
59. District assists county in preventing flood damage. *Intercom,* 6 June 1984, p. 1.
60. Ibid.
61. Meier, Dutch. 2000 fire may cause 2001 flood. *Engineer Update*, January 2001, p. 12.
62. New flash flood warning system. *Heppner (OR) Gazette-Times*, 29 January 1981.
63. USACE, Walla Walla District. *Flood Warning/Preparedness Planning Study, Boise Foothills, Ada County Idaho*. Walla Walla: NWW, 1992.
64. PL 83-780, Title II.
65. Voss, Steven W. Interview. Walla Walla: NWW, 26 June 2001.
66. USACE, Walla Walla District. Flood Emergency Responsibilities. Walla Walla: NWW, 1996. INTERNET: www.nww.usace.army.mil/html/offices/op/em/flodasst.htm.
67 USACE, Walla Walla District. *Assistance Programs of the Corps of Engineers*. Walla Walla: NWW, 1990.
68. *When the River Rises*, p. 106-118.
69. NPW fights flooding in Idaho. *Intercom*, 6 July 1983, p. 1, 7.
70. *When the River Rises*, p. 117-118.
71. PL 80-858, Section 205.
72. Conway, Nola. Corps comes to aid of region in February floods. *Intercom*, April 1996, p. 1, 4.
73. Shelin, Sandra L. Interview. Walla Walla: NWW, 14 September 2001.
74. District responds to New Year's flooding in the region. *Intercom*, February 1997, p. 1, 4.
75. Primary function of Corps being reemphasized. *Intercom*, 1 September 1981, p. 1.
76. MOBEX 85 tests District emergency readiness. *Information Bulletin,* 29 November 1985, p. 1, 4.
77 District prepares for major emergency with radio training. *Intercom*, fall 1995, p. 6.
78. Curtis, Lt. Col. Donald R., Jr. First quarter starts out busy; Requirement to contract out flattens workload. Commander's Corner. *Intercom*, November 1996, p. 2.
79. Lee, Mike. Year 2000 jitters close 6 dams. *Tri-City Herald*, 7 January 2001.

80. Greenwald interview.
81. Voss interview.
82. USACE. *Natural Disaster Procedures.* Engineer Regulation 500-1-1. Washington, D.C.: USACE, 1991.
83. Response team travels to earthquake. *Intercom*, March 1994, p. 4.
84. Greenwald interview.
85. Allendorf, Wendy, quoted in Hurricane staffers awed by damages. *Spokane Spokesman-Review*, 1 December 1992.
86. Stidham, Jeffrey, quoted in Hurricane staffers awed by damages. *Spokane Spokesman-Review*, 1 December 1992.
87. Graham, Bill. Relief workers, victims recall devastation of '93 flood. *Seattle Times*, 14 July 2003.
88. Colfax honors Granite hero. *Intercom*, April 1996.
89. McNary rigger saves life of Pendleton man. *Intercom*, April 1996.
90. Nutt, Lynda G. Interview. Walla Walla: NWW, 20 September 2001.

Chapter 7. Environmental Assessment and Restoration

Environmental Operating Principles

In 2002, the Corps' changing emphasis with regard to environmental concerns was formalized in a set of *Environmental Operating Principles* issued by the Chief of Engineers, Lt. General Robert Flowers (1). The *Principles* were applicable to all Corps decision-making activities and programs. The principles were designed to foster unity of purpose on environmental issues, reflect a new tone and direction for dialogue on environmental matters, and ensure that employees consider conservation, environmental preservation, and restoration in all Corps activities.

In the Corps' view, environmental sustainability could only be achieved by the combined efforts of federal agencies; tribal, state, and local governments; and the private sector—each doing its part, backed by the citizens of the world. These principles helped the Corps define its role in that endeavor.

The Corps' Environmental Operating Principles were as follows:

- Strive to achieve environmental sustainability. An environment maintained in a healthy, diverse, and sustainable condition is necessary to support life.
- Recognize the interdependence of life and the physical environment. Proactively consider environmental consequences of Corps programs and act accordingly in all appropriate circumstances.
- Seek balance and synergy among human development activities and natural systems by designing economic and environmental solutions that support and reinforce one another.
- Continue to accept corporate responsibility and accountability under the law for activities and decisions under our control that impact human health and welfare and the continued viability of natural systems.
- Seek ways and means to assess and mitigate cumulative impacts to the environment; bring systems approaches to the full life cycle of our processes and work.
- Build and share an integrated scientific, economic, and social knowledge base that supports a greater understanding of the environment and impacts of our work.
- Respect the views of individuals and groups interested in Corps activities, listen to them actively, and learn from their perspective in the search to find innovative win-win solutions to the nation's problems that also protect and enhance the environment.

The Chief of Engineers enunciated the principles to provide the Corps direction on how to better achieve stewardship of air, water, and land resources, while demonstrating the connection between water resources, protection of environmental health, and the nation's security. By implementing these principles, the Corps continued its efforts to develop the scientific, economic, and sociological measures to judge the effects of its projects on the environment and to seek better ways of achieving environmentally sustainable solutions.

The principles were consistent with the National Environmental Policy Act; the Army's Environmental Strategy with its four pillars of prevention, compliance, restoration, and conservation; and other environmental statutes and Water Resources Development Acts that govern Corps activities.

Under the principles, consideration of the environmental impact of a Corps project began in the early stages and continued through design, construction, and operation of the project. Corps staff members, specializing in such civil missions as natural and cultural resources, water quality, floodplain management, or toxic waste control, helped the Corps meet its mission of compliance to more than seventy federal environmental statutes, plus numerous regulatory and state requirements. The civil works mission thus enabled the Corps to go "beyond compliance" to take a leadership role in natural resources stewardship.

These principles were the culmination of practices, policies, and concepts that were growing within the Corps during the twenty years covered by this volume. During the 1981-2000 period, Walla Walla District was a harbinger of things to come for the entire Corps and a leader in dealing with environmental issues, particularly with regard to fish and wildlife mitigation.

Background in Law

National Environmental Policy Act

The Corps carries out its Civil Works Program in compliance with environmental laws, executive orders, and regulations. Primary among these was the National Environmental Policy Act of 1969 (2). This law required federal agencies to study and consider the environmental impacts of their proposed actions. The National Environmental Policy Act procedures ensured that public officials and private citizens might obtain and provide environmental information before federal agencies make decisions concerning the environment. In selecting alternative project designs, the Corps strove to choose options with minimum environmental impacts. Study of environmental impacts often resulted in formal documents called environmental impact statements or environmental assessments. Walla Walla District's many activities in this area are discussed in this chapter.

Endangered Species Act

In the Northwest, the Corps' concern for wildlife is not limited to species listed as threatened or endangered but includes mitigation for species affected by Corps projects and activities (see chapter 8 under the Lower Snake River Fish and Wildlife Compensation Plan). However, the Endangered Species Act (3) had a significant impact on Corps operations and decision-making in the region. Congress passed the act in 1973.

Several species of fish native to streams within the jurisdiction of the Walla Walla District were declared threatened or endangered during the 1990s, including several chinook salmon runs and bull trout. The Endangered Species Act required all federal agencies to carry out programs to conserve endangered and threatened species in consultation with the Secretary of the Interior (specifically, the U.S. Fish and Wildlife Service) or the Secretary of Commerce (National Marine Fisheries Service). Efforts for salmon recovery, related primarily to the District's hydropower projects, are detailed in chapter 8.

For the endangered or threatened salmon and steelhead of the Columbia River basin, which were part of a commercial fishery, the Corps was required to conduct

environmental site assessments and Endangered Species Act consultations with the National Marine Fisheries Service. For threatened bull trout, the Corps was required to consult with the U.S. Fish and Wildlife Service. Just as with flood control, multipurpose, or any other projects undertaken by the Corps, environmental restoration projects required environmental assessments and consultations when ESA-listed species might be affected.

Clean Water Act

The Clean Water Act of 1977 (4) required the Corps, and other designated federal agencies, to provide maximum utilization of its programs to maintain water quality. In addition to the permitting process established by this statute (covered in chapter 9), the law required federal compliance with all state and other water quality processes and sanctions. Compliance with this act was a major factor in Walla Walla District activities and operations during the 1981-2000 period.

Treaties with Tribes

As sovereign nations within the United States, Indian tribes reserved specific rights, often expressed in treaties with the U.S. Government. In the Treaty of 1855, Indian nations of the Northwest reserved their hunting and fishing rights in perpetuity, a claim that the federal government is bound by law to uphold, over and above any other laws protecting species or the environment.

In the box below, Antone Minthorn, Chairman, Board of Trustees of the Confederated Tribes of the Umatilla Indian Reservation, a Northwest Indian nation, summed up the situation pertaining to water, fishing and hunting rights, and the federal government's responsibility.

A RIVER PEOPLE

Our people are a river people. We are part of the Tribal culture of the Columbia Plateau. We have a close connection with the Big River – Nch'I-Wana – or as most people know it, the Columbia. We also have close relationships with many of its tributaries, including the Snake, Walla Walla, Grande Ronde, Imnaha, and Umatilla – the river that runs through our Reservation and the river in which we successfully returned salmon.

Without the rivers and the salmon and the land we are not Cayuse or Umatilla or Walla Walla people. Without the rivers and salmon we become a different people. Salmon, the rivers, the land and all things related are so central to our culture that we honor and pay respect to these things each year in age-old ceremonies.

These things were so central to the life style of our ancestors that they reserved specific rights related to them when they signed a Treaty with the federal government in 1855. When our ancestors put their mark at the bottom of the Treaty papers they said "this place and this lifestyle is for our children – forever."

> As a modern Tribal government we have a huge responsibility of upholding that Treaty and protecting the rights that our ancestors reserved in the 1855 Treaty – fishing rights, hunting rights, livestock pasturing rights, and rights to gather traditional foods and medicines within our historical homeland.
>
> This responsibility was the driving force behind our efforts to restore salmon in the Umatilla River. Not only does the Treaty of 1855 represent a great responsibility, it also represents a powerful tool in salmon restoration.
>
> The Treaty has been proclaimed by US Courts as the "Supreme Law of the Land" and that is a proclamation that we continually have to remind the federal government about. We continually have to remind today's federal bureaucrats that not only did our ancestors sign the Treaty, their ancestors did as well. It was the federal government that made promises to my people. And it is the federal government today which is legally bound to uphold their end of the deal.
> –Antone Minthorn, Chairman, Board of Trustees of the Confederated Tribes of the Umatilla Indian Reservation (5).

In working on environmental restoration projects, fish recovery projects, and wildlife mitigation projects, Walla Walla District often engaged in government-to-government consultation with area Indian tribes. (Chapter 11 discusses the individual tribes with whom the District had most contact.)

New Authorities

With a focus on engineering solutions to environmental issues, the Corps developed ecosystem restoration, protection, and mitigation projects if the project(s) were cost-effective and in the public interest. There were various authorities under which the Corps could carry out ecosystem projects; although proposed projects must be justified on the basis of measurable benefits, a traditional cost-benefit ratio was not required, since the primary benefit (an improved ecosystem) is usually not measurable in dollars.

During the period covered by this volume, the Corps was given several new authorities under law to undertake environmental restoration projects.

❖ Ecosystem Restoration, Water Resources Development Act of 1986, Section 1135(b)

The Water Resources Development Act of 1986 (6) authorized the Corps to propose modifications of its existing projects—many of them built before current environmental requirements were in effect—for environmental improvement. This authority allowed the Corps the ability to restore, protect, and create aquatic and wetland habitats in connection with an existing project. Each project was limited to $5 million in federal funding. The Corps normally initiates an investigation of an ecosystem restoration project after receiving a request from a prospective sponsoring agency. The requesting agency, or entity, must be fully empowered, under state law, to provide required local cooperation.

Formal assurance of local cooperation must be furnished by the local sponsoring agency. The sponsoring agency must agree to the following provisions: (1) provide, at no cost to the United States, all land, easements, right-of-ways, relocation, and disposal areas required for the construction and subsequent maintenance of the project; (2) maintain and operate the project after completion, at no cost to the U.S. government; (3) if the value of the sponsor's contribution (as outlined above) does not exceed

twenty-five percent of the project cost, provide a cash contribution to bring total contributions equal to twenty-five percent; (4) if the value of land, easements, right-of-ways, relocation, disposal areas, and a cash contribution does not equal or exceed twenty-five percent of the project cost, pay the additional amount necessary in order for the sponsor's total contribution to equal twenty-five percent of the project cost.

Projects authorized under this legislation are often referred to as "Section 1135 projects."

- **Aquatic Ecosystem Restoration, Water Resources Development Act of 1996, Section 206**

The Water Resources Development Act of 1996 (7) included new authority for aquatic ecosystem restoration, expanding Corps participation to include new restoration efforts where there was no existing Corps project. The Corps' focus was on those ecological resources and processes that are directly associated with or directly dependent upon the hydrologic regime of the ecosystem and watershed. The Corps made proposals under this authority that range from using dredged material to create nesting sites for waterfowl to modification of water control structures to improve downstream water quality for fish.

This authority allowed the Corps to restore degraded aquatic ecosystems. A restoration project could be adopted for construction only after investigation showed that restoration would improve the environment, that the project was in the public interest, and that it would be cost-effective. Each project was limited to a federal cost of not more than $5 million. The federal cost limitation included all project-related costs for feasibility studies, planning, engineering, construction, supervision, and administration. The Corps could initiate an investigation of an aquatic ecosystem restoration project after receiving a request from a prospective sponsoring agency.

Local sponsor requirements for aquatic restoration projects were similar to those for ecosystem restoration; however, the sponsor's total contribution must equal thirty-five percent of the project cost. Projects authorized under this legislation are informally referred to as "Section 206 projects."

THE GREENING OF THE DISTRICT

[Since I came to work in 1978,] the Corps has become greener. Our Fish and Wildlife Section had just a handful of people. We had one wildlife biologist, one fishery biologist, two environmental resources specialists, one limnologist. The economists were down at the other end of the building. As the country got more interested in environmental issues, our staff built up. We acquired another [fishery biologist]. We started gathering more people. We got another wildlife person, and it just grew.

It evolved, so now we have an entire office, as the Environmental Compliance Section. We were the Environmental Resources Branch. We've changed names so many times, we can't keep track of it all. We went from five people to twenty-three. … The environment was taking on a lot more importance. That's where I've stayed.

I've been in Planning my entire federal career and ever since I've been in the Corps. I did change jobs from being a wildlife biologist to being an environmental resource specialist. Partly because being a wildlife biologist was okay, but I'd always wanted to do more—to go out and do something to help the environment, even as a kid.
–Sandra L. Shelin, Environmental Compliance Specialist (8).

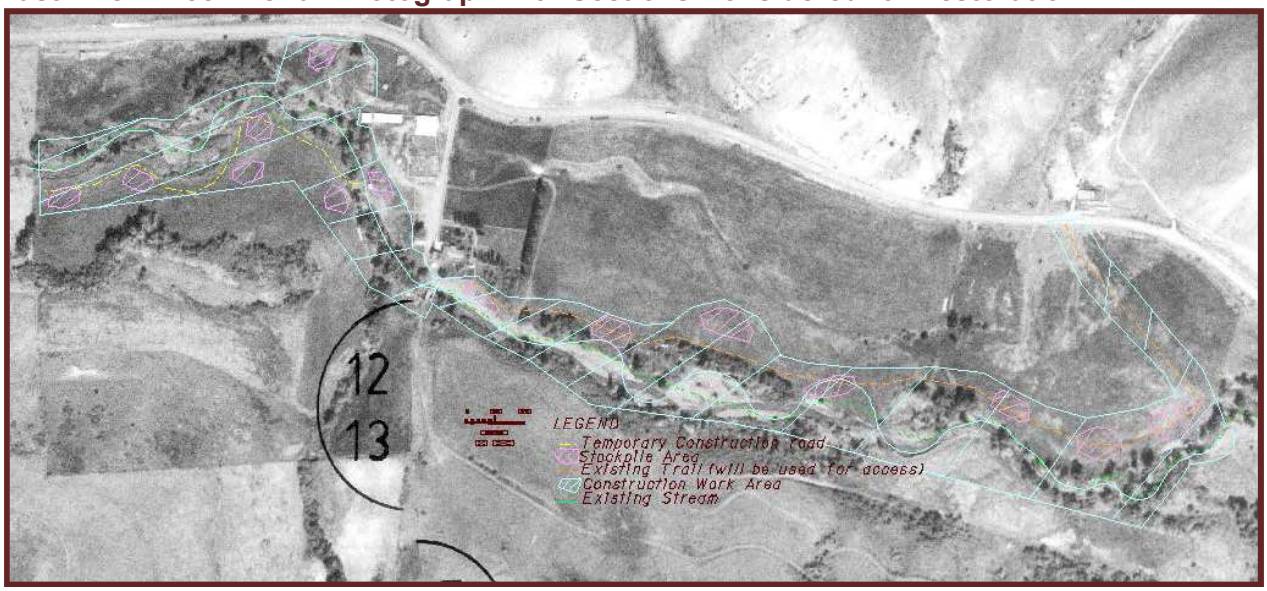
District Restoration Projects

East Birch Creek, Umatilla County, Oregon

The East Birch Creek environmental restoration project (a Section 1135 project) will be discussed at some length in this volume to give the reader an idea of the issues and complexities involved in projects related to fish habitat restoration. Other projects, discussed below in less detail, presented similar issues, constraints, and opportunities.

This project concentrated on a 1.2-mile reach of East Birch Creek located in Umatilla County, Oregon, approximately eight miles south of the town of Pilot Rock. East Birch Creek is part of the Umatilla River system, which empties into the Columbia River. Historically, this reach was an important spawning and rearing area for summer run steelhead trout, part of a stock listed as threatened under the Endangered Species Act. The project's sponsor, the Oregon Department of Fish and Wildlife, believed that loss of quality stream habitat was contributing to depression of the Umatilla steelhead population.

East Birch Creek Aerial Photograph with Sections Considered for Restoration



East Birch Creek was controlled to accommodate land uses introduced by European settlers. Landowners took measures to keep the stream's channel from meandering and flooding. These measures included construction of dikes and levees, channelization (9), and riprapping. The effect in East Birch Creek was that, compared

to the original state, (1) the channel became less sinuous; (2) the channel became deeper, with steeper banks; (3) there were fewer pools and more stretches of running stream; and (4) mean sediment particle size was smaller with a substantially higher proportion of sand and silt.

Diversion of stream flow for irrigation purposes resulted in reduced flow in East Birch Creek during the irrigation season. The most obvious effects of these June through October stream flow reductions on fish habitat were (1) reduced depth, (2) elevated temperature, and (3) greater concentration of total dissolved solids (*e.g.*, salts, nutrients, *etc.*). Excessive grazing and removal of brush and trees (*e.g.*, willows and cottonwoods) from the riparian zone reduced native woody species to about twenty-five percent of their original coverage and midday shade to about ten percent of that with a wet channel.

The change in alignment, along with the loss of stabilizing riparian vegetation, caused instability in the channel with roughly seventy percent of the banks showing evidence of active erosion. The homogeneous nature of the channel offered little in-stream diversity of habitat and little cover for growing fish.

At of the end of the period covered in this volume, the East Birch Creek restoration project was drawing up final plans and specifications, with construction expected to take place in 2001. In this project, the Corps proposed the use of bioengineering techniques. These techniques were designed to restore salmonid habitat quality, to reduce unnatural bank erosion, and to restore natural biological processes in East Birch Creek. This approach was to develop erosion resistant stream restoration treatments using natural stream processes and natural materials.

Recommended structural restoration measures for the East Birch Creek reach included installation of thirty rock weirs to span the width of the channel. The weirs would be constructed of two-foot boulders placed to form a modified upstream “V.” These structures would act to direct the entire range of stream flows away from the bank and reduce bank erosion zones and velocities. The zones of reduced velocity would become an area where finer sediment materials would be deposited, creating suitable conditions for vegetative recovery.

The Corps would complete bank stabilization using rocks, root wads, and logs anchored into the bank and placed where banks were actively eroding. These features would have a stabilizing effect as a result of deflection of high velocity flows away from the bank. This work would benefit fish habitat by scouring a high quality pool around the end of the structure; providing dense cover, large woody debris, and channel complexity; reducing sediment; and providing a stable area along the bank for riparian vegetation to grow.

Only native woody plant species were considered for use in this project. Plant species recommended included willow, red osier dogwood, cottonwood, and alder. Followup measures were to be taken to optimize survival of newly planted vegetation.

During the 25-year expected life of the East Birch Creek project, it was estimated that 16.2 million habitat units would be restored, amounting to about twenty-two habitat

units per $1 spent. (Habitat units are discussed later in chapter 8 in the section on the Lower Snake River Fish and Wildlife Compensation Plan.)

Restoration of Abandoned Mine Sites Program

Abandoned mines, resulting from mining activities that occurred over the past century and a half, are scattered throughout the western United States. These abandoned mines, which are located on private, state, and public lands, contain numerous public safety and environmental hazards such as open shafts and acid rock drainage. Most of the sites were mined and abandoned prior to modern environmental regulations being enacted in the 1970s. Ownership of these sites, and the attendant responsibility to clean them up, has often been transferred over the decades to individuals or companies who had nothing to do with causing the environmental or safety problems at the site. Many of these owners do not have the resources to clean up inherited problems associated with the abandoned mines. Unlike abandoned coal mines, there is no single dedicated source to clean up these abandoned mine sites. At the state level, there are very few funding mechanisms to fill the gap. Preliminary 1998 inventories of western states abandoned mines estimated 300,000 sites.

Abandoned Mines Adit (10)

To fill this gap, the Corps established the Restoration of Abandoned Mine Sites Program, or RAMS Program, utilizing the Corps' environmental authorities. The RAMS Program provided technical, planning, and design assistance to federal and nonfederal interests in carrying out projects to address water quality problems caused by drainage from abandoned and inactive mines (not including coal mines). Projects in the RAMS Program managed drainage from abandoned mines; restored streams, rivers, wetlands, and riparian areas degraded by drainage from abandoned mines; and demonstrated innovative treatment technologies to minimize adverse environmental effects of inactive mines.

The Restoration of Abandoned Mines Program included a research component. Research was designed to apply engineering and scientific support to allow cost-effective performance of projects. The program intended to develop a database of remediation technologies as specified in Section 560 of the Water Resources Development Act of 1999 (11). As of 2000, there were fifty RAMS projects initiated by the Corps throughout the western United States.

An example of a RAMS project occurred in the late 1990s when Walla Walla District contracted with the Idaho Department of Lands to complete an initial site characterization and screening risk analysis for several abandoned mining sites in Owyhee County, Idaho. The work was undertaken under a cost-sharing agreement between the Corps and the Idaho Department of Lands. The goal was to determine a relative level of risk that either of these sites might pose to the environment and to

human health. The purpose of this project was to characterize these sites to determine the extent of the problems and necessary remediation. Plans were to place the information into an abandoned mine database to help the Idaho Department of Lands prioritize abandoned mine reclamation work.

The project studied the Dewey Tunnel and Blue Gulch mines, located in Owyhee County in southwestern Idaho approximately three miles northwest of Silver City, Idaho. The Trade Dollar, Black Jack, and Humboldt Mines, located upslope from the Blue Gulch Mine, were also to be part of the study. These sites featured abandoned mills and other buildings, as well as waste dumps and tailings piles composed of substances whose precise composition was not known. Several streams traveled through these sites and precipitated materials along the banks.

The Corps planned to develop information on the mines that could be used to evaluate the urgency of further action and provide a preliminary estimate of the resources required to address problems at these sites. Walla Walla District would develop a base map and surveys of notable geographic features using the computerized global positioning system, or GPS. The Corps was to sample and analyze water quality, rock, in-stream sediment, and soils. Metals were to be detected using inductively coupled plasma/mass spectrometry, a highly sensitive technique used to measure trace elements in a variety of solid and liquid materials. Plans were to use information from these studies in a risk analysis for both human health and ecological risks. Based on the results of this effort, a report was to be prepared discussing potential risks to water quality, aquatic ecosystems, human health, and analyze options for reducing those risks. It was planned to contract work under Corps' management beginning in 2001.

Barber Pool Master Plan, Boise, Idaho

Barber Pool is located approximately six miles from downtown Boise, on the Boise River. In 1978, Boise Cascade deeded Barber Pool to the Idaho Foundation for Parks and Lands. Recent urban development around the Barber Pool Conservation Area influenced the Foundation to act to protect the ecological value of Barber Pool. The Foundation, and other interested parties, formed the Friends of Barber Pool Conservation Area. This group was made up of representatives of the Idaho Foundation for Parks and Lands, Idaho Department of Parks and Recreation, Ada County, the City of Boise, The Nature Conservancy, Land Trust of Treasure Valley, Golden Eagle Audubon Society, Idaho Fish and Game, and Boise Cascade Corporation.

The goal of the Barber Pool project was to produce a comprehensive planning document that could be used by the Friends of Barber Pool for future management and fundraising purposes. The long-range goal of the Friends of Barber Pool was to acquire more land to serve as a buffer to Barber Pool, preserving and enhancing its ecological integrity, and connecting Barber Pool to important mule deer wintering habitat in the Boise foothills.

The sponsor was the Idaho Department of Parks and Recreation, with contributions from various members of the Friends of Barber Pool Conservation Area. The Corps was to deliver a comprehensive Master Plan and an ArcView GIS (geographic

information system) database. As of the end of the period covered in this volume, the project was in the analysis phase.

Catherine Creek Restoration, Oregon

This ecosystem restoration was a Section 1135 project authorized by the Water Resources Development Act 1986 (12). The project involved a two-mile reach of Catherine Creek located in and immediately upstream of the town of Union, Oregon, where habitat for salmonids, particularly chinook salmon, could be restored. The stream through the city had been straightened, which created a flume effect through town, making it difficult for salmonids to migrate upstream. Efforts to restore complexity to the stream channel without measurably increasing flood damage potential were investigated. The project was terminated with the agreement of the sponsor and deauthorized in 1997.

Grande Ronde River, La Grande, Oregon

Walla Walla District initiated a Section 1135 project study for the Grande Ronde River in Oregon in 1997. The Grande Ronde River channel restoration project was designed to incorporate the use of natural materials, structures, and native vegetation.

The objectives of the project included the following measures.

(1) Developing a set of channel dimensions, patterns, and profiles throughout the study reach that would maintain the river's channel with decreased potential for further downward cutting of stream banks.

(2) Enhancing channel bank stability. The purpose of enhancing stability is to maintain the designed channel dimensions, such that the sediment can be transported efficiently.

(3) Re-establishing floodplain, flood-prone, and wetland areas. The floodplain areas that are re-established and connected to the designed channel would have the potential for developing into riparian-wetland areas.

(4) Developing and improving riparian and wetland vegetation through, planting, transplanting, and recovery techniques. The purpose of increasing riparian vegetation is to provide for natural erosion control mechanisms that are particularly important to the stability of the floodplain area, as well as contributing directly to the quality and quantity of the wetland and aquatic habitat.

(5) Improving fish habitat throughout the reach of concern. The overall objective for the proposed channel restoration is to increase the quality and quantity of fish habitat such that resident fish populations are increased. Population densities will be enhanced through the development or improvement of particular habitat characteristics such as resting areas, hiding cover, pools, riffles, food source areas, and feeding lanes. The project would use "flow control" facilities and structures that employ natural materials (large rocks, large logs, and wads of roots) and native vegetation (grass, sedge, willow, alder, cottonwood, *etc.*)

At the end of the period covered in this volume, the Grande Ronde project was awaiting concurrence from the National Marine Fisheries Service regarding species covered in

the Endangered Species Act. The sponsor requested that construction be deferred until summer 2004. The total project cost was estimated at $3,200,000.

Indian Creek Ecosystem Restoration Feasibility Study, Caldwell, Idaho

A committee appointed by the City of Caldwell, Idaho, recommended that the city look at the possibility of uncovering Indian Creek as it flows through downtown. Based on the committee's recommendation, the city requested assistance from the Corps under their Aquatic Ecosystem Restoration Program.

Walla Walla District, in cooperation with the City of Caldwell, investigated the feasibility of conducting ecosystem restoration of Indian Creek. Indian Creek is home to wildlife such as waterfowl, ducks, and geese, as well as red fox, rabbits, and beaver. Several fish species, including rainbow trout, have found a home in Indian Creek. At the end of our period, the District was planning a study to look at biological improvement opportunities for Indian Creek and its riparian area.

In the early 1950s, the course of Indian Creek was changed so that it runs through Caldwell under buildings and streets. Restoration would consist of daylighting the creek and restoring the historical landscape (riparian area) along the creek as it flows through downtown Caldwell. The feasibility study would also consider restoration activities upstream and downstream of the downtown area. Restoration would provide habitat benefits for fish and wildlife by reconnecting the stream corridor and re-establishing a more natural stream and riparian area. Restoration would provide an opportunity for water quality improvements, educational values, recreational opportunities along the shoreline, and interpretation of past human interactions with the creek.

Several challenges were considered in the planning process. These included the channel geometry, channel restoration, public expectations, possible relocation of structures and utilities, and flow fluctuations. The feasibility study for the project was scheduled for completion in 2003.

Jackson Hole Restoration, Snake River, Wyoming

The Jackson Hole, Wyoming, local flood protection project was constructed between 1957 and 1964. The Corps became responsible for operations and maintenance of the project as authorized by the Water Resource Development Act of 1986 (13). Located both in and south of Grand Teton National Park, Wyoming, the project provides flood protection by channel improvements consisting of channel rectification, levees, and revetment along the Snake and Gros Ventre Rivers north and south of Wilson, Wyoming.

Along the Snake River, the Jackson Hole flood protection project includes approximately 23.5 miles of federally constructed levees. On the right bank is a series of levees, offset levees, and bank protection structures, all with full riprap protection. In addition, a series of federally and nonfederally constructed levees, with a total length of approximately five miles, are interspersed along both banks of the Snake River downstream of the Jackson-Wilson Bridge. The nonfederal levees include a continuous set of levees on the Gros Ventre River downstream of the Grand Teton National Park boundary.

Prior to construction of the levee system, the proposed restoration area was characterized by a complex system of braided river channels and wooded islands that provided highly diverse and productive habitat for both aquatic and terrestrial species. The levees contributed significantly to reducing flood damage with the river corridor, but they changed the physical character of the river system, resulting in river instability and habitat loss and degradation. The tendency of the main river channel to fill and shift has been intensified by the levee system. As the river changes its course, it can impinge on river island habitats, often destroying them completely. With the loss of these island habitats, many species can no longer survive in the area, especially during the harsh winters.

The U.S. Fish and Wildlife Service, state of Wyoming, and various environmental groups requested an environmental restoration proposal. In response to requests for environmental restoration, Walla Walla District prepared three proposals under different authorities. The overall goal of Jackson Hole restoration projects was to restore diverse and sustainable aquatic, wetland, riverside, and terrestrial habitats within the study area.

The effort resulted in authorization of an Environmental Restoration Study, a Section 1135 environmental demonstration project, and a Waterways Experiment Station wetland research project. The original project concept involved the protection of a wooded island from stream erosion and the construction of a gate to introduce water behind the levees and restore flows in the alluvial channels.

The demonstration project was located on the right bank (west side) of the Snake River near Wilson Bridge. The island protection proposal was dropped from the demonstration study, and the flow restoration effort was modified to reduce real estate requirements.

The modified demonstration project augmented flows in existing alluvial channels in an effort to restore historic fish and wildlife habitat in a five-mile-long, 2,500-acre reach of the Snake River. The demonstration project was initiated in 1991 and was being monitored as of the end of 2000. A Local Cooperative Agreement was signed in September 1990 with Teton County, Wyoming, which was the local sponsor responsible for twenty-five percent of costs. Total federal expenditures for the demonstration project through September 1997 were $136,000.

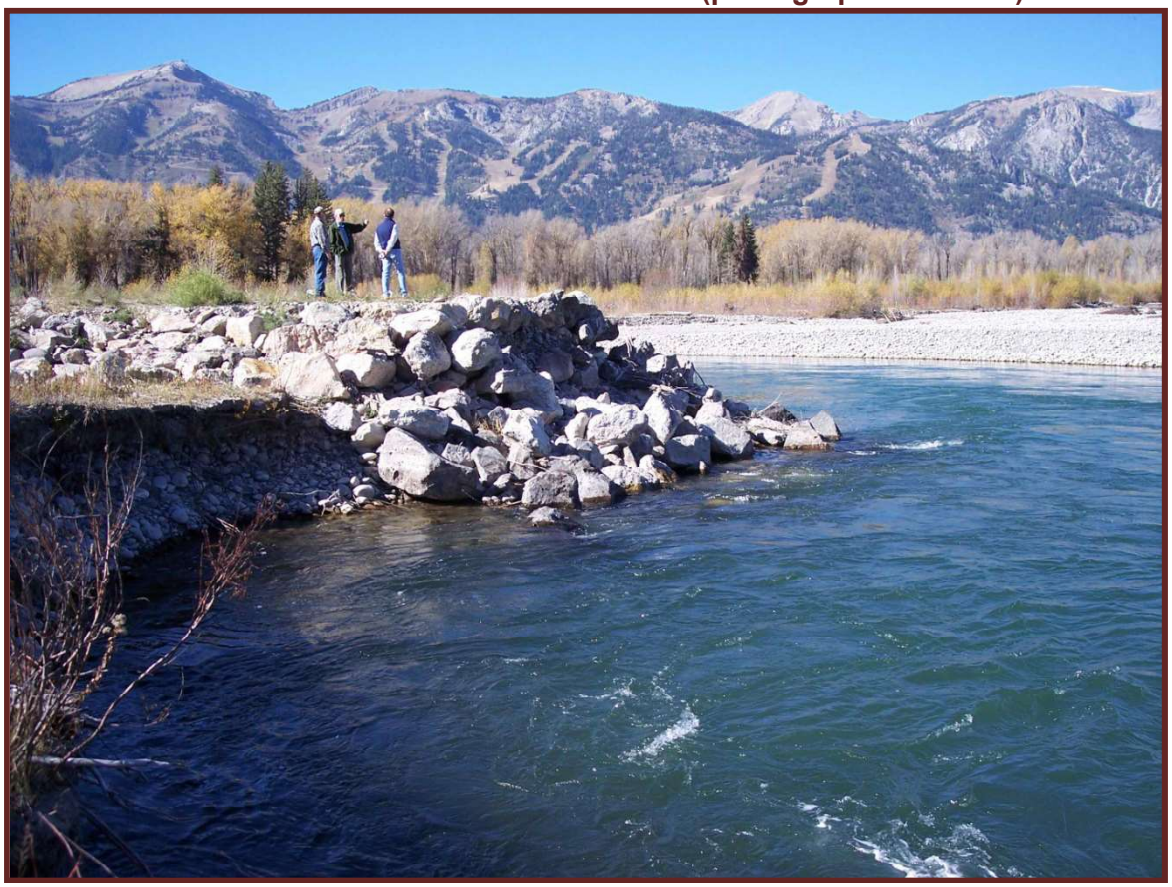
In 1993, a general investigation report and reconnaissance study was completed. This report addressed engineering, economic, and environmental justification for improvements and modifications. This single, comprehensive report, the *Jackson Hole, Wyoming, Flood Damage Reduction and Fish and Wildlife Restoration Reconnaissance Study* (14) recommended further study of restoration actions.

The Headquarters of the U.S. Army Corps of Engineers, Walla Walla District, and the local sponsor participated in a Reconnaissance Review Conference in Portland, Oregon, in March 1994. It was decided to move the study into the feasibility phase represented in a feasibility phase report and environmental assessment, entitled, *Jackson Hole, Wyoming, Environmental Restoration Feasibility Report* (15) issued in 2000.

The preferred alternative outlined in the feasibility report recommended restoration of a 22-mile reach of the Snake River in order to create more than 400,000 aquatic habitat units and 24,000 riparian habitat units as compared to the situation if no project were implemented. Using a phased schedule, construction of restoration structures would be accomplished in two to five years.

Restoration strategies recommended in the feasibility report were similar to those tested in the demonstration project. The recommended project would include gravel removal and construction of channel stabilization pools. Flow patterns in the river would be changed by construction of spur dikes, eco-fences (both rock and wooden piling fences), anchored root wad logs, and rock grade control structures.

Jackson Hole Restoration Results (photographed in 2010)



As the project manager during this phase of the Jackson Hole project said, "I'm not sure that we're going to be able to completely restore an entire ecosystem. What it [the project] will do is at least maintain some of the biological integrity of the system and maybe even bring back some of the historic habitat types that occurred along the river (16)." He was referring to restoring riparian and aquatic habitat types such as willow forests and the side channels fish use for spawning.

The feasibility report was favorably received, and the project was funded for implementation in the early part of the new century. This project, with an estimated cost

of $66.5 million if fully funded, would be the largest ecosystem restoration project undertaken by the Walla Walla District.

BALD EAGLES, TRUMPETER SWANS, CUTTHROAT TROUT, AND COTTONWOOD TREES

Bald eagles, trumpeter swans, cutthroat trout, and cottonwood trees will all benefit from the Corps' demonstration project under way at Jackson Hole, Wyo. …

In January 1991, the District was notified of the Office of the Chief Engineer's intent to fund the proposed demonstration project in Jackson Hole. This is the first such 1135(b) project to be undertaken by the District and one of the first in the United States.

The study area for the project is 5 miles in length and up to 3/4 mile wide, running along the west bank of the Snake River near Wilson, Wyo. Also included in the project is a wooded island along the east bank between the levees, approximately 3/4 miles downstream from the Wilson-Jackson Bridge.

A project is planned to divert water out of the river and behind the levees to restore water flow to channels and wetlands on a year round basis. By improving the watershed, additional fish spawning and rearing opportunities will be developed.

The island is one of few remaining in the Snake River channel having soil which supports mature cottonwood growth. With construction of the levees, the islands lost soil to support vegetation. Another objective of the study is to protect the island from high water flows and to restore soils critical to the growth of diverse vegetation. Pilings will be placed in strategic locations at the upstream area of the island with the intent to divert high flows away from the island and to allow some scouring to occur on the backside of the pilings for holes to be used by fish such as the cutthroat trout.

Trumpeter swans use Jackson Hole for both nesting and wintering, however, the levees have eliminated food sources and wide open water stretches. The project is intended to provide both to help increase the number of swans in the area.

Another wildlife species which will benefit from this project is the bald eagle. By providing habitat Improvements for trout and waterfowl, the primary food sources for the bald eagle will improve. Also, the cottonwood trees and regeneration of vegetation will assure future nesting sites. –*Intercom*, winter 1992 (17).

Ladd Marsh Aquatic Ecosystem Restoration, Oregon

Walla Walla District and the Oregon Department of Fish and Wildlife cooperated on a stream restoration project in the Ladd Marsh Wildlife Area, which is approximately five miles southeast of La Grande, Oregon. This aquatic ecosystem restoration project was undertaken as a Section 206 project.

Ladd Marsh Wildlife Area is a state-owned property totaling 3,208 acres. It is located in the Grande Ronde Valley. Prior to settlement, the entire Grande Ronde Valley had an estimated 30,000 to 40,000 acres of wetlands. Human activity since settlement has continually reduced the amount of wetlands in the valley so it could be used for agricultural purposes. Only remnants of the original wetlands remain. Two small streams, Ladd Creek and Barney Creek, flow through Ladd Marsh.

Ladd Marsh Area

The wildlife area provided a variety of quality habitats for a myriad of species. Habitat types include grain fields, tree and shrub areas, native prairie, as well as marsh and open water areas. Wet meadow and grassy uplands provide safe nesting areas for birds. Grain fields serve as feeding areas for migratory waterfowl. Hayfields provide winter feed for deer and elk. The Middle Fork of Ladd Creek is home to resident rainbow, bull, and steelhead trout. Steelhead and bull trout within the Grande Ronde basin were part of the population listed under the Endangered Species Act for the entire Snake River basin.

Like the rest of the wildlife area, the land surrounding the Middle Fork of Ladd Creek and Barney Creek was once used for agricultural production. The previous private landowner channeled both of these streams to increase the amount of acreage that could be utilized. These streams were made to run straight with little or no meander. The Middle Fork of Ladd Creek is an extreme example of channelization as it has been forced to run directly adjacent to the gravel road. Each spring, during snowmelt runoff, high flows damaged the gravel road along the Middle Fork of Ladd Creek. This created an annual maintenance chore for the Union County Road Department.

The goal of this project was to enhance the ecosystem of a 4,000-foot section of the Middle Fork of Ladd Creek and a 2,000-foot section of Barney Creek. The project involved the following actions: Restoring two small streams to a meandering pattern;

filling a large gravel pit over which new stream alignment would be placed; replacing two culverts with bridges to improve fish passage; relocating a fish screen; and revegetating new stream channels. The affected property was owned by the state of Oregon, and the potential problems of allowing streams to meander or water to spread out are low.

The project, as proposed, would primarily benefit bull trout and summer steelhead, species both listed under the Endangered Species Act. The project followed the intent of the Northwest Power Planning Council's plan to increase the size of salmon and steelhead runs in the Columbia basin. It would be a step toward improving anadromous fish runs for which treaties exist with both Canada and Native American tribes. The total project cost was estimated at $918,000.

Construction was scheduled to begin in late 2001. However, within one week, construction was suspended due to the presence of cultural resource artifacts on the ground. After the significance of the cultural resources is determined and related costs established, a decision will be made to continue construction or terminate the project.

Lava Hot Springs Aquatic Ecosystem Restoration, Portneuf River, Bannock County, Idaho

The Lava Hot Springs aquatic ecosystem restoration project area is located in the town of Lava Hot Springs at the head of a small valley on the Portneuf River in Bannock County, Idaho. The project began approximately two hundred feet downstream from the north abutment of the Main Street Bridge and extended for approximately three hundred feet downstream along the right (north) bank of the Portneuf River to the pedestrian bridge across the river at the north end of Third Avenue East.

Following the flood of 1962, the highway department constructed a retaining wall and adjacent sidewalk along five hundred feet of the right bank of the Portneuf River in Lava Hot Springs. The primary purpose of the state-constructed retaining wall was to protect the state-owned property that lies along the right bank of the river, including the historic natatorium that no longer exists. The result of constructing this wall was the removal of all natural vegetation for five hundred feet along the right bank of the river.

The section of concrete retaining wall removed had degraded the riparian habitat and aquatic ecosystem along the 300-foot stream bank by (1) eliminating all riparian vegetation; (2) increasing stream flow velocities along the right stream bank;
(3) impairing the sediment trapping ability along the retaining wall location;
(4) eliminating riparian cover and stream shading for aquatic biota; and
(5) eliminating habitat for terrestrial insects that are food for fish.

The Walla Walla District project involved restoration of a degraded aquatic ecosystem structure to an improved, more natural condition. The action replaced the concrete wall and sidewalk with a natural riparian area and gravel access road. The local sponsor believed that the removal of the concrete wall would allow bedding of fish in the area to increase, and provide shade and habitat. Over time, the plan will reestablish a 300-foot by 45-foot band of lost riparian habitat along the Portneuf River (approximately 0.55 acres), which would enhance the Portneuf River at the site for water quality, fish, and wildlife. The project will benefit several trout species including rainbow, brown, and

brook trout. The project will also enhance habitat for numerous birds and small mammals, reptiles, and amphibians.

The Portneuf River was listed on the Environmental Protection Agency 303(d) list of impaired water bodies for bacteria, nutrients, and sediment, and in some reaches, for flow alteration. They classified the Portneuf Watershed as “a watershed with more serious water quality problems that has low vulnerability to stressors.” Actions to prevent declines in aquatic conditions in these watersheds were appropriate, but at a lower priority than in watersheds with higher vulnerability.

The project site was owned by the state of Idaho and under the jurisdiction of the Lava Hot Springs Foundation. The local sponsor for this project was the Foundation, an agency within the Idaho Department of Parks and Recreation, which manages the lands. The total project cost was estimated at $467,430 with completion scheduled for September 2002.

Little Bay Stewardship Project, Ahsahka, Idaho

In 2000, Walla Walla District was conducting an environmental assessment of the Little Bay Stewardship Project at Dworshak Dam and Reservoir near Ahsahka, Idaho. The purpose of the project was to restore a healthy forest environment. Selectively removing small trees within overstocked stands and using prescribed burns in areas that have been suppressed from fire will imitate the effects of a natural wildfire. This will improve forest health and restore forest conditions that are beneficial to native wildlife. Fire suppression in this area created overstocked and unnatural forest conditions resulting in less available habitat for certain rare species. It also increased the risk of catastrophic fire and increased disease and beetle infestation.

The proposed project area was located along the Dworshak Reservoir near Canyon Creek between river mile 7 and river mile 11. Approximately 1,300 acres were assessed, of which 685 acres were proposed for treatment using selective tree removal and prescribed burns. The project was to begin implementation as early as 2002 and was expected to extend over a five-year period.

Little Weiser River, Idaho

This study examined a section of the Little Weiser River for possible restoration. Channel and bank erosion was depositing gravel bars, undermining trees on banks, and destroying riparian habitat. Previous snagging and clearing projects done by the Corps had aggravated the problem.

The management report and environmental assessment for the Little Weiser River project received a second favorable review by the Corps during August 1996. The assessment was scheduled for release in October 1997. However, the project was put on hold pending sponsorship review. The construction estimate came in considerably higher than what was originally anticipated, and the sponsor requested termination in December 1996. The project was terminated in January 1997. Federal cost for the study was $105,000.

Milton-Freewater, Oregon

This Walla Walla District environmental restoration study covered the Walla Walla River through Milton-Freewater, Oregon. This study was in the same reach of river as the Walla Walla Section 1135 project discussed below, but had different goals and was a separate project. As of the writing of this volume, the Milton-Freewater project was in the process of creating plans and specifications. Two different areas were to be explored for a setback of existing levees. Setting the levee back will allow for channel meander, vegetation growth, and an improvement of the river for aquatic species.

The sponsor of the project was the Walla Walla Watershed Council. Construction was scheduled to being in fiscal year 2003.

Pasco Shoreline, Pasco, Washington

This Section 1135 project proposed improvements to the aquatic and terrestrial habitat on the north shore of the Snake River near Pasco, Washington, between river mile 328.1 and 330.5 of the Columbia River. This would include salmonid habitat and mammal, avian, and amphibian habitat. The scope of the project includes the reduction of slope and height of the levee while still meeting flows in accordance with applicable and mandated requirements. Habitat improvements proposed would include placing fine grained materials over the existing riprap; creation of an undulating shoreline with excess levee materials for riparian habitat; and construction of limited recreation facilities in combination with other aquatic habitat improvements.The City of Pasco provided a letter of intent to be the study sponsor. A feasibility study was being planned for completion in 2002 to present recommendations for federal action. However, the sponsor was looking at a linear park for human recreation and may not pursue this ecosystem restoration project.

Portneuf River, Pocatello, Idaho

This proposed environmental restoration project would restore approximately one-third mile of river channel to a natural riparian habitat along with establishing a greenway connecting downtown Pocatello, Idaho to the Portneuf River.

“After serious floods in 1962 and 1963, the Army Corps of Engineers was called in to construct the concrete flood channel through Pocatello. Another construction project, the drawdown of Chesterfield Reservoir for dam reconstruction several years ago allowed the carp and silt to be flushed into the stream (18).”

The existing project provides flood control along a 6.2-mile stretch of the Portneuf River through the City of Pocatello, Idaho. The project consists of a 1.5-mile rectangular concrete channel and 4.7 miles of stone-clad levee and channel reaches upstream and downstream. The proposed environmental restoration project would continue to ensure protection of life and property from flooding.

“So the river today is damaged and strained, but maybe not for long. Two ambitious projects would make the Portneuf a park-like green belt … and restore the trout and native plant habitat along its upper reaches (19).”

The National Park Service was enlisted to provide leadership on the greenbelt project, while a Pocatello-based group, the Friends of the Portneuf worked with landowners to

provide the basis of support for the habitat restoration project. Once support had been gathered, the Corps was enlisted to plan the project.

The City of Pocatello provided a letter of intent in which they agreed to become the sponsor and assume full responsibility for all future project operation, maintenance, rehabilitation, and replacements costs. As of the writing of this volume, the project was in the planning phase in which Walla Walla District and the sponsor were working to identify improvements to the environment along with supporting rationale for a feasibility level study.

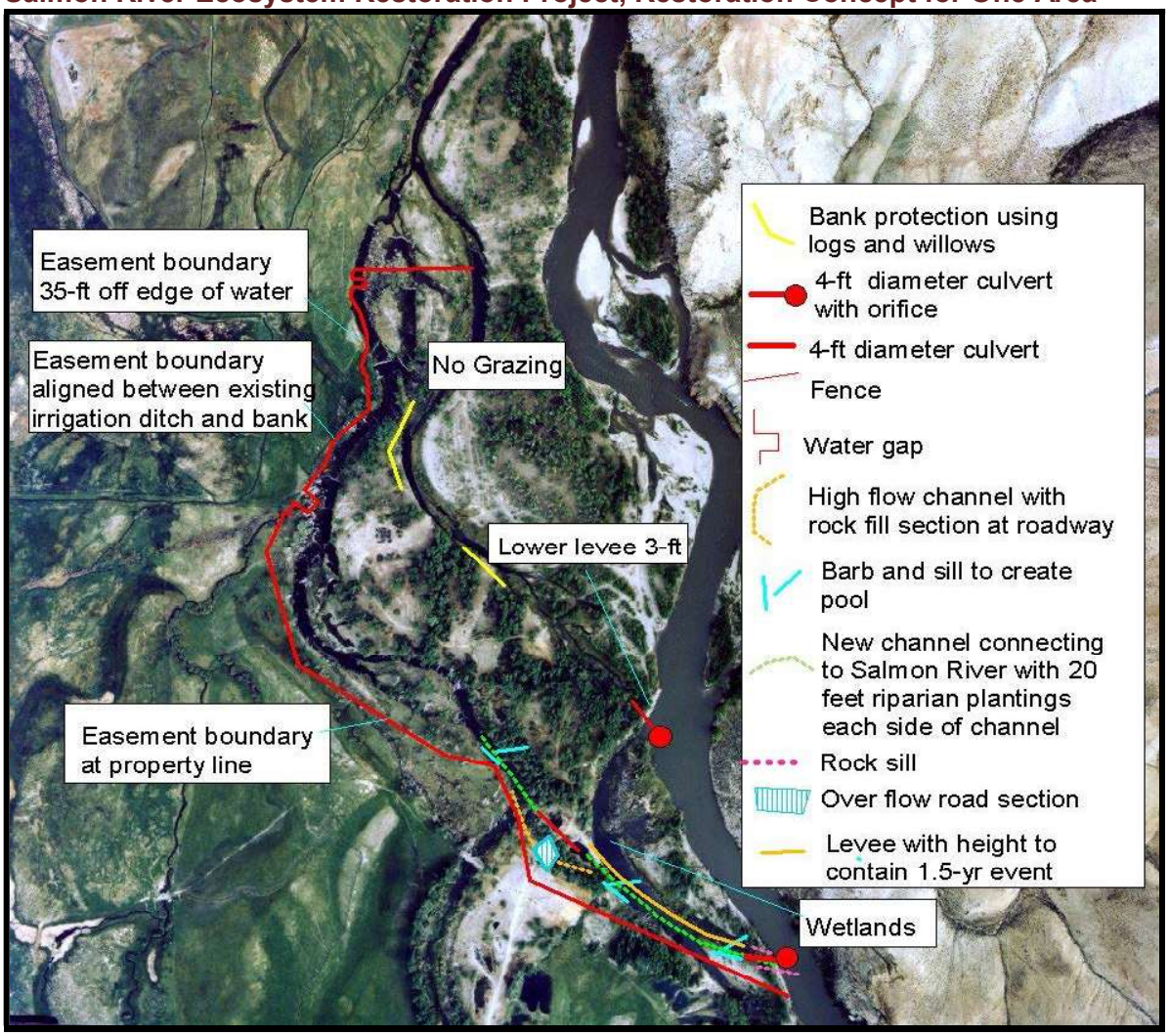
Salmon River Ecosystem Restoration Project, Challis, Idaho

At the end of the period covered by this volume, Walla Walla District was conducting an Aquatic Ecosystem Restoration feasibility study on a twelve-mile reach of the Salmon River near Challis, Idaho. The study was in partnership with the Custer Soil and Water Conservation District, Bonneville Power Administration, University of Idaho, Idaho Fish and Game, Upper Salmon basin watershed project, and others. One of the major goals of the study was to meet specific habitat needs for Snake River spring/summer chinook salmon, steelhead, and bull trout listed under the Endangered Species Act. Chinook salmon use this reach of the Salmon River as a holding area for adults and a rearing area for juveniles with a small amount of spawning occurring. Steelhead used the reach as a holding area for adults, a rearing area for juveniles with significant spawning occurring within the reach. Bull trout likely pass through the area seasonally with some adults and juveniles spending the winter in the area.

Habitat and natural river functioning were impeded by various human practices since non-Native American settlement in the valley. In addition to improving habitat conditions for fish, the partners in this restoration effort wished to restore, to the extent possible, natural floodplain functioning to provide a healthy functional river system. To accomplish this, private landowners would have to become an integral part of the project by providing lands where a variety of restoration measures could be implemented.

The University of Idaho conducted conceptual hydraulic modeling of the reach that visually demonstrated floodplain areas prone to inundation under various flow levels. This computer modeling was planned for use in developing site-specific plans on individual landowners' parcels. The intent was to satisfy the landowners' needs (e.g., lessen bank erosion) while providing environmental benefits and fairly compensate the landowners for the use of their lands. Measures considered included development of a riparian corridor, construction of habitat and cover structures, fencing, opening of side channels for periodic flooding, and removing or breaching of existing flood control structures.

Salmon River Ecosystem Restoration Project, Restoration Concept for One Area



Completion of the feasibility portion of this project was expected in early 2003, with construction beginning during the summer of that year. The federal government's cost share for this project was expected to be in the neighborhood of $2.5 million. Construction was likely to occur over the course of several years, as different landowners became partners.

Soldier Creek Restoration, Fairfield, Camas County, Idaho

Soldier Creek originates in the Soldier Mountains approximately fifteen miles northwest of the City of Fairfield, Idaho, and flows generally in a southeast direction to its confluence with Camas Creek approximately five miles southeast of Fairfield.

In 1957, the Corps constructed a snagging and clearing project on Soldier Creek. During construction, all vegetation was removed from the right bank in order to widen the channel. This flood control work further aggravated an unstable channel that eroded and deposited material on the riparian zone below Fairfield. In 1960, under flood control authority, the Corps excavated a half-mile section of the Soldier Creek channel, removed deposition from the lower three miles, and constructed six rock drop structures in an attempt to stabilize the channel. However, the reach previously worked

on in 1957 continued to erode the banks and deposit material in the channel downstream of Fairfield.

The deeply incised channel of Soldier Creek, resulting from the previous construction in 1957 and 1960, contributed to the death of much of the riparian vegetation along the creek; furthermore, the stream often dries up early in the summer.

The Soldier Creek riparian zone was utilized by deer, bear, beaver, muskrats, coyote, red fox, raccoon, weasel, mink, martin, fisher, badger, and bobcat. It provided feeding, nesting, and roosting for numerous bird species. The area was formerly an excellent nesting area for sandhill cranes, a species used as surrogate parents to raise the endangered whooping crane population. Reptiles and amphibians were plentiful. Loss of the riparian vegetation and perennial stream flows in the Soldier Creek stream complex has resulted in greatly reduced populations of all bird and animal species in the area.

In the past, Soldier Creek and the other three channels provided excellent rainbow and brook trout fishing. At the time this project was undertaken, limited runs of trout existed only in the upper reaches of Soldier Creek in the National Forest. Other tributary streams to Camas Creek suffered conditions similar to Soldier Creek, and the combined effects on the Camas Prairie affected almost all local species.

The Soldier Creek restoration project consisted of eight major actions: (1) constructing a rock structure to divert water during high flow periods into the unnamed creek channel; (2) constructing a rock diversion to channel water into Minear Creek, and possibly into Knowlton Creek, with channel connections along County roads; (3) installing ten rock weirs in Soldier Creek; (4) removing and reshaping one mile of spoil banks and revegetate banks with native plants; (5) installing a diversion structure and diversion channel to direct high flows through an abandoned gravel pit to serve as a sediment trap and allow restoration of a badly eroded channel section; (6) shaping pit banks to restore wetland habitat; (7) removing channel restrictions on the three overflow channels; and (8) replanting riparian vegetation on one hundred acres along channels, with native plants.

Improved flows and restoration of riparian vegetation were expected to provide significant benefits over time. The project aimed to restore the fish habitat in Soldier Creek and improve the habitat in the other branches. Improved habitat along the streams will, eventually, provide food and cover for a great variety of birds and animals. The project offered an opportunity to restore seventeen acres of wetlands along the channels and in an adjacent gravel excavation area. This wetland will provide habitat for many varieties of waterfowl that migrate through the Camas Prairie.

The local sponsor for the Soldier Creek restoration project was the Camas Soil Conservation District. The project was completed in 1997 for a total cost of $262,000.

Walla Walla River Restoration, Milton-Freewater, Oregon

This Section 1135 project involved building a new fish ladder on the Walla Walla River in Milton-Freewater, Oregon. The second piece of the project involved removal of Marie Dorian Dam, which was two miles upstream from the fish ladder.

The then existing fish ladder was outdated and obsolete. It is on the left bank of the river and remained untouched. The new fish ladder was built on the right bank and works under a much wider range of flows than the old ladder.

The Marie Dorian Dam was undermined by high flows in 1997 and was breached by local interests under an agreement brokered by Walla Walla District. Rubble from the dam breaching was removed at the same time the new fish ladder was built.

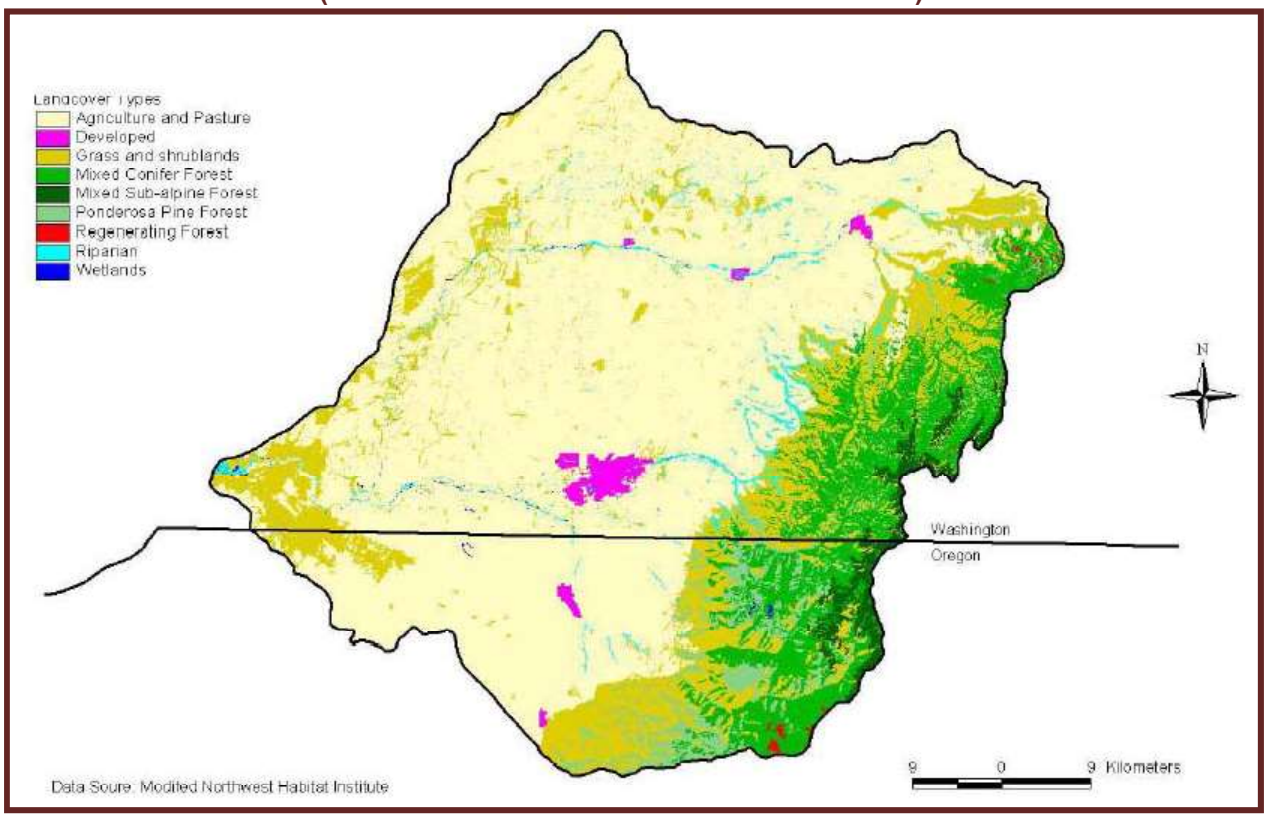
Construction took place during 1999. The total project cost was approximately $1,134,000.

Walla Walla River Watershed Study

A reconnaissance-level study of the Walla Walla River watershed was initiated on August 29, 1996. The study objectives were riparian and wetland restoration, fish and wildlife restoration and enhancement, flood damage reduction, water quality improvements, water supply, erosion control, low flow augmentation, and recreation. The study, released in 1997 (20), identified potential areas for future feasibility studies. The first area was levee removal on the main channel of Walla Walla River. The Washington Department of Fish and Wildlife is the likely sponsor for this effort, as the project lies on lands owned by them. The second possibility was a set-back levee with riparian buffer strip along the Upper Touchet River. A local government entity (city, county, or flood control district) would be the likely sponsor. The third identified study area was salmon reintroduction, in which the Corps' role would increase flows in the spring during the adult spring chinook migration period.

At the end of the period covered by this volume, Walla Walla District staff members, with the assistance and sponsorship of the Confederated Tribes of the Umatilla Indian Reservation, were actively working on a feasibility study and environmental impact statement for the third project listed above, salmon reintroduction. Specifically, the project was studying the feasibility of restoring flows to the Walla Walla River sufficient to support reintroduction of salmon. During the summer irrigation season (June through September), the amount of water flowing through the Walla Walla River was greatly reduced at an irrigation diversion in Milton-Freewater, Oregon. The river usually dried up leaving fish stranded in pools. Fish biologists from the Oregon Department of Fish and Wildlife and the Umatilla Tribes conducted annual fish rescue operations to relocate the fish. In addition to irrigation, the natural flow of the river was affected by the flood control levee, gravel accumulations, and water seeping away into the shallow aquifer.

Typical Illustration from Feasibility Study
(Land Cover in the Walla Walla River Basin)



The traditional use of water in the Walla Walla River became an issue of political and legal concern when river stocks of bull trout (1998) and steelhead (1999) were listed as threatened under the Endangered Species Act. "Federal agencies considered severe intervention while conservation groups considered lawsuits against the irrigation districts to enforce the law. Something different happened in the Walla Walla River basin. Irrigators whose livelihoods depended on water for their farms stepped forward (21)." Regional groups, including the Confederated Tribes of the Umatilla Indian Reservation, the Walla Walla Watershed Council, and Kooskooskie Commons, facilitated a negotiated compromise. Beginning in 2000, three irrigation districts (two in Oregon and one in Washington) pledged to keep a minimum water flow in the river and signed an agreement to this effect with the U.S. Fish and Wildlife Service. This step, along with removing river obstacles such as the Marie Dorian Dam (described above), eliminated the need for an annual fish rescue operation.

The already outstanding level of cooperation in the Walla Walla River basin made the Walla Walla River watershed flow restoration project one that was well worth pursuing. Alternatives being discussed for the basin, as our period came to a close, included improved irrigation efficiency, diversion of water from the Columbia River to the Walla Walla River, and development of one or more water storage sites on tributaries of the Walla Walla River.

Environmental Analyses and Environmental Impact Statements

As mentioned above, the National Environmental Policy Act (22) required federal government agencies to evaluate the environmental impact of proposed actions. In the 1981-2000 period, Walla Walla District conducted many, many evaluations as required by this act.

A PRACTITIONER EXPLAINS THE EIS AND ESA PROCESS

Environmental Impact Statements. They're the big NEPA [documents]. When the government takes on a project that has significant impacts, or is very controversial [we do an environmental impact statement]. It has nothing to do with cost of the construction. Some people think if my construction project costs so much, then I have to go to the EIS. No, that is not what it is. The NEPA's not based on how much money it costs. It has to do more with the size, the scope of your project. Is it something that could have significant impacts, good or bad on the environment? ...

There is the categorical exclusion level which says that the activity you're doing is in a category that normally doesn't have any significant impacts to the environment, but we still have to look at all the environmental review requirements, which means Clean Water Act, Endangered Species Act, cultural resource protection acts, any of those other acts. … Just because you are saying that [the project is covered by] categorical exclusion, you still have to write a biological assessment sometimes, to take care of the Endangered Species Act. Or you have to write up a cultural resources report and coordinate with the state's historical preservation office. … We still have to go though all those other processes so we can definitely say, "no significant impacts, categorical exclusion." …

The second level is an environmental assessment. Congress never anticipated that agencies were going to write environmental assessments all the time. They thought it was either going to be categorical exclusion or straight to the EIS. There's not a lot of guidance on what goes in the EA. …

With the EA you go through project purpose, come up with a list of alternatives, [and] identify what the preferred alternative is. You always compare it to the no change or no action alternative. We do an analysis of what the effects would be. We pick out the issues. You don't touch everything. You don't go through an encyclopedia. In this particular project, what are the issues? If we're building a fish acclimation facility, [there are] endangered species … [issues]. If we're changing the landform, how are we doing that? [We look at] cultural resources because we are excavating. [We look at the] Clean Water Act because we're dumping fish waste. You go through that, put it out for public review, respond to comments. … We can go ahead and sign a "finding of no significant impact" if … the analysis and the input verifies it.

The next level is the environmental impact statement. There are two ways you get to the EIS. One is from the very beginning. You look at your project, and you look at your regulations, and it goes straight to an EIS. … [If] you do the EA, and, through all the analysis, you do find significant impacts, you stop the EA, and you move to the EIS. The EIS takes more time, more money. –Sandra L. Shelin, Environmental Resource Specialist (23).

For example, in 1988, Walla Walla District worked on environmental impact statements for Mill Creek Lake (*i.e.*, Lake Bennington) and the McNary Juvenile Fish Loading and Holding Facility. These were typical of the many "retroactive" environmental impact statements that the District undertook for existing projects or facilities. In the same year, the District also worked on an EIS for Lower Granite interim flood control dredging—over the years, environmental impact statements were repeatedly prepared for dredging activities in the Snake River.

Also in 1988, new and proposed projects were studied for compliance with the National Environmental Policy Act. For example, an environmental impact statement was prepared for the proposed construction of Galloway Dam, and environmental assessments for the construction of Clearwater Fish Hatchery, a Walla Walla River bank protection project, and for establishment of fishing access at Ahsahka on Dworshak Reservoir (24).

Information on the numerous environmental impact statements and environmental assessments completed over the years is given in the District's *Annual Summary of Accumulated Historical Material* (25).

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Notes for Chapter 7

1. USACE. *Environmental Operating Principles*. Washington, D.C: USACE, 2002. INTERNET: http://www.hq.usace.army.mil/cepa/envprinciples.htm.
2. PL 91-190.
3. PL 93-205.
4. PL 95-217.
5. Minthorn, Antone. Salmon restoration: Paper presented at the Who Owns America Conference, University of Wisconsin, Madison, June 7, 2001. Pendleton, OR: Confederated Tribes of the Umatilla Indian Reservation, 2001. INTERNET: www.Umatilla.nsn.us/acmjune7.html.
6. PL 99-662.
7. PL 104-303.
8. Shelin, Sandra L. Interview. Walla Walla, NWW, 14 September 2001.
9. Channelization is a term used by the Corps and others to describe a stream that has been controlled by means of running it through a concrete or earthen ditch. A channelized stream is usually deeper and runs straighter than a natural stream. A channelized stream no longer meanders naturally. Streams were channelized, often as a means to prevent flooding. Channelization can have adverse effects on natural processes such as erosion and the growth of vegetation along streams.
10. USACE, Walla Walla District, Digital Project Notebook, courtesy Idaho Bureau of Mines. INTERNET: www.nww.usace.army.mil/dpn/. Accessed 2005.
11. PL 106-53, Section 560.
12. PL 99-662.
13. PL 99-662.
14. USACE, Walla Walla District. *Jackson Hole, Wyoming, Flood Damage Reduction and Fish and Wildlife Restoration Reconnaissance Study*. Walla Walla: NPW, 1993.
15. USACE, Walla Walla District. *Jackson Hole, Wyoming, Environmental Restoration Feasibility Report*. Walla Walla: NWW, July 2000.
16. McDonald, William F. quoted in Morrison, Jim. The Good Flood. *Compressed Air*, January-February 2000, p. 37 (reproduced, by permission in NWW's *Jackson Hole, Wyoming, Environmental Restoration Feasibility Report*).
17. Jackson Hole flood protection project, 1135(b) demonstration project. *Intercom*, winter 1992, p. 8.
18. Big restoration effort planned for once-neglected Portneuf. *Pocatello Idaho State Journal,* 19 May 1991, B1-B3.
19. Ibid.
20. USACE, *Walla Walla River Watershed Study Reconnaissance Report*. Walla Walla: NWW, 1997.
21. Walla Walla Basin Watershed Council. Walla Walla River flow restoration. Milton-Freewater, OR: The Council, 2002. INTERNET: www.wwbwc.org/Main_Pages/Projects/Flows.htm.
22. PL 91-190.
23. Shelin interview.
24. USACE, Walla Walla District. *Annual Summary of Accumulated Historical Material: Calendar Year 1988.* Walla Walla: NPW, 1989.
25. USACE, Walla Walla District. *Annual Summary of Accumulated Historical Material.* Walla Walla: NPW, 1986-2000.

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Walla Walla District

REFLECTIONS OF MANY WATERS

A HISTORY OF THE WALLA WALLA DISTRICT, U.S. ARMY CORPS OF ENGINEERS, 1981-2000

PART 2 of 2
CHAPTERS 8-12
BIBLIOGRAPHY and APPENDIX

Issued 2013

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Cover Photo: Clearwater River, ca. 1990

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A HISTORY OF THE WALLA WALLA DISTRICT, U.S. ARMY CORPS OF ENGINEERS, 1981-2000

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PART 2 of 2
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Chapter 8. Stewardship of Natural Resources

Fish Protection and Recovery

Anadromous Fish

The Columbia River basin provides habitat for five species of anadromous salmon and steelhead. Anadromous fish hatch in fresh water rivers and tributaries, migrate to and mature in the ocean, and return to their place of origin as adults to spawn. Salmon generally live two to three years in the ocean before returning to spawning areas.

A number of factors contributed to the status of salmon stocks in the Columbia River basin. These factors included the adverse effects of dams, logging, mining, cattle grazing, and pollution on spawning and rearing habitat. Another factor was the increased competition for food and the spread of disease from hatchery stocks. Overharvesting also contributed to the decline of salmon runs. This includes overharvesting in the 1800s and since then by incidental ocean take and sport and commercial fishery in the Columbia River basin. Poor ocean conditions, which prevailed during a good part of the 1980-2000 period, also helped to bring coastal salmon and steelhead stocks into decline, in addition to affecting salmon in the basin. All of these factors combined to lessen survival chances of the wild salmon stocks.

The Corps' eight hydroelectric dams on the lower Snake and Columbia Rivers are also widely believed to be a significant factor in the decline in the numbers of wild Snake River salmon stocks. Besides physically impeding fish migration, the dams create reservoirs that alter water velocities and temperatures, interfering with juvenile migration patterns and improving conditions for predators.

Adult fish ladders had been built into each of the eight lower Snake and Columbia River dams. The ladders allow adult fish to follow a series of graduated steps and pools to scale the 100-foot-rise in elevation from downstream to upstream of each dam as they travel upriver. The ladders have proved effective.

In the years since the dams have been in operation, many improvements were made to juvenile fish passage routes at the dams. As they travel to the sea, there are a number of ways for juvenile fish to pass the dams: over the spillways, through juvenile bypass systems, in specially designed barges, and through the turbines.

A full review of the issues related to Columbia River system anadromous fish and the Corps' efforts to protect them is provided in the book, *Saving the Salmon: A History of the U.S. Army Corps of Engineers' Efforts to Protect Anadromous Fish on the Columbia and Snake Rivers* (1) prepared for the Portland and Walla Walla Districts of the Corps and published in 1994. This volume will not attempt to reiterate the detail provided in *Saving the Salmon*, but will touch only the most significant points of fisheries mitigation as related to the District. Chapter 5 of the current volume provides more information on innovative fisheries technologies employed by the District.

Northwest Power Planning Council

In December 1980, Congress passed the Pacific Northwest Power Act (2), which established the Northwest Power Planning Council. The council is composed of two members each from Idaho, Montana, Oregon, and Washington states. The members are appointed by the governors of their state and charged with preparing and adopting a regional conservation and electric power plan. The Council's charter puts fish and wildlife considerations on an equitable basis with power planning and other purposes for which hydroelectric facilities were developed.

In December 1994, the Council passed amendments to its Fish and Wildlife Plan that called upon the region to implement certain actions for Columbia and Snake River salmon. The amendments, called the "Strategy for Salmon," laid out a number of actions for the Corps, including operational changes to the hydroelectric system and physical changes to the dams. Many of these actions appeared in the Biological Opinion (3) issued in 1995 by the National Marine Fisheries Service under the Endangered Species Act concerning listed Snake River salmon species. The Corps, while attempting to respond to Council plans, has a legal mandate to fulfill Endangered Species Act requirements and has placed higher priority on the measures contained in the Biological Opinion.

The Endangered Species Act and Fish

The Endangered Species Act (4), passed by Congress in 1973, required all federal agencies to carry out programs to conserve endangered and threatened species. Agencies must work in consultation with the Secretary of the Interior (specifically, the U.S. Fish and Wildlife Service) or the Secretary of Commerce (specifically, the National Marine Fisheries Service). Since the salmon and steelhead of the Columbia River basin were part of a commercial fishery, the Corps was required to conduct environmental site assessments and Endangered Species Act consultations with the NMFS.

Despite regional efforts to stop declines in numbers of salmon and steelhead in the Columbia River basin, three species of salmon were listed under the Endangered Species Act. Effective December 20, 1991, the National Marine Fisheries Service listed Snake River sockeye salmon as endangered. Effective May 22, 1992, Snake River spring/summer and fall chinook salmon were listed as threatened species. In August 1994, in an emergency action, NMFS changed the status of the two listed chinook salmon species to endangered. On August 11, 1997, NMFS listed the upper Columbia steelhead as endangered and Snake River steelhead as threatened under the Endangered Species Act. In addition, in 1998 and 1999, the U.S. Fish and Wildlife Service listed a total of six regional populations of bull trout as threatened.

Section 7 of the Endangered Species Act required that a document, termed a biological assessment, be prepared to determine whether a proposed major construction activity under the authority of a federal action agency was likely to adversely affect listed species, proposed species, or designated critical habitat. The outcome of biological assessments determined whether formal consultation or a conference is necessary.

The Endangered Species Act required a biological assessment of the effects on listed species of planned operation of the Federal Columbia River Power System. Following consultations between National Marine Fisheries Service and the Corps, NMFS issued a Biological Opinion. In its March 2, 1995, *Biological Opinion: Endangered Species Act – Section 7 Consultation* (5), NMFS found that the planned operation of the Federal Columbia River Power System would jeopardize the continued existence of the three listed Snake River salmon species. Accordingly, the Biological Opinion provided reasonable and prudent alternative measures to avoid jeopardy. On March 10, 1995, Major General Ernest J. Harrell, then Division Engineer for North Pacific Division, signed a record of decision documenting the Corps' intent to implement the measures in the Biological Opinion.

The 1995 Biological Opinion called for a variety of actions and studies for improving conditions for salmon migration throughout the Columbia River basin. During the 1995 operating year, the Corps implemented operational measures such as flow augmentation, spills, juvenile fish transport, and lowered reservoir levels, as contained in the Biological Opinion. A team of representatives from four federal agencies (the U.S. Fish and Wildlife Service, National Marine Fisheries Service, Bonneville Power Administration, and the Corps) monitored river and fish conditions and recommended adjustments to operations during the migration season.

The 1995 Biological Opinion called for evaluation and implementation of improvements to the existing fish bypass systems, as well as a study of alternative structural configurations at the dams, such as reservoir drawdowns and surface bypass systems. The 1995 Biological Opinion as well as other factors led the Corps to evaluate drawdowns of the four lower Snake River reservoirs—Lower Granite, Little Goose, Lower Monumental, and Ice Harbor. The idea behind drawdowns was to increase the velocity of the river by decreasing the cross-sectional size of the reservoirs. The result of that evaluation was presented in the Corps' Juvenile Salmon Migration Feasibility Study (see below).

Other studies related to the 1995 Biological Opinion focused on improved gas abatement during spill (see below); refined turbine design to reduce turbulence and negative pressures (see chapter 5); and light and sound generation, as well as physical barriers, to guide fish. Research efforts continued concurrently, to evaluate in-river migration versus transport of juvenile fish, study of juvenile fish survival and travel time through the reservoirs, and various aspects of fish behavior.

In December 2000, the National Marine Fisheries Service issued a second Biological Opinion (6). This document reinitiated consultation with the Bonneville Power Administration, Bureau of Reclamation, and the Corps regarding operation of the Federal Columbia River Power System, the Corps' Juvenile Fish Transportation Program (see below), and nineteen Bureau of Reclamation projects in the Columbia River basin.

In the Biological Opinion of 2000 (7), the Corps, Bonneville Power Administration, and the Bureau of Reclamation were designated "action agencies," which "must ensure that their proposed actions would not be likely to jeopardize the continued existence of a

listed species or destroy or adversely modify the designated critical habitat of such species (8)."

Speaking of the environmentally significant units, or ESU, of fish species, the 2000 Biological Opinion concluded: "Although recent improvements in the operation and configuration of the FCRPS [Federal Columbia River Power System] have reduced overall mortality rates for the species, current survival through the FCRPS … is not sufficient to ensure the survival of the ESU … (9)." In other words, more needed to be done to ensure the survival of the salmon stocks covered by the opinion.

The 2000 Biological Opinion outlined a pathway to compliance with the Endangered Species Act for the action agencies in relation to endangered and threatened stocks of salmon. Conservation and system management recommendations to be adopted by the agencies included: create spawning habitat; evaluate the effects of the Federal Columbia River Power System on infectious disease transmission in fish; improve runoff volume forecasting; conduct long-term gas abatement alternative study; spill objectives for assisting fish passage; juvenile fish transportation objectives; and fish passage facility objections. Many of the recommended actions were related to intensifying or improving programs or facilities already in progress by the Corps (as discussed below) and by other action agencies.

Northwestern Division's Fish Management Division

To increase responsiveness to salmon issues in the region, in 1994 the Northwestern Division of the Corps established its Fish Management Division (formerly the Pacific Salmon Coordination Office). The Fish Management Division focused on internal coordination of salmon issues, as well as improved communication and coordination with regional, state, and federal agencies, with tribes, organizations, and the general public. The office provided oversight and strategic planning of Corps activities to ensure timely completion of actions and studies for salmon restoration.

Because of regional interest in actions to aid migration of salmon and steelhead past dams operated by the Corps, the Fish Management Division published *Salmon Passage Notes* (10), a newsletter available on the Internet. The newsletter published many articles about salmon research in Walla Walla and Portland Districts.

Fish Facility Design Review Work Group

Research conducted for the U.S. Army Corps of Engineers lead to the development of new or modified structures that affect fish passage. A review process ensured that the best available biological information is incorporated into each structure's design criteria. The Fish Facility Design Review Work Group, referred to as FFDRWG ("fidder-wig"), was a multiagency group providing technical input regarding these matters. The group was a work committee under the Corps, Northwestern Division's Anadromous Fish Evaluation Program.

In addition to the Northwestern Division and district offices of the Corps, active agency participants in FFDRWG included the National Marine Fisheries Service, U.S. Fish and Wildlife Service, Bonneville Power Administration, Oregon Department of Fish and

Wildlife, Washington Department of Fish and Wildlife, Idaho Fish and Game, and tribal representation through the Columbia River Inter-Tribal Fish Commission. Additional participants included research entities, fisheries management representatives, and field biologists who provided scientific input on specific Corps design, construction, and evaluation activities.

At the end of the period covered by this volume, FFDRWG met quarterly to discuss such modifications as improvements to the juvenile fish bypass system at McNary Dam, possible installation of extended fish screens at Lower Monumental Dam, and the plans for testing and operating the removable spillway weir at Lower Granite Dam (see below and chapter 5 for more on the weir).

Methodologies for Improving Fish Survival

Migrating salmon and steelhead must pass through, around, or over the dams to reach the sea and return to spawning grounds. One area the Corps is constantly investigating is improvements to its structures. In the case of migrating salmonids, it is McNary Dam and the four dams on the lower Snake River that are constantly being studied and modified by Walla Walla District.

Walla Walla District participated in many named programs designed to strengthen the management of fisheries-related activities. During the early 1980s, the District did much work under its Fish Passage Development and Evaluation Program and the Columbia River Juvenile Fish Mitigation Program. One of the broadest fisheries programs, initiated in 1991, was the Columbia River System Salmon Program (called CRSSP). CRSSP had many diverse components that involved Walla Walla District, including: the Columbia River Juvenile Fish Mitigation Project; the System Configuration Study; the Drawdown Plan/Physical Test; special dredging activities; Waterways Experiment Station Model testing; the Columbia River Salmon Flow Measures Options Analysis; the Lower Snake River Fish and Wildlife Compensation Plan; the System Operation Review; the Northwest Power Planning Council Fish and Wildlife Plan; the Fish Passage Development and Evaluation Program; Endangered Species Act consultations; and ESA-related operations and maintenance activities. Many of these individual programs are discussed in this chapter. Through the end of fiscal year 2000, over $365 million had been spent on the CRSSP program.

Habitat Improvement

The creation of the federal hydropower and navigation projects along the Columbia and lower Snake Rivers meant inundation of some spawning areas used by salmon. Other human activities such as logging and land development also affected critical spawning areas.

The Corps undertook various environmental restoration projects that would improve habitat for Columbia River basin salmon and steelhead (as detailed below). In its plans for disposal of dredged materials, the Corps hoped to create suitable habitat for spawning (see chapter 4).

At the end of the period covered in this volume, the need for habitat evaluation remained great. In 2000, a report prepared by Battelle Pacific Northwest National Laboratory and the U.S. Geological Survey's Western Fisheries Research Center reviewed the potential for mainstream habitat restoration along the Columbia-Snake River System (11). The report found that an estimated sixty to eighty percent of fall chinook that pass McNary Dam at the time of the study spawned in the Columbia's Hanford Reach. The report concluded, "To date, no systematic assessment of the extent and types of habitat modification resulting from dam construction has been made. Additionally, potential locations for restoration of riverine processes and/or specific benefits to salmon and steelhead have not been identified (12)."

Learning about the Reservoirs

In 1992, in order to make better decisions about modification of dams and other structures in the lower Snake and mid-Columbia River, Walla Walla District initiated its geographic information system (GIS) for fisheries programs. That year, Lower Granite Reservoir was studied using sounding data from the National Oceanographic and Atmospheric Administration. This data was used in conjunction with Corps Doppler and sounding data derived largely from sedimentation-dredging studies to map the contours of the reservoir's channel. A three dimensional dataset was produced that could be referenced in estimates and research related to fisheries. With information on such things as water velocities and pool elevations, fish travel times and paths through the reservoir could be estimated more accurately.

Learning about Fish Behavior

During the period covered in this volume, the Corps conducted many studies that advanced knowledge of anadromous fish behavior, particularly as it is related to bypass systems. In 1986, for example, Walla Walla District conducted hydroacoustic (most using sonar in water) studies of fish movement.

Many studies of fish were done using PIT tags. Passive integrated transponder tags, or PIT tags, are small microchips (about the size of a grain of rice) that are injected into a fish using a hand-held applicator gun. The basic premise of telemetry research is that tagged fish behave similarly to untagged fish. The miniaturization of tags now makes this a viable premise.

A scanner later reads the tag's electromagnetic code and displays the tag's number. By the year 2000, Bonneville, John Day, McNary, Little Goose, and Lower Monumental Dams had been outfitted with automatic PIT tag detectors in their juvenile fish bypass systems. The PIT tags have been used to study travel times and patterns of migrating salmon as well as survival rates for salmon returning from the ocean.

Anadromous Fish Evaluation Program

In the late 1990s, the Corps restructured its fish research program, formerly the Fish Passage Development and Evaluation Program, to assure that salmon studies were fully coordinated internally and with regional entities. These include the Pacific Salmon Coordinating Committee (a regional federal agency team); the National Marine Fisheries Service (as expressed in its Biological Opinions); the Northwest Power

Planning Council's Fish and Wildlife Program; the states; and tribes. The new program was titled the Anadromous Fish Evaluation Program.

Research focused on improved fish passage and survival through the dams and reservoirs. Under the new structure, a Corps coordination team oversaw the Anadromous Fish Evaluation Program and provided program management, quality assurance, and regional interface for all anadromous fish evaluations.

A technical coordination team provided a process for interfacing with federal and state fishery agencies, tribes, and other interested parties to assure that they have adequate opportunity for review and to provide recommendations throughout the development and implementation of program studies. The team coordinated scientific peer review of Anadromous Fish Evaluation Program proposals, tested fish needs, and studied results.

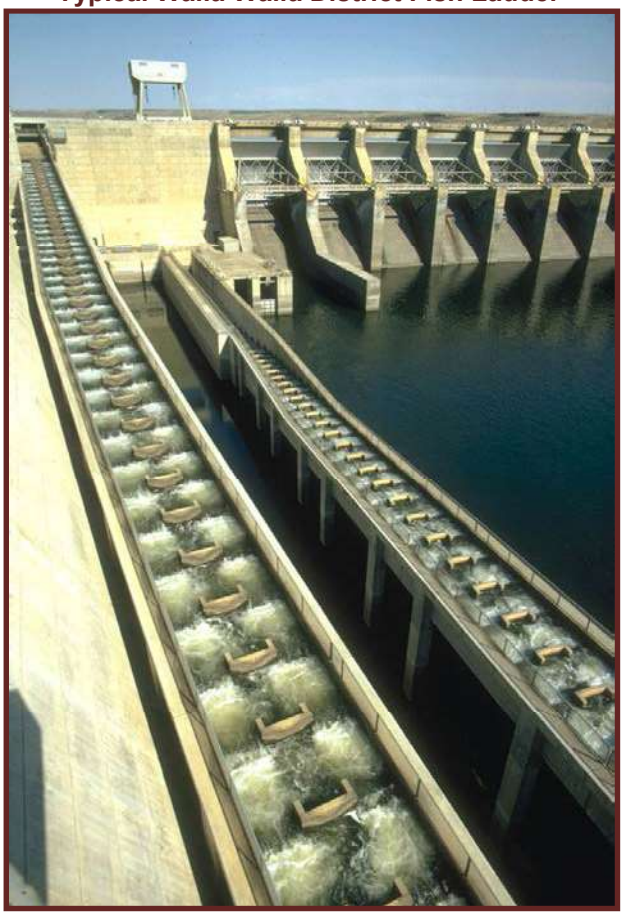
Hatcheries

One of the measures undertaken to mitigate the effect of federal hydropower projects on fisheries was the construction of hatcheries. As discussed in detail below, Walla Walla District constructed many hatcheries under the Lower Snake River Fish and Wildlife Compensation Plan. Table A-6, in the appendix, lists the hatcheries designed by the District.

Adult Fish Ladders

McNary Dam and the lower Snake River projects were originally constructed with adult fish passage facilities. These facilities include fish ladders with a 100-foot vertical rise. In the early 1990s, adult fish passage at the four lower Snake River dams was formally evaluated. The fish ladder weir and walkway at Lower Granite Dam was modified in 2000. Adult collection channels were also modified at McNary Dam in 2000. This would facilitate collection of adult fish for research purposes.

Typical Walla Walla District Fish Ladder



Modified Turbines and Turbine Intake Gates

Between 1992 and 1999, studies of the McNary turbines and associated structures (such as the downstream draft tunnel leading away from the turbines) were conducted to help determine the effect on fish that passed through these structures. Several changes to associated structures were completed in the 1990s.

In 1995, Corps staff and other regional scientists formed a sixteen-member Turbine Technical Working group to share information and develop a coordinated approach to studying and solving turbine passage problems. As one Corps biologist commented, "Our knowledge base of the turbine environment from a fish passage standpoint is that it's a black box. From an engineering discipline, we have a great deal of information on the machinery in the powerhouse. We have lots of engineering expertise to redesign turbines. But we don't know what actually injures the fish (13)." During the period covered by this volume, many studies were undertaken to discover exactly what happens to fish passing through the turbines.

People tend to think of turbines like huge blenders, but, in actuality, they spin much more slowly. Thus fish passing through the turbines at McNary, Ice Harbor, Lower Monumental, Little Goose and Lower Granite tend to survive the journey at something approaching ninety percent. "Juvenile fish heading downstream through dams generally are not chopped up by turbines. Instead, they are harmed when they crash into nonmoving parts and by the drastic pressure changes caused by the turbines. They are also susceptible to the collapse of air bubbles in the turbine – a phenomenon called 'cavitation' that's caused by pressure changes (14)."

Within turbines, water shear, which happens when two parallel jets of differing velocities of water pass next to or near each other, can cause injuries such as torn gills that can sometimes be fatal. Even protruding human safety devices such as hand grips or platforms installed in turbine passages may harm fish.

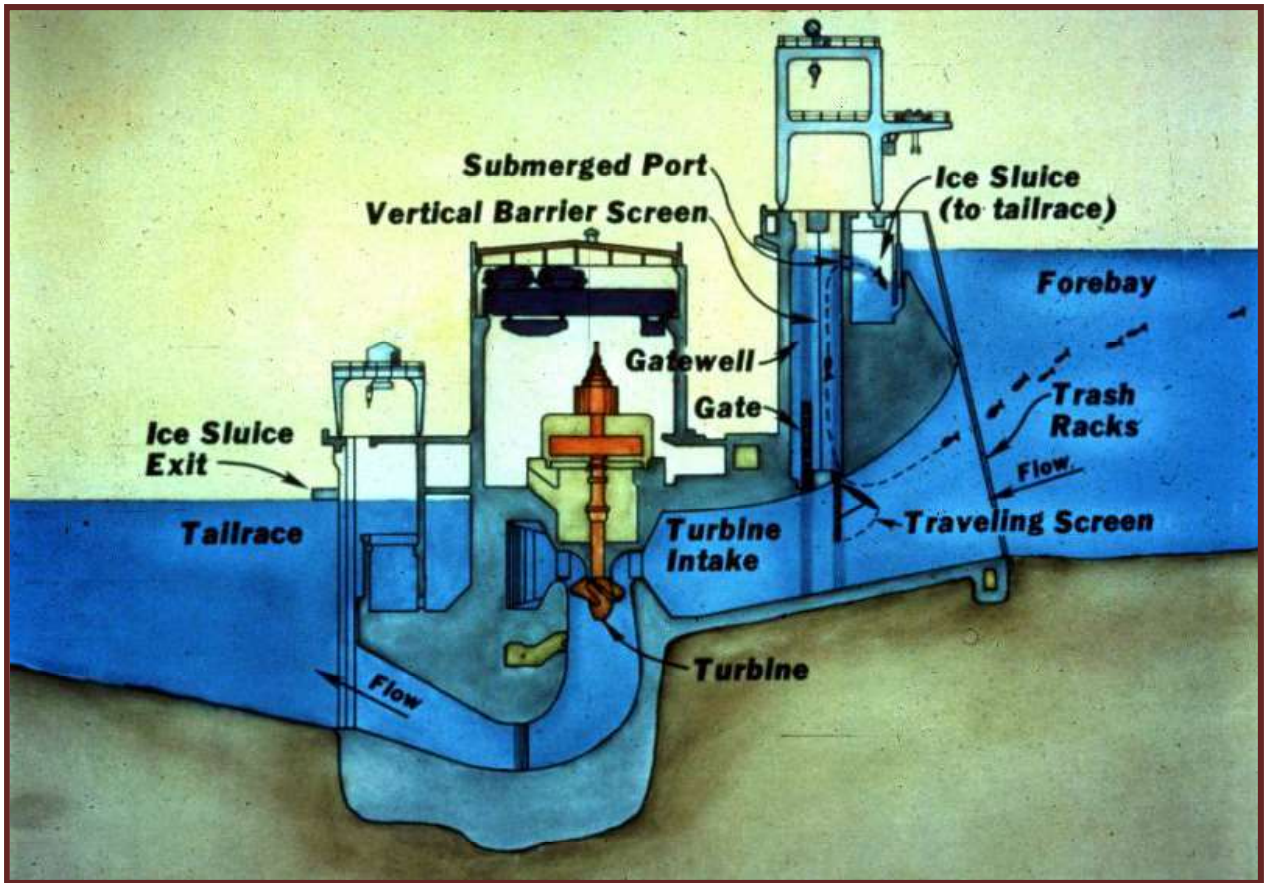
The McNary generating units were installed during 1954-57. As of the end of the twentieth century, no significant investment had been made to improve the efficiency of the generating units since they were installed. To maintain reliability, aging turbines and the associated equipment at hydropower projects have to be replaced or upgraded. This presents an opportunity to improve turbine passage for fish and increase power output. Taking advantage of the technology and information that has become available since the installation of turbines at McNary Dam more than fifty years ago, the McNary Dam Powerhouse Modernization Project could result in replacing all fourteen turbines and related electrical equipment at the dam.

As discussed in chapter 5, Walla Walla District investigated minimum gap runner turbine technology specifically for the McNary modernization. This technology appeared likely to decrease mortality for migrating fish traveling through the turbines. The District planned to advertise a turbine model contract in 2002.

Turbine Screen Bypass Systems

Federal hydropower and navigation dams in the Columbia River basin were not originally provided with facilities to pass migrating juvenile salmon around the turbines as they made their trip from upriver spawning areas to the sea. As of 2000, the two most common methods of passing juvenile fish are spillways (see below) and turbine screen bypass systems. McNary Dam and each of the four lower Snake River dams were provided with turbine screen bypass facilities, which have been the subject of much research and structural improvement during the 1981-2000 period.

Vertical Barrier Screen



Bypass systems basically consist of two parts: structures to divert fish away from turbines and a series of flumes or pipes to carry fish through the dam and discharge them below it.

In the early 1980s, the Corps realized that the Columbia and Snake River projects were experiencing a lower than expected fish guidance efficiency. That is, the standard twenty-foot screens that had been installed to divert fish from turbine intakes were not as effective as desired.

During the 1985-1995 period, Walla Walla District, with the assistance of the Corps Waterways Experiment Station, tested extended submerged traveling screens and extended submerged bar screens. Both types of extended screens were forty feet long,

twice the standard length. A physical model (1:100) of McNary Dam at the Waterways Experiment Station was constructed in 1990 to test the longer screen concept and resulted in further design changes. In 1991, 1992, and 1993, prototype tests of extended-length submerged traveling and bar screens were conducted at McNary Dam and, in 1993, at Little Goose Dam. Three screen designs were evaluated during the spring and summer fish migration periods with encouraging results. The Waterways Experiment Station conducted video imaging of fish approaching the screens and indicated some severe hydraulic stresses associated with the traveling screens. The tests suggested that a new design, a vertical barrier type screen, would be most effective.

In 1993 standard length submerged traveling screens were installed at Ice Harbor. In 1996-1997, new vertical barrier screens were installed at Lower Granite and new extended length travelling screens at Little Goose and McNary Dams. These additions to existing fish passage systems were designed to increase the percentage of juvenile fish guided away from the turbine intakes and up through the bypass channels.

In conjunction with newer surface bypass technologies, Walla Walla District was testing cylindrical dewatering screens. These were installed at McNary in 2000. The screens were designed to reduce the flow, which contains the fish, created by the surface bypass collector (see below).

In addition to screens, other measures were taken in relation to bypass systems. The Lower Granite Fish Guidance Efficiency Study Feasibility Report was completed in 1986. The report recommended raising powerhouse gates twenty feet. In the same year, the McNary reconnaissance level study recommended a raise of that project's powerhouse gates.

In 1984, a Walla Walla District design memorandum proposed relocating the Little Goose fish bypass facilities. The older bypass system experienced high water velocities in the pipeline used to transport the fish downstream. The low height of the holding facility did not allow gravity loading of the fish to barges or trucks as part of the District's transport program. The project to move the bypass facilities and to bypass fish via an innovative "fish flume" was completed in 1990 (see chapter 5 for a fuller discussion of the flume). The contracts for the Little Goose permanent juvenile fish facilities included dewatering facilities, a bypass chamber, and a new laboratory building.

The newly completed McNary Dam juvenile fish facility was dedicated in 1994. The facility featured state-of-the-art improvements for collection and transportation of fish. The facility included the Pacific Salmon Visitors Information Center where the public could view migrating salmon and find out more about salmon and the Corps operation of the bypass facilities. While Walla Walla District officials spoke, presenting the new facility to the public, about a dozen protesters stood by to express their view of the dam as a "proven salmon killer (15)." A local newspaper quoted one of the protesters, "'Here's your door prize – a Corps of Engineers' salmon," said Charlie Ray, of Idaho Rivers United, as he handed out rubber fish skeletons. The protesters focused [on] an incident in late July where warm water in the facility killed up to 90,000 fall

Chinook. One came dressed as the grim Reaper with 'Corps of Engineers' painted on the front of the outfit (16)."

Construction of a conventional juvenile bypass system at Ice Harbor Dam on the lower Snake River was completed in 1996.

Surface Bypass Systems

In the 1990s, surface bypass was a relatively new technology that held promise of more efficiently bypassing juvenile fish at the dams. Surface bypass systems (see more in chapter 5) were designed to intercept the fish within the upper portion of the water column where they normally migrate and allow them to bypass the dams without plunging deep under the water to pass through turbines. There is a potential for less spill water with these systems.

In 1995, the Corps installed and tested several types of surface bypass guidance systems at Ice Harbor, as well as at The Dalles Dam in Portland District. A prototype surface collector was tested at Lower Granite Dam in 1996. This surface bypass collector was a 300-foot-long floating steel "channel" installed upstream of the powerhouse, extending parallel across three of the six powerhouse turbine units. The structure is designed with fish entrance intakes to attract juvenile fish into the surface bypass collector and away from the turbines. The outlet of the channel is connected to an adjacent spillway to allow flow and fish through the structure. Tests were conducted from 1996 through 1999. These studies indicated that a high percentage of fish could be attracted to the surface bypass collector using a relatively low percentage of the river flow. The tests determined that fish are more attracted to shallower weir entrances, generally less than 25-feet deep.

In 1998, the behavioral guidance structure was installed at Lower Granite. This structure tested the concept of discouraging juvenile fish passage by blocking passage into turbine intakes. The behavioral guidance structure was an eighty-foot-deep vertical wall intended to create an artificial shoreline effect to lead juvenile fish away from turbines. Over several years of tests, the guidance structure demonstrated the potential to reduce turbine passage by eighty percent. The five-million-pound structure can be moved and stored nine hundred feet upstream within twelve hours.

One innovative approach to assisting juvenile salmon was the removable spillway weir, an engineering innovation discussed in greater detail in chapter 5. Essentially, the weir partially blocked open spillways, thus retaining more water behind the dam. Hence, that water was available for hydropower generation while the migrating fish could swim downstream over the dam with the partial flow of the river. Fish passed with the approximately eleven-foot-deep surface flow over the shaped weir, in an effect similar to that of a waterfall.

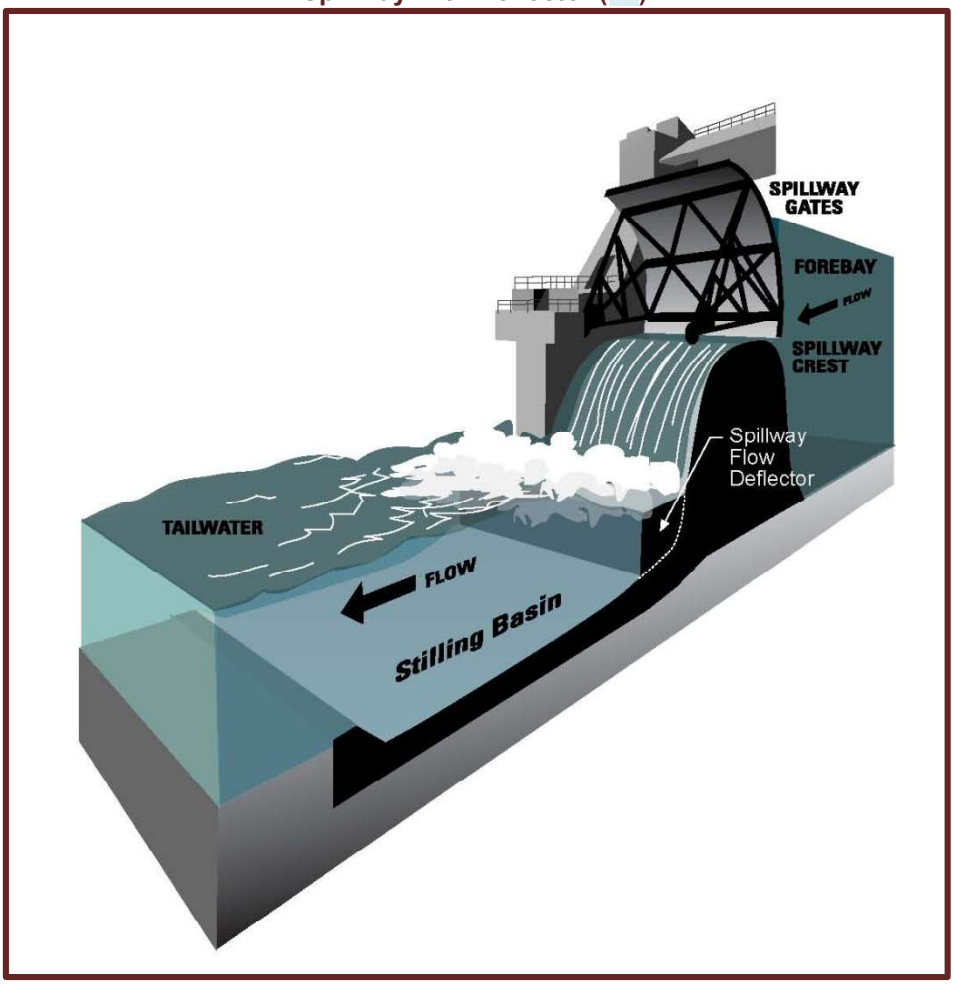
Spillway Deflectors

The installation of spillway deflectors, so called "flip lips," was part of an operational change at the Walla District's Columbia River dams in which more water was sent over the spillways in an effort to speed migrating salmon on their way to the sea (see below).

Much research on spillway deflectors came out of the Corps Dissolved Gas Abatement Study, which is discussed below.

In addition to dissolving an undesirable amount of gas, water falling over the dam can damage the riverbed below the dam (the stilling basin). To prevent these undesirable results, deflectors are positioned to provide a smooth skimming flow.

Spillway with Deflector (17)



A 1:55 scale model of Ice Harbor Dam was built at the Corps Waterways Experiment Station (now the Engineering Research and Design Center). Testing resulted in the selection of 12.5-foot-long deflectors, each with a 15-foot radius. The deflector length was optimized to provide a stable flow for spill between 6,000 and 14,000 cubic feet per second. The deflector was designed so that it could be overridden should a flood require greater spill. The deflector was designed to dissipate the tremendous energy of the falling water, saving the stilling basin from damage.

In 1996, eight deflectors were to be installed at Ice Harbor. However, high water washed away the steel bulkheads that were being used to dewater the construction area. Installation of the total twelve deflectors had to wait until 1997. Tests in 1997,

1998, and 1999 showed that total dissolved gas saturation rates had been reduced significantly (from a maximum of 170 percent to a maximum of 132 percent) (18).

Despite the extensive modeling, the spillway deflectors were not always successful in protecting the stilling basins from damage.

Water Temperature

In operating the hydropower projects in Walla Walla District, it is important to ensure that water temperatures do not exceed the temperature that migrating salmon can withstand. In July 1994, a highly publicized fish kill took place at McNary Dam. Approximately 60,000 chinook salmon were lost because water temperatures rose to an average of seventy-one to seventy-three degrees. Information on salmon indicated that such temperatures would kill the fish. The fish died in the McNary collection system, where they were waiting to be barged downstream. Once the problem was discovered, the Corps began to route fish through an emergency bypass system. This fish kill became a discussion point in the debate over the wisdom of the Corps' Juvenile Fish Transportation Program (see below).

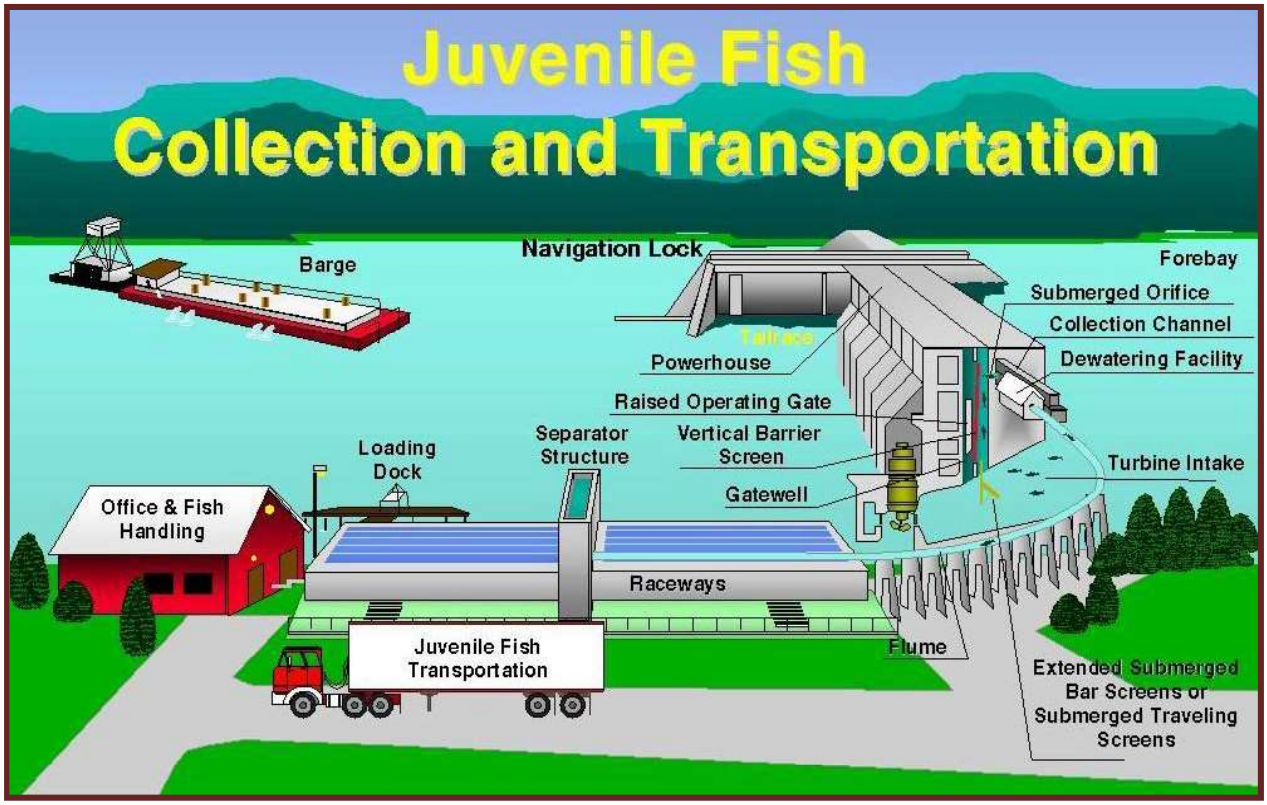
Beginning in the mid-1990s, cool water was routinely discharged from Dworshak reservoir to mitigate high temperatures, particularly in August and September. This flow augmentation, which resulted in lowering of Dworshak Reservoir, was a sore issue with boaters and others who used the lake, as discussed below in the section on drawdowns.

In 1999, the District initiated a study of impacts of water temperature on hydroproject passage. An eleven-day test in 2000 showed that shutting down two turbine units at McNary could reduce temperatures in the collection facility. By evaluating the results of such tests, Walla Walla District hoped to refine its seasonal operating schedule to improve conditions for fish.

Operation Fish Run

In 1968 the Corps funded a National Marine Fisheries Service experiment at Ice Harbor Dam to improve the passage of juvenile salmon and steelhead around the dam. At first, fish were collected and transported past the dams in tanker trucks, later barges were used to transport the bulk of the migrant fish:

> "That's when the whole barging program came up. At that point in time, John McKern and several other people in Walla Walla [District] said: If we are going to screen these fish, and bring them to the surface, and capture them as they are moving downstream to protect them from the turbine, then why do this over and over again? There is a certain amount of mortality from this process. Why don't we capture them, put them into a fish tank that has water flowing through it, and then move them on past the rest of the dams and release them at the mouth of the Columbia, so that they're protected from predators and everything else. [The barge is] basically a bubble that goes down the river and brings them [the fish] along. … Barging of fish is a unique kind of activity. It has the interest of the whole world on how this can happen because it not only protects juvenile migrating anadromous fish from hydroelectric dams, it also protects them from the wide range of predators (19)."



The operation required several bioengineering innovations, which are described in chapter 5. By 1980, however, this experiment in fish transportation had become a regular activity of Walla Walla District. Each April found the District involved in "Operation Fish Run," officially titled the Juvenile Fish Transportation Program. "It's no longer research," said District biologist John McKern in 1981. "This year, we've hired biologists to be stationed at Lower Granite, Little Goose, and McNary and temporary people to run the facilities, drive trucks, and operate the barges. We are also paying the fisheries agencies to provide people at each dam to train our people and state observers. Next year, the National Marine Fisheries Service will be out of the program entirely, and the state agencies will be watching how we handle it. … This year, we are going to have three barges instead of the two we've had in previous years. … We may have 30 to 35 barge loads during the season. We truck the fish when we have low numbers—500 to 25,000 fish at each dam—and when we start approaching 25,000, we bring the barges (20)."

In October 1982, the fourth Fish Run barge was launched following a champagne bottle ceremony. The barge was 150 feet long by 34 feet wide and was built at a cost of over $740,000. By spring of 1983, the barge was ready for use. Conditions inside the new barge were described: "Smolts dart about in oversized aquariums, fed by mass, automated feeders a diet of X percent protein, Y percent starch, Z percent minerals (21)." As the headline read, "Fish barge makes man part of migratory cycle (22)."

OPERATION FISH RUN—IT'S NOT A NINE-TO-FIVE JOB

There's no downtime at the height of the fish transportation season. It's a seven-day, 24-hour operation with fish workers often working six-day or four ten-hour day shifts night or day. … Though the fisheries agencies allow the District to hold young fish for up to four days in its Lower Granite raceways, the fish haulers prefer … "direct load" or transporting fish that have just arrived. …

The fish arrive at the collection facility after being prevented from being sucked up into the dam's turbine blades by traveling fish screens and are then diverted to a system of orifices and gatewells located deep within the dam's interior to a 42-inch pipe which carries them by gravity to the downstream collection facility.

A separator consisting of a row of pipes covered by flowing water separates the adult fish from the young fish and electric counters are used to tally the number in a particular sample. …

The separator exit leads to the raceways which hold the fish until their transport via large pipes to the barge loading compartments. …

After being loaded the barge is pushed down stream … on its long journey downstream to the Columbia. Before its arrival just below Bonneville, the barge will make stopovers at two more collection stations at Little Goose and McNary and pass through the navigation locks of seven dams on the Snake and Columbia Rivers before this odyssey ends. –Intercom, June 1988 (23).

The trip from Lower Granite Dam, the farthest upstream collection point, to just below Bonneville Dam, where young smolts (migrating juvenile fish) are unloaded, took thirty-six hours. Technicians constantly tended the aeration units. Fish were unloaded at night to lessen the chances of the young fish being eaten by daytime predators. Between 1990 and 2000, at a cost of approximately ten cents per fish, fifteen to twenty million salmon and steelhead were typically transported each year (24).

Everyone did not agree that fish transportation was a good idea. In 1983, the Columbia Basin Fish and Wildlife Council requested that most early migrating fish be bypassed rather than transported. This request was based on the theory "that the stresses imposed on fish during collection and transportation are more harmful to spring chinook than the stresses associated with the spilling and bypass procedures (25)."

By the early 1990s, years of studies endorsed by fisheries agencies showed that transported steelhead were more likely to return and spawn than steelhead who made the trip on their own; but studies on migrating chinook salmon were inconclusive (26). In 1994, commercial fisherman and concerned environmentalists faced the worst salmon season in history. Barging was one of the factors they blamed for the declining fishery. "Barging is a dodge," said a spokesman for Idaho Rivers United. "After 25 years, hundreds of millions of dollars and billions of juvenile salmon," he went on to say, "we're looking at the lowest return of spring chinook in history (27)." As twenty protesters gathered at Bonneville Dam to protest barging, a spokesman for Salmon for All, a commercial fishing group, gave his opinion, "It's time to do what should have been done years ago: fix the dams, spill more water, and make the river run more like a river (28)."

Example of Fish Passage System ca. 2000, Ice Harbor Dam

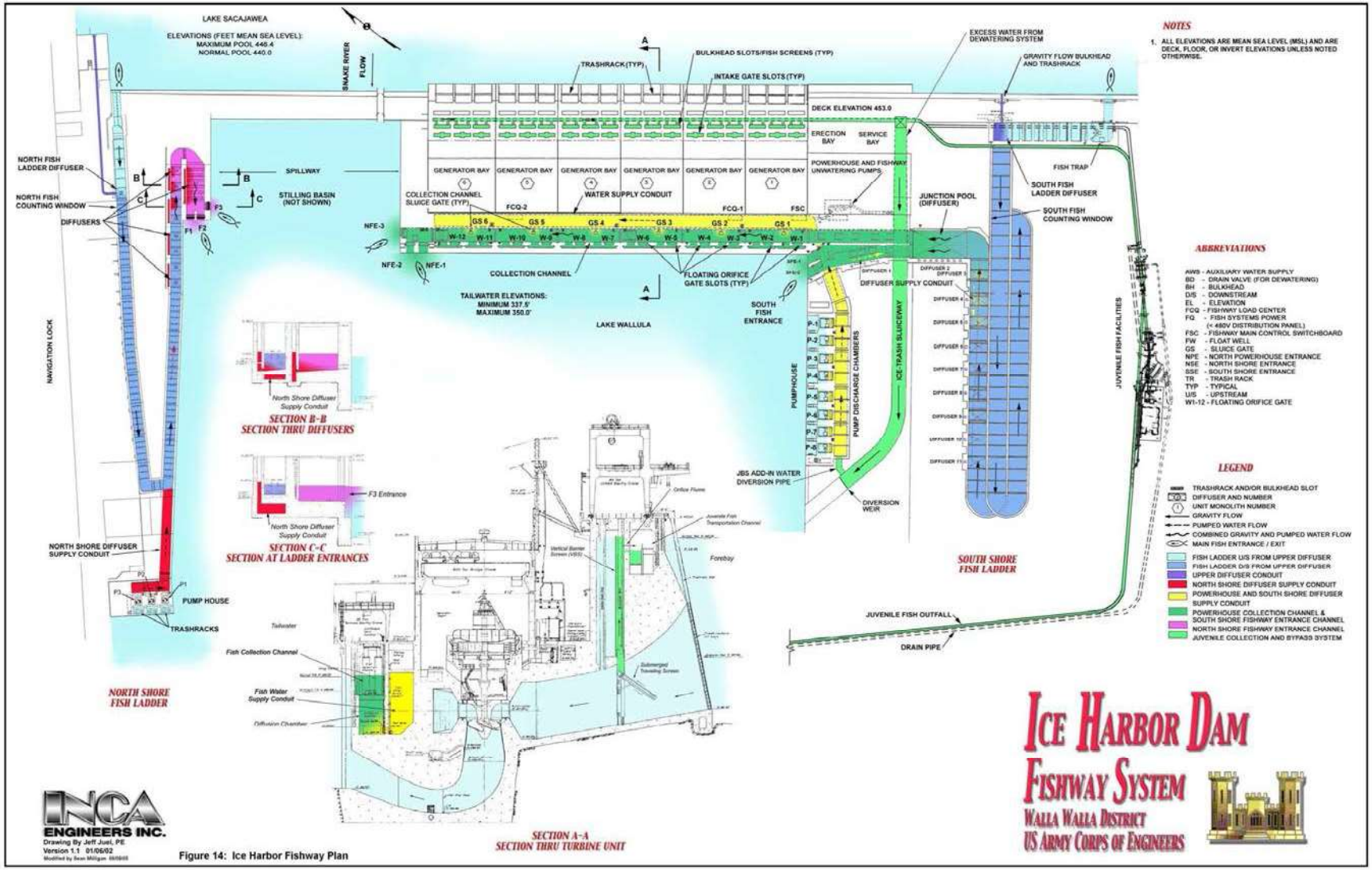


Figure 14: Ice Harbor Fishway Plan

Walla Walla District History, 1981-2000, p. 300
Chapter 8, Stewardship of Natural Resources

Corps fisheries experts did not agree with the negative views of transportation. As a Corps biologist said, "Any disagreement we've had with the Council's recommendations is centered around the concern for the welfare of the fish (29)." Corps fisheries biologist, John McKern, defended the process, "People tend to have a very negative view of the process. They say, 'It's mechanical. It's not natural (30),'" But without the program, salmon and steelhead would be in worse shape than they are now, he contends (31)." In 2003, when the retired McKern was named Distinguished Civilian Employee by Walla Walla District, McKern said the following about the District's fish protection and recovery programs, "In 1977, prior to the work we did on improving fish passage and transportation programs, it was the worst flow year on record, and returning fish numbers were at an all-time low. In 2001, it was the second-worst flow year on record, but the returning fish numbers were higher than ever recorded. … The numbers speak for themselves (32)."

Yet, at of the end of our period, the public debate about this unique fish transportation program continued, as witnessed by an article, "U.S. Gives Lift to Salmon, but Future and Benefits are Questioned," published in the *New York Times* in May 2000 (33). Critics suspected "delayed mortality," of transported fish, which, they said, survived the stressful ride only to die at accelerated rates before maturing. Supporters of the program continued to defend it as a solution that allowed dams and fish to co-exist.

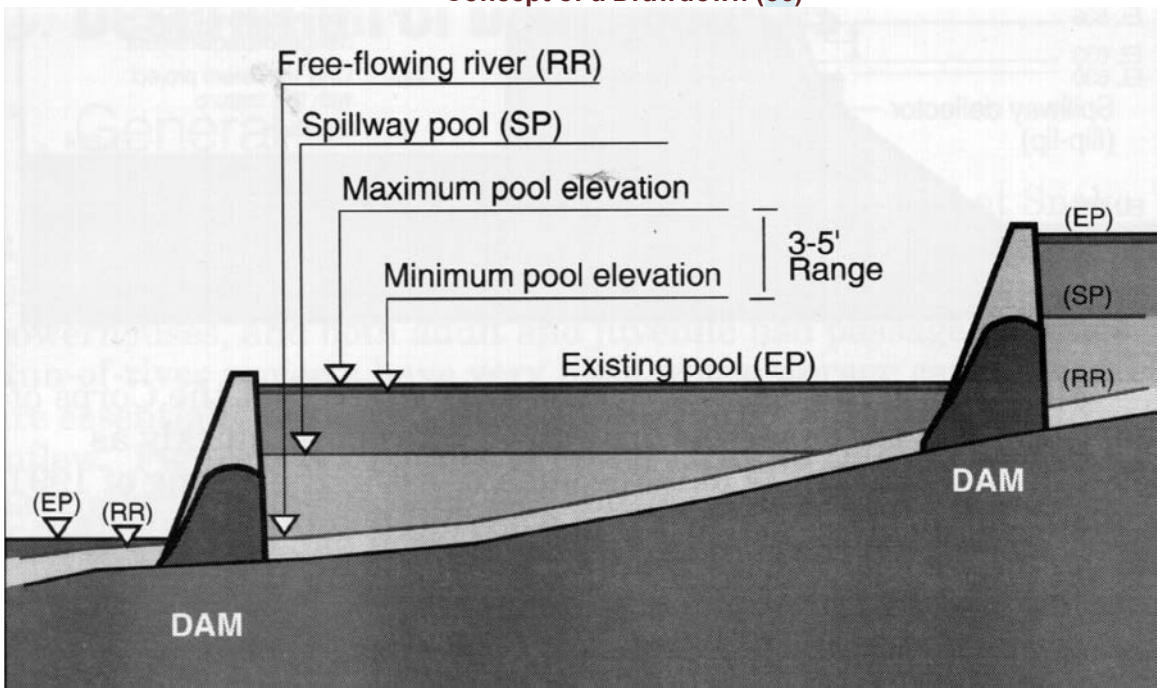
In 1999, Walla Walla District initiated an extensive study of fish transportation. Researchers implanted microchips in a sample of fish, hoping to definitively answer questions about the physiological effects of barging and the percentages of barged and non-barged fish making it back to spawn.

Drawdowns

Important groundwork for the salmon recovery effort was laid in late 1990 and early 1991 when a Salmon Summit (34) was held by the region's Governors and U.S. Senator Mark Hatfield of Oregon. The summit, representing river users, policy makers, and interest groups connected with the Columbia River basin's waterways, developed critical short-term measures that were implemented in 1991 to curtail further decline of salmon runs.

One of the most hotly debated ideas that surfaced during the Salmon Summit was "drawdown." Supporters of drawdown believed that the lower Snake River dams extended the travel time for juvenile salmon migrating to the sea by as much as thirty days (35). Some salmon experts believed that salmon runs could best be enhanced by increasing flow in the river by reducing the elevation of reservoir pools behind the lower Snake River dams by as much as ten feet below their minimum operating pools. For the several weeks or months proposed for such major drawdowns, there would be no navigation through the locks and hydropower generation would be greatly reduced.

Concept of a Drawdown (36)



Governor Cecil Andrus of Idaho was a strong supporter of drawing down the lower Snake River reservoirs such that these proposals came to be known as "the Idaho plan." Some observers interpreted the Idaho interest in drawdown as related to control of scarce water resources: An eastern Oregon newspaper said: "Andrus is focused on the drawdown for good reason. He knows that one of the leading alternatives to the drawdown is a plan to keep reservoirs at their current levels, but increase the rate of flow by calling upon southern Idaho irrigation interests to put more water back in the river (37)."

In February 1991, Governor Andrus sent the Corps of Engineers a request for a drawdown of all four lower Snake River reservoirs to begin April 6, 1991. The Corps replied, also in February 1991, saying, "In order to undertake the necessary analyses and complete the environmental documentation, we will need to have a regional consensus on a plan that details a test protocol (38)." Andrus' plan, however, according to the Lewiston Morning Tribune had "touched off waves of concern among shipping, port, recreation, farming, and other interests (39)."

The Corps believed that a study of the environmental effect of any major drawdown should precede action. In May 1991, in anticipation of implementing an action plan in time for the 1992 spring outmigration (*i.e.*, migration toward the sea) of juvenile salmon, Walla Walla District began work on a draft Columbia River Salmon Flow Measures Options Analysis Environmental Impact Statement that was completed in September 1991. This environmental impact statement did not list a preferred alternative for flow; rather, the Corps held a series of public meetings on the topic. Comments from those meetings were used as part of the criteria for selection of a preferred alternative (40).

In January 1992, in the midst of claims and counterclaims (41) as to what might or might not be the most effective and least costly drawdown plan, the Corps proposed a four-week drawdown test of Lower Granite and Little Goose Reservoirs. Despite the Port of Lewiston filing a request for an injunction against the drawdown (42), the test began, as scheduled on March 1, 1992, and continued until March 31, 1992.

During this test, dubbed "Drawdown '92," two lower Snake River projects, which were designed to operate within a five-foot change of elevation in the reservoir, were lowered substantially. Drawdown '92 took Lower Granite Reservoir thirty-six feet and Little Goose Reservoir more than twelve feet below normal levels. Engineers knew that "once the reservoir dropped below the normal minimum pool operating level, most of the project facilities – such as the navigation lock, juvenile and adult fish passage facilities – would become inoperable. However, they did not know how embankments, structures, and turbines would be affected by the reduced water level (43)."

During 1991 and early 1992, Walla Walla District created a plan to monitor the structural, geophysical, and environmental effects of deep drawdown. In 1993, District fisheries biologist, Sarah Wik, was named Planner of the Year for her efforts in coordinating the specific design details of the drawdown test (44).

The drawdown would send downriver up to three million acre-feet of water over the existing volume of water normally reserved for flow to assist fish migration (45). The drawdown was a major operational project controlled by Walla Walla District personnel. In fact, the drawdown was one of the most significant activities undertaken by the District in the 1981-2000 period with more than one hundred people involved in day-to-day operations and collection of data during the test (46).

Walla Walla District's Chief of Hydrology, who participated in Drawdown '92, talked about this experiment:

> "It was a very interesting operation and it was maybe one of the last real big total District involvement projects that we've had. It impacted every office within the District. All offices had to pull together and supply people and work to accomplish this. Whether it be contracting, whether it be Information Management, whether it be Public Affairs, Engineering—all of the offices, everybody had to [assist]. …
>
> "Normally, our Division office would be scheduling [such an activity], but for this particular operation, we had complete control of it here in Walla Walla. … I'd get the information from the people in my shop [Hydrology Section] doing the computations, and, then, each morning Colonel Volz—he was the commander at that time—held (and this was every day of the week, Sunday and Saturday included), he would hold a meeting each morning—it was either 8 o'clock or 8:30. … I would brief the District staff and the Commander each morning as far as: where are we at with the water; where are we at with the pool; what is the schedule on our spill; and what does it look like as far as our chances and odds of refill. That was an extremely interesting operation (47)."

Walla Walla District's Emergency Management crew was kept at the ready during the thirty-one days of the March 1992 experiment. "We were reasonably sure that we would not see any major failures of levees, embankments, and structures. However

that's one reason why we did the daily helicopter and road survey of the reservoirs. If there was a failure, then we would have stopped the test (48)."

Many areas adjacent to Lower Granite and Little Goose Dams are lined with embankments. No highway or railroad embankment failed; however, cracking and settling occurred throughout an eleven-mile stretch of Whitman County road and on the railroad bed. More than thirty earth subsidences (sloughs) occurred in isolated areas, resulting in no damage to facilities. There was some minor cracking of bridges on State Highway 193 and U.S. Highway 12. The Red Wolf Marina, a privately owned facility, was damaged when water in the area drained away. Numerous slides occurred along natural slopes comprised of silts, sands, and gravels. Slides affected some ports, marinas, and landings (49).

Damage to Red Wolf Marina, Drawdown 1992

Cracking of Whitman County Road due to Drawdown, March 1992

Some fisheries advocates had proposed annual deep drawdowns. Although no major damage to federal structures was evident, the effects were substantial enough to create concern about annual drawdowns of this magnitude. In the final report on the test, the Corps outlined the many changes to structures and embankments that would have to be made to accommodate drawdowns (50).

Other types of data were gathered during the drawdown. When water was released from one of the reservoirs involved in the drawdown experiment, it could either be sent through the turbines or over the spillway. During the drawdown, tests were done on the effect of spilling water. High volume spills were found to create minor damage to the stilling basin below Lower Granite Dam. Power production fell, naturally, during spill tests as less water passed through the electric generating turbines at Lower Granite and Little Goose Dams. A Walla Walla District staff member discussed the effect of drawdown on the turbines: "We expected that the turbines would not function as well with the lower water levels. … What we did not know was how well the turbines would

function under a lower head [pressure] of water. There were safety concerns because of the possibility of temperatures exceeding safe levels and because of vibration. The turbines held up quite well during the test (51)."

The Corps contracted with the U.S. Geological Survey to conduct environmental tests during Drawdown '92. Based on plans developed by Walla Walla District's Test Drawdown Team and with the assistance of District onsite coordinators, the Service studied sediment transport, turbidity, and water velocity in the Snake River during the drawdown. One of the tests, for example, involved pouring 285 pounds of nontoxic dye into the Snake River near the Port of Clarkston. The pinkish red rhodamine dye quickly dispersed in the river. However, hydrologists could monitor the flow patterns of the dye with special instruments. The velocity and trajectory of the river water under drawdown conditions could be monitored. Tests showed that velocities increased substantially upstream of the dams as water was drafted out of the reservoir, but that water velocities below the dam were not increased significantly as the water was released into a large pool of water. The actual benefits to fish from these increased flows would require substantial further testing and were not able to be determined from the drawdown test.

Although none of the 1,600 fish examined during the test showed symptoms of gas bubble disease (see below), water condition tests supported one concern raised by biologists. "If migrating fish are passed over the spillway under lowered water conditions, such as simulated by the test drawdown, a problem encountered is higher concentrations of dissolved gases that can harm the fish. During the spill tests, those concentrations climbed, at times, to 135 percent of what was considered safe for migrating fish. The Corps concluded that: "Although the average fish travel time may be decreased with an increase of average water velocity, there are substantial uncertainties associated with the travel time and survival of the fish [under deep drawdown conditions] (52)."

Other effects of the drawdown were numerous. Barge traffic was, of course, shut down on the river, though locks were normally shut down anyway during one or two weeks in February or March for annual maintenance. The test had less impact on wheat exports than expected because, "unusually high world prices for grain prompted most of the Lower Snake region's wheat to be barged downstream before the drawdown began (53)."

Organized groups of volunteers took the opportunity presented to clean debris from swimming areas and shorelines exposed by the drawdown (54). Despite widely publicized warnings, mud trapped one unwary teenager who ventured alone onto a newly exposed expanse of shore. A half-dozen rescuers struggled ninety minutes to pull the teenager from a sinkhole that nearly swallowed him whole (55). Insurance divers even took advantage of lowered water levels to try to find the wreckage of an airplane that had crashed into Lower Granite Reservoir (56).

For some lifelong area residents, the reemergence of familiar rock outcroppings brought back boyhood recollections (57). "They packed fruit all day and danced all night," said one resident, viewing areas where orchards had once grown along the river (58), but the smell as the water went down was rank and gamy.

The drawdown exposed a number of known and previously unknown archeological sites. Despite monitoring, collecting and vandalism occurred at a much greater scale during the drawdown than anticipated (59). The impact of Drawdown '92 on cultural resources is discussed further in chapter 10.

During the drawdown test, nearly 2,000 juvenile fish had to be rescued from Lower Granite Dam where they were stranded by receding water in areas adjacent to the gates that open and close the dam (gatewells). Meanwhile, nonmigrating fish resident in embankment ponds or shallow water bays on the reservoirs were unable to follow the water as it dropped. Rescue efforts by participating agencies were fairly extensive; however, several instances of fish kills of 1,000 to 2,000 fish were documented (60). The dead fish included bass, bluegills, pike, carp, and bullnose catfish.

Interests experiencing damages from the drawdown sought compensation from the Corps. The Corps responded that it was not authorized to pay damages. The Pacific Northwest Waterways Association requested and received from the U.S. Congress $2 million in compensation. This was paid to eastern Washington and Idaho counties, ports, and businesses for property damages resulting from the test drawdown (61).

Staff at Walla Walla District had feared that a deep drawdown would adversely affect the Lewiston Levees, which are adjacent to the upper reaches of the Lower Granite Reservoir. The levee was compromised by seepage that occurred during Drawdown '92. The full extent of the problem, however, was only realized later. In 2000, the District estimated it would take $2 million to repair this essential structure that protects downtown Lewiston (62).

The cost for preparation, implementation, and reporting of the 1992 month-long drawdown exceeded $4.5 million. The cost of the power loss was estimated at between $1 million and $1.6 million.

Various interests and researchers continued to examine the costs and potential benefits of further drawdowns. In June 1992, an economist presented a report to the Northwest Power Planning Association that said the Idaho plan, including annual deep drawdowns, was the cheapest and most likely way to "save the salmon" (63). Meanwhile, the Pioneer Ports River Alliance, a river users group, presented a report claiming $2.8 million in decreased revenues during the month-long drawdown test and warning of a $100 million cost and loss of seven hundred area jobs if annual five-month drawdowns were implemented (64). The Alliance raised $90,000 to fight drawdowns on the lower Snake River (65). The *Portland Business Journal* reported that electric utilities represented by the Pacific Northwest Generating Cooperative might sue the federal government over any operating plan for the Columbia River system that drastically reduced generating capacity (66).

While some fisheries biologists and some groups (67) advocated drawdowns, other biologists pointed out that periodic deep drawdowns and spill might harm fish because of increased gas saturation. A deep drawdown would render existing fish bypass systems inoperative. Therefore, some biologists warned that a drawdown test during the actual spring migration period might kill more fish than it saved (68).

The calls for and against a drawdown in 1993 continued to swirl with debate centered at the Northwest Power Planning Council. A spokesman representing more than two-dozen conservation groups demanded increased water flows (69). One newspaper ran an article headlined, "Environmentalists blast drawdowns" (70) while another headline read, "Environmentalist backs drawdowns" (71). The Council and the National Marine Fisheries Service did not call for a biological test in 1993. In October, the Corps published a 1993 water management plan that called for operating the lower Snake River and John Day reservoirs at minimum operating pools and making spring, summer, and fall flow releases from Dworshak Reservoir (72)—a plan that was to be a model for operations for many years to come.

Meanwhile, Walla Walla District planned for a future biological drawdown test by intensively studying the proposal. The District issued the *Lower Snake River Biological Drawdown Test: Draft Environmental Impact Statement* in April 1994 (73). The preferred alternative outlined in the draft report was a two-month spring 1996 drawdown test using a new gatewell tank system to bypass fish. There was further public debate at Corps-sponsored regional public meetings (held in May 1994), at political forums (74), in newspaper commentaries (75), and in articles (76). Amid this debate, the District considered the wisdom of the biological drawdown test.

Idaho pro-drawdown sentiment began to change as Idaho Power warned of a potential electrical rate hike due to drawdowns (77). Idaho political leaders split on the issue of drawdown, with Governor Cecil Andrus advocating the Idaho plan (78), while Idaho's Senator Larry Craig came out in opposition to drawdowns (79). The Lewiston, Idaho, Chamber of Commerce ran a series of ads in regional newspapers. One ad showed dead fish stranded on mud flats and read in large bold letters: "Some people think drawdowns save fish. Some fish disagree (80)." In a telephone survey conducted for the Lewis-Clark Economic Development Association, an overwhelming majority (86.1 percent) of area residents surveyed disagreed with drawdown as an effective way to promote salmon recovery (81). An anti-drawdown rally in Clarkston, Washington (adjacent to Lewiston, Idaho), drew a crowd of 1,200 people (82).

By November 1994, the idea of a biological test drawdown was reported as "likely dead (83)." Corps officials believed that there was lack of regional and scientific consensus to support a biological test. Further, the following finding was cited by a Corps official: "NMFS [National Marine Fisheries Service], university, and Corps scientists have estimated at least 90 percent of the smolts (migrating juvenile fish) already survive passing through the Lower Granite Reservoir. … The high natural survival rate means it is unlikely a test drawdown would provide good figures on how to improve that rate (84)."

Spill for Fish

The core idea of drawdowns was that water velocity along the river should be increased to speed migrating salmon along on their trip to the ocean. After 1994, consideration of this core idea behind drawdowns moved to a different phase and was channeled in two different directions. In one direction, the drawdown idea became part of holistic, systemic studies of the entire Columbia-Snake River system operation and its effects on

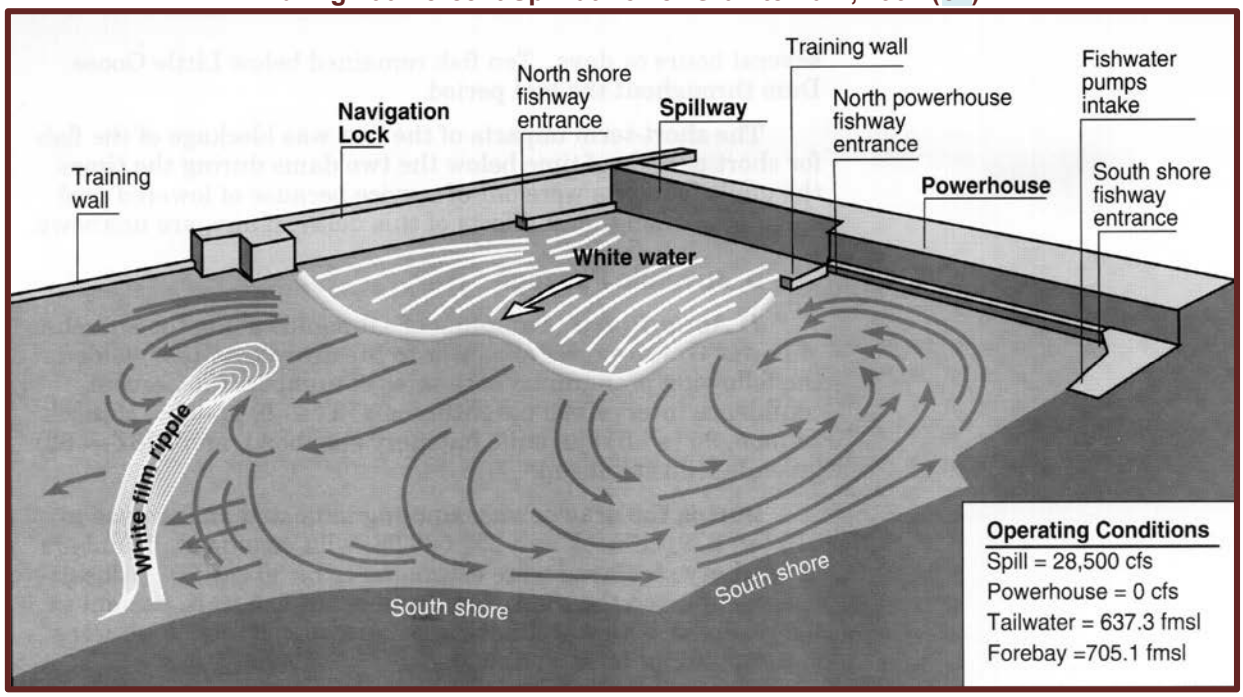
fisheries (see sections that follow). The idea of drawdowns, especially permanent drawdowns (*i.e.*, breaching the four lower Snake River dams) was studied in the context of system-wide studies. This development is discussed below, particularly in the section on Lower Snake River Juvenile Salmon Migration Feasibility Study.

The second direction that the idea behind drawdowns took was in modification of existing operations. The Corps had begun spilling water for fish at several of its projects in 1977 hoping to speed juvenile salmon on their way to the sea. In 1989, agencies in charge (Northwest Power Planning Council, Bonneville Power Administration, National Marine Fisheries Service, the Corps, tribes, and others) had signed a long-term comprehensive spill agreement. This agreement modified operations to augment flow and increase spill over the lower Snake River dams.

In 1992, the Corps, with Bonneville Power Administration and the Bureau of Reclamation as cooperating agencies, analyzed several alternatives to modify the flow regime of the lower Columbia-Snake River. In *Columbia River Salmon Flow Measures: 1992 Option Analysis/Environmental Impact Statement* (85), the agencies issued a preferred plan that, among other things, called for: operating Walla Walla District's four lower Snake River projects at minimum operating pool from April 1 to July 31 (*i.e.*, during the spring salmon migration); augmenting lower Snake River flow from Dworshak to meet target flows of 100,000 cubic feet per second from April 15 to May 13; during low flow years, augmenting lower Columbia River flows with releases from Lake Roosevelt and other reservoirs upstream on the Columbia; and controlling the temperature on the lower Snake River in August and September using releases from Dworshak Reservoir.

Five-Unit Spill Test, Lower Granite Dam, March 1992 (86)

Diagram of Typical Tailwater Eddy Formation Observed During 100 Percent Spill at Lower Granite Dam, 1992 (87)



Thus, the concept of a "water budget" for the operation of the Federal Columbia River Power System arose. A Technical Management Team reporting to the Northwest Power Planning Council met, usually weekly, during salmon migration to set target flows and to suggest modification of operation of the system to help endangered fish (88). Annually, reservoir pools were lowered to minimum operating levels, and commercial shippers were warned about shallow areas that might impede barge traffic (89).

Facing the low returns for salmon and continuing calls for more flow and spill for salmon, federal agencies looked around for a source of water. It was found in the deep waters of Dworshak Reservoir. Beginning in the early 1990s, Corps officials began the practice of releasing water from Dworshak to help boost water flows and sweep small fish downstream. Thus began an almost annual controversy.

Power generation was not impacted much, but, the issue for other users of Dworshak Reservoir was presented succinctly in a headline one Idaho paper ran in 1994: "Drawdown a drain on Orofino economy: As reservoir sinks, so does tourism in 3,000 person town (90)." Each year, residents of the area would "twist by the full pool (91)," boating and camping during a limited window of opportunity when the reservoir was ideal for recreational purposes. The management of Dworshak water was still a controversial issue in 2000. In July of that year, for example, the Nez Perce Tribe (from the area around Dworshak) and Idaho Fish and Game presented the Technical Management Team, which controlled water levels, with a plan that called for more Dworshak water to remain in the reservoir. Their plan was rejected when fisheries managers worried that water temperatures in the lower Snake River would soar without the cooling infusion of Dworshak water (92). The controversy continued as Walla Walla

District, along with other agencies, tried to balance the various calls on water in the Columbia River system.

In 1994, the National Marine Fisheries Service called for emergency spill for fish. The May 10 to June 20 extra spill, diverting eighty percent of Snake River flow over the dams and costing approximately $25 million in lost hydropower generation, was intended to make up for low flows caused by severely dry conditions. "The theory is that this practice will double the predicted survival rate of juvenile salmon swimming to the ocean from 5.2 percent to 10.5 percent (93)." However, many thought, as one headline said, that the "Salmon cure may be as bad as the disease (94)."

The effect that critics of spill were concerned with was gas bubble disease. "The disease, similar to the bends in scuba divers, occurs when the water becomes supersaturated with dissolved gasses, mainly nitrogen. The fishes' blood also becomes supersaturated with gas. When bubbles form they can damage delicate blood vessels and other organs. The NMFS report showed disease symptoms appeared in some steelhead captured below Little Goose and Lower Monumental Dams [during the emergency spill] (95)."

The Corps adjusted spill levels daily to lower nitrogen, but evidence of excess dissolved gas became so strong that, at the end of May 1994, emergency spill was discontinued.

The entire 1994 emergency spill exercise was clouded in claims, counter claims, and in a lack of scientific data. While no fish were found dead as a result of the excess spill, several test samples showed deadly levels of nitrogen bubbles in every fish sampled (96). Further, no one could measure the overall effectiveness or lack of effectiveness of the extra spill for fish survival (97).

The National Marine Fisheries Service convened a panel of experts, the Gas Bubble Expert Panel, to review the situation regarding spill as a salmon recovery strategy. The panel called for much more research on dissolved gas and spill. In response to this call and because of its responsibilities for salmon mitigation, the Northwestern Division of the Corps undertook the dissolved gas abatement study discussed below.

Flow augmentation continued as a strategy to assist salmon migration until beyond the period covered in this volume. The supersaturation caused by spill sometimes created temporary and isolated instances in which the operation of hydropower facilities was not in compliance with Oregon or Washington state water quality standards regarding gas. Thus, as they attempted to create better conditions for salmon, operators of the Federal Columbia River Power System (including the Corps) found themselves balancing the demands of one environmental protection requirement with another—a situation unresolved at the end of the period covered in this volume.

Dam Breaching or Removal

One of the most hotly debated issues related to the efforts to prevent the decline of salmon populations, was the issue of dam removal or breaching. The whole attitude toward dams around the world changed from the time that large dam building took place in the Columbia River basin. In the early and mid-twentieth century, when development

of undeveloped areas was seen as largely positive, dams were, by and large, seen as positive contributions to the march of civilization. In 2000, for example, the World Commission on Dams report, *Dams and Development,* recognized "the social and economic development demands that dams are intended to meet, such as irrigation, electricity, flood control, and water supply (98)." The Commission, however, also called the building of dams "one of the most hotly contested issues in sustainable development today (99)," citing "the adverse impacts of dams, such as debt burden, cost overruns, displacement and impoverishment of people, destruction of important ecosystems and fishery resources, and the inequitable sharing of costs and benefits (100)."

While several of the problems with large dams worldwide, as cited by the World Commission on Dams, do not apply, a similar progression in public opinion can be seen in relation to the monumental dam-building projects of the Columbia River basin—a progression from almost universal approval to greater skepticism. "Overall, 58 dams were built exclusively for hydropower in the basin and 78 others were designed for multiple roles (101)." "Electricity was the key that made life worth living on the farms," said a resident of the Columbia River basin as he looked back to his youth sixty years in the past (102). As described in chapter 4 of this volume, dams in the Northwest provided inexpensive electricity, barge transportation, flood control, and reservoir recreation. "Nature pays a price for Northwest's cheap power," read headline in a regional newspaper (103). More and more, during the period covered in this volume, society began to count the environmental costs of the dams.

As the cost was counted and as salmon runs declined, some segments of the public and some scientists called for a foundational solution to the problem. Dams should be removed. Indeed, around the country several, although smaller, dams were removed. In 1997-1999, Walla Walla District itself participated in removing the Marie Dorian Dam from the Walla Walla River in a measure that opened the river to fish passage. In the 1990s, the idea of breaching the four dams of the lower Snake River (Lower Granite, Lower Monumental, Little Goose, and Ice Harbor) became an issue around which much public debate centered in relation to society's hope to save the salmon. For example, in the paper, *Troubled Waters: Congress, the Corps of Engineers, and Wasteful Water Projects* (104), issued in March 2000, Taxpayers for Common Sense and the National Wildlife Federation listed the lower Snake navigation project as among the top ten most wasteful water resources development projects in the nation.

The Corps studied dam breaching as one alternative in its comprehensive Lower Snake River Juvenile Salmon Migration Feasibility Study (see below). As of the end of the period covered by this volume, dam breaching on the lower Snake remained an issue to be debated and examined further by concerned interests in the region and, indeed, in the nation.

Columbia River System Operation Review

Following Drawdown '92 and its aftermath, Walla Walla District moved on to participating in more systematic, larger scale studies of the Columbia-Snake River system in relation to its effect on fisheries. The Northwestern Division of the Corps of Engineers was responsible for directing and overseeing basin-wide comprehensive

studies undertaken by the Corps in the Pacific Northwest. The Division office also coordinated Corps input and involvement in interagency studies under the direction of other agencies or states. The most comprehensive basin-wide study undertaken by the Corps was the Federal Columbia River Power System Operation Review, referred to as the SOR (105).

Through the SOR, the Corps, Bureau of Reclamation, and Bonneville Power Administration joined forces to evaluate the system of federal projects—many of which were authorized or constructed twenty or more years previous to the study—to determine how best to conform to contemporary laws and social goals in order to provide a long-term strategy for system operation.

The SOR goals were to provide:

> (1) A comprehensive review of Columbia River System operations, including fourteen major federal projects on the Columbia River and its major tributaries.
>
> (2) A strategy for future operations in view of the needs of all users.
>
> (3) Support for a future federal decision on key power agreements, including the Pacific Northwest Coordination Agreement and the Canadian Entitlement Allocation Agreements.

With input from affected tribes and the public and with assistance from other agencies, the SOR interagency team developed and analyzed alternative strategies for system operation.

The SOR process began in 1990 to examine river and reservoir uses. The agencies began drawing up a plan that would balance all river uses. "The Endangered Species Act began to overtake the review in November 1991, when the Snake River sockeye was declared endangered. In the spring of the following year, several stocks of Snake River chinook were listed as threatened. … The SOR began to focus on the role system operations could play in salmon recovery, and NMFS [National Marine Fisheries Service] became a key player (106)."

In 1995, the study team issued a lengthy and detailed report and environmental impact statement describing the expected effects of alternative operation strategies for the Federal Columbia River Power System (107). Many of the system operating strategies in the SOR focus on anadromous fish recovery.

The preferred alternative proposed by the SOR charted a combination course that involved both in-river and barge transportation of migrating juvenile fish.

The preferred SOR alternative mirrors recommendations of the National Marine Fisheries Service and the U.S. Fish and Wildlife Service in their biological opinions (issued in 1995) on salmon recovery plans. The SOR recommendation for an eighty percent fish passage efficiency target, for example, was adopted from the 1995 Biological Opinion.

Columbia River System Salmon Migration Analysis Configuration Study

The Corps completed phase I of the Columbia River System Salmon Migration Analysis Configuration Study in 1994 (108). This study evaluated alternative physical and structural modifications that could be made to the lower Columbia and Snake River water resources projects to improve anadromous fish passage. In phase II, Walla Walla District planned to evaluate and implement several structural and operational modifications on the lower Snake River dams. These modifications, with implementation timelines, were to be incorporated into an updated National Marine Fisheries Service Biological Opinion.

By 2000, measures implemented included: enlarging juvenile transport barge exits on existing barges; acquiring additional transport barges to provide direct loading capability from all transport facilities; overhauling the Lower Granite juvenile fish facility; installation of picketed lead fences in channel entrances to guide adult migrating fish; and fish ladder temperature control mechanisms.

Dissolved Gas Abatement Study

In an effort to improve downstream migration and survival of juvenile salmon, the Corps of Engineers had been spilling water at the eight Lower Columbia and lower Snake River projects (Lower Granite, Lower Monumental, Little Goose, Ice Harbor, McNary, The Dalles, John Day, and Bonneville) as requested by the National Marine Fisheries Service (see above). The special spillway releases consisted of up to eighty percent of the instantaneous total river discharge and occurred throughout the salmon migration season from March through August. The spillway discharge tends to entrain large quantities of air and plunge deeply into the pool below the dam. This tendency forces the air into solution and results in high concentrations of total dissolved gas (referred to as TDG) supersaturation. High exposure to TDG supersaturation causes mortality in juvenile and adult migratory fish, resident fish, and other organisms.

The Dissolved Gas Abatement Study was initiated in response to the Gas Bubble Expert Panel's recommendation to the National Marine Fisheries Service that structural and operational changes would be needed to reduce total dissolved gas in the river system based on the then prevailing spill program. Subsequently, the NMFS 1995 Biological Opinion for operation of the Federal Columbia River Power System detailed that the Corps should develop and implement a gas abatement program at all projects. Problems with spilling water were intensely studied by a virtual team with members from two Corps Northwestern Division districts (Portland and Walla Walla), the Corps Engineering Research Design Center (formerly the Waterways Experiment Station), private laboratories, and architect-engineering firms.

The Dissolved Gas Abatement Study is part of the Columbia River Salmon Mitigation Analysis, which consisted of several programs aimed at improving the survival of endangered salmon species. Other programs within the Mitigation Analysis were examined, such as, drawdown, surface attraction, bypass systems, transportation, turbine rehabilitation, spill patterns, and light and sound applications as means of improving fish passage through the lower Snake and Columbia River projects.

During the 1990s, Portland and Walla Walla Districts of the Corps undertook phase I of the Dissolved Gas Abatement Study in order to define, evaluate, and recommend methods to reduce total dissolved gas created during spillway operations at the eight existing Corps projects on the lower Snake and Columbia Rivers. The original goal of the study was to determine how the projects could be modified to comply with federal and state total dissolved gas water quality standards. In addition, the Dissolved Gas Abatement Study was to provide the justification for implementation of gas abating measures in the form of estimated TDG reductions and associated biological benefits.

In phase I, an effort was made to collect all relevant historic information including: information specific to projects, such as operation, design, and function of spillways; information pertaining to the river system, such as available storage and hydropower development; information about migratory fish, such as natural behavior and gas tolerance; and TDG data. Most of this information was readily available, but TDG data and related biological information was relatively sparse.

The Columbia and Snake River fixed monitoring system for water quality and TDG is the primary source of TDG data for the river system. The fixed monitoring system expanded from a few stations in 1984 to thirty-seven stations by 1995. This monitoring system, originally experimental, has become instrumental in regulating gas concentrations throughout the river system. The overall quality of data from this system was a concern uncovered by phase I of the Dissolved Gas Abatement Study.

Operational as well as structural modifications were studied as alternatives for reducing dissolved gas concentrations in the rivers in an effort to ensure the survival of migratory fish and to comply with TDG water quality standards. Revisions to spill patterns were found to provide minimal gas reductions. Spill deflectors were found to provide significant gas reductions within a specific range of discharge conditions. Installation of deflectors in Walla Walla District was discussed, along with other engineering innovations, in chapter 5 of this volume.

Phase I of the Dissolved Gas Abatement Study, published in a technical report in 1996 (109), recommended minor changes in spillway operations and installation of spillway deflectors at John Day and Ice Harbor Dams. At the end of the period covered by this volume, work continued on phase II of the study (published in 2002).

Lower Snake River Juvenile Salmon Migration Feasibility Study

The System Configuration Study was continued into a second phase with findings published in 2002 in the *Lower Snake River Juvenile Salmon Migration Feasibility Study and Environmental Impact Statement* (110). This was a massive, multiyear, multifaceted study, begun in 1995 that evaluated the merits of drawing down the lower Snake River reservoirs and the utilization of new surface collection technology. In 1999, drawdown regional economic workgroups produced analyses of the power system; recreation and tourism; transportation; water supply; anadromous fish commercial impact analysis; passive use values of wild salmon and free flowing rivers; tribal circumstances and perspectives; regional economics; social impacts; financial circumstances; cost-

effectiveness; cost allocation; implementation and avoided costs; risks and uncertainties; compensatory actions; and a summary of effects.

The feasibility study examined four major alternatives related to juvenile salmon migration in the Columbia River system. Analyses were conducted for each alternative.

❖ Alternative 1—Existing Conditions

Every feasibility report and environmental impact statement completed by the Corps has a starting point from which all other alternatives are measured. Alternative 1, Existing Conditions, was the baseline or no-action alternative under which the Corps would continue operating the four lower Snake River dams according to their then current configuration, including all fish passage programs then in operation. More than fifty percent of the fish would be transported via truck and barge, while the remainder would migrate in-river. This alternative did not mean that no further improvements would be made. The Corps, as part of its ongoing development plans and in response to changes in agency requirements, planned to improve technology at the dams to promote fish passage. The Corps' plans already called for turbine improvements, structural modifications to fish facilities at Lower Granite Dam, new fish barges, adult fish attraction modifications, a new trash boom at Little Goose Dam, modifications to fish separators, added cylindrical dewatering screens, and more or improved spillway flow deflectors.

❖ Alternative 2—Maximum Transport

Most of the improvements planned for Alternative 1 would also be included in Alternative 2, Maximum Transport. The emphasis in this alternative, however, was on operating the existing facilities to maximize the passage of fish through existing collectors into trucks or barges for transport downriver. Voluntary spill to bypass fish would be minimized. Fish would be collected in the existing facilities and transported past the dams. Under this alternative, there would be no need to modify spillway flow deflectors, because voluntary spill would be minimized. Some juvenile fish would still pass through dam turbines.

❖ Alternative 3—Major System Improvements

This alternative, Major System Improvements, like Alternative 2, also maximized transport of juveniles. It differed from Alternative 2 in that it incorporated a full-length surface bypass collector at Lower Granite Dam, which is the first dam juvenile fish encounter, thus the logical point to collect the fish. This new collection technology, in combination with existing bypass screens, would increase collection capability at Lower Granite Dam to ninety percent or higher and minimize the number of dams, bypass systems, and reservoirs that juvenile fish encounter. This bypass collector would span the powerhouse and work in conjunction with the existing extended submerged bar screens to divert fish from the turbines. At Lower Monumental and Ice Harbor, the existing submerged traveling screens would be replaced with bar screens to improve the collection or bypass of juvenile fish that originate from tributaries below Little Goose Dam.

❖ Alternative 4—Dam Breaching

This alternative consisted of breaching the four lower Snake River dams and creating a free flowing 140-mile stretch of river. This would involve removing the earthen embankment section of each dam and eliminating the reservoirs behind the dams. Under this alternative, all facilities for transporting fish would cease to operate. A free flowing river can be achieved by removing only the embankment. The powerhouses, spillways, and navigation locks would not be removed, but would no longer be functional, eliminating power production and commercial navigation.

A draft Lower Snake River Juvenile Salmon Migration Feasibility Study was issued in December 1999. The Corps conducted an aggressive public outreach effort above and beyond National Environmental Policy Act requirements throughout the feasibility study process. Public interest in the study was overwhelming, and continual communication was essential because the impacts of the study were far reaching.

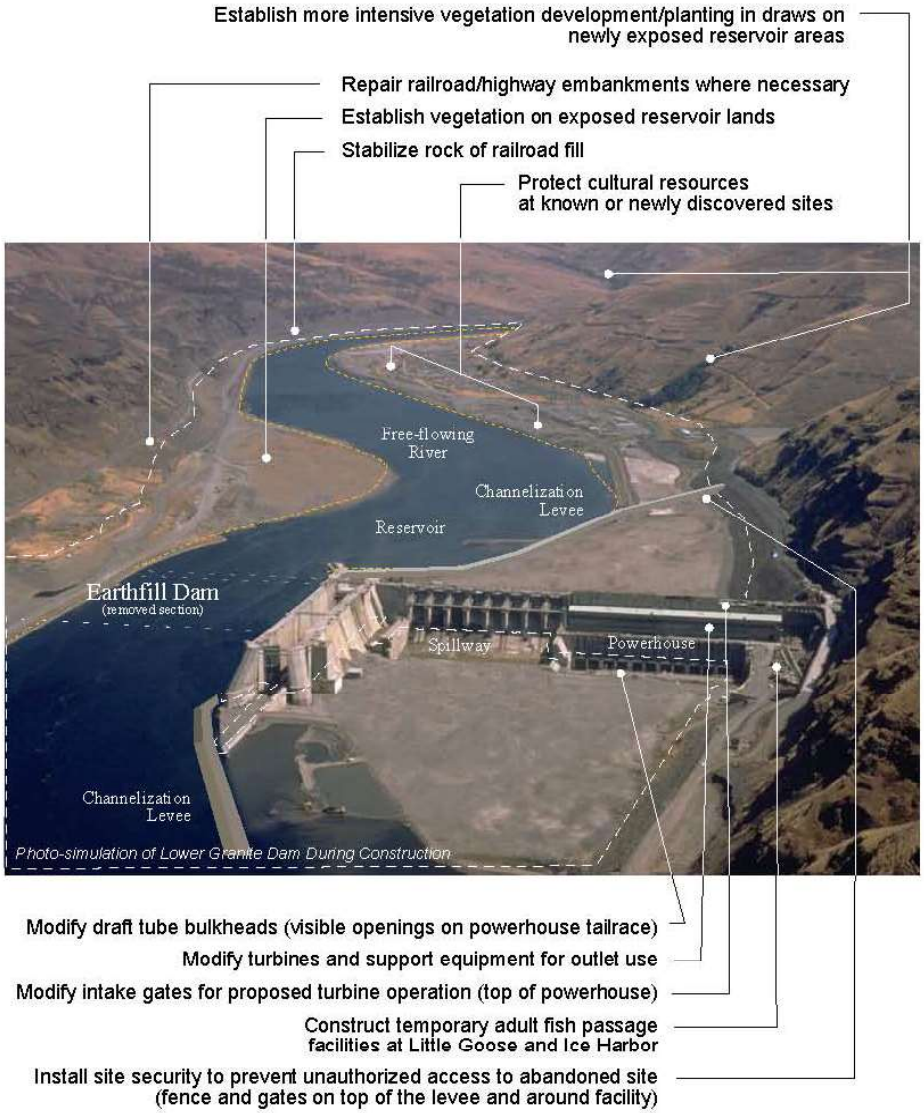
After the draft feasibility study was issued, over 230,000 comment documents in the form of electronic mail, faxes, letters, comment forms, etc., were received. Over 1,700 oral and taped comments were also received at a series of fifteen formal public meetings conducted throughout Washington, Idaho, Oregon, Montana, and Alaska with approximately 9,000 persons in attendance.

Interested groups and individuals used the comment period, and the time immediately prior to it, as an occasion to publicly debate the merits of dam breaching—one of the alternatives in the study. Thousands of "form letters" (nearly identical letters, signed preprinted cards, or e-mails) brought comments from members of environmental groups favoring dam breaching. Local and regional individuals and groups opposing dam breaching sent in petitions with thousands of signatures as well as another group of form letters. News articles and news releases appeared stating the position of various groups on the issue of breaching. The *Confederated Umatilla Journal* ran, "Report says breaching would benefit Tribes (111)." Idaho Fish and Game voiced its opinion in a news release: "Idaho Fish & Game Endorses Snake R. Dam Removal (112)." "Breaching dams would harm grain producers (113)," gave the views of a grain shipping terminal operator. "Lobbyist rides dam fight from start to end" reported the activities of a representative of the Columbia River Alliance in countering the "environmental groups … stepped up national media campaign against Snake River dams (114)." Demonstrations of public opinion were noted in news articles such as, "Dam-breaching proponents make noise at public forum (115) and "Dam supporters strike back: Hearing at Tri-Cities brings anti-breaching crowd out in force (116).

Several politicians took a stance on the issue. "Kitzhaber calls for breaching four dams: Oregon's governor takes a strong stand that is unique among political leaders in the Northwest (117)." The governor of Washington weighed in, "Locke soundly against breaching (118). The Associated Press reported on Congressman Tom Udall's stand on the issue: "New Mexico congressman favors breaching 4 dams (119)."

Description of Dam Breaching

Dam breaching would create a 140-mile stretch of river with near-natural flow by removing the earthen embankment section of each dam and eliminating the reservoirs. The powerhouses, spillways, and navigation locks would not be removed, but would no longer be functional. All facilities for transporting fish would cease to operate, as would hydropower operation and navigation on the lower Snake River. The illustration below shows some of the specific measures involved in dam breaching.



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Source: *Lower Snake River Juvenile Salmon Migration Feasibility Report* (120)

Walla Walla District compiled all comments received. They were considered without regard to whether they were provided by a single commenter or repeated by many. Importance was given to the substance or content of the comment, rather than the number of times a comment was submitted.

During final analysis, **Alternative 1—Existing Conditions** was eliminated because it failed to meet the biological requirements in the National Marine Fisheries Service 2000 Biological Opinion.

Due to the major uncertainty related to the delayed mortality of transported fish, **Alternative 2—Maximum Transport** was ranked lowest of the remaining alternatives because it maximized the collection and transport of juvenile salmon and steelhead.

Although **Alternative 4—Dam Breaching** had a number of positive benefits, the final study ranked it lower than the recommended plan (preferred alternative) for reasons including, but not limited to, the following:

(1) It was determined that breaching was not necessary at that time to recover listed salmon and steelhead stocks (breaching was not determined necessary at the outset of compliance with the National Marine Fisheries Service 2000 Biological Opinion).

(2) Breaching was determined to have maximum negative economic impacts to current system users (i.e., loss of power, navigation, and irrigation).

(3) Breaching would result in high sediment movement in the short term.

(4) The breaching alternative was considered uncertain due to possible harmful effects associated with potential resuspension of contaminants in sediments.

(5) This alternative had a high degree of uncertainty in implementation and the longest period before positive benefits to listed stocks.

(6) Breaching was considered to have the most negative impact to low-income and minority populations.

The plan recommended in the final Lower Snake River Juvenile Salmon Migration Study, issued in 2002, was a modified version of **Alternative 3—Major System Improvements** with increased focus on adaptive migration capabilities.

The recommended plan combined a series of the structural and operational measures described and evaluated in the feasibility for Alternative 3 that are intended to improve fish passage through the four lower Snake River dams. This alternative provided the maximum operational flexibility for juvenile fish passage; optimized in-river passage when river conditions are best for fish; and optimized the juvenile transportation program when that operation is best for fish. The plan also allowed for optimized combined passage when necessary for spread-the-risk operation or to conduct needed research. These improvements were not only intended to reduce direct mortality associated with dam passage, but also to reduce stress on juvenile fish, reduce total dissolved gas, and improve operational reliability.

The rationale for selecting the recommended plan (preferred alternative) was a composite of analyses, information briefings, evaluations, technical expertise, and comments concerning the factors evaluated as part of the feasibility study.

The selection of the recommended plan resulted from the evolution and development of the extraordinary collection of scientific data and information presented in the study, its associated appendices, and supporting research materials and reports.

Other factors considered in this selection included, but were not limited to, those effects associated with social and community resources, Native Americans, technical feasibility, effectiveness of structural modifications, regional acceptability, public comments, and length of implementation.

The structural and operational measures identified for the recommended plan (preferred alternative) were considered to be technically feasible, implying that the Corps has the capability to design, construct, and operate these measures. These structural improvements could be placed into two categories. The first category was near-term improvements, consisting of modifications to existing systems using current technology. These require little or no additional study or research. Near-term improvements could be implemented relatively quickly (within the first five years after the final Record of Decision was signed in 2002). The second category was long-term improvements. These improvements require additional evaluation, prototype development, and testing. Therefore, these improvements take more time to put into place. The actual determination on if, where, how, and when these long-term improvements are implemented would be contingent on the prototype testing and evaluation results, such as further testing of the removable spillway weir installed at Lower Granite Dam in 2001. Implementation would also be dependent on a continued need for improvements in the hydropower system.

The final Lower Snake River Juvenile Salmon Migration Feasibility Study recommended several near-term system improvements, including:

- Complete installation of spillway flow deflectors at Lower Monumental and Little Goose.
- Upgrade auxiliary fish ladder water supply systems at Ice Harbor, Lower Monumental, Little Goose, and Lower Granite.
- Modify extended submerged bar screens at Little Goose and Lower Granite.
- Use additional barges for transport with upgraded mooring facilities at Lower Granite.

The plan proposed the following long-term improvements:

- Install a new juvenile facility at Lower Granite.
- Install new cylindrical dewatering screens at all dams.
- Replace submerged traveling screens with extended-length submerged bar screens at Ice Harbor and Lower Monumental.
- Install new wet separators at Lower Monumental and Little Goose.
- Install turbine improvements (as powerhouses are rehabilitated)
- Install removable spillway weirs with or without a behavioral guidance structure at all four dams.
- Install two-unit powerhouse surface bypass with or without a dewatering system at Lower Monumental and Lower Granite.
- Build full-length powerhouse occlusion structure at Little Goose.

As outlined in the plan, in addition to current operational measures and continued participation in ongoing monitoring, evaluation, and regional coordination programs, there are two principal areas where potential future operational changes for the lower

Snake River need to be further investigated. These areas are: Develop and implement biological rules for flow augmentation; and develop and implement biological rules for smolt transportation, including optimal spill for salmon. The Corps planned to coordinate with federal agencies to establish these specific rules for both smolt transportation and flow augmentation. All such operational rule development would continue to be regionally coordinated in a manner consistent with the National Marine Fisheries Service 2000 Biological Opinion (121).

As detailed earlier in this chapter, many interested persons believed that attempting to return the river to a more natural condition by increasing flows during the juvenile fish outmigration time period would significantly increase juvenile survival and hence recovery of the endangered or threatened species. Biological benefit and economic cost information was assembled in the feasibility study and presented to the National Marine Fisheries Service and the region to assist in determining which, if any, specific drawdown options to pursue. The feasibility study reflected research addressing key uncertainties associated with in-river and reservoir mortality, predation, and transport, including uncertainties related to delayed mortality and impacts on homing of returning adult fish. The final feasibility report presented a comprehensive analysis of surface collection and drawdown, as compared to the methods currently utilized to aid in moving juvenile salmon downstream.

Corps Headquarters accepted the Lower Snake River Juvenile Salmon Migration Feasibility Study recommendations, and a record of decision was published in 2002. The upshot of the study, as of the time of the record of decision, was that it appeared that the lower Snake River dams would remain in place for ten to fifteen years under the National Marine Fisheries Service 2000 Biological Opinion. The Corps and NMFS would monitor the system improvements and breaching would be one solution that could be invoked should the salmon recovery situation warrant it.

Lower Snake River Fish and Wildlife Compensation Plan

The Lower Snake River Fish and Wildlife Compensation Plan, administered by Walla Walla District, resulted from the construction of the lower Snake River projects (primarily, Ice Harbor, Little Goose, Lower Monumental, and Lower Granite Locks and Dams). The implementation of this plan was one of the most significant endeavors of the District during the period covered by this volume.

The Water Resources Development Act of 1976 authorized the Lower Snake River Fish and Wildlife Compensation Plan (Comp Plan). The Comp Plan was a negotiated mitigation settlement to compensate for fish and wildlife habitat lost with associated losses in hunting and fishing opportunities due to construction and operation of the four lower Snake River lock and dam projects (Ice Harbor, Lower Monumental, Little Goose, and Lower Granite). Initial funding for the Comp Plan was received in fiscal year 1978. The estimated total cost of the compensation plan was $232 million.

The Comp Plan was divided into three programs: anadromous fish, resident fish and fisher access, and terrestrial wildlife habitat. The initial goals of the Comp Plan were contained in: *Special Report: Lower Snake River Fish and Wildlife Compensation Plan,*

Lower Snake River, Washington and Idaho published in 1975 (122). The plan was later modified to reflect updated goals.

Anadromous Fish Mitigation Program

The Anadromous Fish Mitigation Program of the Comp Plan focused on hatchery rearing of fish stocks affected by construction and operation of the lower Snake River projects. The Dworshak National Fish Hatchery was part of mitigation for the construction of Dworshak Dam. Hatcheries were constructed or modified in Washington, Oregon, and Idaho, to produce various fish stocks for release in the Snake and Columbia Rivers and tributaries. Once hatcheries were constructed, the Corps turned the facilities over to other agencies. U.S. Fish and Wildlife Service, Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, and Idaho Fish and Game operate these hatcheries. Table A-6 in the appendix lists hatcheries that were constructed or upgraded by Walla Walla District as part of the anadromous fish mitigation program. The table shows the type of fish produced by each hatchery and the pounds of fish that the hatchery was designed to produce each year.

The design of Sawtooth Hatchery, completed in 1985, is typical of these hatcheries, all constructed in the 1980s and early 1990s by Walla Walla District: "The hatchery consists of a hatchery building containing early rearing tanks and incubation facilities; a maintenance garage for storage of operational equipment and fish feed; an office and visitor complex, which will be the focal point for tours and displays; seven outside raceways; residences for operating personnel; and a dormitory for seasonal employees. Also included is a fish ladder for returning adult fish (123)."

In the process of designing and constructing these hatcheries, Walla Walla District "established itself as a Corps leader in hatchery design (124)." Some of these hatcheries were in areas where the harsh winter weather presented design challenges. Sawtooth Hatchery, for example, was located in an area where "winter temperatures reach as low as 50 below zero and consistently drop to an average 20-25 below zero at night. Water temperature at the Salmon River surface typically drops to 31.5 degrees, resulting in frazil, anchor, and slush ice in the river. When river water was diverted into the uncompleted hatchery in December 1984, it was found that ice accumulated in the workings of the hatchery equipment. CH2-M Hill, a Boise, Idaho, design firm, and Corps engineers corrected the problem (125)."

According to one knowledgeable Walla Walla District staff member: "The difficult part of locating any hatchery and getting that hatchery functional is the water supply for the fish. It's got to be just the right temperature. It's got to be in the proper amount. You've got to have all kinds of emergency systems in place in the event that equipment fails—so that you don't kill a whole hatchery of fish because of the water (126)." Design features related to water supply for these facilities were particularly challenging and innovative. At the Irrigon Hatchery, "the key to the project are two 13-foot-diameter concrete-lined wells. These wells are 80 feet deep and obtain ground water from perforated pipes extending some 1,130 feet horizontally from the bottom of the wells. Pumping tests have shown that the wells will provide 25,000 gallons per minute

required for hatchery operation. They are well worth their $1.6 million construction cost … as the well water will enable the hatchery to produce steelhead from eggs to smolts in one year rather than the two years required using water from the river. This is because the well water stays at a relatively constant temperature … while the river water temperature fluctuates (127)"

Likewise: "At Lyons Ferry … the first phase was to go about two miles or a mile and a half up the Palouse River and sink a bunch of deep wells and then pipe out of those wells. Actually, the piping was installed underwater on stands. We drove piles with cross members and then laid the pipe on them. That whole pipeline is about five feet below the surface of the water in the mouth of the Palouse (128)."

Because of fish production losses due to disease, Dworshak National Fish Hatchery was unable to accomplish intended levels of mitigation without the use of other fish-rearing facilities. In 1982, Infectious Hematopoietic Necrosis (IHN, for short) began to cause severe losses in steelhead trout production at Dworshak. By 1190, the IHN at Dworshak, subsequently identified as the "Dworshak" strain of IHN, had resulted in an accumulative total loss in excess of fourteen million, or sixty-seven percent, of the steelhead fry in the nursery. Yearly losses from 1982 to 1990 ranged from twenty-five to ninety-eight percent; totaling 19.5 million fish from an initial 42.5 million eggs. During those same years, another 8.6 million eggs from positive (infected) IHN parents had to be destroyed. It is strongly suspected that Dworshak National Fish Hatchery became contaminated with IHN when water was pumped into the hatchery; the water having been contaminated from IHN-infected fish in the river at or above the main pump intake.

In an effort to manage around the IHN disease and meet Dworshak's mitigation goals, a large percentage of Dworshak's steelhead trout were transferred to Kooskia National Fish Hatchery and to Hagerman National Fish Hatchery (Hagerman) for early rearing purposes. These fish were returned to Dworshak for subsequent rearing. The use of Kooskia began in 1982 and Hagerman in 1988. The Dworshak steelhead trout support programs at Kooskia and Hagerman were intended to be temporary measures until a permanent solution to Dworshak problems could be implemented. However, the ongoing disease problem at Dworshak required the continued use of these facilities through the end of 2000. The U.S. Fish and Wildlife Service estimated the annual cost of these programs to be $48,000.

In April 1990, researchers discovered another strain of the disease, Lyons Ferry" IHN, in Dworshak chinook smolts. The Lyons Ferry strain, which primarily affects chinook salmon, had caused significant mortalities at other hatcheries. Maintaining salmon production at Dworshak became an ongoing struggle in efforts to protect chinook salmon on the Endangered Species List.

The Clearwater Fish Hatchery's water supply represented a major hurdle. Original plans called for its water to come from the Clearwater's North Fork. Since fish health experts feared the IHN virus entered Dworshak from the North Fork, another source of water was needed for this newer hatchery. As a result, the reservoir became the source

of the new hatchery's water (129). The upshot of this necessity required some innovative engineering measures and is described in chapter 5.

The Clearwater Hatchery, dedicated in 1992, was "the ninth and final hatchery constructed under the Lower Snake River Fish and Wildlife Compensation Plan. At a cost of more than $37 million, Clearwater was described by the presiding Walla Walla District Engineer as "the largest and most expensive [hatchery] constructed to date and possibly the most complex (130)."

Starting in 1993, early rearing water for Dworshak National Fish Hatchery was taken from the Clearwater Fish Hatchery water supply. This was an effective means of dealing with the IHN problem at Dworshak. Losses at Dworshak to IHN in 1993 through 1995 were at acceptable levels, indicating that this modification was a success.

As was pointed out by the *Tri-City Herald* in 1990, the hatchery design and construction effort was a part of "the nation's largest effort to rebuild a biological resource (131)." However, as early as 1992, the effectiveness of fisheries mitigation primarily by hatchery supplementation was questioned. In the words of a Walla Walla District fisheries biologist, "We learned the hatcheries can't solve the problem. … It's a big puzzle. You have to look at all the pieces (132)." Toward the end of the 1990s, the scientific wisdom of hatchery supplementation came to be widely questioned on the grounds that hatchery fish were weaker than wild fish (133). As early as 1990, it was pointed out that an abundance of hatchery fish might cause ocean catch limits to be raised and, thus, more wild fish to be caught (134). Also, returning anadromous hatchery fish might stray from their origin (the hatchery) and spawn in the wild, displacing genetically distinct and superior wild fish. As one consulting salmon biologist put it, "The Endangered Species Act says that [wild populations] have to be sustainable in their natural environment (135)."

At the end of our period, there were dissenting opinions, especially among tribal fisheries experts who believed that properly reared hatchery fish should be used to supplement wild fish and even be allowed to spawn, eventually, in the wild where original populations were depleted (136).

Meanwhile, the concept of "evolutionarily significant units" in relation to salmon and other species was receiving scrutiny in the courts. An attorney for Walla Walla District, speaking in June 2001, commented on this trend: "We've recently had a couple of cases that have substantially altered what many, many people thought was absolutely cast in concrete. Which is, that National Marine Fisheries Service was correct when they identified a distinction between hatchery and wild run salmon. The court said that, while they may be biologically correct, they are legally wrong. The law [primarily, the Endangered Species Act] wasn't intended, nor did it state, that such a distinction exists. That wasn't the intent of Congress when they passed the law. … Now, we're going to have to go back to address issues, positions that we take [with regard] to fisheries (137)." How differing scientific opinions and legal opinions will affect the twenty-first century operation of the hatcheries designed and built by the District was unclear at the end of the period covered by this volume.

Brochure on Fish Hatcheries, ca. 1990 – Lower Snake River Fish and Wildlife Compensation Plan

It begins somewhere in the Pacific Ocean, 12 months prior to the appearance of new life. A female steelhead, weighing 5-18 pounds, sleek and healthy from feeding on the rich ocean life, begins to produce the 2,500-4,000 eggs (roe) that she will carry back to the spawning grounds of her own origin.

She undertakes the 8-month journey with single-minded purpose—to reproduce, to lay her eggs and give new life. If she arrives at her chosen spawning grounds hundreds of miles inland, her mission—and her life cycle is nearly complete.

FOR NEW LIFE

Every step of the reproduction process is critical. The gravel stream bed she has selected, for example, must be clean with water flowing **through** it, not just over it. Her freshly laid eggs must have sufficient oxygen. With a few powerful strokes of her tail fin, she rakes the stream bed, preparing a shallow nest (redd) for her roe.

Once deposited in the redd she has just dug, the eggs must be fertilized by a male within 5-10 minutes. Longer delays mean the eggs will swell with water, preventing fertilization.

Even more critical is the life span of the sperm laid over the eggs by the male. Swimming at random, the sperm must contact an egg's tiny opening (micropyle) within 30-60 seconds or her eggs will not be fertilized.

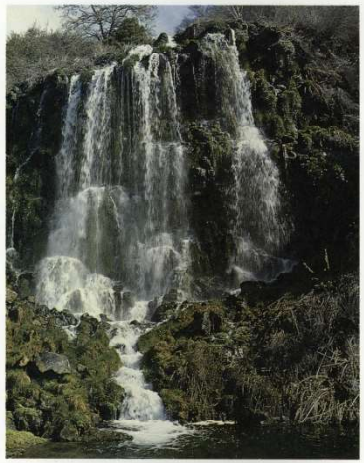
But having done her part, she will cover the fertilized eggs with gravel for security during their incubation Under increasingly complex and difficult environmental conditions, fewer than 50 percent of the female steelhead's roe will be fertilized.

That same steelhead, if taken from the wild and handled under hatchery-controlled conditions, will yield a 95 percent fertility count—a real justification for the hatchery you are visiting today!

LIFE BEGINS

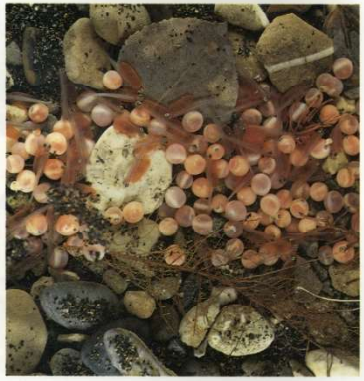
Whether in the wild or under hatchery conditions, the now-fertilized egg immediately begins dividing and developing. Depending on water temperature, cells can divide as often as every 20 minutes.

The egg next enters a 3-14 day "closed period." The embryo grows from a flat disc of cells to a recognizable body form. During this time, the egg and its new life are extremely fragile. Poor water flow, fungus growth, and predation all take a severe toll in the wild.



The gravity flow spring water that abounds in Hagerman is ideal for raising fish.

Unprotected eggs and sack-fry show their largest loss rate in the wild.



THE EYE-UP STAGE

At the end of the closed period, the steelhead egg enters the "eyed" stage. Having completed the delicate process of forming the spine and central nervous system, the retinal pigment of the eye now becomes highly visible through the egg's shell.

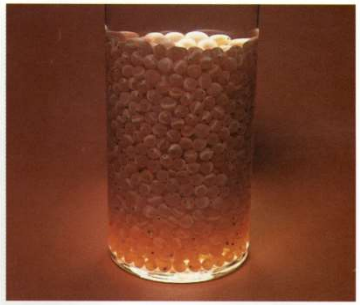
At this time, the egg becomes much more tolerable of rough handling. If necessary, hatcheries can ship eggs at this stage of development. Next the embryo, now 22 days after fertilization, releases an enzyme which softens the egg shell in preparation for hatching. The embryo finally breaks out of the shell, becoming what we call a sac fry.

Once free from the egg, the tiny steelhead lies helpless on the bottom, feeding off the highly nutritious protein and fat stored in its yolk sac. Its gills are active and the sac fry begins to respire—but it still can't swim.

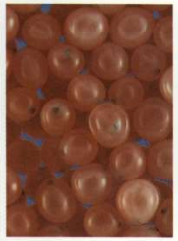
At this stage the steelhead sustains its greatest losses in the wild—primarily due to predation and slow growth due to water temperatures. Under hatchery conditions, the delicate sac fry stage can be reduced from a month or so to 10-15 days. Predation is totally eliminated, resulting in greatly-increased rates of survival.

A percentage of previous years hatch are tagged for future count in the wild.

Hatchery conditions bring steelhead from sack-fry to smolt within a 12 month period.



Eggs being disinfected in iodine solution prior to being released to their hatching jars.



The retinal pigment is highly visible during eye-up stage. Highly visible in the photo above.

The orange sack of the fry holds some of the most nutritious protein known to man.

THE FRY— A TENUOUS BEGINNING

Emerging from its sac fry stage, the steelhead fry becomes a self-sufficient fresh water creature, capable of feeding and swimming. Still, the fry in the wild is literally swimming for its life.

Some two to three years after hatching, the small freshwater steelhead begins to undergo complex hormonal changes, in preparation for its migration to the ocean.

Two vital elements must be present. First, the steelhead's size must be right, ideally 7-8 inches. Equally important is an increasing day length, which is nature's signal telling him to stop resisting the river's current.

On this day, "smoltification" begins. The young fish change color from dark green to the light silver of adulthood as they await the next stage of their amazing life cycle.

If all the factors aren't right, they will remain fresh water fish for life, becoming resident trout. But if they are for-

tunate and nature cooperates, they will begin a 2-3 month journey downstream to the ocean. Continuing to undergo biological changes as they migrate, the young steelhead face the most difficult and dangerous period of their lives.

In the wild, growth to ideal size can take as long as three years before smoltification and migration begin. Under hatchery conditions, the growth and biological changes are accelerated, bringing the steelhead to smolt size in 12 months.

HAGERMAN NATIONAL FISH HATCHERY

These hatchery facilities began operation in 1933, with a capacity of 800,000 fish. In 1983, the U.S. Army Corps of Engineers rebuilt and expanded the facilities as a part of the Lower Snake River Compensation Plan—to offset losses caused by dams on the lower Snake River.

Since the constant 59-degree fresh water is gravity-fed to more than 60 rearing tanks and 102 raceways, the Hagerman National Fish Hatchery becomes one of the most cost-efficient mitigation hatcheries in the northwest. Fresh water flows through these rearing units at 25,000 gallons per minute.

The Hagerman National Fish Hatchery produces more than 1.5 million steelhead each year. The steelhead's life on the hatchery is completed each spring in April, when it is transported to Idaho's Salmon River drainage.

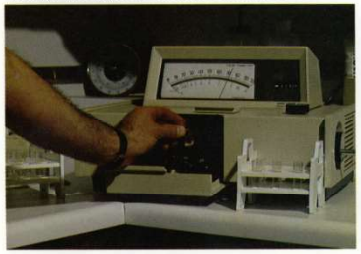
There it will be released to commence its arduous and hazardous journey to the Pacific Ocean. Hatchery loss over the past five years has averaged only 23 percent, as compared to an estimated 97 percent loss of fish in the wild.

With the increasing man-made and environmental pressures existing on America's wild rivers today, facilities such as this are becoming increasingly essential to the steelhead's very survival—operated by men dedicated to the preservation of a species, working to assist the struggle for new life.

Fisheries determine weight, length and populous count by fish count per pound.

Fish actually trip the "demand feeders" when hungry. This is an extremely cost effective feeding method.

Weekly water samples are checked for ammonia concentrations.



As man continues to change his environment, he must be willing to augment his efforts to replenish new life.

US Army Corps of Engineers
Walla Walla District

U.S. FISH & WILDLIFE SERVICE

The following is a listing of facilities constructed by the U.S. Army Corps of Engineers for the Lower Snake River Fish & Wildlife Compensation Plan in Idaho.

STEELHEAD
Hagerman Nat'l Fish Hatchery
Rural Rt. 1, Box 256
Hagerman, ID 83332
(208) 837-4896

SPRING CHINOOK SALMON
Dworshak Nat'l Fish Hatchery
P.O. Box 18
Ahsahka, ID 83520
(208) 476-4591
(Near Orofino)

STEELHEAD
Magic Valley Steelhead Hatchery
Idaho Dept. of Fish & Game, Route 1
Filer, ID 83328
(208) 326-4201

SUMMER CHINOOK SALMON
McCall Fish Hatchery
Idaho Dept. of Fish & Game, Box 1021
McCall, ID 83638
(208) 634-2690

SPRING CHINOOK SALMON
Sawtooth Fish Hatchery
Idaho Dept. of Fish & Game,
HC64, Box 9905
Stanley, ID 83278
(208) 774-3684

Produced by Alfs & Associates - Design Steve Winegar

Resident Fish Mitigation Program

Another part of the Comp Plan was the Resident Fish Mitigation Program. Initially, this program was a hatchery production program. This was altered somewhat in 1986 when funding to construct hatchery raceways was given to Washington Department of Fish and Wildlife for various stream restoration projects in southeast Washington state. However, hatchery trout continued to be produced at Lyons Ferry Hatchery. Another aspect of this program was the purchase of lands adjacent to the tributaries of the Snake and Columbia Rivers in southeastern Washington and western Idaho to develop public fishing access areas.

Terrestrial Wildlife Mitigation Program

The Terrestrial Wildlife Mitigation Program within the Comp Plan was divided into three distinct areas. The first area was the development of project lands purchased as a part of the lower Snake River projects. The lands along the lower Snake River were developed to provide habitat for many game and nongame species, including mule deer, downy woodpecker, yellow warbler, river otter, ring-necked pheasant, California quail, Canada goose, mallard, western meadowlark, chukar partridge, and song sparrow. Fifty-four habitat management units, or HMUs, were identified along the Snake River from Ice Harbor Dam to the upper extent of the Lower Granite pool. Of the fifty-four HMUs (comprising 8,936 acres), twenty-two received some level of development. Of these, twenty-two developed HMUs and ten, totaling 3,258 acres, were developed and maintained on an intensive level. Approximately 1,100 acres were planted within these intensive HMUs, with 960 acres under irrigation. The sites were developed following the Design Memorandum for Wildlife Habitat Development published by the Corps in 1975 (138) and its 1979 supplement (139).

The second area of the Comp Plan's Terrestrial Wildlife Mitigation Program was acquisition of new lands and easements to provide public hunting opportunities for ring-necked pheasant and chukar partridge. In 1986, it was decided it was more cost-effective to purchase lands outright rather than set up leases in perpetuity. Since 1987, over 24,000 acres of land have been purchased or leased for this program. Habitat developments and other facilities are currently being constructed on these lands.

The third major aspect of the Terrestrial Wildlife Mitigation Program was the game farm alternative, a program to provide ring-necked pheasant releases on lower Snake River lands. The game farm alternative began in 1989. The program funded the Washington Department of Fish and Wildlife to obtain easements/leases on private lands to develop ring-necked pheasant habitat and to open most of these lands to the public for hunting. This program was scheduled to run through the year 2007.

By the end of 2000, most of the Comp Plan requirements had been met with regard to the purchase and construction of anadromous and resident fish hatcheries.

For the terrestrial program, the habitat evaluation procedure (called HEP) was being used to measure habitat loss, as well as habitat needed to meet the goals of the Comp Plan for terrestrial wildlife. The initial HEP baseline and onsite analysis was performed in 1989 and 1990. These data were published in Special Report: Lower Snake River

Fish and Wildlife Compensation; Wildlife Habitat Compensation Evaluation for the Lower Snake River Project published in 1991 (140). Based on this evaluation, the two specific habitats showing significant deficits were swampy forest and marsh scrub-shrub. These represent the native shrub and tree habitats that included cottonwood forest and willow thicket.

The Lower Snake River Fish and Wildlife Compensation Plan authorized acquisition of an aggregate of lands in fee or easement for fisherman access, wildlife habitat, and hunting access. Lands were purchased in Washington state from Naches on the lower Yakima River, west of Yakima, Washington, to the Grande Ronde River south of Asotin, Washington. Lands were found in Washington as far north as Revere Ranch, north of LaCrosse, south to the Walla Walla River near Lowden. Off-project land acquisition was one hundred percent complete at the end of the period covered by this volume. The Ahsahka, Myrtle Beach, and Magill Public Fishing areas have been developed. Hunting access development took place at Windmill, Revere, Shumaker, Pintler Creek, Harsock, Fisher Gulch, and Campbell areas in Washington and Idaho.

Lands purchased for wildlife habitat and fisher access were evaluated, a process that began in 1991. The data showed that some habitats for target species meet or exceed the mitigation goals set forth under the Comp Plan. Other habitat areas had not yet met the goals. Toward the end of the period covered in this volume, mitigation had been reevaluated for the Columbia River hydropower projects. The Northwest Power Planning Council worked with the Corps and other agencies to consolidate fish and wildlife mitigation associated with the federal hydropower facilities in the Columbia River basin.

As it turned out, one of the more challenging activities of the Comp Plan was related to a program for establishing game birds, as described by Walla Walla District staff members:

> "The Comp Plan was largely built on nonnative wildlife species—pheasants, chukar, California quail—none of those critters really belong here, yet we're trying to mitigate for the loss of them. What about all the native birds? What about the ones you don't go out there and hunt? The Comp Plan was all built around … [species] that you could hunt. Who cares about the sharp-tailed grouse, or the sage grouse? …
>
> "One of the components was buying 20,000 hatchery pheasants every year for twenty years and dumping out there for hunters to kill. … [The birds were] impaling themselves on the trees, or there weren't any feathers left. They'd just stand there … [expecting to be fed]. They were game farm chickens. They were stupid. But then, the wildlife folks thought, wait a minute, we need to do something different, and we started going towards habitat (141)."
>
> "We went back to Congress to try to get changes to get away from the stocking program and go to the game bird farm alternative program which was taking the same amount of money that we would have put into releasing birds and put that into habitat by the State going out and entering into agreements with farmers to set aside habitat, whether that meant some buffer zones along creeks, by leaving some crops standing, or letting us go in and plant shrubs. We negotiated out about a $2 million cost on that—solely given to the state to manage for eighteen years (142)."

THE HABITAT EVALUATION PROCESS

[There are] problems with doing estimates of wildlife populations. One major one being that these populations can fluctuate. … [At the beginning of work on the Lower Snake River Fish and Wildlife Compensation Plan] an evaluation called HEP—habitat evaluation procedures—was coming into vogue and into acceptance and being utilized with species models developed by the U.S. Fish and Wildlife Service. …

We essentially brought the parties to the table—Fish and Wildlife Service, State—and said, let's relook at this. We think it makes more sense to develop a mitigation goal utilizing HEP than through these estimated numbers of wildlife populations. The State and the Service agreed to that. …

[The HEP is] a combination of habitat quantity combined with an indicator of its quality. … There were lots of other applications of HEP already out there. Species models were to a large extent already developed. …

How you derive that quality component of the HEP is that you actually go out in the field. We had a field team that spent several weeks in the summer of 1989 and '90, go out and take measurements in the field.

Variables are combined in different mathematic equations, and you end up with … what's called a habitat suitability index value.

The Corps still only has the authority to purchase the amount of land [authorized]. … Depending on how this HEP turns out [we said], we'll do the best that we can within this cap.
–Carl J. Christianson, Supervisory Wildlife Biologist (143).

Under the new game farm alternative, the Corps was funded for the cost of producing 20,000 pheasants a year for eighteen years. Walla Walla District leased or purchased farmlands for pheasants and clearings for chukar along the Snake River. Funds were given to the Washington Department of Fish and Wildlife to put into an interest bearing account to apply to a land lease and development program with local farmers to improve and protect pheasant habitat in southeastern Washington. This program was scheduled to end in 2007.

Dworshak Wildlife Mitigation

Dworshak Dam was completed in 1973. Under interagency agreement, the Corps mitigated for this project in the area of fisheries (see discussion above of the Dworshak National Fish Hatchery) and wildlife. The construction of Dworshak Dam and filling the reservoir resulted in the loss of approximately 15,270 acres of terrestrial habitat.

The North Fork Clearwater River drainage is important for wildlife because it supports significant herds of white-tailed deer, mule deer, Rocky Mountain elk, and lesser numbers of ruffled grouse, cougar, black bear, and other game species. The U.S. Fish and Wildlife Service identified the effects on wildlife due to construction of Dworshak Dam and Reservoir. The greatest impact was loss of winter range, primarily for Rocky Mountain elk and secondarily for white-tailed deer.

The Bonneville Power Administration administered a wildlife loss assessment under the Northwest Power Planning Council's Fish and Wildlife Program. An interagency team conducted the assessment using the habitat evaluation procedure. Losses were identified and mitigation plans developed for elk in addition to other HEP evaluation species.

Based on this loss assessment, in March 1992, Idaho Fish and Game signed a Wildlife Mitigation Agreement for Dworshak Dam with Bonneville Power Administration and the Nez Perce Tribe. Under the agreement, Bonneville Power Administration acquired the 60,000-acre Pene lands in Idaho and timber rights to 130 acres of old growth in the Buck Creek drainage in Idaho. Bonneville Power Administration also deposited funds in the Dworshak Wildlife Mitigation Trust Fund to provide for river otter mitigation projects being administered by the Nez Perce Tribe and annual operation and maintenance of the Pene lands.

Walla Walla District Staff Member Conducting a Controlled Burn in the Forest

In addition, the Corps developed Dworshak mitigation lands managed for winter range. Intensive development of wildlife mitigation lands included harvesting the usable timber, hand-cutting brush or mechanically crushing it down, burning brush and slash, replanting and reseeding desirable vegetation, and fertilizing. This work reduced plant succession and increased the production of brush preferred for deer and elk winter feed. Some standing timber was left to provide thermal cover and visual breaks along roads, a buffer along the reservoir, and protection along streams. The result is a

mosaic of brush fields and timberlands similar to what naturally occurs after lightning-caused spot fires.

The Corps obtained title to 5,120 acres adjacent to Dworshak Project lands at the junction of the North Fork and Little North Fork Rivers. These lands, along with 3,900 acres of existing project lands, were developed for winter range. In 1982, the Corps entered into a cooperative agreement with Idaho Fish and Game whereby winter range would be developed to varying degrees upon the remaining 27,000 acres of project lands surrounding the reservoir.

As of the year 2000, some 9,113 acres were being managed specifically for elk habitat. A mitigation goal was proposed by Idaho Fish and Game to provide sufficient browse to sustain 915 elk through a 100-day winter period.

Other species were also impacted due to the construction, but only late in the period covered by this volume did the federal and state wildlife agencies and tribes seek additional mitigation. Funding through the Northwest Power Planning Act has allowed for identification of non-elk habitat and mitigation of these losses in the future.

Other Wildlife Mitigation

In addition to the activities associated with the Lower Snake River Fish and Wildlife Compensation Plan, the Corps has undertaken other activities designed to improve or restore habitats for wildlife.

"Where rock piles litter river, engineers see lush islands." So reads a 1992 *Seattle Times* (144) headline for an article about the Corps' plans to move dredged material by barge to create islands in the Columbia River as a "verdant sanctuary" for wildlife. The article describes the plans: "Some of the barged dirt and rock will serve as river fill around the rock piles. The rest will be molded into small rolling hills. Then comes the conversion into living islands. Wheat will be planted in April to temporarily prevent wind erosion. Trees, more wheat, and Indian rye grass will be added in the fall, the optimum planting time. … River water will seep into the soil to nourish plant life. Geese, herons, muskrats, and beavers are expected to gradually populate the islands (145)."

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Notes for Chapter 8

1 Mighetto, Lisa and Wesley J. Ebel. *Saving the Salmon: A History of the U.S. Army Corps of Engineers' Efforts to Protect Anadromous Fish on the Columbia and Snake Rivers.* Seattle: Historical Research Associates, 1994.
2. PL 96-501.
3. National Marine Fisheries Service. *Biological Opinion: Endangered Species Act – Section 7 Consultation.* [Portland, OR]: National Marine Fisheries Service, 1995.
4. PL 93-205.
5. National Marine Fisheries Service. *Biological Opinion*. 1995.
6. National Marine Fisheries Service. Biological Opinion: Endangered Species Act – Section 7 Consultation. [Portland, OR]: National Marine Fisheries Service, 2000.
7. National Marine Fisheries Service. *Biological Opinion: Endangered Species Act – Section 7 Consultation*. [Portland, OR]: National Marine Fisheries Service, 2000.
8. Ibid, p. 8-1.
9. Ibid, p. 8-3.
10. USACE, Northwestern Division. *Salmon Passage Notes*. Portland: The Division, 1992-1998. INTERNET: http://www.nwd.usace.army.mil/ps/spnchron.htm.
11. The report is discussed in: Espenson, Barry. Report details potential mainstem habitat restoration. *Bend (OR) Columbia Basin Bulletin*, 20 June 2000.
12. Ibid.
13. Researchers look to build a better turbine for salmon. *Idaho Falls Post-Register*, 8 November 1994.
14. Lee, Mike. Corps finds new Bonneville turbines safer for fish. *Tri-City Herald*, 10 August 2000.
15. Early, Christopher. McNary Center opens amidst protest. *The Hermiston (OR) Herald*, 6 September 1994, p. 3A.
16. Ibid.
17 USACE, Walla Walla District. *Lower Snake River Juvenile Salmon Migration Feasibility Report/Environmental Impact Statement, Summary*. Walla Walla, NWW, 2002, p. 18.
18. USACE, Walla Walla District. District of the Month Series, *USACE Engineering & Construction News*, August 2001, p. 8.
19 . Weeks, D. Anthony. Interview. Walla Walla, NWW, 18 June 2001.
20. Operation Fish Run underway. *Intercom*, 15 April 1981.
21. Fish barge makes man part of migratory cycle. *Intercom*, 10 May 1982, p. 3.
22. Ibid.
23. Fish hauling, it's not a nine to five job. *Intercom*, June 1988, p. 8-10.
24. USACE, Pacific Salmon Coordination Office. Juvenile fish transportation program. Seattle: The Office, 2 March 2000. INTERNET: www.nwd.usace.army.mil/ps/juvetran.htm.
25. Fish Council requests changes to Operation Fish Run. *Intercom*, 2 May 1983, p. 1.
26. Kramer, Becky, Fish hitchhikers snag ride downriver. *Walla Walla Union-Bulletin*, 19 April 1992, p. 2.
27. Laatz, Joan. Fishermen, others rip barging of salmon. *Portland Oregonian*, 3 June 1994.
28. Ibid.
29. Fish Council requests changes to Operation Fish Run. *Intercom*, 2 May 1983, p. 1.
30. Kramer, Becky, Fish hitchhikers snag ride downriver. *Walla Walla Union-Bulletin*, 19 April 1992, p. 1.
31. Ibid.
32. McKern named 'Distinguished Civilian Employee.' *Intercom*, June 2003, p. 7.
33. Howe Verhovek, Sam. U.S. gives lift to salmon, but future and benefits are questioned. *New York Times*, 6 May 2000.
34. Salmon summit again eyes lower Snake reservoirs. *Tri-City Herald*, 7 April 1991.
35. Loftus, Bill. Saving young salmon may mean reshaping the Snake. *Lewiston Morning Tribune*, 18 February 1991, p. 5A.
36 USACE, Walla Walla District. *1992 Reservoir Drawdown Test: Lower Granite and Little Goose Dams*. Walla Walla: NPW, 1993, p. 7.
37 Idaho plan protects Idaho interests. *Pendleton East Oregonian*, 1 June 1994.

38. Loftus, Bill. Corps says consensus needed for drawdown. *Lewiston Morning Tribune*, 18 February 1991, p. 1A
39. Ibid.
40. 1992 Columbia River Salmon Flow Measures Options Analysis/Environmental Impact Statement. *Intercom*, winter 1992, p. 7.
41. See, for example: (1) Woehler, Robert. Snake River users fear plan to save salmon. *Tri-City Herald*, 27 February 1991. (2) Loftus, Bill. Corps blocks drawdown. *Lewiston Tribune*, 15 March 1991, p. 9A. (3) Andrus rejects Corps' latest drawdown plan. *Tri-City Herald*, 5 April 1991. (4) Alliance: "Idaho Plan" not cheapest. *Boise Idaho Statesman*, 27 June 1992.
42. Bailey, Julie. Port goes to court. *Lewiston Morning Tribune*, 12 February 1992, 1A, 4A.
43. Planning stops, action begins as water level drops. *Intercom*, May 1992, p. 5.
44. Corps names Wik no. c1 planner. *Intercom*, September 1993, p. 5.
45. Lt. Commander Robert D. Volz, Walla Walla District Engineer, U.S. Army Corps of Engineers quoted in: L. Granite drawdown set in March. *Pomeroy East Washingtonian*, 15 January 1992.
46. Volz, LTC Robert D. Commander's message. *Intercom,* May 1992, p. 3.
47. Reese, David L. Interview. Walla Walla, NWW, 23 October 2001.
48. John, Wayne, Drawdown '92 Project Coordinator quoted in: Engineering principles, designs tested. *Intercom*, May 1992, p. 6.
49. Results of the drawdown test are detailed in the report by USACE, Walla Walla District, *1992 Reservoir Drawdown Test*.
50. Ibid.
51. Krahenbuhl, Charles. Lower Granite-Little Goose Project Manager quoted in: Drawdown '92. Special Issue. *Intercom*, May 1991, p. 7.
52. USACE, Walla Walla District. *1992 Reservoir Drawdown Test*.
53. Barge shutdown starts on lower Snake River. *Seattle Daily Journal of Commerce,* 3 March 1992.
54. Loftus, Bill. Cleanup crews prepare for weekend's "low tide." *Lewiston Tribune*, 30 March 1991, p. 1B.
55. Teen saved from river mud. *Spokane Spokesman-Review*, 6 March 1992.
56. Divers can't find plane in reservoir. *Walla Walla Union-Bulletin*, 27 March 1992, p. 6.
57. Tonn, Darrell, and Lenny Frasure. A history lesson, memories surface, *Lewiston Morning Tribune*, 5 March 1992, 1C, 5C.
58. Remembering the river, *Intercom*, May 1992, p. 15.
59. USACE, Walla Walla District. *1992 Reservoir Drawdown Test*.
60. On fish kills see: Ibid, p. xxxv; Loftus, Bill. Fish discovered dead. *Lewiston Morning Tribune*, 13 March 1992; Woehler, Robert. Drawdown foe says over 1,000 fish died. *Tri-City Herald*, 13 March 1992.
61. Titone, Julie. House panel OKs drawdown damage aid. *Spokane Spokesman-Review*, 10 June 1992.
62. O'Bryant, Mike. Corps looks at funding for leaking Lower Granite levee. *Bend (OR) Columbia Basin Bulletin*, 19 May 2000.
63. Drawdowns deemed cheapest. *Boise Idaho Statesman*, 25 June 1992.
64. Bailey, June. Ports: Drawdown cost $4.1 million. *Lewiston Morning Tribune*, 7 May 1992, 1A, 3A.
65. Bailey, Julie. Anti-drawdown group raises $90,000. *Lewiston Tribune*, 8 May 1992, p. 5C.
66. Marks, Anita. Utilities may sue feds as fish fray heats up. *Portland Business Journal*, 25 May 1992.
67. Corps: No drawdown in '93. *Lewiston Morning Tribune*, 13 May 1992, p. 1A.
68. Johnson, Bruce. River drawdowns have become risky. *Seattle Daily Journal of Commerce*, 5 May 1992.
69. Groups demand increased water flows. *Lewiston Morning Tribune*, 16 June 1992.
70. Environmentalists blast drawdown. *Lewiston Morning Tribune*, 18 May 1994.
71. Woehler, Robert. Environmentalist backs drawdowns. *Tri-City Herald*, 30 May 1992.
72. Plan would end need for severe drawdowns. *Spokane Spokesman-Review*, 23 October 1992, p. B1, B4.
73. USACE, Walla Walla District. *Lower Snake River Biological Drawdown Test: Draft Environmental Impact Statement*. Walla Walla: NPW, April 1994.

74. Trillhaase, Marty. Demo candidates shy away from drawdown. *Lewiston Morning Tribune*, 15 May 1992, p. 1C, 7C.
75. For example: Lovelin, Bruce. Salmon drawdown unproved, wildly expensive. Guest commentary. *Idaho Falls Post-Register*, 12 May 1994, A11.
76. See numerous examples listed in the bibliography including: Nelson, Lorraine. Public opposes Snake drawdowns. *Lewiston Morning Tribune*, 14 January 1994. Titone, Julie. Studies aim for survival of a species. *Spokane Spokesman-Review*, 16 May 1994.
77. Etlinger, Charles. Idaho Power warns of rate hike. *Boise Idaho Statesman*, 1 November 1994, p. 1B, 4B.
78. Andrus makes final push for drawdowns. *Pendleton East Oregonian*, 29 November 1994.
79. Craig opposes Granite drawdown. *Boise Idaho Statesman*, 18 August 1995, p. 3C.
80. Some people think drawdowns save fish: Some fish disagree. Paid advertisement. *Lewiston Morning Tribune*, 13 February 1994. See also: Drawdowns theory doesn't hold water. Paid advertisement. *Lewiston Morning Tribune*, 1 March 1994.
81. Survey: Drawdown for salmon turns people off. *Twin Falls (ID) Times-News*, 20 January 1994, D3.
82. Vogt, Andrea. Drawdown foes vow to fight to the finish. *Lewiston Morning Tribune*, 7 March 1994.
83. Stang, John. Lower Granite drawdown likely dead, Corps says. *Tri-City Herald*, 30 November 1994.
84. Ibid.
85. USACE, North Pacific Division, Bonneville Power Administration and Bureau of Reclamation. *Columbia River Salmon Flow Measures: 1992 Options Analysis/Environmental Impact Statement.* Seattle: The Agencies, 1992.
86 USACE, Walla Walla District. *1992 Reservoir Drawdown Test*, p.107.
87 Ibid, p. 121.
88. USACE, Pacific Salmon Coordination Office. Flow augmentation. Seattle: The Office, 2 March 2000. INTERNET: www.nwd.usace.army.mil/ps/ropsflow.htm.
89. Lowering of Snake River reservoirs starts Monday. *Tri-City Herald,* 9 April 1994, p. A7.
90. Ashton, Linda. Drawdown a drain on Orofino economy. *Boise Idaho Statesman*, 6 September 1994.
91. Barker, Eric. Twisting by the full pool. *Lewiston Morning Tribune*, 29 June 2000, p. 4D.
92. O'Bryant, Mike. River operators clash over use of Dworshak water. *Bend (OR) Columbia Basin Bulletin*, 30 June 2000.
93. Schafer, Dave, and John Stang. 8 dams spill water to save fish. *Tri-City Herald*, 12 May 1994, A1.
94. Titone, Julie. Salmon cure may be as bad as the disease. *Spokane Spokesman-Review*, 1 June 1994, p. A1.
95. Loftus, Bill. Steelhead spill hits the bends. *Lewiston Morning Tribune*, 28 May 1994, p. 1A, 9A.
96. Canopis, Mark. Dam spills kill salmon, experts say. *Boise Idaho Statesman*, 28 May 1994, p. 1C.
97, Scientists: Benefits of spillover will be hard to determine. *Boise Idaho Statesman*, 6 June 1994, 5C.
98. World Commission on Dams. *Dams and Development.* Final Report: Executive Summary. London: The Commission, November 2000, p. 2-3.
99. Ibid.
100. Ibid.
101. Williams, Lauri. We put that river to use, but nature pays a price for Northwest's cheap power: Hydroelectric dams. *Tri-City Herald,* 20 December 1992, p. 1.
102. Ibid.
103. Ibid.
104. Taxpayers for Common Sense and National Wildlife Federation. *Troubled Waters: Congress, The Corps of Engineers and Wasteful Water Projects*. Washington, DC: Taxpayers for Common Sense and National Wildlife Federation, March 2000.
105. The review was finalized in: Bonneville Power Administration, Bureau of Reclamation, and USACE, North Pacific Division. *Columbia River System Operation Review, Final Environmental Impact Statement.* Summary, main report, 20 technical appendixes. Portland, OR: The Agencies, 1995.
106. *Ibid*, p. 2-3.
107. *Ibid*.

108. USACE, Walla Walla District. *Columbia River Salmon Mitigation Analysis System Configuration Study*. Draft, Walla Walla: NPW, 1994. Phase I of the study was completed with this document although it was issued only in draft.
109. USACE, Portland District and Walla Walla District. *Dissolved Gas Abatement Study: Phase I, Technical Report*. Portland and Walla Walla: The Districts, 1996.
110. USACE, Walla Walla District. *Lower Snake River Juvenile Salmon Migration Feasibility Report/Environmental Impact Statement*. Final. Walla Walla: NWW, 2002.
111. Phinney, Wil. Report says breaching dams would benefit tribes. *Confederated Umatilla Journal*, 3 June 1999.
112 Idaho Department of Fish and Game. Idaho Fish and Game Endorses Snake R. Dam Removal. News Release. Boise: The Department, 10 June 1998.
113. Arvid Lyons, Manager of the Lewis Clark Terminal quoted by Butler, Nancy C. Breaching dams would harm grain producers. *Orofino (ID) Clearwater Tribune*, 25 November 1999.
114. Lee, Mike. Lobbyist rides dam fight from start to end. *Tri-City Herald*, 11 February 2000.
115. Brinckman, Jonathan. Dam-breaching proponents make noise at public forum. *Portland Oregonian*, 4 February 2000.
116. Lee, Mike. Dam supporters strike back: Hearing at Tri-Cities brings anti-breaching crowd out in force. *Tri-City Herald*, 25 February 2000.
117. Hunsberger, Brent. Kitzhaber calls for breaching four dams. *Portland Oregonian*, 19 February 2000.
118. Mulick, Chris. Locke soundly against breaching. *Tri-City Herald*, 25 February 2000.
119. New Mexico congressman favors breaching 4 dams. *Associated Press*, 3 March 2000.
120 *Lower Snake River Juvenile Salmon Migration Feasibility Report/Environmental Impact Statement, Summary*, p. 19.
121. National Marine Fisheries Service. *Biological Opinion: Endangered Species Act – Section 7 Consultation*. [Portland, OR]: National Marine Fisheries Service, 2000.
122. USACE, Walla Walla District. *Special Report: Lower Snake River Fish and Wildlife Compensation Plan, Lower Snake River, Washington and Idaho.* Walla Walla, NPW, 1975.
123 Dedication: District completes new fish hatchery. *Intercom*, 5 August 1985, p. 1, 3.
124. LSRRO: Field engineers look forward to the challenge. *Intercom*, 23 October 1984, p. 1.
125. Dedication: District completes new fish hatchery. *Intercom*, 5 August 1985, p. 1.
126. Opbroek, David A. Interview. Walla Walla, NWW, 5 December 2001.
127. Construction starts at Irrigon steelhead hatchery. *Intercom*, 6 June 1984, p. 6.
128. Opbroek interview.
129. Loftus, Bill. Multimillion-dollar project is about to hatch. *Lewiston Morning Tribune*, 16 January 1992.
130. Clearwater dedication: Hatchery largest every constructed. *Intercom*, September 1992, p. 5.
131. Truelove, Tom. Rebuilding fish runs a goal of 90s. *Tri-City Herald*, 10 March 1990, E8.
132. Gallagher, Dan. Hatching a new plan. *Spokane Spokesman-Review*, 16 February 1992.
133. See, for example: (1) Sonner, Scott. Hatcheries weaken fish, experts warn Congress. (2) *Spokane Spokesman-Review*, 3 March 1994, B4. Fish hatcheries under scrutiny as a threat to strong wild runs. *Seattle Post-Intelligencer*, 27 March 2000. (3) Espenson, Barry. Hatchery policy makers seek direction from science. *Bend (OR) Columbia Basin Bulletin*, 20 June 2000. (4) Lichatowich Jim. *Salmon Hatcheries: Past, Present and Future*. [Portland]: Oregon Business Council, [February 2001]. (5) Levin, Phillip S. and Michael H. Schiewe. Preserving salmon biodiversity. *American Scientist*, May-June 2001.
134. Truelove, Tom. Rebuilding fish runs a goal of 90s. *Tri-City Herald*, 10 March 1990, E8.
135. Lichatowich, Jim quoted in Raloff, Janet. Salmon hatcheries can deplete wild stocks. *Science News* 159, no. 22 (2 June 2001).
136. See, for example: Indians plan protest of hatchery policies. *Pendleton East Oregonian*, 14 May 1992, p. 1. Fenton, Jonnie. Fish hatchery dedicated [on the Umatilla Fish Hatchery]. *Hermiston (OR) Herald*, 12 May 1992. Espenson, Barry. Coalition urges use of fish "surplus" for outplanting. *Bend (OR) Columbia Basin Bulletin*, 16 June 2000. Surplus salmon will help restore runs: Hatchery fish, instead of being clubbed, will go into the Okanogan River system. *Portland*

Oregonian, 22 June 2000. Espenson, Barry. Regional experts look at supplementation science. *Bend (OR) Columbia Basin Bulletin*, 23 June 2000.

137. Weeks interview.
138 USACE, Walla Walla District**.** Design Memorandum for Wildlife Habitat Development: Lower Snake River Project. Walla Walla: NPW, 1975.
139 USACE, Walla Walla District. Design Memorandum for Wildlife Habitat Development: Supplement No. 1, Lower Snake River Project. Walla Walla: NPW, 1979.
140. USACE, Walla Walla District**.** *Special Report: Lower Snake River Fish and Wildlife Compensation Plan: Wildlife Habitat Compensation Evaluation for the Lower Snake River Project*. Walla Walla: NPW, 1991.
141. Shelin interview.
142. Christianson, Carl J. Interview. Walla Walla, 26 June 2001.
143. Christianson interview.
144. Where rock piles litter river, engineers see lush islands: Corps plans to create wildlife haven in the Columbia. *Seattle Times*, 27 February 1992, p. F4.
145. Ibid.

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Chapter 9. Regulatory and Environmental Compliance Programs

The Corps Regulatory Program

The U.S. Army Corps of Engineers has one of the oldest regulatory programs in the federal government (1). The Corps acts under various laws and regulations as outlined below.

Rivers and Harbors Act

Under Section 10 of the Rivers and Harbors Act of 1899 (2), the Corps was made responsible for protecting the navigation capacity of the nation's waterways. "Section 10 prohibits obstruction or alteration of navigable waters in the U.S. without a permit. A permit is needed for any work performed in, on, over, or under navigable waters of the United States (not including bridges or causeways, which were handled by the U.S. Coast Guard beginning in 1967) (3)."

Consideration of fish and wildlife impacts of Section 10 permits was added to Corps regulations in 1963, but the effects of activities on navigation was still the primary consideration in granting a permit. A 1967 memorandum of agreement required that the Corps not issue a permit over the objections of the U.S. Fish and Wildlife Service. The Federal Water Pollution Control Act of 1970 (4) required that state water quality certification be obtained before a permit was issued.

Clean Water Act, Section 404

The Corps regulatory responsibilities were expanded in 1972 under Section 404 of the Clean Water Act (5). Section 404 prohibits discharge of dredged or fill material into waters of the United States without a permit. The Code of Federal Regulations (6) authorized the Corps to issue permits under Section 404. The code requires public notice and the opportunity for a public hearing before permits are issued. Disposal of materials must be into specified disposal sites. The selection and use of the sites must be in accordance with guidelines developed by the Environmental Protection Agency in conjunction with the Corps. The Corps is required to consider the economic impact on navigation and anchorage of any prohibition on the use of disposal sites.

Activities for which the Corps typically required Section 404 permits included, but were not limited to (1) placement of fill or dredged material in the waters or wetlands; (2) ditching activities when the excavated material is sidecast (piled on the edge of the ditch); (3) levee and dike construction; (4) mechanized land clearing; (5) land leveling; (6) most road construction; and (7) dam construction (7).

Marine Protection, Research, and Sanctuaries Act

The Corps also issues some one hundred or fewer permits throughout the country each year under the Marine Protection, Research, and Sanctuaries Act (8), popularly called the Ocean Dumping Act, enacted in 1972.

Types of Permits

The Corps was empowered to issue three different types of permits under Section 404 of the Clean Water Act. The three types were: General Permits, first issued in 1975, which included Regional and Nationwide Permits; Letters of Permission; and Individual Permits.

Nationwide Permits were designed for minor work that has little effect on the environment. These permits were revised from time to time and published in the *Federal Register*. There was a revision of permits in 1996, for example, at which time forty Nationwide Permits existed.

Nationwide Permits included minor road crossing fills, submarine utility line crossings, minor wetland fills, small floating recreational docks, and minor bank protection projects. The basic limits of the Nationwide Permits as of 2000 were half an acre of water of the United States, including wetlands. Because Nationwide Permits were formulated at Corps Headquarters, they were uniform throughout the Corps. Districts and states, however, had authorization to make restrictions on Nationwide Permits.

The Corps issued a major revision of Nationwide Permits in June 2000. At that time, the Corps modified six existing Nationwide Permits and issued five new ones. The revisions of 2000 were necessary to ensure compliance with Section 404(e) of the Clean Water Act. Section 404(e) of the Act authorizes the Corps to issue General Permits on a state, regional, or nationwide basis for certain categories of activities involving a discharge of dredged or fill material in waters of the United States. Activities covered under a specific Nationwide Permit must be similar in nature and cause only minimal adverse environmental effects. The revised and new Nationwide Permits of 2000 affect activities in designated critical resource waters and 100-year floodplains.

Regional Permits were developed by the districts based on regional needs, for example, permits for recreational boat docks. This type of Regional Permit was for individual owners only and could cover an activity affecting an area of up to fifty linear feet.

Letters of Permission were used mostly for activities covered in Section 10 of the Rivers and Harbors Act. An example would be a permit issued for constructing a 100-foot recreational floating dock. To approve this type of permit, the Corps coordinates with the state and the U.S. Fish and Wildlife Service.

Individual Permits were used when an activity did not meet the criteria of either the Regional or Nationwide Permit, or Letter of Permission. Individual Permits were issued following a case-by-case evaluation of a specific project in accordance with applicable procedures and regulations and only after a determination that the proposed structure or work is in the public interest. As part of the Individual Permit process, a public notice is issued, giving individuals, agencies, or groups thirty days to respond. A public hearing is sometimes requested of or deemed appropriate by the Corps. All comments received from the public are reviewed and considered before the Corps makes a decision to issue or withhold an Individual Permit.

Because Individual Permits can involve complex considerations, processing time can take 150 days or more. If an Individual 404 Permit is required, the permit cannot be

issued until the appropriate state approves water quality certification under Section 401 of the Clean Water Act.

As of the end of the period covered in this volume, the Corps annually issued about 90,000 permits, and about 1,100 staff members throughout the nation worked in the Corps Regulatory Program.

The Permit Process

What happens when a permit application is received? First, the Corps determines whether it has jurisdiction relating to the proposed excavation or other action. If the Corps does have jurisdiction, a determination is made whether the proposed action falls under Section 10 of the Rivers and Harbors Act, Section 404 of the Clean Water Act, or both. The application is then reviewed to see if it falls under the guidelines for a General Permit (Nationwide or Regional).

When a completed application is received by the Corps, it is assigned a number. The application is reviewed, balancing the need and expected benefits of the activity against the probable impact of the work, taking into consideration all comments received.

Expansion of Corps Jurisdiction

The Rivers and Harbors Act had limited the Corps jurisdiction to navigable waters of the United States. In 1977, the Corps interpreted the Clean Water Act as granting jurisdiction over waters that could be used for interstate commerce or were affected by the tide. The relevant section from the 2000 edition of the Code of Federal Regulations, Title 33, defined "waters of the United States" and "wetlands:"

> "For the purpose of this regulation these terms are defined as follows:
>
> (a) The term waters of the United States means
> (1) All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide;
> (2) All interstate waters including interstate wetlands;
> (3) All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa, lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:
> (i) Which are or could be used by interstate or foreign travelers for recreational or other purposes; or
> (ii) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
> (iii) Which are used or could be used for industrial purpose by industries in interstate commerce;
> (4) All impoundments of waters otherwise defined as waters of the United States under the definition;
> (5) Tributaries of waters identified in paragraphs (a) (1) through (4) of this section;
> (6) The territorial seas;
> (7) Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (a) (1) through (6) of this section.
> (8) Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other Federal agency, for the purposes of the Clean Water Act, the final authority regarding Clean Water Act jurisdiction remains with EPA.

"Waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of CWA (other than cooling ponds as defined in 40 CFR 423.11(m) which also meet the criteria of this definition) are not waters of the United States.

(b) The term wetlands means those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas (9)."

With this interpretation, the Corps expanded the definition of navigable waters to include isolated waters like wetlands, lakes, and streams. This interpretation was supported by the Commerce Clause of the U.S. Constitution whereby the federal government can exercise authority over activities that affect interstate commerce. The interpretation was based on the concept that if such waters were damaged, then interstate commerce would be adversely affected. The Corps' inclusion of wetlands under its jurisdiction was upheld in 1985 in United States v Riverside Bayview Homes, Inc. (10).

In 1986, the Corps issued interpretive guidelines regarding matters of jurisdiction. These guidelines expanded Corps authority. The guidelines specifically state, for example, that the Corps has permitting jurisdiction over waters that are used to irrigate crops sold in interstate commerce. Further, the Corps claimed jurisdiction over waters that are or could be used as habitat by migratory birds or endangered species. These guidelines were in force through the end of the period covered by this volume, although the migratory bird rule was challenged in court during the 1990s and was finally struck down by the U.S. Supreme Court in 2001.

Wetlands

Asotin Slough – a Wetlands Area

During the period covered by this volume, concern about America's disappearing wetlands led to federal and state regulations, policies, and directives aimed at maintaining these diverse habitats. Wetlands came to have a very important place in the Corps' Regulatory Program.

If damages were unavoidable in the course of carrying out activities under a Section 404 permit, the permit holder, or a third party paid by the permit holder, was required to restore, create, preserve, or enhance nearby wetlands as compensation for the damage. Not only is "compensatory mitigation" intended to comply with the Clean Water Act, it also fulfills the national goal of "no net loss of wetland" acreage.

RECOGNIZING WETLANDS AND THEIR IMPORTANCE

A wetland is an area that is covered by shallow water or has waterlogged soils for long periods during the growing season in most years. Prolonged saturation with water leads to chemical changes in wetland soils, which in turn affect the kinds of plants that can grow in wetlands. Therefore, wetland vegetation often looks quite different from that of surrounding non-wetland areas.

Wetlands are known by many different names, some of which are specific to particular regions of the country. Wetlands that are dominated by trees and shrubs are commonly called swamps. Swamp forests associated with rivers and streams in the Southeast are locally known as bottomland hardwoods. Wetlands that consist of herbaceous vegetation, such as sedges, cattails, and bulrushes, are known as marshes. Marshes are highly variable and include fens, sloughs, potholes, and wet meadows. Bogs are generally dominated by sphagnum moss, which, when it dies, builds up in thick layers of peat. Extensive bogs in Canada and Alaska are called muskegs.

One of the goals of the Clean Water Act is to prevent the degradation of the Nation's waters, including needless destruction of wetlands. Wetlands benefit people in many ways that may not be obvious. Depending upon their location, wetlands provide one or more of the following benefits:

- They improve the quality of our water by filtering sediments and removing contaminants.
- They serve as spawning sites and nursery areas for fish and other aquatic life.
- They support downstream aquatic systems, including commercial and sport fisheries, by producing food and organic material that is flushed out of the wetlands and into streams during high flows.
- They reduce flood damage to crops and human settlements downstream by storing floodwater and releasing it slowly.
- They are breeding, feeding, and wintering habitat for hundreds of wildlife species including: waterfowl, shorebirds, muskrats, turtles, frogs, and salamanders.
- They support many endangered species of animals and plants.
- They protect shorelines from erosion due to waves and currents.
- They provide recreational opportunities, such as hunting, fishing, boating, and wildlife watching. –*Recognizing Wetlands* (11).

When talking to school children, Rebecca Rutherford of [the Corps'] Huntington District's Regulatory Branch, put it in simpler terms — "Wetlands act like a sponge soaking up the water." They soak up rainwater and release it gradually. She further explains that wetlands are also like kidneys—they act as filters to clean up water. –*Engineer Update*, July 2001 (12).

Wetlands Delineation

Wetland delineations were prepared according to the Corps' *Wetlands Delineation Manual,* dated 1987 (13). There are many indicators that an area is a wetland. There are vegetation, soil, and hydrology (surface water) indicators for recognizing wetlands. Corps' policy required that at least one indicator from each category be present for an area to be identified as a wetland under Section 404 of the Clean Water Act.

Wetland delineations have sometimes been controversial, and the Corps issued further guidelines in a 1991 memorandum (14) for implementing the 1987 manual and a 1992 memorandum for further clarification and interpretation. Another level of complexity was introduced in 1993 when the Natural Resources Conservation Service was designated as the lead federal agency for delineation of wetlands on farms. A memorandum of understanding between the Corps and the Conservation Service was signed in 1994.

Wetlands Regulatory Assistance Program

The Corps Wetlands Regulatory Assistance Program, initiated in the 1980s, provided scientific and engineering technical support to Corps regulatory programs in the districts. The Assistance Program is a technology transfer activity that supported field needs through:

- Direct scientific, technical, and engineering hands-on assistance for site- and problem-specific issues.
- Delivery and use of state-of-the-science technologies through applications, demonstrations, and technology transfer emphasizing the Internet, plus training for Corps Regulatory Program personnel.

The knowledge and technology base for the Assistance Program was broad and was rooted in past and present Corps efforts conducted under previous Wetlands Research Programs (1970s, 1980s, and 1990s), continuing through the Characterization and Restoration Wetlands Research Program.

No Net Loss of Wetlands Policy

In 1988, President-elect George H.W. Bush announced a Domestic Policy Council initiative calling for "no net loss of wetlands." Subsequent presidents endorsed this policy. Congress directed the Corps to pursue the goal of "no overall net loss" of wetlands in the Water Resources Development Act of 1990 (15). The Act also established a long-term goal for the Corps of increasing the quality and quantity of the nation's wetlands. This policy signaled the Corps to place increased emphasis on wetlands protection and mitigation for aquatic impacts resulting from permit actions.

A 2001 report, *Compensating for Wetland Losses Under the Clean Water Act* (16) by the National Research Council said that the loss of total wetland area had slowed in the previous two decades, but found that programs should be improved to meet the goal of "no net loss in wetlands." The report called for a strategy in managing wetlands that would give greater consideration to how restored or created wetlands can replicate naturally occurring functions and become part of restoration for entire watersheds. In 2001, the Corps estimated that annually it was authorizing the fill of about 30,000 acres of wetlands while it required creation or repair of about 45,000 acres of wetlands (17).

Mitigation Banks

"A wetland mitigation bank has been defined as a parcel of land with functional wetland value that serves as ecological capital to be used in offsetting unavoidable wetland loses (18)." Specifically in relation to the Corps processes, "A wetland mitigation bank is a large tract of created or restored wetlands that has been restored and managed with approval of the U.S. Army Corps of Engineers. Each acre of wetland becomes a 'credit' in the mitigation 'bank.' These credits are available for purchase to any public or private organization that is required by federal law to obtain a 404 permit and to mitigate for impacts to wetlands caused by its development (19)."

The establishment of mitigation banks helped the land user or developer. "Because the Corps has already approved the wetlands in the bank, the permitting process is usually quicker than when the developing organization seeks approval for wetland mitigation on its own site. In addition, the developer can make full use of all available land for its development without the complications involved of including a wetland mitigation area onsite (20)."

Communities were also benefited by mitigation banks because "wetlands in a mitigation bank are usually larger and of higher quality than a wetland that a sole organization can create or restore. Therefore, these wetlands generally can support more wildlife, provide more flood storage, and create more public open space than small, isolated wetlands. Banks are then maintained into perpetuity as a public resource, ensuring that the wetlands will be protected and maintained (21)."

A permit request to the Corps could include a statement of the potential permit holder's plan to buy credits from a mitigation bank. The permit seeker then deposited earnest money with the organization that administered the bank. Following the deposit, the Corps could then approve the permit. Most mitigation banks were watershed-specific. Organizations impacting wetlands outside the watershed could use the bank; however, the Corps would then possibly require that more credits be purchased.

Use of mitigation banks did not receive automatic approval. If the Corps determined that a site included high-quality wetlands, critical wildlife habitat, or small wetlands that are part of a larger wetland, it could require developers to mitigate on site.

In 1995, the *Federal Guidance for the Establishment, Use and Operation of Mitigation Banks* (22) was published implementing the Clinton Administration's Wetland Plan outlining strict procedures and policies to ensure that wetland functions and values are preserved. This publication defined mitigation banking as "the process of preserving, enhancing, restoring or creating habitat to compensate for unavoidable wetland impacts (23)."

The Corps and the Environmental Protection Agency

The permitting process under Section 4 of the Clean Water Act of 1972 specifically calls for cooperation between the Corps and the Environmental Protection Agency. The Corps entered into a number of agreements with the EPA. In 1989, the Corps signed memorandums of agreement with EPA on geographic jurisdiction (related to wetlands), exemptions for agriculture, and enforcement. Under these agreements the

Corps does virtually all wetland delineations and exemption determinations, but EPA can intervene.

A Section 404 Mitigation Memorandum of Agreement between the Corps and the Environmental Protection Agency was signed in 1990. This agreement called for a specific sequence of avoiding and minimizing environmental impacts first, then compensating for wetlands lost as a less desirable preference. Compensation might take the form of restoring, constructing, or enhancing wetlands; or preserving high quality wetlands to offset losses. In 1993, the Corps and EPA signed a "Joint Memorandum (Interim Guidance) on Mitigation Banking," which was in force until the 1995 federal guidance (24) on the subject of mitigation banking was issued.

Tulloch Rule

The Corps' authority over excavation activities (known as the Tulloch Rule) changed nationally in 1998 when the Corps decided not to appeal the District of Columbia Circuit Court decision for the Tulloch case (American Mining Congress v Corps). The Court said that the Corps had exceeded its authority in regulating "incidental fallback." Incidental fallback occurs when a small portion of excavated material spills back into nearly the same spot from which it was removed. In the past, the Corps and other federal agencies took the position that such incidental fallback into wetlands constitutes a "discharge of dredged material" for which a Section 404 permit was required. As a result of the Court's finding, the Corps had no jurisdiction over many activities that it previously regulated.

In 2000, the Environmental Protection Agency and the Corps issued the "Tulloch regulation" (25) to strengthen wetlands protection. The new guidance included an effort to clarify the agencies' definitions, "indicating that the Corps and EPA regard land-clearing, ditching, channelization, in-stream mining, and other mechanized earth moving activities as resulting in a discharge of dredged material unless project-specific evidence shows the discharge to be only 'incidental fallback (26).'"

Transportation Equity Act for the 21st Century

The Transportation Equity Act for the 21st Century (27) was enacted in 1998. The law required the Department of Transportation to establish a coordinated environmental review process for transportation work with other federal agencies. The law specified a coordinated process using concurrent, rather than sequential, reviews. Thus, the states and various agencies could include their environmental reviews in a coordinated environmental review process. If the Secretary of Transportation finds that a project-related environmental issue has not been resolved with another federal agency, the heads of the two agencies must meet within thirty days (of the Secretary's finding) in order to resolve the issue. The Act also expressed congressional preference that mitigation for highway projects be supplied by mitigation banks.

Federal Energy Regulatory Commission Licensing

Following a landmark court decision in 1943 (28), virtually all hydropower projects were required to be licensed by the Federal Energy Regulatory Commission (previously the Federal Power Commission), now a branch of the Department of Energy. Federally

owned and operated hydropower dams, such as those operated by the Corps and the Bureau of Reclamation, are exempt from FERC licensing procedures (though federal environmental compliance as well as state water quality regulations apply to these dams). In 1986, the Federal Power Act (29), under which the commission worked, was amended to require more consideration of fish and wildlife protection.

FERC licenses generally last thirty to fifty years. At the end of the twentieth century and the beginning of the 21st century, many hydropower projects were reaching the time of license expiration, and, more and more, there was intense public interest in the relicensing process.

The original 1920 Federal Power Act required that all applications for licenses be referred to the Corps and other agencies for views and recommendations concerning licensing and provisions to be included in the license or renewal. The Act specified that no license affecting navigation should be issued until the Corps approved the plans. Corps review of hydropower licenses is considered "work for others" for the Corps. The role of the Corps in relation to Federal Energy Regulatory Commission licensing is specified in the Code of Federal Regulations (30), as follows:

> "(1) Investigation of applications filed with FERC for permits and licenses, and for relicensing of projects to ascertain impacts on Corps of Engineers responsibilities.
>
> (2) Investigation of applications for surrender or termination of license to ascertain impacts on Corps of Engineers responsibilities.
>
> (3) Supervision and inspection of operations of licensed hydroelectric projects to ascertain impacts on Corps of Engineers responsibilities.
>
> (a) Applicability. This regulation applies to all field operating agencies having Civil Works responsibilities."

Hydropower projects often require water diversions from lakes or streams, including pumping, piping, or construction of everything from a low diversion weir to a large dam. Structures placed in streams as part of hydropower projects may affect navigation and require a permit from the Corps under Section 10 of the Rivers and Harbors Act (31). Structures to withdraw water from waters of the United States or in-water construction or dredging activities may require a permit from the Corps under Section 404 of the Clean Water Act (32). Dam safety and the relationship of major water diversion projects to flood control may also be issues for the Corps, especially when larger dams are part of a hydropower project.

As mentioned in the applicability section of the Code (above), the responsibility for Federal Energy Regulatory Commission licensing review is vested in each of the districts of the Corps that have civil works responsibilities.

Table 2. Timeline of Significant Federal Laws, Guidelines, and Actions Related to the Corps Regulatory Program

1899	Rivers and Harbors Act enacted (the earliest regulation of activities in waters of the United States).
1920	Federal Power Act enacted.
1934	Fish and Wildlife Coordination Act enacted.
1943	Landmark decision extends federal licensing authority to all hydropower projects.
1968	Corps Public Interest Review promulgated.
1969	National Environmental Policy Act enacted.
1970	Federal Water Pollution Control Act enacted.
1972	Clean Water Act enacted.
1972	National Pollutant Discharge Elimination System, or NPDES, established under EPA.
1972	Marine Protection, Research and Sanctuaries Act enacted.
1973	Endangered Species Act enacted.
1975	Environmental Protection Agency Clean Water Act, Section 404(b)(1) Guidelines promulgated.
1977	Federal Water Pollution Control Act amended (as Clean Water Act).
1980	EPA Clean Water Act, Section 404(b)(1) Guidelines revised.
1981	Presidential Task Force on Regulatory Reform recommends federal regulatory programs be realigned on state borders.
1985	United States v Riverside Bayview Homes, Inc., upholds Corps jurisdiction over wetlands.
1986	Federal Power Act amended to include greater consideration of fish and wildlife protection.
1987	Corps' *Wetlands Delineation Manual* issued.
1988	President-elect George H.W. Bush announced Domestic Policy Council initiative calling for "no net loss of wetlands."
1990	Water Resources Development Act, Section 307 - Congress instructs the Corps to pursue the goal of "no overall net loss" of wetlands.
1990	Corps/EPA mitigation Memorandum of Agreement signed.
1993	Corps/EPA Joint Memorandum (Interim Guidance) on Mitigation Banking issued.
1993	Natural Resources Conservation Service designated as lead federal agency for delineation of wetlands on farms.
1995	Federal Guidance for the Establishment, Use and Operation of Mitigation Banks published.
1998	Transportation Equity Act for the 21st Century.
1999	Tulloch Rule (American Mining Congress v Corps) limits Corps authority over "incidental fallback."
2000	Corps Nationwide Permits revised and five new Nationwide Permits issued.
2000	Corps and Environmental Protection Agency sign new regulation on wetlands protection (clarification in light of Tulloch ruling).

Walla Walla District's Regulatory Program

Walla Walla District's Regulatory Program encompassed all the functions discussed above as part of the Corps' national program. In the view of the long-time Chief of the District Regulatory Branch, the program's basic task was "to assure that proposals submitted for consideration are in the public interest. 'This requires that an evaluation be made, with consideration for the balancing of public benefits and environmental impacts (33).'"

Prior to December 1983, the Corps' regulatory program followed Walla Walla District boundaries. This meant that in Washington, Oregon, and Idaho, for example, there were two Corps districts administering the permitting program. This was changed so that regulatory program jurisdictions would follow state boundaries. The change followed a 1981 recommendation from the Presidential Task Force on Regulatory Reform that suggested that federal regulatory programs be realigned on state borders.

Walla Walla District took over total responsibility of the Corps' regulatory program in Idaho, including northern Idaho (previously under Seattle District) and the extreme southeast of the state, including Bear Lake (previously under Sacramento District). Meanwhile, Walla Walla District turned over responsibilities in the state of Washington to Seattle District and in the state of Oregon to Portland District.

"The change is designed to make it easier for permit applicants to determine which Corps office to contact. The change will also make it easier to coordinate permit applications with state and local agencies since each state will have only one Corps district responsible for permit activities within that state (34)."

Walla Walla District had to adjust its operations, as described by the Regulatory Branch Chief at the time, "We are now responsible for the permit program in northern Idaho, which is unfamiliar territory. We do not know the problem up there or their background. We will have to expand our travel zone so that our inspectors can get up there to review work in progress and to watch for violations of the Clean Water Act and the Rivers and Harbors Act (35)."

Walla Walla District Regulatory Branch

During the period covered by this volume, Walla Walla District's Regulatory Program was administered by the Regulatory Branch, part of the District's Operation's Division. In the early 1980s, the District's Regulatory Branch had a staff of five, including two field representatives. The staff size had increased to eight by 1990. The District, in 1985, located a full-time regulatory employee in Coeur d'Alene and another in Boise. This measure improved responsiveness to Idaho citizens and agencies. Another result of increased Corps regulatory presence in Idaho was an increase in workload, primarily an increased number of enforcement actions, some of them complex.

Regulatory Branch Staff Member in the Field

The increased emphasis on wetlands and aquatic resource protection, as stated in the President's "no net loss of wetlands" policy in 1988, added to the District's regulatory workload and resulted in the growth of a backlog of pending enforcement actions.

In 1991, the District opened a third field office in Idaho Falls. By 1992, the number of field representatives was increased to six, with two in each field office while the branch staff level in Walla Walla was eight positions. In 1992, the field offices took over responsibility for coordinating permit actions, which greatly increased their workload. However, this new organization proved more responsive to serving the regulated public and increased public awareness of the Regulatory Program.

In 1991, the National Marine Fisheries Service listed Snake River sockeye salmon as endangered. Snake River spring/summer and fall chinook salmon were listed as threatened species in 1992. In 1994, the NMFS changed the status of the two listed chinook salmon species to endangered. The NMFS, in 1997, listed the upper Columbia steelhead as endangered and Snake River steelhead as threatened under the Endangered Species Act. In addition, in 1998 and 1999, the U.S. Fish and Wildlife Service listed six regional populations of bull trout as threatened. These listings under the Endangered Species Act required much greater coordination efforts from the District's Regulatory Program, which greatly increased regulators workloads. The coordination slowed the processing of both general and individual permits to ensure that listed species were protected.

In January 1992, the District's Regulatory Branch began a proactive program of meeting monthly with state and federal agencies to review regulatory practices in Idaho and coordinate comments on public notices. "The District is working with the U.S. Fish and Wildlife Service and the Environmental Protection Agency (EPA) to develop mitigation guidelines and is working with the Bureau of Land Management and the U.S. Forest Service to blend the National Environmental Policy Act and the 404 permit process to make it more efficient (36)."

The excellence of Walla Walla District's Regulatory Program was recognized when Mike Doherty, an environmental resources specialist for the District in the Regulatory Branch, received the 1992 Don Lawyer Award as the outstanding regulator in the United States. Mr. Doherty, working out of the field office in Coeur d'Alene, helped the District realign its regulatory program when it became responsible for all of Idaho. During the 1980s and 1990s, northern Idaho was experiencing a period of rapid development. From 1984 until a second field representative was added for the area, Doherty was solely responsible for the large workload covering northern Idaho.

In 1993, new Corps guidance and regulations were published which greatly increased the Corps' jurisdiction to require permits for excavation activities in waters of the United States. In Walla Walla District, these new regulations nearly doubled the activities that would be evaluated during decision document preparation. Also, new projects were added that would not have previously been covered by the Regulatory Program.

The Natural Resources Conservation Service was designated in 1993 to be the lead federal agency for delineation of wetlands on farms. Beginning in that year, Walla Walla District Regulatory Program worked with the Service to implement this change to the overall regulatory process.

When the Corps' authority over excavation activities and "incidental fallback" changed nationally in 1999 (see above), the District's Regulatory Program workload was decreased somewhat.

In 1999, the Idaho Falls Field Office relocated to share office space with the Eastern Region Office of the Idaho Department of Water Resources. This move was made in order to reduce costs, share clerical assistance, and improve coordination with the state.

By 1999, projections for development indicated that Walla Walla District Regulatory Branch would begin to experience a slight decline in workload.

In the late 1990s, the Regulatory Branch implemented a public Internet page. This page was continually updated to make it a more useful tool for communication with users. In 1999, the site was expanded to include public notices, a monthly report of regulatory activities, appeals actions, and wetlands delineation information.

At the end of the period covered by this volume, the Regulatory Branch operated with twelve full-time positions. The Coeur d'Alene and Boise Field Offices each had two Regulatory Project Managers and one Regulatory Assistant while the Idaho Falls Field Office had one Regulatory Project Manager. The remaining positions in the branch were located at District Headquarters in Walla Walla, Washington. There was some decline in the regulatory workload at the end of the period covered by this volume.

Section 404 Permits

Permitting and enforcement actions under Section 404 of the Clean Water Act comprise the bulk of the work of Walla Walla District Regulatory Branch.

The District frequently participated in developing Regional Permits or regional conditions to be used in conjunction with Nationwide Permits. In 2000, the Regulatory Branch developed draft regional conditions for five new and six modified Nationwide Permits that replaced Nationwide Permit 26. The District was involved with helping establish a Regional General Permit for habitat work in 2000. The Regional Permit allowed small landowners and others to make habitat improvements to streams without filing for an individual permit with the Corps. Projects covered by the Regional Permit were restricted to the placement of wood and small boulders in streams to improve fish habitat.

From time to time, there was disagreement among federal agencies about issuing a Section 404 permit. If the District Commander determines that issuance of a permit is in the public interest while another federal agency objects, a referral process is activated whereby the Assistant Secretary of the Army determines the appropriate level at which the final decision to issue or deny the permit will be made. This process is referred to as "elevating" a permit decision.

The Regulatory Branch, in 1999, implemented a program for administrative appeals of permit denials and permits that are declined by the applicant because of objectionable conditions.

Walla Walla District regulatory staff investigated notifications of unauthorized work (work that had been done without a permit) received from any source. Staff followed up on seeing that conditions placed on permits were being followed by the permit holder. When violations were found, Regulatory Branch prepared a "cease and desist" order. A regulatory staff member explained, "We try to administratively resolve these cases, rather than seek action through the courts (37)." "When investigating alleged violations … field representatives attempt to gain permission from the landowners to go on private property and occasionally this permission is not granted. On important cases where access is essential, a federal warrant may be sought through the Environmental

Protection Agency. There have been instances where citizens bearing firearms have intimidated officials. Despite their legal responsibilities under the Clean Water Act, regulatory officials have no citation authority (38)."

Federal Energy Regulatory Commission Licensing Reviews

Over the years, Walla Walla District's Regulatory Branch reviewed many applications for hydropower project licenses and license renewals in cooperation with the Federal Energy Regulatory Commission. Some of these reviews, such as the Horseshoe Bend Hydroelectric Permit discussed below, involved complex issues and evoked heightened public concern. Most of the licensing reviews were for small projects and the number varied from year to year. For example, in 1986, District staff reviewed approximately ninety-five FERC license requests, most on small tributary streams and irrigation canals. In 1992, the District reviewed only nineteen applications.

Public Awareness

Increasing public awareness of the permit process was one of the goals of Walla Walla District's Regulatory Program. Public notices of pending permit actions were routinely issued.

One of the District regulatory staff explained further: "[The] public notice is prepared from information contained in the permit applications and distributed to interested parties, including news media, local, state, and federal agencies, and known interested citizens. Occasionally, public meetings are held when significant controversy develops. After public notification of the permit request, citizens and other interested parties have up to 20 days to comment (39)."

The Corps held an informal public meeting in 1992 that allowed the concerned public to have input on the permit renewal of the Commercial Energy Management, Inc., Federal Energy Regulatory Commission licensed project. In relation to the Bear Lake dredging permit proposal (discussed below), the Corps held a public meeting in 1995 in Montpelier, Idaho. Approximately 180 people attended the meeting.

Also in 1995, the Regulatory Branch conducted public meetings in Lewiston, Salmon, and Challis, Idaho, regarding the Corps' new Nationwide Permit for single-family housing and proposed regional conditions. About 250 people attended these meetings. These are some examples of the many public meetings and hearings held over the years by Walla Walla District as part of the regulatory process.

Transportation Equity Act of the 21st Century

In 2000, Walla Walla District signed a cooperative agreement with the Idaho Transportation Department and the Federal Highway Administration to streamline environmental review of transportation projects. Such coordination was required by the Transportation Equity Act for the 21st Century (40).

In the late 1990s, the Idaho Transportation Department funded a Regulatory Project Manager working out of the Boise Field Office. This position was assigned to specialize in transportation projects and to help create better relations between the Corps and the Department.

The following box is an excerpt from an article published in the District's newsletter, the *Intercom.* The article covers the typical work of Walla Walla District regulators, especially in relation to wetlands, during the period covered by this volume.

WORKING IN IDAHO WETLANDS

When landowners want to develop property in or around Idaho wetlands or waterways, chances are there's a federal law or two they should know about before they begin planning their construction projects.

Walla Walla District's Regulatory Branch guides developers through the permit process, finding a way to achieve an applicant's project purpose and still protect the state's water resources. The U.S. Army Corps of Engineers also serves as the government's enforcement agency, working with landowners who ignore permit requirements and cause damage to United States waters. …

"Our job often starts with a landowner requesting a building permit from their county. The county then notifies us that work is being planned for a potential or known wetland area. We check if the property has wetlands and whether the proposed work will require a permit," said Gregg Rayner, Regulatory's Coeur d'Alene Field Office project manager and environmental resource specialist. "Some counties in Idaho require the developer to get Regulatory's okay before they issue the development permit. We try hard to work with all the cities and counties."

Typical permits issued by the District include work plans for roads, erosion protection, underground utility lines, and ecosystem restoration projects. The Corps works with developers to minimize damage to protected areas, said Brad Daly, the District's Regulatory Branch Chief. The average Regulatory permit application takes about 60 days to process.

"Sometimes shifting a proposed building site to a different location on the property avoids the need for major environmental restoration after construction," said Daly. "If wetlands impact is unavoidable, Regulatory experts can help permit applicants plan for mitigation - restoring or establishing new habitat damaged by construction."

A minor percentage of those who do work that impacts water resources, either by ignorance of the law or failure to comply, break the law by failing to obtain necessary permits. The fines and expense of repairing the damage can be costly, said Rayner. But, most enforcement actions are resolved without litigation.

"Throughout my 24 years in Regulatory, I've seen a big change in the public's attitude about the environment," said Rayner. "They are more aware of environmental laws and seem to understand how important it is that they plan for protecting wetlands and water resources when they prepare to develop a piece of property. More people are aware that permits may be needed for working in waters and wetlands." –Gina Schwetz, *Intercom* (41).

Regulatory Activity

For a summary of regulatory activity, see Table A-7 in the appendix.

Significant Regulatory Actions

As will be seen from the descriptions included below, Walla Walla District engaged in many significant regulatory actions. Some of these involved controversial issuing of permits; others related to denials of permits that were contested. Most of the actions below related to permits requested under Section 404 of the Clean Water Act. Many of these involve wetlands. The District, covering Idaho, a state rich in mineral resources, had many mining related regulatory actions. Some of the actions listed

below are related to review of Federal Energy Regulatory Commission licenses for hydropower plants.

❖ Bailey Wetland Determination

During the 1985-90 period, the most significant regulatory case pending in Walla Walla District was that of Mr. Orville Bailey. By 1990, the District had spent one full year of staff time on this case.

Mr. Bailey owned approximately fifty acres of wetlands at the northern tip of Priest Lake in Idaho. In 1985, the District completed the fieldwork for a detailed determination that these lands were wetlands within Corps of Engineers jurisdiction under the Clean Water Act, Section 404. The District's determination was filed in 1986.

In October 1985, shortly before the official filing of the determination, Mr. Bailey brought suit against the Corps and the Environmental Protection Agency. The suit alleged that the wetland determination was arbitrary, capricious, not in accordance with the law, and contrary to U.S. v Jon Brassey (1982).

The Bailey case and other wetland areas in Idaho under Section 404 jurisdiction were affected in two important respects by the case of U.S. v Jon Brassey: "The Brassey decision introduced the concept that the ordinary person should be able to understand that the prevalent vegetation in a wetland area indicated an aquatic environment. The decision required that water must be held on wetland areas beyond the wet months of the spring run season. These rather nebulous concepts made it very difficult to make uniform and consistent wetland determinations in Idaho (42)."

In October 1986, in the case of Orville and Janet Bailey v U.S. (43), the court granted summary judgment to the Corps and EPA, holding that the wetland determination was not "Arbitrary, capricious, or an abuse of discretion." The judge in the case stated that the "ordinary person" concept, which originated in the Brassey case, was not the law in Idaho.

The U.S. Attorney filed a civil complaint in November 1987, seeking civil penalties and removal of unauthorized wetland fills from the Bailey wetlands. In November 1988, tentative agreement was reached with Mr. and Mrs. Bailey that they would remove unauthorized fills in wetlands on their property and restore the area. Mr. Bailey satisfactorily removed unauthorized wetland fills in 1989. At the end of 1989, the only remaining obstacle to resolution was completion of an agreement with Mr. Bailey to pay civil penalties.

❖ Idaho Department of Fish and Game Waterfowl Islands

Prior to Walla Walla District taking over regulatory functions in Idaho (prior to 1984), the Idaho Department of Fish and Game had received permits for the establishment of waterfowl islands in the Coeur d'Alene River. Over five hundred islands were built under permits issued by Seattle District for approximately 150 islands. The islands were built in marshland areas that were contaminated with heavy metals. During 1986, Walla Walla District planned to re-evaluate the existing islands since the issue of heavy metal contamination had not been included in the original permit decisions. By the end

of the period covered in this volume, issues related to the waterfowl islands had not been resolved.

❖ Bonneville Pacific Fills

This enforcement case took place in 1986 and involved two violations of Section 404 of the Clean Water Act by Bonneville Pacific Corporation. The corporation discharged fills into remote waters of the United States in the course of building access roads to hydropower projects. A consent decree was negotiated between Bonneville Pacific, the Corps, and EPA in which the Corporation was assessed penalties and required to perform detailed restoration measures.

❖ Sunbeam/Grouse Creek Mining Permit Application

The Sunbeam Mining permit application was one of the most complex permit actions in Walla Walla District during the period covered by this volume. The Sunbeam project proposed mining in Pinyon Basin, adjacent to Jordan Creek, a tributary of Yankee Fork of the Salmon River in Idaho. Major federal action required for the Sunbeam proposal included a land use permit from the U.S. Forest Service and a National Pollutant Discharge Elimination System, or NPDES, permit from the Environmental Protection Agency. A Clean Water Act, Section 404 permit from the Corps was required for several proposed actions: (1) minor fills to divert headwater streams just above the project; (2) a small rock berm downstream of the spent ore disposal site; and (3) four clay berms located within the spent ore disposal site.

In July 1988, EPA issued the NPDES permit. The next month, the National Wildlife Federation and Idaho Natural Legal Foundation appealed the permit's issuance. During 1988, the National Wildlife Federation took preliminary steps to bring a lawsuit against the Corps and EPA regarding their procedures for administering Clean Water Act permits for mine wastes, such as Sunbeam's.

In 1989, Grouse Creek Mining purchased Sunbeam Mining and modified the proposed mining operation to include a tailings dam that required a Section 404 permit. Under Environmental Protection Agency regulations, the construction of a tailings dam would convert the area upstream of the dam to part of the treatment facility, an area where there were no waters of the United States. Thus, no NPDES permit for the mine wastes could be processed under Section 404 of the Clean Water Act.

The Grouse Creek Mining proposal rendered the controversy regarding earlier Sunbeam permits irrelevant. The major federal action related to this mining proposal was the issuance of a land use permit by the U.S. Forest Service. Grouse Creek Mining and the Forest Service prepared a supplement to the original environmental impact statement with the Corps serving as a cooperating agency. Processing of the new Section 404 permit began in 1991.

❖ Dredging on Lake Coeur d'Alene

In 1990, Hagadone Hospitality, a company that operated a resort on Lake Coeur d'Alene, considered applying for a permit to dredge in the lake. The company had a floating golf green, and the dredging was needed to move the green three hundred feet from shore during the late and early golf season when Washington Power Company

drew down the lake level. Dredging in Lake Coeur d'Alene was normally not allowed by the Idaho Department of Lands. In relation to the Hagadone proposal, the Corps raised questions about the aquifer that ran under a corner of the lake. The Corps feared that dredging might puncture the lake seal so that lake water would drop through into the aquifer. This had happened with other lakes and might be disastrous for water level in Lake Coeur d'Alene. Raising such serious and technical issues was an important part of Walla Walla District's regulatory mission. Corps advice, as in this situation, could influence a state agency's decision and result in a private enterprise rethinking its plans.

❖ Whiteman Lumber

In 1990, Whiteman Lumber, a small sawmill, near Cataldo, Idaho, wished to expand its log landing area. The Corps ordered the owner to stop filling wetlands with sawdust and bark. A disagreement arose as to the definition of a wetland. The area concerned, Cataldo Slough, was home to birds, muskrats, and beavers. The owner of Whiteman Lumber, Brad Corkill, was quoted as saying of the slough, "It's not a wetland. It's nothing. If I thought it was a wetland I never would have dumped there (44)." The Corps' regulator felt differently, "It's definitely a wetland. … It has the vegetation consistent with a wetland (45)."

One of the complications in this case, was the fact that the Cataldo Slough had once been a dumping ground for tailings from a nearby mine, material that contained cadmium and other toxic wastes. The mine was closed after World War II, but, "The ground remained toxic, and mining companies and wildlife officials dubbed it a tailings pond. Officials often found carcasses of birds, particularly swans, they believed were poisoned by the soil and water (46)." It was no wonder that the area was regarded as a wasteland.

The area, however, did not remain a barren wasteland:

> "'But over the years a really remarkable thing has occurred,' said Susan Weller, president of the Rose Lake Bird Society. 'What was once an area poisonous to wildlife has begun to restore and reclaim itself.' … Weller had documented numerous species of birds nesting in the area as well as visits by eagles, loons, and great blue heron.
>
> "The property owner, however, remained unconvinced. 'They're crazy if they think this is a wetland,' he was quoted as saying as he walked across the four acres of fill he had dumped. 'Look at that. It's not wet (47).'"

The Corps regulator, meanwhile, worked to seek a compromise solution that would involve issuing the landowner an ex post facto permit for the action he had already taken while preventing further loss of wetlands. "We certainly have no intention of trying to shut him down. … We just want to come up with an alternative to obliterating wetlands. In most cases we can do that without having to levy a fine (48)."

❖ J. R. Simplot Company Permit Application

The J. R. Simplot Company proposed to construct a tailings dam for phosphate mine wastes in the Tygee Creek Valley in southeast Idaho near the Wyoming border. This proposal, as with the Grouse Creek Mining proposal, involved disposal of large volumes of mine wastes behind tailings dams where the Environmental Protection Agency was prevented by their regulations from processing a National Pollutant

Discharge Elimination System permit. Neither EPA nor the U.S. Fish and Wildlife Service could assume responsibility for the processed mine wastes. However, the Corps was still required to evaluate the impacts of these discharges under a Section 404 permit review to comply with the National Environmental Policy Act. Both EPA and the U.S. Fish and Wildlife Service had objections to the Section 404 permit. Their objections were resolved by including permit conditions that required development of a mitigation plan before construction began and establishment of a $75,000 performance bond. Mitigation took place in 1992.

❖ Meridian Gold Beartrack Mine

In 1991, the Corps issued a permit to Meridian Gold for its Beartrack Mine operation in Idaho. The permit was issued only after extensive coordination and with special conditions applied to the permit involving wetland mitigation.

This action is a good example of the extensive followup required to ensure that special permit conditions are carried out. In 2000, Walla Walla District met with representatives of Meridian Gold to discuss compliance issues. For example, the mining company was required to ensure permanent exclusion of cattle from its mitigation sites and to reimburse the U.S. Forest Service in perpetuity for the required fences. The Corps required extensive documentation of the mitigation actions taken, such as information on the species planted and the hydrology (source of water) of the mitigation sites. In 2000, the Corps asked the company for an updated mitigation plan and some proof that the mitigation sites were self-sustaining.

❖ Idaho Gold Project

In 1991, the Idaho Gold project applied for a permit that was delayed due to resolution of mitigation issues. The permit was issued in 1992 after extensive controversy and Congressional interest. A fully adequate mitigation plan was developed and approved. This required extensive coordination with Idaho Gold and also with the Bureau of Land Management as the land manager.

❖ Horseshoe Bend Hydroelectric Project

The Horseshoe Bend Hydroelectric Company permit required a massive effort to finalize the permit decision in a time frame within the Federal Energy Regulatory Commission License stipulations. In order to process the permit for this project on the Payette River in Idaho, significant federal agency concerns and objections were addressed and resolved. The Corps required that conditions and mitigation requirements be added to the permit to protect the environment.

The decision document that resulted from the evaluation was the most comprehensive ever developed by the Walla Walla District Regulatory Branch and was very well received by the U.S. Attorney's Office. This document, issued in 1992, was valuable when a lawsuit developed on this case. The initial judgment in the lawsuit was in favor of the Corps' decision to issue the permit, but Idaho Rivers United, *et al*, filed an appeal. In 1993, the appeals court upheld the original decision in favor of the Corps.

❖ Fall River Hydroelectric Project

Another controversial hydroelectric project, widely covered by Idaho media sources (49), was the $11 million Fall River Hydroelectric project, a project that produced 9.1 megawatts of new power. Environmental Energy Company developed the project, which came online in 1993. It is located eleven miles west of Aston, Idaho, and is now owned by Marysville Hydro Partners.

The project developers used the existing Marysville Dam and canal, rather than building new facilities.

Despite local opposition, the developers were moving forward until it appeared that the Corps would require a Section 404 permit for the project because construction of the powerhouse, to be located on the bank of the Fall River, would discharge material into wetlands. At that point, in January 1991, the developer decided to move the powerhouse away from the river, presumably away from the wetlands.

However, in April 1991, the Sierra Club Legal Defense Fund, representing four local organizations, asked the Corps to investigate claims that construction was discharging fill material into Fall River. The Shoshone-Bannock Tribes wrote the Corps opposing the project, saying it would violate their hunting and fishing rights by destroying protected wildlife habitat.

Subsequently the development company agreed with the Corps to map the wetlands in the area, hiring a consultant to re-examine the riverside and the new powerhouse location. The consultant's study was verified by the Corps, and construction of the project proceeded to its finish.

❖ Lava Hot Springs Hydroelectric Project

In 1992, the Corps issued a permit for the Lava Hot Springs Hydroelectric project, which was designed to generate about 5.5 million kilowatt hours of electricity by harnessing the Portneuf River in Idaho. The diversion was accomplished by constructing a weir that diverted waters of the river. According to local news reports, this was a controversial project:

> "Under the permit's terms, Commercial Energy of Pocatello is allowed to divert up to 210 cubic feet per second of water from a quarter-mile stretch of the river. The company will soon lay a six-foot-diameter pipe in the ground under the state-owned property leased by the Cottonwood Family Campground off Highway 30 to a building housing generator turbines about 100 feet downstream from the campground along the river. After turning the turbines, the water will be returned to the river. The permit requires the project to leave at least forty cubic feet per second of water in the channel at all times to maintain aquatic life. …
>
> "Developer Maher F. Wissa has spend more than four years and $500,000 getting the 22 permits he needed from federal and state regulators who've pronounced the project sound in terms of its environmental and economic impacts (50)."

However, farmers still feared that the permit to divert water would affect traditional irrigation practices along the river. An Idaho Falls Corps staff member said that Corps officials "went through the whole permit process again (51)" after Corps representatives met with concerned farmers. The Corps decided that the original determination based on the environmental assessment was adequate.

❖ Robert Wilson Permit

In processing Robert Wilson's 1992 request for a permit for access road fills, Walla Walla District was on the cutting edge of regulatory policy regarding Section 404(f) exemptions regarding farm roads. The issue involved Congress' intent in the Clean Water Act. The road in question was used as a farm road, but that was only its secondary, not its primary use. The area retained a reputation as a wasteland. The District's action in issuing a permit was reviewed by Division and Headquarters Offices of Counsel and found to be correct.

❖ Cougar Bay Subdivision

Cougar Bay is at the northeast corner of Lake Coeur d'Alene. The bay's wetland area was listed by wildlife viewing guides as one of the best sites in the state. In 1992, McCormack Properties proposed a five-acre subdivision in the area of Cougar Bay. Local residents were concerned about the proposed subdivision's effect on the wetlands. This case shows the limits of Corps responsibility. "'They're attempting to design the lots so they won't have to fill in wetlands,' said Greg Rayner, an environmental resource specialist with the Army Corps of Engineers. If the developer finds that it does have to fill in wetlands, it will have to get a permit from the Corps. Rayner said the development could have indirect effects on the larger wetland habitat nearby, 'but that's not in our purview to regulate. It's up to the locality to do that (52).'" Indeed the locality, Kootenai County held a public hearing on the project. Eventually McCormack Properties did develop Cougar Bay Estates. However, an 88-acre track of land became Cougar Bay Preserve, administered by the Nature Conservancy.

❖ Commercial Energy Management

In 1988, Commercial Energy Management, Inc., had received a Corps permit in conjunction with a Federal Energy Regulatory Commission licensed project. However, work on the permit project did not take place, and the permit expired. Much controversy had been raised during the processing of the first permit. An informal public meeting, held in 1992, allowed the concerned public to have input on the permit renewal.

❖ Trustees for the Natural Resource Damage Fund

The case of the Trustees for the Natural Resource Damage Fund is a good example of how several federal agencies concerned with environmental compliance work to provide checks and balances on each other's work. This permit action shows how even projects intended to protect the environment need to be scrutinized for possible side effects. The U.S. Fish and Wildlife Service initiated elevation of a decision by Walla Walla District Regulatory Branch to issue a permit to the Trustees for the Natural Resource Damage Fund. This permit proposed bank stabilization activities to prevent erosion of soils contaminated with heavy metals along the South Fork Coeur d'Alene River. The Service did not believe the proposal provided an overall solution to the contamination and that revegetated areas would cause wildlife losses. After review at the Regional Office level, the Fish and Wildlife Service withdrew their objection to this permit.

❖ Teton Valley Wetlands

In 1994, the Citizens for Teton Valley filed suit on a permit issued to Charlie Sands concerning his proposed driveway fill through wetlands to provide access to an upland house site. Teton County was undergoing a dramatic population increase (ten percent annually) and was the sixth fastest growing county in the United States in 1996. The Valley's wetlands were under threat of development.

Mr. Sands retained his permit, but the upshot of the case was that several key landowners set an example of protective, voluntary stewardship. A grant-funded program, the Teton River Valley Ecosystem project, was set up to protect Valley wetlands with matching funds coming entirely from local private citizens, including Mr. Sands. Besides the private individuals involved, partners in this project included the Teton Valley Land Trust, Idaho Department of Fish and Game, U.S. Fish and Wildlife Service, and the Natural Resources Conservation Service.

Project partners more than matched the $655,000 received through the North American Wetlands Conservation Act by providing over $1.5 million. This project covered all of the Teton Valley. In the initial phase, the partners purchased a number of conservation easements, including a 610-acre conservation easement covering critical wetlands and associated uplands. Teton Valley Land Trust will hold title to purchased lands. The Trust's volunteer Board of Directors, representing farmers and ranchers, businesses, recreationists, wildlife advocates, agencies, and conservation organizations, prioritize lands to be conserved in the Valley (53).

❖ Utah Power and Light, Bear Lake Permits

Three citizens' groups, including Bear Lake Watch, filed suit in 1994 regarding permits issued to Utah Power and Light for work in Bear Lake, which lies near Montpelier, Idaho, close to the Idaho-Utah border. The issue involved proposed dredging of a 2,000-foot channel in Bear Lake to a pumping station at the north end of the lake. The water was needed to continue generating power at six hydropower plants.

In 1918, Utah Power and Light completed construction of a diversion dam on Bear River, the Rainbow canal, and the pumping station at Camp Lifton. Two years later, a court decree established that Utah Power and Light had diversion rights of 5,500 cubic feet per second of Bear River water into the lake for storage.

In the 1986-94 period, the region around Bear Lake suffered an extended drought with depletion of water level in Bear Lake. Between 1991 and 1993, Bear Lake citizens formed several groups to protect their property interests and preserve Bear Lake. The 1993 Utah Power and Light permit application proposed pumping Bear Lake down to approximately thirty-four feet below the natural lake level. Local opponents of the dredging action proposed by UP&L reportedly believed that the dredging could turn the lake into a mosquito-infested marsh (54).

In December 1993, Bear Lake Watch and others initiated a lawsuit. According to Bear Lake Watch, the suit alleged "illegal issuance of a permit to UP&L by the U.S. Army Corps of Engineers. Specifically, the suit contends that the permit to UP&L violated the Clean Water Act, Section 404, and also violated the National Environmental Protection

Act (NEPA) because an environmental impact statement had not been accomplished before granting the permit (55)."

In 1995, the Corps held a public meeting on the permit application in Montpelier, Idaho. Approximately 180 people attended the meeting.

In April of 1995, an agreement, the Bear River Settlement accord, was reached between PacifCorp (formerly Utah Power and Light) and the Bear River Irrigators, Bear Lake Watch, and concerned Bear Lake citizens. Bear Lake Watch describes the mutual goals of the accord:

> "- promote water conservation and efficient use practices.
>
> - promote more reliable water supplies in Bear Lake and Bear River for all users.
>
> - promote soil and energy conservation and improved water quality.
>
> - pursue means other than litigation to resolve conflicts.
>
> - periodically review water allocation proposals.
>
> - promote the concept of a single allocation model for the administration of water on Bear River and Bear Lake (56)."

❖ Idaho Transportation Department Enforcement Action and Subsequent Agreements

Walla Walla District initiated an enforcement action against the Idaho Transportation Department and their contractors for permit violations and unauthorized activities in wetlands. The action, taken in 1995, had to do with projects on U.S. Highway 2, west of Sandpoint, Idaho, and U.S. Highway 95, north of Sandpoint. The U.S. Attorney filed a complaint on behalf of the Corps in the U.S. District Court located in Boise.

In 1999, the settlement of this enforcement action was finalized. The Idaho Transportation Department was required to pay $220,000 and their contractor to pay $60,000 to a wetlands trust fund for unauthorized discharges related to the Highway 2 construction. This followed an earlier settlement related to Highway 95, bringing the total paid to the wetlands trust fund to $480,000.

❖ Auger Falls Hydroelectric Project

A permit was issued in 1995 to Cogeneration, Inc., Salt Lake City, Utah, for the Auger Falls hydroelectric project on the Snake River near Twin Falls, Idaho. The Environmental Protection Agency and the U.S. Fish and Wildlife Service had reserved the right to elevate the permit decision, but did not exercise that option.

The project's promoters failed to start construction within a deadline set by the Federal Energy Regulatory Commission. In 2000, the FERC license was cancelled. Previously, the Corps had rescinded the permit for the project.

The project was controversial and critics questioned its effects on water quality, fish, wildlife, and recreation. Since the Auger Falls permits were originally issued, the middle Snake River has become a protected river, which would block any future hydropower project in the area (57).

❖ "Butch" Otter Enforcement Action

In 1999, Walla Walla District's Regulatory Branch brought an enforcement action against Idaho Lieutenant Governor "Butch" Otter. The enforcement was for unauthorized excavation and filling of wetlands adjacent to the Boise River near Star, Idaho. The case was referred to the Environmental Protection Agency for legal action. Mr. Otter was fined $80,000, an action that he appealed. In 2000, Mr. Otter took the EPA Administrative Law Judge Carl Charneski, representatives of EPA and the Corps on a tour of his property. The case received a moderate amount of media attention. The *Boise Idaho Statesman* reported:

> "The Corps and the EPA issued a notice of violation against Otter in September 1999 for replacing wetlands on his farm in 1998 with a pond. Twice previously, in 1992 and 1995, Otter was cited for altering wetlands without permits but was allowed to keep the changes in place.
>
> "Otter said there was little chance he and the federal government would settle. Charneski has set aside four days for testimony and said he will take the testimony under advisement and issue a decision in 30 days.
>
> "Attorney Mark Ryan, representing the EPA, said he would call only two witnesses. The first, Gregory Martinez, manager of the Boise office of the Corps of Engineers, started testifying Tuesday.
>
> "Otter's attorney, John Sutton, said he planned to put eight witnesses on the stand.
>
> "Old channels of the Boise River that still carry floodwaters cross Otter's sixty-acre farm along the Boise River. Contractor Charles Robnett of Nampa used heavy equipment to dredge and fill 2.7 acres of wetlands and a stream channel in November 1998, the EPA said in its complaint. …
>
> "The bulldozers and other heavy equipment transformed the reedy marsh into a bass-filled pond with waterfalls and flower beds. Wetlands soak up floodwaters, provide wildlife habitat and improve water quality, EPA officials said (58)."

Another report reviewed the case, bringing the crucial definition of "waters of the United States" into focus:

> "Army Corps of Engineers inspector Greg Martinez, who has reviewed more than 2,000 wetlands permits in his 22-year career, testified that the wetlands and waterways on Otter's property near the Boise River rise and fall with the river's level, carry floodwater from the river when it is high and flow directly back into the river a quarter-mile away.
>
> "'I thought I knew what navigable waters of the United States were," Otter said. "The way Mr. Martinez described it, there is no water that is not United States water (59)."'

Mr. Otter retained a Boise engineering firm to help him restore the wetland. As of the end of the period covered in this volume, the case regarding Mr. Otter's fine was still pending.

❖ Lapwai Road Reconstruction

An example of a standard permit issued with restrictions was the permit issued in 2000 for the rebuilding of Lapwai Road east of Lewiston, Idaho. The project shows some of the interrelations of waterways that had to be considered by Corps regulators, as well as provisions made in relation to endangered species (in this case endangered salmon and steelhead). The reconstruction had to be completed in fifty days "because of a

window established by the U.S. Army Corps of Engineers. The project area includes a dry stream bed that has water in it only during periods of snow melt and high runoff. … But because it is a tributary of Lindsay Creek that runs into the Clearwater River, which empties into the Snake River, which has endangered species in it, the Corps controls the work period (60)." The Corps wanted to ensure that the stream bed would be open and able to carry water during the wet period.

❖ Broadway Bridge, Ketchum, Idaho

The Regulatory Branch, in 2000, verified authorization for the City of Ketchum, Idaho, under a Nationwide Permit for replacement of Broadway Bridge. The bridge was eligible for listing on the National Register of Historic Places. Walla Walla District completed a memorandum of agreement with the Idaho State Historic Preservation Office and the City for mitigating the loss of the bridge.

❖ Dry Valley Phosphate Mine

In 2000, Walla Walla District issued a permit to Astaris Production, LLC (formerly operated by FMC Corporation) for expansion of the Dry Valley Phosphate Mine near Soda Springs, Idaho. The Idaho Department of Environmental Quality issued water quality certification, and the concerns of the Environmental Protection Agency and the U.S. Fish and Wildlife Service were satisfactorily resolved, avoiding elevation of the permit decision to higher authority.

❖ Capital Hill Holding Permit Application

The Regulatory Branch reviewed a permit application by Capital Hill Holding, LLC. The company's 2000 permit application proposed burying 505 linear feet of Five Mile Creek in Boise, Idaho, in order to create an equipment storage area. There were significant concerns with the alternatives analysis and regarding water quality impacts and mitigation. Walla Walla District denied this permit application.

❖ West Park Center Bridge

The Regulatory Branch cited the Ada County (Idaho) Highway Department in 1999 for violation of the terms and conditions of their permit to construct the West Park Center Bridge across the Boise River in Boise, Idaho. Walla Walla District referred the Ada County Highway Department to the Environmental Protection Agency for this violation. The matter was settled in 2000, when the County paid a $14,000 penalty and performed mitigation.

❖ Robert Wilson Enforcement Action

At the request of the Environmental Protection Agency, the Robert Wilson violation was referred to that agency for further action. The violation involved the discharge of fill material into wetlands adjacent to the Teton River to construct a golf course.

❖ Other Significant Regulatory Actions

Walla Walla District Regulatory Branch issued a permit to South Fork Ranches. This 1999 permit allowed South Fork to construct two road crossings and dredge two ponds and a stream near Swan Valley, Idaho. In 2000, South Fork received permits to

discharge riprap, gravel, and soil fill material into the Snake River and wetlands for bank stabilization and road crossing for upland commercial resort cabins.

An individual permit was issued in 1999 to discharge fill material into wetlands adjacent to the Big Wood River to construct the Cedar Bend Subdivision near Hailey, Idaho.

Also in 1999, an environmental impact statement was initiated for Emerald Creek Garnet Company's proposed expansion of mining operations in wetlands adjacent to the St. Maries River near Fernwood, Idaho. During 2000, Walla Walla District was continuing preparation of an environmental impact statement to be completed by a third party contractor.

The Regulatory Branch began processing the 1999 FMC Corporation Mining Division's dry phosphate mine application to discharge dredged and fill material into Dry Valley Creek, several tributaries, and adjacent wetlands. This proposal would expand the Dry Valley Phosphate Mine.

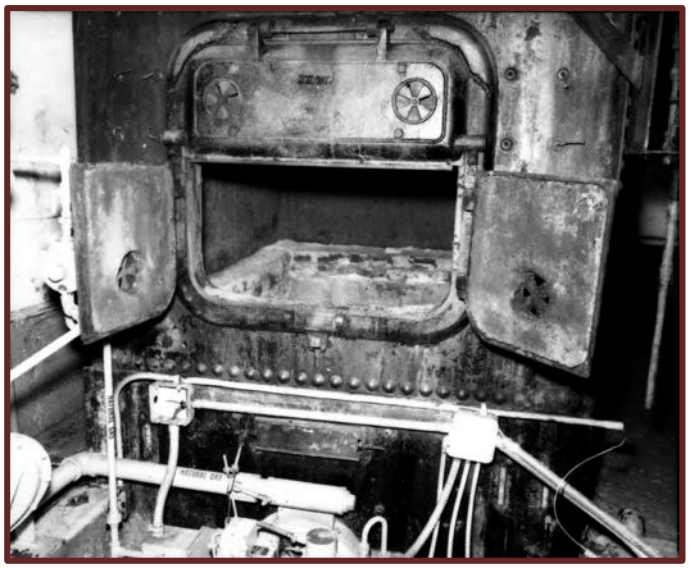
In 1999, Walla Walla District initiated an enforcement action against Mr. David Eby for not complying with the conditions of his after-the-fact permit to complete construction of a lodge in the wetlands adjacent to the Henry's Fork River in Last Chance, Idaho.

Environmental Compliance by Walla Walla District

In addition to administering a regulatory program that enforces compliance with federal laws pertaining to navigation and environmental protection, the Corps must also comply with applicable environmental laws. There were two units in Walla Walla District that were particularly concerned with environmental compliance. The first was Operations Division, which maintains and operates existing District projects, such as the locks and dams on the mid-Columbia and Snake Rivers as well as many smaller projects. The second was Planning Branch.

Operations Division and Environmental Compliance

As one long-time Walla Walla District staff member said: "Natural resource stewardship has always been part of Operations. The part that has probably increased a little bit more is the environmental and the awareness of hazardous materials. Asbestos—a lot of the powerhouses were built with asbestos; the office out at the airport had asbestos in it. People didn't know about lead paints. We don't use those any more. From a safety standpoint, Operations tried to be aware of those things even before there was so much emphasis on them (61)."



Asbestos Removal in Boiler Room of Old District Headquarters, 1990

In the box below, the District's Environmental Compliance Coordinator gives a detailed perspective on his compliance work.

WALLA WALLA DISTRICT'S
ENVIRONMENTAL COMPLIANCE COORDINATOR

[As the District Environmental Compliance Coordinator, I help] identify potential problems, make a recommendation [about] how to fix them, keep track of current or changing regulations. We do internal assessments of all our projects on a five-year and a one-year basis. We furnish a copy to [the District Commander] to tell him what we found that's not in compliance with the law and make a recommendation on how to fix it. Primarily [I am concerned with existing projects, rather than studies] ...

The program that I'm doing did not start until roughly 1990. Prior to that time we had no ERGO [Environmental Review Guide to Operations] manual, and the significance of the ERGO manual is [that it is] a common denominator among all Corps offices nationwide. It was a cookbook that told them how to identify and how to handle environmental problems. Prior to that time, different projects, or different offices, or districts—there was no common denominator. If one did something, there was no guarantee that anyone [else] … [ERGO] was started because of national guidance. …

We changed our practices quite a bit. ... Most of our emphasis is placed on hazardous waste, what we call POLs, petroleum, oils, and lubricants, which is what we have the most of. … We spend an awful lot of time identifying processes, making sure that people who are involved in the program have the required training that some of the laws have in association with them. … The way that our dams work, the generators all have oil in them. ... We … process our oil to clean it and then put it back in the generators. At any one time at a standard project, we'd have close to 250,000 gallons of oil on each of our projects. Any time that the oil gets contaminated with a solvent from somebody cleaning grease [we have to take action]. ...

[We also do external assessments.] We've been hiring contractors to do that for us. ... Somebody new who is not used to the area, quite often can walk onto a site and see something that everybody else has walked around or stepped over.

We do, in conjunction with Planning and Real Estate, go out and look at leased areas. … But we've got 200,000 acres … we can't cover everything. Eventually, perhaps we might, but we're placing all our initial emphasis in the areas, the buildings, the storage areas, the parking lots, the motor pools, where we're expecting to find most everything. Dumping is a problem. Right now, we're going through meth [methamphetamine] labs where people, because we're rural, they will cook on our property and then leave it [the refuse or paraphernalia]. Or they will cook somewhere else and throw their lab on us and dump it. Or stolen cars out of the Tri-Cities and they bring them out to our land and strip them, set them on fire and push them in the river. Everything you can think of. –Jimmie L. Brown, Environmental Resource Specialist (62).

For an agency such as the Corps that specializes in water resources projects, one of the most important areas of environmental compliance involves water pollution and water quality. The Environmental Protection Agency explains its permitting program as follows: "Water pollution degrades surface waters making them unsafe for drinking, fishing, swimming, and other activities. As authorized by the Clean Water Act, the National Pollutant Discharge Elimination System (NPDES) permit program controls water pollution by regulating point sources that discharge pollutants into waters of the United States. Point sources are discrete conveyances such as pipes or excavated ditches. Individual homes that are connected to a municipal system, use a septic system, or do not have a surface discharge do not need an NPDES permit; however,

industrial, municipal, and other facilities must obtain permits if their discharges go directly to surface waters. In most cases, the NPDES permit program is administered by authorized states. Since its introduction in 1972, the NPDES permit program is responsible for significant improvements to our Nation's water quality (63)." Walla Walla District must sometimes obtain an NPDES permit from the authorized states of Oregon or Washington for various operations.

Often, state permits must be obtained for operations. A District Supervisory Outdoor Recreation Planner described one such situation. "We [Walla Walla District] had been doing the dredging of the entrance to the marina [Asotin Marina] for years. … One day I said, folks, this is routine. It happens every year. You're going to have to start doing it [dredging]. … Right about that time DEQ [Department of Environmental Quality] stepped in with their Shoreline Management Act for the state of Washington, and they had say over [*i.e.*, authority over] what happens within the first 200 feet back from the shoreline. Permits had to be obtained then from the state. [The Mayor of Asotin] finally got the permit. [There were things required in the permit that the small City of Asotin could not do.] We had to deal with that (64)."

Another example of federal agency interaction was in regard to inspection of fish screens. The National Marine Fisheries Service came every year to inspect the water intakes on Walla Walla District projects, such as Lower Granite and the Lewiston Levees. This was to make sure that the District had screens that were adequate to prevent fish from swimming into pipes that drafted water from streams.

In 1994, Walla Walla District entered into a contract with Morrison-Knudsen Corporation for environmental cleanup services. The ten-year contract, which was not to exceed $50 million, included services for the entire District, as well as projects in the then-active Hanford Program (discussed below).

Planning Branch and and Environmental Compliance

Besides the Operations Division, the other unit of Walla Walla District significantly involved with environmental compliance was the Planning Branch. This unit included environmental resource specialists who ensured that all applicable laws and regulations were followed as the District developed plans for new projects, major project modifications, or new operations. Federal agencies have a specified process to follow in developing plans. Laws and regulations often require review and coordination by other federal and state agencies, particularly in regard to environmental compliance.

An Environmental Resources Specialist in Planning describes the coordination required in her job this way:

> "My title's Environmental Resource Specialist. Our job is, one, to make sure the Corps of Engineers is following the environmental laws and regulations—the federal laws and regulations are the ones we have to pay attention to. State ones *[i.e.,* state laws and regulations] we expect our contractors [to observe]. [Sometimes we are not required to] get state permits, but we have to talk to state folks and be aware of their permit conditions. They get a little testy when we say, 'We're the Feds, and we don't need your permits.' We are a go-between. We get to negotiate. We have to be friendly folks and try to work it between the engineers and environmental folks out there.

> "It's making sure we're in compliance with the law and doing a lot of coordination. We do it internally within the various offices in the District. We also do [coordination] with all the various agencies that regulate what we do—U.S. Fish and Wildlife Service, National Marine Fisheries Service, state departments of fish and wildlife, state DEQ, Department of Environmental Quality. We wear numerous hats, I guess. It's a lot of coordination (65)."

Leasing or Transferring Land and Environmental Compliance

Whenever Walla Walla District leased or transferred land, laws and regulations related to environmental compliance had to be considered. The District often made inspections of its property to ensure that the company or agency leasing the land was following applicable environmental laws and regulations. When Congress passed the Water Resources and Development Act of 1976, the law required transfer of specific Corps parks land in the Tri-Cities, Washington, to local governments. (This issue is discussed fully in chapter 11.) Prior to the transfer, the District completed an environmental baseline survey to determine the status of "health" of the land. The law authorizing the transfer required that the local entities comply with all federal environmental laws. This clause was perceived as holding the local governments to higher standards than might generally apply to them. This issue became one of the blocks to transferring the land—a transfer that had not yet been accomplished by the end of the period covered in this volume.

Environmental Compliance at Walla Walla District Headquarters

During the early 1990s, several of the buildings at the old District Headquarters at the Walla Walla City-County Airport, as well as field project facilities, received asbestos abatement treatment. For example, in 1990, Building 170 at the old Headquarters, as well as buildings at Ice Harbor and Lower Monumental Locks and Dams, received abatement.

The story of the planning for a new Walla Walla District Headquarters building and the move from the old to the new facility was detailed in chapter 2. Planning was well underway in 1990, when it was found that there was soil contamination on the site in downtown Walla Walla that had been chosen for the new building. The official land transfer between the City of Walla Walla and the Corps of Engineers and the groundbreaking had to be delayed for almost two years while the soil was decontaminated.

A major environmental problem with the site of the old District headquarters is detailed in chapter 4 in the box entitled, "Where Did All That Gasoline Go?" Problems with the new Walla Walla District Headquarters facility are discussed in the box below.

THE NEW WALLA WALLA HEADQUARTERS ENVIRONMENT

This [the new District Headquarters site in downtown Walla Walla] was the site of the old Whitehouse-Crawford lumberyard. The mill is still across the road … but the physical lumberyard set here. In the area where we are right now, was their paint storage, and they had the same issue. You had underground tanks. Also the paint building at some time burned, and all the material went into the ground.

The City [of Walla Walla] was going to make this site available to us. One of the requirements was to make sure the land was clean. We did have some underground tanks that they did have to remove. They did find some solvents in one area, very close to this here that had to be removed. …

Things were changing. Prior to that time you wouldn't have ever thought about having to do an environmental review of the property you were buying. Nowadays, you would be foolish if you didn't do that. We do that whenever we're even leasing our property to someone else. We do what's called an EBS, Environmental Baseline Survey, to identify if the land is contaminated, if anything's ever been spilled on it, so that our lessee at some time in the future, when they're through with it, we have something to measure with on whether or not it has changed in condition from the time they took it or not. –Jimmie L. Brown, Environmental Resource Specialist (66).

Energy Conservation and Recycling

During the period covered by this volume, Walla Walla District instituted recycling and energy conservation measures at the Headquarters building and field projects.

In the 1980s, energy awareness programs were instituted at all projects. These programs ranged from poster campaigns to turning thermostats down or off in unoccupied areas. During this period visitor facilities were often closed to the public in the off-season in order to conserve energy.

The District replaced energy consuming lighting fixtures with energy saving lighting systems. In 1985-86, for example, Ice Harbor and Lower Monumental projects, and the Clarkson Office replaced mercury vapor lights with halide lights; at Dworshak facilities, two hundred fluorescent fixtures replaced four hundred incandescent lights; and "watt miser" bulbs replaced regular incandescent bulbs at Little Goose and Lower Granite Locks and Dams.

The motor pool, beginning in the mid-1980s, began to choose vehicles with an eye to conserving gasoline. By the end of 1985, fuel savings had been realized as twenty-five vehicles had been replaced by smaller, more fuel efficient ones. In 1986, for example, five more large sedans and several pickup trucks as well as one large van were replaced by more fuel-efficient vehicles.

In 1991, the Logistics Management Office established recycling of waste paper within Walla Walla District. This was a profitable project, bringing in excess proceeds of $900 in the first year. Logistics managed over 63,000 pounds of white paper for recycling in 1993. That year, the program was expanded to include recycling of all cardboard materials. Also in 1993, the District's supply warehouse converted to one hundred percent use of recycled paper. By the next year over 9,790 pounds of cardboard was recycled along with a total of over 79,500 pounds of white paper. The high level of

recycling in the mid-1990s dropped off as District employees used less paper. In 1999, 31,875 pounds of white and cardboard products were recycled.

Walla Walla District maintained an active property disposal program, particularly in the late 1990s. In 1994, for example, the Logistics Management Office, Property Disposal Office, generated under $200,000 in sales proceeds while in 1999 the revenue generated rose to over $1.78 million. Also in 1999, the District obtained about $293,000 in equipment from other government sources, thus avoiding purchasing it new.

Hazardous Materials

During the period covered by this volume, Walla Walla District developed considerable expertise in the area of handling and disposal of hazardous materials. Part of this expertise was vested in those staff members who deal with chemicals and waste materials frequently at the field projects. The expertise was also found in the environmental compliance program (discussed above) that ensured that hazardous materials were dealt with according to applicable laws and regulations.

Another group that developed "HAZMAT" expertise was the staff in the Emergency Management Branch of Walla Walla District's Operations Division. Such training was considered essential for each Corps district as part of participation in emergency preparedness in the event of natural or technological disasters.

The environmental engineering projects, discussed in the section below, often involved the treatment or disposal of hazardous substances.

One employee in Operations Division recalled that Walla Walla District completed mandatory hazardous and environmental waste training before other districts (67). In 1989-90, District personnel trained in classes conducted by the Environmental Protection Agency. The EPA training was in: hazardous and toxic waste overview; safety and health for hazardous waste sites; sampling for hazardous materials; risk assessment guidelines for Superfund; hazardous materials treatment technologies; introduction to groundwater investigation; hazardous waste site supervisors; radiation safety at Superfund sites; radiation safety – job-specific orientation; radiological monitors and response; and asbestos management planning and building inspection.

Also in 1989, several staff members received EPA training for state requirements related to the required closing of underground storage tanks. The District implemented permanent closure of five underground tanks at in Pasco, Washington, and one at Little Goose project.

The District established a technical committee, the Hazardous and Toxic Waste Operations and Response Team in 1989. The team was comprised of staff members from District Engineering, Planning, and Operations Divisions.

Walla Walla District renewed hazardous and toxic materials training over the years. Staff participated in interagency groups; for example, a group poised to respond to hazardous materials spills on the Columbia River system.

The Emergency Operations Branch participated in readiness exercises related to hazardous materials such as the 1991 tabletop exercise that was part of the Chemical

Stockpile Emergency Preparedness Program. The program, begun following the establishment of the Army's Intergovernmental Consultation and Coordination Board in 1989, was designed to prepare local communities for possible emergencies that could arise from the continued storage and subsequent chemical agent destruction at Army Installations (68). Walla Walla District staff members were part of an updated disaster plan developed under the Preparedness Program covering the Hermiston, Oregon, area in relation to the Umatilla Army Depot, a storage area for chemical weapons. McNary Lock and Dam project personnel reside within the Immediate Response Zone and would respond should such any emergency arise at the Depot. District staff participated in the hazardous materials response Team formed for eastern Oregon in 1992, which included firefighters from the area (69).

Also in 1991, District staff received radiological training conducted at Walla Walla Community College. Courses included fundamentals for radiological monitoring and a Radiological Response Team refresher course. Team members who received the training were selected from major divisions within Walla Walla District Headquarters and from field projects. The instructors were previously trained District staff joined by an experienced instructor from Seattle District.

An example of Walla Walla District responding to a potentially hazardous emergency situation came in 1988 when approximately 20,000 gallons of sodium hydroxide solution spilled into the Columbia River as a result of a train derailment.

Environmental Engineering

During the last two decades of the twentieth century, Walla Walla District developed substantial expertise in environmental engineering. In 1991, the District established an Environmental Engineering Branch, particularly in support of the Hanford Program (discussed below). Though this Branch was disbanded by 2000, its creation testified to the importance of the District's new mission related to environmental restoration and remediation. Some of the District's environmental engineering expertise was related to aquatic, wildlife, and habitat restoration and mitigation projects discussed in chapter 7. Other District environmental engineering projects, discussed below, were related to handling hazardous and toxic waste remediation.

One of Walla Walla District's largest environmental engineering projects, design work related to the Umatilla Army Depot Chemical Stockpile Disposal Program, is discussed in chapter 4 as part of the District's Military Works Program.

A smaller project that utilized the District's environmental engineering expertise was undertaken for the Farmers Home Administration. The project, active in 1993 and 1994, involved site inspections and cleanup actions at regional FmHA properties.

Hanford Program

Three weeks after the first controlled nuclear chain reaction was achieved on a now nondescript street in Chicago, scouts for the federal government were flying over a sparsely populated, arid area of eastern Washington. It was deemed the perfect place to build the world's first full-scale plutonium reactor. This was in1943, and by 1945 the Hanford Nuclear Reservation had produced the plutonium for the bombs that were used

at the end of World War II. The Corps had participated in construction of the Hanford Nuclear Reservation near Richland, Washington. Nearly fifty years later, the Corps was asked to participate in environmental cleanup and remediation of the 560-square-mile Reservation—an area about half the size of Rhode Island.

In the intervening years, much atomic weapons and atomic energy research had taken place on Hanford Reservation resulting in the accumulation of hazardous waste materials. The Reservation was "dotted with at least 1,391 waste sites. There are 830,000 cubic yards of solid waste, 44 billion gallons of liquid waste, and 200 square miles of polluted groundwater (70)." Under the federal government's Superfund Program, there was funding for environmental cleanup and restoration of Hanford—the largest contaminated site in the country. The original schedule called for a thirty-year cleanup program, a target period that was revised in 1994 to forty years.

In July 1990, an interagency agreement was signed between the Department of Energy, Richland Operations Office, and the Corps' North Pacific Division to secure technical and management expertise from Walla Walla District for hazardous and toxic waste management and environmental restoration activities at the Hanford Nuclear Reservation.

Initially, the District was retained for assistance with program management; for review and preparation of remedial investigations and to perform feasibility studies on the 1100-EM-1 operable unit (a specific geographic area on the Reservation); preparation of a work plan for the 100-FR-1 operable unit; and for grouting formulations (essentially, plans for sealing storage tanks).

In March 1991, Walla Walla District established the Hanford Program Office at the Federal Building in Richland, Washington. By the end of that year the Corps had assigned a program manager, three project managers, and a secretary to its Hanford Program Office.

The Hanford Program was a very large one for the District while it operated. In 1992, for example, the work at Hanford was funded at close to the $5 million level. In that year, twenty-four full-time equivalent positions were part of the District's Hanford Program. By 1994, the program engaged sixty staff members and was funded for $27.4 million.

Staff developed many planning and management documents to assist in environmental remediation at the Hanford Nuclear Reservation. For example, in 1991, Walla Walla District staff developed a quality assurance program plan and produced three value-engineering studies. In 1992, the District performed all of Hanford's real estate transactions and inspection services for restoration sites on the Reservation.

Also in 1992, Walla Walla District worked on the design of the Hanford 200 Area Environmental Restoration Storage and Disposal Facility. In 1994, District staff completed engineering studies, final design, and construction of the facility, which was sized for the first phase (one million cubic years) of treating Hanford remediation wastes. By 1995, the District had completed the W-252 Effluent Treatment and Disposal Facility design as well the W-291 Effluent Treatment and Disposal Facility design and construction.

Walla Walla District was involved in the design and construction of the HAMMER facility, a multimedia training facility for hazardous waste workers. The $29.9 million facility was dedicated in 1997. HAMMER stretches over 120 acres to provide not only an indoor, but also an outdoor training center "for those who respond to emergencies and workers who might be caught in them (71)."

The District employed a state-of-the art geographic information systems (GIS) in statewide mapping projects for the Department of Energy as part of the Hanford Program. A 1995 statewide well survey for 2,500 wells and boreholes was managed from the Hanford Program Office.

Hanford North Slope

Cost estimation and development of related automated systems were a big part of the Corps' contributions to Hanford environmental work. These detailed automated activity-based cost-estimating systems were applied to environmental remediation and decontamination-decommissioning activities throughout the Hanford installation. Walla Walla District staff also completed specific cost estimates. In 1992, for example, 334 cost estimates were produced for major remediation projects planned for the 1990s.

Another major effort of the Hanford Program was related to the Reservations top-priority site for remediation, the 1100-EM-1 site. In 1992, District staff produced a remedial investigation and feasibility study for the site in order to meet a very aggressive schedule. The completion of the report and all necessary documents in a four-month time frame represented a unique effort on the part of staff involved. This was the very first such report produced by Corps staff for any Superfund project in the nation. Following the feasibility study, the District managed the remediation of a portion of the site in 1993.

Walla Walla District implemented the remediation of the area of Hanford that became, in 1994, the 120-square-mile Arid Lands Ecological Reserve. This was the first major area of the Reservation to be cleared of contaminants. More than seventy sites polluted largely with industrial wastes were cleaned up. The sites in this area were never used for nuclear operations.

The District restored the 140-square-mile North Slope area, an area that had served as a defense perimeter for the Hanford Nuclear Reservation. In later years, visitors driving through the Reservation often saw a herd of elk browsing on the North Slope. In 1994, the Corps and the Department of Energy were fined $6,000 and $9,500 respectively by the Washington Department of Ecology. The fines stemmed from the improper dumping of five 55-gallon drums of suspected hazardous petroleum materials, one cubic yard of contaminated soil, and a fifteen-gallon can of oil. The dumpings, which occurred in 1993, were part of a cleanup of the North Slope area. The construction company employed by the Corps improperly routed the wastes to the Richland landfill. The city had to isolate a 125- by 200-foot area suspected of contamination.

Despite District expectations that its Hanford Program might grow to a $100 million a year operation, the program ended rather abruptly in 1995. The Department of Energy decided to manage its own remediation projects at Hanford and to contract with private firms for any services not available internally. New positions in Walla Walla District were found for most of the Hanford Program Office employees.

The District, however, kept up a relationship with the Richland Operations office, particularly as regards to producing cost estimation studies and reviews of cost-accounting practices.

In 1999, Walla Walla District conducted an independent review for the Richland Operations Office. The District reviewed the revised fiscal year 1999 *Richland Environmental Restoration Project Baseline* (72). For this project the District assembled a virtual team of Corps staff and private industry representatives located in Walla Walla, Texas, and Virginia.

Walla Walla District undertook other projects related to Hanford in 1999. For example, the District provided support to the Richland Operations Office's Regulatory Unit for oversight of the Hanford Tank Waste Remediation System Privatization contractor. Under the privatization concept, the Department of Energy purchased waste processing services from a contractor-owned, contractor-operated facility. Part of the Corps' role was to provide seismic expertise in reviewing contractor plans and proposals.

In June 2000, the Hanford Reach of the Columbia River, a stretch of the river running through the Hanford Nuclear Reservation and therefore not much developed along its banks, was designated as a National Monument. This action by the federal government was emblematic of the success of environmental remediation—remediation that may have prevented toxic wastes from seeping into the aquifer below Hanford and into the Columbia River. The action emphasized the importance of the ongoing environmental restoration work at the Hanford Nuclear Reservation.

AN ENGINEER DESCRIBES WORKING ON HANFORD PROJECTS

We were involved in the work out at Hanford. We had several different major efforts out there. One of the first ones was to do the restoration and cleanup on a national priority listed site. It was in the 1100 area. ... That was nice—to be involved with something that had that kind of importance placed on it. ... We got involved with trying to get feasibility studies done; [with trying to] get the data collected, get the studies done, get a record of decision agreed to by all the regulatory agencies. They'd clean it up [an area on the Hanford Reservation]. I stayed with it up until about the record of decision point.

At that time, I got switched over to another project that involved constructing a disposal cell for mixed waste. When they say mixed waste that means that you have combined together hazardous things, such as ammonia and mercury or anything that's considered toxic. ... Also [there is waste with a] … radiologic component. Because of those two together, it ends up being a much more tricky thing to dispose of because of all the regulations. ...

I got involved in that [design process], and we were headed down the path of constructing something similar to what's out there now, where you have an awful lot of disposal cells that are relatively small. It's a real intensive effort to manage and do work in each little cell. The idea that everybody had in mind was something similar to what was out there already. All these small burial trenches that they used for disposing of their operating waste. ...

It was really expensive. Everybody, all of a sudden, once we gathered that information together, put it together on our drawing; everybody was shocked. Boy, that is going to be just awful and expensive. Then this mining engineer said "Why can't we put it in one big trench?" It seems like such an obvious question to ask now, but at the time, that's how everything got done. That was one big breakthrough that saved a lot of money, and how you operate that was another big savings. …

Everybody thought that the way this would operate is that you'd have containers that the trucks would haul around. They'd have the truck out at this area being cleaned up, and they'd dump the waste into that container, and they'd seal it up. Then it'd come to our facility and then … [the waste] would be dumped into the trench. Then that [container] would have to be all cleaned up. … [It would be like] a great huge car wash that would scrub the outside of the container and get it all clean. … So that when it left our facility again, it wouldn't track contamination around the whole complex.

That was an idea being promoted at all kinds of levels. They were talking about a plant that would cost … $300. … [It involved] automatic sensors that would scan the outside of the container to see whether any contamination was left after it was cleaned. If it wasn't clean enough, then it would get automatically rerouted around to go through this cleaner system again. It was all automated—this enormous, really complex automated system that would wash all these containers. It had to be automated because everybody was worried that if people were there who would have hoses and washing, they'd be exposed. That's a real liability. Plus, if people are in the room, the way you operate it is a lot different than if just a piece of equipment is there. [With people present] you have to really control the contamination levels; all your air ventilation is closely controlled. …

In this case, it was the Corps people that said, let's look at something different in how we do this. Let's see if we can't have something mounted onto the truck that would suppress the contamination and keep it from getting onto the container in the first place. Then, maybe all you have to do is scan the outside to assure that it's not contaminated. We can eliminate this whole facility. Or at least reduce it to something more like this little car wash, not this enormous automated … [facility].

We did some studies at the Pasco Sign Shop where we fabricated this dumper and had sprays and dust suppression equipment that would spray as we dumped the material. Then we took measurements to see—is there any dust released by this? We tried different spray configurations. [We] finally concluded that it doesn't take a very sophisticated system to pretty effectively control the contamination. We were proposing having this little spray system that went onto the container of the truck. That should have saved … [about] $300 million. …

We went from this big, elaborate [design with] small trenches that … [required] this incredibly intricate, intensive effort … to operate them, to one big trench. … [We went] from this huge industrial, automated [cleaning] complex down to people with hoses. It was a remarkable thing in terms of Hanford, because usually things are on a track to get more complex, more involved, and it never gets put back to simple. To go from the big [and] complex to simple is unusual. We were pretty pleased at the involvement.

[After the Corps' Hanford office closed in 1995], Cost Engineering … had quite a few jobs that involved the Department of Energy. … After Hanford, we [in the District] were recognized as having more experience with DOE and radiologic related [disposal]. … Other districts have [since] been doing [cost] estimates of their own [in the area of environmental cleanup], but we were really the ones that broke the ground with that.

I got to describe how we [would] go about this at the National Academy of Sciences, there at their Woods Hole facility in Massachusetts. … [It] was an interesting thing to talk to the National Academy of Sciences because you have people from all kinds of backgrounds there. ... In my Cost Engineering career, it's almost been exclusively DOE focus. It's been in several different arenas, but primarily with innovative technologies. That's involved traveling to various Department of Energy facilities and seeing them.
–Wendell L. Greenwald, District Engineer (73).

Bunker Hill Superfund Program

Balancing the downturn in workload following the closure of Walla Walla District's Hanford Program Office in 1995, the District began a five-year involvement in the Superfund cleanup efforts at the former site of the Bunker Hill Mining Corporation in Kellogg, Idaho. Walla Walla District opened a resident office at Bunker Hill and worked jointly with Seattle District and the Environmental Protection Agency on this project.

Bunker Hill was a 120-square-mile site located along the Interstate-90 freeway. The area had seen mining activity since the 1800s, and the Bunker Hill Mine had produced lead, zinc, cadmium, silver, and gold. Plants in the Bunker Hill complex produced sulfuric acid, zinc oxide, and phosphate fertilizers. The mine went bankrupt in the early 1980s, and the site was added to the Superfund national priorities list of hazardous and toxic waste sites because of abnormally high levels of lead, arsenic, cadmium, and zinc left on the site.

Working with its major contractor, Morrison-Knudsen Corporation of Boise, Idaho, Walla Walla District began in 1995 by demolishing industrial buildings in the lead smelter, a zinc plant, and a phosphoric acid plant. More than fifty buildings were demolished by 1997. An old gypsum collection post was cleaned up, as was a giant pile of slag. Sometimes, as many as fifty contract employees worked on the site clothed in special chemically protective clothing and outfitted with respirators because of the heavy metals present. Material from the spent factories was placed in a specially designed landfill on the site.

The Bunker Hill site and its cleanup eventually became part of a larger Superfund site, the second largest in the area. By that point, the Corps was no longer involved in remediation at Bunker Hill. In August 2000, the District closed its Bunker Hill resident office.

Bunker Hill's Smelter Chimney Comes Down, 1996

Notes for Chapter 9

1. The Corps Regulatory Program was explained in Rea, Kathy. Regulators have big, tough mission. *Engineer Update*, July 2001, p. 5-6. Comprehensive information about the Corps Regulatory Program may also be found at the program's Web site at: http://www.usace.army.mil/inet/functions/cw/cecwo/reg/.
2. 33 United States Code 408.
3. Ibid, p. 5.
4, PL 91-224.
5. PL 92-500.
6. CFR, Title 33, Section 320.3.
7. USACE. Recognizing Wetlands. Washington, D.C.: USACE, 1998, p. 3-4.
8. PL 92-532.
9. Code of Federal Regulations (2000), Title 33, Section 328.3.
10. United States Code 474 § 121 (1985).
11. USACE. *Recognizing Wetlands.* Washington, D.C.: USACE, 1998, p. 2-3.
12 Rea, Kathy. Regulators have big, tough mission. *Engineer Update*, July 2001, p. 6.
13. USACE, Waterways Experiment Station, Environmental Laboratory. *Corps of Engineers Wetlands Delineation Manual*. Vicksburg, MS: The Station, 1987.
14. The text of memorandums of agreement and memorandums of understanding currently in force pertaining to the Corps Regulatory Program may be found online at: USACE, CWA Guidance, http://www.usace.army.mil/missions/civilworks/regulatoryprogramandpermits/relatedresources/cwaguidance.aspx.
15. PL 101-640, Section 307.
16. National Research Council, Committee on Mitigating Wetland Losses. *Compensating for Wetland Losses Under the Clean Water Act.* Washington, D.C.: National Academy of Sciences Press, 2001.
17. Rea, Kathy. Regulators have big, tough mission. *Engineer Update*, July 2001, p. 1.
18. Mitigation Bank. Overview. Fort Myers, FL.: Mitigation Bank, [n.d.]. INTERNET: http://www.mitigationbank.com/.
19. Wetlands Research, Inc. Mitigation bank. Chicago: Wetlands Research, Inc., [n.d.]. INTERNET: http://www.wetlandsresearch.org/improvin.htm.
20. Ibid.
21. Ibid.
22. Federal Guidance for the Establishment, Use and Operation of Mitigation Banks. *Federal Register*, 28 November 1985.
23. Ibid.
24. Federal guidance for the establishment, use and operation of mitigation banks. *Federal Register*, 28 November 1985.
25. USACE and Environmental Protection Agency. *Further Revisions to the* Clean Water Act *Regulatory Definition of "Discharge of Dredged Material."* Proposed rule. *Federal Register* 65:50108.
26. Final "Tulloch" regulation to strengthen wetlands protection. *Water Log: A Legal Reporter of the Mississippi-Alabama Sea Grant Consortium*, 1 November 2001, p. 9.
27. PL 105-178.
28. United States Code 319 § 61. Jersey Central Power & Light Co. v Federal Power Commission, 1943. The court found that the light company was under federal jurisdiction because it was tied into the interstate power grid.
29. The Federal Power Act, first enacted in 1920 is PL 66-280; the 1986 amendments were in PL 99-495.
30. Code of Federal Regulations, Title 33, Section 221.1.
31 As codified in United States Code 33 § 401 et seq..
32 PL 95-217.
33. Regulators keep close eye on Idaho waters, wetlands. *Intercom*, 14 April 1987, p. 10.
34 Regulatory boundaries changed. *Intercom*, 22 December 1987.
35. Ibid.
36. Expanding regulatory functions. *Intercom*, winter 1992, p. 10.

37. Regulatory functions: Process streamlined for Idaho residents to secure use permits. *Intercom*, 17 September 1984, p. 4.
38. Ibid.
39. Ibid.
40. PL 105-178.
41. Schwetz, Gina. Working in wetlands. *Intercom*, July 2003, p. 4, 6.
42. Walla Walla District. *Annual Summary of Accumulated Historical Material.* Walla Walla: NPW, 1986, p. 11-12.
43. Civil No. 85-3147, U.S. District Court, District of Idaho.
44. McBride, Kelly. Corps, sawmill owner clash in Cataldo area. *Spokane Spokesman-Review,* 8 April 1990, A1.
45. Ibid.
46. Ibid, A2.
47. Ibid.
48. Ibid.
49. Media reports used in this section include: (1) Richert, Kevin. Dam developer to redesign project. *Idaho Falls Post-Register*, 4 January 1991. (2) Richert, Kevin. Controversial project starts: Fall River developers' changes fail to placate critics. *Idaho Falls Post-Register*, 28 April 1991. (3) Barker, Rocky. Hydro developer complains about project opposition. *Idaho Falls Post-Register*, 20 June 1991, C1-C2. (4) Jackson, Tim. Environmentalists want hydro project halted. *Pocatello Idaho State Journal*, 13 June 1991. (5) Richert, Kevin. Army Corps tries to block hydro project. *Idaho Falls Post-Register*, 12 June 1991.
50. Jackson, Tim. Controversial hydro project under way. *Pocatello Idaho State Journal*, 7 September 1994.
51. Farmers worried project permit will deny them irrigation water. *Pocatello Idaho State Journal*, 7 September 1994.
52. Drumheller, Susan. Cougar Bay plans stir opposition. *Spokane Spokesman-Review*, 10 August 1992, A7.
53. Information taken from: U.S. Fish and Wildlife Service, Division of Bird Habitat Conservation. Idaho. Washington, D.C.: The Service, [2001]. INTERNET: http://northamerican.fws.gov/NAWCA/projects/USprojects/ID.htm.
54. Bare land at Bear Lake. *High Country News*, 20 February 1995.
55. Bear Lake Watch. Water History of Bear Lake. [n.p.]: Bear Lake Watch, [n.d.]. INTERNET: http://www.bearlakewatch.com/AboutFight3.html.
56. Ibid.
57. The demise of this project is discussed in: Nokkentved, N. S. FERC terminates Auger Falls hydro license. *Twin Falls (ID) Times-News*, 7 June 2000.
58. Barker, Rocky. Lt. Governor Otter fights $80,000 fine for wetlands violation. *Boise Idaho Statesman*, 7 June 2000.
59. Russell, Betsy Z. Inspector disputes Otter wetlands claim. *Spokane Spokesman-Review*, 7 June 2000.
60. Lee, Sandra L. Lewiston company to rebuild Lapwai Road. *Lewiston Morning Tribune*, 3 June 2000.
61. Voss, Steven W. Interview. Walla Walla: NWW, 26 June 2001.
62. Brown, Jimmie L. Interview. Walla Walla: NWW, 23 July 2001.
63. Environmental Protection Agency. National Pollutant Discharge Elimination System. Washington, D.C.: The Agency, 2003. INTERNET: http://cfpub2.epa.gov/npdes.
64. Hixson, Phil L. Interview. Walla Walla: NWW, 10 July 2001.
65. Shelin, Sandra L. Interview. Walla Walla: NWW, 14 September 2001.
66. Brown interview.
67. Voss interview.
68. Meyers, Steve. Depot plans emergency response to incineration. *Pendleton East Oregonian*, 27 January 1992, 3A.
69. Rees, Lauri. Hazardous materials team forming at Hermiston. *Pendleton East Oregonian*, 3 October 1992.
70. Dietrich, Bill. Hanford mop-up: Complex, costly. *Seattle Times*, 1 June 1992.

71. Cary, Annette. Hammer Training Center dedicated. *Tri-City Herald*, 27 September 1997.
72. The baseline document reviewed was based on: Department of Energy, Richland Operations Office. Richland environmental restoration project baseline (DOE-RL-96-105). Richland, WA: The Office, 1998.
73. Greenwald, Wendell L. Interview. Walla Walla: NWW, 17 September 2001.

Chapter 10. Cultural Resources Management

"The Corps concentrates on rivers, and historically, human populations have concentrated on rivers so it's not unusual to find archeological sites in these areas."
–Paul Nickens, Research Archeologist, Waterways Experiment Station (1)."

Heritage Conservation Laws

Throughout the 1981-2000 period, Corps of Engineers programs operated under a number of federal laws that were enacted to protect the nation's historical, cultural, and prehistoric resources in the United States.

Antiquities Act

Congress enacted the Antiquities Act in 1906 (2). This act provides criminal penalties for anyone desecrating, injuring, excavating, or otherwise destroying any historic or prehistoric ruin or monument without express federal permission. Under this act, federal agencies can declare historic and prehistoric landmarks as national monuments and can transfer objects of antiquity to the management of properly qualified institutions. Following this Act, permits were required for antiquity excavations or investigations on federal lands.

Historic Sites Act

The Historic Sites Act (3) was enacted in 1935 and provided for preservation of historic and archeological sites of national significance. This Act authorized the system of designating national landmarks, allowing interagency and intergovernmental efforts to preserve cultural resources. This Act authorized the first efforts by federal agencies to salvage archeological data that would otherwise be lost due to construction or other activities on federal lands.

Reservoir Salvage Act and the Archeological and Historic Preservation Act

The Reservoir Salvage Act of 1960 (4) provided for the preservation of historical and archeological data by the Department of the Interior when that data might be lost as a result of the construction of a dam. The Act was the first to recognize the importance of collecting data from a historic or archeological site, even if the site could not be preserved. It was the first federal cultural resources legislation specifically to provide funding for related activities. Responsibility for implementing the Reservoir Salvage Act was assigned to the National Park Service within the Department of the Interior. Three regional offices were set up, including one in San Francisco, under which the Park Service coordinated federal archeological research in the western states. The Park Service contracted with Washington State University for the archeological studies related to the lower Snake River reservoirs.

The Reservoir Salvage Act was amended in 1974 (5) by the Archeological and Historic Preservation Act (known as the Moss-Bennet Bill). The 1974 Act set up the Federal Archeology Program allowing agencies to fund and conduct archeological surveys. It was under this authorization that federal agencies, including the Corps, began to hire their own archeologists. The National Park Service retained leadership of the Federal Archeology Program and published standards and guidelines for the program.

The Archeological and Historic Preservation Act capped federal expenditures for preserving historical or archeological data at one percent of construction funds. However, the Corps received a permanent exemption from this cap. The Water Resources Development Act of 1986 (6), further clarified the fact that the Corps had independent authorization to protect and preserve historic properties on the lands it managed.

National Historic Preservation Act

The National Historic Preservation Act (7), enacted in 1966, declared a national policy of historic preservation. The Act directed the federal government to provide leadership in preserving, restoring, and maintaining the historic and cultural environment of the nation. This act established the National Register of Historic Places and the Advisory Council on Historic Preservation. The Act was amended in 1980 (8) to require consultation by federal agencies in order to establish standards for preservation of historic properties in federal ownership or control.

Section 106 of the National Historic Preservation Act requires that federal agencies evaluate the effects of federal undertakings on historical, archeological, and cultural resources and afford the Advisory Council on Historic Preservation opportunities to comment on the proposed undertaking. The first step in the process is to identify cultural resources included in (or eligible for inclusion in) the National Register of Historic Places that are located in or near the project area. The second step is to identify the possible effects of proposed actions. The lead agency must examine whether feasible alternatives exist that would avoid such effects. If an effect cannot reasonably be avoided, measures must be taken to minimize or mitigate potential adverse effects.

Section 110 of the National Historic Preservation Act set out the broad historic preservation responsibilities of federal agencies and was intended to ensure that historic preservation was fully integrated into the ongoing programs of all federal agencies. When the Act was amended in 1980, Section 110 was added to clarify and expand the responsibilities of federal agencies for identifying and protecting historic properties and avoiding unnecessary damage to them. Section 110 also calls for a state and/or national registry of historic, archeological, or cultural sites.

According to the Secretary of the Interior's *Standards and Guidelines for Federal Agency Historic Preservation Programs Pursuant to the National Historic Preservation Act,* Section 110, set out some specific benchmarks for federal agency preservation programs, including:

> "(a) historic properties under the jurisdiction or control of the agency are to be managed and maintained in a way that considers the preservation of their historic, archeological, architectural, and cultural values;
>
> (b) historic properties not under agency jurisdiction or control but potentially affected by agency actions are to be fully considered in agency planning;
>
> (c) agency preservation-related activities are to be carried out in consultation with other federal, state, and local agencies, Indian tribes, Native Hawaiian organizations, and the private sector;
>
> (d) agency procedures for compliance with Section 106 of the Act are to be consistent with regulations issued by the Advisory Council on Historic Preservation; and

(e) an agency may not grant assistance or a license or permit to an applicant who damages or destroys historic property with the intent of avoiding the requirements of Section 106, unless specific circumstances warrant such assistance (9)."

Compliance with Section 110, over and above Section 106, became the goal of Corps cultural resources programs.

American Indian Religious Freedom Act

The American Indian Religious Freedom Act of 1978 (10) established protection and preservation of Native American's rights of freedom of belief, expression, and exercise of traditional religions. Courts have interpreted this act to mean that public officials must consider Native American's interests before undertaking actions that might harm those interests.

Archeological Resources Protection Act

The Archeological Resources Protection Act (11), passed by Congress in 1979 provides for the protection of archeological sites located on public and Indian lands, establishes permit requirements for the excavation or removal of cultural properties from public or Indian lands, and establishes civil and criminal penalties for the unauthorized appropriation, alteration, exchange, or other handling of cultural properties.

This act improved the authority of federal agencies to effectively deal with looting or vandalism of cultural resources on lands they managed. The act provided federal authorities with a wide-ranging mandate for cooperation with state and local agencies, professional scholarly organizations, and private individuals in the interest of preserving archeological resources.

Water Resources Development Act of 1986

Section 943 of the Water Resources Development Act of 1986 authorized the Corps to restore, preserve, and maintain historic properties on Corps lands if they are entered in the National Register of Historic Places.

Native American Graves Protection and Repatriation Act

The Native American Graves Protection and Repatriation Act (NAGPRA) (12), enacted in 1990, addressed the discovery, identification, treatment, and repatriation of Native American and Native Hawaiian human remains and cultural items (associated funerary objects, unassociated funerary objects, sacred objects, and objects of cultural patrimony). This Act established fines and penalties for the sale, use, and transport of Native American and Native Hawaiian cultural items.

NAGPRA specified that all federal agencies inventory (13), within five years, their collection of human skeletal remains and associated funerary objects (14) and identify the cultural descendants. Human skeletal remains and associated funerary objects must be transferred to these cultural descendants for disposition in accordance with their customs if they so request.

Consistent with procedures set forth in applicable federal laws, regulations, and policies, the Corps resolved to work proactively to preserve and protect natural and cultural resources, establish NAGPRA protocols and procedures, and allow reasonable access to sacred sites.

Water Resources Development Act of 2000

Section 203 of the Water Resources Development Act of 2000 (15) established a new "tribal partnership" authority for the Corps. Section 203 authorized the Corps to study and carry out projects that would benefit Indian tribes. Water resources projects could include those that address economic, flood reduction, environmental, or cultural resources needs.

When Worlds Collide

"When Worlds Collide" is the title of a paper about "Indians, archeologists, and the preservation of traditional cultural properties (16)" published in the National Park Service's journal of public archeology, *Cultural Resources Management.* The laws described above, as well as the change in societal attitudes and goals that these laws reflect, changed the practice of archeology. They changed the practice of public land management. They "changed the future of the past forever." The metaphor of worlds colliding is not too strong a one to express the effect of these changes on agencies charged with managing cultural resources in the public trust. Walla Walla District, as will be seen throughout this chapter, was one of the epicenters of this collision.

Archeology or Cultural Resources Management?

By definition, archeology is "the scientific study of past human culture and behavior, from the origins of humans to the present. Archeology studies past human behavior through the examination of material remains of previous human societies. These remains include the fossils (preserved bones) of humans, food remains, the ruins of buildings, and human artifacts—items such as tools, pottery, and jewelry (17)."

The general definition, as well as modern practice of archeology, includes investigation of sites documented by written history. In practice and general parlance, however, archeological sites are often equated with prehistoric sites and thus distinguished from historic sites. This use of the term "archeology" adds a layer of confusion to the interpretation of statutes and programs related to cultural resources.

Archeologists, as scientists, value the ideal of the objective human observer and experimenter, one who examines and studies the object of study. The archeologist adds to the common human stock of knowledge through careful fieldwork, laboratory examinations, theoretical model-building, and written interpretations that bring the past alive.

Cultural resources management is less concerned with learning about the past than with protecting and preserving it. Archeological research in the context of cultural resources management is not an end in itself. Cultural resources research—regional surveys to locate sites, site mapping, and limited excavations—is done, not primarily to add to the store of common human knowledge, but to avoid destroying sites during development or use of land. Sites on public lands, rich in cultural resources, are avoided or, short of avoided, protected as well as can be done in the course of operations. If a site cannot be avoided, then cultural resource managers mitigate the effect of their actions by engaging in "data recovery" to learn about a site before it is destroyed. If a site that cannot be avoided contains Native American human remains, the situation becomes more complex and requires consultation with appropriate Indian tribes to discuss possible reinterment of remains at another site.

Public archeology in this context is clearly a tool for cultural resources managers. At times however, it is not so easy to practice this type of archeology out in the field. On the one hand, investigators wish to preserve and not disturb a site as much as possible; on the other hand, everyone concerned wishes to properly identify significant cultural resources sites so that they can be protected and so that artifacts from the site do not, over the years, become inadvertent discoveries. How deep do you dig to determine if the site contains significant artifacts?

The Definition of Cultural Resources

When groups have different worldviews, their definitions of words, even when using a common language, often collide. The following paragraphs, taken from a report issued by Walla Walla District in 2002, give a good idea of some of the issues regarding the definition of cultural resources as understood by the District at the end of the period covered by this volume:

"Cultural resources are the material remains of past human life or activities. They can consist of objects, buildings, structures, sites, or districts (a group of closely associated sites). … Most of the cultural resources within the APE [area of potential effect] are prehistoric archaeological sites. Archaeological sites are typically open campsites, housepit villages, rockshelters, rock art (petroglyphs/pictographs), lithic (stone) quarries and workshops, burial grounds and cemeteries, and isolated rock cairns, pits, and alignments. Historic sites are also located in the APE and represent Euro-American activities. These include the remains of farms, towns, trading posts, mining sites, military forts, burial sites, abandoned settlements, and transportation and industrial facilities.

> "The third cultural resources category is TCP [traditional cultural property]. A TCP is the beliefs, practices, lifeways, arts, crafts, and social institutions of any community that has been passed down through the generations, usually orally or through practice. It can be embodied in buildings, structures, sites, landscapes, and individual objects or groups of buildings, structures, or sites. A TCP often pertains to cultural sites, natural features, and resources important in traditional, social, and religious practices that tend to preserve cultural identity. It encompasses such things as distinctive shapes in the natural landscape, named features in local geography, natural habitats for important subsistence or medicinal plants, traditional usual and accustomed fisheries, sacred religious sites, and places of spiritual renewal.
>
> "While the preceding discussion provides one description of cultural resources, there are other views of what constitutes cultural resources. The academic and legal definitions tend to focus on tangible evidence such as sites and artifacts and for this study, the definition of cultural resources contained in federal law and regulation will be followed. However, for Native American people, these definitions are too narrow. They view their entire heritage, including beliefs, traditions, customs, and spiritual relationship to the earth and natural resources, as sacred cultural resources. This broader definition/view of cultural resources by Native Americans is acknowledged (18)."

Almost every project undertaken by Walla Walla District at the end of the twentieth century had to grapple with definitions of cultural resources. Statutes, such as the National Historic Preservation Act, limit their scope by speaking of "historic properties," rather than cultural resources. Generally, historic properties are defined as historic or prehistoric sites eligible for listing in the National Registry of Historic Places. It is actually these historic properties that the Corps and other federal agencies are legally

responsible to preserve and manage when they are on federal lands. By the end of the 1981-2000 period, however, the Corps and other agencies still spoke of "cultural resources programs" and "cultural resources management plans," and this volume follows that general usage.

One major example of the broader definition of cultural resources that many Native Americans in the Northwest held was a definition that included salmon species as a cultural resource. During the period recounted in this volume, the Corps did not use this broad level of inclusiveness as a working definition of cultural resources as reflected in Corps studies or formal discussions. This difference in definitions sometimes created tensions and misunderstandings in discussions related to cultural resources.

Deaccessioning Artifacts

Given the more pragmatic approach to archeology that comes about in a context of cultural resources management, the question of maintaining collections becomes an issue. If public officials, including archeologists, are not primarily interested in scientific knowledge for its own sake, the creating, maintaining, and study of collections of artifacts comes into question:

> "Most archeologists practicing in the United States have been trained in a tradition of keeping everything we find. Everything gets washed, labeled, inventoried, and cataloged: nothing is discarded, and with few exceptions, it is all deemed precious.
>
> "Armed with this paradigm, it is no wonder that the archeological community has generated tens of millions of objects during the past 50 years (19)."

The Native American Graves Protection and Repatriation Act forced issues of curation to the fore. The collections resulting from previous decades of archeological research on public lands would be examined and, when appropriate, Native American remains and funerary objects returned to affiliated tribes. Collections for a particular site would no longer be "intact" and, despite the fact that some federal artifact collections had not been carefully handled while under U.S. government control, there was a fear of what would happen to these "precious" objects of scientific study once they became again the sacred and traditional objects of the tribes.

Who Owns the Past?

In the world of the archeologist and anthropologist, the knowledge resulting from their activities is common human knowledge. We all can profit from studying what archeology reveals about the ancient Egyptian religion or the ancient Assyrian irrigation system. In the early twentieth century, the knowledge derived from archeology practiced on sites controlled by the federal government was viewed as part of that common storehouse of knowledge, part of the public's right to know about the past of our nation.

Many Native American's have a different view of artifacts, as well as of traditional places and natural objects associated with their past. These sacred and traditional objects and places are not to be handled, studied impartially, or even, at times, revealed to persons outside the tribe. Handling and studying, in the Western scientific sense, is regarded by some tribal members and in some circumstances as disrespectful, even as an abridgement of native people's religious freedom.

A Walla Walla District archeologist expressed the colliding views this way:

> "We've got, if you will, science versus culture. I hate to put it in those terms, but that's what's out there. … If you stand down and try to be objective about the whole thing, it does become a balancing act. There are some real difficult issues there because … for many Indian people it truly is … very hard for them to see archeological sites dug up. Even if they don't have human remains in them; [even if] they don't have sacred objects. Many Indian peoples view all their past culture as sacred, as something that should not be disturbed. Of course, that's very much contrary to what archeology is all about, … trying to get a better understanding of the past (20)."

The Native American view that is particularly enacted into law in the Native American Graves Protection and Repatriation Act and in the American Indian Religious Freedom Act may be in keeping with long-held beliefs of native peoples. It is also reinforced by over two hundred years of sordid and sorry history, as poignantly detailed in David Hurst Thomas' book, *Skull Wars: Kennewick Man, Archeology, and the Battle for Native American Identity* (21). Here is one passage from Thomas' hundreds of well documented pages regarding the early practice of North American archeology and anthropology in the United States:

> "[The American Museum of Natural History, the Smithsonian Museum, and the Chicago Field Museum] fought for years in a furious and well-financed rivalry over American Indian collectibles. Dorsey's [Director of the Field Museum] first expedition for the Field Museum, in 1897, was a four-month blitz throughout western North America. His first stop was Browning, Montana, where just seven years earlier nearly a quarter of the local Blackfeet population had starved on Ghost Ridge. Dorsey dug into the shallow graves and shipped three dozen whole skeletons back to Chicago. Flushed with this early success, he moved to the Pacific Northwest, searching out the rich graves, coffins, and caves known to exist there. …
>
> "At the time, local missionaries were complaining that skull and artifact collectors had destroyed almost every grave in the Virago Sound and North Island area. They were shocked by the men 'who however laudable their object, could so mercilessly ride roughshod over the susceptibilities of the Indians.' Dorsey was briefly arrested on the Columbia River, but was then released when he promised to return the materials he had taken. Elated at this development, Boas [Director of the Field Museum] boasted that he had 'never come into conflict with the feelings of Indians,' conveniently glossing over the hundreds of similar grave-robbing forays he and his agents had conducted through the years. Given the bitter rivalry, it is hardly surprising that ethics and honesty became conditional, at times giving way to deception and theft.
>
> "Boas and Dorsey were hardly the first to dig graves in the Pacific Northwest. In his book *The Naturalist in Vancouver Island and British Columbia*, published in 1866, John Keats Lord, recounted his earlier experience at Fort Rupert (British Columbia), where he was told of a Koskimo man, reportedly shot and decapitated in a recent enemy raid. This unfortunate had a distinctive 'sugar-loaf-shaped' skull, intentionally deformed shortly after birth. … Lord was 'determined at any risk to have the skull.' Under the cover of darkness, he overturned the pole, "bagged the skull," and smuggled it out in a pork barrel. Lord later presented his treasure to the British Museum (22)."

"Kennewick Man," whose remains were discovered on property owned by the Walla Walla District, pulled the District firmly into this long-standing collision of worldviews. Thomas summarizes his point of view:

> "The bottom line is defining which history gets taught and who gets to teach it. In seeking identities independent of non-Indian historians and anthropologists, many Native

Americans have come to resent the appropriation of their ancient artifacts and ancestral bones by 'experts' claiming an authority denied to the Indians themselves (23)."

"The central thesis of Skull Wars can be stated rather simply. … The pivotal issue at Kennewick is not about religion or science. It is about politics. The dispute is about control and power, not philosophy. Who gets to control ancient American history—governmental agencies, the academic community, or modern Indian people? (24)"

PHILOSOPHIES OF ARCHEOLOGY IN WALLA WALLA DISTRICT

If you look at the Corps' previous history, our way of handling cultural resource management was to take it out of the ground and put it into a curation facility. Where the tribes—and particularly human remains—the major ones—those things should not be disturbed. That's their history, and they were to stay where they were. Of course, tribes did not ask us to come in and inundate half of their lands—what they saw as their lands.

All of that painted the setting for [the tribes' view]: we don't trust you and your form of archeology. It does not match [our worldviews].

They don't like archeologists, period, because those are the people that took the cultural resources out of the ground. There was some question, the people who did the original work, a lot of … [artifacts] ended up missing, and so they [the tribes] think they are in private collections. …

We've taken a big turnaround in our philosophies, and we are no longer going out and digging things up and collecting them. We are trying to preserve them. But it's taken us that long to learn that that's the preferred [approach]. We finally are listening to the tribes. The work group [Payos Kuus Cuukwe (*see below)*] has been probably the biggest shove that we've had outside of Kennewick man to really have to stop and listen to the tribes. –Lynda G. Nutt, former Walla Walla District Native American Coordinator (25).

Corps Cultural Resources Programs

"The formal archeological program associated with the civil and military activities of the U.S. Army Corps of Engineers actually began in 1970 as an outgrowth of the National Environmental Policy Act of 1969. … Between 1970 and 1974, only a single archeological position existed in the Corps. As a direct result of the 1974 amendment of the Reservoir Salvage Act of 1974 [the Archeological and Historic Preservation Act, discussed above], the real growth of archeological staffing in the Corps began (26)."

The Corps of Engineers Mandatory Center of Expertise for the Curation and Management of Archeological Collections was, at the time of this writing, the largest single organization in the Department of Defense dedicated to addressing curation of archeological collections on a national scale. Curation is defined as the preservation and organization of artifacts stored in collections, usually in museums or other institutions of learning. The organizational part of curation includes identification of artifacts, their cataloging, and arranging their physical arrangement to facilitate location. Preservation includes cleaning and chemically treating artifacts as well as storing them under climate-controlled conditions to prevent deterioration.

The Center, established in 1994 and located in St. Louis, Missouri, maintained state-of-the-art technical expertise in curation, helping the Corps to develop standards, guidelines, and policies on curation. The center led the Corps in development of databases to record information about archeological collections. The Center also

provided Corps districts with field assistance, Native American Graves Protection and Repatriation Act program review, and assistance with Native American consultation (27).

Prior to the establishment of the Mandatory Center of Expertise for the Curation and Management of Archeological Collections, the Corps Waterways Experiment Station had staff archeologists who could assist districts. One of these archeologists assisted Walla Walla District during the 1992 reservoir drawdown discussed below.

The Construction Engineering Research Laboratory of the Corps assists districts with cultural resources management, particularly in regard to the Corps' military programs. In the late 1980s, the Laboratory established the Cultural Resources Research Center to help focus technologies toward cultural resources management issues, particularly on military installations. These issues included identification and evaluation of historic building, structures, and landscapes; geoarcheological process modeling; archeological application in remote sensing; Native American consultation; and integrated cultural resources management planning (28).

The District's Role in Cultural Resources Management

Multiple Roles

The Walla Walla District has often been seen by observers and by its own staff as primarily an organization of engineers, builders, and developers—as an organization that changes the landscape. Indeed, this role is valued and promoted by segments of society that see benefits in particular water resources projects. Such development, naturally, can affect cultural resources. In latter days, the Corps has committed itself to environmental restoration and mitigation. Such efforts, beneficial as they may be to the environment, can also impact cultural resources.

Because Walla Walla District projects involve ancillary lands, property that is used for project operations, recreation, and wildlife mitigation, the District has the role of land manager and sometimes land conveyer when property is transferred. Once again, any action on land owned by the District, from digging a fence post to building a visitors' center, may have consequences in the cultural resources arena.

The District, as does the whole Corps, sees itself as the servant of the nation, particularly as society expresses itself in its laws. As such, the District has the responsibility to follow the laws and regulations regarding land development and land use, transfer, and development. A substantial body of those laws, as described above, pertain to cultural resources management.

Walla Walla District, as part of the Corps, is defined as a trust agency, having a responsibility to Indian Nations and engaging with them in government-to-government consultations at crucial decision-making points. Often those consultations pertain to actions that affect or potentially affect Native Americans' culture or cultural heritage.

The Corps is also a contractor, bound by rules and obligations pertaining to legal spending of government funds. In terms of cultural resources, this puts the District in the role of purchaser and evaluator of archeological and other cultural resources management services. When the service provider is another agency, a university, or an Indian tribe with unique cultural resources management services to offer, the standard government contracting procedures come under strain.

Walla Walla District has archeologists on staff. The role of archeologists in the Corps and other agencies has evolved throughout this period. In general, the cultural resources management staff at the District grew during this period. All during this period, the District has heavily relied on contracting for actual field and curation work. This means that the role of a District archeologist is more of a contract administrator, planner, liaison, and communicator. At times, the District has had sufficient staff to do cursory, initial site surveys using its own staff, but, mostly, District archeologists have not been field workers.

These District roles—engineer, developer, servant to the law, trust agency, contractor, archeologist—are not always easily reconciled when it comes to cultural resources management.

Growth of the District's Cultural Resources Program

In the early 1980s, the District's cultural resources program was essentially a one-person effort with most fieldwork accomplished by contracting with universities. In 1986, limited contract activities occurred due to protests on the award of Walla Walla District's fiscal year 1986 cultural resources contract. The protests eliminated or forced the delay of scheduled District work and reduced the number of projects undertaken for this year.

In fiscal year 1991, the operations and maintenance budget for cultural resources contract work was reduced by almost eighty percent from the originally allocated amount. As a result of the loss in funding, Walla Walla District was only able to accomplish limited work related to cultural resources. This consisted of continuing with inventory work on District archaeological collections stored at Washington State University, University of Idaho, and the Idaho State Historical Society, Boise, Idaho.

By 1993, however, Walla Walla District's cultural resources program was on the upswing. Continued growth in the need for cultural resources assessments and accompanying workload necessitated the hiring of a second full-time archaeologist. The position was staffed in the Environmental Resources Branch, Planning Division.

Cultural Awareness Programs

During the 1990s, Walla Walla District reached out in a proactive attempt to raise local awareness on the importance of preserving cultural resources. In the early 1990s, the District archeologists presented cultural awareness programs at local schools and to community groups. The District participated in the first annual Washington Archaeology Week in 1993. In 1994, the archeologists conducted a tour of archaeological sites on the Palouse River as part of Washington Archaeology Week.

CULTURAL RESOURCES COMING TO THE FORE

Over the last twenty years there has been a greater recognition of cultural resources. When I started here [in the Walla Walla District] in 1981, the program was a one-person operation. For three years, I was the understudy for my predecessor. … He retired in 1984.

From 1984 to about 1993, I was the one and only person dealing with cultural resources. … I was literally a one-man show. I was archeologist; I was program manager; I served unofficially as the Native American Coordinator for the District. It was a situation … where the law said you needed to deal with cultural resources and … the District was dealing with it, but … the emphasis wasn't there. …

Gradually over time … and more so in the late 1980s, early 1990s, the workload started to increase in terms of the number and types of projects that the District was doing. Much of the focus when I first came was on the reservoir projects themselves. …

[In the] late 1980s, early 1990s, not only did we continue to have the work on the reservoirs, but we were going outside of those boundaries, so to speak. [We were] doing more work over in Idaho, [in] Washington, [and within] our District boundaries. With one person you do what you can, the best you can, but your options are pretty limited. Most of the work we did was under contract. …

By law and regulation, we are obligated to work with the State Historical Preservation Office, each state has one. If you had good working relationships, … you got a lot done by phone.

Again, by law and regulation, you are obligated … to look at each of these projects, especially ones that involve ground disturbing. [You do] so you if you were only putting in a fence post all the way to building a hatchery. The process is the same. You're supposed to try to determine if that undertaking, that project, is going to impact archeology, cultural resources. …

Around 1992—that's when the shift started really occurring. We had a new General that came into the Division [Northwestern Division], and also the [new] Administration coming on board. The new Administration, the Clinton presidency, seemed to put a lot of focus on Native American people. A number of executive orders were issued, directing agencies to start working more closely with tribes. That definitely had an effect on how we did business. As I said, a new General came in about 1992. He seemed to be committed to developing those new relationships with the tribes. We were also starting what's called the System Operation Review study about that time. …

About 1992, one of the primary laws that we work under, the National Historic Preservation Act, was amended, and the language was changed. Some of the major changes that took place were in how agencies were to work with tribes. Two years prior to that, in 1990, they enacted a new law called the Native American Graves Protection and Repatriation Act dealing with human remains, sacred objects, and other types of items. …

On their side, the tribes started being much more proactive in trying to get the agencies that [had] treaty obligations … [to fulfill those obligations].

Just for the District, our workload continued to increase. Much of it had to do with the amendments in the National Historic Preservation Act. … For this law, there was a set of implementing regulations. … The new guidance [came seven years after the law and contained more] requirements, not just in working with tribes, but in our general process of dealing with cultural resources. …

[As a result of the increased requirements] we were able to get a second archeologist on board in 1993. … That person was hired … to try to deal with a lot of the actual fieldwork. … [Larger site investigations] are still under contract. … The goal was … to have the capabilities to do some very small [site investigations] that didn't require a lot of in-house capabilities in the sense of equipment, laboratory space, storage space. … Really, I was a desk archeologist. …

It stayed that way until … Kennewick Man started in 1996. … [Work related to the discovery of Kennewick man] overran not only the cultural resources end [but also the] legal end, for a year or more. Two to three people in the District [worked] not quite full-time dealing with that issue. …

The requirements became more formal. … [We were required to leave] a paper trail all the way. [In] June of 2000, we brought a third archeologist on board, simply because, again, the workload is so great … in trying to comply [with laws and regulations].
–John P. Leier, District Archeologist (29).

Tribal Relations and Cultural Resources

"We are linked by the river," commented a Native American trainer to Corps staff members attending a cultural awareness workshop in 1999 (30). The rivers in the Northwest are the vital center of Indian culture; they became, much later, a concern of the Walla Walla District. In the early part of the period covered by this volume, relationships between the Indian Nations in the region and the District were sporadic and informal. But soon, to continue the metaphor, the linkage that existed along the rivers felt a new pull and a new vibrant force as Indian peoples became much more active politically and more prosperous. Meanwhile the U.S. Congress enacted laws that made clearer the rights of Indian people, particularly in regard to cultural resources. A new balance needed to be struck in the use of this linked resource.

Walla Walla District established a position for Native American Coordinator in the early 1990s. A coordinator during part of the period covered by this volume spoke about coordination and consultation with Native Americans regarding cultural resources:

> "The Corps as an agency is a trust agency. That means that we have trust responsibilities by law that we have to provide for tribes, and one of them is to provide for cultural resources. Trust is a hard word because we understand trust to mean something, and the tribes depend on us to understand what their terms of trust are. We have treaties that were put in place in the 1800s—a lot of them were 1855 for this region. We also have tribes who at a later date were named by Congress to be a recognized Indian tribe that we have to deal with too.
>
> "My job as Native American Coordinator was to work very closely, when I knew a project was assigned, to meet with the PM [project manager], start setting up an agenda for consultation. … [I] find out from the tribes what level they wanted the consultation to occur. … Then bring the Colonel [the District Commander] in to nail the final formal agreements (31)."

The District Archeologist spoke about the evolution of the position of Native American Coordinator in relation to the position of archeologist in the Walla Walla District:

> "In 1998, the District went ahead and split those roles out. Now we have the archeologist and have … [a] Native American Coordinator position. That was a role the archeologist played up until around 1996. I was the unofficial [Native American Coordinator]—nobody knew what to call it—but I was playing that role. … Back in 1998, they created a program manager to handle the one pot of money we have for archeology. To me, it is a great statement on how far cultural resources has come in terms of the recognition and what people are now willing to do and consider when it comes to the cultural resources arena (32)."

A Native American Advisory Committee was formed in 1994 "to develop a viable program to provide opportunities for Indian coordination in some areas of the District's

mission, such as cultural resources, fisheries, wildlife and regulatory concerns (33)." The committee held meetings with representatives of the Yakama Indian Nation, Confederated Tribes of the Umatilla Indian Reservation, and Nez Perce Tribe to propose workshops between the District and each tribe. The purpose of the workshops was to provide both the District and tribes with an opportunity to develop a better understanding of one another that would help foster improved working relationships. Workshops were held with the Umatilla and Yakama Tribes.

Also in 1994, Walla Walla District participated in the Nez Perce County Cooperative Strategy Initiative. The Initiative was an effort to develop a framework and create an action plan under which the Nez Perce Tribe, the various federal and state agencies, and others could communicate, build relationships, and reach common goals concerning the history and culture of the Nez Perce peoples.

One of the most important events in the history of tribal involvement in cultural resources management took place during the studies of the System Operation Review and the subsequent establishment of a cooperating group (discussed in separate sections below).

Section 203 of the Water Resources Development Act of 2000 established a new "tribal partnership" authority for the Corps. This would affect the District's relationships with the tribal nations of the Confederated Tribes of the Umatilla Indian Reservation, the Nez Perce Tribe, the Confederated Colville Tribes, the Shoshone-Bannock Tribe, and Yakama Indian Nation. In 2001, the District made its Native American Coordinator a full-time position.

Cultural Resources Processes

Standard Processes

When new construction or modification to existing Corps facilities is proposed, the Corps has a standard process for "clearing" the site, that is, for determining whether or not there are significant cultural resources and, if there are, determining appropriate avoidance or mitigation measures.

SITE CLEARANCE—STANDARD PROCEDURES

For any big or small project … first of all, we'd probably do a record search, a file search—see if there is any information available on that location in terms of cultural resources. …

The next step would be to personally go out and look at the site. … Normally [we] go out, take a look at it, do a survey.

You might or might not at that time—usually we wouldn't—put a few holes in the ground. [We would] come back and say, we do or we don't see anything out there on the surface. ... Given the location, we [may] recommend some testing be done. The next step would be to actually test the site--do some subsurface investigation. It's not at all uncommon to see nothing on the surface and find out you've got a huge site underneath the surface. If nothing shows up in testing, you pretty much don't have any concerns. What you would do is pull all that information together in a report and send it on to the State [Historical Preservation] Office. …

That would be the standard [procedure]. … Because of additions, again to some of our regulations, we need to look at another cultural resources' arena that's called traditional cultural properties. Normally that has to do with Indian peoples. [We have to] see if that location, even if there's not an archeological site there, do they use it for plant gatherings, say for food or for medicinal purposes? Some [areas] they've used for generations. Has it [*i.e.*, a site] something to do with religious services or ceremonies? … Besides doing the standard archeological work, we coordinate with the tribes … [on] traditional cultural properties, or TCP is the acronym, to see if there are any concerns from their standpoint of trying to do work out there. TCP's are something that only an Indian tribe or a specific cultural group can tell you about. We can't sit there and say, we know what TCP concerns would be for a certain location. … Normally, and particularly for Indian people, that's very closely guarded information from a cultural and perhaps even a religious standpoint. …

That would be the normal process. … Back to our [hypothetical] site: the testing's showing nothing's there; we hear nothing from the tribe or tribes that there's a concern for TCP's or anything else. We take all that information … and send it off to the State [Historic Preservation] Office because that's a required process. … [We are saying that] we've done all these steps that we're required to do under the regulations. We don't feel, based on what we've found, that there is any concern for cultural resources. We are asking that you agree with us. … [Concurrence from the State Historic Preservation Office] would clear the project from the cultural resources standpoint for them to proceed on.

On the other side, if you do your testing and you find something, … you've got an archeological site there. What you need to determine is whether it's, the catchword is, a "significant" site. There are some criteria that you go by to make that determination. ...

If it's significant, it's eligible for what's called the National Register of Historic Places. That's a national effort to keep track of significant properties at the national level. If you want, you can actually fill out paperwork on this site, submit it to what's called the Keeper of the Register. They will say, "Yes, we agree," and they'll list it. … They might disagree and say, "No, we need more information." Eventually, you'll get it on the Register. …

You can either put a significant site on the Register or do one step less and go to the State [Historical Preservation] Office and say, "We believe this site is significant and eligible for listing on the Register." If the state agrees with you, you don't have to go that step of actually getting it on [the National Register]. By getting the [state's] official determination that it is eligible and concurrence with it, it affords that site the same level of protection as one that's on the Register. That's what allows the agency to look at spending money … to try to protect that site. …

So, you've got your site listed as significant. It's eligible for the listing on the Register. Then … you work with all the involved parties, saying, what are we going to do with this site? The involved parties are normally the agency, the State [Historic Preservation] Office, and appropriate Indian tribes. There may be other groups out there that have an interest for whatever reason. You would bring them into the process. …

Quite often, at least in the past, what has been the usual or standard approach has been to do what they call mitigation work, [data] recovery. … You dig up a portion of that site, and you take that information, and we say, "that's good," that supposedly captures what's at that site. We know we're going to lose most of the rest of it to the construction of the [project], but we have saved a portion of it and hopefully that, for the most part, captures what's there on the entire site. –John P. Leier, District Archeologist (34).

Contracting for Cultural Resources Work

A Walla Walla District archeologist discussed contracting for cultural resources work by the Corps:

> "When I started here [in the 1970s] basically all contract work was done with universities. The small independent contracting companies doing archeology were just starting up and even with large companies—I don't know how many have been around long. … There were exemptions in the contracting law that allowed agencies, such as the Corps, to go directly to universities for such services, and we were using them. We got overall good products for a very reasonable price.
>
> "Around '87, Contracting notified me that there'd been some changes. These exemptions that included the universities had been removed. The whole cultural resources program was put under a small business venue in the sense that, given the nature of the work that normally is done, it could be performed by small businesses. … We did use universities under a contract up until about '91 or '92—so, I'd say it was about that time that it was switched for most contracting, what we do is small business from then on (35)."

CONTRACTING AND THE TRIBES

We have regulations that say—contracting, for instance—that we have to work a certain way, but the parameters we set don't necessarily match the parameters the tribes live under. For example, they are not a small business, and yet we had cultural resource work that would be best served by them. How do we get them the money to do that work? We're not a grant agency. We have other … [regulations] that don't give us the freedom [to contract].

We have an agency, like Bonneville Power, which is involved in the relationship. That is a grant agency that can give money without any question at all. It's created almost a tug-of-war for us. … [The tribes] want to try to become self-sufficient. Yet they don't want to give up sovereignty and things that are important to them. …

Resulting from SOR [the System Operation Review, discussed below], Bonneville Power agreed to put [aside] $3 million a year for on-the-ground cultural resource work. So, there's a big pool of money. Walla Walla District got the biggest share of that, because we had the most reservoirs that were affected. The tribes felt that they fought for that money and … it should come to them, and they will do the on-the-ground cultural resource work. The issue initially was—I can say it was money, but probably it was distrust—for a federal agency that hadn't done them any favors. We had to get past that. … They had staff archeologists—very knowledgeable people. It wasn't an issue of could they [the tribes] do the work. It was how we did that [*i.e.*, contracting with the tribes].
–Lynda G. Nutt, former Native American Coordinator (36).

Surveys on Specific Projects

This section contains descriptions of some of the many cultural resources surveys completed by Walla Walla District during the 1981-2000 period. It is intended to give the reader a sample that indicates the type of cultural resources surveys completed. Information about surveys on the mid-Columbia and lower Snake River projects and Dworshak is given in separate sections below.

❖ Malheur Basin Project

In 1986, the *Overview and Inventory of Cultural Resources in the Malheur Basin Project* (37) was completed by researchers from Central Washington University under a contract from Walla Walla District. The survey was typical of those completed at the

time. Its findings will be discussed in detail as an example of the type of work completed in relation to District projects.

The cultural resources overview was completed as part of the Corps investigation of the feasibility of constructing an overflow channel from the southeast corner of Malheur Lake to the South Fork of the Malheur River. Work being considered included excavation of a ditch in a valley near the river (Virginia Valley), installation of pumping stations, and a cement-lined ditch through the gorge of the South Fork as well as access roads to be used during construction.

The cultural resources contract included, specifically, preparation of the overview report; an inventory and evaluation of cultural resources sites along the proposed drainage channel; estimation of cultural resources along alternative routes; and recommendations for additional evaluation and mitigation procedures.

The Malheur inventory covered a 7,264-acre area. The inventory documented 130 prehistoric sites and 11 historic sites. The majority of sites had dates ranging from possibly 10,000 BP to 1,500 BP. The study made some conclusions about the life of residents of the area. During the early period (10,000-7,000 BP), people concentrated along the lakeshore and a now dry river in the adjacent Virginia Valley. The people appeared to be mobile, shifting camps from place to place along the shoreline. Between 7,000 and 3,000 BP, the mobility pattern continued, but people scattered from the lakeshore into the canyon of the South Fork. Later, by 3,000 BP, base camps developed that included rock supported huts in rock shelters. Evidence was found of hunting blinds and of the use cliffs and rocks over which prey was driven.

The overview concluded that the proposed project activities would certainly damage some sites, particularly in the Virginia Valley where the ditch would be excavated. The archeologists recommended a particular alternate route for the ditch that would have the least adverse impact on cultural resources. Partially as a result of cultural resources concerns, the District's overall feasibility report recommended not implementing a major federal flood control project.

❖ LORAN-C Transmitting Station

A proposed Federal Aviation Administration LORAN-C transmitting station site in Wyoming was surveyed in 1988. The District completed necessary environmental documentation, including cultural resources for the FAA.

❖ Palouse Canyon Archeological District

The Palouse Canyon Archaeological District is in Franklin County, Washington, in the area covered by the Walla Walla District of the Corps. The archeological district was entered in the National Register in 1984. The site is listed as a domestic site and historical campsite with cultural affiliations that span a long period (ca. 11,000 BC through 1899 AD)

from the Windust through the Cascade to the Numipu periods of Native American culture.

In 1988, Walla Walla District resurveyed the Palouse Canyon Archeological District. The purpose of resurveying was to update site information, specifically type, condition, and location information. Until the 1988 survey, many of the archaeological sites within

the archeological district had received only cursory inspection and were in need of additional study.

Three seasons of fieldwork were conducted in the Palouse Canyon Archaeological District during 1992-94. Work consisted of both site survey and testing for the purpose of identifying/assessing the kinds and extent of resources present in the archeological district. The assessment was to help in the management of the resources.

❖ New District Headquarters Building Sites

Cultural resources assessments were made in 1989 of the two proposed sites in Walla Walla for the District's new Headquarters building. The assessments provided the necessary information for obtaining cultural resources clearance for both locations.

❖ Clearwater Fish Hatchery

In the late 1980s, the District was building fish hatcheries as part of the Lower Snake River Fish and Wildlife Compensation Plan. Sites suitable for hatcheries are limited in that a good water supply is essential for successful operations. A site along the Clearwater River, near Ahsahka, Idaho, was selected for the future Clearwater Fish Hatchery. Cultural artifacts were discovered on the site. A second phase of testing at the archaeological site, designated as 10-CW-4, began in 1988. The purpose of the work was to establish site boundaries and gather additional site information. In 1989, a third phase of testing was done at the site. The purpose of the third phase was to determine the effects on the specific areas of archaeological site 10-CW-4, which would be disturbed by hatchery construction activities.

Work at the hatchery site centered on recovery of a Native American living area. The find stirred considerable controversy. At first, the site was interpreted as possibly being a 3,000-year-old permanent house pit village. Then researchers revised their interpretation, finding that the site was approximately 1,250 years old and that it was a temporary mat lodge rather than a more permanent house pit site.

In early March 1990, the Nez Perce Tribe filed a lawsuit requesting an injunction on construction at the hatchery related to the 10-CW-4 site. Later that same month, the tribe and the Corps reached an agreement to settle the suit. The agreement involved setting aside 1.5 acres of the 18-acre hatchery site for future excavation. The Corps would erect only structures of a temporary nature in the set aside area. The set-aside would be cleared in the future when the tribe has resources to undertake future digs. The Corps agreed to spend approximately an additional $250,000 on the current investigations. Data recovery work on the 10-CW-4 site was completed in 1990. The Corps agreed to install signage at the hatchery detailing the importance of the area to the Nez Perce tribe's early history (38).

❖ Umatilla Army Depot

In the early 1990s, the District was involved in cleanup at the Umatilla Army Depot, near Hermiston, Oregon (see chapter 4). The District undertook a cultural resources survey at the Umatilla Army Depot. The survey included those sections within the depot, as well as outside areas, for which the District had design responsibilities under the chemical weapons disposal project.

❖ Jackson Hole Levees, Jackson Hole, Wyoming

In 1991, the District made a cultural resources survey of five proposed quarry sites in the vicinity of Jackson, Wyoming. The work was done as part of the District's Jackson Hole Levee Study. The Wyoming State Historic Preservation Office clearance was obtained for all five sites.

❖ Ladd Marsh Aquatic Ecosystem Restoration, Oregon

The Ladd Marsh aquatic ecosystem restoration project in Oregon (see chapter 7) was a project planned during the period covered by this volume. Construction was scheduled to begin on the project in late 2001. However, construction was suspended due to the presence of cultural resources artifacts on the ground. At the end of the period covered by this volume, the District was investigating the significance of the cultural resources and related costs for data recovery and/or mitigation of the site before making a decision to continue construction or terminate the project.

❖ Other Surveys

In 1988, reconnaissance level surveys were done for the Malheur, Mud Lake, and Palouse River project studies. The District completed a cultural resources survey of the Big Lost River Study area in 1991. Also in 1991, a cultural resources literature review was undertaken as part of the Walla Walla River basin reconnaissance study. The District performed cultural resources investigations in 1993 on the Arid Lands Ecological Reserve at Hanford to assist with remediation efforts.

System Operation Review and the Cultural Resources Work Group

The Columbia River system contains a complex combination of federal and nonfederal facilities used for many purposes, including power production and navigation. Beginning in 1990, the federal agencies who were responsible for managing the river, began an intensive study of the system (see chapter 8) called the System Operating Review or SOR. The SOR had ten work groups including the Cultural Resources Work Group that presented issues related to cultural resources in appendix D of the *Columbia River System Operation Review, Final Environmental Impact Statement* (39). The purpose of the committee was to prepare all needed cultural resources information and responses to project alternatives proposed under the SOR.

Cultural resources managers from Walla Walla District participated on the Cultural Resources Work Group from 1992-94. The District archeologist commented on the work group:

> "Each District [within the Northwestern Division] was to be represented [on the SOR Working Group]. As we progressed in that SOR study, and we had three agencies involved—the Corps, Bureau of Reclamation, and Bonneville Power—and we started seeing through that venue tribes being brought in. One of the real obvious places to bring tribes in was through the archeology, the cultural resources. We started having more dealings with tribes. A general [commander at the Division] at that time was personally committed to these relationships (40)."

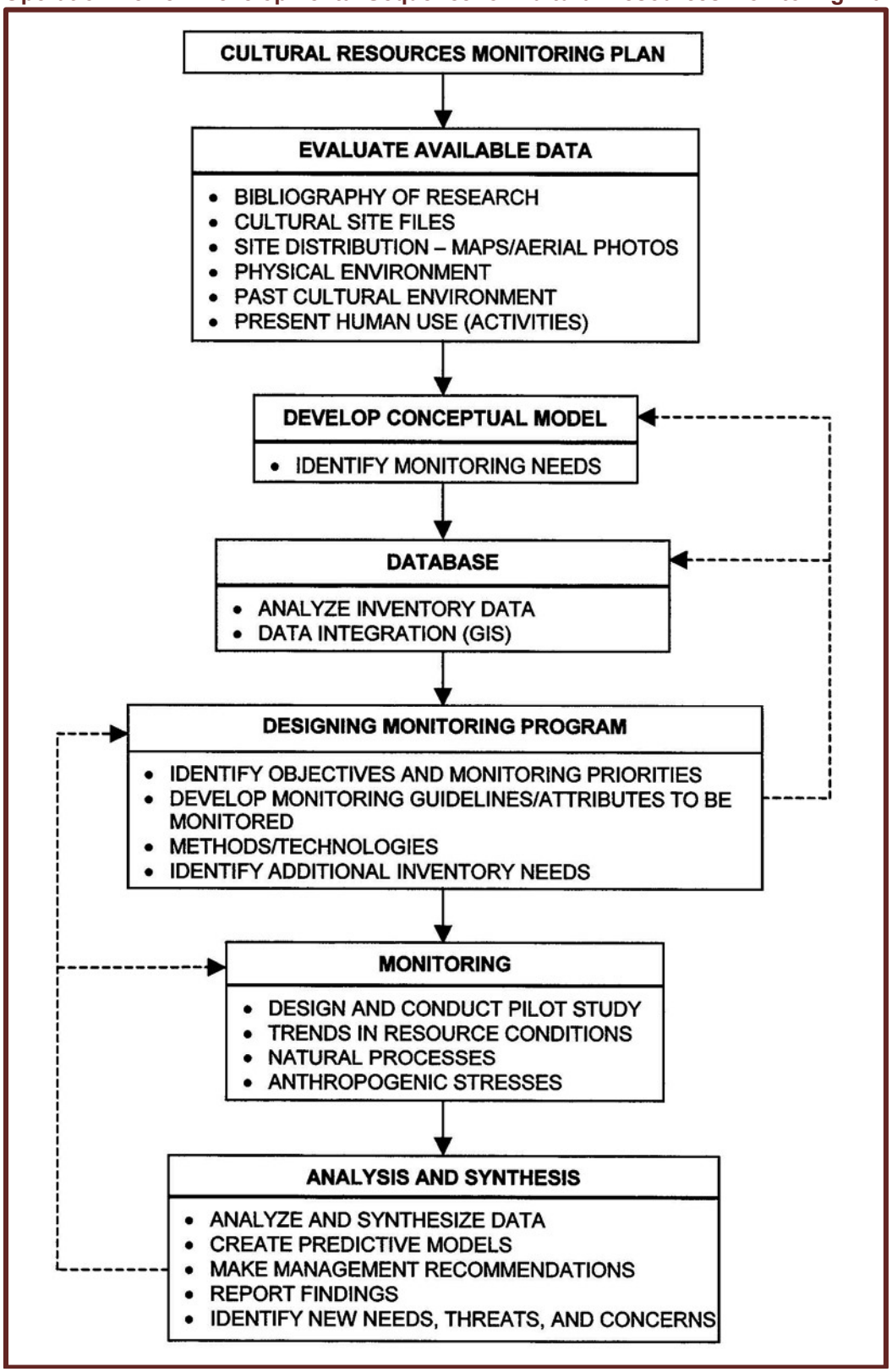
Indeed, the Cultural Resources Work Group brought into sharp focus the deep concerns of regional Indian nations regarding cultural resources management. The group's concerns centered on the federal reservoir system on the Columbia River and its tributaries and on federal lands in the region. As the cultural resources appendix to the

SOR report states: “One of the main themes throughout all the meetings held with the Tribes of the region was their demand for comanagement of the cultural resources, with adequate funding levels to give the Tribes assurances that cultural sites would be protected (41).” Tribal representatives pointed out that: “There should be a consistent process for defining what the trust responsibility is. This process must not be unilateral but should be a product of interaction with affected Tribal Governments (42).” The report also stated, “Agreement on definition of important concepts and terms has not been established. Examples of key concepts and terms are: cultural resources, traditional cultural properties, Indian identities, *etc*. (43).”

The types of conflicts discussed above as “worlds colliding” were brought explicitly to the fore in the Cultural Resources Work Group report:

> “Several factors combined to make this study especially challenging. One is the need to understand and incorporate the natural, holistic view of cultural resources held by Native Americans and the highly specific scientifically oriented Euroamerican approach. The way in which cultural resources is defined is in itself a product of values and perceptions; there is no universally accepted definition of cultural resources.
>
> “Not all members of the CRWG are comfortable with the term ‘Euroamerican.’ Some feel it ignores the historic role of other ethnic groups in the region such as Chinese-Americans. Others feel the term is outdated and that a more relevant term would be ‘western technology.’ While the term Euroamerican is not inclusive of all historic sites, it is used here to denote a characteristic set of values which are in sharp contrast to traditional values and beliefs held by many Native Americans. Western technology is a product of the Euroamerican system of values. Many people view technology as an independent element in western culture. But a driving force behind technology is the core Euroamerican value that views nature and the material world, in general, as something to be manipulated, used, consumed, or even subjugated. Western technology, then, demonstrates this core Euroamerican value in action. At the same time, it is important to acknowledge that it is a value that many non-Indians do not personally accept.
>
> “The Euroamerican culture places high value on the importance of scientific and/or objective observation. A good observer is generally expected to remain detached and not become personally involved in the subject. Information developed from physical observations, according to Euroamerican values, is usually considered more trustworthy than subjective material. In fact, the word ‘subjective’ is sometimes used disparagingly to imply that information or opinions of a subjective nature may not be trustworthy. This contrasts with the traditional Native American value which understands that ‘the people’ are another component of nature with responsibilities in the material world. The Native American value places importance on complete physical and spiritual interaction in the natural world. Nature’s law supersedes all human created laws. To some Native Americans, the Euroamerican attitude of the disinterested observer suggests a lack of respect. In fact, some Native Americans point out that the difference between the role of observer and that of a participant is a critical distinction. In the words of one Native American, a member of the CRWG:
>
> *“‘You don’t understand that this ain’t a game. It’s a way of life that you have to learn. We’re all put here for a purpose and a reason [Mr. Jeffrey Van Pelt, Confederated Tribes of the Umatilla Indian Reservation at a CRWG meeting on January 31, 1995]* (44).’“

System Operation Review Developmental Sequence for Cultural Resources Monitoring Plan (45)



The appendix continues:

> "Another factor is the lack of complete information on the cultural resources for each affected federal project. This factor has two components. One is the need for a deeper and more complete understanding of the cultural context of the known cultural resources as viewed by Native Americans who have occupied the Columbia Plateau for thousands of years. This is embodied in oral traditions and knowledge which is preserved and handed down to present and future generations by tribal elders. It is not, for the most part recorded in books or documents. This knowledge is held sacred by Native Americans, and is something which they may feel is inappropriate to share on a purely academic basis. Doing so may, in fact, be a violation of their cultural norms.
>
> "The second component stems from the fact that not all project lands have been surveyed for cultural resources nor have all identified cultural resources been evaluated in cooperation with affected Native American tribes and/or by National Register criteria.
>
> "As the Umatilla Tribes state in their reports (see exhibits), 'The agencies have not been able to fully identify actual cultural resource properties that this undertaking will have an effect on. This cannot be accomplished without conducting cultural resource inventory work along the reservoirs. The cultural resource modeling is an academic exercise and is useful, but these models need to be adequately tested before such broad statements can be made. Further there is no indication that the agencies have began to identify the resources necessary to conduct adequate cultural resource inventories.'
>
> "… The importance of traditional cultural resources to Native Americans is, in many ways, experienced more directly and personally than by the social scientist. This fact is acknowledged in [National Register] Bulletin 38, which states: 'Traditional cultural values are often central to the way a community or group defines itself and maintaining such values is often vital to self respect. Properties to which traditional cultural value is ascribed often take on this kind of vital significance, so that any damage to or infringement upon them is perceived to be deeply offensive to, and even destructive of the group that values them (46).'"

The work of the System Operation Review's Cultural Resources Work Group may not have achieved a high level of consensus, and it may not have solved many issues related to regional cultural resources management, but it served to bring the parties together—representatives of Indian nations and federal agencies particularly—who needed to be working together to protect cultural resources.

The SOR led to active funding of cultural resources management by the Bonneville Power Administration for Federal Columbia River Power System (FCRPS) projects administered by the Corps and the Bureau of Reclamation. "The commitment was also realized in a direct funding agreement that was signed last December [1997] between Bonneville and Corps headquarters. The agreement was designed to provide monies for operations and maintenance repairs at federal dams along the Columbia River to increase efficiency of the dams for hydropower and to address cultural resource effects (47)."

Forty-five million dollars in joint funding over 15 years was set aside for FCRPS cultural resources management. BPA funding came from revenues generated by the sale of electricity produced at the projects. Meanwhile, the Corps and the Bureau of Reclamation continued to receive their part of the joint funding from Congressional appropriations. The funding under this agreement constitutes the most ambitious

funding support, to date, for a cultural resources program in the history of the federal government.

In October 1998, BPA began actually funding cultural resources activities at hydropower projects in the Federal Columbia River Power System managed by the Walla Walla District. These projects were, McNary, Ice Harbor, Lower Monumental, Little Goose, and Lower Granite Locks and Dams, plus Dworshak Dam.

The System Operation Review led to the formation of consultative groups in Portland, Seattle, and Walla Walla Districts within the Northwestern Division of the Corps of Engineers. The Walla Walla based group is discussed in the next section.

Payos Kuus Cuukwe (Federal Columbia River Power System Cooperating Group)

In May of 1997, the Federal Columbia River Power System Cooperating Group, as it was then called, met for the first time at District Headquarters in Walla Walla, Washington. In April of 1998, the group adopted its new name, Payos Kuus Cuukwe, which means “Snake River knowledge or learning.”

From its inception though the end of the period covered by this volume, the cooperating group met frequently, sometimes quarterly, other times every month to discuss a wide range of issues relating to cultural resources management in the portion of the Federal Columbia River Power System within Walla Walla District’s jurisdiction. Regularly attending participants included members of the Confederated Tribes and Bands of Yakama Nation, the Nez Perce Tribe, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Colville Reservation, Bonneville Power Administration, and the Corps of Engineers, Walla Walla District and Northwestern Division. At various meetings the Wanapum, Shoshone-Paiute Tribe, Shoshone-Bannock Tribe and Coeur d’Alene Tribes, and the U.S. Department of Energy were represented.

The cooperating group primarily looked at cultural resources activities in relation to the District’s mid-Columbia (McNary Lock and Dam) and lower Snake River (Lower Granite, Little Goose, Lower Monumental, and Ice Harbor Locks and Dams), but it also took up issues related to Dworshak project lands. As the federal land manager for these lands on the Columbia-Snake River system, the Corps is responsible for complying with its trust duties under applicable treaties, laws, and regulations. The specific purpose of the Payos Kuus Cuukwe was to provide technical advice on how to bring the Corps into compliance with Section 106 of the National Historic Preservation Act and Section 33 of the Native American Graves Protection and Repatriation Act).

During the late 1990s, the group kept up its intense commitment to cultural resources management dealing with a myriad of issues including: group authority, structure, and decision-making; budgeting and contracting for cultural resources work; tribal concerns; cultural resources management plans; definition of areas of potential effect in relation to the River System; reservoir surveys; oral histories; traditional cultural properties; coordination of and training for law enforcement; site monitoring; physical site protection and stabilization; inadvertent discoveries and budgeting to cover them; and land transfers and their effect on cultural resources.

Payos Kuus Cuukwe Poster, ca. 2002

For several years, the Bonneville Power Administration sponsored an annual Cultural Resources Conference in which the cooperating group members participated. In 1999, for example, the Conference was held in Spokane, Washington. Over one hundred people from the area, including tribal elders, attended the two-day conference. The last half of the second day was set aside for tribal elders to give reactions to what they had heard in an effort to help guide cultural resources work in the region.

Much cultural resources work was done with the substantial annual budgets (*e.g.*, $1.25 million in fiscal year 1999; $1.85 million in fiscal year 2000) provided jointly by the Bonneville Power Administration and the Corps. The Payos Kuus Cuukwe developed action plans for cultural resources work and became the primary influence guiding the agencies regarding which cultural resources projects should be funded on federal lands associated with the Federal Columbia River Power System.

Mid-Columbia and Lower Snake River Reservoirs Management Plans

In 1986, Walla Walla District developed an overall Cultural Resources Management Plan for operating projects. The plan provided some guidance for administering cultural resources located on project lands. In 1995, a cultural resources overview of the Walla Walla District was published (48). The overview provided, in summary form, all available primary cultural resources information from within the boundaries of the Walla

Walla District. The overview was used as a reference source for cultural resources management purposes.

Army Regulation 200-4, *Cultural Resources Management,* published in 1998, established requirements for cultural resources plans. An "integrated cultural resources management plan" is a five-year plan that is a component of an installation's (or, to use Corps terms, a project's) overall master plan. The regulation gives an outline of the components of a cultural resources management plan:

> "(1) Identification of all applicable legal requirements and procedures for integrating compliance between the various independent cultural resources legal requirements.
>
> "(2) Identification to the extent possible, of specific actions, projects, and undertakings projected over a 5-year period that may require cultural resources legal compliance actions.
>
> "(3) Development and implementation, as appropriate, of a cultural landscape approach to installation cultural resources management and planning …
>
> "(4) A planning level survey that includes existing information on cultural resources, development of or reference to existing historic contexts, an archeological sensitivity assessment or archeological predictive model, and a listing of any Federally-recognized Indian tribes or Native Hawaiian organizations associated with the installation.
>
> "(5) A plan for the actual field inventory and evaluation of cultural resources that is prioritized according to the inventory and evaluation requirements associated with specific installation compliance requirements, such as NHPA Section 106 undertakings, that could affect cultural resources. Any electronic spatial data produced by inventories shall conform with the Federal Information Processing Standards and spatial data standards for DOD [the Department of Defense] to ensure that the spatial data is useable in various spatial data systems.
>
> "(6) Internal procedures for consultation, survey, inventory, evaluation, treatment, recordation, monitoring, emergency or inadvertent discovery, reporting, *etc*., tailored for the particular conditions and specific requirements at the installation. Interface requirements between the cultural resources management program and other program areas …
>
> "(7) Provisions for curation of collections and records (IAW 36 CFR 79) that are, associated with NHPA undertakings, and procedures to reduce the amount of materials that are accessioned and permanently curated by the installation.
>
> "(8) Provisions for limiting the availability of cultural resource locational information for the purposes of protecting resources from damage.
>
> "(9) Provisions and procedures for the conduct of an economic analysis and alternative use analysis on historic properties that are being considered for demolition and replacement.
>
> "(10) Procedures to ensure Indian tribes and Native Hawaiian organizations are provided access to sacred sites and are consulted when future access may be restricted or when adverse effects to the physical integrity of the sacred site may occur.
>
> "(11) Development of standard treatment measures for cultural resources.
>
> "(12) An estimate of resources required to execute the plan. Such estimates must have restricted access and be "For Official Use Only" due to protection of government cost estimates (49)."

By the end of fiscal year 1998, five of the reservoirs along the mid-Columbia and lower Snake, as well as Dworshak Reservoir had cultural resources management plans specific to those reservoirs. In 1998-99, the Confederated Colville Tribes prepared a cultural resources management plan relative to the lower Snake River reservoirs. A portion of the contract funds was used for the Payos Kuus Cuukwe's tribal technical teams to review and finalize the plan. The intent was to review the plans every five years.

Mid-Columbia and Lower Snake River Reservoirs Surveys

Columbia River Salmon Flow Measures Options Analysis

In 1992, Walla Walla District completed a cultural resources overview as part of the Columbia River Salmon Flow Measures Options Analysis (50). The overview identified pertinent information on cultural resources sites within Walla Walla reservoir projects included in the study.

McNary Survey

Following the serious need for cultural resources work revealed by the System Operation Review Cultural Resources Work Group (discussed above) and with funding provided by Bonneville Power Administration and the Corps. Walla Walla District commissioned surveys and inventories on specific areas impacted by the Federal Columbia River Power System reservoirs. The first survey looked at lands that were part of the McNary Lock and Dam project. The District contracted with the Confederated Tribes of the Umatilla Indian Reservation for this survey, which involved updating information on previously discovered sites as well as locating new sites. Sites were mapped, and baseline information about erosion and other geological forces affecting each site was recorded. The purpose of the survey was to evaluate sites for protection. The survey report was completed in late 1999.

Ice Harbor Survey

The Confederated Tribes of the Umatilla Indian Reservation contracted with Walla Walla District in 1999 to do cultural resources survey work on project lands associated with Ice Harbor Lock and Dam. One of the problems encountered in this survey, as with some others, is that the Corps does not own all of the lands potentially impacted by the reservoir. Cultural resources may still be in the reservoir's "area of potential effect." Yet, Corps-commissioned surveys only pertain to Corps lands. As of the writing of this volume, the issues related to areas of potential effect remained unclear.

The Ice Harbor survey updated information on eight previously identified prehistoric sites, identified five new historic sites, and found three prehistoric sites with four more isolated prehistoric finds. Investigators were unable to locate twenty additional sites that researchers believed to be inundated. Ten other sites in the reservoir's area of potential effect were on private land. Information from the survey was supplied for inclusion in the Corps' geographical information system database. Fieldwork was completed in August 1999.

Little Goose Survey

The Nez Perce Tribe contracted with Walla Walla District in 2000 to provide a cultural resources survey of lands associated with Little Goose Lock and Dam. An interesting

aspect of this work was the scheduling, which had to be timed to low-flow time so that the maximum number of sites could be surveyed.

Lower Monumental Survey

Planning to survey the cultural resources sites associated with Lower Monumental Lock and Dam was taking place in 2000. The District hoped that fieldwork could be scheduled for 2002.

Mid-Columbia and Lower Snake River Reservoirs Specific Cultural Sites and Projects

In 1986, cultural resources site studies were conducted by the University of Idaho, Washington State University, and Eastern Washington University on the McNary and lower Snake River projects. The studies were to determine if selected sites exhibited sufficient integrity to warrant further management consideration. The next year, the District prepared two National Register of Historic Places nomination forms for archaeological sites located in the McNary and Lower Monumental projects.

Hat'luhpuh (Windy Place)

In the 1980s, a survey recorded a previously overlooked site near the mouth of the lower Snake and Tucannon Rivers. The site, officially designated 45-WT-134, was called Hat'luhpuh or Windy Place.

The quarter-square-mile site is situated on a high riverbank that was not inundated by the lake formed in back of Lower Monumental Lock and Dam. "The uneven character of the ground, at variance with natural surface areas above the site, provided evidence to archeologists of possible ancient inhabitants. … Following the discovery, the Corps contracted with Archeological and Historical Services of Eastern Washington University to test the site. Results indicated that the potential existed for recovery of significant information. River erosion and constant freezing and thawing of the ground at the site compelled the Corps to contract for a more extensive archeological investigation (51)."

Under a 1987 Corps contract from Walla Walla District, a team of University of Idaho students, directed by Professor David Chance, investigated the site. Preliminary findings indicated that the site contained some of the oldest Indian housepits (semisubterranean dwellings) that had ever been found in the Northwest, dating back 4,000 to 5,000 years. The District's newsletter reported on the first season of excavations:

> "Work concentrated on two housepits located close to the river. … Erosion has already sluffed off dirt from the river bank location of the dwellings under excavation and the riverside of the dwellings is pockmarked with bird nesting holes. …
>
> "All recovered items, carefully recorded and identified, were sent to the University of Idaho for detailed examination.
>
> "Artifacts found so far at the site include milling stones and various cutting tools made of green basalt. Projectile points and fresh-water mussel shells were also discovered. One of the last discoveries made was of an antelope skull. …
>
> "Most of the students [working on the site] were Native Americans. … These ancient inhabitants may have been ancestors of the Nez Perce and Palouse tribes.

> "Weather conditions have been harsh. At one point, the researchers experienced 60-mph winds at the exposed location of the dwellings (52)."

In 1988, a second season of data recovery work resumed at Hat'luhpuh. Under a new contract, a different team of archeologists, this time from Oregon State University, completed work started by the University of Idaho team. The 1988 field season completed recovery work on three housepits.

Marmes Rock Shelter

In 1953, residents along the lower Snake River discovered a rock shelter once inhabited by ancient people. It was on property once owned by Roland Marmes. Richard Daughtery, a prominent archeologist from Washington State University began to excavate the site. Numerous artifacts and fragments of human bone dated at approximately 10,000 years BP were found at the site, evidently a center of human habitation for thousands of years.

The shelter was in the pathway of inundation subsequent to completion of Lower Granite Lock and Dam. Fieldwork by Washington State University proceeded in eighteen-hour days as the dam neared completion. Despite efforts to build a levee, in 1969 the site was sealed under the waters of Lower Granite Reservoir.

Collections removed from the shelter are housed at Washington State University. However, a full archeological report was never issued. In the early 1990s, the Confederated Tribes of the Colville Reservation approached Walla Walla District about finishing the report. At that time, the District had no funds to provide, but North Pacific Division contracted with the Colville Tribes to complete the report, which was eventually funded as part of the budgeting process reviewed by the Payos Kuus Cuukwe. The extensive contract was not yet completed as of 2000.

Drawdown 1992

In March 1992, Walla Walla District conducted a major operational test involving drawdown of two reservoirs on the lower Snake River. This drawdown test, discussed in detail in chapter 8, involved the lowering of water levels behind Lower Granite and Little Goose Locks and Dams. The test was designed mainly to evaluate the integrity of structures under lowered water conditions. Proponents of drawdown believed that periodically lowering reservoirs, perhaps annually, to create a faster flowing river might assist salmon on their migrations to the sea.

"The drawdown presented both an opportunity and a challenge to concerned tribes, District archeologists, and law enforcement specialists in the region. "The past has been buried by the future, but the future now will uncover parts to the past. During the drawdown … some Native American archeological sites will be uncovered. These sites were buried when the river dams were completed in the 1970s. The U.S. Army Corps of Engineers contracted with WSU's [Washington State University's] Center for Northwest Anthropology to evaluate and map those sites which will be exposed by the drawdown (53)."

A research archeologist from the Corps' Waterways Experiment Station joined District staff. The archeologist was an expert on ways of protecting cultural resources in place. He joined the WSU researchers in trying to determine the impact of the drawdown on

cultural resources. Researchers mapped and documented fourteen previously identified sites. Four additional sites were located.

Because of the limited time frame, the field team of eight professional archeologists and graduate students did not to try to recover artifacts. However, some artifacts that did not require extensive excavation were removed to protect them. The team made detailed topographic maps of each site to develop a "picture" of the site and assess impacts from the drawdown. "This picture is a drawing of a region's surface features, showing specific relations to shape, size and position, and visible artifacts such as fireplaces. The site also will be videotaped and photographed. Re-evaluating sites with these maps will reveal erosion on the river embankments and will make it possible to judge future changes if there are future drawdowns (54)." As of the writing of this volume, there have been no further drawdowns.

As the waters receded, the Snake's secrets started to surface. At first, it was just odds and ends, such as a crusty safe and cash register found just west of Clarkston, Washington. Then two cars were discovered, one of them stolen and one not reported as stolen. The recovery of the cars attracted a crowd to the parking lot near the Southway boat ramp along Lower Granite Reservoir (55). Then on March 9, 1992, a human skull was found along the shoreline, spotted by private citizens. The previous week the bones from a human torso had been discovered nearby. Speculation reigned about the source of the bones—modern or ancient. It was finally determined that the bones were the remains of a man who had disappeared from Lapwai, Idaho, in 1988 (56).

More ancient human remains were found, however. A Nez Perce tribal leader reported that the tribe had been informed of an ancient grave discovered along the shoreline exposed as a result of the receding water. Tribal representatives of the Nez Perce and the Umatilla met with the Walla Walla District Engineer to seek greater protection for archeological sites. The tribes discussed assisting the Corps with site monitoring (57). As quoted in an area newspaper, one Nez Perce leader commented on the situation: "We're not too happy about the scavengers and looters who move in and exploit these areas for commercial purposes (58)."

The Corps had expected that forty-three sites would be exposed at maximum drawdown, but other sites may have gone undiscovered and unmonitored. Indeed, the report of the 1992 reservoir drawdown test made the following conclusions about the impact of collecting and vandalism on cultural resources during the test:

> "While collecting/vandalism was recognized as a potential problem, it occurred at a much greater scale during the drawdown than was anticipated. This happened despite extensive 'anticollecting' press releases both prior to and during the drawdown along with patrolling efforts by Corps project personnel, WSU, and members of the Nez Perce and Umatilla Tribes. Several sites in particular received heavy impacts from collecting. This undoubtedly was due in part to their being located in close proximity to Lewiston and Clarkston. Overall, the drawdown provided access to almost every site that was monitored; sites which were inspected were marked by footprints of artifact collectors or curiosity seekers (59)."

McNary Site Investigations

In 1999, the District contracted with Hemisphere Field Services to investigate various sites on McNary project lands. The contract involved evaluating eight to ten sites that had previously been identified. The site evaluation methodology involved a pedestrian survey of the particular site and transects with shovel probes ten meters apart. The probes with the shovel were fifty centimeters in diameter, and material was screened through a one-fourth-inch wire mesh. At least one 1-by-1 meter excavation was done on each site. Fieldwork was completed in 2000.

A greater amount of sediment and fewer artifacts than anticipated were identified on evaluated sites with a very small amount of organic remains for radiocarbon dating. Datable material was only found on one site. One of the difficulties was that significant artifacts might be buried more deeply than shallow probing would reveal. This project is an example of the difficult balancing act facing investigators in the context of late twentieth century public archeology (as discussed above). It is important to establish a site's significance so it can be protected, but investigators do not wish to disturb the site any more than necessary.

Other Sites on the Mid-Columbia and Lower Snake Reservoirs

In 1989, a data recovery project was done at archaeological site 45-WT-1 (Riparia) on the Snake River, Lower Monumental Reservoir. The Walla Walla District contracted for this work as the result of erosion to the site caused by wave action and pool fluctuations. Also in 1989, two archaeological sites on Wilma Bar, Lower Granite project, were tested. The District completed initial assessment of a rock art site outside Clarkston, Washington, in 1990. Then, in 2000, the District commissioned cultural resources investigations on Myrtle Beach and Magill Fishing Access Sites.

Dredging and Dredged Materials Management Plan

In 1986, Walla Walla District commissioned a survey and testing of selected dredge disposal and contractor staging areas for the Clarkston dredging project along the Lower Granite Reservoir. Two cultural areas were identified. Agreement was reached with the state of Washington to flag both areas and avoid them for the duration of the project.

In the late 1990s, the District proposed a Dredged Materials Management Plan (see chapter 4). The plan considered upland and in-water disposal of dredged materials. In planning the anticipated effect of disposal in-water, the anticipated effect on possible inundated burials was considered.

Lower Snake River Juvenile Salmon Migration Feasibility Study

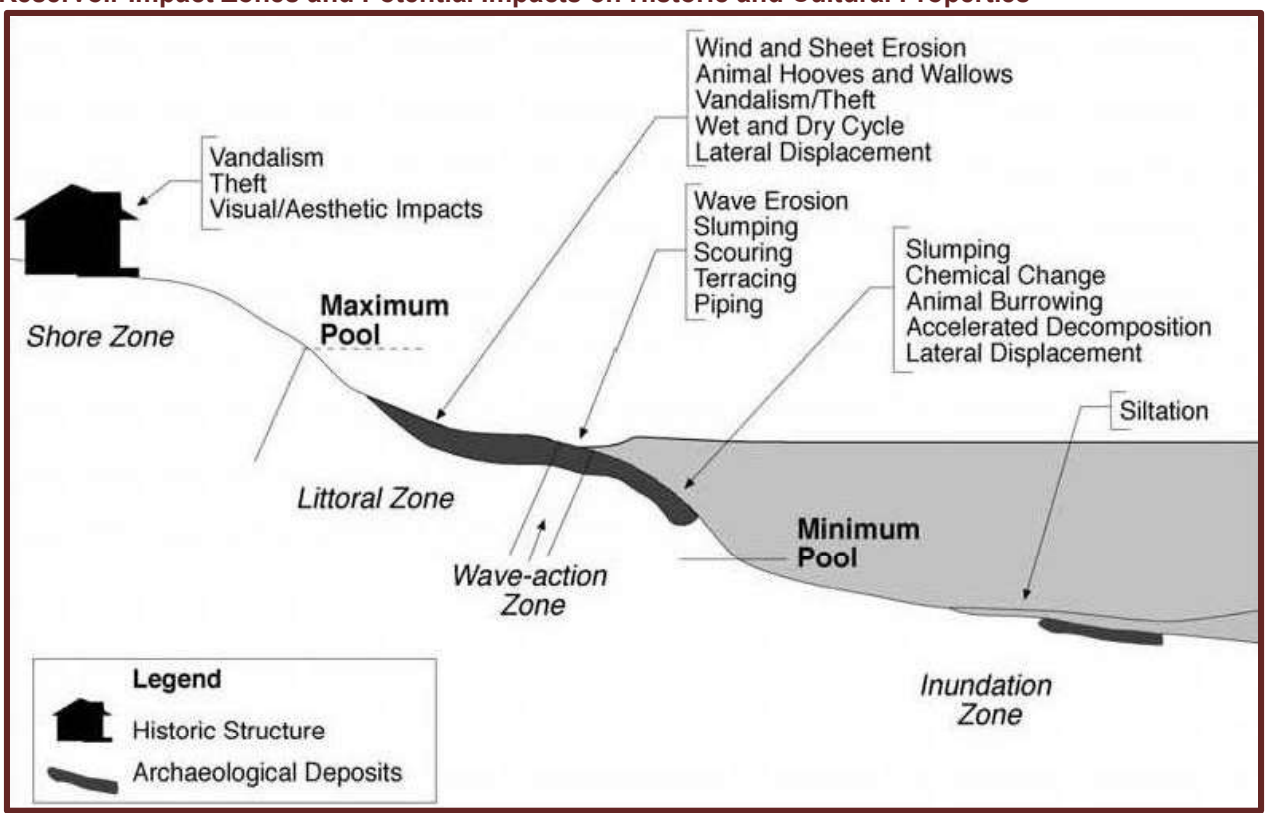
The Lower Snake River Juvenile Salmon Migration Feasibility Study's final report was issued in 2002 (60), but most of the research and deliberation for the study had taken place prior to the end of 2000. A draft report of the study was available for public comment in 1999. The study, discussed in detail in chapter 8, looked at several alternatives for improving juvenile salmon migration, including the much-debated option of permanent drawdown (or breaching) of the four lower Snake River dams.

In looking at cultural resources, the report adopted legal definitions of cultural resources as material remains of past human life activities. This definition was augmented by the

concept of traditional cultural properties (see separate section on TCPs). The report did not, per se, accept salmon species as a cultural resource. Therefore, the study's cultural resources section and appendix did not talk about salmon as a cultural resource per se.

The *Lower Snake River Juvenile Salmon Migration Feasibility Report* looked at cultural resources sites and discussed the impact each alternative would have on those sites. The study painted an explicit picture of the effect of reservoirs on inundated and adjacent cultural resources sites. These are effects that the Walla Walla District, as manager of such a large reservoir system, has to deal with on an ongoing basis and are, therefore, quoted in the box below.

Reservoir Impact Zones and Potential Impacts on Historic and Cultural Properties



THE EFFECT OF THE LOWER SNAKE RIVER RESERVOIRS ON CULTURAL RESOURCES

Changing water levels and flows can cause wave action, inundation, and exposure of reservoir drawdown zones, all of which can affect cultural resources. System operations can also have impacts on historic properties as a result of changes in the human use and aesthetics of the shore and drawdown zones. Impacts to archaeological deposits occur differently in each of the four reservoir zones: the littoral zone (exposed beach), wave-action zone, inundation zone, and shore zone [see figure above].

Exposed archaeological deposits within the littoral zone are subject to impacts that are mechanical, human, and animal in origin. Erosion is the primary concern for cultural resources in this zone and in the wave-action zone. Generally, soils on which the lower Snake River hydropower facilities are located are derived from glacier and flood deposits. They are light soils, highly susceptible to erosion by water and wind. In addition, the lower Snake River reservoirs have steep slopes that are somewhat susceptible to slumping and landslides.

Because inundation removes vegetation, wind and water (runoff) erosion deflates archaeological sites in the littoral zone. Deflation is the removal of the archaeological soils, leaving heavier items and artifacts in place. Water running over unvegetated slopes also causes erosional rills and gullies and moves artifacts. The movement of artifacts and site features within or away from a site decreases its scientific integrity and value because it becomes more difficult to reconstruct the site's original features and placement of artifacts. The littoral zone is also subject to repeated cycles of wetting and drying, which can cause organic deposits, such as bone, and some artifacts, such as ceramics, to deteriorate. Erosion from livestock trampling and wallowing may also occur in this zone.

In the wave-action zone, wind- and powerboat-generated wave action erodes and deflates archaeological sites. It may also stimulate geomorphological changes that can destroy intact archaeological deposits. These changes can include slumping, scouring, terracing, and piping. …

Impacts on archaeological deposits in the inundation zone include sedimentation, erosion, chemical change, and accelerated decomposition. In general, sedimentation in the project reservoirs tends to enhance cultural resource preservation by providing a sediment buffer against mechanical impacts (*e.g.*, wave action). However, cultural resources buried under a deep silt and water column are no longer accessible for research, and little is known about the long-term impacts of deep sediment burial on fragile cultural deposits. There have been no definitive studies of the impacts of heavy silt deposit on cultural resources; but it is prudent to assume that soil saturation, soil movement, and other processes may result in some adverse impacts to cultural resources. Underwater landslides and sediment shifts are known to occur in the permanently inundated zones of reservoirs. ...

Cultural resources in the inundation zone that are not completely covered with silt are subject to underwater currents that displace materials and artifacts. Archaeological deposits can also be disturbed and moved by aquatic organisms such as burrowing clams. Reservoir water can degrade cultural resources. It dissolves organic materials and ceramics, and changes chemical attributes, such as pH, phosphate, and nitrogen levels of deposits. An accumulation of organic acids accelerates the decomposition of organic materials and ceramics.

Impacts to historic and cultural properties due to system operating strategies also result from human use of the shore and littoral zones. For example, reservoir operations affect the attractiveness of the reservoir for recreation, and thereby influence the number of people visiting these zones. The devegetation and deflation of archaeological sites in the littoral zone, furthermore, make them more visible to the public. When more people are present and archaeological sites are more visible, there is a greater likelihood of vandalism and artifact theft.

Land management actions not related to system operations can also affect human activities at the reservoirs, and different uses can have different effects on archaeological and historic sites near project reservoirs. Decisions to develop or permit camping or hiking trails, for example, may lead to increased impacts on historic and archaeological sites from human-caused erosion, vandalism, and artifact theft.

Project operations that change land uses might also change the integrity or association of a historic or cultural property. For example, change in nearby recreational uses might adversely affect a traditional cultural property such as a Native American ritual site, by increasing sights and sounds incompatible with ritual use. Reservoir drawdown might destroy the visual integrity of a historic site or traditional cultural property by introducing an element that is inconsistent with its historic or cultural character. –*Lower Snake River Juvenile Salmon Migration Feasibility Report* (61).

The *Lower Snake River Juvenile Salmon Migration Feasibility Report* provided the following conclusions about Alternative 4—Dam Breaching:

> "Under Alternative 4—Dam Breaching, reservoirs behind the four lower Snake River dams would be permanently lowered by removing the earth-filled section of each dam to create a 140-mile near-natural river. This would expose archaeological sites that have been inundated for decades. This alternative would have both short-term and long-term effects on cultural resources.
>
> "Alternative 4—Dam Breaching would cause a higher rate of site exposure than the other alternatives. The current set of cultural resource management issues for the four lower Snake River dams in large part would be exchanged for another set. Potential long-term effects on newly exposed sites in this reservoir system could include: vandalism, theft, surface erosion, slumping along river banks and hill slopes, lateral displacement, trampling/wallowing by hoofed animals, rodent burrowing, climatic/precipitation cycles, and biochemical soil changes. …
>
> "Under this alternative, short- and long-term river behaviors would re-expose sites to periodic flood events, and river movements that alter terrace structures and river bed channel locations. Such river movements would occur within the limits of the lower Snake River's natural meander zones, which generally are expected to be at lower elevations than the current reservoirs' fluctuation zone. Some sites and portions of sites would be re-exposed with an overlying sediment load of variable thickness due to a 20-plus year period of reservoir inundation conditions. Consequently, sites in these circumstances would remain partially or prohibitively inaccessible.
>
> "Many of this alternative's most significant impacts to cultural resources would be short term. Although most known archaeological sites would be exposed in a nonvegetated zone following the reservoir drawdowns, in time, the reservoir landscape would be revegetated and other site protective measures established. …
>
> "Assuming that the culmination of effects for inundated cultural resources and shoreline erosion to sites is often worse than site exposure, it can be said that alternatives that increase site exposure are possibly best for the resource. Drawdown would remove the previously constant effects of shoreline erosion at the four reservoirs in exchange for near-natural river behaviors within the river's meander/flood zones. The net long-term effect on cultural and historic properties could be positive. However, a cultural resource management plan (CRMP) with aggressive resource treatments and preservation strategies would need to be funded and implemented (62)."

Traditional Cultural Properties and Oral Histories

Under the guidance of the Payos Kuus Cuukwe (Federal Columbia River Power System Cooperating Group), Walla Walla District, in the late 1990s, commissioned oral histories

from Native American groups in the region. The oral histories were to capture information from tribal members about traditional cultural resources sites (sites with archeological or historical remains or artifacts) and also about traditional cultural properties.

An article in the National Park Service's journal, *Cultural Resources*, "Traditional Cultural Properties: What You Do and How We Think," defines a traditional cultural property as:

> "a property, a place, that is eligible for inclusion on the National Register of Historic Places because of its association with cultural practices and beliefs that are (1) rooted in the history of a community, and (2) are important to maintaining the continuity of that community's traditional beliefs and practices. Examples of places important to maintaining the traditional beliefs of a community are the vision quest sites important to many Indian tribes of the northern plains and the Sandia sandbars, important to maintaining the ceremonial practices of the people of Sandia Pueblo. Examples of places important to the continuation of traditional subsistence practices include the special sedge fields from which Pomo basketmakers gather the materials they need to continue their basket making traditions, and the habitat ranges of birds, fish, turtles, and other animals whose continued presence and use are essential to continue ongoing cultural traditions (63)."

In 1990, the National Park Service published National Register Bulletin, number 38, *Guidelines for Evaluating and Documenting Traditional Cultural Properties* (64). These are the guidelines that the Corps and other federal agencies follow regarding traditional cultural properties.

As can be seen from the definition, traditional cultural properties are valuable, not only or primarily as measured in traditional archeological terms, but in terms of a particular people's culture. Only that people can say what is a traditional cultural property—a sacred or significant site to their people.

An example of an oral history program was the one that the Nez Perce Tribe began in 1999 under commission from the Walla Walla District. Tribal investigators began gathering oral history information about their tribe's use of the lower Snake and mid-Columbia River basins. The goals of this oral history study were as follows: to solicit testimony to help in the identification of significant cultural resources; to document a wider range of traditional land uses and traditional cultural properties representative of Nez Perce life; and to identify Nez Perce place names for sites and features.

Unlike traditional Western scientific anthropological studies, these studies were not modeled using the concept of an impartial, outside observer. Rather, these projects used concepts of authenticity that had become prevalent in anthropology toward the end of the twentieth century. In these projects, it was important that the investigators be members of the tribe. This was important for several reasons. First of all, members of the same culture would be able to understand and interpret oral testimony in an authentic manner, a manner fully informed by intimate knowledge of the culture. Secondly, a co-tribal member would often be able to gain the trust and full cooperation of the person giving the oral testimony. Also, very importantly, tribal investigators could be auditors of sensitive, sometimes sacred tribal information that would not be shared with a person who was not a member of the tribe.

Another example of a federally funded oral history program was that conducted by the Confederated Tribes of the Umatilla Indian Reservation. This project was conducted with tribal elders and involved the following methodologies: conducting a file and literature search pertaining to the geographic area along the reservoir system traditionally associated with the Confederated Tribes; identifying and contacting knowledgeable tribal elders; conveying tribal elders to various places of their concern or knowledge to conduct interviews; conducting followup interviews later with the elders; transcribing a summary of the interviews and a summary report for the Confederated Tribes of the Umatilla Indian Reservation archives; curating the tapes; and preparing a summary report for the Corps.

The Colville Confederated Tribes worked on compiling an oral history related to the McNary area. At the end of 2000, the various tribes were working on oral history projects commissioned under the guidance of the Payos Kuus Cuukwe cooperating group. These oral histories, awarded as sole source contracts, were funded by the Federal Columbia River Power System cultural resources budgets, which ultimately came from Bonneville Power Administration and the Corps.

Only using this new research paradigm, could full information be gathered. Although this information would not be shared with the public, it was in the public interest to gather it, so that it could be available, if needed to make decisions about land use that would not negatively impact cultural properties protected by trust obligations and by law.

Protecting Antiquities from Illegal Activities

In 1983, the Walla District's archeologist discussed some of the challenges facing Corps land managers when it came to protecting sites from illegal activities: "The evidence of vandalism to historic and prehistoric sites in the District continues to be a concern not only to the Corps, but to others also. Examples include the unauthorized digging at old townsites by bottle collectors and destruction or removal of petroglyphs and pictographs. The most flagrant and objectionable abuse by vandals is the premeditated act of digging into burial sites for grave artifacts and the complete disregard for the human remains encountered (65)."

In 1983, Walla Walla District sponsored a training session that centered on violations of laws protecting antiquities, *i.e.*, vandalism and theft of cultural resources. The three-day course, held in Walla Walla, was attended by staff from Walla Walla, Portland, and Seattle Districts of the Corps. According to the District archeologist of the time, this may have been the first cultural resources training session in the Corps. "The Forest Service has been conducting these sessions for several years, and some Corps employees have attended Forest Service training, but I believe our session was the first antiquities training sponsored by the Corps for Corps employees," he was quoted as saying (66). During the course, participants learned about the legal history of cultural resources protection as well as about procedures for investigating and reporting violations.

The District conducted a testing program at archaeological site 10-NP-292 on the Clearwater River, Lower Granite project. This work was undertaken in 1989 as the direct result of illegal digging at the site.

In 1989, a Lewiston, Idaho, man was convicted of digging at a historic site along the Clearwater River and sentenced to a year's probation and 120 hours of community

service. The site was near the Nez Perce Indian Reservation on land under Corps jurisdiction. The site was, according to a University of Idaho archeologist who testified in court, rich in cultural artifacts, but left in a jumble by illegal diggers. "Thousands [of artifacts at the site] have been disturbed and probably hundreds taken (67)," he said. No artifacts were recovered from the convicted man. The extent of the actual sentence compared to the maximum fine and jail sentence he faced outraged archeologists and members of the Nez Perce Tribe. "It's just like going to Yellowstone Park and shooting a bunch of buffalo and being put on probation and told you can't come back for a year," said the testifying archeologist (68). The tribe determined to press law enforcement and court officials to pursue such crimes more seriously.

In the mid-Columbia region, a consortium of Indian tribes, federal and local government organizations, and local historical societies joined in 1999 in a program to increase public awareness of the importance of protecting the rich heritage of cultural resources in the region. The goal of the program was to "ensure that every student in the mid-Columbia region is exposed to the concepts of ARPA [the Archeological Resources Protection Act] (69)." The program also focused on raising the awareness of regional law enforcement agents regarding crimes against antiquities. District staff often participated in programs to increase awareness about cultural resource preservation among school students. Cultural resources protection was stressed with law enforcement agencies contracted to patrol Corps lands.

Under the guidance of the Payos Kuus Cuukwe (Federal Columbia River Power System Cooperating Group), site monitoring, training for law enforcement, and public awareness activities were funded for federal lands that were part of the reservoir system.

A 1998 Bonneville Power Administration grant to the Confederated Tribes of the Umatilla Indian Reservation funded training on how to do investigations related to the Archeological Resources Protection Act (70) on a site that has been vandalized. The same year, training was done for law enforcement in ARPA. The training was conducted at on the Department of Energy's Hanford Nuclear Reservation in the Hammer facility where DOE staff were testing ground-penetrating radar and had expertise in nonintrusive methods for investigating cultural resources. Participants in the Hammer training built a mock archeological site, stated mock violations, and collected different kinds of evidence with critiques by County prosecutors and a U.S. Attorney.

Beginning in 1998 and by recommendation of the Payos Kuus Cuukwe cooperating group, the Columbia River Inter-Tribal Fish Commission, a group that already patrolled along the Columbia, was contracted to do cultural resources monitoring and investigation along the reservoirs.

In 1998, the Corps rangers and natural resources personnel attended a training session on cultural resources protection and relevant laws. This session was designed to assist with monitoring of sites by educating Corps staff who are in the field about cultural resources protection. Representatives of at least two tribes in the region presented sessions at the training, covering the Native American Graves Protection and Repatriation Act and the Archeological Resources Protection Act.

The problem of illegal digging continued, however, through the end of the period covered by this volume. In May 2000, a resident of Hermiston, Oregon, was found guilty of disturbing archeological resources on an island in the Columbia River near the same spot where an Irrigon, Oregon, couple was found looting a burial ground in 1995. The couple was convicted of antiquities law violations in 1998. Some progress had been made, in the opinion of one spokeswoman for the Confederated Tribes of the Umatilla Indian Reservation: "It's nice to see authorities finally recognize digging up Indian remains is a serious crime. Years ago, artifact hunters might have been ignorant of the damage they did to American Indians, but that's not the case anymore (71)."

Site Protection and Stabilization

A Corps archeologist from the Waterways Experiment Station who specialized in site protection visited Walla Walla District in 1992. He made the following comments related to protecting cultural resources:

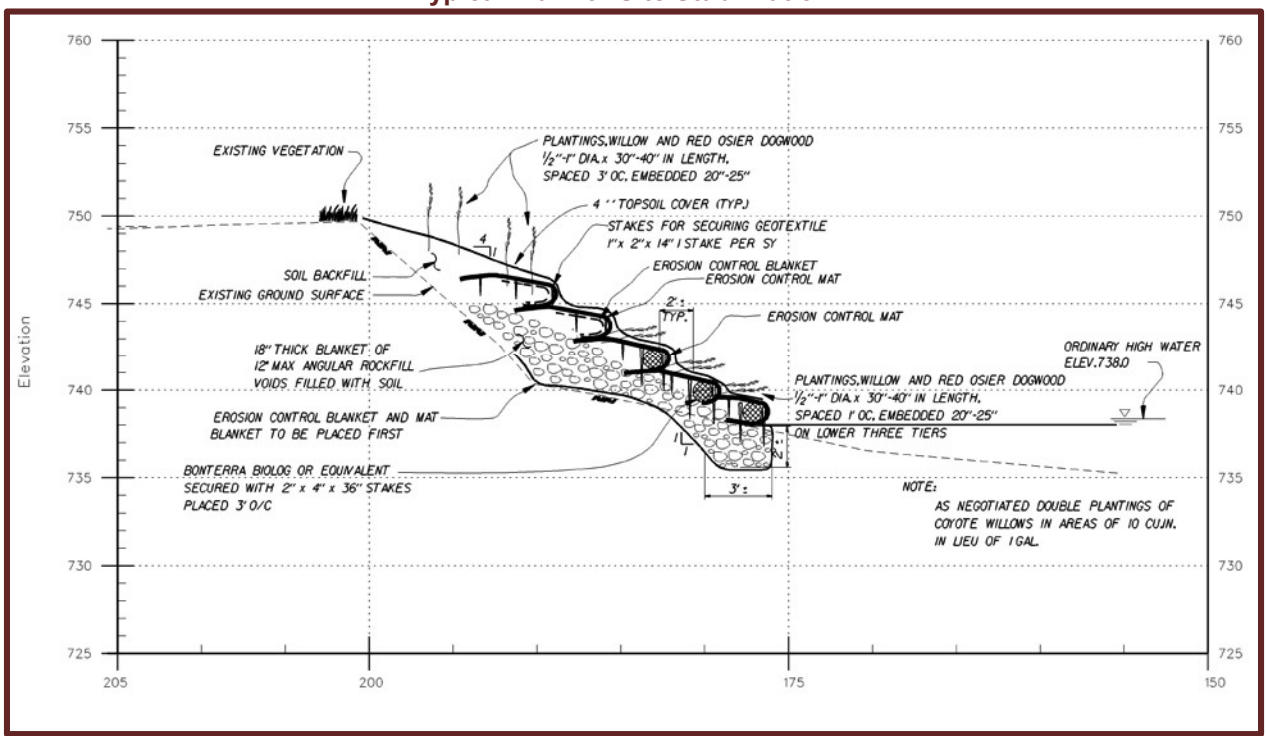
> "There are three ways to look at archeological sites. You can let the sites go – simple avoidance; you can excavate sites; or you can protect them. The third is really a combination of the first two. By protecting sites you leave them alone for possible excavation at a later date. It also uses engineering as a solution. You can engineer ways to protect cultural resource areas, such as using vegetation to prevent the erosion of a bank or by burying a site by putting it into a bank. You can also construct levees to protect sites (72)."

The archeologist pointed out that archeological sites are a rapidly disappearing resource due to excavation, erosion, and vandalism. Protecting sites in place serves two purposes, he said: "First, you can manage the resources at a minimum cost – it's expensive these days to excavate sites. Secondly, you protect the sites for future generations of archeologists." Or, depending on the wishes of involved tribes, you may be protecting the site so that it can be left undisturbed in perpetuity—particularly if it is a burial site (73)."

A Walla Walla District staff archeologist commented on this trend:

> "Since 1992-93 … particularly as the tribes have become more involved … you have seen more of that happening—that, where possible, a project would actually be moved. [We would change a project's] physical location, if … there are cultural resources there. If it's not possible to move it, are there ways to redesign [a project] to minimize the impact? … I would say definitely we are seeing more of the approach of preservation in place. …
>
> "Others are also supporting that [approach] because of the feeling that this is a limited, resource, particularly older sites. So many of them have already been dug up, covered over, flooded by the reservoirs, that if we can save these [sites] for future use, let's try and do that instead of simply digging them all up right now. The belief is that, as time goes on, archeologists will develop better techniques. New methods are going to come along that will give us much more information with the same amount of digging (74)."

Typical Plan for Site Stabilization



Many of the Corps' stabilization and site protection measures were unanticipated activities as the result of inadvertent finds. This caused some budgetary dislocation in the cultural resources arena since stabilization projects could be very expensive. Stabilizing the site where the remains of the Ancient One (Kennewick Man) were found for example, cost the Corps well over $500,000.

Staff from the Corps' Waterways Experiment Station visited various Walla Walla District sites in the late 1990s to discuss various methods of site stabilization. The District looked for creative ways to do stabilization using onsite materials. Logs washed up on reservoir shorelines, for example, could be used for stabilization.

Inadvertent discoveries in the late 1990s on three river islands resulted in major projects for cultural resources site protection. In 1999, for example, Walla Walla District awarded a contract for just over $150,000 to Earth Construction for bank stabilization to protect significant cultural resources on an island in the Snake River near Pasco, Washington. Stabilization was actually performed using a specially equipped helicopter with a bucket to place materials at the site. Corps expenses, including site monitoring, and design work, brought project costs to approximately $210,000. Besides stabilizing the site for the short term, the Corps also revegetated the island, placing netting with topsoil over stabilizing riprap, to help prevent future erosion.

On another island, a $350,000 site protection project involved stabilizing eight hundred feet of shoreline by means of bioengineering techniques involving the laying of coconut mat materials to prevent erosion and promote growth of vegetation. The site was important also as a wildlife habitat; therefore, bioengineering was important.

Site Stabilization-Before

Site Stabilization--After

Land Acquisitions and Transfers in Relation to Cultural Resources

Lower Snake River Fish and Wildlife Compensation Plan

Many cultural resources studies were conducted in conjunction with the District's purchase of land for habitat areas in conjunction with the Lower Snake River Fish and Wildlife Compensation Plan. The chief of the District's Real Estate Division commented on the lands acquired as a result of the compensation plan: "We've had a lot of very interesting things to deal with over the years, from a real estate standpoint, with tribes, and others. As long as we own these lands that are adjacent to the river, the tribes are very interested in everything that we do out there. All of these lands that we've acquired under the compensation, there was very little the tribes could do at that time for protection. Now that we've bought some of them, obviously these things are of much more interest to the tribes (75)."

In 1987, the District made a cultural resources reconnaissance survey of over twenty-nine parcels of land (thirty-five acres) on the Bailie Memorial Youth Ranch. The survey was done as part of the District's development of habitat area for upland game birds and migratory waterfowl. Then, in 1990, cultural resource surveys were conducted over five parcels of land considered for purchase under the District's compensation plan. The purpose of the work was to provide preliminary information on the cultural resources potential of each land segment prior to purchase. In 1991, the District made cultural resources inspections on twelve parcels of land considered for government purchase under the compensation plan. The purpose of the inspections was to provide preliminary information on the cultural resources potential of each segment of land prior to purchase. Through 1992-94, cultural resources testing and/or review continued to be done on all segments of land considered for acquisition or development.

Again as part of the Lower Snake River Fish and Wildlife Compensation Plan, in 1989 the District did cultural resources testing on two wildlife habitat management units, or HMUs. The units were along the Clearwater River in Lower Granite project. Testing was undertaken to determine if archaeological sites recorded in each of the HMUs would be disturbed by current and proposed Corps activities.

Port of Whitman

In 1989, the District performed cultural resource tests on two archaeological sites on Wilma Bar on the Lower Granite project. This work was done as part of a proposed land exchange with the Port of Whitman.

Transfer of Tri-Cities Lands under the Water Resources Development Act of 1996

The 1996 Water Resources and Development Act (76), the biennial legislation that largely funds Corps of Engineers civil works programs, included a provision for the transfer of certain Corps lands in the Tri-Cities, Washington, area to local governmental entities. The act authorized the transfer of approximately 2,500 acres of land that were purchased as part of the McNary project. The most important parcel of land in this bill was Columbia Park, a riverfront park along the Columbia River.

Most of the land specified in the 1996 act was already under lease to local governments in the Tri-Cities. The Cities of Richland, Kennewick, and Benton and Franklin Counties in Washington were all interested in further developing the park (see the longer discussion of this proposed transfer in chapter 11).

Columbia Park, however, was not only a recreation haven for current residents of the Tri-Cities, it was also the site of one of the most prominent inadvertent archeological discoveries in history. Columbia Park was where the Ancient One (Kennewick Man) was discovered (see discussion below). Given that discovery, Walla Walla District and area Indian nations were concerned about the level of protection that would be given to other archeological sites that might be found in the park.

Because the land involved might include burial sites and traditional cultural properties, several thorny questions arose:

- Was the Corps responsible for full compliance with all applicable cultural resources laws and regulations before conveyance of the land? If so, more survey and inventory work might need to be conducted. How, then, would the Corps and/or the local governments accomplish cultural resources mitigation? Since the State Historic Preservation Office had determined that the land transfer would have an adverse effect on cultural resources, the Corps would be required to do an in-depth investigation of possible site mitigation measures, as required under Section 106 of the National Historic Preservation Act. The cost for such work was estimated at between $200,000 and $500,000.
- Would local governments be able to afford the costly site protection measures that the Corps completed at the site where the Ancient One was found? What would happen if future inadvertent finds on these lands occurred?

- Would local ordinances and state laws be as effective in protecting cultural resources on the transferred land as were federal laws and regulations?
- Would tribal concerns and the need for consultation with tribes be fulfilled as part of the transfer and new surveying efforts?

Indeed, in the late 1990s the Corps extended an existing contract with Hemisphere Field Services, a company evaluating sites for the Corps in the McNary area. The extended contract called for noninvasive field survey work on the lands specified in the Water Resources Development Act of 1996. The contractor used ground-penetrating radar, as outlined in a draft report provided to the Corps in May 2000.

Consideration of cultural resource protection related to this legislated transfer was largely responsible for the fact that the transfer had not taken place by the end of the period covered in this volume.

Transfer of McNary Project Lands to the U.S. Fish and Wildlife Service

By Congressional mandate, as expressed in the Water Resources Development Act of 1999 (77), the Corps was required to transfer lands that had been part of the McNary project to the U.S. Fish and Wildlife Service. These lands would become part of the Umatilla Wildlife Refuge. The parcels included Madame Dorian Park and lands along the river from Burbank, Washington, to Wallula, Washington. Although these lands would remain under federal management, the Payos Kuus Cuukwe was concerned about adequate funding for cultural resources management on these lands. It was unclear if funding would still come from the Corps and Bonneville Power Administration or from the U.S. Fish and Wildlife Service.

Leased Lands

The District often leases out land, especially land that is used as parks. Circumstances related to cultural resources can occur on leased lands. The Chief of Walla Walla District's Real Estate Division described one situation that happened in the mid-1990s at Hells Gate State Park in Idaho: "They were in the process of building a sediment pond up there. In just about all cases like this, where we think there may be cultural resources, our lessees or grantees are required to have an archeologist present in case they do happen upon something. In this particular case, they did find some mammoth remains, a fire pit, and so on. That required some adjustments as far as the … [plans] out there (78)."

Dworshak Cultural Resources

One of the District's major projects was the Dworshak Dam and Reservoir on the North Fork of the Clearwater River in Idaho. The North Fork of the Clearwater River has a rich history. Traces of this history remain and are protected by the Corps. The Nez Perce Tribe used the area for sustenance and religious purposes before European culture arrived. Later, the area was important for bootleggers, homesteaders, and loggers. The river was an important transportation corridor in moving logs to market.

A survey of cultural resources by the Nez Perce Tribe revealed over four hundred significant sites and isolated findings in the drawdown zone alone. It is possible that additional, yet undiscovered cultural resources sites could be found across the project. Dozens of homesteads remain on project lands. All sites require monitoring and

protection to comply with laws and regulations, including the National Historic Preservation Act.

The operation of Dworshak Reservoir involved significant changes in water levels. Cultural resource sites in the reservoir drawdown zone were particularly vulnerable to the effects of shoreline erosion. In 1986, the District commissioned a site reconnaissance survey on Dworshak Reservoir as follow up to information provided by local archaeologists. As a result of the reconnaissance survey, Idaho State and Walla Walla District staff conducted a tour of Dworshak to determine if a survey is needed in the reservoir drawdown zone. The reconnaissance survey showed that high potential existed for numerous archaeological sites to be located within the drawdown zone. Based on the results, a complete and systematic survey of the reservoir drawdown zone was undertaken.

The District contracted for an intensive survey in the drawdown zone at Dworshak Reservoir in 1989. The survey identified more than 160 new sites. In 1997-1998, the upper portion of reservoir lands was surveyed. In addition, the entire project was remapped. No sites were excavated in these surveys; rather the investigators studied the geology and looked for evidence of cultural resources sites.

Throughout the 1990s, particularly as a new master plan was being developed for Dworshak Dam and Reservoir, more attention was paid to cultural resources management at the project. In 1994, the District entered into a Memorandum of Agreement with Bonneville Power Administration regarding cultural resources actions to be undertaken at Dworshak Reservoir in 1994 as part of BPA's intertie project. This provided increased funding for cultural resources management at Dworshak.

In the late 1990s, the District contracted with the Nez Perce Tribe for development of a Dworshak Cultural Resources Management Plan. In developing the plan, the tribe compiled data for all the land claims and homesteads made in the project area as well as developing lists of cultural resources sites, their integrity, and National Register status. The third and final phase of the Plan was being prepared at the end of 2000.

In the late 1990s, the Nez Perce Tribe also worked on monitoring and surveying Dworshak cultural resources. The investigators concentrated on the drawdown zone, which was comprised of fifty-four miles of reservoir branching off at two ends. The annual drawdown of 150 feet destroyed the shoreline and caused artifacts to move around, out of chronology, within sites. Each year several new sites were discovered along the newly exposed shore. For example, in the year prior to April 2000, six new sites were added to the inventory. In fiscal year 1999, the tribe was contracted to survey twelve sites. The tribe observed some unauthorized human activities at monitored sites, including stakes being pulled up.

The Nez Perce Tribe assessed Dworshak cultural resources collections in the late 1990s. By the end of 2000, a rough draft of an assessment was completed. It was discovered that a private individual had excavated one site on project territory prior to completion of the reservoir, but the whereabouts of any artifacts removed are unknown. With that exception and the exception of the collections of the Nez Perce Tribe cultural resources program, all other Dworshak-related collections are under federal management.

In 1992, the District developed and installed a cultural resources exhibit at the Dworshak Visitor's Center. The exhibit covers the major themes identified for the North Fork of the Clearwater River—Native American occupation, mining, Euroamerican settlement, and the timber industry.

Inadvertent Discoveries

Inadvertent discoveries of archeological sites take place when evidence of artifacts or human remains are found, not as a part of an archeological survey, but as a result of other human activities at the discovery site. During the period covered by this volume, Walla Walla District has experienced several inadvertent discoveries, including the world famous one, discussed below, in which the remains referred to as the Ancient One, or Kennewick Man, were recovered.

Several inadvertent discoveries in the late 1990s took place at islands in the Columbia River (see above section on site protection and stabilization). For example, in 1997, a controversial discovery of a human skull was made on Strawberry Island. The incident was reported later in a regional newspaper article:

> "Although the remains were believed to be those of an American Indian from about 200 years ago, the Franklin County coroner initially refused to turn them over to the Corps of Engineers.
>
> "The skull eventually was turned over to representatives of four mid-Columbia Indian tribes at a meeting in Hood Park. Yakama tribal officials said the island belonged to them for thousands of years.
>
> "Archeologists excavated parts of the island in the 1970s and determined it was probably a winter village for Indians going back at least 600 years (79)."

In 2000, the island, owned by the Corps but managed as part of the McNary Wildlife Refuge, experienced a serious fire that was of concern to those wishing to protect cultural resources at the site: "The fire took most of the riparian vegetation, so about two thirds of the island is denuded. … It was definitely a man-caused fire," the manager of the refuge said (80). There was great concern because removal of vegetation sometimes allows archeological sites to become more visible. Law enforcement efforts on the island were stepped up to prevent antiquities law violations.

One of the difficulties with inadvertent finds was in budgeting for them. The Corps normally had difficulty in holding back funds for unplanned activities and in carrying forward funds when no unplanned activities occur in a given year. Sometimes it was unclear which budget should support costs associated with inadvertent discoveries. At first, for example, it was hoped that special funds might be available to deal with inadvertent finds of human remains that fell under the Native American Graves Protection and Repatriation Act. Only limited funds were ever available to federal agencies specifically in relation to the act, and the Corps was rarely able to draw on such funds.

Funding for activities in relation to inadvertent discoveries was a significant concern of regional tribes as represented by participants of the Payos Kuus Cuukwe. At the end of the period covered by this volume, Walla Walla District had achieved a notable exemption allowing a limited ($500,000 maximum) carryover of funds to cover future inadvertent discoveries.

Reinterment

Even before cultural resources management came to the fore as an area of concentration within Walla Walla District, there were instances when project construction or operation disturbed a Native American burial site. A District staff member and long-time resident of the region discussed the situation:

> "When I was small, one of my first archeological remembrances was my dad took us out on weekends, and we worked on the Marmes site, which was being done by the Corps of Engineers. … Those sorts of things, at that time, were considered extraordinary scientific … [endeavors]. But [these digs were] not part of the values of the [Native American] people.
>
> "Today, I look at things like grave-digging as, would I want someone digging my ancestor's graves? No, I would not. I'd find that appalling. I'd rather they didn't, and so I look [likewise] at the issue in this land. …
>
> "Let's just say there've been 250,000 people alive in this entire region, which defines how big the region might be. They've been alive for 10,000 years. Their lifespan was somewhere around twenty-seven years. How many graves does that create? What is the grave density of that? It's extremely high. It means that everywhere, everywhere there are graves (81).

A moving reburial ceremony that took place in 1982 is described in the box below. In 1986, a burial recovery was made on the Little Goose project. In 1987, reinterment of a Nez Perce burial took place at Lapwai, Idaho. The burial was recovered from the Little Goose Reservoir. Many other reinterments were quietly completed during the period covered by this volume.

BURIAL CEREMONIES BECOME FOCAL POINT OF A LIFE'S HERITAGE

I haven't been up this early since Fr. [Father] Kilian led a sunrise jog-n-pray at college. I knew I should have brought a coat. This breeze coming up and over the banks of the Yakima River is ignoring my sweater. We waited 90 minutes for the 6 a.m. reburial ceremony to begin. … The ceremony will begin when the community arrives and the moment is right. Use the time to meditate. … It does wonders for one's health.

Chain link and barbed wire fences, a two-acre rectangle of sagebrush and sand-soil in the desert west of Richland. This is the sight of an 1850s ambush of 66 Indians. It is now the West Richland Indian Cemetery. An unidentified security zone in the middle of a wasteland. It is also sacred ground.

I witnessed countless funerals as an altar boy. Funerals for those from nursing homes where the mortuary attendants outnumbered the mourners and the car procession following the hearse numbered one. A funeral for a town's favorite son, whose life was tragically cut short and whose rain-soaked mourners were greeted by a brilliant double rainbow. Spanish funerals, where altar boys fought to keep solemn looks because of how funny everything sounded. Weekday funerals were held at 10 a.m. Serving the funeral meant dispensation from math class.

But never had I seen a funeral for those long since interred and forgotten—who having been accidentally disturbed—were reinterred by their descendants. Some of them driving hundreds of miles for the occasion.

Their music was beautiful. Hollywood has not done justice to the Indian chant. It is a stunningly beautiful free vocal interplay. A voice jam session with a single bell bass. Improvised music from a traditional way. No monk at a Latin high mass ever sang so true. The monk's notes may be clearer, sharper, reflective of classical forms, but they will always reek of a performance; a show singing for the benefit of others, not a lyrical expression of his being. Only a monk of from the middle Ages could sing a Gregorian chant with authenticity.

The Indians sang with authenticity. It was ceremony in the true sense of the word. …

Blankets. Colorful blankets and a half-woven mat, placed design-side-down upon four white boxes of remains. One aqua-blue bell with gold trim beats a steady rhythm of chanting. The bell swings instinctively to an over-the-head crescendo. Indian right hands are raised, palms out. The wail quickens and raises an octave.

Grant Wahneka traveled 300 miles from Warm Springs, Ore., to give the reburial sermon. "Who knows what chiefs or medicine men these may have been. What leaders from what tribes they were. We come here today to give respect to what they were and who they may have been." He spoke to convince the Caucasians present that what they gathered to do was not superstitious nonsense to put wandering spirits to a final rest; but rather, a memorial tribute to a people and a way of life. The ceremony is no more unusual than the lighting of an eternal flame or the erection of a monument so that the future will not forget those who allowed it to be.

Heritage is the reaffirmation of what we were, with the ceremonies that made us what we are. Heritage is a living monument. It is an eternal flame that not only reminds the future, but also unites the future with the past. I was glad I attended the reburial ceremony Aug. 10. I got to see my first funeral. –Jim Sawatzki, *Intercom*, 1982 (82).

The Ancient One (Kennewick Man)

On Sunday July 28, 1996, two young men went to see the boat races at Columbia Park in Kennewick, in Benton County, Washington. The men waded out from the shore of the Columbia River and, "Thus it happened that, squinting through the two-foot-deep water for safe footing, Will Thomas saw what he thought was a smooth, round rock looming in his path. … 'Hey,' he shouted to Deacy, reaching into the water and plucking out the rock, 'we have a human head (83).'" More remains from the same individual were found later, including a pelvis bone embedded with what was later identified as a spearhead worked in the Cascade tradition of Native American weapon-working.

The local newspaper reported the find the next day (84). By Tuesday, the newspaper ran a story saying that the Benton County Coroner's Office had determined that the remains were likely those of a white settler, that is, about 100 or 150 years old (85). This information was later conveyed to Walla Walla District, which held title to the lands at Columbia Park that Kennewick, Washington, leased.

However, when radiocarbon testing indicated that the remains were approximately 9,000 years old—making it one of the oldest discoveries in the Americans of such a complete remains—tribal representatives, scientists, and government officials began to realize that this inadvertent discovery was one of the most significant ever made (86).

A search made in 2003 of the term "Kennewick Man" on Amazon.com, the self-proclaimed world's largest bookstore, revealed that Kennewick Man is mentioned in sixty-one books, and this includes only mentions that happen to be quoted at the Web site. A cursory review reveals that Kennewick Man, or as members of many regional Indian tribes prefer to call him, "The Ancient One," is now a prominent figure in books about American prehistory.

By the end of 2000, at least three books focusing specifically on the discovery of The Ancient One had been published: *Riddle of the Bones: Politics, Science, Race, and the Story of the Kennewick Man* (87) by Roger Downey; *Ancient Encounters: Kennewick Man and the First Americans* (88) by James C. Chatters; and *Skull Wars: Kennewick Man, Archeology, and the Battle for Native American Identity* by David Thomas Hurst (89). The reader is referred to these works for detailed information on this monumental discovery. Downey and Chatters' works give details about the actual events surrounding the discovery as well as background information on regional archeology; while the Hurst volume links the treatment of The Ancient One's remains to two centuries of deplorable practice in the treatment of Indian remains on the part of the U.S. institutions and scientists.

The discovery of Kennewick Man was important to science because of its early date and the completeness of the remains. To science, Kennewick Man was an object worthy of the most detailed scientific study. It was the key, perhaps, to new understanding of how people lived and how they came to North America. The Ancient One was important to Native Americans because he was their revered and ancient ancestor, his burial protected, so they had been promised by the U.S. government, by law, specifically by the Native American Graves Protection and Repatriation Act.

THE DISCOVERY OF THE ANCIENT ONE AND DISTRICT INVOLVEMENT

Kennewick man … is essentially a trial balloon for these laws that protect [cultural] resources. –Mark G. Eastman, Park Ranger (90).

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There's one thing that will stand out [in the history of Walla Walla cultural resource management], obviously, and that's the Kennewick Man situation. There's never been anything like that.

Much of what we heard at the time is based on newspaper articles that anybody can read. … During the hydroplane races in 1996 over at Columbia Park, two college age kids were on their way down to the boat races, walking in the water, shallow water. One of them hit something. Turns out it was a skull. They stashed the skull away. Went to the races. After the races were done, they came back. Don't know if they collected anything more, but they notified the police. The police showed up, started looking in the area. More remains were found. At that point, the county coroner for Benton County brought in Dr. James Chatters who was under contract with them to analyze bones. Dr. Chatters collected them. This happened, I believe, on a Saturday.

On Monday, we got a call from one of the tribes, the Umatilla [Confederated Tribes of the Umatilla Indian Reservation], inquiring about a newspaper article saying remains had been found. We had not even heard anything up to that point. We did some calling. I talked to Jim Chatters. He said that, in his opinion, at that point, what he told me is that he thought they were the remains of a non-Indian. He thought maybe an early settler. …

[Eventually Chatters'] studies indicated that they [the remains] were Indian, [but] at the time, he was telling me he didn't believe they were. … We passed that word on to the tribes. …

It just so happened that literally the day they were to make the press release that these were 9,000-year-old human remains, or shortly before that—we became aware of that fact [i.e., became aware that these were ancient remains], which made this a totally different situation than what we thought we had a month ago [*i.e.*, previously].

The rest has been played out pretty much in the newspapers. … We ended up with a court case that's still ongoing. We're waiting to see how that will work out. Without any doubt, that's been the most significant event that's occurred in the cultural resources program because of the publicity it's received. …

You just don't come across 9,000-year-old human remains. … To my knowledge, I don't think any other Corps District ever encountered this kind of a situation. There are other agencies, federal agencies that are dealing with remains that are about as old or maybe a little bit older than Kennewick Man. But, again, not the Corps. …

Because Kennewick Man has been such a unique situation, outside of the normal process, it's skewed things. … In some sense, you're almost better off to put Kennewick man in its own little compartment. … The politics of Kennewick Man have been … beyond anything I've ever encountered. It's hard to get a real perspective on [the situation]. …

That situation overran, not only the Cultural Resources end, [but also] the legal end, for a year or more. Two to three people in the District [worked] … not quite full-time dealing with that issue. –John P. Leier, Walla Walla District Archeologist (91).

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[The situation surrounding the Ancient One] was a real wakeup call for this District. Something which seemed so insignificant—because we've found a lot of bones along the river and we've taken care of them [*i.e.,* reinterred them] —suddenly … [caused] the world [to be] looking at how Walla Walla District is run. …

The Kennewick Man [situation] actually aided our position with the tribes because they saw us defending something. We agreed with them that it was a NAGPRA [Native American Graves Protection and Repatriation Act] issue. We were moving the way they [the tribes] would have preferred before we got … [involved in] a lawsuit. That opened up a "we can work things out" type of relationship. We [*i.e.,* the tribes and the Corps] began to talk to each other a little more. We deferred to them on how the remains would be moved. We also had to listen to the plaintiffs [on that issue].

Those are the little occurrences that make you look back and say, there really was a change after that. It did take us in a different direction. All I can say is that [the Kennewick Man situation], plus the introduction of the Native American Coordinator [position] has done nothing but assist us in getting a better relationship [with local tribes].
–Lynda G. Nutt, former Native American Coordinator (92).

In 1996, the Corps took steps to stabilize the site where The Ancient One was found, thus preventing other inadvertent discoveries. The stabilization effort was similar to others that the Corps undertook in the late 1990s along the shore of the Columbia and the Snake River. The project involved covering the site with rip-rap and replanting vegetation to further protect the site.

In October 1996, the Corps was in the process of taking steps to reinter the remains of Kennewick Man, after allowing a period for public comment. At that point, reinterment was stayed by legal action. The eight scientists who were plaintiffs in a lawsuit, *Bonnischen, et. al v. United States of America* essentially claimed, among other things, that the remains found in Kennewick were too old to establish cultural affiliation with existing tribes. Cultural affiliation is required in the NAGPRA. Thus, began a legal entanglement of major proportions.

In June 1997, federal Judge Jelderks of the U.S. District Court in Oregon issued an opinion that put the issue of cultural affiliation as the center of the case. In his opinion, the judge wrote:

> "In reaching its decision on the ultimate disposition of the remains in question ... the Corps should consider, inter alia, the following issues:
>
> --whether these remains are subject to NAGPRA, and why (or why not);
> --what is meant by terms such as 'Native American' and 'indigenous' ... ;
> --whether ... NAGPRA applies to remains or cultural objects from a population that failed to survive ...;whether NAGPRA requires (either expressly or implicitly) a biological connection between the remains and a contemporary Native American tribe;
> --whether there has to be any cultural affiliation between the remains and a contemporary Native American tribe—and if yes, how that affiliation is established if no cultural objects are found with the remains;
> --the level of certainty required to establish such biological or cultural affiliation, e.g., possible, probable, clear, and convincing, etc. …;
> --whether there is evidence of a link, either biological or cultural, between the remains and ... any other ethnic or cultural group including (but not limited to) those of Europe, Asia, and the Pacific islands (93)."

In *The Riddle of the Bones*, Downey interprets the situation:

> "By asking the Corps to clarify and define the terms of NAGPRA, the judge had implicitly accepted the specious but intriguing line of argument introduced by the plaintiffs' attorney Paula Barran in the very first hearing on the case back in October 1996. If no present-day Native American could show a plausible line of descent from Kennewick

Man, then Kennewick Man himself could not be considered Native American. Given that on the testimony of James Chatters and others, the remains did not resemble those of modern Native Americans, the burden of proof was on the Corps to establish the connection. The only way to do so would be through the very kinds of scientific testing demanded by the plaintiffs.

"In principle, you could say it was a clean victory for the plaintiffs, though in practice, the judge gave the scientists and their attorneys little comfort. Their application to study the remains was denied. True, the Corps was sent off with its tail between its legs and a hefty homework assignment, but the remains would remain under lock and key, unexamined by anyone, for the time being. Meanwhile, the plaintiffs were instructed to collaborate with the Corps in seeking clarification of the judge's questions and in developing procedures whereby they could be answered. 'The parties are to provide the court with quarterly status reports (preferably a joint report, but separately if they cannot agree)' at three-month intervals until 'this matter is resolved (94).'"

The Corps of Engineers and the U.S. Justice Department turned to the Department of the Interior, qualified because of its archeological expertise in the National Park Service and its relationships with Indian issues via the Bureau of Indian Affairs and because the Department is the source of regulations and guidance regarding cultural resources protection laws.

Up until 2000, the public and media interest in the ongoing litigation regarding the ancient human remains known as Kennewick Man remained high. The Ancient One was the subject of numerous inquiries, newspaper articles, and a live, national radio broadcast. In mid-2000, the case remained in the federal court, and experts from the U.S. Department of Interior were still examining the skeleton.

On September 25, 2000, Walla Walla District issued a press release announcing the determination of the Department of Interior regarding The Ancient One:

"The U.S. Army Corps of Engineers announced today that, based on a Department of the Interior determination, the ancient human remains commonly called "Kennewick Man" or "The Ancient One" should be returned to a coalition of tribes under provisions of the federal Native American Graves Protection and Repatriation Act of 1990. In its report to the court, the Corps announced it would deny the plaintiffs' request to further study the remains.

"'This report bears out the original course charted by the Walla Walla District four years ago. We feel it vindicates our actions which were guided by extensive intra- and interagency consultations,' said Lieutenant Colonel Richard P. Wagenaar, District Commander. 'Now we will continue to work within the legal system to complete the NAGPRA process.'

"The report is the product of an agreement entered into by Interior and the Army more than two years ago. A key responsibility was to determine whether the remains were covered under NAGPRA and what should be done with them. Interior announced early this year that they were indeed protected by NAGPRA. Interior recently reported to the Army that the coalition of claiming tribes is entitled to the more than 9,000-year-old remains.

"The Corps will continue the administrative process for transferring the remains while continuing to defend against the case in the court. Today's filing cites Justice Department guidance that the plaintiffs have no right to study the remains as they claimed under the First Amendment to the U.S. Constitution.

> "The Corps began NAGPRA administrative processes four years ago following a claim by a coalition of tribes: the Confederated Tribes of the Umatilla Indian Reservation, The Yakama Indian Nation, The Nez Perce Tribe, The Confederated Tribes of the Colville Reservation, and the Wanapum Band. The transfer to those claimants was halted by a lawsuit initiated by eight academics and scientists who demanded the right to study the skeleton (95)."

The Ancient One was not, however, laid to rest in the twentieth century. The case was appealed by the plaintiffs and, as of this writing in 2003, it appears that this issue will come before the 9th U.S. Circuit Court of Appeals.

Lewis and Clark

As detailed in chapter 3 of the Walla Walla District commissioned volume, *Controversy, Conflict and Compromise: A History of the Lower Snake River Development,* in 1805 and again in 1806, Lewis and Clark traveled through the territory that was to later be within the boundaries of the Walla Walla District. As the U.S. came close to the bicentennial of the expedition, the District planned to participate in the national commemorations of the historic journey. The Corps had direct land management responsibilities for a portion of the expedition's route along the Clearwater River.

A staff member from Walla Walla District, Craig Rockwell, served as the Columbia River basin coordinator for the Bicentennial celebrations. The District worked with the tribes to determine their requirements for displays and exhibits that might be created on Corps property.

The District anticipated increased public visitation along the route of the Lewis and Clark Expedition and along the Snake and Columbia Rivers. Regionally, it was estimated that there would be a twelve percent increase in visitation to public sites in relation to the Bicentennial. It was expected that many visitors would not be the casual ones who normally visit historical exhibits. Many would be following the expedition's route with detailed information about where the Expedition camped, *etc*. Site protection was a concern in anticipating this type of visitation.

At the end of 1999, the National Park Service took the lead in planning for the Bicentennial with a program called "Corps of Discovery II, 200 Years to the Future." At the end of the period covered by this volume, District staff and others involved in the bicentennial planning were concerned because there did not seem to be sufficient resources to make adequate preparations for site protection, exhibits, or for building facilities to handle the expected influx of visitors.

One specific event related to preparations for the Lewis and Clark Bicentennial and its impact on cultural resources—the proposed expansion of Hood Park to accommodate a larger number of visitors. Omaha District assisted an overworked Walla Walla District staff by administering the contract for an inventory of the proposed park expansion site (as required by Section 106 of the National Historic Preservation Act). The Confederated Tribes of the Umatilla Indian Reservation received the contract for this work, which took place in 2000.

LEWIS AND CLARK IN THE INTERIOR NORTHWEST

On 12 August [1805] the Corps of Discovery reached the source of the Missouri River. The next day an advance party of Lewis, Drouillard, and two privates encountered the Shoshones. Using friendly hand signals and gifts, the soldiers managed to win the trust of the Indians. Four days later Clark and the rest of the Corps of Discovery joined Lewis and established Camp Fortunate. At the council that evening, Sacagawea was there to interpret. But before the meeting began, she recognized the Shoshone chief Cameahwait as her brother. She immediately embraced him. Lewis wrote that the reunion was "really affecting." More gifts, promises of future trading, and the good fortune that the chief of the Shoshones was the brother of Sacagawea enabled the party to secure horses and guides for the journey along the Continental Divide and over the rugged Bitterroots to the country of the Nez Perce Indians. The hard, forced march across the Rockies along the Lolo Trail, where the freezing cold and lack of food pushed the Corps of Discovery to the limits of its endurance, ended in late September [1805], when the advance party under Clark met the Nez Perce.

On 23 September Lewis and Clark held a council with Twisted Hair and some lesser chiefs of the Nez Perce. Anxious to get to the Pacific (and aware of the fact that they were no longer in U.S. territory), the captains dispensed with the usual displays of American military might and instead passed out medals and gifts, explained their mission to Twisted Hair, and requested his assistance in building canoes for the expedition. Indeed, the soldiers were so weak from crossing the Rockies that they could hardly move and spent nearly a week recovering. The Nez Perce could have easily destroyed the expedition, but thanks largely to their generosity and kindness, the canoes were finished by 6 October and the Corps of Discovery was ready for its final leg to the Pacific.

On 7 October the expedition began its journey down the Clearwater, Snake, and Columbia Rivers to the ocean. In dealing with the tribes they encountered along the way, Lewis and Clark followed their usual practice of expressing joy at meeting the Indians, urging them to make peace with their neighbors, handing out gifts, and promising more trade goods from future American traders. To impress the tribes, the Corps of Discovery occasionally paraded in formation or showed off a magnifying glass, the air gun, or another device. Friendly talk and displays of the expedition's military prowess usually impressed the Indians and guaranteed safe passage. …

After three months of constant rain, dietary problems, fleas, and boredom, the Corps of Discovery left Fort Clatsop on 23 March 1806. Concerned with the security of the expedition, the two captains wanted "to lose as little time as possible" getting to the Nez Perce. They decided to return along the same path they had come, satisfied that it was the best possible route. Even though security was rigid, at various points on the way up the Columbia, Lewis and Clark had to use the threat of violence to preclude trouble with the Indians. In early May they finally reached their old friends, the Nez Perce. Once again, the Nez Perce demonstrated their hospitality by feeding and taking care of the Corps of Discovery. During a two-month stay with the Nez Perce, Lewis and Clark held councils with the tribal elders, while their men participated in horse races and other games with young Indian warriors. Clark also used his limited medical skills to create more goodwill. These activities built great relations with the Indians. Indeed, Lewis wrote that the Nez Perce considered Clark their "favorite physician."

On 10 June, over the objections of the Nez Perce, the Corps of Discovery set out toward the Lolo Trail. The Indians had warned Lewis and Clark that the snow was still too deep to attempt a recrossing of the Rockies. Eager to get home, the captains ignored this sound advice and proceeded on without Indian guides. In a week the expedition found itself enveloped in snow twelve to fifteen feet deep. Admitting that the going was "difficult and dangerous," Lewis and Clark decided to turn back. "This was the first time since we have been on this long tour," Lewis wrote, "that we have ever been compelled to retreat or make a retrograde march." Sergeant Gass agreed, and noted that most of the men were "melancholy and disappointed." Two weeks later, the Corps of Discovery set out once again, this time with Indian guides.

Averaging nearly twenty-six miles a day, the expedition took just six days to reach the eastern side of the Rockies. On 30 June Lewis and Clark set up camp at Travelers Rest. There, the Corps of Discovery rested for three days before implementing the final portion of its exploration. –*The U.S. Army and the Lewis and Clark Expedition* (96).

Curation of Collections

In 1985, Walla Walla District completed preliminary inventories of its cultural resources collections located throughout the Pacific Northwest. The purpose of the inventories was to provide basic information on the type, size, and condition of all cultural resources collections belonging to the District. Also, portions of collections identified as deteriorating were stabilized.

In the late 1980s and the early 1990s, inventorying of the District archaeological collection at Washington State University, University of Idaho, and the Idaho State Historical Society in Boise, Idaho, continued. In 1997, a regional newspaper described the ongoing inventorying process at Washington State University:

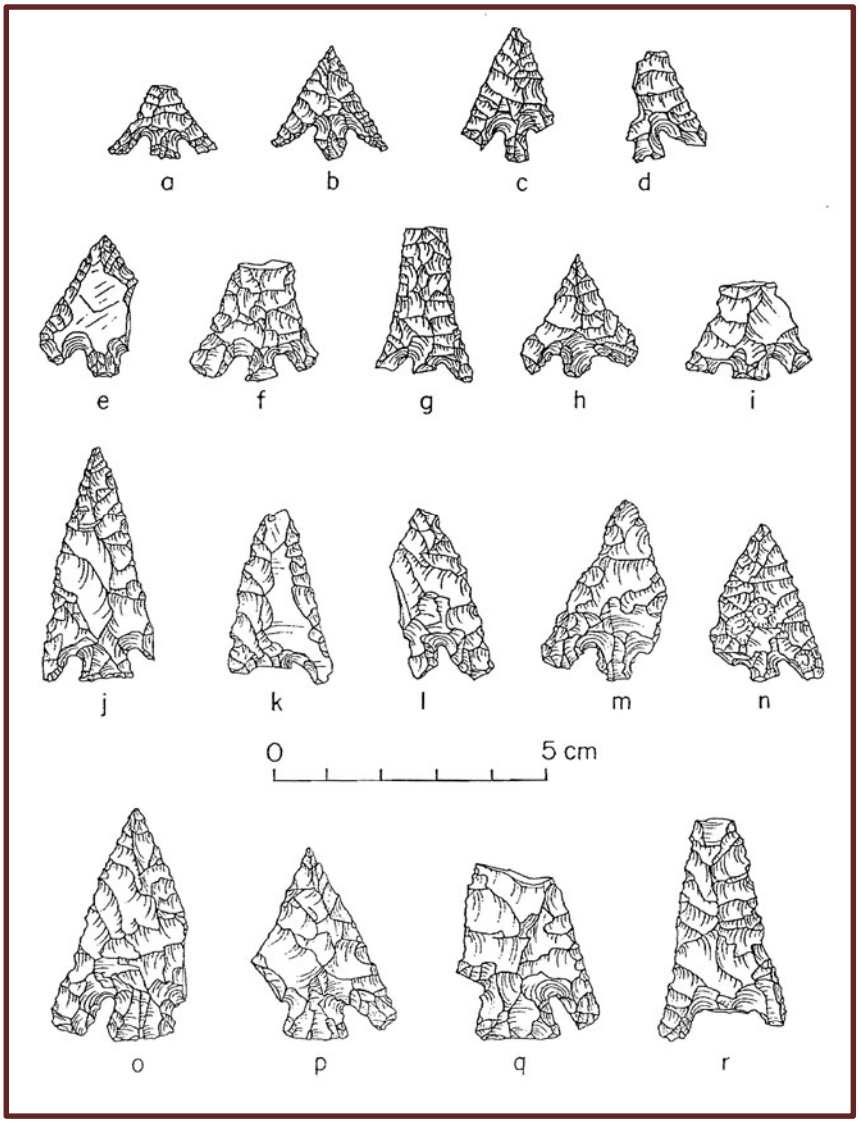
> "Piece by painstaking piece, WSU scientists are examining 50,000 artifacts excavated from the Snake River before the dams flooded eons of mid-Columbia history. …
>
> "'The undertaking is a massive job for a small staff,' said Mary Collins, assistant director of the WSU anthropology museum, 'and it can be profoundly tedious cataloguing hundreds of tiny fragments of bone or stone flakes.'
>
> "WSU's collection – owned by the Army Corps of Engineers – was believed to be the largest of Paleo-Indian artifacts in North America in the early 1960s and still ranks as one of the largest in the state (97)."

The first year of inventory of District cultural resources collections under the Native American Graves Protection and Repatriation Act was 1994. At that point, inventories of District collections began to sort out items from American Indian burial rituals, including human remains. Washington State University, the University of Washington, Oregon State University, the University of Oregon, the University of Idaho, Eastern Washington State University, and the Idaho State Historical Society performed inventories for NAGPRA.

Native Americans such as Armand Minthorn, religious leader of the Confederated Tribes of the Umatilla Indian Reservation, welcomed NAGPRA. "Scientists have dug up and studied Native Americans for decades. We view this as desecration of the body and a violation of our most deeply held beliefs," he wrote on the tribe's Web page (98). "Today thousands of native human remains sit on the shelves of museums and institutions waiting for the day when they can return to the earth, and waiting for the day scientists and others pay them the respect they are due (99)."

During the late 1990s, Walla Walla District was in the process of assessing and analyzing existing collections, particularly in relation to each of the major reservoir projects it managed. Collections of funerary objects, historical and ancestral use materials, and even human remains were scattered in various institutions and some artifacts from federal lands had fallen into the hands of private collectors.

Arrow and Dart Points found at a District Site (100)



Assessments attempted to determine the location and general status of preservation of collections as well as whether each collection contained materials subject to repatriation under the Native American Graves Protection and Repatriation Act.
After assessments were completed in 1999-2000, the Corps hoped to conduct evaluations of each collection. The Colville Confederated Tribes began the process by working on collections assessment for the McNary project.

The District was pursuing the idea of consolidating collections at Washington State University for Washington materials; the University of Idaho for Idaho collections; and the Oregon State Museum of Anthropology for artifacts from Oregon sites.

Technology and Cultural Resources

Bioengineering for Site Stabilization

As discussed above in the section on site protection and stabilization, Walla Walla District faced several challenging situations that required stabilization of eroding reservoir shorelines in order to protect cultural resources. The District experimented with using onsite materials and revegetation over armoring riprap placed on sites.
One site protection project stabilized eight hundred feet of shoreline by means of laying coconut mat materials that slowed erosion and allowed plants to grow over the site.

a. Emergent aquatic plants in WES greenhouse nursery that were seeded on coir fiber mat

b. Emergent aquatic plants established on a coir fiber mat being rolled up in WES nursery ready for transport to bioengineering site

c. Coir geotextile mat in a roll planted with emergent aquatic plants being carried to planting site

Figure 25. Coir geotextile mat being prevegetated in WES nursery in 1983 and transported to field site ready for immediate growth (Roots and stems of the plant have already been established in the mat)

Geographic Information Systems

Archeology has always had a strong geographical component. Even in traditional archeology, sites must be located regionally and then carefully mapped individually, showing the spatial relationships of artifacts. Walla Walla District was a leader in the use of automated geographic information systems (as discussed in chapter 3). In the late 1990s, it became evident that geographic information systems technology could be utilized to assist the District with cultural resources management.

Geographic information systems technology involves the output of maps layered with information about different spatially oriented elements. The vegetation types, topography, and cultural resources sites (for example) can each form a different layer or theme of a GIS-based map for a particular area. Underlying the GIS map is a database of facts and statistics related to spatial coordinates. With cultural resources, a site's informal name, numerical site designation, age, status of investigation, former ownership, and latitude and longitude, could all be entered into the GIS database.

Geographic information systems technology has helped Walla Walla District cultural resources managers with large-scale inventories of sites throughout the District lands. In 1994, a GIS database was established for Lower Granite, Dworshak, and Jackson Hole. The Mill Creek database was established in fiscal year 1993. Work continued on the regional databases to the end of the period covered by this volume. Once landforms are all GIS mapped for District lands, the District hopes to use this data for cultural site predictions based on elevation and proximity to streambeds.

One important aspect of GIS work related to cultural resources was tracking where all land in the District originated—who owned it before the Corps. By 2000, tracking the origin of land tracts associated with Dworshak Reservoir had been completed. The information was loaded in a GIS database in conjunction with the District's Master Plan for Dworshak and as part of the supplemental environmental impact statement process. The Payos Kuus Cuukwe was very interested in how this data could be shared (for example, via compact disc) with the tribes.

During 2000, the McNary Cultural Resources Management Plan used geographic information systems technology, to a limited extent. During an eight to nine month process, data from sites discovered before the updated inventory had to be linked with data more recently discovered.

At the end of 2000, the Payos Kuus Cuukwe group was discussing support for funding more input of cultural resources data into GIS databases. As envisioned by Corps staff, such an undertaking has many phases and would take multiple years to complete. Ever changing technology and software was a concern in investing time and money in creating a cultural resources GIS database.

Noninvasive Field Technologies

The Corps, via its contractor, used ground-penetrating radar to do noninvasive field survey work on lands mandated for transfer under the Water Resources Development Act of 1996 (see an earlier section of this chapter). The contractor and the Corps needed to develop an innovative approach to using this technology on a site heavily covered by vegetation.

Another example of noninvasive field techniques took place when the contracted crew from the Confederated Tribes of the Umatilla Indian Reservation mapped McNary project sites using a laser reflecting survey.

Notes for Chapter 10

1. Research archeologist, Paul Nickens, from the Corps' Waterways Experiment Station, commenting during his visit to the Walla Walla District quoted in: Cultural resources: Drawdown presents opportunity, challenges to District archeologist. *Intercom*, May 1992, p. 13.
2. PL 59-209.
3. PL 74-292.
4. PL 86-523.
5. PL 93-291.
6. PL 99-662.
7. PL 89-665.
8. PL 96-515.
9. National Park Service. *The Secretary of the Interior's Standards and Guidelines for Federal Agency Historic Preservation Programs Pursuant to the National Historic Preservation Act*. Washington, DC: The Service, 1998.
10. PL 95-341.
11. PL 96-95.
12. PL 101-601.
13. Under the Native American Graves Protection and Repatriation Act, an inventory is a written document providing a specific description of a museum or federal agency's collection of Native American human remains and associated funerary objects. The statutory deadline for inventories was November 16, 1996. Certain museums were granted extensions (by the National Park Service). See: National NAGPRA. Washington, DC: The Service, [2003]. INTERNET: http://www.cr.nps.gov/nagpra/.
14. A funerary object is an object that is either placed with human remains during a death ceremony or made specifically for mortuary purposes (from National Park Service, national NAGPRA Web site).
15 PL 106-541.
16. Cushman, David W. When worlds collide: Indians, archeologists and the preservation of traditional cultural properties. *Cultural Resources Management* 16, special Issue (1993), p. 49-54.
17. Ragz-International World History Center. Archeology. Ragz-International, 2001. INTERNET: ragz-international.com/archeologylhtm.
18. USACE, Walla Walla District. *Dredged Material Management Plan and Environmental Impact Statement--McNary Reservoir and Lower Snake River Reservoirs*. Final. Walla Walla: NWW, July 2002, p. 3-34.
19. Sonderman, Robert C. Primal fear: deaccessioning collections. *Common Ground*, vol. 1, no. 2, summer 1996.
20. Leier, John P. Interview. Walla Walla: NWW, 12 July 2001.
21. Thomas, David Hurst. *Skull Wars: Kennewick Man, Archeology, and the Battle for Native American Identity.* New York: Basic Books, 2000.
22. Ibid, p. 62-63.
23. Ibid, p. xxxiv.
24. Ibid, p. xxv.
25. Nutt, Lynda G. Interview. Walla Walla: NWW, 20 September 2001.
26. Banks, Larry. Army Corps of Engineers. In Smith, George S., et al., compilers. Archeology and the federal government. *Cultural Resources Management Bulletin*, special issue, v. 11, July 1988. This special issue, available on the Internet, is an excellent introduction to the topic.
27. USACE, Mandatory Center of Expertise for the Curation and Management of Archeological Collections. MCX-CMAC projects. St. Louis: The Center, 2000. INTERNET: www.mvs.usace.army.mil/eng/Curation/Projects.htm.
28. USACE, Construction Engineering Research Laboratory. Cultural resources risk assessment. Champaign, Ill.: Construction Engineering Research Laboratory, 27 September 2001. INTERNET: www.cecer.army.mil/td/tips/indesAREA.cfm?AREA=9.
29. Leier interview.
30. Reported by Pomraning, Allen N. Interview. Walla Walla: NWW, 24 January 2002.
31. Nutt interview.
32. Leier interview.
33. Wolff, Carol A. District seeks better ties with tribes. *Intercom*, September 1994, p. 11.
34. Leier interview.

35. Leier interview.
36. Nutt interview.
37. Central Washington University, Central Washington Archeological Survey. *Overview and Inventory of Cultural Resources in the Malheur Basin Project, Southeastern Oregon.* Walla Walla: NPW, 1986.
38. Loftus, Bill. Corps, tribe agree to let fish hatchery proceed. *Lewiston Morning Tribune*, 24 March 1990, B1.
39. Bonneville Power Administration, Bureau of Reclamation, and USACE, North Pacific Division. *Columbia River System Operation Review, Final Environmental Impact Statement, Appendix D: Cultural Resources*. Portland, OR: The Agencies, 1995.
40. Leier interview.
41. *System Operation Review, Appendix D: Cultural Resources*, p. 1-1.
42. Ibid, p. 1-2.
43. Ibid, p. 1-2.
44. Ibid, p. 1-10.
45. Ibid, Exhibits, figure 11, p. 39.
46. Ibid, p. 1-11.
47. Arbios, Gerry. Cultural resource program protects native treasures. *Engineer Update*, August 1998.
48. Reid, Kenneth C. *An Overview of Cultural Resources in the Snake River Basin: Prehistory and Paleoenvironments*. Submitted to NWW under contract DACW68-95-Q-0157. Pullman, WA: Rainshadow Research, 1995.
49. U.S. Army. *Cultural Resources Management*, Army Regulation 200-4. Washington, DC.: U.S. Army, 1998, chapter 4.
50. USACE, North Pacific Division, Bonneville Power Administration and Bureau of Reclamation. *Columbia River Salmon Flow Measures: 1992 Options Analysis/Environmental Impact Statement.* .Seattle: The Agencies, 1992.
51. Hackett, James S. Ancient village unearthed. *Intercom*, 6 August 1987, p. 3.
52. Ibid.
53. Snake River drawdown to expose history. *Washington State Evergreen (Pullman)*, 2 March 1992, p. 1.
54. Ibid, p. 7.
55. Loftus, Bill. Snake's secrets are starting to surface. *Lewiston Tribune*, 4 March 1992, p. 1A.
56. Loftus, Bill. Snake yields human skull. *Lewiston Morning Tribune*, 10 March 1992, p. 1A, 3A.
57. Titone, Julie. Tribes want to help watch ancestral sites. *Spokane Spokesman-Review*, March 2000, p. B1.
58. Loftus, Bill. Snake yields human skull. *Lewiston Morning Tribune*, 10 March 1992, p. 3A.
59. USACE, Walla Walla District. *1992 Reservoir Drawdown Test: Lower Granite and Little Goose Dams*. Walla Walla: NPW, 1993, p. xxxix.
60. USACE, Walla Walla District. *Lower Snake River Juvenile Salmon Migration Feasibility Report/Environmental Impact Statement.* Final. Walla Walla: NWW, 2002.
61. Ibid, p. 5.7-1-p. 5.7-3.
62. Ibid, p. 5.7-6-p. 5.7-7.
63. Parker, Patricia L. Traditional cultural properties: What you do and how we think. *Cultural Resources Management* 16, special Issue (1993), p. 1.
64. Parker, Patricia L., and Thomas F. King. *Guidelines for Evaluating and Documenting Traditional Cultural Properties*. National Register Bulletin, no. 38. Washington, DC.: National Park Service, 1990.
65 Leroy Allen quoted in: NPW hosts Division cultural resources training. *Intercom*, 18 March 1983.
66. Ibid.
67. Preston, Seth. Robbing a people's past: tribe demands tougher penalties for illegal digging. *Lewiston Morning Tribune*, 10 September 1989, p. 3A.
68. Ibid.
69. Stapp, Darby C., and Julia G. Longenecker. Reaching out to the Mid-Columbia in Washington State. *Society for America Archeology Bulletin* 17, no. 2 (March 1999). INTERNET: www.sa.org/publications/saabulletin/17-2/saa13.html.
70. PL 96-95.
71. Hagey, Jason. Hermiston man found guilty of disturbing Indian artifacts. *Tri-City Herald*, 18 May 2000.

72. Paul Nickens, quoted in: Cultural resources: Drawdown presents opportunity, challenges to District archeologist. *Intercom*, May 1992, p. 16.
73. Ibid.
74. Leier interview.
75 Carlton, Richard. Interview. Walla Walla: NWW, 24 October 2001.
76. PL 104-303.
77. PL 106-53.
78. Carlton, Richard. Interview.
79. Hagey, Jason. No major damage from Snake River island fire. *Tri-City Herald*, 18 May 2000.
80. Farquhar, Brodie. Fire burns island in Snake River. *Walla Walla Union-Bulletin*, 22 May 2000.
81. Pomraning interview.
82. Sawatzki, Jim. Burial ceremonies become focal point of a life's heritage. *Intercom*, 20 August 1982, p. 1.
83. Downey, Roger. *Riddle of the Bones: Politics, Science, Race, and the Story of the Kennewick Man.* New York: Springer-Verlag, 2000, p. 5.
84. Stang, John. Skull found on shore of Columbia. *Tri-City Herald*, 29 July 1996.
85. Schafer, Dave. Skull likely early white settler. *Tri-City Herald*, 30 July 1996.
86. The saga was played out in the newspapers and is captured online in the Kennewick Man Virtual Interpretive Center. *Tri-City Herald*, 2001-. INTERNET: www.Kennewick-man.com.
87. Downey, Roger. *Riddle of the Bones*.
88. Chatters, James C. *Ancient Encounters: Kennewick Man and The First Americans.* New York: Simon & Schuster, 2001.
89. Thomas, David Hurst. *Skull Wars*.
90. Eastman, Mark G. Interview. Walla Walla: NWW, 25 June 2001, NWW.
91. Leier interview.
92. Nutt interview.
93. Excerpt in Downey, p. 116-117.
94. Downey, p. 117-118.
95. USACE, Walla Walla District. Corps receives Interior Dept. results, advises court: Give ancient human skeleton to tribes. News release. Walla Walla: NWW, 25 September 2000.
96. U.S. Army, Center of Military History. *The U.S. Army and the Lewis and Clark Expedition.* [Washington, DC.]: The Center, [2000?].
97. Lee, Mike. Pullman scientists sort Corps artifacts. *Tri-City Herald*, 27 September 1997.
98. Confederated Tribes of the Umatilla Indian Reservation. Ancient One determined to be culturally affiliated with Five Tribes. Pendleton, OR: Confederated Tribes of the Umatilla Indian Reservation, 25 September 2000. Press statement. INTERNET: www.umatilla.nsn.us/kennman6.html.
99. Ibid.
100 Reid, Kenneth C. *An Overview of Cultural Resources in the Snake River Basin: Prehistory and Paleoenvironments*. Submitted to NWW under contract DACW68-95-Q-0157. Pullman, WA: Rainshadow Research, 1995. Figure 2.14, page 2.34.
101 Allen, Hollis H., and James R. Leech. *Bioengineering for Streambank Erosion Control*. Environmental Impact Research Program, Report 1, Guidelines; Technical Report EL-97-8. Washington, DC: USACE, 1997. Figure 25, p. 38.

Chapter 11. Recreation and Land Management

Recreation Program—Corps of Engineers

At the end of the twentieth century, the Corps of Engineers was the nation's largest provider of outdoor recreation, operating more than 2,500 recreation areas at 463 projects (mostly lakes) and leasing an additional 1,800 sites to state or local park and recreation authorities or private interests. The Corps hosted about 360 million visits a year at its lakes, beaches, and other areas, and estimated that 25 million Americans (one in ten) visited a Corps project at least once a year. Supporting visitors to these recreation areas generated 600,000 jobs. For many citizens, the rangers at the recreation sites represented their only contact with the Corps or the Department of the Army.

Since the vast majority of Corps recreation areas are located next to water, the Corps, in partnership with other agencies, was active in a National Water Safety Program. Walla Walla District administered the program, which is discussed below.

Overview of Recreation in Walla Walla District

Walla Walla District had sixty-seven recreation sites (listed in sections below). The Corps managed thirty-seven of these sites, and lessees managed thirty. The District offers the public twenty-three boat ramps, six visitor centers, 258 campsites, and 833 miles of lake shoreline. Outdoor recreational opportunities include boating, fishing, hunting, camping, viewing migrating fish, swimming, biking, and walking.

Total recreation use in Walla Walla District in 1985 was 6,263,666 visits. Throughout the 1980s, visitation decreased slightly to a low of just over 5.5 million visits annually at the end of the decade.

In 1991-92, the Corps implemented its Visitation Estimation and Reporting System, developed by the Corps Waterways Experimental Station. The VERS system had two phases: Phase I was to input all recreation survey data and meter readings. The District contracted with Walla Walla Community College to input the recreation survey data. The meter readings were input and analyzed by the Corps. Walla Walla District compled phase I in 1991. In phase II, completed in 1992, recreation use surveys were conducted at sites within the District for each of the four seasons.

In 1995, the Corps and cooperating agencies published the *Columbia River System Operation Review* (1). Appendix J, Recreation, provided a rich and detailed picture of recreation along the Columbia River basin, including many of the recreation sites under the jurisdiction of the Walla Walla District. The report analyzed water-based recreation under four types of scenarios: free flowing rivers and streams, storage reservoirs, run-of-the-river reservoirs, and controlled downstream river reaches. The authors of the appendix made the following point: "It is difficult to overestimate the importance of water as a recreation resource, especially in the Basin where opportunities for water-related recreation are so diverse and varied (2)."

During the late 1990s, during the preparation of the *Lower Snake River Juvenile Salmon Migration Feasibility Study* extensive study was made of recreation benefits and costs in relation to the lower Snake River (3). Not all of this recreation took place on Corps lands, but the estimates are an indicator of recreation levels in the area. Five surveys identified current recreation use. Based on these surveys, total recreation use on lands and reservoirs along the lower Snake River was nearly 1.15 million trips annually worth a total of over $82 million per year (see table below for details).

Table 3. Lower Snake River Estimated Existing Recreation Trips and Benefits

Survey	Number of Trips	Willingness to Pay ($ per trip)	Annual Benefits ($ millions)
Reservoir Angling*	66,000	29.23	1.956
Reservoir General Recreation	442,834	71.31	31.578
Upriver Angling**	11,393	35.71	.406
Central Idaho Angling	129,026	37.68	4.862
Central Idaho General Recreation	497,480	87.24	43.400
TOTAL	**1,147,659**	**n/a**	**82.224**

*Angling is defined as fishing or recreation related to fishing.
**Upriver on the Snake from the town of Lewiston, Idaho.

Nature Trail at McNary Lock and Dam Project

Most of the uses of recreation sites maintained by Walla Walla District were compatible with each other. However, one District environmental specialist spoke about some conflicting uses:

> "There are some conflicts between nonconsumptive recreationists versus consumptive. Out at Mill Creek, there are some folks here in town that like to just go out there and walk and look at birds, and they're not too happy when it's hunting season. I've received some seasonal complaints from those folks, 'Hey we almost got shot at by these hunters. Why can't you have more of a buffer zone?' Or, 'Why do you have to allow this hunting?' … As more and more housing areas build up around our property, we're going to have to think about what we allow there as far as hunting. It's already shotgun-only anyway.
>
> "Out on the Snake … recreational sites can also be used for wildlife management and then recreation does occur on wildlife management lands, not only your fish and wildlife type recreation, but just people going out there. …
>
> "[For example, there is] the sand beach at Illia. We had a … beach at the upstream end [and a] boat launch. But at the downstream end it was a sandy beach. … That was all part of the wildlife management unit. … [College] kids started showing up, and they parked and they trampled vegetation to get out to the beach. After a while we decided … we'd better build a parking lot. … We've turned it into a recreation facility at that end, because that's where everybody kept going. To help preserve the rest of the site, we thought we better accommodate these people, so we did. … [The public] tell you where they want to go (4)."

DIVERSIFIED RECREATION

Up until about the 1980s, we always placed an economic value on recreation, but the economic value was very closely related to how we recreated. … Pretty much, we had the Ozzie and Harriet view of recreation: the family goes out, you have a tent or a trailer, and you pull a motorboat. … Recreation at the Corps of Engineers represented motor boating and waterskiing. Under motor boating, you get all the fishing opportunities, sightseeing, and all that, but it was pretty much motor boating.

The environmental movement came around, and we began to view all the issues of the EPA and of natural resource management. We began to recreate in new ways. Now it's chic to climb rocks or to go backpacking. Riding horses is no longer work; now we do it for enjoyment. It's a different way. It requires an environment [in] which we seek nature. We seek water; we seek green things; we seek the desert. … [We look for places] that are not adulterated by man. Seeking nature in those ways, in quiet, thoughtful ways—that's changed our perception and our values.

Actually, [it's changed] how the Corps places an economic value on recreation. We place economic value on many kinds of recreation today that we simply didn't do [previously]. … The money represents the values given to us by the people through the Congress. … Today we see very robust recreational budgets. Never enough for the recreation people, but better than they were.

Not only are they robust, but they're diversified. … We are given the opportunity to make local decisions about how we'll spend that money. Sometimes, it's for signage, or sometimes it's for trail development, or sometimes it's for the creation of habitat areas that may be just for hunting [or] for fishing dock facilities. We'll build a dock so that wheelchair people can go fishing and enjoy it. Many kinds of recreation that would have never been conceptualized in the past [are now considered] so that we serve the nation in a much broader way.
–Allen N. Pomraning, Planning staff member (5).

Training for Recreation Management

A Walla Walla District recreation planner talks about the District's involvement in developing a national recreation training program, a program that the Corps began to emphasize in the 1980s:

> "The Visitor Assistance Program … was really developing in the early '80s. The first ever rangers in the Corps were in 1972, and there were only six of them—that was in Tennessee. They started hiring rangers around the country. Initially, we farmed out all of our visitor assistance training to places like Slippery Rock College in Pennsylvania [or] Louisville. [The] University of Southern Mississippi is where I went for one of my early … [training sessions]. In 1984, myself, from the field, and three others, respectively from District, Division, and Headquarters level, became the team to put together the national course. From 1984 on, we have taught that course in-house. … I taught in it for the first two years (6)."

Walla Walla District park rangers and managers, along with guests from Alaska, Portland, and Seattle Districts as well as staff from North Pacific Division, attended a week-long Resources Management Conference in Boise, Idaho, in October 1994. Speakers included a public affairs officer from the Bureau of Land Management, the Idaho State Parks Director, an interpretive specialist from the University of Idaho, the director of the Morrison-Knudson Nature Center in Boise, and several Corps presenters. Also in 1994, rangers from Seattle, Portland, and Walla Walla District attended a three-day Visitor Assistance Training Session that was coordinated and taught by Corps North Pacific Division personnel, U.S. Attorneys, and local law enforcement officers.

Lockage Schedules

Walla Walla District administers five locks and dams along the mid-Columbia and lower Snake Rivers. These are McNary, Ice Harbor, Lower Monumental, Little Goose, and Lower Granite Locks and Dams. The locks provide inland navigation for commercial barge and other traffic, but also opportunities for recreational boaters to travel up and down the river in their personal craft.

Because the locks are so large and the operation of them consumes quite a bit of energy, the District decided that locks could not be raised and lowered at will to accommodate recreational use. (See the section on navigation in chapter 4 for more details on lockage schedules.)

Visitor Centers

During most of the period covered by this volume, McNary, Ice Harbor, Lower Granite, and Dworshak projects within Walla Walla District all had visitor centers,

In the mid-1980s, some of the visitor facilities were closed during the off-season to conserve energy and reduce maintenance costs. In 1993, staff at Dworshak Vistitor Center found an innovative way to save on cooling:

> "An early spring maintenance check of the freon-based cooling system at the visitor center stressed the need for major maintenance. Freon recharging alone can be an annual expense of $2,000 plus. In addition the current environmental regulations and awareness of the dangers of freon led [staff] to examine an alternative. … After using a contractor to remove the remaining freon from the old system [the crew] replaced it with a heat exchanger. The equipment went from the size of a car to the size of a truck muffler system. … Water from the reservoir is pumped

from a depth of 220 feet at a temperature of 43 degrees Fahrenheit. At the visitor center the water cools the air through a simple heat exchange process (7)."

In 1981, the Ice Harbor visitor facility opened. The center served "as an introduction to how the Northwest has harnessed its waters to provide power, recreation, navigation, and irrigation. Visitors were invited to walk down inside a throbbing 90,000-kilowatt turbine. Another high point of a center tour was the opportunity to see part of the Snake River fish population pass in view while the visitor watches from an underwater room aside the dam's fish ladder. Visitors were also invited to drive across the dam and view a lockage (8)."

In addition to the fish viewing facility at Ice Harbor, fish viewing rooms were available at McNary, Little Goose, and Lower Granite projects.

In 1994, the Pacific Salmon Visitor Information Center at the McNary Juvenile Fish Facility in Umatilla, Oregon, opened with new state-of-the-art interpretive exhibits focusing on the Corps' mission in salmon recovery. The park ranger working at the center at its opening described its purpose: "In order to understand the decisions that may be made to save salmon runs in the Northwest, a background of the salmon's life is needed. … The modern exhibits are devoted to the natural and cultural history of the salmon, complete with life-size models of fish in their natural habitat (9)."

Pacific Salmon Visitor Information Center

The Public Affairs Office and Operations Division worked together to conduct a media day at the new Pacific Salmon Information Center one week prior to the September opening of the facility. When it was completed in 1994, the center was the only facility in the Pacific Northwest that focused on salmon from so many diverse angles (10).

The Pacific Salmon Information Center became a venue for area programs. For example in 2000, the Center offered the "Natural Wonders of the Mid-Columbia Speaker Series," introducing the flora, fauna, and geology of the area to the public (11).

Lower Granite Lock and Dam also had a visitor center, open seven days a week, which offered movies, interactive displays, brochures, guided tours, and staff assistance. Staff at Lower Granite offered small group and family tours of the powerhouse and Juvenile Fish Facility during the summer season.

Interpretive Programs and Community Relations

Many of Walla Walla District's interpretive programs took place at visitor centers and recreation sites, while others were outreach programs presented in communities throughout the District.

An interpretive contractor from Colorado completed a District-wide interpretive booklet in 1993. The information obtained through this process was used at the District's operating projects to guide planning for the visitor facilities, interpretive displays, and brochures.

In 1996, Walla Walla District received two awards from the National Association for Interpretation. The first was in the "Interpretive Skills Training" category for the development of a *McNary Training Manual for Interpreters* (12). The second award was for the "Traveling Columbia and Snake River Waterway Interactive Navigation Exhibit." The creator of this exhibit described it: "The purpose of this exhibit is to stimulate interest in and build appreciation for navigation on the Columbia and Snake River system and to emphasize the significant role this has played in the development of the Northwest (13)." The exhibit used photographs, an authentic audio program of riverboat shipping sounds, as well as original and replica items to get across its message.

Tours

In 1995, McNary's Pacific Salmon Visitor Information Center reported typical levels of touring: approximately 10,000 students from forty-five area elementary and high schools visited; 117 college students toured in groups; church and home school groups visited for a total of three hundred people; a cruise line visited thirteen times, bringing nine hundred visitors (14). In the summer of 1995, McNary offered "Kid's Day at McNary Dam," an event attended by 300 children. Walla Walla District visitor centers hosted similar types of activities throughout the period covered by this volume.

A ranger describes his tour-related duties:

> "I was the tour coordinator for both Lower Granite and [Little] Goose. Granite would get the most visitation. … Lower Granite is close enough to Lewiston, Pullman, Moscow, Colfax, Grangeville that they would have a lot of school tours, organized tours, especially in the springtime when they are doing juvenile fish collecting. We had to coordinate all that to have enough people on hand to conduct these tours. At first, there were no formal tour guides at Lower Granite. During my

tenure, we did get a tour guide to give public information. They would do everything: the dam, hydroelectric production, juvenile fish facility, and the lock. Up there they had all that eccentric machinery at Lower Granite for assisting bypass in juveniles. We got a tour guide full time seasonal (15)."

Public Affairs in the Field

Walla Walla District's Public Affairs Office was responsible for issuing news releases. During the twenty years covered by this volume, the majority of news releases related to the District's recreational program. In 1990, for example, Public Affairs prepared and disseminated fifty-eight news releases to local and regional media. Principal subjects included Dworshak Dam water releases and the Corps' recreation season. Dworshak water releases (see discussion below) were of continuing interest to the public, causing the District to issue one or more drawdown news releases each year during the period covered by this volume.

Out of sixty news releases issued by Walla Walla District in 2000, thirty-four of them were related to recreation. Among many other topics, news released alerted the public to a temporary visitor center closure, to the recreational lockage schedule, to recreational opportunities at McNary, about the fact that fireworks were not allowed in Corps parks during the Fourth of July holiday, and about stakeholder meetings held to discuss recreation area modernization.

The District's Public Affairs Office coordinated news events, especially controversial ones, often related to fish programs and the dams. In 1990, for example, the Office assisted Bonneville Power Administration, local officials, and county officials in planning and coordinating media coverage for the dedication ceremonies for the Umatilla Fish Hatchery.

Also in 1990, in conjunction with Earth Week activities, the Public Affairs Office coordinated a media day event during the opening of the Little Goose Juvenile Fish Facility, which was attended by Congressional and media representatives.

In 1999, Walla Walla District Public Affairs Office provided media orientation training to rangers and other natural resource staffers for the Eastern Area Project Office and the Dworshak Dam Natural Resources Management staff, as well as some individual District office staff members.

Community Relations

In addition to providing tours, Walla Walla District reached out to communities at regional, state, county, and municipal events. Some of these are detailed below to give the reader a taste of the many, diverse activities in which the District participated.

In 1986, the District prepared a display for the Southeastern Washington Fair and an entry in the Frontier Days Parade in Walla Walla. The traveling display was also set up during Lumberjack Days near Dworshak Dam, Orofino, Idaho.

In 1990, Walla Walla District's Public Affairs Office coordinated one of the District's most successful exhibits for the annual Southeastern Washington Fair, which was held in late August. The exhibit, entitled "Environmental Engineering: An Investment in the Future," featured several environmental murals of District projects. Also in 1990, staff prepared

an Armed Forces Week exhibit for the Blue Mountain Mall in Walla Walla and assisted with Corps exhibits for an Earth Day Fair at Walla Walla Community College. In conjunction with Earth Week, the District also coordinated a media day event for the opening of the Little Goose Juvenile Fish Facility, which was attended by Congressional and media representatives.

By 1991, a member of Walla Walla District's Public Affairs Office served as an advisory member of the 1991 Southeastern Washington Fair Committee.

The Public Affairs Office coordinated preparation of a fiftieth Anniversary Hanford Brochure and Exhibit in 1992. In 1993, Walla Walla District acquired new movable exhibits. One exhibit told the story of the District in general, while another focused on activities at the Hanford Nuclear Reservation where the District was assisting with superfund cleanup. These modular, easily assembled exhibits, were used extensively by the District's Equal Employment Opportunity Office, Engineering Division, and the Hanford Program Office for such community relations projects as partnering with local schools, recruitment of personnel from Southwestern schools, and celebration of National Engineers Week, as well as commemoration of the fiftieth Anniversary of the Hanford Nuclear Reservation.

Through the end of the period covered by this volume, the District remained active in local and regional community events, such as 1994's "Make A Difference Day," a program of community assistance to the needy and the annual Walla Walla Frontier Days.

Speakers Program

In 1990, the Public Affairs Office began to track the external speeches of Walla Walla District employees. In 1992, the District published a Speaker's Program brochure. In 1993, the formal Speaker's Bureau Program was organized and developed to manage speaking arrangements for District personnel. The program continued to 2000 and beyond and provided speakers for schools, community groups, and public events.

Recreation Web Site

In the late 1990s, Walla Walla District developed an extensive Recreation Web site (16). All of the District's recreational areas, including those leased to the states and other entities, were listed with information about facilities available, hours of operation, and administration and contact numbers. According to a staff member who maintained the site, it was designed to be "not only appealing to the public, but [to provide] information to government employees (17)."

Public Input on Recreation Issues

Public interest in recreation resources can be high. One Walla Walla District manager described the situation: "Recreational craft, navigation users—that's a significant impact. We're finding that. We found with Lower Granite when we replace that gate that it has significant regional impacts. People get very involved in that and want to have a say in it. That's probably the key difference. Probably twenty years ago, thirty years ago, that we'd look at all the information from a District standpoint trying to figure out the best options, what's best for the region, what costs the least to deliver a quality

product. Now there are a lot more public meetings, stakeholders, and people coming in, which is good in the long run (18)."

Since the recreation program serves the public directly, Walla Walla District has attempted, from time to time, to hold public meetings related to recreational land use. A series of "stakeholder" meetings were held at Walla Walla, the Tri-Cities, and Clarkston in Washington and at Boise, Idaho, in 2000. No meeting was held at Dworshak, primarily because a public scoping meeting to review that project's master plan had been held in 1999. The meeting in Clarkston, for example, was advertised as "Corps Seeks Input for Recreational Improvement (19)," specifically, as an opportunity to discuss planned area park improvements and to find out about Lewis and Clark Bicentennial initiatives.

Public turnout at the meetings was low, with no more than thirty people attending any one session. A Walla Walla District staff member described the stakeholder meetings: "The idea was to get from the public what they want to see happen at the project. At the same time, there's an opportunity for us to share a couple of things—Lewis and Clark Bicentennial, the Park Modernization Program. … It was successful in that we had several Congressional people show up—aides (20)."

However, public meetings held to discuss specific recreational issues could draw more attention from the public. "[Because of safety concerns], it was thought within the Corps that we should change the policy about fishing off the wall at [Little] Goose [Dam]. I was directed to advertise for a public meeting. … They [the public] didn't want to lose the opportunity to fish out there. We had seventy-five people show up at that public meeting at Little Goose, which is way out of the way. … [When] you can get seventy-five out to Goose, crowded into the lunchroom, you know what their passion is. There are probably that many more who feel that way (21)."

Public input regarding recreation services offered by the Corps also came by informal means, primarily by interaction between the public with rangers and other staff at the projects: "This whole business about the customer being right, I believe in that. I feel that I'm a servant, and if they have a legitimate request [we should consider that]. We provide sanitation facilities, a place with at least the appearance of security and certain conveniences like boat launches and garbage disposal. All this other stuff—that's not the average camper's concern. They want to go out there and relax and have a good time. It's pretty simple, but it can get very complex because it's in a government format (22)."

Visitor Safety

Situations often occur in recreational settings that may put visitors at risk. Incidents that may involve visitor safety include health emergencies, accidents, crimes, and natural disasters such as fires, floods, and storms. Visitor safety required continual staff training, upgrading of physical facilities and signage, and communications systems that would support fast response to emergencies.

During the twenty years covered by this volume, on-project improvements for visitor safety were a high priority. Examples of improvements included realignment of McNary Beach Park Road, restriction of skateboard use at Ice Harbor, installation of an

interagency radio communications system at Dworshak, enforcement of slower driving at Mill Creek, and signage installation at a new water discharge area at Lucky Peak.

Walla Walla District also took action to improve conditions at outgranted areas, including cooperative inspections with safety and real estate representatives. An inspection of all Corps-operated recreation areas was completed during the spring of 1988 by Natural Resources Management and Safety personnel to gather baseline data on conditions and potential hazards at District recreation sites.

Park rangers were required to have training in cardiopulmonary resuscitation and other first aid techniques. Rangers frequently took training in rescue techniques: "As a result of being on the Confined Space Rescue [Team], I got additional first aid training, which is good for me. … You might actually save somebody's life. You've got to have the training, courage, and confidence to do that role (23)."

Other safety precautions were of a more mundane nature. Corps staff routinely tested how potable the drinking water was at recreation sites. Sanitation could also be an issue. For example, there were reoccurring problems with toilet facilities at the Texas Rapids recreations site, which ran off a generator normally shut down at night for safety reasons. "If you had a busy weekend—100 people out there 4th of July—that's a safety issue. The policy was such that you'd lock the doors, and a lot of time you didn't have a backup outhouse. It was up to me to get one there by hook or by crook. … Sometimes, you had to get it all the way from Clarkston. I've actually driven a truck with … a port-a-potty on the weekend. … Over my five years, this probably happened twenty times (24)."

Until the era of cell phones, communication from Walla Walla District recreation sites was poor, and the personal safety of rangers remained an issue: "Communication was very poor from Little Goose to Clarkston on the phone, the radio. If you are in the field, you are pretty much out there by yourself. Sometimes, you'd have radio contact with the sheriff's department; sometimes you didn't. We did upgrade it with cellular satellite telephones. That took a long time getting it straight, because they weren't very reliable. We had trouble with providers. I would say it took a year. 1997 maybe, we got those. There was this initiative coming nationally for safety for park rangers. We also had to do personal protection training—judo or philosophical things, verbal skills. Twenty hours each year. Safety equipment [was required] on vehicles. That was driven by a national mandate (25)."

Water Safety

With so many square miles of water and miles of shoreline under its jurisdiction, Walla Walla District has always had a concern for water safety.

Throughout the late 1980s, the District participated in National Safe Boating Week, emphasizing its concern for water-related safety with displays and activities at recreation sites. The District also contracted with local law enforcement agencies to patrol in order to try to keep boaters safe. For example, the Walla Walla County Sheriff's Office was paid to help patrol ninety miles of river on the weekends during the Memorial Day to Labor Day recreational season (26).

In 1991, Lower Granite-and Little Goose projects were successful in establishing the Lewis and Clark Water Safety Council (the 47th nationwide). This effort served a two-state region within the Walla Walla District. Although initiated by the Corps, it was a multiagency and private industry joint venture aimed at addressing all aspects of water safety.

Sometimes there were water safety stories with happy endings. One such story occurred in 1984 when a Corps staff member happened to be walking at the Mill Creek recreation site. The staff member dove into the water and swam out to tow a struggling teenager to safety (27). Another man was rescued from near-death in the water in 1988. A private citizen using Levey Park, adjacent to Ice Harbor Lock and Dam, heard cries for help. He used an inner tube to rescue an unconscious man. Another citizen administered artificial respiration to the victim who was revived and taken to the hospital (28). Too many other water accidents ended in tragedy. For example, in 1992, a five-year-old boy from Firth, Idaho, was lost in the waters of the Snake River and, in 1998, a man drowned while swimming a half-mile downstream from Levey Park (29) .

Because of a rash of drownings on the lower Snake River in 1992, the Walla Walla District Public Affairs Office and the Natural Resources Management Section, Operations Division, initiated a series of news releases and reader board messages to regional media urging water safety by river users. A longer and more comprehensive public awareness program was initiated in 1993. There were seven drownings in 1993. In 1995, there were still twelve drownings within the reaches of the Columbia and Snake Rivers within the District.

Walla Walla District efforts continued to "get the message out" about water safety. In 1996, the McNary project hosted a day that focused on water safety. The District teamed with area groups such as the American Red Cross and the U.S. Coast Guard Auxiliary to present the event. "Waterfest Day" was planned as an event to educate children on water safety, but also allowed adults to learn ways to keep their children safe while in the water. Children taking part in Waterfest Day were offered a variety of activities to participate in, such as a water safety obstacle course and a water safety poster coloring contest. … A 60-seconds-to-float game and demonstration of hypothermia known as Cool Hand Luke was also popular (30)."

A Walla Walla District ranger talks about the effort to reach out to area students with a message of water safety:

> "One of my other [areas of interest] was water safety in schools. … I got into Camp Wooten. It's an environmental camp on Forest Service land up the Tucannon [River]. For a certain grade, [schools would] send the kids out there for one week. It's a good block of training. I weaseled my way into going to Camp Wooten and doing this water safety. I'd already done it in Clarkston, [and] Lewiston. … But I had a much smaller population to work with at [Little] Goose. Eventually, I got accepted into Pomeroy (4th-5th-6th grade), Dayton, Washtucna, Lacrosse, [and] Colfax, [Washington], and Connell for a natural history program. These are radiating out of that dam [Little Goose]. Any one of those would be an all day deal. You're actually competing with other special interests, other agendas who want those kids as a captured audience, for whatever reason (31)."

Corps staff members at the projects received special training to help them in case of emergencies on the water. A Motor Boat Operators course was taught in May 1994,

at Lake Sacajawea. This course, in which fourteen people were trained, completed the District's goal of training all people needing a boat operator's license prior to the end of that year. In 1999, training continued when the District provided a personal watercraft training session to thirty Corps operations and natural resources managers and to local county sheriffs' deputies.

A ranger described his experiences in dealing with emergencies in the field during the period covered by this volume:

> "I was a member of the Confined Space Rescue Team, but we never did have anybody need to get rescued. That was voluntary. All the other members were from the [hydroelectric] powerhouse. … We had drowning victims [that] I coordinated removing from the river. …
>
> "We had a boater break his neck, diving in. That was an emergency helicopter evacuation to St. Mary's [Hospital] here [in Walla Walla, Washington]. I wasn't right there at the park. Shortly after, I interviewed all the people who rescued the guy out of the water [and] took notes on how they proceeded. … They had to go to the dam, which was eight miles away, and use our pay phone to get to 911. They sent a helicopter all the way from Spokane. The people did a very good job of coordinating that. The guy survived. I had to do followup at the hospital (32)."

Seamoor—Walla Walla District's Water Safety Roving Remote-Control Ambassador

National Water Safety Program

In 1994, a Walla Walla District Natural Resources Management employee, Lynda Nutt, completed a four-month developmental assignment at Corps Headquarters in Washington, DC, working on the National Water Safety Program. At the end of her term, she was asked to serve as the Corps' Water Safety Coordinator for the Corps' National Water Safety Program to be housed in Walla Walla.

WALLA WALLA TAPPED TO ADMINISTER THE NATIONAL WATER SAFETY PROGRAM

It was brought to my attention that they were doing away with the Corps' centralized, National [Water Safety] Program because they didn't have a manager anymore, and [they] asked if I'd be interested in that on a full-time basis. … I wrestled with …not wanting to be in Washington, DC. I hated to see the program die because it had been valuable to me as a park ranger. I began some negotiation with them and began to ask the question of why does it need to be in Washington, DC? ... It blew me away that [Corps] Headquarters loved the idea. ... The program moved to Walla Walla with me when I came home in fall of '94. ...

One of the first things that I did when I brought the program home to Walla Walla … was to make sure I put out four posters with water safety themes a year and two brochures—one for adults, one children. … I began to wonder if we were putting the tools out that best served the people that were using them. This is educational material and, from my own experience, I knew that there were other things I needed to supplement my program efforts. I told Headquarters that one of the things I'd like to do is to form an official committee and they would serve as the product advisors to me. … In the spring of '95, we [*i.e.*, the committee] got together, and it has been an overwhelming success. … The people on the committee serve for three-year terms. …

We began what I saw as another voice piece, and that was a Web site (33). Relying very heavily on Walla Walla's Information Management Office, [we] got tremendous support to get a Web site in place. The first purpose of the Web site was to allow me to put a catalog of products out that was electronic, so that I didn't have to put out a separate hard piece catalog. … Now [we have] Web-based, interactive ordering. …

We've done some films. In 1996, we completed an outstanding, award-winning youth package called *Safe Passage* that literally has won everything from an ADDY—if you are in the advertisement world, that's a big award—to interpretive awards from the national levels. It played on Nickelodeon. ...

We've become a professional speaking group. We've become professional writers. We are sponsoring national level competitions. …

We are very fortunate that Headquarters has continued to go to Congress and ask for money for the program. … They see it as we are also saving money in tort claims, lawsuits. Any time someone gets injured or killed out there, the Corps is vulnerable for lawsuit. We've gone to court on several occasions, defending based on our water safety efforts. It's actually gotten us out of a couple of major cases. The success is not just seen down here; it's recognized at the Headquarters level as well. …

Partnerships have added so much to the program, because there's always economy of scale. … Because of our regulations, we can't go into corporate America, but we have hit the nonprofit groups who are generally membership groups for corporate America … [for example] the Personal Watercraft Industry Association [that] represents the personal watercraft manufacturers. There is a similar one for the motorboat industry, and Coast Guard, [the] Coast Guard Auxiliary. ... We've worked with a lot of individual states who are adopting *Safe Passage* as their youth program, [with the] American Red Cross, [and the] American Canoe Association. …

We had gotten special permission [to establish a relationship with Disney]. .. [Disney] give[s] us advice when we do film. They actually do consulting for us, and that's free to us. And who better? They were part of the secret behind *Safe Passage*. They told us what would work and what wouldn't work. ...

It's incredible. We are the leading provider of water-based recreation in the nation—actually the leading provider of recreation. That was announced this year. That is beating out Forest Service, Park Service, and any of the other federal agencies. When you look at it, the majority of the public-owned lakes or waters are under Corps management. We can't not do this.

A couple of years ago, we were frustrated by what we were seeing as statistics coming in. Safety Offices throughout the Corps reported differently. It wasn't a good thing to report a drowning in the District. … There was disparity in how [accidents] … were being reported. We partnered up with Safety Office at Headquarters and agreed to be the gatekeepers on the statistics, but they had to assist us by feeding us true information. … We worked for two years to get a good database put in place, and it tracks everything. ... [Because] we have a lot the waters out there nationwide, [our statistics] are very good indications of what the trends are. …

We are [now at] less than two hundred drownings a year. When the program started, it was [over] five hundred a year. … But even two hundred is way too many. … The real key for all of this has been that we are making a difference. … Even though our visitation is going up, the number of fatalities occurring on Corps lakes is coming down as we're fleshing up our programs out there and getting more educational materials in people's hands.
–Lynda G. Nutt, National Water Safety Program Coordinator (34).

Law Enforcement and Legal Issues

As an owner of publicly accessible lands and operator of recreational services, Walla Walla District became involved in law enforcement and legal issues.

Tort claims filed against Walla Walla District increased during the period covered by this volume. Most claims related to personal property damage and accidents to persons at recreation areas. Lawsuits also increased in terms of amount of damages claimed. For example, during the 1980s and early 1990s, typically, five or fewer claims were filed against the government. This number increased to closer to ten per year in the late 1990s.

Newspaper articles tell some of the story of law enforcement at Walla Walla District recreational sites: From 1981,"A former Kennewick man who allegedly dumped 2,000 old tires along the Columbia River near Finley [Washington] more than a year ago has become a federal fugitive (35)."

In 1983, two young boys, aged eight and nine, played on the trains in the Spokane train yard, climbing aboard a flat car attached to a long train. Suddenly the train began

moving. "By the time they realized that the train wasn't going to stop, they were moving too fast to jump off. … As night fell and temperatures plummeted to near freezing, they huddled together for warmth. … At least 14 hours after their journey began, the train stopped in the Pasco train yard. … At Hood Park, they decided to ask for help at the park ranger's residence (36)."

An article "Shoot out at Texas Rapids," from 1988, reported that, "a 71-year-old man was injured in a shooting incident last week at Texas Rapids Park, located four miles downstream of Little Goose. … [The man] received a gunshot wound to his elbow in what was described as a family dispute. … About 10-12 gunshots were fired. … The dispute was reported to have occurred during an argument over a knocked-over fishing rod (37)."

In 1994: "Police are investigating three arson fires in Asotin County." Two of the fires were on Corps-owned land—one near the marina at Swallows Park and one at Chief Looking Glass Park (38).

Also in 1994: "Two young Lewiston men have been issued citations charging them with injury to another by careless discharge of a firearm in connection with the wounding of a Cub Scout at Hells Gate State Park Saturday (39.)" The state of Idaho leased Hells Gate State Park from the Corps. Also, from 1994, "A man killed himself by crashing his van through a concrete wall at the Lower Granite Dam, sending the vehicle plunging 100 feet into the Snake River (40)."

For law enforcement on its lands, Walla Walla District relied on its own park rangers and on cooperative agreements with area law enforcement agencies. Details on the challenges of law enforcement in such isolated areas are given in the words of District staff members in the box below.

KEEPING THE PEACE

[Corps park rangers are] really not law enforcement. We have Title 36 (41), Rules and Regulations that we enforce, and we have citations that we can write—tickets—and enforce them. It's interesting that the national Corps' philosophy is to get compliance at the lowest level. Hopefully get it with a verbal warning, stepped up to a written warning, and finally a full citation, if that's what it takes. …

Probably the most egregious [actions] would be firearm violations—discharging firearms inside the safety area. [There is] recklessness with fire itself—we have restrictions, time periods, and bans in that area [near Little Goose Dam] June-September on any kind of open fires. That would be an enforceable regulation under Title 36. [Also] following campground rules, such as areas you can and cannot camp on, litter, or dumping.

[Rangers would follow up on] certain wildlife violations—if you saw overt poaching of animals or fish—you'd have an obligation to intervene. However, we don't have authority to check licenses or write a citation [for wildlife violations]. You could probably direct somebody to return a sturgeon that was obviously an illegal size. Generally, just standing there with the uniform is enough to get compliance on that because an average person doesn't understand what your authority is.

I've had cases of arson; people setting off fires with fireworks in an overtly reckless manner, shooting them into fields on the Fourth of July. Or child abuse cases that campers would report to me that I had to make a decision on the next logical step. I really didn't have any authority; it's just hearsay at that point: something happened in the campground the night before. [The situation] requires some tact. You've got to interview both the aggravated witnesses and the accused without having any actual authority to issue a citation. Animal abuse, I had that too—abusing dogs.

We want to please the public and have certain levels of conduct within our recreation areas. We want everybody to go out there and have a good time. Ninety percent of the things … you can work it out diplomatically. … Some of them are more difficult.

[Little] Goose [project] … is my main experience. Goose is a very popular steelhead fishing area between Lower Monumental and Goose they catch between ninety percent of the steelhead taken in season. [Most] are taken right off the dam itself—which is controversial because it's close to a water attraction for the fish ladders. But it's legal, so it's a big draw. A lot of people come out there and fish for meat. Strictly hatchery-raised steelhead. But, because of the congestion, there is a possibility that you can have conflict, kind of a territorial conflict over fishing holes even though it's standing on a concrete dam. …

First I had to analyze how much of a problem it actually was. Was it really a big problem? Were there firearms and knives every year? It was a little overblown. You don't regulate against alcohol use, which is interesting because alcohol seems to be involved in ninety percent of these social problems. … If you are around there [at the recreation area] flying the flag, you will get compliance because they [the public] don't know it. The only people that have authority to enforce that open container law would be the county sheriffs that come out in support. Any time there is a serious problem, we go straight to them if we could get them. Support from them is a long ways away—twenty-five miles.

Drugs [are also a problem]. There was a case where I came into possession of seven pounds of marijuana, and you have to turn it over to law enforcement and document it. …

[Actually] there is very little crime out there. For the barebones security, we could provide that. We had theft of campers' picnic food. Break-ins. But there wasn't so much of that. …

You are on display in uniform and in a [government] vehicle. It's a tension that you know you are symbolic, you're vulnerable. Your comportment better be pleasing, not bending rules, just polite and interested. …

There was always something that was a little adrenaline connected, it seems. Personal safety was driving the train, [for example with] a shooting at a state park. I happened to be patrolling with the county sheriff when he did a high-speed response to that. Firearms and alcohol [were involved]. That was a lease area of ours. [Out there] it's a long time until we get help.
–Mark G. Eastman, Park Ranger (42).

Dumping is a problem [on Corps' lands]. Right now, we're going through meth [*i.e.*, methamphetamine] labs where people, because we're rural, they will cook on our property and then leave it. Or they will cook somewhere else and throw their lab on us and dump it. Or stolen cars out of the Tri-Cities [Washington], and they bring them out to our land and strip 'em, set 'em on fire, and push 'em in the river. Everything you can think of.
–Jimmie L. Brown, Environmental Resource Specialist (43).

Right now in our District [*i.e.*, Walla Walla District] we have fourteen law enforcement cooperative agreements. … [Those] provide additional law enforcement services above and beyond what they would needed to have done if we hadn't created the parks. It's aimed at the peak recreation season. We've determined that steelhead fishing, even though it's not during the summer—it's during fall and winter—that's a peak recreation activity and so we have some help there. We have those with cities and counties. [We] don't have any with states.
–Phil L. Hixson (44)

Interestingly enough, recreation touches on environmental efforts, but more of its impact to us are people who are injured when using the recreation. We spend a lot of our time, interestingly, responding to damages that people suffer while they're using our facilities. If you deal with the public, you are going to have to eat with the ranger, that's just the way it is. You've got to be prepared to address those issues. That has been one of the major jobs of Office of Counsel—to go out and investigate and work with the Department of Justice and to examine our practices and procedures here in the District to respond to the injury of individuals. To the extent that we get more involved in developing the property—and I think we will—recreation facilities as the population grows, the role of Office of Counsel will be to respond to those processes.

But what we [staff of Office of Counsel] do, is, we say, what is your [the Corps staff member's] relationship with the local law enforcement that allows an arrest? If you see somebody doing something they're not supposed to be doing, what is your remedy, if you are the manager of that recreational facility? Is your remedy to call the local sheriff? The FBI [Federal Bureau of Investigation]? Do you prosecute them in state court? Do you prosecute them in civil court? How binding are the regulations? How do we make minor federal violations prosecutable in the state court? How can we work together with local authorities and local agencies so that management of the parks becomes a seamless transaction? …

We look at options. We have parks in Idaho that have been transferred over to the state for administration. This is a simple solution. It all is administered in state courts. It all is administered according to state regulations. Does that mean that Corps gives up all its authority? No. What the Corps does is, is that if the Corps observes something going on in those parks administered by the state that they don't like, they go write a letter to the State Parks Board and say to them, "Do you want to keep managing our parks, we want this changed." They bring it before their board and they say well, the Corps's pretty serious about this, we're going to have to stop this stuff. … [There were] some other environmental issues that the state of Idaho, for instance, didn't particularly want to [address], that we wanted them to do. We said, you do it with our parks or we'll take that away and manage it ourselves.
–D. Anthony Weeks, General Attorney, Office of Counsel (45).

Security

Even before the September 11, 2001, attacks on America, there was concern for security from international terrorism at Corps facilities. One of these was formalized in the ThreatCon2 initiative investigated by the Department of Defense in the mid-1990s. A Walla Walla District park ranger talked about what this meant in the field:

> "Because of international world terrorism, we had to change our security procedures at all government installations, not just the Corps of Engineers. It was directed right across the board to tighten up. Slowly the government responded, and they are still working to tighten up security at government facilities. …

> "At Little Goose Dam it means very specifically that we had to close the facility to the public at a certain hour, because to fish there you go through an electric gate. In the past, we let [the public] stay in there and fish all night if they pleased. That led to a lot of our problems with conflicts because people would sleep in their campers. … We started locking that gate at five p.m. You did your public information program to tell people, 'We've got some changes because of this international terrorism.' You make public notices, and you get special signs, permanent signs (46)."

Park Rangers

The Corps has recreation planners, natural resources specialists, and managers whose jobs focus on enhancing recreational opportunities on Corps lands. Corps real estate experts and contract experts as well as engineers and designers all work on assignments related to recreation. However, it is the Corps park rangers who are most closely associated with recreation, particularly in the eyes of the public. The ranger's role in stewardship of recreational resources is varied, as detailed in the boxes below.

A DAY IN THE LIFE OF A PARK RANGER

It's a people business

Dave Dankel, one of six park rangers at Dworshak Reservoir, would agree that people are the most important part of his job.

Three days a week during the summer months he patrols 180 miles of reservoir shorelines, located in the rugged mountains of northern Idaho, in a Corps boat to check on campground contractors, help out boaters, talk to campers along the reservoir's shorelines and enforce federal regulations.

Wearing a uniform, badge, and ranger's hat, Dankel and other rangers work with the Clearwater County Sheriff's Office to enforce regulations against removal of precious gems from reservoir lands, boating safety regulations, and federal fire regulations.

"We have citation authority, but we don't see ourselves as policemen. We see ourselves as assisting visitors," Dankel said.

Code enforcement

Although charged with the task of enforcing Title 36, Code of Federal Regulations, Dankel and other rangers don't carry firearms because they are prohibited by Corps policy. That doesn't prevent them from dealing with illegal activities at reservoir parks.

A day in the life of a park ranger at Dworshak is filled with dealing with water and forest users—from water skiers to campground users in the upper reaches of the reservoir. And Dankel's main means of transportation is his boat.

His boat, powered by a 90-horsepower outboard motor, may reach outlying camping areas in 45 minutes compared to two-and-a-half hours by vehicle over the winding back roads connecting the main recreation areas of the reservoir.

In constant communication with other law enforcement and emergency agencies through a hand-held radio, Dankel can report a forest fire or other emergency while his 17-foot craft skims over the surface of the lake. On a recent day he traveled to the upper reaches of the reservoir to investigate a report of illegal garnet removal and finding no one at the scene of the crime proceeded on his usual inspection of park contractors, then sighted a forest fire on the return trip.

Wilderness patrol

Despite the remoteness of the area which he patrols, Dankel says the reservoir may have 400 boats on a good weekend, scattered over 120 campsites, which includes primitive get-away-from-it-all locations. The Corps maintains a cooperative law enforcement agreement with the Clearwater County Sheriff's Department, providing routine patrols of recreational areas as well as assisting a marine deputy on busy weekends.

The reservoir experiences heavy use on holiday weekends such as Fourth of July and Labor Day. On those days, most resources employees are on duty to provide visitor assistance and cope with any emergency.

Since 1974, the Corps has patrolled the reservoir more frequently, said Dankel, because an unattended campfire which started on Corps land burned 1,100 acres, most of which was on private lands.

Visitors are required to camp at designated campsites along the reservoir. As a precaution, fire trails, hand-constructed swaths of soil with vegetation removed, are located above each site, to prevent a possible fire from spreading.

Although Dankel and other Dworshak resource employees are trained to fight fires, their main job is to report them. Of all the emergencies Dankel has dealt with in the past 13 years at Dworshak such as searches for missing persons, drowning investigations, accidents, and even a round-up of stray cattle on Corps lands, forest fires have created the most challenges.

Two years ago, firefighting crews had to be removed from the Gold Creek area to prevent their injury or death when the wind shifted on the reservoir. As the firefighters watched, planes carrying fire retardant and helicopters continued to battle the blaze.

Outside crises, a typical day on the reservoir involves widespread contact with people.

People talk

As Dankel travels the reservoir, he stops to talk to recreationists. At Medley's Resort at Big Eddy Marine, the closest tourist-user site to the dam, the ranger advises swimmers to follow safety procedures, hands out a Dworshak brochure to a woman sitting on the beach and asks four girls who just arrived by canoe across the reservoir whether they had lifejackets in the vessel. They tell him they were wearing the jackets, not a requirement, but in line with good water safety precautions.

While cruising on the water, Dankel spots a boat dead in the water and upon reaching the craft occupied by two women and three children, offers mechanical assistance to a youngster repairing an outboard prop. A screwdriver is loaned and the teen completes the repair.

"If I hadn't been able to repair the prop, my job would have been to tow the boat ashore and transport someone back to the marina for assistance," said Dankel.

Dankel presents a red flag to the boaters for displaying during water skiing, a new safety requirement from the state of Idaho. He also tells the group that if they ever need assistance, a waving of lifejackets would alert other boaters or patrol boats that they required assistance. …

Job satisfaction

Asked about job satisfaction after 13 years, Dankel replied, "There's the challenge of Dworshak, where natural resources are so abundant, as well as the challenging work of a ranger."

One of Dankel's chief responsibilities is to monitor contractors at the reservoir's campgrounds to determine whether they are meeting the terms of the contract and answer their questions. Some of the park areas like Dent Acres, though remote, contain urban amenities such as modern restrooms, playground equipment, and outdoor shelters for public gatherings and picnics, requiring contractor maintenance.

In the course of a day with his job of inspecting park contractors, Dankel estimates he walks several miles outside of his boat travel. His walks are further lengthened by the drop in lake level at Dworshak because of this year's low-water conditions, making steep climbs out of ramps leading to boat docks.

Dworshak's rangers also keep the waterway clear of floating logs and other debris, which left alone, might cause problems for reservoir boaters.

When he is able to free himself from the paperwork on his desk Dankel spends as much time as possible patrolling the reservoir and serving as the District's link with its visitors.

Dankel likes his job, not only because of the people he meets, but because of the natural resources in this still pristine part of the world. Dworshak's thousands of visitors each summer would probably agree. –*Intercom,* August 1988 (47).

THE RANGER'S ROLES

Let's go through what a park ranger does first. The nature of the word is to range. … A park ranger has a little bit of autonomy to find their own role within a given boundary. In my case, I was stationed at Little Goose Dam, had my office right there. I had seven or eight little free parks … [where] we didn't have to charge fees. …

In my case at [Little] Goose, I was the only ranger—the only person in Natural Resources. My management was Clarkston, which is seventy-five miles away. Whatever I did was by phone or e-mail. I also had to range up to Lower Granite because we did not have a ranger there. If you made the trip between the two, it's 114-mile road with lots of stops, and that's your day. You would roll in different responsibilities. …

You count the visitation. We have digital counters at all the major parks. Those have to be recorded on a monthly basis [and reported] to the District, then nationally. …

You work unusual schedules as a park ranger. In the visitor season, you have to be very adaptable to requests for tours. You have to work all the weekends from May to Labor Day or longer. In my case, because it was the most pragmatic, I would go to work on Thursday in the evening and work late to ten p.m. because they are setting up camps. …

In the spring when you are doing tours, the activity would be more brisk. …

Because you have the uniform on, because you are out with the public, you become the de facto representative—they [the public] expect you to know all, be all. They all expect you to know about dam breaching—you better know what to say when that subject comes up—it's going to come up all the time. They think you are the Corps in a lot of cases. When they want to complain, you are the one they will complain to. You [are] a love/hate figure to them. –Mark G. Eastman, Park Ranger (48).

Fees

The final rule on the Corps' Shoreline Management Program regulation was first published in the *Federal Register* in July 1990 (49). The program is the Corps' means of regulating individually owned mooring facilities and other private uses of the lands and waters at Corps lakes where private facilities were placed before December 1974.

No private use is allowed elsewhere. Lake Wallula is the only lake within Walla Walla District that was affected. The District had 71 Shoreline Management Permits on the lake.

The final rule made the following changes: (1) periodic reviews of the Shoreline Management Plan were required; (2) permits for docks, boathouses, houseboats, floating cabins, *etc.*, that were in effect on or before November 17, 1989, were renewed as long as the facilities did not present a threat to life or property or interfere with other project activities; (3) increased emphasis was placed on electrical service and equipment safety; (4) guidelines for vegetative modifications were better defined; (5) guarantee of pedestrian access to the shoreline was promoted; and (6) increased fees were proposed.

Fees were published in the *Federal Register* in August 1990. The rule substantially increased the $30 fee for a new owner to $400.

The year 1994 saw the beginning of public user fees at Corps recreational facilities. The federal Omnibus Budget Reconciliation Act of 1993 (50) required the Corps to implement fees.

One such fee was a one-time, $10 fee for issuing a Golden Age Passport to senior citizens for use of federal recreational facilities.

Walla Walla District also instituted fees for the use of boat ramps, a process that did not go as smoothly as it could have. For example, at Lucky Peak, boating enthusiasts had heard about the possibility of purchasing a season pass for $25 in lieu of paying a $2 per day fee levied on vehicles parked in the launch area. According to the local press, in April, just one month before the season began, the District had not finalized plans for where and how season passes were to be obtained (51). Passes were finally made available around May 10.

The new fees began to be collected in 1994 at various popular boat ramps around the District, including McNary Dam; Hood Park; Barkley and Turner Bay at Lucky Peak; and Swallows Park and Greenbelt near Clarkston. Fees were collected using self-deposit vaults similar to those found in National Forest Campgrounds (52).

The start of Corps fees at boat launches resulted in local and regional news media attention. The Distict Public Affairs Office sent out news releases and arranged media interviews to gain greater public awareness of the new fees.

A ranger who was in the field when fees were instituted commented on the public's reaction:

> "[The public reacted] badly [to the fees]. There was a national initiative. We had this problem of low visitation per area, which is the very reason [Corps recreation sites] are attractive—people like to go out there and have some space. The most involvement I had was right in Lewiston-Clarkston—at its real busy boat launches. We have two of them where we charge fees now to launch. That was a huge change in policy.
>
> "There were questions: Didn't the Corps have an obligation to provide recreation in mitigation for taking the beaches away and some of that public access? Nobody could really remember, and so it was a political battle in the newspapers. The whole thing boiled down to: You are going to

be paying. I had to write up a justification for the Corps and put it on windshields throughout all the parking lots to try to get people to accept it. It was a slow phasing-in, where you have a lot of warning tickets. [Fees were collected via self-pay, but it was] not the honor system though, because we enforce with ticket writing with rangers (53)."

Commercial Activities Studies

During 1985, the Commercial Activity Program, mandated by Office of Management and Budget's Circular A-76 (54), initiated commercial activity studies in four areas identified as commercial functions. Two of these four areas involved recreation-related functions: recreation area operations and recreation area maintenance.

In addition, in 1985, delegation of authority was received for the Walla Walla District Commander to determine which commercial functions could be directly contracted without a full study. Custodial services in the projects was identified as a function to be directly contracted. Contracts were set up for custodial services in 1986.

In the case of operation and maintenance of recreation areas, all nongovernmental functions, as determined by the District, were contracted in 1986. The District is awaiting higher headquarters concurrence to complete the study.

Two more commercial activities studies under OMB Circular A-76 concluded with a final decision in October 1989. These studies were for total natural resources management and operation of recreation areas and grounds at McNary and Ice Harbor-Lower Monumental Projects. The results of the process, after a bid opening, showed that the McNary government bid was nearly $1 million less than the best contract proposal bid. The Ice Harbor-Lower Monumental government bid was $2 million less than the best contractor bid. Concurrence was received from Corps Headquarters in Washington, DC, and these functions continued to be performed by Walla Walla District staff.

In 1989, further commercial activities studies were initiated at the Granite-Goose and Dworshak projects. The studies again included natural resources maintenance and operation of recreation areas and grounds. A contractor was hired to assist Corps employees in the collection of workload data and development of a performance work statement. During the course of the workload data collection, Walla Walla District experienced a hiring freeze and budget reduction that affected the accuracy of the data. Information from earlier years was used to complete the contract specifications, cost studies, and management studies.

The Dworshak and Granite-Goose contracts were advertised as requests for proposals. After four months of synopsizing and a 45-day advertisement, the District did not receive any proposals for the work. Again, these functions continued to be conducted by District staff.

In 1999, the Corps conducted a yearlong study of its recreational services, looking for "possibilities for new partnerships with nonfederal agencies and the private sector in development and operation of recreation facilities (55)."

Land Management

"In the early days, there were no recreation facilities on the reservoirs to speak of till they built the dams. As part of construction of the dams, we also built

recreation facilities. Places like North Charbonneau Park, Fishhook Park, and Boyer Park, some of the state parks that are on the river have really grown and have tremendous amount of usage. Some, like Rooks Park, used to be leased to the County of Walla Walla, and they couldn't maintain it and so we got it back and we put in different things like campsites and restrooms, upgraded those (56)."

Thus, because of its hydropower and flood control projects along the Columbia, Snake, and Clearwater Rivers, Walla Walla District became a land manager in Washington, Oregon, and Idaho.

Lower Snake River Fish and Wildlife Compensation Plan

The driving force behind and implementation of the Lower Snake River Fish and Wildlife Compensation Plan is discussed fully in chapter eight of this volume. Aspects touching on the acqusition of land for the plan and the establishment of hunting and fishing areas as well as habitat management units is discussed in this chapter.

Hunting Area, Lower Snake River

UNIQUE LAND ACQUISITION PROCESS

[The Lower] Snake River [Fish and Wildlife] Compensation Plan … was the compensation plan for the construction of the four lower Snake River projects. It involved a lot of real estate acquisition. We acquired lands that were immediately adjacent to project boundaries, and we partnered with the states of Washington and Idaho to acquire what we called off-project lands. We acquired over 20,000 acres in all. [Land acquisition] ran from 1978 through [1994] … but most of the acquisition culminated in the early 90s. …

[Land acquisitions for the Lower Snake River Fish and Wildlife Compensation Plan was] a little bit unique and different from the standpoint that most of our flood control and navigation projects, like McNary or Ice Harbor, or Dworshak, you absolutely need certain lands to build the project. You either acquire those lands by what we call direct purchase, meaning we negotiate with the property owner. …

[Normally, the Corps is] able to reach agreement with the owner and acquire the property by direct purchase. If the owner disagrees with the price that you're offering or, in certain cases, if his property has encumbrances that need to be removed that he, himself, is not able to remove, then we have to go into what's called a condemnation, eminent domain proceedings. This is a legal action under which we actually acquire the rights through the courts to the property. We're obligated to deposit what we think is the value of the land with the court. …

The Lower Snake River Comp Plan was different, because the legislation required that it be done only on a willing seller basis. What that means is, that you can't force anyone to sell. Eminent domain proceedings are out the window. Consequently, being a willing seller project, both the Corps and the states involved had to do a lot of property owner contacts, assess interest. We had cases where, once it was appraised, they weren't interested anymore because it didn't come out as high as what they had hoped for. We would end up, of necessity, spending more money than you would normally spend because you would have to go through quite a few more people before you found what we called the willing seller.

The process underwent several different stages during the years. … The plan was to acquire easements for [hunting]. Unfortunately, we found that the owners were not willing to grant easements. To allow somebody to trample over their farmlands and everything else, just wasn't worth it. ...

We went back [to Congress] and received authority to acquire in fee instead of easements for those lands, including whole ownerships. Once that approval was obtained, the program went better.

We also got better at assessing property owners' knowledge and true willingness to sell by broaching with them what we thought the property might appraise at based on our experience versus what they thought it was worth. Ultimately, the acres were acquired for the project. Everybody was very pleased. The lands are being utilized now for those purposes.
–Richard Carlton, Chief, Real Estate Division (57).

Land acquistions for hunting and fishing areas proceeded throughout the 1980 to 1994 period.

In 1993, Walla Walla District created hunting maps for lands purchased for the Lower Snake River Fish and Wildlife Compensation Plan. The property information generated from land surveys was used to produce ownership maps for hunters and the general public. Walla Walla District produced brochures with a specific property on one side and a generalized map of all public access sites on the other.

By 1994 all mitigation lands had been acquired—a total of 24,158 acres. The Corps retained title on 4,635 acres on six parcels adjacent to existing Corps lands, while other lands were turned over to various federal and state agencies. Of this the acreage retained by the Corps, 4,063 acres was suitable as chukar habitat and 572 acres was suitable as riparian habitat.

Lower Snake River Fish and Wildlife Compensation Plan Land

Fencing and development of facilities on properties acquired as part of the Lower Snake River Fish and Wildlife Compensation Plan continued through the end of the period covered by this volume. In 1999, for example, development continued at Rice Bar Habitat Management Unit and at Myrtle Beach and Magill public fishing access areas. Some of these projects ran into the hundreds of thousands of dollars. The Rice Bar contract, for example, was in an amount exceeding $250,000.

In addition to acquiring areas for hunting, the Lower Snake River Fish and Wildlife Compensation Plan was to mitigate for loss of wildlife that could be hunted. Mitigation efforts were built around providing non-native bird species—pheasants, chukars, and California quail—species favored by hunters. Walla Walla District developed a game farm alternative to support stocking of birds (see chapter 8).

Habitat Management Units

As part of the Lower Snake River Fish and Wildlife Compensation Plan, the Walla Walla Distict developed habitat management units. These HMUs included shrub-tree plantings, nest boxes, meadows, fields, pastures, nesting platforms, quail roosts, water cisterns, and irrigation systems.

Hunting was allowed in the HMUs, but generally not in Corps parks, which were considered safety zones. The HMUs offered bird hunting with shotgun or archery. In a few areas, visitors could use rifles to hunt for deer and elk.

Rice Bar Habitat Management Unit

Irrigation at Rice Bar HMU

Activities in the late 1980s at the Wallula, Peninsula, and Two Rivers Habitat Management Units, discussed below, should provide the reader with a better idea of the tasks involved in managing mitigated lands in relation to hunter access.

❖ Wallula Habitat Management Unit

In 1987, access to Wallula Habitat Management Unit and other HMUs on Lake Wallula, near Pasco, Washington, had to be managed to prevent overuse of the area by hunters, reduce user conflicts, and provide quality hunting.

At Wallula HMU in 1987, habitat management activities during spring and summer consisted of corn, millet, buckwheat, and sunflower plantings as a supplemental food source for waterfowl and other birds. Parking lots and gates were constructed in order to control off-road vehicles; internal roads were graded and some rerouted to reduce impacts to wildlife.

An agricultural lease for the Wallula HMU was advertised and awarded in 1987 for a portion of the HMU. Farming activities include alfalfa hay, native grass seed production, and row crop and cereal grain production. The lease conditions were designed to benefit wildlife by breaking up larger fields through permanent cover plantings, requiring portions of annual crops to be left in the field and delaying hay-cutting dates.

Areas of permanent nesting in the Wallula HUM were established in 1987, and a complete weed control program utilizing herbicides, prescribed burning, and mechanical methods was initiated. Some crop areas were flooded every fall to provide resting and feeding areas for migratory waterfowl, along with hunting opportunities. One pond in the area was reserved as a refuge area.

The hunting program in the HMU consisted of "free choice" within the open area. Unless hunting pressure expands greatly, this system will be retained. Enforcement was held to a minimum by the use of physical barriers; littering and off-road vehicle incidents were minimal.

❖ Peninsula and Two Rivers Habitat Management Units

In the 1980s, habitat management activities in the Peninsula Habitat Management Unit consisted of yearly light discing of annual ryegrass to stimulate new growth and mowing of existing meadows to control weeds and provide a short, succulent growth for geese. Management activities in the Two Rivers area consisted of mechanical and chemical weed control. Parking lots and gates were constructed in order to regulate seasonal access.

Twelve goose pit locations on the Peninsula were available on a "first come, first served" basis with hunters required to check in at a registration board. Shoreline hunting on the east side of the Peninsula area and the islands in the Two Rivers area was regulated by white posts. Hunters could only construct temporary blinds, and these must be within fifty feet of a white post site. All other areas were open to "free choice," except that hunting on the Peninsula unit is limited to Friday, Saturday, Sunday, and Monday along the shoreline. State hunting regulations also applied to both areas.

Divestiture of Lands and Land Management Responsibilities

As described above, during the late twentieth century, due to mitigation efforts of the Lower Snake River Fish and Wildlife Compensation Plan, Walla Walla District was involved in acquiring a great deal of new land. This activity, however, went against the general trend, which was for federal agencies to divest themselves of land. Indeed, Walla Walla District tuned over much of the property acquired as part of the compensation plan to other agencies.

A Walla Walla District natural resouces staff member talks about some of the events and trends related to land divestiture and park closures:

> "There was that period in which the Corps was instructed to try to divest itself of lands. Back in '81, July, we took back Swallow's Park [from a lessee]. In September of that year, we got an edict from HQ. They said thou shalt not take back any parks without closing them. We came [in] under the wire.

> "In 1981, though, we did go through a park closure era nationwide. We closed three areas on Lower Monumental, Lower Granite, and Goose. I'm not familiar with the other parks at that time. But on those three, we closed, Riparia, Knoxway Canyon, which was a boat-in-only site on Lower Granite's south shore, and we closed the sailboat ramp at Clarkston because it had silted in already and would forever be a dredging problem. It was on the inside of the curve where silt would drop out forever. It really didn't hurt us. It was probably a good thing that we got rid of those sites. The Knoxway Canyon one was getting shot up a lot, signs torn down, the outhouses in particular were being shot up quite a bit.
>
> "But every couple of years somebody would get a burr under their saddle, and 'oh, we've got to look at saving money,' and we'd close more parks. 'What's the criteria for keeping them open?' We would go through and work our imaginations on that to see if we could save money. In the end we, usually contracted work a little more and did a little less of it ourselves (58)."

In 1985, Walla Walla District excessed approximately 504 acres of Lower Granite project land. This property was excessed in accordance with Executive Order 12512, *Federal Real Property Management* (59). The lands were submitted to the General Services Administration for disposal.

A little over ten years later, in 1996, there was another major initiative within the federal government to divest itself of lands and to get out of direct management of recreational facilities.

DISTRICT STAFF COMMENT ON DIVESTITURE OF LANDS

In '96, when we had the big budget crunch, people higher than me decided we would start a process to try to outgrant or flat out give away as many parks as we could. Division put a halt to the giveaway idea, but said you could pursue the lease. Out of 64 agencies contacted, I had exactly three responses where they thought they might be interested. Not one of those ever panned out. Let me back up. One of them did pan out. Fish and Wildlife Services ended up with 12,000 acres of our land. … [The land was leased to them with the intent that under legislation we will eventually give it to them. …

The only concerns I have there [with parks] is, and we've seen it historically, if we develop a really nice area and then turn it over to the locals, they don't always have the funding to maintain it to the level to what people expect or to what we envisioned when we developed it. I get real mixed feelings. I guess, if we are doing it carefully, yeah, there is no need for us to hold on to [lands] … if others can more efficiently manage them.
–Lynda G. Nutt, former Park Ranger (60).

It hit a low point in 1996-97, where there was an initiative to give away these parks. If we are giving away the parks, and you're a park ranger, there's no security. It was active; they offered; they did give away some of our land to other agencies—Tri-Cities; Wallula to Fish and Wildlife. I think the tribes may have taken over a little bit. They offered it to anybody who would assume responsibility for operations and maintenance. We had such a big responsibility for maintenance that nobody wanted to step up to bat. …

That was a low point for Natural Resources [Sections]. … It was not just this District. … But now that's turned over for various reasons. Lewis and Clark may be contributing.
–Mark G. Eastman, Park Ranger (61).

You take that value into a civil agency, with long-term civil servant stewards of that agency and leaders of that agency, and they will say, well, yes, but we're preserving that for the future generations. When you hand that same value and instructions to the military, they execute it tomorrow. When they do that, what comes down through Joint Chiefs, to the Department of Army, is: How much land does the Army have? Why do you have it? Explain the need for every piece that you have. Anything that does not have a direct need, we are going to divest. … [We have the] ability, through this military chain of command, to respond quickly, and that comes down as far as the colonel. The colonel will walk into the Natural Resources people and the Real Estate people and say, my boss has said let's … justify every piece of it and divest [the District] of anything we don't directly need today.

And, sure enough … when you look at national visitations and then you look at some of our western parks, visitation at Lower Granite Pool is extremely low. There is nobody out there. No one lives there. Yes, we don't have the same visitation as Yosemite or even a good fishing hole in Alabama, because we have a low population base. It's difficult for us to justify.

Where the civil agencies will take a longer view, the military executes because it's their job and their role. It causes conflict between the military leadership in the Corps and the lead civil servants in the Natural Resources groups, because they have different values, and they don't often understand that they are arguing about two different topics. The civil folks will argue that we're preserving and doing. They'll take you out, and they'll say, "Look at the fence. The Corps of Engineers side is natural, and the other side is grazed to bare ground. Is this what we want for this entire basin? No, it is not. We need to preserve that grassland for the future."

But, it is a higher value [that] the military obey. I don't necessarily agree with the divestiture of land. In fact, I disagree. … But I understand why we divest, and I support why that happens. I do not ever want to live in a nondemocratic country. … What it raises, then, is the issue, should we be a civil agency? Should we be under military leadership? Congress kicks that around, in going about four or five cycles, where they bring it up and say, we should remove the military leadership because it's dysfunctional in a civil agency. The civil is not doing what we think they should do because they bring Army values. That is not my decision. My boss is a military leader, and, so, I accept the values that they need to have to maintain a healthy nation. It has a higher purpose. Sometimes what appears to be not in the best interest of the local folks … is in the best interest of the nation.

Those directions come directly from the president. Those [directions] are not something thought up halfway down in the Corps. –Allen N. Pomraning, General Engineer (62).

Parks, very few of them actually make any money, most of them are money losers. The states of Idaho and Washington are making specific efforts now to even out the income and costs. Idaho is doing a fairly good job of it, but still, it's a no money maker for them. Some parts of the country, in higher urbanized areas, you have more of a demand for people to come in and develop large marinas and motels and things of this nature, so some do better than others. Out in our area, we have very few of those. …

From a real estate perspective, it's very interesting because, being responsible for the lands--and we're probably talking about close to a 100,000 acres--it's very interesting to work with the lessees in helping them to carry out their objectives out there.
–Richard Carlton, Chief, Real Estate Division (63).

Transfer of Lands to the U.S. Fish and Wildlife Service

The Water Resources and Development Act of 1999 (64) included a provision transferring jurisdiction over McNary Refuge for management from the Corps to the U.S. Fish and Wildlife Service. The lands included were the Hanford Islands (minus Leslie Grove), Strawberry Island, and the McNary Refuge. The transferred lands are still under federal ownership. The transfer was completed in 1999.

The Walla Walla District Engineer, in 2000, executed a cooperative agreement, similar to a lease, with the Wildlife Service to transfer management over Corps-owned properties. These lands included the Madame Dorian Park as well as Wallula, Peninsula, and Two Rivers Habitat Management Units. This agreement involves approximately 12,000 acres of land located in the states of Oregon and Washington.

Leasing of Project Lands and Parks

The Chief of Walla Walla District's Real Estate Division talked about the high level of activity in the District related to leasing project lands and parks: "A significant volume of Real Estate Division's work over the last twenty years has been in what we call our Operations and Maintenance arena. What that involves is the management and disposal of lands. What management includes are things like outgranting. This means leasing lands for different purposes like parks and recreation, fish and wildlife, agricultural and grazing. We do compliance inspections to make sure that our grantees are living up to the terms of their leases or easements, and so on (65)."

As can be seen in the sections below, many, many thousands of acres of land owned by the Corps are under direct administration of other governmental entities—city, county, state, and federal agencies. A few recreation sites are leased by private companies.

At the end of the period covered by this volume, Congress was looking at legislation to authorize the Corps to charge administrative fees for our different outgrants. "What this means is the majority of the people who come to us now, either for an easement to cross our land for a utility or a road or something, or just about any kind of use, they are going to have to pay our administrative costs for doing that. That's going to be close to $3,000. … Up until this date, we were able to waive administrative costs and fair market value for a lot of entities, counties, states, cities, so, if they wanted to put a road across our land, a sewer line or something, we didn't have to charge. Now they are going to have to start paying for it (66)."

Recreation Areas and Land Management Initiatives

The following sections discussion specific Walla Walla District recreation resources and, additionally, significant land management initiatives during the period covered by this volume.

Lake Wallula (McNary Lock and Dam)

Lake Wallula lies directly behind McNary Lock and Dam. The lake extends sixty-four miles upstream to the U.S. Department of Energy's Hanford Site (about twenty-seven miles above Pasco, Washington), on the Columbia River. The lake also extends up

the Snake River to Ice Harbor Lock and Dam. Lake Wallula has a water surface area of 38,800 acres, with 242 miles of shoreline.

At the end of the period covered in this volume, there were 16,908 acres of public lands surrounding the lake utilized for public recreational purposes, wildlife habitat, wildlife mitigation, and water-connected industrial development. Approximately 2,400 acres were licensed to state or local park agencies. The U.S. Fish and Wildlife Service leased approximately 3,500 acres of public lands as part of the McNary National Wildlife Refuge. Facilities operated by commercial concessionaires or boat clubs are available at eight locations. Public boat launching facilities are available at seventeen locations along the shoreline.

Hat Rock State Park (67)

Facilities adjacent to Lake Wallula included: Chiawana Park and Road 54 Park; Columbia Park; Hat Rock State Park; Hood Park; Howard Amon Park; Hover Park; Leslie R. Grove Park; Locust Grove/Martindale; Madame Dorion Memorial Park; McNary Beach Park; McNary National Wildlife Refuge; McNary Yacht Club; Oregon Boat Launch; Pacific Salmon Visitor Information Center; Pasco Boat Basin; Peninsula Habitat Management Unit; Sacajawea State Park; Sand Station; Spillway Park; Two Rivers Habitat Management Unit; Two Rivers Park; Walla Walla Yacht Club; Wallula Habitat Management Unit; Warehouse Beach; Washington Boat Launch; West Park; Wye Park; and Yakima River Delta Wildlife Nature Area. Recreational opportunities at

these sites included picnic areas; playgrounds; bike trails; hiking trails; swimming areas; a radio-controlled car course; an outdoor stage; boating; marinas; fishing; the Pacific Salmon Visitor Information Center; and wildlife viewing areas.

Various agencies operated these parks including Walla Walla District, Franklin and Benton Counties, Washington; the cities of Kennewick, Pasco, and Richland, Washington; the McNary and Walla Walla Yacht Clubs; Washington State Parks and Recreation Commission; State of Oregon Parks and Recreation Division; and the U.S. Fish and Wildlife Service.

Sand Station Swimming Area, Lake Wallula

Columbia Park

Columbia Park is a prime recreation area along the Columbia River contiguous with the cities of Richland and Pasco, Washington. The park was operated by Benton County under a lease with the Corps. Because of revenue problems over several years prior to 1988, the county had to abolish its Parks and Recreation Department and expressed a desire to withdraw from its lease. The cities of Kennewick and Richland were eager to take over and operate portions of Columbia Park that would lay within their proposed area of annexation.

In 1988, the cities of Kennewick and Richland filed the necessary documentation for annexing Columbia Park and Bateman Island into their respective cities. Initial

complications were resolved when both cities withdrew from the position of overlapping interests and came up with a mutually agreeable common boundary. The annexation packages for both cities were forwarded to Corps Headquarters in Washington, DC.

A Consent to Annexation was sent to each city in April 1989. A sublease agreement between the cities of Kennewick and Richland with Benton County was signed, also in April 1989, which allowed each of the cities to take over maintenance of their respective portions of the park.

Early in 1990, the City of Kennewick submitted a draft Kennewick Riverfront Recreation Master Plan. This plan identified development for Columbia Park, which would involve major improvements and opportunities for the public.

During the remainder of 1990, the cities of Kennewick and Richland continued to operate Columbia Park under a Municipal Sublease Agreement with Benton County, the Corps' prime lessee for Columbia Park. The Corps approved the assignment of a cost-sharing contract to the cities and agreed to the lease terms for the cost-sharing leases with the cities. The City of Richland agreed to the terms of the contract and the lease; however, execution of the lease was never completed due to lack of approval by the City of Kennewick. The City of Kennewick's apparent major concern in taking over the lease was the forty years left in the lease term and the absence of any method of terminating the lease if a loss of tax revenue should become a problem. The city apparently had no problem continuing to operate the park under its existing agreement with Benton County. The city and the county were working toward jointly sharing in maintenance costs for the park.

Under the continuing cost-sharing lease, the Corps continued to be responsible for fifty percent of capital improvements in the park. In 1989, the City of Kennewick submitted a proposal to develop a grand prix racecourse in Columbia Park. The Corps prepared alternative ideas for development of the park and expressed concern over potential interruption of public access and use through a major part of the park (68).

A public meeting was held in March 1989. In his introductory remarks, the Walla Walla District Commander cited aesthetic and environmental concerns and the need for a master land-use plan for the Park. He said of the racetrack plan: "We noted that the concept had now taken on the tone of a permanent race track development. In our view, this would be detrimental to existing water-oriented recreation use and potential multipurpose public recreation use of the park lands (69)." Local supporters and opponents were sharply divided over the racecourse idea. In June 1989, the District Commander announced his decision to deny the proposal for the racecourse (70).

The lease situation related to Columbia Park and the continuing authority that the Corps exerted over development plans for the park, was a direct factor in the provisions for land transfer enacted in the Water Resources Development Act of 1996, as explained in the next section.

Tri-Cities Rivershore Enhancement and Levee Lowering

The levee system throughout the Tri-Cities was constructed during the early 1950s, as an integral part of the development of McNary project. The levees are essential for protection of the cities of Richland, Kennewick, and Pasco (the Tri-Cities), Washington

The design documents for the proposed and never built second powerhouse at McNary Dam discussed beautification of the existing levees through much of the Tri-Cities. Plans included the concept of linking various parts of the Tri-Cities together with bicycle and walking paths. This work was originally projected to begin about 1983.

In 1986, considerable interest developed within the Tri-Cities to "do something with the levees." There were proposals to construct condominiums on the levees and to use the revenue from them to pay for landscaping and enhancement to the levee system. Additional interest developed to lower the levees to provide a view of the river. Elected officials picked up these proposals, and they requested that the Corps "take some action."

In 1987, the Rivershore Enhancement Committee was formed. The Committee was formed under the umbrella of the Inter-Governmental Conference. The purpose of the committee was to evaluate the river shore and seek changes that would enhance the economic climate within the Tri-Cities and that would develop a broader base of employment.

The Committee asked questions concerning how much the levees could be lowered in the areas of the cities of Kennewick and Pasco. The Corps responded by stating that the presence of upstream storage had reduced the level of anticipated flooding (the standard project flood) in the area of the Tri-Cities. This allowed Walla Walla District to consider a reduction in levee height of between three and four feet.

The Walla Walla District Commander requested that Operations Division develop a series of drawings to depict ideas to beautify the levees and provide better utilization by adjacent communities. A set of drawings, developed by Operations Division and Engineering Division personnel, was presented to decision makers in the Tri-Cities through a series of meetings in January 1988. These drawings and the presentations had two major messages:

(1) It was not in the general interest to lower the levees because that would increase, at least marginally, the Corps' liability (in terms of flood protection) to the citizens of the Tri-Cities. Therefore, the work would have to be done with no expense to the federal government.

(2) There would be no commercial or residential structures allowed on the levees because that would interfere with the Corps' responsibility to inspect and maintain the levees and drainage structures (71).

Despite this initial message from the Walla Walla District, interest in modification of the levee system and development of the river shore in the area of Columbia Park continued to grow. The District initiated a reconnaissance study in December 1989 to determine if there were benefits to lowering some of the levees. There was sufficient

interest and Congress provided the Corps money to finish the study and assist in developing alternatives that would improve the economic viability of the Tri-Cities (72).

Meanwhile, the Mayor of Pasco met with Walla Walla District staff on February 14, 1989, to discuss his vision for the modification and beautification of the levees in Pasco. He asked if the Corps could assist in preparing preliminary estimates for some of the levee work. Additional discussions were held during March 1989 to determine what support the District could provide.

The Rivershore Enhancement Committee hired a consulting company, the NBBJ Group, Seattle. The company was given a very short period to evaluate the overall situation; to hold public meetings, and to develop alternatives and recommendations. Because the Corps owns all of the shoreline and areas of lands that could be enhanced or developed, much of the attention of the study focused on Corps policies and programs.

In April of 1989, the NBBJ Group published the Draft Final Report called the *Tri-Cities Regional Rivershore Enhancement Plan* (73). The plan represented a long-term vision for the shoreline that would (1) improve access to the river shoreline; (2) provide a myriad of recreational pursuits through new and/or enhanced parks and open space; and (3) encourage private development that could be a major part of economic diversification for the area. The NBBJ Group produced sketches showing a swimming beach, a swimming pool with river viewing area, tennis courts, a restaurant and deli on the river, a boardwalk, a boat launch, soccer fields, a picnic area, and a resort on a lagoon—all to be part of the revamped Columbia Park (74).

In March 1992, Walla Walla District completed its reconnaissance study, concluding that there was no federal interest in lowering and beautifying the levees due to low budgetary priority given by the Corps for recreation and land enhancement (75).

In 1993, Franklin County, Washington, requested to lower the levees in Pasco, Washington, and to construct a bike path on top of it. The District requested approval for the project based upon the Reconnaissance Study. The County then sought Congressional authorization to direct the Corps to authorize the lowering of the levees. In June 1994, the District received a response from Corps Headquarters in Washington, DC, that determined the Corps of Engineers had the authority to approve the proposed modifications to the levees on the McNary Lock and Dam project. On December 6, 1994, the District received Franklin County's Levee 12-1 Modification Report. The District completed its technical review of the county's plans and suggested some revisions. As of 2000, this project had not been implemented due to lack of local sponsor resources.

Water Resources Development Act of 1996 Land Transfer

After 1992, interest in the beautificaton of the Tri-Cities river shore took on a new twist as local interests worked to achieve their goals with the assistance of their elected representatives. This action culminated in the Water Resources Development Act of 1996 (76), which included provisions for disposal of approximately 2,500 acres of parks and recreation lands and levees and flood control structures to six different local governmental entities in the Tri-Cities area.

The transfer of the lands did not proceed smoothly, as many problems and obstacles were uncovered during the process.

As of 2000, Walla Walla District continued to work on environmental compliance coordination on conveyance of the McNary Flood Control Levee system and associated project property. During fiscal year 2000, environmental baseline studies were completed, surveys of the properties were finalized, and over 100 encroachments were identified with some resolution. The encroachments involved discovery that private structures (buildings, fences, *etc.*) existed on Corps land that was to be transferred. Negotiation continued on a Memorandum of Agreement for operation of the levee system. Completion of the deed conveyance was also contingent upon finding mitigation for the adverse environmental effect of the land transfer.

The land to be conveyed included twenty-six known cultural resource sites. The Corps and local governments met with the Washington State Historic Preservation Officer, a staff member from the Advisory Council on Historic Preservation, and consulting Indian tribes. A major issue identified at the meeting was the need to have at least an equal level of protection afforded to cultural properties after the land conveyance, as now exists under federal control. A proposal was made to provide conveyance in the property deeds that would protect cultural resources, once transferred from federal ownership.

In 2000,Walla Walla District completed cultural resource surveys for all sites within the proposed land transfer. Work on the traditional cultural properties was initiated. The eighteen acres associated with an inadvertent discovery near Kennewick, Washington, was withdrawn from the proposed project land to be conveyed to the local governments.

In the box below, District staff members discuss the trials and tribulations of the WRDA 96 land transfer process—a process that turned out to be one of the most lengthy, complex, and contentious of any the District undertook during the twenty years coveredd by this volume.

DISTRICT STAFF MEMBERS TALK ABOUT WRDA 96

We've had a number of these park and recreation leases for decades for some of our areas or projects. The Tri-Cities is one of the main ones. ... Benton County leases Columbia Park over there. It's over four hundred acres of prime land along the Columbia River there, beautiful park, beautiful access to the Columbia River. They have race boat competitions each year over there. It's considered a pearl in southeastern Washington as far as recreation, scenery, and so on. On the other side of the river, we have Franklin County [and the] City of Pasco that lease lands along the river as well and so does Richland to the north there. ...

However, a lot of our lessees, and particularly there in the Tri-Cities, have been uncomfortable with the fact that they've always had to come back to the Corps of Engineers and get our approval if they want to build anything down there and things of this nature. ... They asked ... to get legislation to require us to actually convey the land to them. The Cities of Kennewick, Richland, and Pasco, Benton and Franklin County, and the Port of Pasco, each were specifically named in the legislation. Particular properties were specifically mentioned in the legislation by lease number to be conveyed to the local entities. …

There were and continue to be some significant issues with that whole process. One was administrative costs. Because it was an unfunded mandate for us, we told the local entities that they were going to have to pay for the administrative costs for the conveyances [*i.e.*, the land transfer process]. We did an original estimate of a little over $2 million to actually do all of the conveyances over there. ... Ultimately, they were only required to kick in $20,000 a piece for administrative costs. ...

The tribes affected—there're about five of them—are naturally concerned because these [lands] are culturally rich areas. We know, and there are registered sites in these areas. The tribes were concerned about losing the protection that the federal government provides for federal lands, particularly in NAGPRA, which is the Native American Graves [Protection and] Repatriation Act. … Where we stand right now [2001] is that we do have draft preservation covenants that have been reviewed by the local entities. …

Under the legislation, there is no charge for the lands, if they continue to be used for park and recreation purposes. ... In that context, what locals are finding out, and will ultimately find out, is that they are not getting Uncle Sam totally out of the picture. Because, obviously, we are going to have a continuing responsibility, once they're conveyed, to make sure, through inspections, that they are following the terms of the conveyance as far as … park and recreation use.

Another important facet of the deed will be that the government will reserve a flowage easement over the lands because we want to make sure that we have the right to flood any of the lands that we may need to for operational purposes.
–Richard Carlton, Chief, Real Estate Division (77).

[The WRDA 96 land transfer provision] was a first, because there wasn't any real clear model out there to follow. It's been a trial and error. … We've run into all kinds of problems. … We've run into encroachments. You can't believe how many people in Tri-Cities have got lawns and yards on government land. … It's been [an] eye-opener to find that even huge commercial enterprises have patios and plantings that are built, actually built on Corps property. As part of a transfer, you have to clear title. If there is an encroachment, that's not a clear title. That was a big issue to deal with. –Diane J. Davis, Program Analyst (78).

The first meeting we had with all of the parties involved, [the city manager of Kennewick] asked the question: What might be a showstopper on this? I immediately said: cultural resources. … The last line [of the legislation] says: "We will comply with all federal environmental laws," which there are about sixteen of, including cultural resources.
–D. Anthony Weeks, General Attorney, Office of Counsel(79).

They [local governments] still keep thinking condos and hotels, because, "Well, that's recreation." Shops are recreation. People shop for recreation, so that could be recreational activity. ... But I don't think that's appropriate for open space parkland along the river. The environmental part of me just goes nuts over some of these things.
–Sandra L. Shelin, Environmental Resource Specialist (80).

Hood Park

Hood Park has long been one of the most popular recreation areas within Walla Walla District. In 2000, the District was in the midst of planning expansion improvements to prepare for an influx of visitors for the Lewis and Clark Bicentennial (see chapter 10).

The Hood Park modernization was a multimillion-dollar project involving expanding the camping area, changing the entrance to the park, and other improvements. A cultural resources inventory was completed in 2000 prior to construction. The Omaha District administered this contract because there was too much work for Walla Walla District to handle this within the short timeframe.

Playground at Hood Park

Lake Sacajawea (Ice Harbor Lock and Dam)

When full, Lake Sacajawea extends northeast thirty-two miles upstream from Ice Harbor Lock and Dam to Lower Monumental Lock and Dam. The lake has a surface area of 9,200 acres. At the close of 2000, there were 3,576 acres of public lands surrounding Lake Sacajawea. These lands included fee lands, federally owned and managed by the Corps, as well as easement lands to which the Corps has specific rights or easements. There were a little over 3,517 acres of Corps-managed lands that were utilized for public recreation purposes, wildlife habitat, wildlife mitigation, and water-connected industrial development. No lands adjacent to Lake Sacajawea were licensed to state or local park agencies.

The following recreation areas, all administered from Walla Walla District offices at Ice Harbor Lock and Dam, were available near Lake Sacajawea: Big Flat; Charbonneau Park; Fishhook Park; Hollebeke; Ice Harbor Dam Visitor Center; Lake Emma; Levey Park; Lost Island (Votaw); Matthews; Walker; and Windust. Public boat launching

facilities were available at six locations along the shoreline. There was a marina at Charbonneau Park, while day-use, swimming, and camping were also available at many of these areas.

Some work was completed on the Ice Harbor Master Plan during the mid-1990s. Base data and land classifications were scanned and geo-referenced. The coordinates for survey monument locations were entered to establish survey points and project boundaries. The plan would guide recreational and other development on project lands.

Lake Herbert G. West (Lower Monumental Lock and Dam)

Lake Herbert G. West lies behind Lower Monumental Lock and Dam and extends up the Snake River for a distance of 28.1 miles to the tailwater of Little Goose Dam. The lake has a surface area of 6,590 acres. Recreation facilities adjacent to Lake West included Ayer Boat Basin; Devils Bench; Lyons Ferry Marina and Park; Riparia; and Texas Rapids. Recreational opportunities included boating, hiking, day-use, camping, a marina, and a historic ferry display. At the end of the period covered by this volume, all but one of these areas was administered by Walla Walla District from its Eastern Area Project Office in Clarkston, Washington. A private concessionaire operated Lyons Ferry Park and Marina.

In 1992, the Port of Columbia operated the Lyons Ferry Marina under a public park and recreation lease. On December 16, 1992, an explosion and fire occurred at the marina, destroying 80 to 100 feet of dock, causing an estimated $250,000 to $350,000 in damages. Before firefighters could arrive from the small towns of Kahlotus and Starbuck, Washington, the marina concessionarie, assisted by a construction line crew from Pacific Gas and Electric Corporation that happened to be working nearby, fought the fire in conditions of severe cold. One firefighter was taken to the hospital and treated for hypothermia (81). Damage to boats was estimated to be at $120,000. The Port Manager stated in December 1992, that the probable cause of the fire was a light bulb or heater in one of the boats docked in the destroyed section of the marina (82).

Lake Bryan (Little Goose Lock and Dam)

Lake Bryan lies directly behind Little Goose Lock and Dam. The lake extends about 37.2 miles up the Snake River, until it reaches Lower Granite Lock and Dam. Corps of Engineers recreation areas adjacent to Lake Bryan are Boyer Park and Marina, Central Ferry Park, Illia Dunes, Illia Landing, Little Goose Landing, and Willow Landing. These areas offered several points for boat launching, camping, picnicking, and hiking. Little Goose Lock and Dam had fish viewing rooms that allowed an up-close look at the many species of fish in the lower Snake River.

Lower Granite Lake (Lower Granite Lock and Dam)

Recreation associated with Lower Granite Lake, which extends up the Snake River about 39.3 miles to Lewiston, Idaho, included a wide array of outdoor activities—everything from a peaceful walk along a tree-lined path on the Clearwater and Snake River National Recreation Trail to fishing for sturgeon at Lower Granite Lock and Dam. There were also opportunities for camping, picnicking, wildlife viewing, boating, and hunting for deer, upland birds, and waterfowl.

Lower Granite, like other dams in the Walla Walla District, featured fish viewing rooms that allowed a look at the many species of fish traveling the lower Snake River. Lower Granite Lock and Dam also had a visitor center.

Recreation areas along Lower Granite Lake included Blyton Landing, Chief Looking Glass Park, Chief Timothy Park, Chief Timothy Habitat Management Unit, Clearwater Park, Greenbelt Ramp, Hells Canyon Resort, Hells Gate State Park, Lewiston Levee Parkway, Nisqually John Landing, North Lewiston Ramp, Offield Landing, Southway Ramp, Swallows Park, Wawawai County Park, and Wawawai Landing. Walla Walla District administered some of these areas from its Eastern Area Project Office in Clarkston, Washington, while others were leased to the Idaho Department of Parks and Recreation, or to counties in Idaho and Washington. These areas, some administered by the Corps, some by the Idaho Department included boat landings, marinas, camping sites, day-use parks, swimming areas, hiking trails, and hunting.

In 1994, Walla Walla District completed mapping of Lower Granite project for the Lower Granite Master Plan, which, when completed, would chart a future course for operation of the project, including recreation facilities.

Drawdown 1992

In 1992, Walla Walla District engaged in a month-long test that involved significanly lowering the reservoir levels behind Lower Granite and Little Goose Dams. The test, related to salmon recovery, is discussed primarily in chapter 8. Some of the most notable impacts were on recreational resources along the reservoris. While the drawdown caused some damage, for example to the Red Wolf Marina (see below), the exercise also allowed several boat ramps and the Hells Gate Marina to be revamped while water levels were low (83).

Others seized the drawdown as an opportunity to make improvements, “The Lewiston and Clarkston Chambers of Commerce took advantage of the mild weather and organized a clean up of the exposed shoreline (84).

“Visitation to project areas in general was up substantially. Many of the areas where people could view the drawdown experienced an increase of visitation of approximately 100 percent. Prior to the drawdown, it was anticipated that visitation could be down substantially due to closed boat ramps and the less appealing low water levels. However, due to the unique nature of this test drawdown, the number of visitors who were sight-seeing during this test time frame appeared to increase dramatically (85).” With increased visitation during the test, came increased need for patrolling by Corps recreation staff. Despite warnings, some visitors did not avoid danger. “One youth found out how bad the mud was when he became entrapped while fishing. It took a fire department with a hose to get him free and he was not injured (86).”

Red Wolf Marina, Clarkston

In 1986, a public park and recreational lease was issued to the Port of Clarkston for a marina to be constructed near the Red Wolf Bridge, and a sublease agreement was executed. Construction of the Marina was completed in 1987. The Red Wolf Marina was a very successful operation. In 1989, the facility was upgraded to increase the length of the floating breakwater, remodel and enlarge the restaurant, and add new

boat slips to increase the moorage capacity. The marina operator also offered rental of houseboats.

During the 1992 test drawdown of the Lower Granite pool (discussed above), U.S. Highway 12 had two small slides near Red Wolf Marina. About 200 feet of shoreline was washed away, and the marina suffered extensive damage to its boat landings (87). The marina suffered $400,000 in lost business and subsequently filed bankruptcy. Insurers refused to pay the damages (88) calling the damage an "act of God." In June 1992, the U.S. Congress authorized payment for damages incurred in the drawdown (89). The marina eventually regained financial stability and was operating as of 2000.

Proposed Gateway Park, Port of Clarkston

In February 1988, a park and recreation lease was granted to the Port of Clarkston for a proposed recreation facility. Development on this 29-acre site was to include a golf course and driving range, a paved parking lot, an irrigated lawn, and other landscaping. Also included was development of a public park and bike trail. The agreement included scheduling that assured simultaneous development of the golf course and the public recreation facilities.

Late in 1989, however, the Port of Clarkston was denied a request for matching grant funds for the public park from the Washington State Inter-Agency Council on Recreation. At that time, the Port of Clarkston requested a five-year development schedule for the public facilities. The privately funded golf course would be completed as originally scheduled. Concern that the private facility would be completed while the public park would not, caused the Corps to deny the request for development. Throughout 1990, numerous modifications in the golf course and park plans were submitted to the Corps for approval as Port officials and the golf course developer discovered difficulties in funding.

Finally, in 1991, the Corps was able to enter into the Gateway Park Local Cooperation Agreement. The development of Gateway Park at the Port of Clarkston was funded for $150,000 by a Congressional National Environmental Policy Act appropriations addition. The local cooperation agreement required cost sharing for construction of Gateway Park; $150,000 was appropriated for the project within the Corps' budget. In 1992, the Corps determined that more study was needed prior to undertaking development of Gateway Park. The estimated cost to complete this report was approximately $55,000. In 1993, the Local Cooperative Agreement with the Port of Clarkston for construction of Gateway Park was canceled at the request of the port.

Lewiston Levees

By the time the Lower Granite Lock and Dam project was completed in 1984, a system of levees related to the backwater had also been installed in the Lewiston, Idaho, and Clarkston, Washington, area. The levees became a national pilot project for levee beautifcation. The local newspaper praised the project: "As the plantings begin to mature and the richess of the choice of trees and shrubs becomes apparent, the southern bank of the Clearwater has been especially impressive. … The more natural and less formal plantings on the Clarkston side of the Snake are ripening into one of the

prime strolling, jogging, and biking paths in the region. And the city park on the Lewiston side of the Snake is also developing into a primary island of cool green in this hot hole in the ground (90)."

DOWN ON THE LEVEE—THE BEAUTIFUL LEVEE

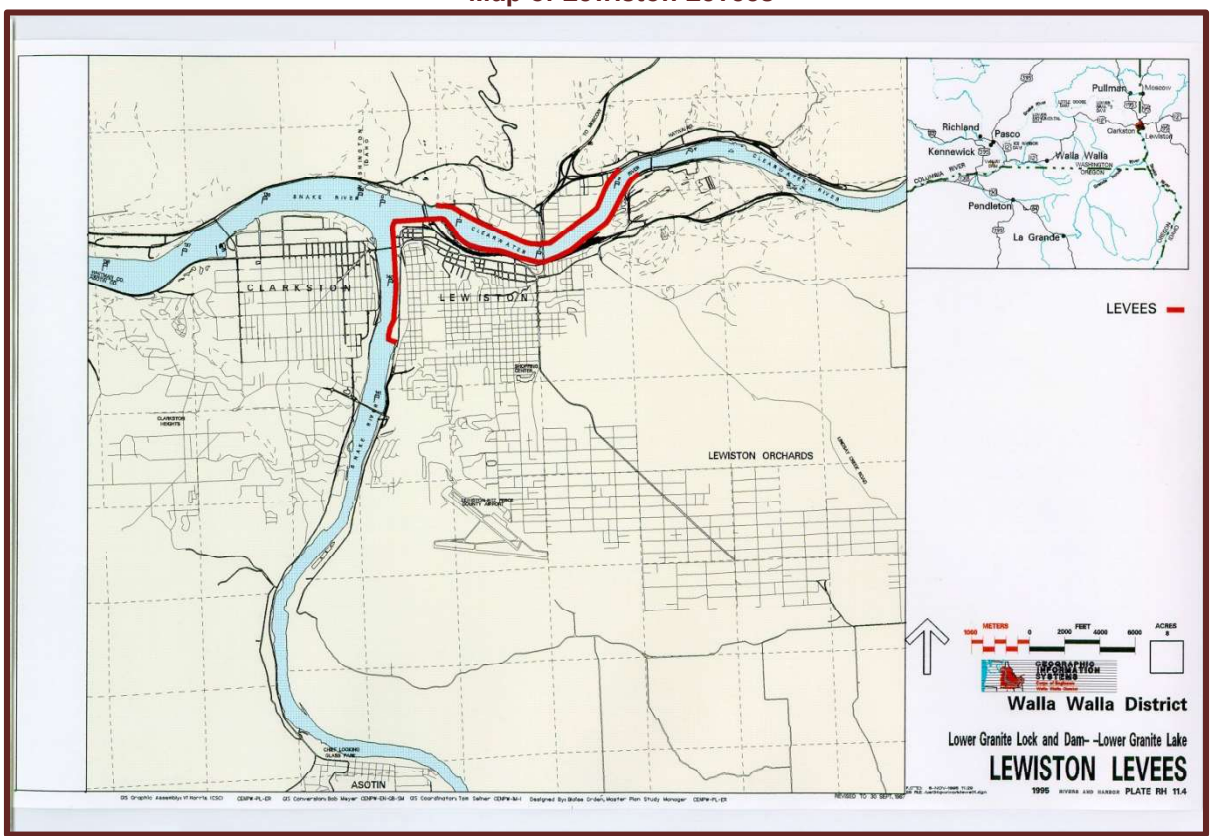
The Lewiston Levees were relatively new [in 1981]. They were built by 1975, but the beautification was being ramped up around 1978, and, over the next few years, we began to manage those as a park, Lewiston Levee Parkway. As far as I know, the Lewiston Levees was one of the earliest efforts by the Corps to beautify a levee. It stemmed from the reaction of the Lewiston and Clarkston people. When they heard that they were going to be getting levees, they didn't want something like what was in the Tri-Cities where it was just grass. … They pushed through some public meetings and so on to beautify the system.

We ended up with a system that included not only the levees, but 21 miles of bike paths that interconnect with the Clarkston side of the river, which doesn't have any levees and the Lewiston side, which has the levees. Also, the bike paths extend clear out to Hell's Gate State Park, and they extend across the Memorial Bridge on the north end of town and go on out eight miles further. … We got it established as a National Recreation Trail, and it's had that designation ever since.

One of the major features of the beautification is that there's an interpretive center right at the confluence, Lewis and Clark Interpretive Center and a statue out front. They set aside something like one tenth of one percent of the cost of the levee to perform this artwork. It turned out to be $10,000. They had a contest, and an artist's concept was chosen. [Nancy N. Dreher] was awarded the money, and she built [*i.e.*, designed] a concrete statue called, Tsceminicum. It's got a Mother Earth on the front, and her hair blends back into the statue. … On either side of it are depicted plants and animals of Indian legends. On one side is from the Clearwater region, and the other side is from the Snake River region. She even threw in a face of Sasquatch, just in case. It's got the Seven Devils depicted on it—the mountain range. There is a nice dedication, an arrowhead plaque on the west side of the statue. It has a fountain by the Mother Earth—the water comes out of her fingertips into a little pool. Around the base of that are rocks that the artist brought from her place down on the Salmon River and placed in the concrete around it. …

The public … love the levee system, the bike paths and so on. Some people use it to commute to work. Most people use it for some sort of recreation or fitness activities. We have a lot of bicyclists, skaters, skate boarders, walkers, runners; during the winter, we've even had skiers on the levees. It's been real attractive to the community and a selling point in the community. We provided at one time a stencil that various restaurants could use for a place mat, and it had the bike path system on it. People in the area are proud of it. That Tsceminicum statue is one thing that, if you have out-of-town company, you always want to take them down and show them the statue. –Phil Hixson, Supervisory Outdoor Recreation Planner (91)

Map of Lewiston Levees



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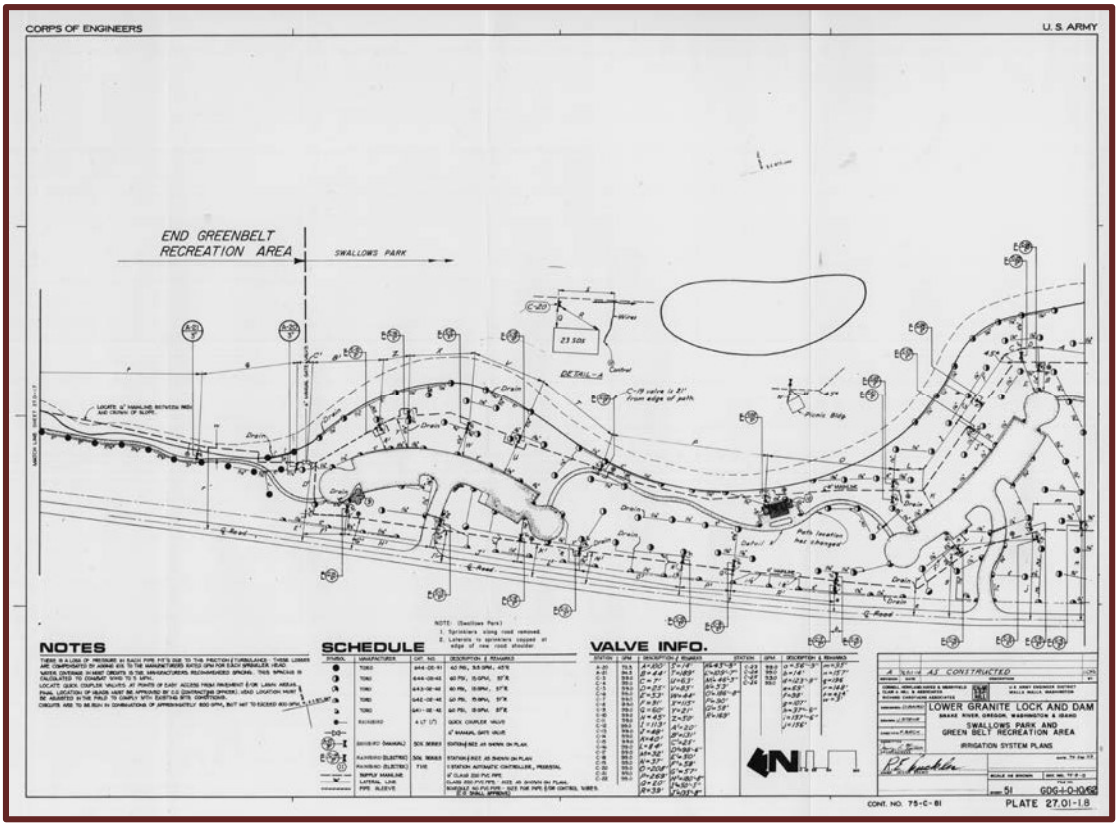
Swallows Park and Lewiston Greenbelt Maintenance Plan ca. 1979



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Chapter 11, Recreation and Land Management

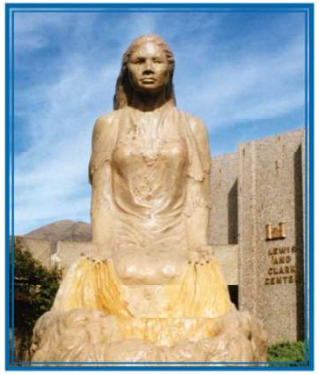
Along the Lewiston Levee Recreation Trail

US Army Corps
of Engineers®
Walla Walla District

TSCEMINICUM

(si-min'-i-kum)
[<Nez Perce Tse-me-na-kem]

Meaning "Meeting-of-the-Waters" in the Nez Perce language, this was the historic name for the confluence of the Snake and Clearwater Rivers.



The sculpture interprets Native American mythology with a symbolic Earth Mother figure whose body sustains all forms of life and from whose hands the rivers run. The wildlife and legends depicted on the east-facing wall are those of the Clearwater River and its tributaries; on the other side are those of the Snake River. A Coyote, the central "Trickster" character of Native American legend, keeps watch from the north end of the wall.

ABOUT THE ARTIST

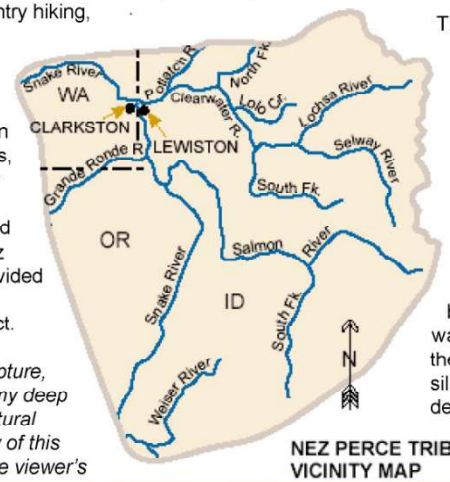
Nancy N. Dreher, who spent the major portion of three years in the creation of "Tsceminicum," holds a bachelor's degree in Art Education from the University of New Hampshire. She has worked in a variety of mediums, including drawing and painting, with a special interest in portraits and action figures. With her mother's work in clay and plaster as an early influence, she has found sculpting, especially wax studies for bronze pieces, to give her the most creative satisfaction in recent years. Activities in the Salmon River Art Guild and participation in Northwestern art shows have stimulated her work. She also teaches classes in basic sculpture and children's art.

Nancy and her family make their home at Slate Creek in the Salmon River canyon. Many years of back country hiking, hunting, and photography have given the artist familiarity with the wildlife portrayed in her sculpture. This, combined with her research into the culture, history, and legends of the Nez Perce people, provided the background to develop this project.

"I hope this sculpture, while expressing my deep feelings for the natural beauty and history of this area, also frees the viewer's imagination to take flight beyond the bounds of sight and touch."

"My special thanks go to Architect George Kirkham of the Walla Walla District, U.S. Army Corps of Engineers, for his unfailing encouragement and to Bill Gussenhoven for technical coordination. Bill, along with my family, also contributed many hours of hard labor. Welcome assistance was received from Carrol Adkison of Grangeville, Nancy Stalter, J. M. Stanaway, Art Bolton, the Corps of Engineers staff, Lewiston High School students and faculty, Dale and Linda Clinton, and many other wonderful people of the Lewiston-Clarkston area."

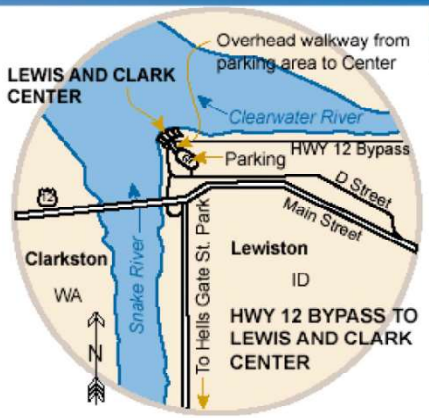
Nancy N. Dreher



NEZ PERCE TRIBAL AR
VICINITY MAP

ABOUT THE SCULPTURE

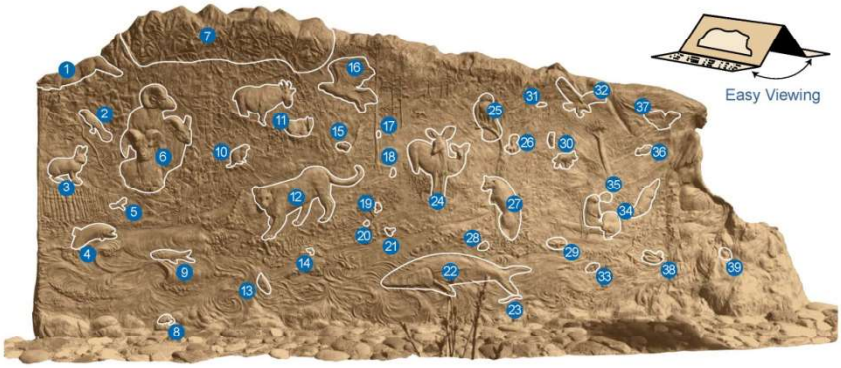
The original scale model for "Tsceminicum" was entered in a 1976 design competition held by the U.S. Army Corps of Engineers as part of the Lewiston Levee Beautification Project and was chosen for the final commission in February 1977. By fall 1978, the full size sculpture, modeled with 850 pounds of non-hardening clay over a wooden framework, had been assembled in a Clarkston warehouse. The clay surface was then covered with many coats of silicone rubber, capturing each detail in a flexible liner that was sprayed with urethane foam to form a



4-inch-thick, rigid, lightweight mold. This was cut away from the clay in sections, transported to the site and carefully reassembled, leaving a cavity into which reinforcing steel and plumbing and electrical connections were placed. Massive form work, backfilled with a sand-plaster mix, was bolted around the urethane shell to support the 25,000 pounds of concrete that was pumped and vibrated into the mold cavity. Once the concrete was cured sufficiently to remove the bracing and mold, the sculptor completed the necessary patching, coloring, and protective coating. The base of native river rock was then laid.

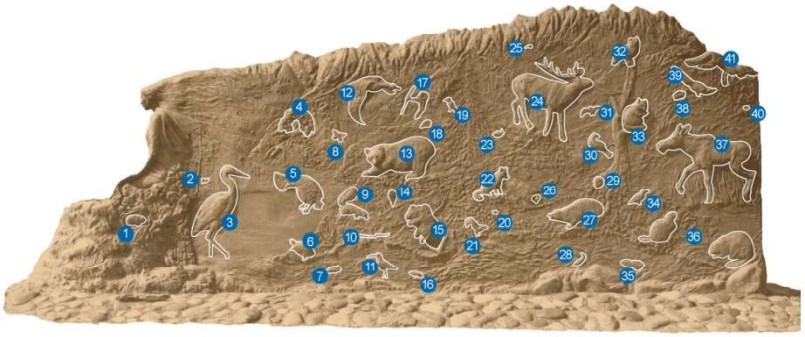
For stories about the animals of the sculpture, read "Nu Mee Poom Tit Wah Tit" (Nez Perce Legends) - Nez Perce Tribe of Idaho, 1972 - Allen Slickpoo, Jr., Coordinator; "Indian Tales of the Pacific Northwest" - Ella C. Clark; and "Tales of the Nimipoo" - Eleanor B. Heady.

Tsceminicum Brochure (continued)



KEY TO SNAKE RIVER WILDLIFE AND LEGENDS

1 Coyote (legend)
2 Gray (Canada) Jay "Camp Robber"
3 Snowshoe Rabbit
4 Steelhead Trout
5 Dragonfly
6 Rocky Mountain Bighorn Sheep
7 Seven Devils Mountains
8 Muskrat
9 Salmon
10 Marmot
11 Mountain Goat
12 Cougar
13 Bass
14 Mouse
15 Grizzly Bear
16 Eagle
17 Woodpecker
18 Weasel
19 Chickadee
20 Snail
21 Water Ouzel
22 Sturgeon
23 Lamprey Eel
24 Mule Deer
25 Redtail Hawk
26 Pine Squirrell
27 Wolverine
28 Cricket
29 Frog
30 Timber Wolf
31 Mosquito (legend)
32 Osprey (Fish Hawk)
33 Crawfish
34 Otter
35 Spider
36 Prairie Chicken
37 Raven
38 Rattlesnake
39 Chipmunk



KEY TO CLEARWATER RIVER WILDLIFE AND LEGENDS

1 Cottontail Rabbit
2 Bobcat
3 Great Blue Heron
4 Ant and Yellowjacket (legend)
5 Mallard Duck
6 Turtle
7 Sucker (rough fish)
8 Butterfly
9 Skunk
10 Blue Racer Snake
11 Curlew
12 Goose
13 Black Bear
14 Blue Camas
15 Porcupine
16 Whitefish
17 Stone Resembling Aiming
18 Heart of the Monster (legend)
19 Blue Jay (Steller's)
20 Wood Tick
21 Mink
22 Fox
23 Mountain Quail
24 Elk
25 Hummingbird
26 Ground Squirrel
27 Badger
28 Sculpin
29 Buffalo (legend)
30 Blue Grouse
31 Bat
32 Great Horned Owl
33 Raccoon
34 Meadowlark
35 Northern Pike Minnow
36 Beaver
37 Moose
38 Grasshopper
39 Magpie
40 Pika
41 Coyote (legend)

Mill Creek Project and Bennington Lake

Mill Creek project is located on the western edge of the Blue Mountains, approximately three miles northeast of Walla Walla, Washington. Mill Creek was a water resource development project completed in 1942 after a history of damaging floods in the Walla Walla Valley. During the 1981-2000 period, Mill Creek project was managed to provide flood control, outdoor recreation, and natural resource stewardship.

Sunflowers at Mill Creek Project—Seeded by the District to Support Wildlife (92)

Mill Creek project consists of 612 acres and is the largest tract of public land in the Walla Walla Valley. Visitors seeking year-round recreation may enjoy boating, hunting, fishing, picnicking, and swimming, as well as bicycling, strolling, rollerblading, jogging, horseback riding, cross-country skiing, and wildlife viewing at the three recreation areas located within Mill Creek: Bennington Lake, Mill Creek Recreation Trail, and Rooks Park. In-season hunting and archery were also activities allowed at the project.

During the 1981-2000 period, the lake was often stocked with trout. In 1991, for example, the local newspaper reported, “Mill Creek Lake Filled to the Gills in Trout (93).” That year, about 12,000 legal-to-catch rainbow trout from the Lyons Ferry Trout Hatchery were placed in the lake by the Washington Department of Wildlife.

In 1937, Virgil Bennington, a Walla Walla farmer and businessman, was sent to Washington, DC, to lobby for a flood control project to protect the city and county of Walla Walla. Three years later, the Mill Creek project commenced construction. Mr. Bennington was also a hunter, a fisherman, and a leader in conservation. In 1992, Mill Creek Reservoir was renamed Bennington Lake to honor Mr. Bennington.

Between October 1998 and September 1999, the area recorded a total of 168,300 visitors. The project manager commented on usage at Mill Creek: "Considering the size of the area, it is very heavily used by a very diverse range of users (94)." A project ranger added, "We do have seasonal swings in the level of usage (95)."

The Mill Creek Master Plan (96) was completed in September 1993. This was the first multiple resource inventory and analysis in the project's fifty-year history. The Master Plan was also the first Water Resource Master Plan in the Corps of Engineers to fully use the computerized geographic information system. Other Corps districts and Department of Defense facilities requested copies of the plan. The Mill Creek database developed as part of the Master Plan Program was presented (using a workstation) to the National Surveying, Mapping, Remote Sensing, and GIS Symposium at New Orleans in August 1994.

PARTNERSHIP AT MILL CREEK

We built that flood control project [the Mill Creek project], never intending for that lake to be a full-time lake. The state looked at it, saying, could you guys maybe put water in it so maybe we could sell fishing licenses? We started filling the lake, and then we found out that our geologic reports were at odds. One said that we were building that dam on top of solid rock. The other [report] said it's porous as heck. We found out that, guess what, it's pretty porous. The water kept leaking out of the thing [*i.e.*, Bennington Lake]. …

But anyway, we divert water down there. We know that we have fish living in Mill Creek. Although I never heard any real substantiated reports of fish being diverted into the lake, they probably would not have made it anyway because the intake canal is concrete and it has steep drop off at one time. We had trees out there at one time, but decided we had an erosion problem. We dumped riprap out there. Great, if any fish got flushed down the canal, they ended up in the riprap and got lost forever. It was essentially a death trap. It's a one-way trip for any fish that happens to be diverted. …

What was nice, as far as a partnership, was that the Washington Department of Fish and Wildlife said, we'll provide the screens if the Corps will put them in. To me, that was a partnership to solve a problem. It benefited both of us, because they had the water rights, and they wanted the water in the lake. If they couldn't divert the water, they couldn't have a recreational lake, and we were in trouble with Endangered Species Act if we didn't put some kind of screen out there. We came up with money, they came up with money, and we now have screens out there. –Sandra L. Shelin, Environmental Compliance Specialist (97).

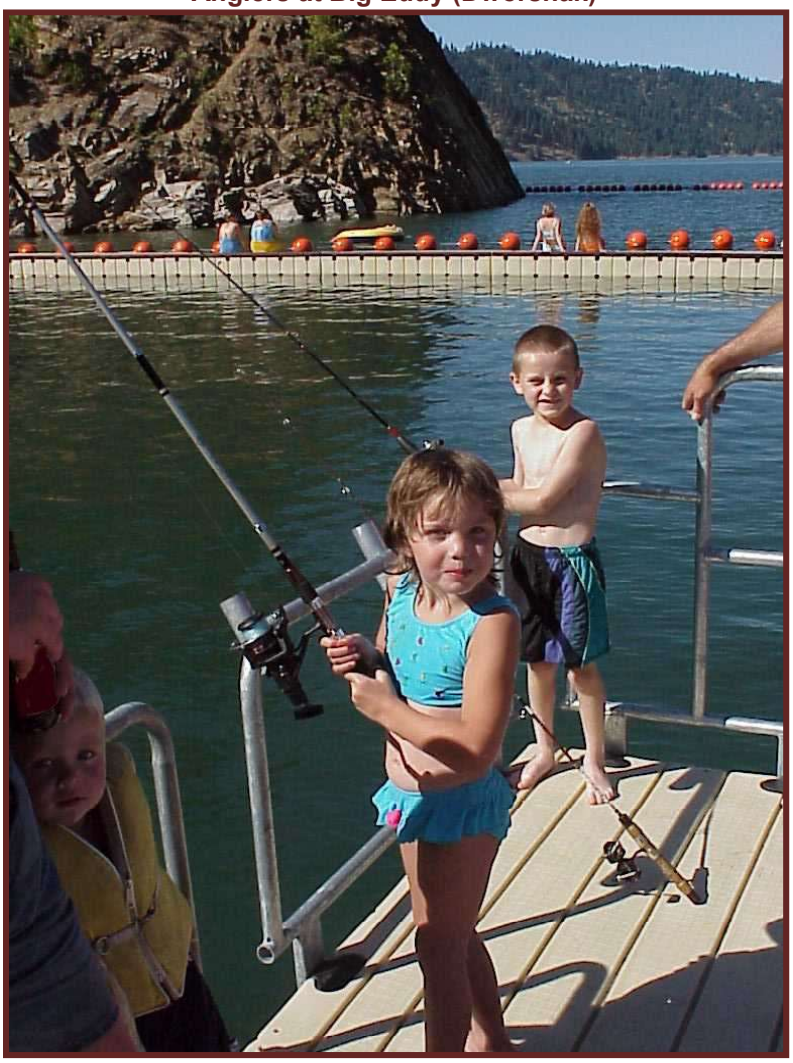
Dworshak Dam and Reservoir

Dworshak Dam is in northern Idaho on the North Fork of the Clearwater River, 1.9 miles above its confluence with the Clearwater River. Construction of the project started in 1963, and it became operational for flood control in 1972. It is the highest straight-axis concrete gravity dam in the Western Hemisphere and the 22nd highest dam in the world. Only two other dams in the United States exceed its height. At normal full pool

elevation level, Dworshak Reservoir is 54 miles long, has 184 miles of shoreline, and covers an area of 19,824 acres.

Dworshak Reservoir is surrounded by lush forested mountains and offers a myriad of recreation opportunities: boating, including canoeing, sailing, and motor boating; swimming and water skiing; fishing for kokanee salmon and rainbow trout; camping at one of the remote minicamps; hunting for elk or whitetail deer; and hiking on the forested trails. Boat launching ramps are available at all reservoir recreation sites accessible by road.

Anglers at Big Eddy (Dworshak)



To facilitate recreation opportunities and protect project and adjacent private and state industrial timberlands, nearly 100 primitive minicamps are dispersed across the reservoir's shoreline. They provide unique access to project lands and waters for hunting, fishing, and solitude.

There are 30,000 acres of public lands around the reservoir. The project provides numerous opportunities for recreation at the following areas: Bruces Eddy; Canyon Creek; Cold Springs Group Camp; Dent Acres; Dent Acres Group Camp; Dworshak

Visitor Center; Dworshak State Park (Freeman Creek, Big Eddy, and Three Meadows Group Camp); Grandad; Merrys Bay; Picnic Glen; Powerhouse Road and North Fork River; and Viewpoint.

The visitor center at the top of Dworshak Dam provides informative slide programs and displays. Guided tours of the dam and powerhouse start at the visitor center. On average, approximately 125,000 recreation visitors use the project each year.

❖ Dworshak Timber Blowdown

In August 1983, a terrific windstorm on the North Fork of the Clearwater River blew down a large acreage of timber on the Dworshak project. The Bureau of Land Management acted as the Corps' primary agent in administering the timber sales contracts. A total of 10,315,000 board feet of lumber was sold through the end of 1985. Due to terrain and access considerations, not all blowdown material could be removed, but post-1985 activities in this blowdown area were directed towards reduction of fire, insect, and public safety hazards.

❖ Dworshak Forest Fires

Forest fires were a particular challenge on the heavily wooded and often dry lands surrounding Dworshak project.

In 1984, an unattended campfire started a fire on Corps land that burned 1,100 acres, most of which were on private lands.

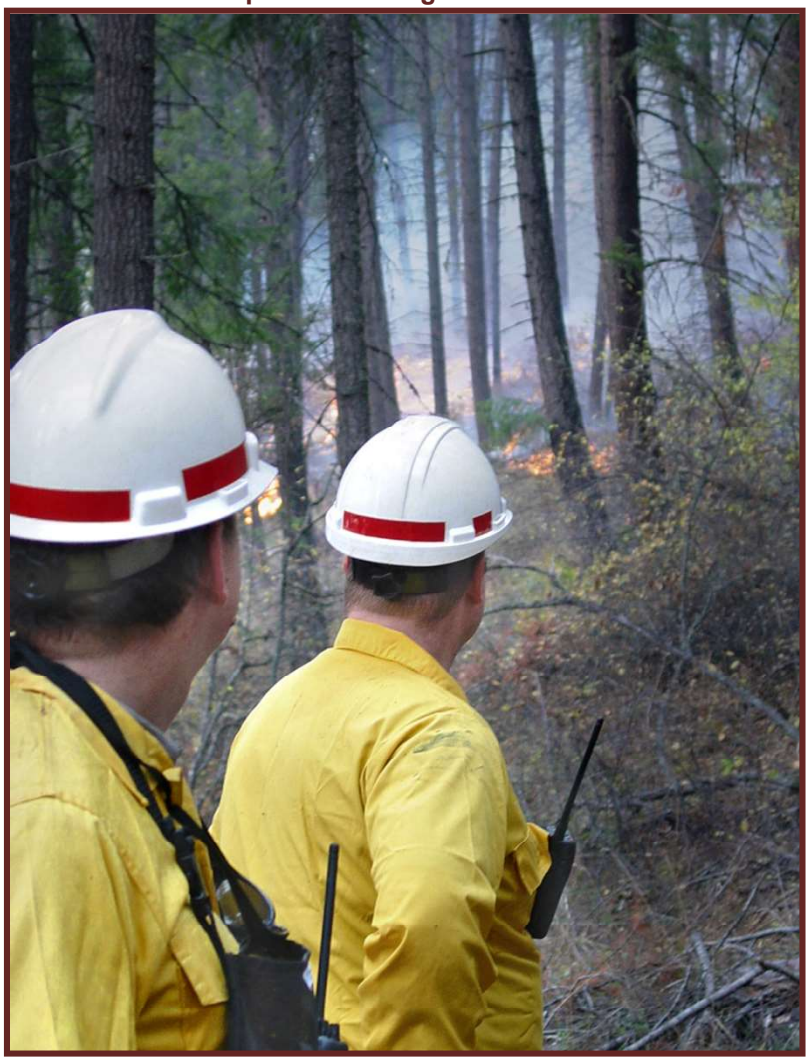
A seventy-acre forest fire broke out on Dworshak project lands in July 1985:

> "The blaze, located about 40 miles from the dam near Telephone Creek and about one-forth mile from the reservoir, was first spotted about 9:30 a.m. July 3. From a helicopter, fire official learned the fire wasn't a controlled burn and dispatched the first six-man crew to the scene at 11 a.m. …
>
> "Two helicopters transported crew members to the upper ends of the fire, so they could douse hot spots with reservoir water and spot fires beyond the fire lines. A bulldozer and grader opened up and repaired old logging roads near the fire, but because of the steepness of the terrain, workers still had to make a 45-minute trek to the area. …
>
> The project resource workers [Corps staff] had just received training in helicopter safety at an annual fire school held a week before the fire. … [The project manager] credited resource workers for their fire-fighting (98)."

No one was injured and the fire was brought under control within three days.

In 1986, firefighting crews had to be removed from the Gold Creek area to prevent their injury or death when high winds forced the fire in their direction. As the firefighters watched, planes carrying fire retardant and helicopters continued to battle the blaze.

Corps Staff Facing a Forest Fire



❖ Freeman Creek (Dworshak State Park)

Freeman Creek recreation area at Dworshak project was opened in 1979 under Corps operation. In 1994, Walla Walla District received $100,000 to extend the Freeman Creek boat ramp. The boat ramp extension made it usable during drawdown periods.

Freeman Creek was developed as a major recreational facility with campgrounds, shelters, swimming beaches, hiking trails, and day-use areas.

❖ Three Meadows Group Camp (Dworshak State Park)

In 1985, Walla Walla District let a contract for development of Three Meadows Group Camp at Dworshak Reservior. The contract provided for 31 miles of gravel access road, a water supply system, sewage disposal system, lodge building for meetings and dining, two toilet/shower buildings, and nine sleeping cabins. The project had been delayed until a sponsor, the Nez Perce Tribe, was selected to operate and maintain the facility.

The camp was completed in the fall of 1986. This area provided eight sleeping cabins, restrooms with showers, and a central lodge with commercial kitchen facilities. All told,

96 visitors could be accommodated at Three Meadows Group Camp. The Nez Perce Tribe notified the District of its intent to withdraw from camp management, and the District initiated a three-year search for another lessee. The Idaho Department of Parks and Recreation, Lewis and Clark State College in Lewiston, Idaho, and representatives from the Boy Scouts of America were interested in the camp.

❖ Big Eddy Marina (Dworshak State Park)

During the 1980s, the Nez Perce Tribe leased the Big Eddy area, and a marina was developed. During the 1980s, Walla Walla District worked to resolve safety problems regarding the marina. In 1986, the District directed the tribe to immediately repair deficiencies considered life threatening (the electrical and fuel handling systems) and action was deferred on enforcing compliance on the less serious problems such as replacement or repair of the dock. The tribe contracted for repair of the dock's electrical and fuel handling systems, completing the repairs in time for the 1986 recreation season.

The Corps developed an innovative design feature for this recreational site: "During the drought period of the late 1980s and expectations of low water during the recreation season, another challenge surfaced. Big Eddy had the only shoreline marina pumpout station for boats and was not accessible during lower water conditions. A design, considered for several years, to convert a small barge to a floating marina pumpout station became a reality. This new concept was welcomed by recreational boaters and is used as a model by federal, state, and marine consultants (99)."

An August 1986 windstorm caused major damage to the downstream finger of the dock, pointing out the facility's deteriorated condition. The tribe was required by the Corps to make immediate repairs and submit plans for replacement of the entire dock system. Temporary repairs were made to carry through the remainder of the recreation season.

The first full season for operation of a new restaurant at the Big Eddy Marina was 1988. While the restaurant was generally considered an excellent facility with the quality of food above average, patronage was less than anticipated, attributed to a lower than normal pool level and fewer people using the reservoir. Because of an unanticipated cost overrun for the restaurant building, the sublessee was unable to replace the docks as agreed. A meeting was held in the summer of 1988 with the sublessee and the Nez Perce Tribe to work out details on a phase-in of new dock facilities.

In June 1992, the marina docks were damaged beyond repair due to the effects of a severe windstorm. A dock anchoring cable installed and maintained by the Corps apparently failed under the force of the wind causing damage to the docks (100). All public boat-fueling and dock-mooring services were curtailed as a result of the damaged docks.

In October 1994, Walla Walla District received $250,000 to be used at Big Eddy to restore docks and an anchorage. The District was in the process of contract preparation to have a dock and fuel system installed prior to the start of the 1995 recreation season. During 1992-95, the District negotiated with the Nez Perce Tribe and their sublessee on various issues dealing with damage claims, operation of the facilities, and lease termination.

In 1995, new docks and a fueling facility were constructed at Big Eddy Marina, replacing the facilities damaged in the 1992 windstorm. The replacement facilities accommodate 98 vessels. The Nez Perce Tribe "bowed out and within ten days, we had Idaho State [Department of] Parks signed on. [The Department] added it to Dworshak State Park. They've got three units down there: Big Eddy Marina, Freeman Creek, and Three Meadows (101)."

Again in 2000, the Big Eddy docks were upgraded. New structures made of polyethylene were installed. The surface of the docks were cool to the touch, even with the sun shining on them. The new docks, funded through a grant from the Idaho Department of Parks and Recreation and local waterways committees, were safer and also compliant with Americans with Disabilities Act requirements.

❖ Dworshak State Park

In 1989, the Idaho state legislature appropriated funds to the Idaho State Department of Parks and Recreation to operate Dworshak State Park. That year, the Idaho Department of Parks and Recreation entered into a 25-year lease to operate and maintain both Three Meadows Group Camp and Freeman Creek Campground. The lease area was appropriately named Dworshak State Park. The park, as constituted in 1989 featured 798 acres of wooded land, 473 acres of water, 101 modern individual campsites, and a large group camping area. Later, in 1995, Big Eddy was added to the State Park.

❖ Dent Acres

In 1994, a $98,369.60 extension of the Dent Acres Boat Ramp was completed. In July 1999, Walla Walla District awarded a contract to repair damages resulting from a massive mudslide. Phase two of improvements, completed in late 1999, involved a contract for approximately $116,000 for geocell wall and earthwork.

❖ Elk Mitigation

At Dworshak project, the Corps was involved in efforts to mitigate for the loss of Rocky Mountain elk habitat that was inundated when the project was constructed. The mitigation requirement, as agreed to in 1985, was to produce enough usable browse on project lands to sustain 915 elk for a 100-day winter period. This was estimated to be 1.83 million pounds annually.

By 1986, an area of about 9,133 acres was under intensive management for elk habitat. Over 3,000 acres were developed for browse production. In addition to this intensive management area, over 811 acres of browse and meadow development were established on the lower Dworshak Reservoir. In addition, this ongoing program provides recreation for hunters.

❖ Dworshak Drawdowns

The water stored behind Dworshak Dam was regulated according to guidelines specified in the project's water control manual (102). As a consequence of implementation of the Endangered Species Act, and in response to a 1995 Biological Opinion by the National Marine Fisheries Service (103), the reservoir was lowered approximately eighty feet from early July through late August. Lowering the reservoir

moderated warm downstream river temperatures and augmented flow, helping to conserve anadromous fisheries stocks listed as endangered (salmon and steelhead). During the fall and winter, additional withdrawals were sometimes necessary to create storage capacity for spring runoff. The reservoir was refilled during the spring, conserving floodwaters and supporting flood damage reduction.

Implementation of these water management strategies made an impact on recreation benefits of Dworshak Reservoir. Facilities could sometimes be difficult to use during summer drawdowns. Recreation visitation diminished by nearly fifty percent during the 1990s.

During the 1990s, Walla Walla District Operations Division and Public Affairs Office produced a series of news releases throughout the spring, summer, and fall of 1992 to urge continued use of Dworshak reservoir despite a drop in water levels. Additionally, Public Affairs worked closely with Dworshak State Park, managed by the State of Idaho, in a partnering relationship to include information about park facilities in the news releases. The program achieved success in explaining reservoir conditions beyond the simple reporting of water levels as done in years previous.

The summer of 1994 saw the District drafting Dworshak Reservoir to the lowest summer levels in its history. This action resulted in significant attention from local, regional, and national media. A local newspaper wrote: "The dramatic drawdown at the Dworshak Dam reservoir this summer did more than flush young salmon toward the Pacific Ocean. It drained an estimated $1.5 million from the local economy. … 'People come to this part of Idaho for the beauty and adventure,' said Orofino businesswoman Jeanie Dean. 'A mud puddle behind a dam is not an exciting adventure (104).'"

Local dissatisfaction with drawdowns of Dworshak Reservoir continued to run high as reflected in regional newspaper articles published throughout the 1990 to 2000 period. From 1990: "Corps, BPA [Bonneville Power Administration] Get an Earful on Dworshak Water Level (105)." From 1994: "Drawdown a Drain on Orofino Economy (106);" and "Dworshak Drawdown Draws Fire (107)." From 2000: "River Operators Clash over Use of Dworshak Water (108)."

Through the end of the 1990s, Dworshak drawdowns continued to be important to Walla Walla District due to the community sensitivity to reservoir levels during the recreation season. For example, the District held annual public information meetings on Dworshak Dam reservoir operations in Orofino, Idaho.

❖ Dworshak Master Plan

During 1999, Walla Walla District updated the Dworshak Master Plan and supplemental environmental impact statement. Because major changes took place in the operation of the project due to requirements mandated by the National Marine Fisheries Service's 1995 Biological Opinion (109) regarding Snake River salmon and steelhead listed under the Endangered Species Act, it was essential that the project operating documentation be updated.

Work on the master plan update started during the mid-1990s but was halted due to budget constraints. During fiscal year 2000, Dworshak Project and Planning Branch

staff developed an extensive project study plan and schedule for completion of research, data analysis, the master plan, and the entire supplemental environmental impact statement process. The cost was estimated at approximately $2.5 million. The schedule included approximately five years for completion. The extensive schedule was required to update natural and cultural resource inventory data that did not exist for Dworshak project.

Lucky Peak Lake and Dam

Lucky Peak Lake and Dam is a Corps project in the mountains of southwestern Idaho on the Boise River, ten miles southeast of the City of Boise. Lucky Peak Dam was constructed primarily for flood control along the main stem of the Boise River. Lucky Peak Dam was completed in 1961. Behind Lucky Peak Dam is a storage reservoir, Lucky Peak Lake. The lake, when full, is twelve miles long. It has 45 miles of shoreline and 3,019 acres of surface area.

There were 4,288 acres of public lands surrounding Lucky Peak Lake. These lands included lands federally owned and managed by the Corps as well as easement lands to which the Corps had specific rights (*i.e.*, flowage or access). Corps-managed lands that were utilized for public recreation purposes, wildlife habitat, and operation purposes totaled 4,079 acres.

There were ten major and ten minor recreation sites along the lake. The state of Idaho operates Lucky Peak State Park at three locations around the lake. Lucky Peak State Park is the most visited state park in Idaho. The Corps operates other recreation areas.

Recreation facilities at Lucky Peak Lake consisted of twenty picnic/day-use areas, a bike path, hiking trails, four boat launch ramps, and three swimming areas. In fiscal year 1999, there were 750,900 visits to Lucky Peak Lake. Recreation areas included Barclay Bay, Birch Creek, Browns Gulch, Charcoal Creek, Chimney Rock, Dead Dog Creek, Deer Flat, Foote Park, Lydle Gulch, Goose Neck Bay, Lucky Peak Viewpoint, Macks Creek, Mores Creek, Pipeline Gulch, Placer Point, Robie Creek, Robie Creek South, Sheep Creek, Turner Gulch, and Turnaround Point. Lucky Peak State Park included Sandy Point, Spring Shores, and Discovery Units. With the exception of Lucky Peak State Park, the Corps operates these recreation areas.

Under a 1984 agreement, the Boise Board of Control, a consortium of local irrigation districts, constructed a powerhouse at Lucky Peak. The powerhouse construction project included a visitor center, reconstruction of the existing outlet, and construction of a second outlet plus mitigation and enhancement of recreation and operation facilities. Numerous improvements to recreation facilities were accomplished during construction of the hydropower additions during the 1980s. For example, road and parking facilities and a boat ramp were expanded at the Barclay Bay-Turner Gulch site to provide additional parking and increased safety (110).

The lake lies within the Idaho Department of Fish and Game's Boise River Wildlife Management Area, the major game range in the state. The state of Idaho has developed wildlife habitat especially for mule deer on Lucky Peak lands. A project land interchange was completed in 1988 between the Corps and the U.S. Forest Service. The interchange eliminated dual jurisdiction on lands within Lucky Peak project. This

consolidation of land management responsibilities maximized the overall benefits derived from the project.

The updated Lucky Peak Master Plan, approved in July 1988, guided the operation, recreation, and wildlife activities of the project. In 1994, the land classifications and base maps for Lucky Peak project were scanned. Thematic maps included hydrology, topography, transportation, outgrant facilities, and land classifications. These digitized files were intended for use in future project plans.

❖ Lucky Peak State Park

The Idaho Department of Parks and Recreation operated the Sandy Point and Spring Shores Units of Lucky Peak State Park. Lucky Peak State Park receives the highest visitation of any state park in Idaho.

During the period covered by this volume, expansion at the Sandy Point Unit of Lucky Peak State Park included additional trees and lawn, a new amphitheater, extension of the bike path from the Discovery Unit to the Sandy Point Unit, and measures to improve the appearance and water quality at the swimming beach. The Idaho Department of Parks and Recreation also replaced the marina docks at the Spring Shores Unit of Lucky Peak State Park.

❖ Spring Shores Unit (Lucky Peak State Park)

In 1985, Idaho State Department of Parks and Recreation, was unsuccessful in negotiating a new sublease with its concessionaire at Spring Shores Unit. The state advertised for proposals from parties interested in providing marina and other services at Spring Shores and received a proposal that appeared to be satisfactory. In 1985-86, the state wrestled with buy-out issues regarding the marina. In 1986, there was a legal ruling against the former concessionarie who failed to vacate the premises and prevented the opening of the marina under a new operator for the 1987 season.

Arbitration in 1988 resolved price differences regarding the buyout of facilities, settling on $325,000. The new concessionaire failed to pay the price, and the state of Idaho stepped in and paid in order to prevent further litigation. The state constructed temporary facilities in the spring of 1988 and operated them during the 1988 and 1989 recreation seasons. The state constructed new permanent dock facilities and, as of the end of 2000, retained management of the marina.

In 2000, the Idaho Department of Parks and Recreation, in cooperation with the Corps, had substantially completed a remodel of the Spring Shores Unit, including marina and restrooms upgrades, paving, and security lighting. All remaining work, including landscaping, was to be completed in 2002.

Lewis and Clark

In 1999, Walla Walla District initiated planning to prepare for the Lewis and Clark Bicentennial Commemoration. (See chapter 10 for background regarding Lewis and Clark's travels through the District.) Several District staff members worked on planning activities including Craig Rockwell who served as the Columbia River basin coordinator for the Lewis and Clark Bicentennial. The Corps and other agencies worked to prepare

for a potential onslaught of tourists up and down the expedition's path during the 2003-2006 period. It was estimated that some sites might receive between two and ten million additional visitors, over and above what was normal, during the celebration.

Regionally, it was seen as extremely important that the story of Lewis and Clark be told from the perspectives of both Native Americans and Euroamericans. As the Bicentennial drew closer, District staff worked to develop a partnership between the tribes and the federal agencies to ensure the Indian perspective was represented. One idea was to place Native American signs at display points. The idea was to contract with the tribes to develop wording in interpretive display panels.

At first, it was thought that special funding would be available for interpretive displays and other improvements. However, by the end of 2000, Congressional representatives had indicated that funds would not be available for the Lewis and Clark Bicentennial. Anything to be done for the Bicentennial would be done through existing agency, state, or tribal resources. The interested federal agencies active in the region were the Corps, the Bureau of Land Management, the Forest Service, the Bureau of Indian Affairs, and the National Park Service.

The District allocated a portion of its recreation budget each year for improvements. In 2000 and 2001, approximately $800,000 each year was allocated for improvements. By 1998-2000, the Corps was working to prioritize use of this money as related to the Lewis and Clark commemorative activities. The District also received special multimillion dollar funding for a modernization project at Hood Park (see above for details) to increase the number of campsites for the large number of anticipated visitors. Hood Park is located right on the Lewis and Clark Trail and is one of the most heavily used parks in the District.

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Notes for Chapter 11

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1. Bonneville Power Administration, Bureau of Reclamation, and USACE, North Pacific Division. *Columbia River System Operation Review, Final Environmental Impact Statement*. Summary, main report, 20 technical appendixes. Portland, OR: The Agencies, 1995.
2. Ibid, Appendix J, p. 2-1.
3. Information pertaining to recreation can be found in: *Lower Snake River Juvenile Salmon Migration Feasibility Report/Environmental Impact Statement.* Final. Walla Walla: NWW, 2002, p. ES-7-ES-10; and Appendix 13, *Recreation Use.*
4. Shelin, Sandra L. Interview. Walla Walla: NWW, 14 September 2001.
5. Pomraning, Allen N. Interview. Walla Walla: NWW, 24 January 2002.
6. Hixson, Phil L. Interview. Walla Walla: NWW, 10 July 2001.
7. Dworshak crew finds innovative way to chill out. *Intercom*, September 1993, p. 4.
8. Ice Harbor visitor facility opens, water's role told. *Intercom*, 1 May 1981, p. 1.
9. Philip, Jeff, quoted in: McNary Dam fish facility dedicated. *Intercom*, September 1994, p. 10.
10. Chamberlain, Todd. McNary center to attract visitors. *Hermiston (Or.) Herald*, 3 May 1994.
11. Learn about birds, rocks and history at McNary speaker series. *Pendleton East Oregonian*, 24 January 2000.
12. District receives national honors for interpretive program. *Intercom*, February 1997, p. 8.
13. Dankel, Dave, quoted in: District receives national honors for interpretive program. *Intercom*, February 1997, p. 8.
14. 1995 accomplishments. *Intercom*, winter 1995-96, p. 12.
15. Eastman, Mark G. Interview. Walla Walla: NWW, 25 June 2001.
16. USACE, Walla Walla District. Walla Walla District Recreation Areas. Walla Walla: NWW, [n.d]. INTERNET: http://www.nww.usace.army.mil/corpsoutdoors/.
17. Eastman interview.
18. Voss, Steven W. Interview. Walla Walla: NWW, 26 June 2001.
19. Corps seeks input for recreational improvement. *Lewiston Morning Tribune*, 22 August 2000.
20. Hixson interview.
21. Eastman interview.
22. Eastman interview.
23. Eastman interview.
24. Eastman interview.
25. Eastman interview.
26. McConn, Terry. Patrols try to keep boaters safe. *Walla Walla Union-Bulletin*, 25 April 1990, p. 9-10.
27. Photographer saves life at Mill Creek. *Intercom*, 1 August 1984, p. 2.
28. Drowning, near drowning near Levey Park. *Intercom*, 31 August 1988, p. 1.
29. Corgatelli, Kathy. River search continues for Firth boy. *Pocatello Idaho State Journal*, 22 June 1992, A1, A6.
30. McNary hosts a day focusing on water safety. *Intercom*, September 1996, p. 1.
31. Eastman interview.
32. Eastman interview.
33. USACE, National Water Safety Program. National Water Safety Program. Walla Walla: The Program, 2000. INTERNET: watersafety.usace.army.mil/.
34. Nutt, Lynda G. Interview. Walla Walla: NWW, 20 September 2001.
35. Tire dumper flees. Reprint from *Tri-City Herald*, 2 May 1981. *Intercom*, 1 July 1981, p. 4.
36. Jump, Norma, and Rick Brown. Ice Harbor helps youthful rail-riders. *Intercom*, 4 November 1983.
37. Shoot-out at Texas Rapids. *Information Bulletin*, 3 August 1988, p. 1.
38. Three arson fires under investigation. *Lewiston Morning Tribune*, 31 May 1994.
39. Lewiston men cited in Hells Gate gun injury. *Lewiston Morning Tribune*, 9 June 1994.
40. Despondent man drives off dam. *Pendleton East Oregonian*, 22 September 1994.
41. CFR Title 36.
42. Eastman interview.
43. Brown, Jimmie L. Interview. Walla Walla: NWW, 23 July 2001.
44. Hixson interview.
45. Weeks, D. Anthony. Interview. Walla Walla: NWW, 18 June 2001.

46. Eastman interview.
47. A day in the life of a park ranger. *Intercom,* August 1988, p. 8-10.
48. Eastman interview.
49. Encoded as CFR Title 36, Part 327.30; first published in the *Federal Register*, July 27, 1990.
50. PL 103-66.
51. Lucky Peak boat-ramp fees cause confusion. *Boise Idaho Statesman*, 7 April 1994.
52. Boat ramp user fees start May 10. *Intercom*, March 1994, p. 4.
53. Eastman interview.
54. U.S. Office of Management and Budget. *Circular A-76.* Washington, DC: The Office, 1983.
55. Corps undertaking year-long study of recreation services. *Orofino (ID) Clearwater Tribune*, 3 November 1999.
56. Voss interview.
57. Carlton, Richard. Interview. Walla Walla: NWW, 24 October 2001.
58. Hixson interview.
59. Executive Order, 12512, *Federal Real Property Managemen*t, April 29, 1985.
60. Nutt interview.
61. Eastman interview.
62. Pomraning interview.
63. Carlton interview.
64. PL 106-53.
65. Carlton interview.
66. Carlton interview.
67. Grass, Charlene. Personal photo, November 2004.
68. Citizens debate whether race course development should be allowed. *Intercom,* June 1989, p. 10-12.
69. Ibid, p. 11.
70. District commander denies proposed race course at Columbia Park. *Intercom*, September 1989, p. 6.
71. USACE, Walla Walla District. *Annual Summary of Accumulated Historical Material: Calendar Year 1989.* Walla Walla: NPW, 1990.
72. Rexus, Cecila. Money to finish levee study OK'd. *Tri-City Herald,* 12 April 1990.
73. NBBJ Group. *Tri-Cities Regional Rivershore Enhancement Plan*. Seattle, Washington: NBBJ Group, 1989.
74. Robinette, Gale B. Columbia Park planners envision tourist mecca. *Tri-City Herald,* 4 June 1990.
75. USACE, Walla Walla District. *Annual Summary of Accumulated Historical Material: Calendar Year 1992.* Walla Walla: NPW, 1993.
76. PL 104-303.
77. Carlton interview.
78. Davis, Diane J. Interview. Walla Walla: NWW, 21 October 2001.
79. Weeks interview.
80. Shelin interview.
81. Munns Gerkey, Nadine. Explosion rocks Lyons Ferry: Boats destroyed. *Walla Walla Union-Bulletin*, 16 December 1992.
82. USACE, Walla Walla District. *Annual Summary of Accumulated Historical Material: Calendar Year 1992.*
83. Askari, Mohsin, and Bill Loftus. Boat ramps revamped, park plan goes under. *Lewiston Morning Tribune*, 19 March 1992, p 1D, 5D.
84 Drawdown '92. Special Issue. *Intercom*, May 1991, p. 14.
85. USACE, Walla Walla District. *1992 Reservoir Drawdown Test: Lower Granite and Little Goose Dams*. Walla Walla: NPW, 1993, p. xxxix.
86. Teen saved from river mud. *Spokane Spokesman-Review*, 6 March 1992.
87. Corps releases final drawdown report. *Intercom*, March 1994, p. 16.
88. Ports assess damage from drawdown. *Lewiston Morning Tribune*, 23 March 1992.
89. Titone, Julie. House panel OKs drawdown damage aid. *Spokane Spokesman-Review*, 10 June 1992.
90. Levees praised. Reprint *Lewiston Morning Tribune*, 20 May 1981. *Intercom*, 1 July 1981, p. 4.

91 Hixson interview.
92 Grass, Charlene. Personal photograph, July 2004.
93. Mill Creek Lake filled to the gills in trout. *Walla Walla Union-Bulletin*, 13 March 1991.
94. Hayes, Dave quoted in: Bennington Lake. *Walla Walla Union Bulletin*, 23 April 2000, p. 17.
95. Thompson, Steve quoted in: Bennington Lake. *Walla Walla Union Bulletin*, 23 April 2000, p. 17.
96. USACE, Walla Walla District. *Mill Creek Master Plan, Design Memorandum No. 1*. Walla Walla, NPW, 1993.
97. Shelin interview.
98. Forest fire fought on Dworshak Reservoir lands. *Intercom*, 1 August 1984, p. 3.
99. Disposing of solid wastes. *Intercom*, winter 1992, p. 11.
100. USACE, Walla Walla District. *Annual Summary of Accumulated Historical Material: Calendar Year 1992.* Walla Walla: NPW, 1993.
101. Hixson interview.
102. USACE, Walla Walla District *Water Control Manual for Dworshak Dam and Reservoir, North Fork, Clearwater River, Idaho.* Walla Walla: NPW, 1986.
103. National Marine Fisheries Service. *Biological Opinion: Endangered Species Act – Section 7 Consultation.* [Portland, Or.]: National Marine Fisheries Service, 1995.
104. Ashton, Linda. Drawdown a drain on Orofino economy. *Boise Idaho Statesman*, 6 September 1994.
105. Loftus, Bill. Corps, BPA get an earful on Dworshak water levels. *Lewiston Morning Tribune*, 21 March 1990.
106. Ashton, Linda. Drawdown a drain on Orofino economy. *Boise Idaho Statesman*, 6 September 1994.
107. Loftus, Bill. Dworshak drawdown draws fire. *Lewiston Morning Tribune*, 2 June 1994, p. 1C, 8C.
108. O'Bryant, Mike. River operators clash over use of Dworshak water. *Bend (Or.) Columbia Basin Bulletin*, 30 June 2000.
109. National Marine Fisheries Service. *Biological Opinion: Endangered Species Act – Section 7 Consultation.* [Portland, Or.]: National Marine Fisheries Service, 1995.
110. Brownell, Dave. Powerhouse completed at Lucky Peak. *Intercom*, August 1988, p. 7.

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Chapter 12. Partnering for the Future

Introduction

As the Walla Walla District moved into the twenty-first century, there were many issues facing the organization in its quest to fulfill its water resources engineering mission and maintain itself as a productive and dynamic organization that serves the nation.

The District will continue to go forward as part of a larger organization. Changes and initiatives coming out of the Corps, the Army, the Department of Defense, and the federal government as a whole will continue to have a profound effect on the District. Also, the District will continue to be guided and affected by the rule of law, striving to properly interpret and follow the many laws that pertain to its multitude of activities.

The nation's emphasis on environmental stewardship was particularly important to the District, which covered an area where such important natural resources as the Snake River salmon runs were found.

Walla Walla District and the Corps understood the need to develop strong partnerships at all levels of government. At the end of our era, the District was working on specific partnered projects and on general relationships with tribal nations; municipalities and other local government entities; state agencies; federal agencies; the academic community; and professional organizations. The District saw these partnerships as key to the future, necessary to accomplish its mission and part of any project that will benefit society.

Going into the future, the District fully expected to continue implementing management initiatives striving to model itself as a learning organization. The project management business process was taking hold as the primary way of doing business. All District activities were being conceptualized as projects and be managed by this business process, as supported by implementation of a Corps-wide automated system, called P2.

Going into the twenty-first century, District staff were profoundly concerned with the aging of the infrastructure. Some of the District's locks, dams, turbines, and other facilities were nearing their expected life spans or were entering eras where more maintenance would be required. This was not a concern unique to the District, but this national issue was certainly brought home every day to staff working at Walla Walla District's field projects.

The District fully expected, however, to retain its active participation in an organization that was considered the premier engineering organization in the world. As such, the District looked forward to putting science into action designing and constructing innovative new structures and systems.

This chapter looks at how the Walla Walla District was poised at the end of this era in relation to some of these challenges and opportunities as it moved forward into the twenty-first century.

Relationships and Partnerships in the District

One major lesson learned during the 1981-2000 period was the importance of Walla Walla District developing strong relationships and partnerships with other organizations.

The District Outreach Coordinator had this to say about partnering:

> "We have a long history, especially through the 40s and 50s and 60s, of making engineering decisions—and it's not just our agency—I'm speaking broadly, but we would make agency decisions, and then we would implement those decisions. We had all the authority and we had all the money we needed to do that. If we felt that it was in the best interest of water resources to do something, we were fully funded to execute our decisions—if they were approved at several levels.
>
> "It's not often hard to get like-minded people to agree on something. Many times, we did things not for communities, but to communities. … We had favorite communities we would serve. What began to happen is that, on the one hand there were a lot of complaints that we were doing [projects] … that communities didn't always want; on the other, we had a lot of requests for [projects] … because everything was one-hundred-percent funded.
>
> "[We had requests] to do much more than the Federal budget could possibly support. This became an insurmountable public problem. It became a political problem because Congress could not, and the President, and the Executive Branch, could not seem to deliver all that it could promise. Things again and again went unfunded. The whole political process began to get knotted up. There were so many promises unfulfilled that the integrity of the whole government began to be questioned. Out of it came the concept that was finally implemented into law where people will cost share [projects] … with the government. It's not just this District. It's the whole Corps of Engineers. It's the Forest Service. It's the Bureau of Land Management. …
>
> "Cost sharing does two things. First, it gives the local sponsor total control of the project. If they don't like it, they don't fund it. If they like it, they fund it—very simple. They have control of the process.
>
> "Second, it [*i.e.*, cost sharing] also puts responsibility on the local entity to find ways to say, I want this project [and come up] with money. What that did is cut the number of project requests almost to zero for a while, and then it rebuilt. It allows Congress to keep its promises, because if a local entity believes in [a project] … enough to pay for a third or half of it, then they surely want it. It is truly a community value to have that project, if they are willing to say it with money. It's an extremely healthy thing.
>
> "It has brought us into contact with customers. … I believe the first major motto that came out of that was … "customer care." … We don't just work for ourselves and the President and the Congress now, we also work for communities and customers. Listen to them, pay attention to them, take care of them, and then you'll be successful as an agency. That customer care motto still floats in the districts. … It was a good one because it stood for a new set of values that we would have to accomplish works. …
>
> "If this law [requiring cost sharing] hadn't have come into place, and we had always marched on with just an engineering mentality and the ability and authority to do what we wanted, we could have worked our way to the right of the public, and, in doing so, never changed our image, which is changing in healthy ways. We now work toward being good stewards of the environment and the water resources. I'm not sure we

> would have moved that quickly in that direction if we hadn't have had a lot of partners that wanted us to have those values (1)."

As it formed project teams, the District included the sponsor, and where appropriate, representatives from other state or federal agencies. A Walla Walla District staff member from the Planning Branch talks about the need coordination:

> The need, and the requirements, and the expectation [for coordination] have only increased as time has gone on and projects become more complex. Which is one reason why we have more people working in that arena than we had before. That is a major aspect of what we deal with every day. Especially right now, I don't do anything without a sponsor, and normally [the sponsor] part of the team I'm working with—we'll have an internal Corps team, but the project team normally includes not only the sponsor but there's usually … at least a limited number of other agencies [represented] (2)."

Federal Agencies

At the end of the twentieth century, Walla Walla District maintained a number of very important partnerships with other federal agencies. Working with federal agencies took many different forms. First, the District might provide engineering, project management, or other services to another agency. This was the District's primary relationship to the U.S. Department of Energy, for example. In providing these services, the District had to be careful not to overstep its authority and not to compete with services available from commercial firms.

The District might be a partner with another agency in a defined process. For example, the Corps and the Environmental Protection Agency participated in the regulatory process that ensured that a number of environmental laws were enforced. Conversely, the District might find that it needed the approval or input of an agency in formulating its plans or in implementing a project. For example, the National Marine Fisheries Service or the U.S. Fish and Wildlife Service needed to provide the District input on plans and projects affecting endangered species.

Finally, the District might actually partner with other federal agencies on projects or ongoing activities, such as gathering data, operating the Federal Columbia River Power System, or managing lands for wildlife mitigation.

The most important of these federal agencies to Walla Walla District partnerships and working relationships are discussed in separate sections below.

Downsizing the Federal Government and Partnerships

One significant trend during the 1981-2000 period was the downsizing of the federal government. In 2003, the U.S. Merit Systems Protection Board reported on a survey of 6,959 federal employees conducted in 2000 (3). According to the *Washington Post*, the report "suggests that workforce reductions during the 1990s placed a number of agencies at risk of being unable to fully deliver services and programs to the public. … Forty percent [of those surveyed] said they would consider retiring because there were too few people in their office to handle the workload (4)."

While workload stress was not mentioned as a big factor among Walla Walla District staff interviewed in the preparation of this volume, it was mentioned by several

interviewees as a factor in District interactions with other federal agencies. A District staff member talks about some of the difficulties related to downsizing other agencies:

> "I don't think any of those agencies or the people working for those agencies—and it's becoming more apparent as time goes on—are staffed to a significant level where they pretend to keep up with the workload that's coming in to them. Therefore, we come in towards the tail end of a project, and we can only go so far in coordinating with the other agencies. [The project] has to be at a pretty far along level of design to be able to portray enough detail to be able to say, 'here's what we're going to do, and here's what we predict are going to be the impacts. They [*i.e.*, the agencies] look at that and either agree or disagree to our evaluation of the level of impacts (5)."

As the trend toward downsizing federal agencies continues, this situation appeared likely to become even more pronounced.

Bonneville Power Administration

As of 2000, the U.S. Army Corps of Engineers and the Bureau of Reclamation were the owners and operators of thirty-one federally owned hydropower projects on the Columbia and Snake Rivers. This included McNary, Ice Harbor, Lower Monumental, Little Goose, Lower Granite, and Dworshak projects operated by Walla Walla District. Bonneville Power Administration marketed and distributed the power generated from these federal dams. BPA also owned and operated about 75 percent of the Northwest's transmission system. The dams and the electrical system were known as the Federal Columbia River Power System.

In recent years, there have been some significant changes in Bonneville Power Administration. The first of these changes involved segmenting BPA into a power generation/marketing "side" and a power transmission "side." These two sides of BPA operate as virtually separate organizations. This change took place so that BPA could be positioned properly as deregulation of the power industry in the United States went forward. In a deregulated electrical power industry, transmission would be, by law, separate from generation of electricity.

A Walla Walla District staff member discussed how partitioning Bonneville Power Administration affected the District:

> "Up till a few years ago, BPA was one entity. They had the side that took care of the transmission lines, the power distribution. Then, they had the group that took care of the power marketing and the sales, but they were basically one group. We [staff in the Walla Walla District] dealt with dispatchers and schedulers at BPA's Control Center in Vancouver, Washington, and we still do. But they no longer deal with the marketing side—in fact they don't even talk to them—they are specifically forbidden to talk to them. If you know when a line is scheduled to be out, that means that you may have to buy power from some other source, and that would give you an unfair advantage in the market.
>
> "Yet in here [in the Walla Walla District Headquarters], we talk to the marketing side. … They're the ones that provide the funding for our power side, what's called the joint-costed side. We share costs with them. Yet the operators at the project deal directly with the transmission business line—the schedulers, the dispatchers, and those that control the river system. It's totally different from the way we used to do business.

> "From the project operator's standpoint, it didn't change, because we [the Corps] have separated those things. What may be interesting, through our Project Management Business Process here in the District, the people in charge of the projects—the operations maintenance managers—will act as their own project managers. On the one hand, in their day-to-day operations, they deal with the transmission business line—schedules, know the outage schedules. On the other hand, they go to Portland or someplace and act as a project manager and deal with the business line. It's going to be interesting to see how that relationship works out. [It's] still pretty new (6)."

As of 2000, revenues collected through power rates covered the operation of these projects and the transmission system, the debt service required to repay the initial investment in the system, and contributed to other costs associated with these projects, such as the region's efforts to protect and rebuild fish and wildlife populations in the Columbia River basin.

Prior to 1996, however, much of the revenue generated from power marketed by the Bonneville Power Administration went to the U.S. Treasury. Corps hydropower projects, then, would receive operating budgets from Congress as part of the Corps' budget. The trouble was that the projects, which generated revenue, were not being maintained or modernized adequately. In 2000, BPA provided $150 million in direct funding for the entire operation and maintenance at Corps and Bureau of Reclamation Projects.

Following the Bonneville Power Administration budget restructuring, Walla Walla District began to receive this direct funding. This funding allowed the District to look at implementing such projects as the McNary Modernization project, which would replace McNary's fourteen fifty-year-old turbines with more efficient, more fish-friendly modern turbines.

Thus, Walla Walla District was linked to the financial health of Bonneville Power Administration. In 2000, the fiscal outlook was bright as BPA not only continued to generate electricity from hydropower, but also looked at encouraging alternative sources of generation, such as wind power (7). The BPA, however, had some financial challenges.

First, Bonneville Power Administration continued to pay the U.S. Treasury on a $7 billion debt. The BPA had assumed this dept from the failed Washington Public Power Supply Systems, which defaulted as a result of aborted construction of five nuclear power plants in the state.

Second, Bonneville Power Administration was paying heavily to help fund a massive fish recovery effort related to the effect hydropower projects were having on fish of endangered species.

Third, Bonneville Power Administration was now operating in an era of scarcity, rather than abundance in regard to power demand. As a quasi-governmental entity, BPA was restricted by law to filling the needs of various public utilities and rural electric cooperatives, before those of other customers. This meant that BPA could not just sell its electricity to the highest bidder.

Finally, the whole restructuring of the electricity industry had introduced fluctuations in the price and demand for electricity that affected the organization in unpredictable ways. No one knew how the quasi-governmental Bonneville Power Administration would fit into a truly deregulated electricity marketplace. The question was, as one review committee asked, "What do you do with a federal sovereign power in the middle of this market (8)?"

It remains to be seen if Bonneville Power Administration will maintain its fiscal and operational health in the new century. What happens to BPA will have profound ramifications for Walla Walla District.

National Marine Fisheries Service

In the Northwest, the Corps' concern for wildlife was not limited to species listed as threatened or endangered but included mitigation for species affected by Corps projects and activities. However, the Endangered Species Act (9) had a significant impact on Corps operations and decision-making in the region. Congress passed the act in 1973. It required all federal agencies to carry out programs to conserve endangered and threatened species in consultation with the U.S. Department of the Interior (specifically, the U.S. Fish and Wildlife Service) or the U.S. Department of Commerce. Since salmon and steelhead of the Columbia River basin were part of a commercial fishery, the Corps was required to conduct ESA consultations with the National Marine Fisheries Service, part of the U.S. Department of Commerce.

In 1991, the National Marine Fisheries Service listed three species of salmon under the Endangered Species Act. In 1997, NMFS listed two more species endangered or threatened.

Section 7 of the Endangered Species Act required that the National Marine Fisheries Service prepare a document, termed a biological assessment, to determine whether a proposed major construction activity under the authority of a federal action agency was likely to adversely affect listed species, proposed species, or designated critical habitat. The outcome of biological assessments determined whether formal consultation or a conference was necessary.

The National Marine Fisheries Service issued biological assessments in 1995 and 2000 pertinent to fish species and the operation of the Federal Columbia River Power System. These included McNary and the lower Snake River Projects operated by Walla Walla District. Whenever the District proposed an action, such as dredging in the lower Snake River, for example, the Corps sought out a biological opinion from National Marine Fisheries Service.

The Service also had its own group of biologists who conducted research on anadromous fish. This research contributed to the body of knowledge utilized by the Corps in making operational and construction decisions that might affect fisheries.

Environmental Protection Agency

In the regulatory arena, the Corps worked closely with the Environmental Protection Agency to help protect wetlands and ensure that the Clean Water Act was observed in

the waters of the United States. The District's work with the Bunker Hill mining area Superfund cleanup was done in conjunction with EPA.

The District issued several joint reports with EPA. These included reports that utilized the District's cost engineering expertise to analyze cost-tracking systems utilized by EPA. Corps staff and staff from the Environmental Protection Agency operated as a team to complete these reports.

Bureau of Reclamation

The Bureau of Reclamation has a number of projects within the geographic area of the Walla Walla District, particularly in Idaho. These projects were primarily dams that stored water for irrigation purposes. Some of these projects were on the same streams where the Walla Walla District has flood control or multipurpose dams. For example, Walla Walla District's Lucky Peak Lake storage was regulated in conjunction with Arrowrock and Anderson Ranch Reservoirs upstream on the Boise River. These two projects were constructed by the Bureau of Reclamation before construction of Lucky Peak Dam by the Corps. The three reservoirs were operated as an integral system under the guidelines of a joint water control manual for Boise River. The guidelines limited river flows so as to try to prevent flooding on the river.

The safety of Bureau of Reclamation dams was also a concern for the District since the Corps was tasked with dam safety inspections for all dams in the country.

U.S. Fish and Wildlife Service and the U.S. Forest Service

The U.S. Fish and Wildlife Service and the U.S. Forest Service have taken over the management of lands that Walla Walla District acquired for the purposes of wildlife mitigation. The Fish and Wildlife Service, for example, took over management of lands that now form McNary Wildlife Refuge. It is possible that, in the future, the Corps might divest itself of even more land management responsibilities or partner with these agencies in the stewardship of natural resources.

Noncommercial fish, such as the six regional populations of bull trout listed as threatened under the Endangered Species Act, come under the jurisdiction of the U.S. Fish and Wildlife Service. Walla Walla District cooperates with the U.S. Fish and Wildlife Service when considering actions that might potentially affect bull trout. Consultation was also required and utilized on environmental restoration projects that might assist this threatened species of trout.

Federal Emergency Management Agency

Since the enactment by Congress of the 1988 Stafford Act (10), the Corps has been involved in a coordinated Federal Emergency Response Program with the support of the Federal Emergency Management Agency. This program was expected to continue into the indefinite future, and Walla Walla District continues to train for disaster response in coordination with a multitude of federal, state, and local governmental entities.

Federal Energy Regulatory Commission

The Corps participated with the Federal Energy Regulatory Commission in the licensing and relicensing of hydropower projects. By the end of 2000, licensing and relicensing of hydropower had become a controversial process as potential environmental impacts were brought to the fore. Walla Walla District may be expected to continue to be involved in heavily scrutinized and hotly debated licensing processes, especially as older hydropower projects in the area come up to their fifty-year relicensing dates.

Natural Resources Conservation Service

The Corps used data collected by the Natural Resources Conservation Service, part of the U.S. Department of Agriculture, for information about the levels of snowfall in areas feeding river basins. Such snow pack information, as it is called, was very important for the arid lands of Walla Walla District, where the source of water was often from melting snow in the distant mountains of Idaho.

U.S. Department of Energy

Some working relationships between agencies and the District were very productive. A District cost engineer talked about his experience in working under contract to help the Department of Energy and the Environmental Protection Agency analyze their project cost-accounting systems. Instead of just working for these agencies, the District worked with them: "When you speak about partnerships, we work with DOE. We have deliberate contracts. The work that we've done for EPA and DOE, when we work with those people, it's as though we're all one team (11)."

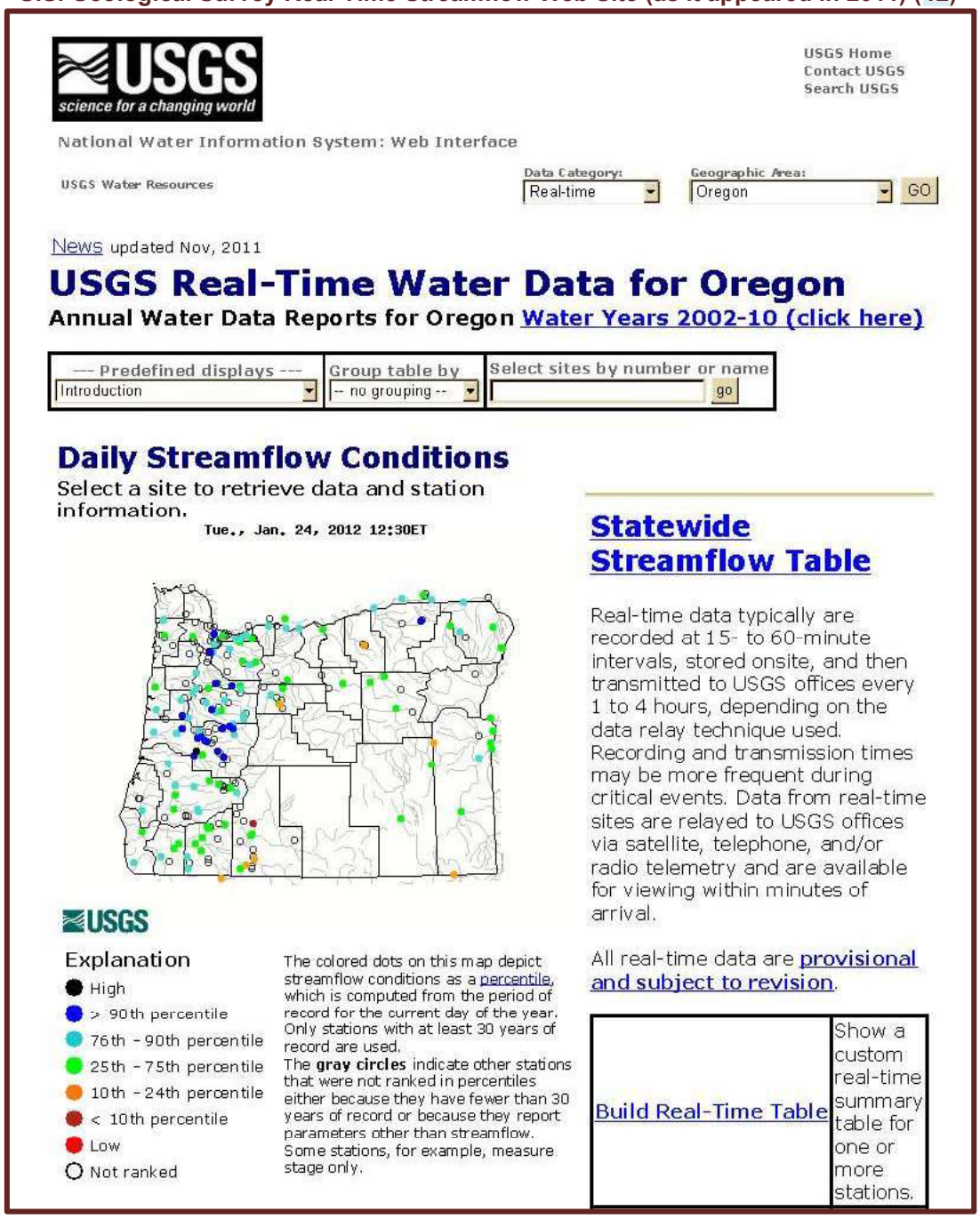
National Recreation Reservation Service

The National Recreation Reservation Service is a one-stop reservation service for the U.S. Forest Service, Army Corps of Engineers, National Park Service, Bureau of Land Management, and Bureau of Reclamation outdoor recreation facilities and activities. The online and phone service allows units such as Walla Walla District to avoid staffing their own reservation services, while it gives the public "one stop shopping" in reserving camping and other bookable recreation sites.

U.S. Geological Survey

The Corps of Engineers relied on the U.S. Geological Survey for information about streamflow. The Survey maintained a system of gages that measured the volume of flow in streams. By 2000, these gages were largely automated and were even linked to dynamic displays available to the public on the Web. The Corps, using such estimates, predicted the elevation of reservoir pools and adjusted the flow through dams. This system was of great importance in Walla Walla District where water levels through the Columbia and Snake Rivers could be variable and needed to be balanced for power generation, navigation, and fish migration.

U.S. Geological Survey Real-Time Streamflow Web Site (as it appeared in 2011) (12)



Lewis and Clark Bicentennial

Preparing for the celebration of the Lewis and Clark Bicentennial was a national project that involved much partnering among agencies, including the Corps. A Walla Walla District staff member was prominent in the early regional planning for the Bicentennial and transferred temporarily to work on the event at the national committee level.

In the Walla Walla District and in the Northwest in general, there was desire to tell the story of the Lewis and Clark expedition from a multicultural viewpoint. For example, the various Indian tribes in the area that had contact with the explorers prepared information

that could be placed on exhibits at sites along the trail, including sites located on Corps property.

State Agencies

The Walla Walla District Outreach Coordinator talked about the importance of working with state agencies:

> "Today, we consider state agencies as coregulators. We consider them, the states themselves, as extremely important, not only as customers, but as true public servant—as people who have the same, not the same, but similar, goals …. Partnerships with the states of Washington, Oregon, and Idaho are extremely important. You saw that at the end of the Lower Snake Compensation Plan. You see that now with the [National Marine Fisheries] Biological Opinion. You see it in the regulation of our projects where, everyday, the state governments call in … to the process by which all the water in the region is operated—that's a daily meeting. The states are an important part of that. They represent all the agencies that work for the states (13)."

Washington

In Washington State, Walla Walla District cultivated working relationships with many state agencies including the Washington Department of Natural Resources and State Historic Preservation Office. The District worked closely, for example, with the Washington Department of Transportation to help lay out routes for U.S. Highway 12, observing environmental protection laws and trying to preserve habitats and wetlands while expanding the highway.

Idaho

Walla Walla District partnered with several branches of the Idaho state government. The Idaho State Department of Parks and Recreation leased several recreation areas, particularly at the District's Dworshak project, and managed these as state parks. The Idaho Department of Transportation partnered with the District's Regulatory Branch in streamlining the permit process as related to road building in the state.

The Corps' Restoration of Abandoned Mine Sites Program in the Western Region worked through District staff to assist the Idaho Department of Lands in the study of abandoned mine sites in Idaho and determination of the resources required to restore these areas.

The largest population center in Walla Walla District is around Boise, Idaho. However, for a long time in its history, the Corps was not a visible presence in that area. Going into the future, it is hoped that the Corps will be more visible, in part by virtue of the activities of the Boise Area Office (discussed below).

The District, with construction of the lower Snake River hydropower projects and mitigation performed under the Lower Snake River Fish and Wildlife Compensation Plan, seemed to focus away from Idaho. One District staff member characterized the situation at the end of our period with regard to the state of Idaho:

> "Idaho has heard … that the state of Washington had the Federal government fund one hundred percent of the salmon program in the Lower Snake Comp Plan. But our District is going over there [to Idaho] with proposals that we jointly fund these programs under

civil works authority. We work together to come up with 50-50 or 25-75, or 65-35, various cost shares for environmental programs. The state of Idaho is not real pleased with this proposal. They're saying, 'look, we were happily living up here, doing our own thing, and you guys came in and tried to turn off the water. You're still trying to do it. The basis for this is that the salmon are allegedly endangered. We're of the opinion that, if they are endangered you need to come up with a proposal to save them that doesn't involve us. It seems to us, we've heard somewhere that the Federal government has the duty to mitigate for its projects. We heard this happened in the state of Washington. You've got a couple of projects over here … and we want mitigation. How is it that we go about getting it?' … That's what's happening right now (14)."

Another staff member talks about refocusing District efforts in the part of Walla Walla District that lies in southern Idaho:

> "We're spending a lot of time in trying to refocus back onto southern Idaho, which we've done through the creation of the office in Boise, which was a significant and ground-breaking initiative. … We've done good things down there. It does take a lot of time and effort. We've been so focused on fish on the lower Snake River that we have forgotten about our customers and their needs in southern Idaho. Without building those relationships and face time with somebody they can come to meet and get to know and understand and trust, our only face in Idaho has been through the regulatory side. That's a very different side of the Corps, and they have their own mission and objectives and ways in which they need to do business. In our work, we are becoming much more attuned to political scenes than we have in the past out of necessity (15)."

Idaho was home to a very different community from eastern Washington. In Idaho, for example, there was some strong sentiment in favor of breaching the four lower Snake River dams. This was primarily because Idaho relies heavily on irrigation water that is sometimes diverted to help flush endangered fish through the dams. Idaho sport fishers and the businesses they support also greatly valued the salmon runs. It remains to be seen how Walla Walla District will serve Idaho while still serving the other states in its area.

Oregon

Most of Oregon's river basins are not part of the Walla Walla District. However the extreme northeast of the state includes tributaries of the Snake River, including portions of the Walla Walla River. The mid-Columbia River too, for example, near McNary Lock and Dam, forms the border between the states of Oregon and Washington.

The District cooperated with many agencies in Oregon state including the Oregon Department of Environmental Quality, Oregon Department of Fish and Wildlife, Oregon Division of State Lands, Oregon Water Resources Department, and the Oregon State Historic Preservation Office.

Over the years, the District has undertaken many activities in the Walla Walla River basin in the state of Oregon, cooperating with the Confederated Tribes of the Umatilla Indian Reservation and local irrigation districts, such as the Walla Walla River Irrigation District, on projects to improve stream flow for anadromous fish. In 1987, the state of Oregon recognized that instream flows were a beneficial use of water (16). This law allowed for projects promoting increased flows to go forward. Going into the new

century, the District was actively working on the Walla Walla River Basin Feasibility Study, a cooperative project looking to improve water conditions for migrating fish.

Local Communities and Governmental Entities

Walla Walla District's Outreach Coordinator talked about the District's basis for cooperating with local governmental entities:

> "Congress has given us some very specific authorities to assist states and communities under the Continuing Authorities Program, which takes us to stream restoration and certain things like that. With those programs, Congress wants us to cost share. That gives the local entity veto and control authority because they can control their cost share. They can create it or they can cut it off. They can manage us through the cost share, because we have to match up.
>
> "All those … [relationships with local groups] constantly need new energy in them because, as one job completes, you want to roll that job over into other work for the same group. But you need to keep looking for other opportunities in the region where it's appropriate. Part of my job is to figure out what those opportunities are and to make that information available to people who do whatever it is. It's not just getting myself or the Colonel or the Chief of Project Management out there to do glad hand salesmanship, but it's more making them aware and focusing the District's senior leadership and the project managers and some of your lead technical people and saying, there's an opportunity here, we want to focus on that. We want to develop something specifically in that [local] area (17)."

Walla Walla District has relationships with many local governmental groups for several reasons. The District interacts with local government bodies in counties and municipalities where projects are located. The District usually interacts with local law enforcement agencies to coordinate policing projects and emergency action plans. Real estate issues, such as encroachments on Corps property, often involve participation of local governmental agencies.

Local agencies may lease District property for parks and recreation areas. This was true, for example, in the Tri-Cities area of Washington where Columbia Park, along the Columbia River, was leased by several local authorities. The Water Resources Development Act of 1996 (18) included provisions for land transfers in the Tri-Cities area. Under the law, land was to be transferred from the Corps to local authorities. Because of the many legal requirements involving environmental laws and cultural resources protection laws, this transfer was not straightforward. As the agencies involved and the Corps worked though this sometimes difficult process, the result was stronger and more knowledgeable relationships, as described by one District staff member:

> "Our relationship with Tri-Cities is now excellent. We have an active partnership with them on Tri-Cities TRAC, Rivershore Enhancement Group. We actively participate with them on a lot of activities. [I and several other District staff members] attended a big luncheon they had there a couple of three weeks ago. … They personally called and invited us on the phone to come. I think that we've made some real progress … [and] we need to—because … we are talking a multimillion dollar project [*i.e.*, Rivershore Enhancement] at our front door (19)."

Oftentimes, local governmental bodies acted as sponsors for projects or were part of the consultation for proposed projects. The Zintel Canyon Dam, for example, was a flood protection project sponsored by the City of Kennewick.

As expressed by a District staff member who was involved with locally sponsored projects, the forging of relationships also affected Walla Walla District:

> "We [in the District] are probably more closely attuned to the local political environment when we are involved in these sponsor-driven projects. That's another aspect where it's imperative that we try to get from conception to construction as quickly as possible because the local political scene changes. If you can enjoin a Board of County Commissioners—which can be very difficult—to get them all on the same page on a project to get buy-in. … The local Conservation District—… it's the same idea. It's a political board [with] appointed or elected offices. It takes a lot of time to educate them as to their responsibilities in the cost sharing, what that means down the road with respect to operation and maintenance requirements and funding, with securing easements for property, and then being the holders for the easements with the associated responsibilities, assuring that those lands and those structures that we construct are retained there and the elements of the easement are upheld for the duration of the easement.
>
> "It takes a lot of work to get a group of people all on the same page. The longer you go on, the project drags on, and the composition of that board starts to change, it's just that much more challenging. You don't want to have to invest all kinds of time and money and design what ends up to be a great project, only at the end [not have a local sponsor]. … Then it's too late. …
>
> "In our work, we are becoming much more attuned to political scenes than we have in the past, out of necessity (20)."

One District employee talked about the implications of the fact that Walla Walla District is not located in the largest community in the District:

> "Part of our reason for placing the Boise Office the last couple of years is because we want to be near the Idaho State government, but it's also because the Boise Valley represents our population base. That's where the population of the District is, and where a lot of our future work will come from.
>
> "Those partnerships we've created with the City of Boise and Ada County and all those folks are a key part of where we will be in ten or twenty years. I don't think anyone has a concept of exactly what that will be, but if you look, statistically, districts serve their geographically immediate areas. It's an inverse law. The further you go out, the lower the projects become. We can see that mathematically. If you look at events in the big districts, you'll see that the projects are right around the district building, because it involves people that have understanding of the value of the land they live and work in and among. We are placing some people in Boise. … Just because of the number of people, we will end up having a role in serving that population center. … I don't know if it's climbed to a million [people], but it will.
>
> "If you look at Omaha District, they made an interesting observation which is [that] eighty-five percent of their work is done within fifteen miles of their building. [For Omaha District] that's enormous. They have the City of Omaha and some major rivers there, but, still, it reflects the difficulty of overcoming geography. If you don't place people

where the population is, you'll never end up serving that population. … Our future partnership with that population center down there [in Boise] is a very important future partnership. …

"The joy of information technology is that we're able to place … expertise down there [in the Boise area] for a day, or hour, or a minute, or an opinion—and not just someone, but the very best the District has to offer. Or sometimes the best the Division has to offer with difficult problems. We're able to place those people there at a key and critical time. … [Staff] who live and work down there—they become like the people who work in concrete with the little stinger. They focus all this energy, and it … settles out, and it smoothes out. They bring the right energy to a problem. More and more that will happen. …

"The question is, at what point do we make a financial decision to invest in more people down there. That decision is still ahead of us, but I see great things coming out of our partnerships that we're creating down there. Not only for those two people [staffing the office in 2000], but the partnerships that they're creating both for projects and the networking relationships between key people in our District and key people down in that Valley [*i.e.*, the Boise Valley] (21)."

The presence of a local office in Clarkston certainly seemed to help the Corps to form partnerships with local governmental groups in the Clarkston, Washington, and Lewiston, Idaho, area.

One Walla Walla District staff member, a long-time employee stationed at the Clarkston area office talked about its function:

"Plus, then there's that ability to interface with the public. Being close by [having an office in Clarkston] where they can get to you, you can get to them. We participated many times in what I call the lunch bunch. We'd give interpretive programs to Rotary, Lions Club, any of the service organizations. … You had a Waterways Commission over at the Lewiston side. We'd meet with them. Chamber of Commerce—met with them frequently (22)."

The fact that the Walla Walla District moved its Headquarters facility from the airport at the outskirts of the city to downtown Walla Walla also had an effect on Corps-town relationships, as described by a District staff member:

"Across the nation there was a real concerted effort to begin to place Corps facilities downtown. … We ended up teaming, actually partnering with the City of Walla Walla. [The District] got a lot of assistance, both lobbying assistance as well as political assistance from the City of Walla Walla, who wanted to keep the District here, who was concerned that … the Army had other plans for this District. They became heavily involved at that point with keeping the District in Walla Walla. They insisted that it was important to the economic health of this town and this valley to maintain the District's presence.

"In the lobbying effort, they also became involved with wanting the building not only in Walla Walla, but downtown. They had a more local interest. [They] felt that, by being downtown … we would be more a part of the community. The particular place where we are today was a lumberyard and a combine repair facility, and generally an eyesore …. By cleaning up the lot and building this great facility here, they've actually improved the downtown a lot (23)."

Another District staff member talked about the effect on the District of moving downtown:

> "In hindsight, it [*i.e.*, moving downtown] was a very wise decision. It proved to be beneficial to both the Corps and the local entities. The thinking of the locals was that, by having the Corps come down, that would be a core area in the business district that, hopefully, would improve the development of the City. It's proved to be exactly that. Some of our folks were a little bit concerned about parking. They liked being out there because you could take a nice walk. It had a more rural environment and so on. A lot of folks, though, do like the newer building, and being able to run out to lunch or something if you want to downtown. … Certainly from a public relations standpoint, it's much, much better [now] because we were perceived out there as not being part of the community and an outsider. Now we're considered much more a part of the community itself (24)."

There were many examples of partnering with municipalities. For example, as of 2000, the City of Richland was a nonfederal sponsor for the City of Richland Ecosystem Restoration Project. This project was to help restore salmon habitat and riparian habitat for wildlife. An extra feature, recreation, was added to the project at the request of the sponsor. The Corps will fund habitat restoration at seventy-five percent of the total cost and recreation at fifty percent with Richland funding the remainders.

Another cooperative project was the Paradise Creek Aquatic Ecosystem Restoration in Moscow, Idaho. This ecosystem restoration project was undertaken in cooperation with the University of Idaho and the City of Moscow. The project would restore more natural wetland features in the area and help improve the overall water quality of Paradise Creek, which runs through the University and the City. The project plans involved a combination of new channel construction, drainage swale, and storm water wetland cell development.

Universities and Colleges

Almost every year, the District cooperates with scientists doing research at the operating projects. Certain research projects have been ongoing for years. Most of these projects have involved research into fish biology, fish habitat, and the effect of dams on fish migration. Most prominent in such research were scientists from the University of Idaho and Washington State University.

In the past, much cultural research work was contracted to universities. However, for the future, it is likely that this type of work will go to small businesses and particularly to those affiliated with Indian tribes. The District housed its collection of cultural artifacts at Washington State University and contracted with the university to inventory the collection.

Irrigation Districts

The Walla Walla River Basin Feasibility Study was an excellent example of cooperation between Walla Walla District and irrigation districts. The goals of the study were to find ways to augment the flow of the river. Any projects involving use of the water in the river would have a high probability of affecting irrigators in the area. Although the irrigation districts in the area of the study were not sponsors, the Corps tried to consult with them regarding every major step. The irrigation districts supplied the Corps with

information regarding water flow and loss of water to seepage. The Corps and the official sponsor of the Feasibility Study constantly looked for ways to make any proposal useful to all water users in the river basin. For example, part of the study was striving to understand more about the loss of water from irrigation canals and ditches in the area.

The Indian Nations and Bands

In 1891, Smohalla, a prophet of the Wanapum Band, told this story of the creation:

> "Once the world was all water and God lived alone. He was lonesome and he had no place to put his foot, so he scratched the sand from the bottom and made the land and he made the rocks and he made trees and he made a man and the man was winged and could go anywhere.
>
> "The man was lonesome and God made a woman. They ate fish from the water and God made the deer and other animals. … Many more men and women grew up and they lived on the banks of the Great River whose waters were full of salmon (25)."

The Great River of which the tribal elder spoke was the Columbia. The tribes in the region and Walla Walla District are truly bound by their mutual ties to the rivers that flow through the land. Walla Walla District's outreach coordinator spoke about the importance of relationships between the tribes and the District in developing a mutual understanding of the past and of the region as homeland with its multitude of natural resources:

> "I talked earlier about our slowly increasing understanding of the history of our land and the people that lived here before the white culture. Most of that information is lost. Even in the tribes, most of it is lost, but there is still a lot to know and to learn. The very fact that we're asking questions comes as a result of partnerships with the different tribes for usually very small projects, but they have a big impact on us, because it increases our understanding one person at a time. Exposing our military leadership out here in the West to [tribal perspectives]—these folks [the military leadership] go all over the world later. They begin to share with the government culture and the military culture values that are held by western tribes. Things like that are important for the land management and water management of the region. We're slowly functioning as an agency that's really trying to change our understanding. We're just one of a number of agencies that are in this position. Those partnerships are extremely important to us. …
>
> "The concept of outreach at Headquarters is called international or interagency support. What that means is that we need to have people who look at [opportunities] … beyond the traditional civil works borders. In the Walla Walla District's case, that is often interpreted as let's get out there and do some work for the tribes. In other words, the Indian nations are, in fact, an international entity—not in the traditional sense, they don't live in Africa or anything, but we don't have a mission in Africa. Part of [our mission] is, we spend time with the tribes. …
>
> "We've taken on a lot of natural and healthy environmental values as a result of partnering with tribes (26)."

Section 203 of the Water Resources Development Act of 2000 (27) established a new tribal partnership authority for the Corps. The Corps' Tribal Partnership Program should prove important for the future in helping the Corps "to support the Federal government's trust responsibility while addressing tribal water and related resource challenges (28)."

The new authority allowed the Corps and tribes to more easily pay the cost of feasibility studies related to projects that might assist tribes. In its guidance on this authority, national Corps Headquarters stressed the need for cooperation and consultation with the Interior Department (Bureau of Indian Affairs) and for project planning to take into consideration cultural resources and the value of assisting tribes with economic capacity building. The future could certainly find Walla Walla District studying projects under this authority.

Tribes in the Region

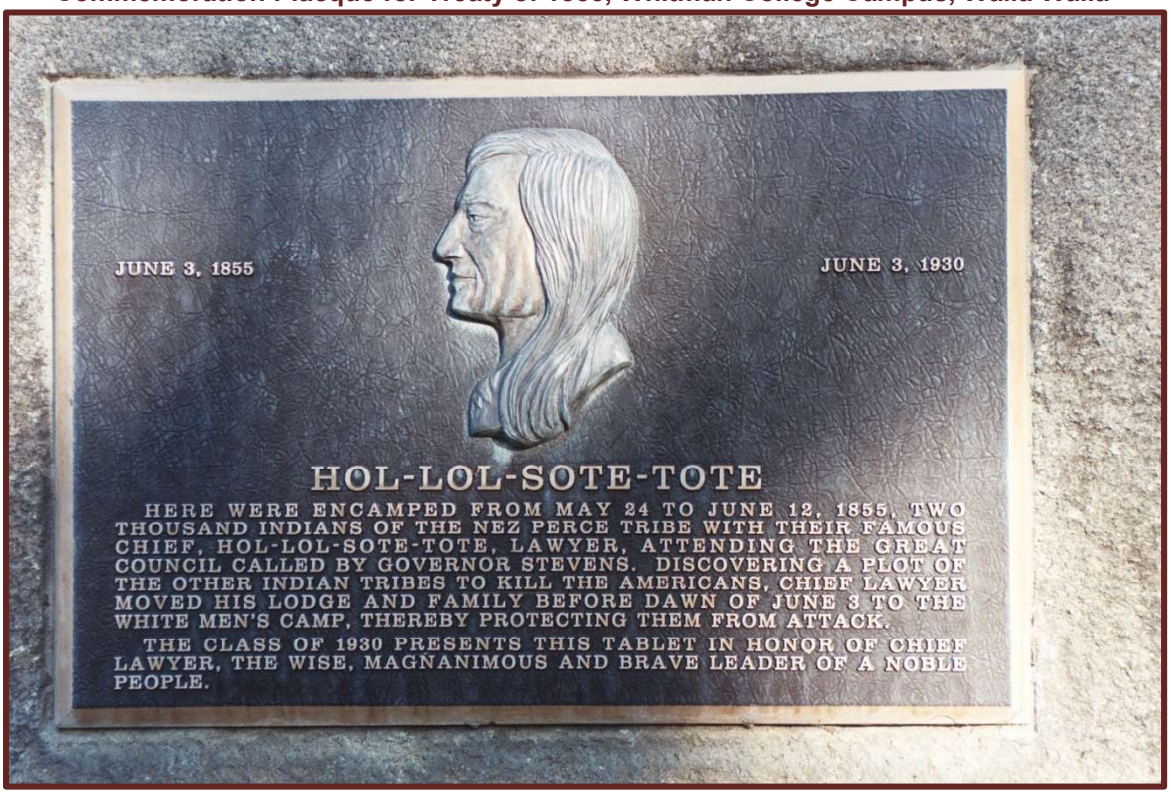
In 1855, several of the Indian nations in the Northwest signed treaties with the federal government. The 1855 "treaty tribes" are the Nez Perce, the Confederated Tribes of the Umatilla Indian Reservation, the Confederated Tribes of the Warm Springs Reservation of Oregon, and the Confederated Tribes and Bands of the Yakama Indian Nation. The 1855 treaties recognized tribal rights regarding usual and accustomed fishing, hunting, and gathering areas. Therefore, the 1855 treaty tribes have special legal rights to consultation regarding actions affecting areas of accustomed use. According to the Columbia Inter-Tribal Fish Commission: "The people of these tribes have always shared a common understanding — that their very existence depends on the respectful enjoyment of the Columbia River basin's vast land and water resources. Indeed, their very souls and spirits were and are inextricably tied to the natural world and its myriad inhabitants. Among those inhabitants, none were more important than the teeming millions of anadromous fish enriching the basin's rivers and streams (29)."

As required by treaty and by later laws, Walla Walla District sought Government-to-Government consultation with the recognized tribes in the region on various issues such as salmon recovery plans, dredging, wildlife mitigation, cultural resources, *etc.* The District also looked for informal input and cooperation from the tribes regarding District activities.

Federally recognized tribes in the area of Walla Walla District included the **Confederated Tribes and Bands of the Yakama Indian Nation of the Yakama Reservation**. The Yakama Reservation, established by treaty in 1855, is located in south-central Washington. The bands and tribes included in the Confederation are the: Kah-milt-pah, Klickitat, Klinquit, Kow-was-say-ee, Li-ay-was, Oche-chotes, Palouse, Pisquose, Se-ap-cat, Shyiks, Skinpah, Wenatshapam, Wishram, and Yakama (30). Geographic areas of primary concern to the Yakama Nation fall into the Portland, Seattle, and Walla Walla Districts.

The tribes of the Yakama Nation have usual and accustomed fishing places in many locations in the Columbia River basin. The tribe was very active in debates regarding salmon recovery in the area. "Salmon continue to be the lifeblood of the nearly 8,400 Yakama tribal members (31)."

Commemoration Placque for Treaty of 1855, Whitman College Campus, Walla Walla



According to the Columbia River Inter-Tribal Fish Commission, "The tribe, which uses an interdisciplinary and sustainable approach to care for the land and natural resources, operates a fisheries program with approximately forty employees. Among its fisheries projects, is unique work with the U.S. Department of Energy to use abandoned intake settling ponds at the Hanford Nuclear Reservation to acclimate about 500,000 fall Chinook juveniles before releasing them into the Columbia (32)." Members of the Yakama Nation also worked on an innovative and nationally recognized salmon hatchery project on the Yakima River. This hatchery project was funded as part of the Bonneville Power Administration's program to protect, mitigate, and enhance fish and wildlife affected by the development and operation of hydroelectric facilities on the Columbia River and its tributaries.

Although the fisheries projects described above were not in waters within Walla Walla District, these projects were of great interest to District fisheries staff and to the District's Fish Facility Design Review Work Group and were discussed at the Anadromous Fish Evaluation Program's annual research meeting (see chapter 8).

The **Confederated Tribes of the Umatilla Indian Reservation** consist of three tribes: the Cayuse, Umatilla, and Walla Walla (33). This confederation was established by a treaty between the three tribes and the United States government in 1855. Prior to the treaty, these three tribes inhabited what is today southeastern Washington and northeastern Oregon. These tribes frequented the Columbia River, especially along the lower regions of its tributaries (the Umatilla, Walla Walla, and Snake Rivers, as well as Willow Creek). Tribal members gathered roots and fished for salmon and other fish such as eels, steelhead, sturgeon, and whitefish. At the end of the twentieth century,

the Confederated Tribes of the Umatilla Indian Reservation numbered about 2,400 strong.

The Confederated Tribes partnered with Walla Walla District on a number of projects, including the Walla Walla River Basin Feasibility Study. This study, described in chapter 7, was looking at ways to increase water flow in the Walla Walla River to help in salmon migration.

Another tribe in the area of the Walla Walla District was the **Nez Perce Tribe**. Before contact with white explorers and settlers, the Nez Perce Tribe, or the Nimi'ipuu, lived in groups traveling seasonally among the deep canyons cut by the Snake, Clearwater, and Salmon Rivers, traveling across what is today Oregon, Washington, and Idaho (34). The tribe practiced a seasonal subsistence cycle relying on salmon and other fish, game, dried roots, and berries. As of 2000, the Nez Perce Tribe had approximately 3,200 members. The Nez Perce Reservation is located in north central Idaho. The Nez Perce were one of the tribes who reserved fishing and other accustomed rights in an 1855 treaty with the U.S. government.

The Nez Perce were concerned particularly with activities at the Walla Walla District's Dworshak Project. The Nez Perce tribal government included natural and cultural resources departments that shared many of the same interests as District cultural resources staff, environmental engineers, and biologists.

The **Confederated Tribes of the Colville Reservation** numbered approximately 8,700 people in 2000 (35). The reservation, located in northeastern Washington State, was established in 1872. The Confederated Tribes, known generally by their French or English names, are: the Colville, Nespelem, San Poil, Lake, Palus, Wenatchi, Chelan, Entitat, Methow, southern Okanogan, Moses Columbia, and Nez Perce of Chief Joseph's Band. The Colville Confederated Tribes have been active in working with Walla Walla District on cultural resources projects.

Another Indian group in the area is the **Shoshone-Bannock Tribes of Fort Hall Indian Reservation** in southeastern Idaho and extreme northern Utah. In the early 1830s, the lower reaches of the Snake and its adjoining tributaries, the Boise, Payette, and Weiser to the east and the Owyhee, Malheur, and Burnt, to the west, were highly productive fisheries for the Shoshone-Bannock people (36). The Walla Walla District in the past has studied the streams in the area of Fort Hall as part of the Upper Snake River Basin Study.

Water quality continues to be an issue on the Fort Hall Indian Reservation. In 1993, the Shoshone-Bannock Tribes passed a Water Quality Standards Act that gives the Water Quality Program the exclusive duty and authority over both surface and ground water contamination on lands within the exterior boundaries of the Fort Hall Reservation.

The **Shoshone-Paiute Tribes are** centered on the Nevada-Idaho border at the Duck Valley Reservation. The Reservation relies on the Owyee River, a tributary of the Snake, for water. In addition to the U.S. Bureau of Reclamation's Owyhee Reservoir, principal existing irrigation storage projects include Antelope Reservoir in the Jordan Valley in Oregon and Wild Horse Reservoir in Nevada on the Duck Creek Indian

Reservation. In the past, the Corps has studied the streams in the area as part of its mission to study the upper Snake River.

Other Indian groups in the area adjacent to the Walla Walla District include the **Coeur D'Alene Tribes** near the area of Lake Coeur D'Alene in Idaho (more closely associated with USACE Seattle District's territory). The **Wanapum** are an Indian group centered around the Moses Lake, Washington, area, but not officially recognized as a tribe by the federal government. The Walla Walla District and the federally recognized Indian tribes in the area included representatives of the Wanapum in informal discussions related to subjects of their potential interest, such as cultural resources.

Cultural Resources

Preserving their heritage and cultural resources are important issues to the tribes in the area of Walla Walla District. Many of the tribal governments have cultural resources staff who can perform professional cultural resources investigations. Many tribes in the area have contracted with Walla Walla District to perform archeological, oral history, and other cultural resources protection or investigation projects. Most of the tribes described above participated in the many District cultural resources activities fostered by the Payos Kuus Cuukwe (Federal Columbia River Power System Cooperating group, see chapter 10).

The tribes are expected to be a potent force in helping to shape the future of Walla Walla District:

> "We are beginning to heal from the process of placing the tribes on reservations, from trying to Americanize the tribes. They are developing a sense of political power. The laws that they have had actually for a long time, they are beginning to exercise. It really has to do with creating a sense of pride, because you have a people who were virtually decimated. The ones who are left are simply asking for respect. I think that's a very small thing that we're doing. We're treating them with respect as a race, as a tribe, as people who are indigenous. Not exploiting their history, but allowing them to be and live their own history without choosing to change it to meet our own ends.
>
> "We're trying to incorporate those values into the work that we do in the very sites that are affected by that history. Yes, it has changed a great deal. It used to be that cultural issues were considered an annoyance. I talked to the first colonel of this District, Colonel Whipple, about his extraordinary problems with McNary Dam and all the burials that were done in and along the river that they were going to cover up [*i.e.*, inundate]. …
>
> "Today we try to work with [the tribes] …to try to find Stephen Covey's win-win solutions for needs of the region, which we often represent, and balance that with the needs of the tribes, which are, in fact, legitimate—to care for graveyards or to care for sites where ancestors are buried, or to care for a traditional, sacred site. If it's a mosque or a synagogue or a church, we don't simply bulldoze those down because we'd prefer to have a parking lot there. We simply are incorporating those same values and sensitivities about the indigenous people in the land that we know very little about.
>
> "We have been here on this land, perhaps since the 1820s, 1840s—depending on who you talk about—so, two hundred years. What do we know about the land that we're using right now? Our culture knows very little. For the first time, we're looking hard and

trying to discover not only what it was about, but also trying to thread through our own mythology that we use to try to [justify our actions].

"I am very, very supportive of the cultural programs. We still have a long way to go. I do not think that we actually incorporate the values that we should into our [ways of doing] things. We're doing better than others. I give us the gold star, A+, but we also have room for growth. I enjoy working for the Corps and seeing the cultural programs that it undertakes, and how we, one program at a time … try to solve those issues. What we're doing is we're beginning to create a process, not just for the Corps, but also for the agencies, because there are different agencies doing this as well. We're one of the very best agencies at this. …

"From there, will come more of a public awareness. We are leading the nation and the public in many things. Not everyone realizes that it's just the western Corps of Engineers folks that have these sensitivities. When you go back East, many of those things are gone. Those opportunities are lost. They're paved over; they're plowed under; they're forested and deforested and reforested. Their pyramids have been reused for barn foundations. All these things that—those opportunities are still there.

"Just last week I got to go down and see some pueblo ruins in the Southwest. Still existing, still cared for, and it reminds me that in the West here we have public land responsibilities. Many, many things have happened on those public lands that we need to be aware of before we make decisions about those lands, and the use of those lands. I'm encouraged by our progress and want us to keep going (37)."

Native American Coordinator

The Walla Walla District has a full-time position designated as Native American Coordinator. Prior to 1996, this role was a part-time responsibility for a District staff member. In 2000, the District designated a full-time position as Native American Coordinator. A District staff member who was involved in this transition talks about how it occurred:

"Because of my half-time work with Natural Resources, I was involved in cultural resource work … working with archeologists in Planning. 106 [Section 106 of the National Historic Preservation Act] responsibility—that refers to the cultural program. I began to see that there was a lot of interaction with tribes and felt like there was a real need for a Native American Coordinator. Colonel Curtis was the commander at that point. We were going through the Kennewick Man process. I was the project manager for Kennewick Man. I had opportunity to speak to him from time to time about the need for someone to build relationships with the tribes. One of his actions as he prepared to leave at the change of command was to name me the Native American Coordinator. At that point, I became a half-time coordinator and half-time national program manager. That was in 1996.

"I did that for four years, and the demands on my time for the Native American were incredible. Where I was supposed to be a fifty-fifty split, I'd say eighty percent of the time was spent on Native American issues. I began again doing the underground campaign to get people to recognize that that needed to be a full-time position to do the District any justice. It wasn't that I was interested in that program. … [That] made it easier for me to sell it because I was an outsider, saying I don't want this for me. I'm not trying to build my own career. I'm looking at the good of the District. I did some write-ups for them and demonstrated why I felt the way I did and did get them last year to

advertise for a Native American full-time Coordinator. We're thrilled that that's what we have today. When that happened, I went back to my old job in Natural Resources as an Outdoor Recreation Planner (38)."

Ideally, the Native American Coordinator was involved in District projects, generally from the beginning: "My job as Native American Coordinator was to work very closely when I knew a project was assigned to meet with the PM, start setting up an agenda for consultation. … Find out from the tribes what level they wanted the consultation to occur. … Then bringing the Colonel in to nail the final formal agreements (39)."

The Corps as a Trust Agency

As we go into the future, Walla Walla District takes its responsibilities as a trust agency very seriously. The former Native American Coordinator talks about evolving working relationships between the tribes and the District:

> "The Corps as an agency is a trust agency. That means that we have trust responsibilities by law that we have to provide for tribes, and one of them is to provide for cultural resources. Trust is a hard word because we understand trust to mean something and the tribes depend on us to understand what their terms of trust are. We also have treaties that were put in place in the 1800s—at lot of them were 1855 for this region. Then, we also have tribes who at a later date were named by Congress to be a recognized Indian tribe that we have to deal with too. …
>
> "The tribes didn't live by Corps boundaries. That's where the reservations sit today, but [considering] the historic use of the territory, we have more realistically about fourteen tribes that we need to deal with. Our work touches their lives in some way almost every day. …
>
> "What we're seeing is commanders becoming more and more educated. I would hope if they are sending them to Walla Walla, or anywhere in the Northwest, they would put them through tribal 101. …
>
> "We weren't doing much to protect cultural resources either. Our reservoirs operate in a way that is destructive to shorelines. We've had a lot of grave exposures. When human remains are involved, the tribes are even more fervent in their efforts to try to get us to work to protect. That's been the wakeup call for all of us. We can't keep being blind to their [the tribes] requests for cooperation. We do need to act as a trust agency and hear from them what their concerns are. As we're building the relationship, it's actually taken the burden off of us somewhat. … The tribes—have become much more politically powerful. … As a sovereign nation, they have the ear of the Assistant Secretary of the Army. …
>
> "Once the Colonel [District Commander] has gone and met with tribal leaders, he has no qualms about just picking up the phone and calling that person and talking to them. Which is different than any process we've had. It's always been formal, setting up a meeting and getting them to meet together with their staffs. … Once the relationship's in place, man it sure makes the work easier. … If we have missed an opportunity or a requirement to consult, it's very easy for the Colonel to go back and say, 'I'm sorry … we missed that one. Why don't we get out and talk to you right away?' So, the tribes aren't hostile about it. There's a great relationship that's only going to help [for the future] (40)."

Tribes as Project Sponsors

An excellent example of tribal sponsorship of a project was Walla Walla River Basin Feasibility study. The Confederated Tribes of the Umatilla Indian Reservation were the nonfederal partner on this project. The joint endeavor hoped to use Corps expertise in hydrology, engineering, project management, and pertinent water law to find ways to increase water flows in the Walla Walla River to aid fish migration. One of the hallmarks of this project was the significant attempt by the tribes and the Corps to work cooperatively with irrigation districts and local farmers so that the limited water resource could be managed to benefit all groups of people in the area while assisting to recover habitat for fish.

Another example of a cooperative project between the Nez Perce Tribe and the District appeared in the 1999 *Evaluation Report of Structures for Deer Creek Dam* (41). In this report, the District, at the request of the tribe, evaluated the alternatives for creating a dam on the Deer Creek site on lands owned by the Nez Perce. The purpose of such a structure would be to meet the requirements of the tribe's ponds project, a fish-stocking program to mitigate against fisheries losses due to construction and operation of the Federal Columbia River Power System.

Regional Groups

During the period covered by this volume, the Walla Walla District was an active participant on several regional groups as discussed in the following sections.

Northwest Power Planning Council

The Northwest Power Act of 1980 (42) created a commission representing the states of Idaho, Washington, Oregon, and Montana. This commission, the Northwest Power Planning Council addressed fishery problems and natural resources problems among other issues that arose in the Columbia River basin. The council drew its funds from the money collected by Bonneville Power Administration from the ratepayers that would otherwise go to the U.S. Treasury.

The Act and the establishment of the Northwest Power Planning Council gave great impetus to cooperation in the region on issues of salmon recovery, in particular. One District staff member talked about trying to organize to deal with fisheries issues:

"By 1981 when I arrived, that organization was just getting established. The federal government, in the form of EPA proper, the Corps of Engineers, FERC (who licensed the mid-Columbia public utility dams), the Federal Energy Regulatory Commission, and the Department of Energy, Hanford, were just getting organized to try—were starting to hire management and biologists. Everybody was in the initial stages of organization. That was in 1981, and we were getting ready to redesign or rebuild a new natural resource management consortium (43)."

Salmon Summit

In 1999, state, federal, tribal, and industry leaders met to grapple with a key question that has dogged efforts to restore dwindling salmon runs in the Columbia River basin. Efforts to balance fish restoration, hydropower, river transportation, and other uses of the Columbia had been stymied by decades of discoordination among competing

government agencies and dueling interest groups. Senator Mark O. Hatfield, of Oregon, convened the regional conference.

This began a long history of a more centralized approach to salmon recovery as described by a District staff member:

> "[During the] Clinton Administration, Will Stelle, and the 'Salmon Czar' group were running the program.… They attempted to pull [all the] strings together also. That caused some concern, because [programs] were separately funded, separately managed, separately operated processes. But Mr. Stelle said: I am from the White House. My job is to coordinate all activities. That confusion led to a lot of people who were new being inserted into the program, who didn't have the background, confusing these programs, hopelessly intertying them, not understanding how they were run. From a period of about 1994 until maybe, until last year [2000] it took a long time for the participants at a higher level to understand the distinction between these different projects and that they couldn't be combined into one. They all serve different functions, and they were being managed because of different laws that mandated them.
>
> "It wasn't just one big recovery. … They took the money together, and their theory of management was: "We're going to look at all of these options that are available to us … and then … we're going to focus on one solution (44)."

This ultracentralized approach seems to have ended with the change in administrations in 2000. Still, Walla Walla District approaches the new century with a lot of experience in working with other organizations on salmon recovery, and there is every expectation that the Corps will continue to share and receive information and will continue to partner with other agencies on a multifaceted recovery effort.

Fish Facility Design Review Work Group

As biological research conducted for the U.S. Army Corps of Engineers leads to the development of new or modified structures that affect fish passage, specifically for anadromous salmon and steelhead of the Snake and Columbia River basins, the engineering designs, construction activities, and pre and postconstruction evaluations undergo a technical review process. This review ensured that the best biological information available would be incorporated into each structure's design criteria.

The multiagency group that provides this technical input was the Fish Facility Design Review Work Group (FFDRWG), a work committee under the U.S. Army Corps of Engineers, Northwestern Division, Anadromous Fish Evaluation Program. Included in the types of work being reviewed by this group were elements of the Lower Snake River Feasibility Study, for example.

In addition to the Corps' Northwestern Division, Portland District, Seattle District, and Walla Walla District, active agency participants in the Fish Facility Design Review Work Group included the National Marine Fisheries Service, U.S. Fish and Wildlife Service, Bonneville Power Administration, Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, Idaho Department of Fish and Game, and tribal representation through the Columbia River Inter-Tribal Fish Commission.

All federal, state, and tribal fishery agencies were invited to participate in the Work Group meetings and to provide comments through the technical review process.

Additional participants included research entities, fisheries management, and field biologists that are requested to or wish to provide scientific input on specific design, construction, and evaluation activities.

The Fish Facility Design Review Work Group generally met quarterly at the Walla Walla District Headquarters. The District looked to this group for assistance in guiding its future actions with regard to design of fish facilities.

Fish Facility Design Review Work Group Web Site in 2011

US Army Corps of Engineers
Walla Walla District
BUILDING STRONG.

DISTRICT HOME | NEWSROOM | WHO WE ARE | MISSIONS | HISTORY

Fish Facility Design Review Work Group (FFDRWG)

AFEP Minutes | FFDRWG Other Links | Research Habitat | Reports Home

Purpose:

As biological research conducted for the US Army Corps of Engineers leads to the development of new or modified structures that affect fish passage, specifically for anadromous salmon and steelhead of the Snake and Columbia River Basins, the engineering designs, construction activities, and pre-/post-construction evaluations undergo a technical review process. This review ensures that the best biological information available is incorporated into the structure's design criteria. The multi-agency group that provides this technical input is the Fish Facility Design Review Work Group, a work committee under the U.S. Army Corps of Engineers, Northwestern Division's Anadromous Fish Evaluation Program, included in the types of work traditionally being reviewed by this group are elements of the Lower Snake River Feasibility Study.

Participants:

In addition to the Division and District offices of the US Army Corps of Engineers, active agency participants include National Marine Fisheries Service, US Fish and Wildlife Service, Bonneville Power Administration, Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, Idaho Department of Fish and Game, and tribal representation through the Columbia River Inter-Tribal Fish Commission. All federal, state, and tribal fishery agencies are invited to participate in the FFDRWG meetings and provide comments through the technical review process. Additional participants may include research entities, fisheries management, and field biologists that wish to provide scientific input on specific design, construction, and evaluation activities.

Anadromous Fish Evaluation Program

The U.S. Army Corps of Engineers, Northwestern Division, sponsored biological studies continuously since 1952 in an integrated, applied research program to better understand and improve anadromous fish passage conditions at its multipurpose projects on the Columbia and lower Snake Rivers in Oregon and Washington.

These monitoring, research, and evaluation studies were managed under the Anadromous Fish Evaluation Program. The Program was coordinated with Federal, state, and tribal fish agencies who provide both technical and policy level input to the Corps on study objectives, experimental design, and methodologies.

A few Anadromous Fish Evaluation Program studies were funded from project operations and maintenance accounts. Most studies were integral components of elements of the Columbia River Fish Mitigation project, a large Corps construction account that funds numerous fish passage improvements on the Columbia and Snake Rivers.

Historically, Corps-funded studies have focused on project-specific adult and juvenile fish passage issues. However, that has changed to include system and reach survival studies, as well as studies of juvenile and adult lamprey. Most of the passage facilities and operations on the river have been developed and refined based on results of these studies. These include adult fish ladders and collection channels, juvenile bypasses with turbine intake screens, the juvenile fish transportation program, spill for juvenile fish passage, and a comprehensive set of project/hydrosystem operating criteria.

The main purpose of the Anadromous Fish Evaluation Program was to produce scientific information to assist the Corps in making engineering, design, and operations decisions for the eight Columbia and Snake River projects in order to provide safe, efficient passage through the system for adult and juvenile fish.

The program investigated how fisheries requirements of the Endangered Species Act, Clean Water Act, National Environmental Policy Act, Northwest Power Act, and Fish and Wildlife Coordination Act could be met during operation of Corps projects. Biological opinions related to the Endangered Species Act included measures to evaluate and make decisions on new passage technologies and system configurations. The resulting biological studies had a high priority in the Anadromous Fish Evaluation Program. Most were conducted to answer key questions about behavior, survival, and condition of fish as they migrate through the Columbia-Snake River corridor.

In addition to the Northwestern Division and district offices of the Corps, active agency participants in the program included the National Marine Fisheries Service, U.S. Fish and Wildlife Service, Bonneville Power Administration, Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, Idaho Department of Fish and Game, and tribal representation through the Columbia River Inter-Tribal Fish Commission. Federal, state, and tribal fishery agencies were invited to participate in meetings and to provide comments through the technical review process; additional participants included research biologists from universities and colleges, as well as fisheries management and field biologists, that wished to provide scientific input to the Corps.

The Local Sediment Management Work Group, formed as part of the effort to develop a Programmatic Sediment Management Plan, was another regional cooperative group. The purpose of the group was to exchange information about the accumulation and removal of sediment in the lower Snake River reservoirs. The group reviewed and commented, for example, on planning documents related to dredging such as the *Dredged Material Management Plan and Environmental Impact Statement—McNary Reservoir and Lower Snake River Reservoirs* (45). The group also helped the District to identify and prioritize beneficial uses of dredged material.

Floodplain Management Services Program

The manager of Walla Walla District's Floodplain Management Services Program talked about how the District served communities through that program:

> "We have what's called the Floodplain Management Services Program. We can directly work with small communities …. [We can work with] a community over in Idaho—we've got a whole bunch of them—the little community of Eagle, down below Boise, Idaho City,

up above Boise, Kamiah, over in Idaho, here in Walla Walla. We've done all kinds of studies defining their floodplains for [these communities]. That's something we do on a routine basis. … [We are able to] give a community information that don't have about their floodplain for the streams going through their community so they can do their planning, their land use planning, their zoning and other things—I consider that to be a very, very, important thing, very, very significant. Again, a lot of people in the District don't even realize that we do it, but that's a continual, ongoing thing. We usually do several of those studies each year. We get special funding for it. …

"What happens is, the community typically will contact … [the District office]. Then, they'll write a letter requesting that we do some special studies for them. We've been fortunate in that funding that we've been able to get is not cost sharing. A lot of the programs that the Corps has now are not cost-sharing programs. This particular one is meant to be a technical one, where we provide technical information. We don't build anything from it, but we provide them with technical information. A lot of the communities are very small, and they may not have any engineering staff of their own at all. We're providing information that they just can't get anywhere else (46)."

Valley Recreation Association

The Valley Recreation Association was another example of the kind of regional association with which the Walla Walla District cooperated. A District staff member who worked for many years in the District's Clarkston Office talked about the group:

"We also developed—the Corps took the lead in developing this—a Valley Recreation Association. [It was] a loose knit thing. From about September to May, we'd try to meet with all the other park managers once a month. We had involvement from Idaho State Parks, Washington State Parks, the cities, and counties right there. Plus Washington State University and the University of Idaho had their outdoor recreation people participate. …. Occasionally, either a Clearwater National Forest or Umatilla National Forest person would show up. It was an opportunity to exchange professional information and share what we were doing. For example, we presented a program—the fish program—one time. … That was of real interest to them [park officials], and it's something that they then could tell their visitors—well here's something you might want to go see. … We did a lot of good professional exchange (47)."

Looking Toward the Future

At the turn of the millennium, several trends could be identified as likely to affect the future of the Walla Walla District.

Public Involvement

By regulation and as a result of changing attitudes both outside and within the Corps, the District's activities have grown even more subject to public involvement. This trend is likely to continue into the future.

Public involvement may take the form of standing meetings, such as those under the Anadromous Fish Evaluation Program, for example. Such standing meetings were open to the public; however, they often became forums for representatives of agencies and other formal groups to meet with Corps staff.

More explicitly, public meetings were the advertised meetings that were held as part of the process of completing projects. The Walla Walla River Basin Feasibility Study is an excellent example of public involvement. During various steps along the way, public meetings were held. One of the first of these was a scoping meeting, in which the Corps outlined its ideas for a project and where it solicited ideas from the meeting participants as to the scope or features of a project in the basin. The meeting was advertised in many area publications, both in English and Spanish. The scoping meeting for this project helped to generate a mailing list so that the Corps could send out regular newsletters and notifications regarding the progress of the project.

The Corps also had an active public relations program, including issuing news releases and responding to press queries. Various programs in the Walla Walla District receive regional and even national attention from the media. The District continued its efforts to inform the public about its activities via information and displays at projects, visitor centers, and area events, such as fairs and school programs. The District expects this trend to continue in the future and will continue to seek to "get its message out" to the public.

Use of Contractors

It is likely that in the future Walla Walla District will operate using more and more contracted staff. Under George W. Bush's administration, the issue of further decreasing the number of government employees came up with a revision of the Office of Management and Budget's *Circular A-76* (see below in the section on the Corps and the federal government). Even without special initiatives, more and more of the Corps looked to contract for work whenever appropriate.

Rule of Law

The Corps has always directed its activities according to law, and it is likely that there will continue to be significant legislation that will affect the organization. There are other laws and regulations, such as those that govern the civil service system and contracts. These include such things as the *Federal Acquisitions Regulations* (48).

In its *Digest of Water Resources Policies and Authorities* (49), Corps Headquarters gave a fifty-page summary of the many laws that pertain to the Corps and its activities. The digest includes laws dating back as early as 1779 that govern the fundamental nature of the Corps. Then there were the many River and Harbor Acts that over the years governed the mission of the Corps.

The Corps, too, was ultimately controlled by budget authority, which is provided in the biennial Water Resources Development Acts. At times, the WRDAs contained sweeping provisions that impact the whole Corps. For example, the Water Resources Development Act of 1976 changed the fundamental cost-sharing equations for Corps projects, requiring that local sponsors fund a greater percentage of the cost of studies and projects.

Another far reaching change was included in the Water Resources Development Act of 2000. The District coordinator for outreach discussed this law, referred to as the Thomas Amendment (50):

> "One of my legalistic responsibilities is to make sure that we are complying with the Thomas Amendment, which is the law that says, basically, we won't go out and compete with private AEs [architect-engineering firms]. You have to have someone involved in the outreach process that has high sensitivity to our legal constraints. …
>
> "This District has not [had any problems in this area]. Many districts have, which is why the law exists. The law is specific to the Corps of Engineers. It just appeared a few years ago. We, fortunately, we've made a number of decisions to not pursue something based on the idea that this law exists. We have preemptively used it to avoid problems (51)."

At other times, the Water Resources Development Acts contained special provisions that pertain only to one or a few units of the Corps. This was the case with WRDA 96 when Walla Walla District was required, as part of the law, to transfer lands in the Tri-Cities, Washington, to local governments.

For the future, the Water Resources Development Acts are likely to remain Congress' chosen vehicle for expressing directives specific to the Corps.

There were many laws, including the National Historic Preservation Act and the Native American Graves Protection and Repatriation Act that governed the activities of the District with regard to cultural resources. These are discussed in chapter 10.

There were many laws that pertain to the Corps by which it carries out its regulatory duties, especially the Clean Water Act and the Endangered Species Act. There were also specific laws such as those pertaining to discharge of fill materials in waters of the United States. The legal foundation of the Corps' regulatory mission is discussed in chapter 9.

The Corps and the Walla Walla District in particular have been affected by environmental legislation such as the Endangered Species Act and the National Environmental Policy Act. These are discussed particularly in chapters 7 and 8. In part, this is due to the fact that, compared to many more populated districts, Walla Walla District's territory held reaches of great potential for environmental preservation—areas, if not untouched by man, at least not totally transformed by the action of man. Naturally, the national concern to preserve such areas was high.

In local communities of the Northwest, environmental values, such as the conservation of wildlife and lands, were held high. People felt they lived in a beautiful part of the country, and they wanted to keep it that way. The rivers, most people understood, were the lifeblood of the arid sector of the country that made up the Walla Walla District.

In the twenty years from 1981 to 2000, many legal challenges to Walla Walla District operations arose. Many of these challenges were in areas related to operation of the lower Snake River projects and their affect on endangered or threatened fish species. Such suits were most typically brought by organized groups concerned with the environment, wildlife, or commercial fisheries.

Many social observers have commented on the fact that our society grows more and more litigious. For the future, there seems high probability of more suits related to the District's activities, particularly dredging, salmon recovery activities, operation of the

hydropower projects, and perhaps cultural resources activities. Also, despite growing safety efforts, the District, as an operator of public recreation areas, can also expect continued significant numbers of private suits related to injuries.

Homeland Security

At the end of 2000, the term homeland security was rarely heard or used in the United States. Though the Corps and the District had been aware of security issues prior to the terrorist attacks of September 11, 2001, after 9/11 this issue later took on a whole new importance. How the country's continuing concern for security was to affect the Corps and the District in the long-term was not clear.

Environmental Stewardship

The future of the Corps and, especially, of the Walla Walla District, is likely to be closely tied to environmental stewardship. An awareness of the need for a holistic approach to the management of water resources had grown during the period covered by this volume. Where once in the Northwest water seemed abundant, now there was a realization that water, especially in arid areas, is a limited resource. Decisions affecting natural resources were made in a context of scarcity, rather than with a perception of abundance.

The Aging Infrastructure

Across the country, the condition of the nation's infrastructure, according to the American Society of Civil Engineers, was deteriorating. In its *2001 Report Card for America's Infrastructure* (52), the Society gave the country's overall infrastructure a grade of D+ and estimated that the total investment needs amounted to $1.3 trillion. Drinking water systems, wastewater systems, and energy production-transmission systems, all of some relevance to the Corps' mission, received no higher than a D+.

"There are more than 2,100 unsafe dams in the United States," said the report card. "There were 61 reported dam failures in the past two years [*i.e.,* 1999 and 2000]. The number of 'high-hazard potential' dams – those whose failure would cause loss of life – increased from 9,281 in 1998 to 9, 921 in 2000." Though these dams were not, in general, operated or maintained by the Corps, still they were of significant concern to the agency charged with flood prevention.

The *2001 Report Card* quoted the Corps on the state of the nation's navigable waterways: "The U.S. Army Corps of Engineers has a backlog of $38 billion in active authorized projects. On the inland waterways system, 44 percent of all the lock chambers have already exceeded their fifty-year design lives. Key deep draft channels were inadequate for the mega-container ships, which were the world standard for international trade, and intermodal connectors to ports were in poor condition."

Walla Walla District witnessed the aging of America's water resources-related infrastructure, in particular in relation to the large hydropower and navigation projects along the mid-Columbia and Snake Rivers. McNary Lock and Dam became operational in 1947, Ice Harbor in 1961, Lower Monumental in 1969, Little Goose in 1970, and Lower Granite in 1975. By the end of the period covered in this volume, these projects were showing their age. Major repairs (as detailed in chapter 4) to navigation locks,

turbines, and fish passage facilities were needed more frequently. Furthermore, the District had not been adequately funded to take advantage of improvements in technology, for example in the area of turbine design, which would make operation of these projects more efficient and beneficial.

In 1998, the funding structure related to the Federal Columbia River Power System projects, including those mentioned in the last paragraph, was changed. Funding for maintaining and improving the hydropower system would now come directly from revenue created by generating power. This change held out hope for the future of the electric generation infrastructure. It does not affect, however, the situation in regard to maintaining navigation on the Columbia and Snake Rivers.

This issue of maintaining what the District has already built remains of great concern as we move into the twenty-first century.

Emergency Operations

Emergency Operations will continue to be an important part of the Walla Walla District's mission. One District staff member reflected on the importance of this crucial Corps role:

> "Emergency operations are widely publicized, are at the very heart and soul of the public and why they support us. ….
>
> We provide one of those [basic needs], which is safety from water threats.
>
> "If you look back a hundred years, that simply didn't exist. If you look in the town of Walla Walla, if you look in Boise … any house built before the 1930s is built on about a six-foot berm, and only poor houses were built on level with the street because every few years the streets filled with water. They dissipated all the extra water. Today, we wouldn't dream of building big berms to put our houses on because we have a trust, in Walla Walla's case, in the Corps of Engineers.
>
> "Emergency Management is very, very important to our agency and very important to our public perception. It's a small group, small funding, but high prestige in the public eye. They're a very important piece of who we are. We always need to maintain and polish that organization and keep it on its best behavior (53)."

The District in the Corps

As it looks to the future, the Walla Walla District will not do so alone, but as part of a dynamic organization that is planning for the future. Finally released late in 2003, the Corps reorganization plan, "USACE 2012" was in the planning stages at the end of the period covered by this volume.

Key operational concepts of the plan included a Regional Business Center, Regional Integration Teams, Communities of Practice, and "One Corps."

Under USACE 2012, certain functions in each division would be regionalized in a business center. Functions like real estate or information management might be regionalized with all staff in the division reporting to a regional business center. How staff would actually be located geographically remained to be seen.

The regional integration team concept meant that at the division and district level staff would be assigned to participate in and concentrate on activities in a particular region. For example, there would be people on the regional integration team at national Corps Headquarters in Washington, DC, who specialized in projects and activities of Walla Walla District. There would be similar specialists at Northwestern Division Headquarters in Portland, Oregon.

The communities of practice concept in the USACE 2012 reorganization intended to foster cooperation and communication between subject experts throughout the Corps. For example, Walla Walla District might have subject experts in the area of roller-compacted concrete who would be in a community of practice with other concrete experts throughout the Corps.

All of these reorganization concepts were meant to achieve the long-standing goal of "One Corps." In the past, the many districts and divisions of the Corps acted somewhat independently of one another without optimal sharing of expertise. USACE 2012 hopes to eliminate redundancy in the organization while creating synergy between staff members who might actually be working in far-flung locations. In this effort the Corps would be aided by modern information management technologies and modern team-based management concepts.

In the National Water Safety Program, Walla Walla District housed one example of a modern, technologically enabled "community of practice" that might serve as a model for the future.

COMMUNITY OF PRACTICE IN ACTION,
THE NATIONAL WATER SAFETY PROGRAM

I began some negotiation with … [national Corps Headquarters] and began to ask the question of why does that need to be in Washington, D.C. With the technology today and the way we function, it would be better served to be in a field environment. That way people in the field who need the tools that we're creating would have better access to us, feel more comfortable. We'd be close to the ground and get it back to a grass roots level. ... Headquarters loved the idea. They put together a concept. They wanted—we were going through a lot of development of mandatory centers of expertise at that time—and that's what they wanted to call this. I was hesitant because I certainly would not call myself an expert. There are certainly people that know more about water safety than I do. My recommendation was to simply be an operations center. Because I could operate the program, manage the program, but rely on other people for the expertise. That's what we became. The first Corps National Operations Center. The program moved to Walla Walla ... in 1994. …
–Lynda G. Nutt, National Water Safety Program Coordinator (54)

Throughout the 1981-2000 period, the Corps worked to eliminate unnecessary managerial layers, following a trend seen throughout the corporate world. One Walla Walla District staff member summarized how this trend had affected the District: "[In] our relationship with Headquarters, we began to see them as helpful. … They became visible. At the same time, they were severely slashing the heart out of all the technical expertise at Headquarters. What we're left with today is people who truly are just policy people, who truly are just vision people, who truly are just people who work with Congressional staffs and work with the Army, and who work to create resources and opportunities for the agency, but are not down doing any of the technical work or trying

to execute anything. [They are there to] truly represent the Corps' interest to the Congress (55)." USACE 2012 was likely to continue this trend toward streamlining the organization, leaving the technical experts at the districts, and assigning Headquarters staff to policy and facilitation roles.

The District in the Federal Government

Competitive Sourcing

As mentioned above, there was a conscious effort during the 1981-2000 period to downsize the federal government. Another major initiative in this effort was likely to affect the District for the future. In 1999, the Office of Management and Budget issued a revision to their *Circular A-76* (56). This revision required re-examining government jobs with the idea of allowing competition in areas that were not inherently governmental. Once again, a new administration was looking at reducing the size of the government workforce. As it was for many areas of the federal government, the application of the new round of A-76 competitions was an area of uncertainty for the Walla Walla District. The only thing that seemed clear was that some functions performed by civil service staff in 2000 would be performed by contractors in the future.

Civil Service Changes

As the Corps and the District look to the future, there will be changes in the federal civil service. There was a movement to change long-standing processes for evaluating Department of Defense civilians and for assigning merit pay. In 2003 and 2004, the Department of Defense was seeking Congressional approval for the Defense Transformation Act for the 21st Century that would include "improvements in certain provisions under Title 5 that have proven to be insufficiently flexible in today's environment (57)." Title 5 of the U.S. Code (58) covered the personnel system for civil service employees. It remains to be seen if and just how these changes will be enacted into law and how they might affect the Corps and Walla Walla District.

Science into Action

The Corps, looking toward the twenty-first century, attempted to better define processes that bring science into action in its projects. New guidance was issued by national Corps Headquarters defining the planning study process (59). This guidance offered Corps staff a model for comprehensively planning studies so that the outcome produces viable projects or reveals the real lack of merit of other proposals.

The Walla Walla District approached the coming years with strong staff representation in several areas of expertise: cost accounting, design and construction of fish recovery facilities, applications of roller-compacted concrete, dam technology, and turbine design (see chapter 5).

The District continued to be innovative, bringing science into action in several areas. One District engineer commented on this: "[Innovation]—that's been … typical of our projects, especially the ones related to fish. We do so many prototype things that have never been done before. The surface collector is one that had never been done before. The behavioral guidance structure had never been done before. A lot of the stuff that we're doing on the fish screens … we've been developing it first (60)."

The challenge for the future of the District seemed to lie in two different directions. The first was in keeping a strong and capable workforce, staff with technical expertise, especially in view of the many impending retirements. The second challenge was to share that expertise more widely and more efficiently across the entire Corps. Such sharing was one large goal of the "USACE 2012" reorganization of the Corps. If this reorganization is proved effective, Walla Walla District will continue to participate in Corps-wide efforts to ensure the expertise of its staff is fully utilized, including participation on projects initiated in other areas and regions.

Management's Evolution

For the future, Walla Walla District, along with the Corps and the Army, is likely to seek out new management practices. The District is also likely to continue to work to fully implement time-tested management philosophies such as the importance of good leadership, teamwork, and careful project planning and execution.

Leadership

General Hatch, Commander of the Corps of Engineers in the late 1980s issued *Leadership Principles* (61) for the Corps. The ideal for Corps leadership, according to this official publication, was characterized as "values-based," "customer focused," "people powered," "future oriented," and "excellence driven (62)." The statement stressed empowerment of employee and leadership by example and talked about "building team synergy (63)." This leadership model remains the Corps ideal and will, no doubt, inform thinking into the future.

The Learning Organization

Looking to the twenty-first century, the Corps and Walla Walla District were working at changing its internal constitution to respond to external opportunities and challenges. Changes included increased use of teams, including virtual teams. They included an increased emphasis on examining and improving processes. For example, improving and defining how feasibility studies were conducted.

The Corps was looking at going beyond managing information to the era of knowledge management, where the expertise and experience of staff and other experts could readily be tapped for new projects.

Looking toward the future, at the end of the period covered by this volume, the Walla Walla District chose to become an early adopter of management initiatives. With numerous workshops and continuing discussion, the District prepared itself for adoption of the project management business process model. Under this model, the notion of a "project" (a key concept for the District) would become even more central. Potentially, every activity would be considered a project. Project teams would manage all activities and act as customers in obtaining services from technical experts in the District, in the rest of the Corps, and from outside contractors.

Future of the District

Following the era of building dams, Walla Walla District searched to define the mission of the District. One District staff member discussed this search for a District identity:

“There was a belief among those people who had built dams from the ‘50s, that when the dams were done, there was no purpose for this District. Their self-concept of the mission of the Corps was that the Corps of Engineers built dams. That was reflected in our self-image. It was reflected in our organizations. For example, when I came here, I believe there were one or two biologists, and there was one archeologist. Any of the nonengineering sciences were either nonexistent or had a token person. …

“If you look at the organization today, biologists and the environmental sciences … represent half of the District’s work and workload. It is also the kind of people that we now have. It’s changed who we believe we are. I have a T-shirt at home—it’s green—and it has three leaves growing out of a Corps castle. Today, I have worn that a few times and people go, oh, environmental work at the Corps. At the time that T-shirt was created by someone here in the District …it was bitterly [resented]. …

“I believe that we hired a certain construction-oriented person to design and get those things done. Those people did that well, and that was all that was in their vision. They had no vision beyond the last dam. …

“There are plans on the shelf in the library today for a whole number of dams that will never exist probably. That was done at the end of that era, looking for more dams, more things to build in the rivers that made sense. …

“I don’t think anyone saw all the environmental work and the continuing work we would do with the river, the operations and maintenance program, and all those kinds of things.

“We still struggle today with articulating a vision that is comprehensive enough to cause people to feel secure. My whole job is about trying to develop pieces of programs that will continue to serve the region in a way that is appropriate and helping. … It’s wonderful to go back sometimes (I know a number of the past colonels, and some that were here long before I was) … and talk to those men who struggled with some of the same things we struggle with today. We tend to think that all of our battles are new, and all of our concerns are urgent and just appeared. In fact, we’ve been fighting these same dragons since our existence and our creation. …

“At the beginning of the ‘80s we still represented a traditional engineering organization with traditional roles and focused a great deal on what was our reigning glory of creating the hydroelectric projects. That is no longer our self-image. It is no longer where we’re going or what we’re going to be doing. We do an amazingly great job of stewardship of the hydroelectric projects, but we are also working in the direction of becoming good water resource stewards for the entire region. … As a result of being more adaptable, we’re keeping up better with changes in the community values. I see a very bright future for the Corps. I think it’s a great place to work (64).”

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Notes for Chapter 12

1. Pomraning, Allen N. Interview. Walla Walla: NWW, 24 January 2002.
2. Christianson, Carl J. Interview. Walla Walla: NWW, 26 June 2001.
3. Summarized in: Barr, Stephen. Report highlights risks of "reform." *Washington Post*, 23 November 2003.
4. Ibid.
5. Christianson interview.
6. Walker, Lawrence P. Interview. Walla Walla: NWW, 18 June 2001.
7. BPA Treasury payment includes $402.6 million in interest. *Bend (OR) Columbia Basin Bulletin*, 20 November, 2000.
8. Comprehensive Energy Review Steering Committee, Thursday, July 11, 1996, Seattle Center, Seattle, Washington. *Newsdata Regional Review* (Seattle), 15 July 1996. INTERNET: www.newsdata.com/enernet/review/rr10.html.
9. PL 93-205.
10. PL 100-707.
11. Clausen, Gareth M. Interview. Walla Walla: NWW, 19 September 2001.
12. U.S. Geological Survey, Current Water Data for the Nation, http://waterdata.usgs.gov/nwis/rt, accessed March 2011.
13. Pomraning interview.
14. Weeks, D. Anthony. Interview. Walla Walla: NWW, 18 June 2001.
15. Christianson interview.
16. Oregon Revised Statutes 537.348.
17. Pomraning interview.
18. PL 104-303.
19. Davis, Diane J. Interview. Walla Walla: NWW, 21 October 2001.
20. Christianson interview.
21. Pomraning interview.
22 Hixson, Phil L. Interview. Walla Walla: NWW, 10 July 2001.
23. Hixson interview.
24. Carlton, Richard. Interview. Walla Walla: NWW, 24 October 2001.
25. Quoted in: First inhabitants: Plateau neighbors. Vancouver, Washington: Center for Columbia River History, 1999. INTERNET: www.ccrh.org/comm/moses/inhab2.html.
26. Pomraning interview.
27. PL 106-541.
28. USACE, Institute for Water Resources Policy Studies Program. *Tribal Partnership Program: Issues Relevant to Working with Native Americans and Alaska Natives on Section 203 Studies*, IWR 01-PS-3. Washington, DC: USACE, The Institute, January 2002, p. viii.
29. Columbia River Inter-Tribal Fish Commission. Confederated Tribes and Bands of the Yakama Nation. Portland, OR: Columbia River Inter-Tribal Fish Commission, 2002. INTERNET: www.critfc.org/text/yahama.html.
30. Information about the Yakama Nation may be found at: Columbia River Inter-Tribal Fish Commission. Confederated Tribes and Bands of the Yakama Nation. Portland, OR: Columbia River Inter-Tribal Fish Commission, 2002. INTERNET: www.critfc.org/text/yahama.html; and at: McInerney, Terra, Stacey Cole and Melissa Pabisz. The Yakama Indian Nation: Unofficial Web site. Pullman: Washington State University, 2002. INTERNET: ceed.wsu.edu/wsu_StudentProjects/Yakama_Indian_Nation/Yakama_Indian_nation.htm.
31. Columbia River Inter-Tribal +Fish Commission. Confederated Tribes and Bands of the Yakama Nation. Portland, OR: Columbia River Inter-Tribal Fish Commission, 2002. INTERNET: www.critfc.org/text/yahama.html.
32. Ibid.
33. Most of the information in this section was taken from the tribe's official Web site: Confederated Tribes of the Umatilla Indian Reservation. History and culture of the Cayuse, Umatilla and Walla Walla Indians. Pendleton, OR: Confederated Tribes of the Umatilla Indian Reservation, 1996-2000. INTERNET: www.umatilla.nsn.us/history.html.
34. Information on the Nez Perce Tribe may be found at their official Web site: Nez Perce Tribe. Nez Perce Tribe Web site. Lapwai, Idaho: The Tribe. INTERNET: http://www.nezperce.org/Main.html.

35. Information on the Confederated Tribes of the Colville Reservation may be found at their official Web site: Colville Tribes official Web site. Nespelem, WA: Confederated Tribes of the Colville Reservation, 31 December 2002. INTERNET: www.colvilletribes.com
36. Information on the Shoshone-Bannock Tribes may be found at their official Web site: Shoshone-Bannock Tribes. Fort Hall, Idaho: The Tribes, 2003. INTERNET: http://www.shoshonebannocktribes.com/
37. Pomraning interview.
38. Nutt, Lynda G. Interview. Walla Walla: NWW, 20 September 2001.
39. Nutt interview.
40. Nutt interview.
41. USACE, Walla Walla District. *Evaluation Report of Structures for Deer Creek Dam*. Walla Walla: NWW, April 1999.
42. PL 96-501.
43. Weeks interview.
44. Weeks interview.
45. USACE, Walla Walla District. *Dredged Material Management Plan and Environmental Impact Statement—McNary Reservoir and Lower Snake River Reservoirs*. Final. Walla Walla: NWW, July 2002.
46. Reese, David L. Interview. Walla Walla, 23 October 2001, NWW.
47. Hixson interview.
48. *Federal Acquisitions Regulations.* INTERNET: http://www.acquisition.gov/far/.
49. USACE. *Digest of Water Resources Policies and Authorities.* Engineer Pamphlet EP-1165-2-1. Washington, DC: USACE, 30 July, 1999.
50. Amendment contained in the *Water Resources and Development Act of 2000* (PL 106-541).
51. Pomraning interview.
52. American Society for Civil Engineers. 2001 report card for America's infrastructure. Washington, DC: The Society, 2001. INTERNET: www.asce.org/reprotcard.
53. Pomraning interview.
54 Nutt interview.
55. Pomraning interview.
56. U.S. Office of Management and Budget. *Circular No. A-76*. Washington, DC: The Office, 1983 (revised 1999).
57. Rogers discusses human resources management reform within DOD. Federal News Online, 25 September 2003. INTERNET: http://www.fpmi.com/FedNews/september-22-week.html.
58. USC, Title 5, *Government Organization and Employees*. INTERNET: http://uscode.house.gov/download/title_05.shtml.
59. USACE. *Planning Guidance Notebook.* Engineer Regulation 1105-2-100. Washington, DC: USACE, 2000.
60. Opbroek, David A. Interview. Walla Walla: NWW, 5 December 2001.
61. USACE. *Leadership Principles.* Engineer Pamphlet 600-1-1. Washington, DC: USACE, March 1989.
62. Ibid, p. 2.
63. Ibid, p. 4.
64. Pomraning interview.

Bibliography

Abbreviations and Identifications

USACE	U.S. Army Corps of Engineers
NPW	U.S. Army Corps of Engineers, North Pacific Division, Walla Walla District (prior to June 1997)
NWD	U.S. Army Corps of Engineers, Northwestern Division
NWW	U.S. Army Corps of Engineers, Northwestern Division, Walla Walla District (June 1997 forward)
Information Bulletin	Employee newsletter published by USACE, NWW
Intercom	Newsletter/ magazine published by USACE, NWW
Nor'wester Alert	Newspaper published by USACE, Northwestern Division
Numbers in brackets	Chapter associations

Books and Reports

Allen, Hollis H., and James R. Leech. *Bioengineering for Streambank Erosion Control*. Environmental Impact Research Program, Report 1, Guidelines; Technical Report EL-97-8. Washington, DC: USACE, 1997.

American Public Power Association. *Straight Answers to False Charges about Public Power*. Washington, DC: American Public Power Association, 2002. [4]

Bennett, David H., et al. *Lower Granite Reservoir In-Water Disposal Test: Results of the Fishery, Benthic and Habitat Monitoring Program - Year 3 (1990)*. Walla Walla: NWW, 1993. [4] [5] [8]

Bennett, David H., et al. *The Use of Dredged Material to Enhance Habitat in Lower Granite Reservoir, Idaho-Washington.* Walla Walla: NWW, 1989. [4] [5] [8]

Bennett, David H., James H. Chandler and Gwynne Chandler. *Lower Granite Reservoir In-Water Disposal Test: Results of the Fishery, Benthic and Habitat Monitoring Program - Year 2 (1989)*. Walla Walla: NWW, 1991. [4] [5] [8]

Bjorn, Theodore. *Migration of Adult Steelhead Past Dams and Through Reservoirs in the Lower Snake River and into Tributaries (1991-95)*. Walla Walla: NWW, 2003. [5]

Bonneville Power Administration. A*ssessment of the Impacts of Development and Operation of the Columbia River Hydroelectric System on Mainstem Riverine Processes and Salmon Habitats.* Portland, OR: The Administration, 2001. [4] [8]

Bonneville Power Administration, Bureau of Reclamation, and USACE, North Pacific Division. *Columbia River System Operation Review, Final Environmental Impact Statement.* Summary, main report, 20 technical appendixes. Portland, OR: The Agencies, 1995. [2] [4] [5] [8] [10] [11]

Central Washington University, Central Washington Archeological Survey. *Overview and Inventory of Cultural Resources in the Malheur Basin Project, Southeastern Oregon.* Walla Walla: NPW, 1986. [10]

Chatters, James C. *Ancient encounters: Kennewick Man and the first Americans.* New York: Simon and Schuster, 2001. [10]

Chicago Manual of Style, The. 14th ed. Chicago: University of Chicago Press, 1993.

Columbia River Inter-Tribal Fish Commission. *Empty Promises, Empty Nets*. Videotape. Portland, OR: Columbia River Inter-Tribal Fish Commission, 1994. [8] [12]

D'Antonio, Michael. *Atomic Harvest: Hanford and the Lethal Toll of America's Nuclear Arsenal.* New York: Crown Publishers, 1993. [9]

Department of Energy, Richland Operations Office. Richland environmental restoration project baseline. DOE-RL-96-105. Richland, WA: The Office, 1998.

Downey, Roger. *Riddle of the Bones: Politics, Science, Race, and the Story of the Kennewick Man.* New York: Springer-Verlag, 2000. [10]

Environmental Protection Agency, Region 10, Environmental Cleanup Office. *First 5-Year Review of the Non-Populated Area Operable Unit Bunker Hill Mining and Metallurgical Complex, Shoshone County, Idaho.* [Seattle]: Environmental Cleanup Office, 2000. [9]

Eppard, M. Brad. *Spillway Survival for Hatchery Yearling and Subyearling Chinook Salmon Passing Ice Harbor Dam*, 2000. Seattle: Northwest Fisheries Science Center, Fish Ecology Division, 2002. [5]

Evans, Allen F. and Roy E. Bealy. *Identification and Enumeration of Steelhead (Oncorhynchus Mykiss) Kelts at Little Goose Dam Juvenile Bypass Separator, 1999*. Portland: Columbia River Inter-Tribal Fish Commission, 2000. [5]

Gerber, Michele Stenehjem. *On the Home Front: The Cold War Legacy of the Hanford Nuclear War.* Lincoln: University of Nebraska Press, 1992. [10]

Harden, Blaine. *A River Lost: The Life and Death of the Columbia*. New York: W. W. Norton, 1996. [4] [8]

Kaden, Richard A. *Lunar Concrete*. Special Publication 125. Farmington, MI: American Concrete Institute, 1991. [5]

Kelly, William L. *You and Value Whatnot*. Revised ed. Walla Walla, WA: The Author, 1986. [5]

Ledgerwood, Richard D. *Estuarine Recovery of PIT-Tagged Juvenile Salmonids From Lower Granite Dam Transportation Study, 1998*. Seattle: Northwest Fisheries Science Center, 2000. [5]

Lichatowich, Jim. *Salmon Hatcheries: Past, Present and Future*. [Portland]: Oregon Business Council, [February 2001]. [8]

Liu, Yijun. Lecture notes: Introduction to Finite Element Method. Cincinnati: University of Cincinnati, 1998. [5]

Mighetto, Lisa, and Wesley J. Ebel. *Saving the Salmon: A History of the U.S Army Corps of Engineers' Efforts to Protect Anadromous Fish on the Columbia and Snake Rivers*. Seattle: Historical Research Associates, prepared for the Corps, Portland and Walla Walla Districts, 1994. [1] [4] [5] [8]

Moore, Jamie B. *The Army Corps of Engineers and the Evolution of Federal Flood Plain Management Policy*. Boulder, Col.: Institute of Behavioral Science, University of Colorado, 1989. [6]

Nagle, James F. *A History of Government Contracting*. Washington, DC: George Washington University Law School, Government Contracts Program, 1999. [2] [10] [11]

National Marine Fisheries Service. *Biological Opinion: Endangered Species Act – Section 7 Consultation.* [Portland, OR]: National Marine Fisheries Service, 1995. [4] [8]

____. *Biological Opinion: Endangered Species Act – Section 7 Consultation*. [Portland, OR]: National Marine Fisheries Service, 2000. [8]

National Park Service. *The Secretary of the Interior's Standards and Guidelines for Federal Agency Historic Preservation Programs Pursuant to the National Historic Preservation Act*. Washington, DC.: The Service, 1998.

National Research Council, Committee on Mitigating Wetland Losses. *Compensating for Wetland Losses Under the Clean Water Act.* Washington, DC: National Academy of Sciences Press, 2001. [9]

NBBJ Group. *Tri-Cities Regional Rivershore Enhancement Plan*. Seattle, Washington: NBBJ Group, 1989. [11]

Northwest Power Planning Council. *Briefing Book.* [Portland, OR]: Northwest Power Planning Council, 2003. [4] [8]

Northwest Power Planning Council, Independent Scientific Group. *Return to the River: Restoration of Salmonid Fishes in the Columbia River Ecosystem*. Prepublication copy. [Portland, OR]: Northwest Power Planning Council, 1996. [8]

Norton, W. R., I. P. King, and Gerald T. Orlob. *A Finite Element Model for Lower Granite Reservoir.* Walla Walla: NPW, 1973. [5]

Pacific Northwest River Basins Commission. *Agencies, Organizations and Interests Affecting Columbia River Anadromous Fish: A Descriptive Summary.* Vancouver, WA: The Commission, 1999. [8]

Parker, Patricia L., and Thomas F. King. *Guidelines for Evaluating and Documenting Traditional Cultural Properties*. National Register Bulletin, no. 38. Washington, DC: National Park Service, 1990. [10]

Peterson, Keith C., and Mary E. Reed. *Controversy, Conflict and Compromise: A History of the Lower Snake River Development.* Walla Walla: NPW, 1994. [1] [4] [8] [12]

Reid, Kenneth C. *An Overview of Cultural Resources in the Snake River Basin: Prehistory and Paleoenvironments*. Submitted to NWW under contract DACW68-95-Q-0157. Pullman, WA: Rainshadow Research, 1995.

Reisner, Marc. *Cadillac Desert: The American West and Its Disappearing Water.* New York: Penguin Books, 1987. [4] [8]

Reuss, Martin, and Paul K. Walker. *Financing Water Resources Development: A Brief History*. Washington, DC: USACE, Historical Division, July 1983. [2] [4] [12]

Sampson, Don. *Hatchery Evaluation Report: Summary for Irrigon Hatchery*. Portland, OR: Northwest Power Planning Council, 1998. [8]

Stacy, Susan M. *When the River Rises: Flood Control on the Boise River 1943-1985.* Program on Environment and Behavior Special Publication, no. 27. Boulder: Institute of Behavior Science, Natural Hazards Research and Applications Information Center, University of Colorado; Boise: College of Social Sciences and Public Affairs, Boise State University, 1993. [1] [6]

Taxpayers for Common Sense and National Wildlife Federation. *Troubled Waters: Congress, the Corps of Engineers and Wasteful Water Projects*. Washington, DC: Taxpayers for Common Sense and National Wildlife Federation, March 2000. [2] [4] [8]

Thomas, David Hurst. *Skull Wars: Kennewick Man, Archeology, and the Battle for Native American Identity*. New York: Basic Books, 2000. [10]

U.S. Army, Center for Military History. *The U.S. Army and the Lewis and Clark Expedition.* [Washington, DC]: The Center, [2000?]. [10] [11]

USACE. *Civil Works Construction Cost Index System.* Engineer Manual 1110-2-1304. Washington, DC: USACE, published annually. [2] [3] [5]

____. *Construction Equipment Ownership and Operating Expense Schedule.* Engineer Pamphlet 1110-8. Washington, DC: USACE, published annually. [2] [3] [5]

____. *Digest of Water Resources Policies and Authorities*. Engineer Pamphlet EP-1165-2-1. Washington, DC: USACE, 30 July, 1999.

____. *Hydropower: The Role of the U.S. Army Corps of Engineers.* Washington, DC: USACE, 1987. [4]

____. *Leadership Principles*. Engineer Pamphlet EP-600-1-1. Washington, DC: USACE, March 1989. [2]

____. *National Hydroelectric Resources Study.* Washington, DC: USACE, 1983. [4]

____. *National Inventory of Dams.* Washington, DC: USACE, 2002. INTERNET: crunch.tec.army.mil/nid. [4]

____. *Program Management Plan (PgMP), Project Management Business Process (PMBP) Initiative Program*. Washington, DC: USACE, 2001. [2] [12]

____. *Recognizing Wetlands.* Washington, DC: USACE, 1998. [9]

____. *Strategic Vision*. Washington, DC: USACE, [1997]. [1]

USACE and Bureau of Reclamation. *Water Control Manual for Boise River Reservoirs, Boise River, Idaho: Boise River Project.* Walla Walla, USACE, 1985. [4]

USACE, Institute for Water Resources. *Environmental Activities in Corps of Engineers Water Resources Programs: Charting a New Direction*. Fort Belvoir, VA: Institute for Water Resources, 1993. [7]

USACE, Institute for Water Resources, Policy Studies Program. *Tribal Partnership Program: Issues Relevant to Working with Native Americans and Alaska Natives on Section 203 Studies*. IWR 01-PS-3. Washington, DC: USACE, The Institute, January 2002. [12]

USACE, North Pacific Division. *Annual Fish Passage Report: Columbia River Projects, Snake River Projects, Oregon and Washington.* Seattle: The Division, 1980-1998. [8]

USACE, North Pacific Division, Bonneville Power Administration and Bureau of Reclamation. *Columbia River Salmon Flow Measures: 1992 Options Analysis/Environmental Impact Statement.* . Seattle: The Agencies, 1992. [8]

USACE, Northwestern Division. *Annual Fish Passage Report: Columbia River Projects, Snake River Projects, Oregon and Washington.* Seattle: The Division, 1999-2000. [8]

USACE, Office of History. *The History of the USACE.* Washington, DC: USACE, 1998.

USACE, Portland District. *Water Resources Development in Oregon 1993.* Portland, OR: Portland District, 1993.

____. *Water Resources Development in Oregon 1997*. Portland, OR: Portland District, 1997.

USACE, Portland District and Walla Walla District. *Annual Anadromous Fish Evaluation Program Review*. Portland and Walla Walla: The Districts, published annually. [8] [12]

____. *Dissolved Gas Abatement Study: Phase I, Technical Report*. Portland and Walla Walla: The Districts, 1996. [5] [8]

____. *Dissolved Gas Abatement Study: Phase II, Technical Report*. Portland and Walla Walla: The Districts, 2002. [5] [8]

USACE, Seattle District. *Water Resources Development in Oregon 1993*. Seattle: Seattle District, 1993.

USACE, Walla Walla District. *1992 Reservoir Drawdown Test: Lower Granite and Little Goose Dams*. Walla Walla: NPW, 1993. [4] [5] [8] [10] [11]

____. *Analysis of Water Supply Alternatives: Clearwater Fish Hatchery*. Walla Walla: NPW, 1986. [5]

____. *Annual Summary of Accumulated Historical Material*. Walla Walla: NPW, 1986. [9]

____. *Annual Summary of Accumulated Historical Material*. Walla Walla: NPW, 1987.

____. *Annual Summary of Accumulated Historical Material: Calendar Year 1988*. Walla Walla: NPW, 1989. [3] [7]

____. *Annual Summary of Accumulated Historical Material: Calendar Year 1989*. Walla Walla: NPW, 1990. [6]

____. *Annual Summary of Accumulated Historical Material: Calendar Year 1990*. Walla Walla: NPW, 1991. [6]

____. *Annual Summary of Accumulated Historical Material: Calendar Year 1991*. Walla Walla: NPW, 1992.

____. *Annual Summary of Accumulated Historical Material: Calendar Year 1992*. Walla Walla: NPW, 1993.

____. *Annual Summary of Accumulated Historical Material: Calendar Year 1993*. Walla Walla: NPW, 1994. [6]

____. *Annual Summary of Accumulated Historical Material: Calendar Year 1994*. Walla Walla: NPW, 1995. [3]

____. *Annual Summary of Accumulated Historical Material: Calendar Year 1999*. Walla Walla: NWW, 2000.

____. *Annual Summary of Accumulated Historical Material: Calendar Year 2000*. Walla Walla: NWW, 2001. [6]

____. *Assistance Programs of the Corps of Engineers*. Walla Walla: NWW, 1990. [6]

____. *Columbia River and Tributaries Study: Snake River and Tributaries Basin Summary Report*. Walla Walla: NPW, August 1987. [5]

____. *Columbia River Salmon Mitigation Analysis Biological Drawdown Test*. Walla Walla: NPW, August 1994. [8]

____. *Columbia River Salmon Mitigation Analysis System Configuration Study*. Draft, Walla Walla: NPW, 1994. [8]

____. *Concept Design Report: Walla Walla District Headquarters Building*. Walla Walla: NPW, June 1990. [2]

____. *Concrete Report, Willow Creek Dam: World's First All Roller Compacted Concrete Dam*. Walla Walla: NPW, August 1984. [5]

____. *Design Memorandum for Wildlife Habitat Development: Supplement no. 1, Lower Snake River Project*. Walla Walla: NPW, 1979. [8]

____. *Dedication Ceremony of the New Walla Walla District Headquarters Building*. Videotape. Walla Walla: NPW, 5 May 1995. [2]

____. *Demolition of the Former District Headquarters Facilities*. Walla Walla: NWW, March 2000. [2] [4]

____. *Design Memorandum for Wildlife Habitat Development: Lower Snake River Project*. Walla Walla: NPW, 1975. [8]

____. *District Management Model*. Walla Walla: NPW, 1992. [1] [2]

____. *Drawdown 92*. Project Video Series no. 9-no. 27; videotapes. Walla Walla: NPW, 15 March-25 March, 1992. [8]

____. *Dredged Material Management Plan and Environmental Impact Statement--McNary Reservoir and Lower Snake River Reservoirs*. Final. Walla Walla: NWW, July 2002. [4] [5] [8]

____. *Dworshak Dam Underseepage Study*. Walla Walla: NPW, 1989. [4]

____. *Environmental Assessment Payette Wastewater Treatment Plant Bank Stabilization*. Walla Walla: NWW, March 1999. [7]

____. *Evaluation of Juvenile Fish Separators Technical Report*. Walla Walla: NWW, March 2002. [5]

____. *Evaluation Report of Structures for Deer Creek Dam*. Walla Walla: NWW, April 1999. [12]

____. *Fault and Earthquake Hazard Evaluation of Five U.S. Corps of Engineers Dams in Southeastern Washington*. Revised edition. Walla Walla, NPW, 1980. [6]

____. *Final Environmental Impact Statement: Zintel Canyon Dam, Vicinity of Kennewick, Washington*. Walla Walla: NPW, 1974. [6]

____. *Flood Warning/Preparedness Planning Study, Boise Foothills, Ada County Idaho*. Walla Walla: NWW, 1992. [6]

____. *Flood Waters—Walla Walla Jan. 8, 1996.* Miscellaneous Video, no. 81; videotape. Walla Walla: NPW, 1996. [6]

____. *Galloway Dam and Reservoir, Weiser River, Idaho: Preliminary Report: Weiser River Basin Interim, Upper Snake River and Tributaries*. Walla Walla: NPW, 1989. [4] [5]

____. *Grande Ronde River Stream Restoration, LaGrande, Oregon, Environmental Restoration Report/Environmental Assessment*. Walla Walla: NWW, November 1999. [7]

____. *History of the Walla Walla District, 1948-70, A*. Walla Walla: NPW, [1971].

____. *Interim Dredging and Disposal of Dredged Materials: Snake and Clearwater Rivers (2000-2001), Washington and Idaho*. Walla Walla: NWW, 26 September 2000. [2] [4] [8]

____. *Jackson Hole, Wyoming, Environmental Restoration Feasibility Report*. Walla Walla: NWW, July 2000. [7]

____. *Jackson Hole, Wyoming, Environmental Restoration Project*. PowerPoint presentation. Walla Walla: NWW, 2000. [7]

____. *Jackson Hole, Wyoming, Flood Damage Reduction and Fish and Wildlife Restoration Reconnaissance Study*. Walla Walla: NPW, 1993. [6] [7]

____. *Jackson Hole, Wyoming, O&M Decision Document and EIS*. Walla Walla: NPW, May 1990. [6]

____. *Lower Snake and Columbia Rivers Extended Length Submerged Bar Screen (ESBS) System-Wide Letter Report*. Walla Walla: NWW, August 2002. [5]

____. *Lower Snake River Biological Drawdown Test: Draft Environmental Impact Statement*. Walla Walla: NPW, April 1994. [8]

____. *Lower Snake River Juvenile Salmon Migration Feasibility Report/Environmental Impact Statement*. Final. Walla Walla: NWW, 2002. [2] [5] [8]

____. *Memories of the Walla Walla District Headquarters, U.S. Army Corps of Engineers, As Recalled by Retirees 1948-1995: In Celebration of the March 17, 1995 Decommissioning Ceremony of the Current Walla Walla District Headquarters, U.S. Army Corps of Engineers at the Walla Walla Regional Airport*. Walla Walla: NWW, 1995. [2]

____. *McNary Training Manual for Interpreters*. Walla Walla: NPW, 1996. [3] [11]

____. *Mill Creek Master Plan*. Design Memorandum no. 1. Walla Walla, NPW, 1993. [4] [11]

____. *NWW Direction 2000*. Walla Walla: NWW, 2000. [1]

____. *Plan For Development of Dworshak Dam and Reservoir, North Fork Clearwater River, Idaho*. Design Memorandum no. 15. Walla Walla: NPW, 1977. [4] [8] [11]

____. *Post Flood Report: 1984 Lemhi River Ice Jam Flood Salmon, Idaho*. Walla Walla: NPW, 1984. [5] [6]

____. *Reconnaissance Report, Palouse River Basin, Idaho and Washington*. Walla Walla: NPW, March 1989. [5]

____. *Record of Decision: Lower Snake River Juvenile Salmon Migration Feasibility Study*. Walla Walla: NWW, 2002. [4] [8]

____. *Report of the Secretary of the Army on Civil Works Activities: Extract Report of Walla Walla District*. Annual. Walla Walla: NWW, 1981-2000. [6]

____. *Report on the Floods of May and June 1981 on the Snake River and Tributaries*. Walla Walla: NPW, 1982. [6]

____. *Salmon River Flood Reduction Study*. NPW, 1984. [5] [6]

____. *Southeast Washington Floods 1996*. Miscellaneous Video no. 50; videotape. Walla Walla: NPW, 1996. [6]

____. *Special Flood Hazard Information Report: Snake River Ice Jams from Farewell Bend Upstream to Payette County Line*. Walla Walla: NPW, 1984. [6]

____. *Special Report: Lower Snake River Fish and Wildlife Compensation Plan, Lower Snake River, Washington and Idaho*. Walla Walla, NPW, 1975. [8]

____. *Special Report: Lower Snake River Fish and Wildlife Compensation Plan: Wildlife Habitat Compensation Evaluation for the Lower Snake River Project*. Walla Walla: NPW, 1991. [8]

____. *Walla Walla District Corps of Engineers Headquarters Old/New*. Slides. Walla Walla: NWW, 1999. [2]

____. *Walla Walla District History, Part II, 1970-75*. Walla Walla: NPW, [1976].

____. *Walla Walla District History, Part III, 1975-80*. Walla Walla: NPW, 1980.

____. *Walla Walla River Fish Passage Restoration Project, Environmental Assessment*. Walla Walla: NWW, 1996. [7]

____. *Walla Walla River Watershed Study Reconnaissance Report*. Walla Walla: NWW, 1997. [2] [7] [12]

____. Water Control Manual for Dworshak Dam and Reservoir, North Fork, Clearwater River, Idaho. Walla Walla: NPW, 1986. [11]

____. *Water Resources Development in Idaho, 1993*. Walla Walla: NPW, 1993.

____. *Water Resources Development in Idaho, 1995*. Walla Walla: NPW, 1995.

____. *Water Resources Development in Idaho, 1999*. Walla Walla: NWW, 2002. [4]

____. *Zintel Canyon Dam, Kennewick, WA*. General Design Memorandum No.2. Walla Walla: NPW, 1974, rev. 1989

USACE, Walla Walla District, Information Management Office. *Information Management Office Business Plan.* Revision 20. Walla Walla: NWW, 4 March 2002. [3]

USACE, Waterways Experiment Station. *Geoarchaeologic and Historical Investigation of the Discovery Site of Ancient Remains in Columbia Park, Kennewick, Washington--TR GL-98-13*. Vicksburg, MS: The Station, 1998. [10]

USACE, Waterways Experiment Station, Environmental Laboratory. *Corps of Engineers Wetlands Delineation Manual*. Vicksburg, MS: The Station, 1987. [9]

U.S. Department of Energy, Energy Information Administration. *The Changing Structure of the Electric Power Industry, 1970-1991*. Washington, DC: The Administration, March 1993. [4]

U.S. Department of Energy, Energy Information Administration. *The Changing Structure of the Electric Power Industry 2000: An Update*. Washington, DC: The Administration, October 2000. [4] [12]

U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy. *A Primer on Electric Utility Deregulation, and Restructuring of U.S. Electricity Markets*. Version 2.0. Washington, DC: The Office, May 2002. [4]

U.S. Environmental Protection Agency and USACE, Walla Walla District. *EPA/USACE Assessment of Cost Procedures: Comprehensive IGCE Review*. Walla Walla: The Agencies, December 1999. [2] [4] [5] [12]

U.S. General Accounting Office. *Hydroelectric Dams: Issues Surrounding Columbia River Basin Juvenile Fish Bypasses: Report to the Chairman, Subcommittee on Energy and Commerce, House of Representatives*. Washington, DC: General Accounting Office, 1990. [4] [8]

U.S. Government Printing Office. *Style Manual.* Washington, DC: The Office, 2000.

U.S. Office of Management and Budget. *Circular A-76.* Washington, DC: The Office, 1983 (revised 1999). [1] [2] [4] [11] [12]

Upstream: Salmon and Society in the Pacific Northwest. Washington, DC: National Research Council and National Academy Press, 1996. [4] [8]

Voest-Alpine Machinery Construction Engineering (MCE). *Model Test Report on Lower Granite Dam Project: Model Test Phase II for Turbine Model Development and Testing*. Vol. 1-7. Linz, Austria: Voest, 1998-2000. [5]

Volkman, John. *A River in Common: The Columbia River, the Salmon Ecosystem, and Water Policy: Report to the Western Water Policy Review Advisory Commission*. Denver: The Commission, 1997. [4] [8]

Water Resources Council. *Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies*. Approved by Executive Order 11747 (*Federal Register* 38:30993, February 3, 1983).

World Commission on Dams. *Dams and Development.* Final Report: Executive Summary. London: The Commission, November 2000. [4] [6] [8]

____. *Dams and Development.* Final Report: An Overview. London: The Commission, November 2000. [4] [6]

Articles, Media Reports, Chapters in Books, Internet Sites

NOTE: Unless otherwised noted, all Internet sources were accessed in 2006.

1990: Walla Walla District annual review of accomplishments. *Intercom*, winter 1990, p. 1-56.

1992 Columbia River Salmon Flow Measures Options Analysis/Environmental Impact Statement. *Intercom*, winter 1992, p. 7. [8]

1992 in review. *Intercom*, March 1993, p. 10-11.

1993, District focuses on change. *Intercom*, December 1993, p. 6.

1995 accomplishments. *Intercom*, winter 1995-96, p. 4-16. [2] [4]

2nd dam on Snake drawn to minimum. *Tri-City Herald*, 25 April 1991. [8]

3,500 birds to be released. *Intercom*, 4 November 1983. [8]

40 years of history chronicled. *Intercom*, October 1988, p. 3-7.

Abrams, Joan. Barges. *Lewiston Morning Tribune*, 22 January 1989. [4]

Administration briefs states on Federal efforts to restore salmon recovery. White House news release, 19 May 2000. [8] [12]

Administration bucks Congress, issues TMDL regs. *Bend (OR) Columbia Basin Bulletin*, 14 July 2000. [4] [8] [9]

ADP adds three programs to District computer. *Intercom*, 6 July 1983, p. 8. [3]

ADP Center handles specifications for military, civil projects. *Intercom*, 4 November 1983, p. 1. [3]

Affirmative action plan signed. *Intercom*, 21 December 1984. [2]

Alford, A. L., Jr. For every dam built, there were others existing only on paper. *Lewiston Morning Tribune*, 4 March 1994. [2] [5] [8] [12]

Alliance: "Idaho Plan" not cheapest. *Boise Idaho Statesman*, 27 June 1992. [4] [8] [12]

American Rivers. Dams slated for removal in 2001 and dams removed in 1999 and 2000. Washington, DC: American Rivers, [2001]. INTERNET: americanrivers.org/damremoval/damremovals2001.htm. [8]

____. Removal of the Marie Dorian Dam. Washington, DC: American Rivers, [2001]. INTERNET: americanrivers.org/tableofcontents/sswallawalla.htm. [8]

American Society for Civil Engineers. 2001 report card for America's infrastructure. Washington, DC: The Society, 2001. INTERNET: www.asce.org/reprotcard. [4] [12]

Analysts mull power rate changes due to salmon recovery efforts. *Twin Falls (ID) Times-News*, 5 March 2000, p. 1. [8]

Anderson, James J. A Personal in-side review of PATH: Paper presented at the Idaho State House, Boise, Jan. 20, 1999. CBR Publications. Seattle: University of Washington, School of Aquatic and Fishery Sciences, Columbia Basin Research, 1999. INTERNET: http://www.cqs.washington.edu/papers/jim/handout.html. [8]

____. Testimony and analyses of juvenile Snake River endangered salmon. *For Balanced Solutions* no. 31. Ephrata, WA: Stallard Consulting, [n.d.]. [8]

Andrus challenges U.S. on cost of drawdowns. Boise Idaho Statesman, 28 April 1994. [8] [12]

Andrus makes final push for drawdowns. *Pendleton East Oregonian*, 29 November 1994. [8] [12]

Andrus rejects Corps' latest drawdown plan. *Tri-City Herald*, 5 April 1991. [8]

Andrus signs Snake River law. *Twin Falls (ID) Times-News*, 19 March 1994, p. B2. [4] [12]

Anglen, Ralph. Army Corps should consider all species. *Bonners Ferry (ID) Herald*, 29 April 1992. [8]

Anolfo, Pasquale. Intern gets hands on experience at McNary. *Intercom*, fall 1995, p. 10. [2] [11]

Another Ice Harbor blast today. *Tri-City Herald*, 7 January 1994, p. A7. [4]

Another reservoir lowered. *Seattle Times*, 16 March 1992. [8]

Another Snake River lawsuit. *Kent (WA) Valley Daily News*, 6 August 1992. [8]

Anti-drawdown rally to be at Clarkston park. *Lewiston Morning Tribune*, 4 March 1994. [8] [12]

Arbios, Gerry. Cultural resource program protects native treasures. *Engineer Update*, August 1998. [10]

Area grows to become power producing center. *Hermiston (OR) Herald*, 21 July 1994. [4] [8]

Army Corps admits McNary salmon kill exceeded estimate. *Spokane Spokesman-Review*, 21 November 1990. [8]

Army Corps seeks land. *Colfax (WA) Gazette*, 5 December 1991. [8] [11]

Army Corps turns naturalist. *Seattle Daily Journal of Commerce*, 27 February 1992. [8] [9]

ASA focuses on six civil works program goals. *Intercom*, winter 1995-1995, p. 3, 20. [2] [4] [12]

ASCE honors Schrader. *Intercom*, 7 March 1984, p. 1. [5]

Ashton, Linda. Drawdown a drain on Orofino economy. *Boise Idaho Statesman*, 6 September 1994. [8] [11] [12]

Askari, Mohsin. Councilman tries to get attention of Corps officials. *Lewiston Morning Tribune*, 3 June 1992. [4] [8] [12]

____. Get along little duckie! *Lewiston Morning Tribune*, 27 March 1994, p. 1B, 8B. [8]

Askari, Mohsin, and Bill Loftus. Boat ramps revamped, park plan goes under. *Lewiston Morning Tribune*, 19 March 1992, p. 1D, 5D. [11]

Asseo, Laurie. Court to clarify Army Corps role. *Associated Press*, 22 May 2000. [9]

Assistant secretary of the Army visits Dworshak Dam, hatchery. *Orofino (ID) Clearwater Tribune*, 24 February 2000. [4]

Association of Corps Employees. *Intercom*, 30 December 1987. [2]

At Clarkston, volunteers make a difference. *Intercom,* 14 April 1987, p. 11. [2]

August target month for move into new headquarters. *Intercom,* March 1994, p. 4. [2]

Awards ceremony honors many accomplishments. *Intercom*, 1 December 1981, p. 3. [2]

Babbitt, Bruce. A River runs against it: America's evolving view of dams. *Open Spaces Quarterly*, winter 1998. [8] [12]

Back-injury prevention program starts. *Intercom*, December 1989, p. 18. [4]

Backstage opening night. *Intercom*, 1 September 1981, p. 4. [8]

Bailey, Julie. Anti-drawdown group raises $90,000. *Lewiston Tribune*, 8 May 1992, p. 5C, 8C. [8] [12]

____. Drawing down the economy. *Lewiston Tribune*, 5 April 1992. [8] [12]

____. Marina sinks into bankruptcy. *Lewiston Morning Tribune*, 30 April 1992. [8] [11]

____. Port goes to court. *Lewiston Morning Tribune*, 12 February 1992, p. 1A, 4A. [8]

____. Ports: Drawdown cost $4.1 million. *Lewiston Morning Tribune*, 7 May 1992, p. 1A, 3A. [8]

____. Ports of Clarkston to pull docks out of the river. *Lewiston Morning Tribune*, 3 March 1992. [8]

____. Road from Lewiston to Lower Granite Dam may be funded. *Lewiston Tribune*, 16 October 1992. [4]

Baldwin served nine commanders as Executive Assistant. *Intercom*, October 1988, p. 13-14.

Bard, J. C. Ethnographic/contact period of the Hanford Site, Washington. Hanford, WA: U.S. Department of Energy, Hanford Cultural Resources Program, 1997. INTERNET: www.hanford.gov/doe/culres/mpd/sec3.htm. [10]

Bare land at Bear Lake. *High Country News*, 20 February 1995. [9]

Barge damages John Day Dam lock. *Intercom*, August 1990, p. 7. [4]

Barge shutdown starts on lower Snake River. *Seattle Daily Journal of Commerce,* 3 March 1992. [4] [8]

Barge strikes Ice Harbor north guidewall. *Intercom,* fall 1995, p. 7. [4]

Barges overturn in Lower Granite Lock. *Intercom*, fall 1995, p. 1, 9. [4]

Barker, Eric. 60 Minutes films in L-C Valley. *Lewiston Morning Tribune*, 28 April 2000, p. 1A. [8]

____. Gov: Dams should stay. *Lewiston Morning Tribune*, 25 February 2000. [8] [12]

____. Dealing with fish and drawdowns. *Lewiston Morning Tribune*, 14 June 2000, p. 2D. [8] [11]

____. Dworshak should be full before July 1: Release of more water by Corps not allowing rate of fill by too much. *Lewiston Morning Tribune*, 14 June 2000. [8] [11]

____. Dworshak water is staying put, for now anyway. *Lewiston Morning Tribune*, 7 July 2000. [8] [11]

____. EPA permit churns the waters. *Lewiston Morning Tribune*, 28 January 2000. [8] [12]

____. It's settled: Dworshak will be 80 feet below full by end of August. *Lewiston Morning Tribune*, 9 July 2000. [8] [11]

____. Memo: Power must be sent to California: Clinton letter orders agencies to maximize availability. *Lewiston Morning Tribune*, 12 August 2000. [4]

____. Poachers lift hatchery grate: Adult steelhead trapped in pipes. *Lewiston Morning Tribune*, 2 March 2000. [8]

____. Revelation roils the waters: Dam supporters say this proves politics, not science, is ruling in dam debate. *Lewiston Morning Tribune*, 20 April 2000. [4] [8] [12]

____. Speaker says salmon are just a symptom. *Lewiston Morning Tribune*, 21 April 2000. [8]

____. Tribe nets OK for fish hatchery. *Lewiston Morning Tribune*, 18 May 2000. [8] [12]

____. Twisting by the full pool. *Lewiston Morning Tribune*, 29 June 2000, p. 4D. [4] [8] [11]

____. Workers put EPA in hot seat: About 1,500 attend hearing on Potlatch permit. *Lewiston Morning Tribune*, 28 January 2000. [8] [12]

Barker, Rocky. Andrus blasts BPA, Corps in letter. *Idaho Falls Post-Register*, 6 January 1991. [8]

____. Boise salmon hearing today will draw thousands. *Boise Idaho Statesman*, 25 February 2000. [8]

____. Council denies more water for fish. *Idaho Falls Post-Register*, 20 July 1994. [8] [12]

____. Crying over spilt water isn't going to help restore salmon runs. *Idaho Falls Post-Register*, 17 May 1994. [8]

____. Draft Boise River flood map already changing landscape. *Boise Idaho Statesman*, 29 April 2000. [6] [12]

____. Dworshak water is staying put, for now anyway. *Lewiston Morning Tribune*, 7 July 2000. [8] [11]

____. Flip-flop on approach to streams. *Idaho Falls Post-Register*, 12 July 1992. [9]

____. Hydro developer complains about project opposition. *Idaho Falls Post-Register*, 20 June 1991, p. C1-C2. [9]

____. Lt. Governor Otter fights $80,000 fine for wetlands violation. *Boise Idaho Statesman*, 7 June 2000. [9]

____. New clean-water rules spark concerns about costs, timeline. *Boise Idaho Statesman*, 17 July 2000. [8] [12]

____. Water dispute boiling over. *Idaho Falls Post-Register*, 20 April 1992. [4] [12]

Barnard, Jeff. Good news for salmon, but it's long term. *Spokane Spokesman-Review,* 21 May 1994, p. B2. [8]

Barnett, Jim. Despite decision, focus still on dams. *Portland Oregonian*, 20 July 2000. [4] [8]

Barnett, Jim, and Jonathan Brinckman. 4 dams will stay for now. *Portland Oregonian*, 19 July 2000. [4] [8]

Barr, Stephen. Report highlights risks of "reform." *Washington Post*, 23 November 2003. [2] [12]

Basin enjoying huge salmon run. *Confederated Umatilla Journal*, 6 September 2001. [8]

Baum, Bob. Corps adjusts spills to lower nitrogen levels. *Lewiston Morning Tribune*, 14 May 1994. [8]

____. Emergency spill ends, could start again. *Lewiston Morning Tribune*, 22 June 1994, p. 9A. [8]

____. Salmon death toll at McNary climbs to 90,000. *Pendleton East Oregonian*, 21 July 1994. [8]

____. U.S. judge won't stop drawdown. *Pendleton East Oregonian*, 13 May 1994, p. 1A-2A. [8]

Bear Lake Watch. Water History of Bear Lake. [n.p.]: Bear Lake Watch, [n.d.]. INTERNET: http://www.bearlakewatch.com/AboutFight3.html. [9]

Beautification plan. *Intercom*, 1 April 1980. [2]

Bender, David. Mix-up jeopardizes fish eggs. *Spokane Spokesman-Review*, 27 February 1990. [8] [9]

Bennett, Gregory. What Luna City will be like in 100 years. [Plano, TX:] The Artemis Project, 2002. INTERNET: www.asi.org/adb/01/02/future-luna-city.html. [5]

Bennett, Shelley. Jackie Anderson selected for Chief of Contracting Division. *Intercom*, September 1996, p. 4. [2]

Bennington Lake. *Walla Walla Union-Bulletin*, 23 April 2000, p. 17. [11]

"Best Dam Ever" event Oct. 8. *Information Bulletin*, 5 October 1988, p. 1. [5]

Big Hanford budget a relief, a warning. *Tri-City Herald*, 9 February 1994, p. A6. [9]

"Big Red" wins name nod. *Intercom*, 1 August 1981, p. 1. [2]

Big restoration effort planned for once-neglected Portneuf. *Pocatello Idaho State Journal,* 19 May 1991, p. B1-B3. [7]

Big runs mostly hatchery salmon. *Tri-City Herald*, 15 July 2000, p. A7. [8]

Big turnouts expected at salmon strategy meetings. *Tri-City Herald*, 8 February 2000, p. A7. [8]

Boat collision in fog hospitalizes two. *Intercom*, 17 December 1982, p. 6. [11]

Boat ramp user fees start May 10. *Intercom*, March 1994, p. 4. [11]

Bonneville Power Administration. BPA, Corps applauded for cutting red tape. News release. [Portland]: The Administration, 27 January 1998. [2]

Bonneville Power Administration, USACE, and Bureau of Reclamation. Federal Columbia River Power System. Brochure. [Portland, OR] The Agencies, August 2003: INTERNET: http://www.bpa.gov/power/pg/fcrps_brochure_17x11.pdf.

Blumenthal, Les. Administration flounders on salmon issue. *Tri-City Herald*, 29 May 1994. [8] [12]

____. Canada breaks off salmon talks. *Tri-City Herald*, 28 May 1994. [8]

____. Dam-spill decision hurts Foley. *Portland Oregonian*, 31 May 1994. [8] [12]

____. Northwest farmers head to Capitol Hill to battle breaching. *Tri-City Herald*, 23 March 2000. [4] [8] [12]

____. Salmon protections could endanger power supply, BPA says. *Tri-City Herald*, 15 March 1991. [4] [8]

Blown fuse "wracks" Granite's tainter gate. *Intercom*, 18 March 1983, p. 1, 3. [4]

Blumenthal, Les, and Wanda Briggs. DOE asks for new deals with contractors. *Tri-City Herald*, 4 February 1994. [9]

Blumenthal, Les, and Gale Robinette. Cleanup puts Hanford on budget high. *Tri-City Herald*, 5 February 1991, p. A1. [9]

Bond, David. Prosecutor to Intervene in file transfer: Mining magnate fears loss of information on Bunker Hill probe. *Coeur d'Alene Press*, [March 2002]. INTERNET: www.cdpress.com/story.asp?str=4234. [9]

Bonneville Power Administration. Fish and wildlife funding principles for Bonneville Power Administration rates and contracts. Portland, OR: Bonneville Power Administration, 16 September 1998. INTERNET: www.efw.bpa.gov/Envrionment/EW/FISCAL/POST2001/980916.principles.html. [8]

____. Walla Walla Basin anadromous fish passage. Portland, OR: Bonneville Power Administration, [2000]. INTERNET: www.efw.bpa.gov/Envrionment/EW/CONTRACTS/SUMMARY/9601200.htm. [9]

Boise River ordinance spawns new feud. *Twin Falls (ID) Times-News*, 26 October 1992. [4] [8]

BPA fish salvage will cost "billions." *Salem (OR) Capital Press*, 1 May 1992, p. 1-2. [8]

BPA helps with expected California power shortage. *Waitsburg (WA) Times*, 3 August 2000, p. 6. [4] [8]

BPA plans to wean aluminum industry. *Associated Press*, 30 December 2000. [4] [8]

BPA says rate increase to top 10%: Exact figure depends on final salmon plan. *Tri-City Herald*, 19 March 1991. [4] [8]

BPA to reduce electricity to industry to help utilities. *Tri-City Herald*, 18 August 1992. [4]

BPA Treasury payment includes $402.6 million in interest. *Bend (OR) Columbia Basin Bulletin*, 20 November, 2000. [2] [4] [12]

Bradshaw, Rusty. Local man fights to save land from erosion. *Milton-Freewater (OR) Valley Herald*, 10 October 1990. [6]

Brandt, Aviva L. Smolts receive physical exams following tumble over dams. *Lewiston Tribune*, 12 May 1994. [5] [8]

Briggs, Wanda. Hanford budget 'A major victory'. *Tri-City Herald*, 27 May 1994. [9]

____. Hanford workers nervously await ERMC transition. *Tri-City Herald*, 6 April 1994. [9]

Brinckman, Jonathan. Breaching dams might push silt into stretch of Columbia. *Portland Oregonian*, 3 March 2000. [4] [8]

____. Call to breach dams upsets governors. *Portland Oregonian*, 23 February 2000. [8] [12]

____. Captive breeding helps sockeye buy some time. *Portland Oregonian*, 3 September 1999. [8]

____. Clubbing of salmon unleashes outrage. *Portland Oregonian*, 4 March 2000. [8]

____. Dam-breaching proponents make noise at public forum. *Portland Oregonian*, 4 February 2000. [8] [12]

____. Dam study finds new energy sources. *Portland Oregonian*, 10 April 2000. [4] [8]

____. New turbine design does less harm to migrating salmon. *Portland Oregonian*, 17 March 2000. [5] [8]

____. NW governors jointly propose salmon strategy. *Portland Oregonian*, 27 July 2000. [8] [12]

____. Panel disputes breaching study. *Portland Oregonian*, 27 July 2000. [4] [8]

____. Returning salmon pose a dilemma. *Portland Oregonian*, 19 March 2000. [8]

____. Tribes demand action to restore salmon, trout. *Portland Oregonian*, 25 January 2000. [8] [12]

____. Warm river temperatures pose grave threat to salmon, steelhead. *Portland Oregonian*, 11 August 2000. [8]

____. White House releases plan to help salmon. *Portland Oregonian*, 29 June 2000. [8] [12]

Brock, William. Court dumps 2 key water laws. *Twin Falls (ID) Times-News*, 5 February 1994. [4] [8] [12]

____. Groups to ban together to reduce pollution in Middle Snake River. *Twin Falls (ID) Times-News*, 11 January 1994. [4] [8]

____. Reservoir tour highlights water improvement. *Twin Falls (ID) Times-News*, 25 September 1994. [4]

____. Snake runs low, drops even lower. *Twin Falls (ID) Times-News*, 15 July 1994. [4]

Broom, John S. City water supply may be hurt by drawdown. *Hermiston (OR) Herald*, 21 April 1992. [8]

____. Some irrigators unhappy about water situation. *Hermiston (OR) Herald*, 11 June 1992. [8]

Brown, Sally L., Charles Henry, Rufus L. Chaney, and Harry Compton. Bunker Hill superfund site: Ecological restoration program. Beltsville, Md.: Agricultural Research Service, 18 December 1998. INTERNET: www.nal.usda.gov/ttic/tektran/data/000009/25/0000092566.html. [9]

Brown, Steven. Formation of Walla Walla Basin Council under way. *Pendleton East Oregonian*, 3 March 1994. [4] [12]

____. Preservation effort targets Walla Walla's south fork. *Pendleton East Oregonian*, 3 October 1992. [9]

Brownell, Dave. Powerhouse completed at Lucky Peak. *Intercom*, August 1988, p. 7. [4] [8] [11]

Budget gives billions for water projects. *Seattle Daily Journal of Commerce*, 31 January 1992. [2] [4] [12]

Building Blocks Committee update. *Intercom,* fall 1995, p. 4. [2]

Bull trout decision expected in June. *Spokane Spokesman-Review*, 28 April 1994. [8]

Burley flood fight draws state, county praise. *Information Bulletin,* 3 July 1984, p. 5. [6]

Burns, Candace. Boom: Boon or boondoggle. *Idaho Falls Post-Register*, 7 January 1991. [5]

____. Groups take river inventory. *Idaho Falls Post-Register*, 28 April 1994.

____. Life by river may put couple in jam. *Idaho Falls Post-Register*, 7 January 1991. [5] [6]

____. River ice jam prevention woks—so far. *Idaho Falls Post-Register*, 28 January 1991. [5] [6]

Butler, Nancy C. Breaching dams would harm grain producers. *Orofino (ID) Clearwater Tribune*, 25 November 1999. [4] [8]

____. Dworshak summer lake operation still uncertain. *Orofino (ID) Clearwater Times*, 11 May 2000. [8] [11]

____. Final draft on regional water study ready soon. *Orofino (ID) Clearwater Tribune*, 28 December 2000. [4]

____. Orofino Creek mitigation project may be in jeopardy. *Orofino (ID) Clearwater Tribune*, 27 April 2000. [9]

____. Recreational opportunities available in numerous realms. *Orofino (ID) Clearwater Tribune*, 8 June 2000. [11]

By popular demand. *Intercom*, 15 March 1981, p. 4. [9]

CADD training. *Intercom*, 9 September 1985, p. 4. [3]

Canada ready for "war" over salmon fishery. *Spokane Spokesman-Review*, 8 June 1994. [8]

Canopis, Mark. Dam spills kill salmon, experts say. *Boise Idaho Statesman*, 28 May 1994, p. 1C-2C. [8]

Carney, Daniel F. Setting new boundaries. *Federal Computer Week*, 16 October 2000. INTERNET: www.fcw.com. [3]

Carpenter, Steve. Columbia River fish runs hit historic highs. *Intercom*, 21 November 1986. [8]

Carroll, Charles. Administering Federal laws and regulations relating to Native Americans. *Cultural Resources Management*, no. 16, special Issue, 1993, p. 16-21. [10]

Cary, Annette. Hammer Training Center dedicated. *Tri-City Herald*, 27 September 1997. [9]

Casanova, I. Feasibility and applications of sulfur concrete for lunar base development, *Lunar and Planetary Science*, vol. 28. [5]

Caspian terns' saga poses troubling omen for NW fish recovery. Editorial. *Tri-City Herald*, 21 March 2000. [8]

Caution urged despite hatchery returns. *Spokane Spokesman-Review*, 12 October 1994. [8]

CBS Evening News. Dworshak Dam Leak. News broadcast (videotape). New York: CBS News, 18 June 1980. [4]

____. Sockeye salmon, endangered species? News broadcast (videotape). New York: CBS News, 5 May 1991. [8]

CEFMS: District moves towards Corps Electronic Funds Management System. *Intercom*, February 1997, p. 6. [3]

CEFMS: New financial management system to revolutionize Corps' business practices. *Intercom*, November 1997, p. 7. [3]

Challenge: Placing navigation markers at Hell's Canyon. *Intercom*, 29 November 1984, p. 3. [4]

Chamberlain, Todd. Irrigators, tribal leaders negotiate for water. *Hermiston (OR) Herald*, 1 March 1994, p. 2A. [12]

____. McNary Center to attract visitors. *Hermiston (OR) Herald*, 3 May 1994. [8] [11]

____. Pool drawdown would boost rates. *Hermiston (OR) Herald*, 24 April 1990. [4] [8]

Changes in Endangered Species Act would aid timber industry. *Boise Idaho Statesman*, 21 January 1994, p. 3C. [8]

Changes planned for Mill Creek Lake. *Intercom*, 16 December 1987. [6]

Changes slated for personnel system. *Intercom*, 21 November 1986, p. 4. [2] [12]

Channel work to Improve Ice Harbor navigation. *Intercom*, 23 January 1985, p. 1. [4]

Charts show lowest return on record. *Pendleton East Oregonian*, 12 May 1994. [8]

Chicken, Carrie. Columbia County power plant on track for 2004. *Walla Wall Union-Bulletin*, 7 July 2000, p. 7. [4]

Chinese delegation visits projects. *Intercom*, 1 December 1983, p. 1-3. [5]

Chronology 1985: It was a very good year for the District. *Intercom*, 23 December 1985, p. 1, 4.

Chukar: Information about the chukar partridge. [n.p.]: Valley View Pheasants, 1997-98. INTERNET: www.vvpheasants.com/partridge.html. [8]

Chukar recovery. *Intercom*, 24 October 1986. [8]

Citizens debate whether race course development should be allowed. *Intercom,* June 1989, p. 10-12. [11] [12]

City asked to maintain park. *Lewiston Morning Tribune*, 20 March 1990. [11]

Clear passage. *Lewiston Morning Tribune*, 4 May 1989. [8]

Clearwater dedication: Hatchery largest every constructed. *Intercom*, September 1992, p. 5. [8]

Clearwater Fish Hatchery opens. *Idaho Wildlife*, Hunting 1992, p. 26. [5] [8]

Clearwater River fluctuation tests called off. *Intercom*, March 1981. [8]

Clearwater River still has a chance at a new designation. *Boise Idaho Statesman*, 10 August 2000. [8]

Clearwater's flow going up. *Lewiston Tribune*, 10 September 1992. [8]

Clinton expected to sign bill ensuring Hanford funding. *Tri-City Herald*, 13 August 1994. [9]

Cockle, Richard. Grazing ban may hurt Wallowa fish habitat. *Portland Oregonian*, 13 July 1994, p. C2. [8]

____. Ranchers, farmers fear they'll shrivel up under new water rules. *Portland Oregonian*, 16 June 1994, p. D6. [8]

____. River town officials attack water plan. *Portland Oregonian*, 29 April 1994. [8] [12]

Col. Thayer gets tri-state award. *Intercom*, 15 March 1982, p. 2. [9]

Colfax honors Granite hero. *Intercom*, April 1996. [6]

Columbia Basin Fish and Wildlife Authority. Walla Walla River juvenile and adult passage improvements. Portland, OR: The Authority, 2002. INTERNET: www.cbfwa.org/files/province/plateau/projects/199601100.htm. [8] [9] [12]

Columbia Basin native fishery. Vancouver, WA: Center for Columbia River History, 2000. INTERNET: www.ccrh.org/comm./river/main.htm.

Columbia Basin runoff forecasts shrink. *Bend (OR) Columbia Basin Bulletin*, 14 July 2000. [4]

Columbia River fish bypass program. *Intercom*, December 1989, p. 7. [5] [8]

Columbia River fish bypass program. *Intercom*, winter 1992, p. 6. [8]

Columbia River Inter-Tribal Fish Commission. Confederated Tribes and Bands of the Yakama Nation. Portland, OR: Columbia River Inter-Tribal Fish Commission, 2002. INTERNET: www.critfc.org/text/yahama.html. [8] [12]

Columbia, Snake on endangered list. *Tri-City Herald*, 19 April 1994, p. A2. [8]

Colville Tribes official Web site. Nespelem, WA: Confederated Tribes of the Colville Reservation, 31 December 2002. INTERNET: www.colvilletribes.com. [8] [12]

Colvilles want dam money next spring. *Seattle Daily Journal of Commerce*, 23 November 1994. [4] [8] [12]

A Commander's farewell. *Nor'wester Alert*, August 2001, p. 1, 3-4. [2] [12]

Commanding presence: Fort Wood's leader nominated for Army Corps of Engineers' top post. *Springfield (MO) News and Leader*, 26 July 2000. [12] [12]

Commentary: Life goes on after the big move. *Intercom*, June 1996, p. 3. [2]

Committee OKs funding for fish bypasses. *Lewiston Morning Tribune*, 8 September 1989. [8]

Community support can help save jobs. Editorial. *Walla Walla Union-Bulletin*, 17 December 1992. [2] [12]

A Comparison of the February 28, 2001, Nisqually, Washington, and January 17, 1994, Northridge, California, Earthquakes. Los Angeles: Southern California Earthquake Center, 2001. INTERNET: www.scec.org/instantet/01news/feature010313.html. [9]

Comprehensive Energy Review Steering Committee, Thursday, July 11, 1996, Seattle Center, Seattle, Washington. *Newsdata Regional Review* (Seattle), 15 July 1996. INTERNET: www.newsdata.com/enernet/review/rr10.html. [4] [12]

Computer assisted drafting proposed in District. *Intercom*, 17 September 1984, p. 3. [3]

Computers: History and development. *Jones Telecommunications & Multimedia Encyclopedia*. INTERNET: www.digitalcentury.com/encycolopedia/comp_hd.html. [3]

Confederated Tribes of the Umatilla Indian Reservation. Ancient One determined to be culturally affiliated with Five Tribes. Pendleton, OR: Confederated Tribes of the Umatilla Indian Reservation, 25 September 2000. Press statement. INTERNET: www.umatilla.nsn.us/kennman6.html. [10]

____. Fish killed at McNary: Background paper. Pendleton, OR: Confederated Tribes of the Umatilla Indian Reservation, 6 August 1998. Press statement. INTERNET: www.umatilla.nsn.us/fishkill.html. [8]

____. History and culture of the Cayuse, Umatilla and Walla Walla Indians. Pendleton, OR: Confederated Tribes of the Umatilla Indian Reservation, 1996-2000. INTERNET: www.umatilla.nsn.us/history.html. [8] [12]

Congress backs Snake, Columbia bypasses. *Lewiston Tribune*, 8 September 1989. [8]

Congressman urges president to breach dams on Snake River. *Walla Walla Union-Bulletin*, 3 March 2000. [8] [12]

Connelly, Joel. Salmon protection could follow route of spotted owl. *Pendleton East Oregonian*, 8 January 1992. [8] [12]

Construction. *Intercom*, winter 1995-1996, p. 16. [4] [8] [9]

Construction booming at Lucky Peak. *Intercom*, 26 March 1986, p. 5. [4]

Construction Division. *Intercom*, 30 December 1987, p. 18. [2] [4]

Construction Division Chief hangs up Corps hard hat. *Intercom*, December 1987, p. 7. [2] [4]

Construction progresses on many fronts. *Intercom*, December 1989, p. 6. [4] [8]

Construction starts at Irrigon steelhead hatchery. *Intercom*, 6 June 1984, p. 6. [8]

Continuing authorities flood control program. *Intercom*, December 1989. [6]

Contracting Division. *Intercom*, 30 December 1987. [2]

Contractors call for Corps oversight of cleanup. *Tri-City Herald*, 15 October 1990. [9]

Contractors tackle Umatilla fish hatchery project. *Portland (OR) Daily Journal of Commerce*, 19 February 1991. [8]

Conway, Nola. District completes major milestone. *Intercom*, September 1994, p. 6. [9]

____. Fish kill numbers disputed. *Seattle Daily Journal of Commerce*, 18 August 1994. [8]

____. Hanford: 50 years later the Corps returns. *Intercom*, March 1993, p. 8. [9]

____. Picking up after past generations. *Intercom*, September 1993, p. 7. [9]

Co-op student named number one in state. *Intercom,* June 1993, p. 11. [2]

Co-ops: College students learn while they earn. *Intercom*, 5 August 1985, p. 2. [2]

Corbett, Dan. Quality in the new millennium: Recognizing that people make it happen. *Hot from the Desk* (National Quality Institute), 22 February 2002. INTERNET: www.nus.edu.sg/OQM/witnews22feb02.htm. [2]

Corgatelli, Kathy. Farmers, biologists argue over wildlife area. *Pocatello Idaho State Journal*, 24 February 1991, p. A1, A3. [8] [9]

____. River search continues for Firth boy. *Pocatello Idaho State Journal*, 22 June 1992, p. A1, A6. [11]

Corliss, Bryan. Port lobbies for more cleanup jobs, demolition of old Corps headquarters being reconsidered. *Walla Walla Union-Bulletin*, 24 March 1994, p. 11-12. [2] [9]

Corps awards contract to Spokane firm for fish facility. *Walla Walla Union-Bulletin*, 28 September 1992. [8]

Corps' chiefs hoping budget jumps. *Walla Wall Union-Bulletin*, 24 February 2000. [2] [4] [12]

Corps claims no authority to pay drawdown damage costs. *Salem (OR) Capital Press*, 8 May 1992. [8] [12]

Corps comes to aid of region in February floods. *Intercom*, April 1996, p. 1, 4. [6]

Corps cuts may be needed in deficit battle. Editorial. *Walla Walla Union-Bulletin*, 29 November 1992. [2] [12]

Corps delays Lower Granite drawdown. *Walla Walla Union-Bulletin*, 13 March 1991. [8] [12]

Corps describes cost of remaking dams for salmon. *Tri-City Herald*, 10 December 1992. [5] [8]

Corps extends salmon study comment period until April 30. *Orofino (ID) Clearwater Tribune,* 6 April 2000. [8] [12]

Corps fish mitigation budget moves forward. *Bend (OR) Columbia Basin Bulletin*, 14 July 2000. [8]

Corps faces new charges over ancient skeleton site. *Walla Walla Union-Bulletin*, 3 January 2001, p. 7. [10]

Corps goes public: District holds regional salmon meetings. *Intercom*, November 1991, p. 5, 20. [8]

Corps grew with nation. *Intercom*, 30 December 1987, p. 4-6. [2] [4] [12]

Corps is only Federal agency to recognize Sasquatch so far. *Intercom*, 1 February 1981. [8]

Corps leader leaves controversies in move to Alaska. *Alaska Daily News*, 23 June 2000. [2] [8]

Corps looks at economic impact of drawdown. *Orofino (ID) Clearwater Tribune*, 9 June 1994. [8] [11]

Corps names Wik no. 1 planner. *Intercom*, September 1993, p. 5. [8]

Corps: No drawdown in '93. *Lewiston Morning Tribune*, 13 May 1992, p. 1A, 4A. [8]

Corps of Engineers bans alcohol, fireworks in its Washington parks. *Tri-City Herald*, 30 June 2000. [11]

Corps of Engineers changes permits. *Salmon (ID) Recorder-Herald*, 2 January 1992. [9]

Corps of Engineers constructing first fish flume at Little Goose. *Waitsburg (WA) Times*, 31 August 1989. [8]

Corps of Engineers park system ready for summer. *Pendleton East Oregonian*, 16 June 2000. [11]

Corps of Engineers stops reservoir drawdown test. *Boise Idaho Statesman*, 16 March 1991. [8]

Corps of Engineers Time, Attendance and Labor (CETAL) system. *Intercom*, December 1989, p. 16. [3]

Corps of Engineers to hold meeting on Dworshak levels. *Lewiston Morning Tribune*, 21 February 1990. [8] [11]

Corps offers to boost salmon-saving river draw. *Tri-City Herald*, 4 April 1991, p. D1. [8]

Corps officer says '93 drawdown still possible. *Spokane Spokesman-Review*, 15 May 1992. [8]

Corps opposes breaching Snake River dams. *Environmental News Service*, 21 February 2000. [4] [8]

Corps' plan on Hanford misses mark. *Walla Walla Union-Bulletin*, 27 March 1994. Editorial. [9]

Corps proposes a reorganization. *Engineering News Record*, 30 November, 1992. [2]

Corps proposes blanket permit for habitat work. *Bend (OR) Columbia Basin Bulletin*, 21 April 2000. [9]

Corps releases final drawdown report. *Intercom*, March 1994, p. 10, 16. [8] [11]

Corps repairs Lyon Ferry Hatchery supply pipeline. *Portland (OR) Daily Shipping News*, 9 August 1991. [5] [8]

Corps seeks input for recreational improvement. *Lewiston Morning Tribune*, 22 August 2000. [11]

Corps shows sense on John Day: Dare we hope for more? *Tri-City Herald*, 25 February 2000. [8]

Corps streamlining process for buying wildlife habitat. *Spokane Spokesman-Review*, 16 March 1991. [2] [8]

Corps tests ice jam flood barrier. *Intercom*, November 1991, p. 6. [5] [6]

Corps to issue rules on wetlands. *Walla Wall Union-Bulletin*, 3 March 2000. [8] [9]

Corps to tackle Hanford clean-up: Environmental restoration expands NPW's mission. *Intercom*, August 1990, p. 8-9. [7] [12]

Corps to study levee habitat damage in separate report. *Jackson Hole (WY) News*, 11 April 1990. [7]

Corps undertaking year-long study of recreation services. *Orofino (ID) Clearwater Tribune*, 3 November 1999. [11]

Corps unveils new fish handling facility. *Tri-City Herald,* 20 April 1990. [8]

Corps unveils results of drawdown. *Tri-City Herald,* 13 May 1992. [8]

Corps will lace carrots with poison to kill pesky marmots. *Boise Idaho Statesman*, 31 May 1992. [6] [12]

Council adopts flood plan. *Waitsburg (WA) Times*, 27 July 2000, p. 1. [6]

Counsel retires after 16 years at helm. *Intercom*, September 1989, p. 9. [2]

County, Army Corps closer to levee improvement plan. *Jackson Hole (WY) Guide*, 6 April 1994, p. A6. [6]

County may close river road. *Colfax (WA) Gazette*, 26 March 1992.

Court favors states' water rights. *Boise Idaho Statesman*, 1 June 1994. [4] [8] [12]

Coyle, Kevin. Don't over-engineer nation's rivers. Guest column. *Portland Oregonian*, 15 May 1990. [4] [8] [9]

Craig opposes Granite drawdown. *Boise Idaho Statesman*, 18 August 1995, p. 3C. [8]

Craig says water for salmon will be from willing sellers. *Lewiston Morning Tribune*, 23 March 1994. [8]

Craig speaks out on resource issues. *Orofino (ID) Clearwater Tribune*, 17 March 1994. [8] [12]

Crapo, Senator Mike. Crapo criticizes NMFS decision to take water. Guest editorial. *Salmon (ID) Recorder-Herald*, 24 February 1994, p. 5. [8] [12]

Credit cards to be issued for official travel. *Intercom*, 4 November 1983. [2]

Criddle, Kathy, Jack Pickard and Dennis Kreid. Reach valued for recreation. *Tri-City Herald,* 8 March 1994, p. A6. [11]

Crystal Spring's delay brings lawsuit. *Twin Falls (ID) Times-News*, 3 March 1981. [8]

Crystal Springs Hatchery sale final. *Twin Falls (ID) Times-News*, 19 March 1981. [8]

Cullier, David. The Columbia River 1792-1992. *Vancouver (WA) Columbian*, 8 June 1992, p. A1, A3. [4]

Cultural resources: Drawdown presents opportunity, challenges to District archeologist. *Intercom*, May 1992, p. 13, 16. [8] [10]

Culverwell, Wendy. Growers building insurance on Snake River. *Tri-City Herald*, 11 February 2000. [4]

Curtis, Lt. Col. Donald R., Jr. Commander's Corner. *Intercom*, February 1997, p. 2. [4]

____. Commander's Corner. *Intercom*, September 1997, p. 2. [2] [4]

____. First quarter starts out busy; Requirement to contract out flattens workload. Commander's Corner. *Intercom*, November 1996, p. 2. [2] [6]

Curtis, Jeff. Hatfield's salmon arguments lack key facts. Editorial. *Portland Oregonian*, 19 June 2000.

Cushman, David W. When worlds collide: Indians, archeologists and the preservation of traditional cultural properties. *Cultural Resources Management*, no. 16, special Issue, 1993, p. 49-54. [10]

Customer care provided to Mother Nature. *Intercom*, 6 June 1986, p. 4. [8]

Dam breaching decision could hinge on regional sentiment. *Lewiston Morning Tribune*, 24 March 2000. [4] [8] [12]

Dam drawdowns could cost irrigators millions. *Seattle Daily Journal of Commerce*, 7 August 1991. [8]

Dam safety program. *Intercom*, December 1989. [6]

Dams release water in effort to save salmon. *Grant County (WA) Journal*, 4 May 1992. [8]

Dams removal: What's the hurry? Editorial. *Portland Oregonian*, 4 February 2000. [7 [12]

The Dark side of dam breaching. *Portland Oregonian*, 4 April 2000. [4] [8]

Davies, John. Army Corps vows to keep Columbia, Snake Rivers at barge-navigable levels. *New York Journal of Commerce*, Pacific edition, 29 May 1992. [4] [8]

Davis, Don. Fallen river pilings aside, the jury is still out on drawdown. *Walla Walla Union-Bulletin*, 1 April 1992. [8]

____. Mill Creek Lake filled to the gills in trout. *Walla Walla Union-Bulletin*, 13 March 1991. [11]

Davis, Hester A. NHPA and the practice of archeology. *Cultural Resources Management*, no. 6, 1966, p. 42-44. [10]

Day in the life of a park ranger, A. *Intercom,* August 1988, p. 8-10. [11]

Dedication: District completes new fish hatchery. *Intercom*, 5 August 1985, p. 1, 3. [8]

Defenders of dams map a new strategy. *Lewiston Morning Tribune*, 18 February 2000. [8] [12]

Degerman, Eric. A Room with a view. *Tri-City Herald*, 5 May 2001. [8]

Delay of August drawdown could mean disaster: Lucky Peak boaters disgruntled. *Intercom*, 28 August 1986, p. 6. [8] [11]

Derailed train closes McNary powerhouse. *Information Bulletin*, 13 April 1988, p. 1. [4]

DeSilver, Drew. Panel likes plan for Mid-Snake. *Twin Falls (ID) Times-News*, 19 February 1994. [4] [12]

____. State plan for Middle Snake River sailing smoothly so far in Boise. *Twin Falls (ID) Times-News*, 1 January 1994. [4] [12]

Despondent man drives off dam. *Pendleton East Oregonian*, 22 September 1994. [11]

Dewell, Thomas. The Troubled waters of the Snake River. *Jackson Hole News*, October 19, 1994, p. 1, 7. [4] [8] [12]

Dietrich, Bill. Hanford mop-up: Complex, costly. *Seattle Times*, 1 June 1992. [9]

Disability rights movement: A Brief history, The. *U.S. Society and Values*, January 1999, p. 11-12. [2]

Disibio, Ralph R. World will have eyes on Hanford. *Tri-City Herald*, 16 March 1991, p. D2-D4. [9]

Disposing of solid wastes. *Intercom*, winter 1992, p. 11. [11]

District assists county in preventing flood damage. *Intercom,* 6 June 1984, p. 1. [6]

District begins Walla Walla River watershed study. *Intercom*, September 1996, p. 4. [9]

District captures national award. *Intercom*, 19 February 1987. [4] [5]

District clarifies report on dam removal (Harza report). *Intercom*, November 1996, p. 3, 8. [4] [8]

District combats lock problems. *Intercom*, December 1988, p. 6-7. [4]

District Commander denies proposed race course at Columbia Park. *Intercom*, September 1989, p. 6. [11] [12]

District continues MCB test program. *Intercom*, June 1986, p. 16. [2]

District designs runway lighting. *Intercom*, 21 November 1986. [4]

District employees revolutionize borehole filming process. *Intercom*, 8 October 1987. [4]

District expertise extends to Colorado. *Intercom*, 29 April 1986, p. 7. [4] [8]

District focus on TQM increases. *Intercom,* winter 1995-96, p. 17. [2]

District gears up for fish transport. *Intercom*, March 1994. [8]

District hosts public at local fair. *Intercom*, 24 October 1986. [2] [12]

District offices plan massive cleanup. *Intercom*, 29 April 1986. [2] [3]

District on the move with continuous quality improvement. *Intercom,* fall 1995, p. 4. [2]

District opens Bunker Hill office. *Intercom*, fall 1995, p. 8-9. [9]

District overcomes lock crisis. *Intercom*, December 1989, p. 10-11. [4]

District prepares for major emergency with radio training. *Intercom*, fall 1995, p. 6. [6]

District receives Jobs Bill funds. *Information Bulletin,* 25 May 1983, p. 3. [2]

District receives national honors for interpretive program. *Intercom*, February 1997, p. 8. [3] [11]

District recommends projects for Walla Walla River Basin. *Intercom*, November 1997, p. 8. [3]

District relocation downtown considered. *Information Bulletin,* 27 July 1988, p. 1. [2]

District responds to New Year's flooding in the region. *Intercom*, February 1997, p. 1, 4. [6]

District safety is slack. *Intercom*, 23 July 1982. [4]

District selected for profit sharing test. *Intercom*, June 1986, p. 6. [2]

District served as melting pot for innovation. *Intercom*, October 1988, p. 10, 18. [2] [5]

District studies contracting of warehousing. *Intercom*, 8 August 1983, p. 1. [2] [4]

District to lose 3,000 acres of land. *Intercom*, 23 July 1982. [11]

District unveils strategic focus plan. *Intercom*, December 1992, p. 4. [2]

District volunteers aid hurricane recovery. *Information Bulletin,* December 1992, p. 12. [6]

District was key player in North Pacific development. *Intercom*, 30 December 1987, p. 4-6. [2] [4] [12]

Divers can't find plane in reservoir. *Walla Walla Union-Bulletin*, 27 March 1992, p. 6. [8]

Dobyns, Becki. Chief of Engineers presents new vision, strategy. *Intercom*, February 1997, p. 3, 5. [2] [12]

DoD declares war on waste with hotline. *Intercom*, 15 August 1981. [2]

DoD names Seiner member of planning committee. *Intercom*, March 1994, p. 5. [3]

DOE, Army Corps fined for dumping hazardous materials. *Walla Walla Union-Bulletin*, 11 March 1994, p. 10. [9]

Donovan, Peter. The Colville Tribe Blazes the Trail. Enterprise, OR: Managing Wholes, 2000. INTERNET: www.managingwholes.com/cct6.htm. [12]

Down on the levee with rodents and colonels. Editorial. *Lewiston Morning Tribune*, 31 May 1992. [6]

Downer, Alan S., and Alexandra Roberts. Traditional cultural properties, cultural resources management and environmental planning. *Cultural Resources Management*, no. 16, special Issue, 1993, p. 12-14. [10]

Drawdown '92. Special Issue. *Intercom*, May 1991, p. 1-16. [8]

Drawdown facts and fantasies. *Orofino (ID) Clearwater Tribune,* March 1994. [8]

Drawdowns deemed cheapest. *Boise Idaho Statesman*, 25 June 1992. [8]

Drawdowns rile residents, hike power rates. *Boise Idaho Statesman*, 19 July 1994. [8] [12]

Drawdowns theory doesn't hold water. Paid advertisement. *Lewiston Morning Tribune*, 1 March 1994. [4] [8]

Drowning, near drowning near Levey Park. *Intercom*, 31 August 1988, p. 1. [11]

Drumheller, Susan. Cougar Bay plans stir opposition. *Spokane Spokesman-Review*, 10 August 1992, p. A7-A8. [9]

Drummond, Marshall E. Working group considers future uses for Hanford. *Pendleton East Oregonian*, 7 September 1992. [9]

Duncan, Andy. Fishing for answers. *Oregon's Agricultural Progress*, spring/summer 1998. INTERNET: eesc.orst.edu/agcomwebfile/magazine/98Spring/text/OAPSpr9804.html. [8]

Durbin, Kathie. Seven projects to aid fish hooked on red tape. *Clark County (WA) Columbian*, 29 May 2000. [8]

____. Thomas: It's too late for some salmon, face it, say ex-Forest Service Chief, and let some Columbia runs go. *Clark County (WA) Columbian*, 18 March 2000. [8]

Durbin, Kathie, and Don Hamilton. Dam spills reduced to protect fish runs. *Portland Oregonian*, 29 May 1994. [8]

Durkin, Padraic. Riverside residents oppose dam. *Idaho Falls Post-Register*, 18 April 1991, p. B1-2. [4]

Dworshak cracks. *Lewiston Morning Tribune*, 23 December 1980. [4]

Dworshak crew finds innovative way to chill out. *Intercom*, September 1993, p. 4. [11]

Dworshak eagles noted. *Pendleton East Oregonian*, 11 January 1981. [8]

Dworshak from a chopper, the only way to fly. *Intercom*, April 1982, p. 3. [4] [6] [8]

Dworshak mechanic saves accident victim. *Intercom*, September 1997. [6] [11]

Dworshak project awaits. *Intercom*, 1 December 1981, p. 4-5. [4]

Dworshak staff thankful summer of '93 is over. *Intercom*, December 1993, p. 8. [11]

Dworshak water is staying put—for now anyway. *Lewiston Morning Tribune*, 7 July 2000. [8] [11]

Early, Christopher. Army Depot cleanup to begin in September. *Hermiston (OR) Herald*, 8 March 1994, p. 2A. [9]

____. Corps: Drawdown would be costly. *Hermiston (OR) Herald*, 19 April 1994, p. 3A. [8]

____. McNary Center opens amidst protest. *Hermiston (OR) Herald*, 6 September 1994, p. 3A. [8] [12]

Earthquake rocks Idaho. *Tri-City Herald*, 8 June 1994. [6]

Ecologists target fisheries agency. *Kent (WA) Valley Daily News*, 6 May 1992. [8]

Ecologists want new faces on power panel. *Tri-City Herald*, 1 December 1992. [4] [8]

Ecology extends ban on new water rights. *Tri-City Herald*, 3 December 1992. [8]

Economic predictions clouded by uncertainty. *Pendleton East Oregonian*, 3 July 2000, p. 5A. [4] [8] [11]

E-Day celebrated with run, picnic, games, awards. *Intercom*, August 1989, p. 14-15. [2] [9]

Edelman, Lester. Pride in public service. Washington, DC: USACE, Office of the Chief Counsel, [n.d.]. INTERNET: www.hq.usace.army.mil/CECC/pubs/PRIDE.PDF. [2] [12]

Education programs span District. *Intercom*, 24 November 1982, p. 2. [2] [12]

EEO Office. *Intercom*, 30 December 1987. [2]

EEO program thrives on diversity, change. *Intercom*, September 1994, p. 12-13. [2]

Egan, Dan. Conservationists continue to lambaste NMFS ruling. *Ketchum Idaho Mountain Express*, 17 June 1992. [8]

____. NMFS will get the last word on which salmon plan is used. *Idaho Falls Post-Register*, 8 November 1994. [8] [12]

____. Snake River salmon might get their day in court. *Ketchum Idaho Mountain Express*, 13 May 1992. [8]

Elmenhurst, Joan. Corps plays role in hurricane cleanup. *Walla Walla Union-Bulletin*, 26 November 1992. [6]

____. Geese go home to Little Goose. *Walla Walla Union-Bulletin*, 26 June 1992. [8]

Emergency plan sought for salmon. *Walla Walla Union-Bulletin*, 10 May 1994. [8]

Emerson, Paul. Mighty river nourishes a wildlife menagerie. Commentary. *Lewiston Morning Tribune*, 29 November 1994. [8]

Employee Assistance Program. *Information Bulletin,* 30 December 1987. [2]

Encore gets high marks from social critic. *Intercom*, 20 August 1982, p. 2. [2] [3]

Energy crisis could hit the Northwest. *Associated Press*, 2 October 2000. [4] [8]

Energy: District and GSA work to conserve energy resources. *Intercom,* 23 October 1985, p. 4. [2] [9]

Eng, James L. Scientists issue cautious report to save salmon. *Spokane Spokesman-Review*, 15 June 1994. [8]

Engineer comes to defense of Willow Creek construction. *Information Bulletin*, 28 September 1988, p. 1. [5]

Engineer-outdoorsman retires to City of Lewiston to direct its public works dept. *Intercom*, June 1989, p. 6-7. [2]

Engineer remembers early challenges. *Intercom*, October 1988, p. 9, 19. [2] [4]

Engineer Wives Club plans lunch. *Intercom*, 1 February 1981. [2]

Engineering. *Intercom*, winter 1995-96, p. 9. [4] [8] [9]

Engineering a path to the future. *Intercom*, December 1989. [5]

Engineering chief picked for SES slot at MRD. *Intercom*, fall 1995, p. 5, 12. [2] [5]

Engineering Division. *Intercom*, 30 December 1987, p. 9. [2]

Engineering principles, designs tested. *Intercom*, May 1992, p. 6. [8]

Engineers now hold interest in Bear Lake. *Montpelier (ID) News Examiner*, 28 March 1991. [9]

Engineers tour Johnston Island disposal system. *Intercom*, 30 December 1987, p. 1. [4]

Engineers want marmots to leave the levees. *Boise Idaho Statesman*, 30 August 1992. [6]

Englert, Stuart. Cut off: Irrigators forced to tap into water reserves. *Idaho Falls Post-Register*, 4 June 1994. [4]

____. Irrigators question moratorium. *Idaho Falls Post-Register*, 31 May 1992. [4]

____. New Sweden farmers vow to conserve. *Idaho Falls Post-Register*, 15 May 1992. [4]

The Environment: Hanford Reservation. *Intercom*, winter 1992, p. 8. [9]

Environmental Protection Agency. National Pollutant Discharge Elimination System. Washington, DC: The Agency, 2003. INTERNET: http://cfpub2.epa.gov/npdes. [9]

Environmental Protection Agency, Region 10. Bunker Hill Mining and Metallurgical Superfund Site (Coeur d'Alene Basin). [Seattle]: Environmental Protection Agency, 6 July 2001. INTERNET: http://yosemite.epa.gov/r10/cleanup.nsf/sites/bh. [9]

Environmental resources policy assistant. *Intercom*, 30 December 1997. [9]

Environmentalists blast drawdown. *Lewiston Morning Tribune*, 18 May 1994. [8]

Environmentalists seek protection for creek. *Idaho Falls Post-Register*, 31 January 1994, p. A9. [9]

EPA defies Congress, issues new water rules. *Walla Walla Union-Bulletin*, 12 July 2000, p. 1. [8]

Eskil, Rick. Corps decision stalls despite Foley's efforts. *Walla Walla Union-Bulletin*, 28 January 1989. [2] [12]

Espenson, Barry. Adult fish ladder proposals considered. *Bend (OR) Columbia Basin Bulletin*, 16 June 2000. [8]

____. Coalition urges use of fish "surplus" for outplanting. *Bend (OR) Columbia Basin Bulletin*, 16 June 2000. [8]

____. Cool Dworshak Reservoir waters unleashed. *Bend (OR) Columbia Basin Bulletin*, 14 July 2000. [8] [11]

____. Hatchery policy makers seek direction from science. *Bend (OR) Columbia Basin Bulletin*, 20 June 2000. [8]

____. Jury out on wild spring Chinook returns in 2000. *Bend (OR) Columbia Basin Bulletin*, 16 June 2000. [8]

____. Managers ponder 2001 fish passage project list. *Bend (OR) Columbia Basin Bulletin*, 21 April 2000. [8]

____. Power Council gets proposals for new fish program. *Bend (OR) Columbia Basin Bulletin*, 19 May 2000. [8]

____. Regional experts look at supplementation science. *Bend (OR) Columbia Basin Bulletin*, 23 June 2000. [8]

____. Report details potential mainstem habitat restoration. *Bend (OR) Columbia Basin Bulletin*, 20 June 2000. [6] [7]

____. States challenge NMFS harvest allocation process. *Bend (OR) Columbia Basin Bulletin*, 20 June 2000. [8]

____. Upriver spring Chinook run climbs to 198,826 fish. *Bend (OR) Columbia Basin Bulletin*, 2 June 2000. [8]

Etlinger, Charles. Drawdowns rile residents, hike power rates. *Boise Idaho Statesman*, 19 July 1994, p. 7A. [4] [8]

____. Folks in Salmon miss the salmon. *Boise Idaho Statesman*, 19 July 1994, p. 7A. [8] [12]

____. Hydropower fuels debate over salmon. *Boise Idaho Statesman*, 26 June 1994, p. 9A. [4] [8]

____. Idaho Power warns of rate hike. *Boise Idaho Statesman*, 1 November 1994, p. 1B, 4B. [4] [8]

____. Idaho's salmon once ran so thick "you could walk across their backs." *Boise Idaho Statesman*, 26 June 1994, p. 8A. [8]

____. Politics taint Idaho salmon's recovery. *Boise Idaho Statesman*, 8 August 1994, p. 1A. [8] [12]

____. Salmon. *Boise Idaho Statesman*, 26 June 1994, p. 1A. [8]

____. Salmon River home to history, but few fish. *Boise Idaho Statesman*, 16 September 1994. [8]

____. Salmon-saving plans draw Flak. *Boise Idaho Statesman*, 17 May 1994. [8] [12]

____. Some tout barging to save fish, but others say it's killing them. *Boise Idaho Statesman*, 4 August 1994, p. 6A. [8]

____. Weekend weather keeps Lucky Peak traffic to a minimum. *Boise Idaho Statesman*, 29 May 2000. [11]

Expanding regulatory functions. *Intercom*, winter 1992, p. 10. [9]

Explosion destroys part of marina, 15 boats. *Tri-City Herald*, 17 December 1992. [11]

F and A to move. *Intercom*, 1 December 1981, p. 1. [2]

Fable conveys EEO management message. *Intercom*, 11 November 1994, p. 12-13. [2]

Farmers worried project permit will deny them irrigation water. *Pocatello Idaho State Journal*, 7 September 1994. [9]

Farquhar, Brodie. Fire burns island in Snake River. *Walla Walla Union-Bulletin*, 22 May 2000. [10] [11]

____. Old Army site razed for industrial park. *Walla Walla Union-Bulletin*, 17 April 2000. [2]

____. Port may turn $1 purchase into $1 million in dredging. *Walla Walla Union-Bulletin*, 24 Mar 2000. [4]

____. Rainfall triples runoff. *Walla Walla Union-Bulletin*, 11 February 2000. [6]

____. Remembering when: Area experts discuss ways to control flooding, damage. *Walla Walla Union-Bulletin*, 9 February 2000. [6]

____. Trout to get a lift past old WW River dam site. *Walla Walla Union-Bulletin*, 29 May 2000, p. 7. [8]

____. Salmon saga has been a $3 billion journey and it continues. *Walla Walla Union-Bulletin*, 3 June 2000. [8]

Federal Energy Regulatory Commission (FERC) permit and license review. *Intercom*, December 1989. [4] [8]

Federal goal: Eliminate pollution at its source. *Intercom,* March 1994, p. 6. [2] [9]

Federal Government may pay for demolition of Corps buildings. *Walla Walla Union-Bulletin*, 27 May 1994. [2] [12]

Federal guidance for the establishment, use and operation of mitigation banks. *Federal Register*, 28 November 1985. [9]

Federal land transfer: Find interim option. *Tri-City Herald*, 28 January 2000. [10] [11]

Federal Women's Program Committee sets training schedule. *Intercom*, 1 July 1981. [2]

Federman, Mike. Columbia River treaty tribes challenge fish harvest lawsuit. *Pendleton East Oregonian*, 18 July 1990, p. 3A. [8] [12]

____. Event celebrates salmon success. *Pendleton East Oregonian*, 18 May 1990, p. 1. [8]

____. Northwest tribes say breaching key piece of puzzle. *Pendleton East Oregonian*, 20 July 2000, p. 5A. [8] [12]

____. Tribes join university in effort to save salmon. *Pendleton East Oregonian*, 21 July 2000, p. 3A. [8]

Feds urged to do more to save fish. *Lewiston Morning Tribune*, 23 May 1992. [8]

Fees for Golden Age Passports begin Jan. 1. *Intercom*, December 1993, p. 9. [11]

Fenton, Jonnie. Corps assesses cost, benefits of drawdown. *Hermiston (OR) Herald*, 19 May 1992. [8]

____. Corps estimates $77 million to help reduce impact of restoring fish runs. *Hermiston (OR) Herald*, 15 December 1992. [8]

____. Corps looks for ways to ease fish passage. *Hermiston (OR) Herald*, 22 September 1992, p. 6. [5] [8]

____. Fish hatchery dedicated. *Hermiston (OR) Herald*, 12 May 1992. [8]

____. Ida-West "pleased" to join group of BPA candidates. *Hermiston (OR) Herald*, 22 December 1992. [4]

____. Port hopes to reduce losses with new lease for marina. *Hermiston (OR) Herald*, 27 October 1992. [11]

____. Young fish travel Columbia River by barge. *Hermiston (OR) Herald*, 26 March 1992. [8]

Few returning fish naturally produced: Fishing season possible for hatchery Chinook. *Spokane Spokesman-Review*, 16 April 2000. [8]

Fighting words: Lewis, Clark wintered in Washington. *Walla Walla Union-Bulletin*, 23 March 2000. [11]

Final "Tulloch" regulation to strengthen wetlands protection. *Water Log: A Legal Reporter of the Mississippi-Alabama Sea Grant Consortium*, 1 November 2001, p. 9. [9]

Financial studies continue. *Intercom*, 1 February 1982, p. 1. [2]

First Dworshak manager retires. *Intercom*, September 1993, p. 11. [4]

The first fifty years, Walla Walla District 1948-1998. *Intercom,* Special Edition, November 1998, p. 1-16. [4]

First inhabitants: Plateau neighbors. Vancouver, WA: Center for Columbia River History, 1999. INTERNET: www.ccrh.org/comm./moses/inhab2.html. [9]

First woman to head Engineering. *Intercom*, September 1992, p. 9. [2]

Fish and Game and tribal leaders agree to negotiate [sic]. *Orofino (ID) Clearwater Tribune,* 24 November 1994. [8] [12]

Fish and wildlife compensation: Corps work of the '80s. *Intercom*, 15 September 1981, p. 2. [8] [9]

Fish arrive en masse for river trip. *Walla Walla Union-Bulletin*, 24 April 1992. [8]

Fish barge makes man part of migratory cycle. *Intercom*, 10 May 1982, p. 3. [8]

Fish bypass improvements planned. *Seattle Daily Journal of Commerce*, 11 September 1999. [8]

Fish Council requests changes to Operation Fish Run. *Intercom*, 2 May 1983, p. 1, 4-5. [8]

Fish hatcheries under scrutiny as a threat to strong wild runs. *Seattle Post-Intelligencer*, 27 March 2000. [8]

Fish hatchery ceremony set April 16 in Irrigon. *Pendleton East Oregonian*, 30 March 1990. [8]

Fish hauling, it's not a nine to five job. *Intercom*, June 1988, p. 8-10. [8]

Fish ladder design: District expertise extends to Colorado. *Intercom*, 29 April 1986, p. 7. [8]

Fish lady has counted 11 years. *Intercom*, 1 September 1981, p. 2. [8]

Fish money misspent, environmentalists say. *Tri-City Herald*, 15 February 1994, p. A9. [8]

Fish run inspires thoughts of highways and byways. *Intercom*, 1 April 1982, p. 2. [8]

Fish to suffer as Boise River drops. *Twin Falls (ID) Times-News*, 22 October 1992. [8]

Fish transport: Swelling numbers credited to fish barging program. *Intercom*, 9 September 1985, p. 5. [8]

Fisher, Jim. It's time to douse hot tempers in cool February flow. Opinion Section. *Lewiston Morning Tribune*, 30 September 1994. [8] [11] [12]

Flagg, Marianne. Tribe: Steelhead anglers must pay $10 to fish on reservation. *Boise Idaho Statesman*, 5 May 2000, p. 5B. [8] [12]

Floaters take a look at Boise River issues. *Boise Idaho Statesman*, 21 July 2000. [4]

Flood plain pain. *Pocatello Idaho State Journal*, 6 October 1992. [6]

Flood support: District fills holes in Midwest disaster relief effort. *Intercom*, September 1993, p. 4. [6]

Focus on the Walla Walla District: Construction Division. *Information Bulletin*, 12 October 2001. [2]

Focus on the Walla Walla District: Office of Counsel. *Information Bulletin*, September 2000. [2]

Focus on the Walla Walla District: Planning Branch. *Information Bulletin*, September 2000. [2] [4] [5] [8] [12]

Forecast is grim for most fall Columbia River runs. *Lewiston Tribune*, 2 April 1992. [8]

Forecaster leaves weather behind him. *Intercom*, April 1988, p. 4. [4] [6]

Foreman lauds safety-conscious workers. *Intercom*, September 1994, p. 14. [4]

Ford, Pat. Pretending to save wild salmon. Opinion. *Seattle Post-Intelligencer*, 18 January 2002.

Forest fire fought on Dworshak Reservoir lands. *Intercom*, 1 August 1984, p. 3. [11]

Former District member Ed Groff named president of ASCE. *Intercom*, February 1997. [5]

Forrester, J. W. As has always been the case, Oregon's future depends on water. Comment. *Pendleton East Oregonian*, 7 May 1994, p. 10A. [8]

Foster, J. Todd. Lead cleanup may need an overhaul. *Spokane Spokesman-Review*, 12 April 1994, p. A4. [9]

____. Tribe: Superfund plan lacking. *Spokane Spokesman-Review*, 2 October 1992. [9]

Free, Cathy. Plan to kill marmots upsets many. *Spokane Spokesman-Review*, 14 June 1992. [6] [12]

Frommer, Frederic J. Snake River dams on "most wasteful" list. *Associated Press*, 10 March 2000. [4]

Funding backed for salmon runs. *Spokane Spokesman-Review*, 3 June 1994. [8] [12]

FWP evolves into the Special Emphasis Program. *Intercom,* winter 1995-96, p. 17. [2]

FWP recommends computer. *Intercom*, 15 March 1982, p. 1, 4. [2]

Gallagher, Dan. Hatching a new plan. *Spokane Spokesman-Review*, 16 February 1992. [8]

____. Idaho Water Users Association: Governor says water pivotal to Idaho economy. *Boise Idaho Statesman*, 21 January 2000. [4]

____. Low steelhead numbers could preclude fishing. *Twin Falls (ID) Times-News*, 12 May 1994. [8]

____. Marking the path of Lewis and Clark. *Lewiston Morning Tribune*, 26 February 2000. [11]

____. Return of the salmon runs: Pipe dream or possibility. *Lewiston Morning Tribune*, 15 April 1989. [8]

Galloway Dam and Reservoir, Weiser River, Idaho. *Intercom*, December 1989. [5] [6]

Galloway Dam on Weiser draws support. *Boise Idaho Statesman*, 21 January 1992, p. 1C-2C. [5] [6]

Garber, Andrew. Boise River level soon will plunge. *Boise Idaho Statesman*, 21 October 1992. [8]

____. Boise River pollution exceeds standards. *Boise Idaho Statesman*, 12 January 1994, p. 3C. [4] [8] [12]

____. LaRocco proposes changes in Endangered Species Act. *Boise Idaho Statesman*, 12 January 1994, p. 3C. [8]

Gee whiz!!! *Intercom*, 30 December 1987. [4] [5]

George, Jerry. Fruit growers may get disaster funds. *Salem (OR) Capital Press*, 28 February 1992. [4] [8]

Geranios, Nicholas K. Abuse takes its toll on the mighty Columbia. *Lewiston Morning Tribune*, 6 September 1992. [4] [8]

____. Any change will strain river users, report says. *Walla Walla Union-Bulletin*, 1 September 1992. [4] [12]

____. Corps wants rivers at minimum levels. *Lewiston Tribune*, 22 October 1992. [4] [8] [12]

____. People shape Columbia since 1792. *Tri-City Herald*, 3 August 1992.

Gettmann, Diane. Fish hatchery ground broken. *Pendleton East Oregonian*, 17 April 1990, p. 1A-2A. [8]

Giant strides made in IMO. *Intercom*, December 1989, p. 19. [3]

GIS: District on leading edge of technology. *Intercom*, November 1991, p. 10. [3]

GIS outlook: Strides made in acquiring new computerized map-making. *Intercom*, 8 February 1988, p. 4. [3]

Glenn becomes chief, procurement and supply. *Intercom*, 25 July 1986, p. 10. [2]

Go-ahead given for new headquarters. *Intercom*, June 1988, p. 4. [2]

Goffredo, Theresa. 100-year old Dorian Dam removed from Walla Walla River. *Tri-City Herald*, 4 April 1997. [8]

Goodstein, Elban, and Karen Sable. Salmon can benefit from simple "eco-efficient" steps. *Portland Oregonian*, 4 February 2000. [8]

Gorton, Hastings ask Corps for land transfers. *Tri-City Herald*, 27 September 2000. [11]

Government: Kennewick Man skeleton belongs to Indian tribes. *Associated Press*, 26 September 2000.

Graham, Bill. Relief workers, victims recall devastation of '93 flood. *Seattle Times*, 14 July 2003. [6]

Grden, Blaise. The Interrelationship of geographic information systems with master plans and operational management plans. Walla Walla, NWW, 11 April 2001. INTERNET: www.nww.usace.army.mil/gis/interrelatonship.htm. [3]

____. The Walla Walla District's holistic approach to geographic information systems (GIS). Walla Walla: NWW, 12 February 2001. INTERNET: www.nww.usace.army.mil/gis/holistic.htm. [3]

Greider, Katherine. Feds still studying water contamination. *Moses Lake (WA) Columbia Basin Herald*, 18 June 1992. [9]

Greiser, Sally Thompson, and T. Weber Grieser. Two views of the world. *Cultural Resources Management*, no. 16, special issue, 1993, p. 9-11. [10]

Griffiths, Richard T. History of electronic mail. In *History of the Internet*. Leiden: University of Leiden, 2001. INTERNET: www.let.leidenuniv.nl/history/ivh/chap3.htm. [3]

Groff returns home to Boise. *Intercom*, September 1989. [2] [4]

Gromov, Gregory R. History of the Internet and WWW. Gromov, 2002. INTERNET: www.netvalley,com/intval.html. [3]

Group tries to make fish studies more useful. *Boise Idaho Statesman*, 28 July 1994. [8]

Groups ask for judicial action on "water spreading." *Bend (OR) Columbia Basin Bulletin*, 19 May 2000. [4] [8] [12]

Groups demand increased water flows. *Lewiston Morning Tribune*, 16 June 1992. [8]

Groups protest salmon barging. *Tri-City Herald*, 3 June 1994. [8]

Grunwald, Michael. The Corps: Agency of unchecked clout. *Washington Post*, 12 September 2000. [2] [4] [12] [12]

____. Engineers of power inside the Army Corps. *Washington Post*, 10 September 2000, p. A16. [4] [8] [12]

____. Shooting pork in the barrel. *Washington Post*, 2 March 2000. [4] [12]

____. Snake River dams: A battle over values. *Washington Post*, 12 September 2000, p. A16. [4] [8] [12]

____. Working to please Hill commanders. *Washington Post*, 11 September 2000, p. A1. [4] [12]

Gruver, Deb. County questions cost of Corp's Snake levee project. *Jackson Hole (WY) News*, 23 September 1992. [6] [9]

GSA places 2nd in nation. *Intercom*, 4 June 1982. [2]

Guinee, Kathleen. A Journey through the history of information technology. Princeton: Princeton University, 1995. INTERNET: www.cs.Princeton.edu/~kguinee/Thesis.html. [3]

Hackett, James S. Ancient village unearthed. *Intercom*, 6 August 1987, p. 3. [10]

____. Biological drawdown test proposed. *Intercom*, June 1993, p. 5. [8]

____. Endangered fish: Salmon issue engulfs Corps planning process. *Intercom*, August 1991, p. 4-5, 20. [8] [12]

____. Engineering chief picked for SES slot at MRD. *Intercom*, fall 1995, p. 5, 12. [2] [5]

____. Engineering Division chief retires. *Intercom*, September 1992, p. 8-9. [3] [4] [5]

____. Environmental specialist receives award. *Intercom*, March 1993, p. 5. [9]

____. Planning Chief retires. *Intercom*, August 1991. [2] [6] [8]

____. Reorganization. *Intercom*, December 1992. [2] [12]

____. Salmon recovery: Supplemental Environmental Impact Statement addresses water management issues for 1993 and beyond. *Intercom*, December 1992, p. 7. [8] [12]

Haddick, Lt. Col. John. What is an IMA? *Information Bulletin,* 14 April 1987. [6]

Hagberg, Richard, and Julie Heifetz. Corporate culture / organizational culture: Understanding and assessment. Foster City, Calif.: Hagberg Consulting Group, 2000. INTERNET: www.hcgnet.com/html/articles/understanding-Culture.html. [2] [12]

Hagey, Jason. Hermiston man found guilty of disturbing Indian artifacts. *Tri-City Herald*, 18 May 2000. [10]

____. No major damage from Snake River island fire. *Tri-City Herald*, 18 May 2000. [10] [11]

Halter, Mike. Deluge brings debris to Granite. *Intercom*, April 1996, p. 5. [6]

Hammer, C. G. Shelley project continues despite flood dangers. *Idaho Falls Post-Register*, 26 May 1991. [6]

Hanford Reach proposal controversial. *Tri-City Herald*, 10 September 1992. [10]

Hanford Reach to open for salmon. *Tri-City Herald*, 14 August 1994. [8] [11]

Hanford team adjusts to growing mission. *Intercom*, March 1994, p. 7. [9]

Hansen, Dan. Wasteland to treasure: Scientists long have valued Hanford, National Monument status may draw tourists. *Spokane Spokesman-Review*, 12 June 2000. [9] [11]

Hansen, Tony. Idaho salmon season may exceed expectations. *Boise Idaho Statesman*, 9 June 2000. [8]

Harreld, Heather. Web expands boundaries of GIS. *Federal Computer Week*, 5 June 2000.

Harrison, Linda. Email is top cause of workplace stress. *The Register (U.K.)*, 16 May 2001. INTERNET: www.theregister.co.uk/content/6/18983.html. [3]

Hartman, Carrie. Cost of Corps' cleanup $2.8 million. *Walla Walla Union-Bulletin*, 11 March 1992, p. 1-2. [2] [4] [12]

____. Tanks but no tanks. *Walla Walla Union-Bulletin*, 30 January 1992, p. 1-2. [2] [4] [12]

____. Thirty fuel tanks dug up at airport-Corps site. *Walla Walla Union-Bulletin*, 2 April 1992. [2] [12]

Hasenauer, Heike. Corps protects America's wetlands. *Soldiers*, April 1990, p. 13-17. [9]

Hatch, Lt. Gen. H. J. Engineers respect rivers' environment. Guest column. *Portland Oregonian*, 15 May 1990. [4] [8] [9]

Hatchery construction nears completion. *Intercom*, 24 October 1986, p. 1. [8]

Hatchery fish being rescued. *Waitsburg (WA) Times*, 20 June 1991. [8]

Hatfield, Mark O. To breach or not to breach?: That is not the question. *Portland Oregonian*, 4 June 2000. [8] [12]

Hay, Janet. Hansen worked long hours for water transfer legislation. *Idaho Falls Post-Register*, 16 August 1992. [4] [12]

Hayden, Roger. Corps asks review of Canyon design. *Jackson Hole News*, 6 April 1994, p. 19A. [9]

Hayes, Heather B. Working off the Same Map: OMB's I-Team initiative pulls together Federal, state and local mapping efforts. *Federal Computer Week*, 29 October 2001. INTERNET: www.fcw.com. [3]

Harvest dance set for Sept. 23. *Intercom,* 14 September 1989. [2]

Headquarters update. *Intercom,* 24 October 1986, p. 1. [2]

Healy, Melissa. Babbitt dreams of blasting dams to protect rivers. *Idaho Falls Post-Register*, 1 April 1994. [8] [12]

____. States given power to set stream-flow limits. *Spokane Spokesman-Review*, 1 June 1994, p. B4. [8]

Heat kills salmon at McNary. *Hermiston (OR) Herald*, 26 July 1994. [8]

Heathfield, Susan M. Community, gone?: Or just harder to find? *Human Resources*, 2 March 2002. INTERNET: humanresources.about.com/library/weekly/nosearch/naa020302a.htm.

Heiberg speaks out on "customer care." *Intercom*, 29 April 1986, p. 1. [2]

Helix-area wind farm may expand. *Pendleton East Oregonian*, 22 July 2000, p. 1A. [4]

Helms, Douglas. Bringing Federal coordination to snow surveys. Reprint from *Proceedings of the Western Snow Conference, 1991* (p. 119-125). Washington, DC: U.S. National Resources Conservation Service, 2001. INTERNET: www.nhq.usda.gov/RESS/econ/History/FedCoor_SnowSurveys.html. [4] [6] [12]

____. Small watersheds and the USDA: The Legacy of the Flood Control Act of 1936. Reprint from *The Flood Control Challenge* edited by Howard Rosen and Martin Reuss (p. 67-88). Chicago: Public Works Historical Society, 1988. INTERNET: www.nhq.nrcs.usda.gov/RESS/econ/History/SmallWatersheds.html. [6] [12]

Herbicide found OK. *Intercom*, 1 March 1981, p. 1. [8] [11]

Hewitt, Bob. Accidents are plaguing NPS. *Intercom*, 1 December 1981. [2] [4]

____. Of Indian chiefs and limericks. *Intercom*, 1 January 1982, p. 3. [2] [4] [6]

High water temperatures kill fish at McNary Dam. *Intercom*, September 1994, p. 11. [12]

Hixson, Phil. Mud cat extracts Snake River silt. *Intercom*, 24 October 1986. [4]

Ho, Tienlon. Water equals power, extension agent says. *Walla Walla Union-Bulletin*, 16 March 2000. [4] [8]

House approves salmon-related spending bills. *Bend (OR) Columbia Basin Bulletin*, 30 June 2000. [8] [12]

How about an RCC sandwich? *Intercom*, 7 March 1984. [5]

Howe Verhovek, Sam. U.S. gives lift to salmon, but future and benefits are questioned. *New York Times*, 6 May 2000. [8]

Hozeman, Suellen. Whose community is it anyway? *Human Resources*, 2 March 2002. INTERNET: humanresources.about.com/library/weekly/nosearch/naa020302a.htm.

HQ site tested for contaminants. *Intercom*, December 1992, p. 5. [2]

HRD week activities planned. *Information Bulletin*, 3 February 1988, p. 1. [2]

Huegel, Tony. City OKs money for hydro project. *Idaho Falls Post-Register*, 21 August 1991. [4] [8] [12]

____. Middle Fork status arouses controversy. *Idaho Falls Post-Register*, 22 February 1992. [4]

Huffman, Mark. Feds study Flat Creek to judge flood problem. *Jackson Hole News*. 30 September 1992. [6]

Hughes, John. Study questions Army Corps findings on Snake River dams. *Boise Idaho Statesman*, 26 July 2000. [4] [8] [12]

Human medicine used on salmon. *Tri-City Herald*, 2 October 1994. [8]

Human Resources development programs. *Intercom*, April 1983. [2]

Human Resources Week. *Intercom*, 6 June 1984, p. 5. [2]

Hunsberger, Brent. Dams hurt river quality, the EPA says. *Portland Oregonian*, 28 April 2000. [8] [12]

____. Kitzhaber calls for breaching four dams. *Portland Oregonian*, 19 February 2000. [8] [12]

Hurricane staffers awed by damages. *Spokane Spokesman-Review*, 1 December 1992. [6]

Ice Harbor Dam: Cracks in downstream lock lift gate force emergency outages. *Intercom*, September 1994, p. 5. [4]

Ice Harbor Dam reopens, repairs done. *Walla Walla Union-Bulletin*, 30 December 1992. [4]

Ice Harbor employee saves life. *Information Bulletin*, 6 April 1988, p. 1. [4]

Ice Harbor visitor facility opens, water's role told. *Intercom*, 1 May 1981, p. 1. [11]

Ice Harbor lock to be closed until Tuesday. *Tri-City Herald*, 28 July 1994. [4]

Ice jam floods: Engineers look for ways to prevent them. *Intercom,* 31 January 1986, p. 4. [6]

Ice jams: Floodfighters battle winter phenomenon at Little Lost River. *Intercom,* 8 March 1985, p. 1. [5] [6]

Idaho, Department of Fish and Game. Fish and game refutes opposition to spill. News release. Boise: The Department, 19 May 1994. [8]

_____. Idaho Fish and Game Endorses Snake R. Dam Removal. News release. Boise: The Department, 10 June 1998. [8] [12]

Idaho firm gets Corps cleanup contract. *Tri-City Herald,* 27 July 1994. [9]

Idaho plan protects Idaho interests. *Pendleton East Oregonian*, 1 June 1994. [4] [8] [12]

Idaho reservoirs will be dry next year, Peavey says. *Twin Falls (ID) Times-News*, 23 August 1994. [4] [8] [12]

Idaho Rivers United. Salmon FAQs. Boise: Idaho Rivers United, 2001. INTERNET: www.idahorivers.org/salmonfaq.html. [8]

Idahoan hits dam operation: Official says fish kill shows need for change. *Lewiston Morning Tribune*, 27 July 1994. [8]

Ichniowski, Tom. ENR interviews new chief of the Corps of Engineers. *Engineering News Record*, 3 August 2000. [12] [12]

IMO chief hangs up hat, goes off line. *Intercom*, September 1993, p. 11. [3]

Importance of minor earthquake not known. *Walla Walla Union-Bulletin*, 24 September 1992. [6]

Information Management Office. *Intercom*, 30 December 1987, p. 16. [3]

Information Management Office: Holmes selected as Chief. *Intercom*, 21 November 1986, p. 3. [3]

Innovation: Proposal to save thousands of dollars. *Intercom*, 29 March 1985, p. 4. [4]

Intergraph Corp. Intergraph: Computer pioneer. Huntsville, Al.: Intergraph, 29 July 2001. INTERNET: www.Intergraph.com/ingrhistory00s.htm. [3]

Internal review. *Intercom*, 30 December 1987. [2]

Internet Software Consortium. Internet Domain Survey. Redwood City, Cal: The Consortium, 2003. INTERNET: http://www.isc.org/ds/host-count-history.html. [3]

Internet Society. A Brief history of the Internet. Reston, Va.: Internet Society, 18 November 2001. INTERNET: www.isoc.org/internet/history/brief.shtml. [3]

____. A Brief history of the Internet and related networks. Reston, Va.: Internet Society, 18 November 2001. INTERNET: www.isoc.org/internet/history/cerf.shtml. [3]

It really hasn't seemed that long for 39-year employee. *Intercom*, October 1988, p. 17. [2] [3] [4]

Jackson Hole flood protection project, 1135(b) demonstration project. *Intercom*, winter 1992, p. 8. [6] [7] [8]

Jackson Hole selected for wetlands demonstration. *Intercom*, August 1991, p. 6. [9]

Jackson, Tim. Controversial hydro project under way. *Pocatello Idaho State Journal*, 7 September 1994. [9]

____. Environmentalists want hydro project halted. *Pocatello Idaho State Journal*, 13 June 1991. [9]

Jacobs, Jim. LCSC dean says he had no reason to slant poll. *Lewiston Morning Tribune*, 25 January 1994, p. 1A. [4] [8] [12]

____. The Politics of polls. *Lewiston Morning Tribune*, 24 January 1994, p. 1A. [4] [8] [12]

Jarvis, Chris. Harrison: Typologies of organisational culture. Hounslow, England: Business Open Learning Archive, [1999]. INTERNET: //sol.brunel.ac.uk/~jarvis/bola/culture/Harrison.html. [2] [12] [12]

Jim Krussel promoted ADP Chief. *Intercom*, 6 June 1984, p. 4. [3]

Jobs Bill brings skilled workers to District projects. *Information Bulletin,* 15 September 1983, p. 3. [2] [12]

John Cunnington officially retires. *Intercom*, December 1990, p. 7-8. [2]

Johnson, Bruce. River drawdowns have become risky. *Seattle Daily Journal of Commerce*, 5 May 1992. [8]

Johnson, David. Corps conducts duck roundup. *Lewiston Morning Tribune*, 26 March 1994. [8] [12]

Johnson, Huey D. Agriculture's need for water blamed for salmon's demise. *Boise Idaho Statesman*, 20 May 1994. [8]

Johnson, Kenneth W. The Role of culture in achieving organizational integrity and managing conflicts between cultures. Ethical Edge.com, 29 April 2001. INTERNET: www.ethicaledge.com/quest_5.html. [2] [12] [12]

Johnston, Greg. The Lure of shad. *Seattle Post-Intelligencer*, 15 June 2000.

Jump, Norma, and Rick Brown. Ice Harbor helps youthful rail-riders. *Intercom*, 4 November 1983. [11]

Keeping the phones running. *Intercom*, June 1988, p. 7. [3]

Kelley, Beverley. U.S. Army Corps' water plan unveiled in Wash. *Salem (OR) Capital Press*, 17 January 1992.

Kelly, Bill. Value engineering cited. *Intercom*, 1 March 1981, p. 1. [2]

Kennewick Man Virtual Interpretive Center. *Tri-City Herald*, 2001-2004. INTERNET: www.Kennewick-man.com. [10]

Key found in hallway. *Intercom*, 8 March 1985, p. 2. [3]

Kick: Local boaters say the Army Corps of Engineers needs to get organized. *Boise Idaho Statesman*, 9 April 1994. [11]

Killing salmon with Beavis and Butt-head. Editorial. *Pendleton East Oregonian*, 10 June 1994, p. 6A. [8] [12]

Koberstein, Paul. Out of the earth, into our lungs: A century of mining leaves poison and poverty in the Idaho panhandle, *Cascadia Times*, November 2000.
INTERNET: cascadia.times.org/archives/2000/november2000/bunkerhill.htm.

Koreans tour McNary. *Intercom*, 30 June 1982, p. 1. [5]

Knickerbocker, Brad. Salmon protection play with a sharp fin. *Christian Science Monitor*, 22 June 2000. [8]

Knutson, Kate. River links cities, port official says. *Tri-City Herald*, 25 April 1991. [4]

Kramer, Becky. As water goes down, smell goes up at dam. *Walla Walla Union-Bulletin*, 6 March 1992. [8]

____. City leaders question Corps' cutback plans. *Walla Walla Union-Bulletin*, 17 December 1992. [2] [12]

____. Concrete dumping halted. *Walla Walla Union-Bulletin*, 3 March 1992. [2] [12]

____. Corps considers removing dam. *Walla Walla Union-Bulletin*, 11 July 1997, p. 3-4. [8]

____. Corps' Hanford workload grows dramatically. *Walla Walla Union-Bulletin*, 11 February 1994, p. 9. [9]

____. Corps' site cleanup to begin today. *Walla Walla Union-Bulletin*, 21 September 1992. [9]

____. Corps staff may be cut one-third. *Walla Walla Union-Bulletin*, 19 November 1992. [2]

____. Corps study doesn't endorse reservoir funding. *Walla Walla Union-Bulletin*, 3 March 1992. [5]

____. Corps tries to gauge experiment's danger to fish. *Walla Walla Union-Bulletin*, 27 March 1992, p. 7-8. [8]

____. Fish hitch rides with Corps for lease on life. *Walla Walla Union-Bulletin*, 23 September 1990, p. 1-2. [8]

____. Fish hitchhikers snag ride downriver. *Walla Walla Union-Bulletin*, 19 April 1992, p. 1-2. [8]

____. Idaho governor touts state's plan to save salmon. *Walla Walla Union-Bulletin*, 23 May 1994, p. 7. [8]

____. Irrigators ponder dry future: Farmers who depend on water worry about drawdowns. *Walla Walla Union-Bulletin*, 16 January 1992, p. 1-2. [8]

____. Mill Creek Reservoir may get new name. *Walla Walla Union-Bulletin*, 9 August 9 1992. [11] [12]

____. River's restoration may be studied. *Walla Walla Union-Bulletin*, 28 February 1994. [7]

____. Salmon solutions: Snake, Columbia River flows at heart of EIS. *Walla Walla Union-Bulletin*, 30 January 1992. [8]

Kraul, Chris. State's energy users pay price to save salmon. *Los Angeles Times*, 25 September 2000. [4] [8]

L. Granite drawdown set in March. *Pomeroy East Washingtonian*, 15 January 1992. [8]

Laatz, Joan. Chinook deaths magnify debate. *Portland Oregonian*, 21 July 1994. [8]

____. Deaths of baby chinook heat up debate. *Portland Oregonian*, 20 July 1994, p. C1, C8. [8]

____. Debate rages over fish rescue. *Portland Oregonian*, 16 May 1994. [8]

____. Fishermen, others rip barging of salmon. *Portland Oregonian*, 3 June 1994. [8]

____. Man who headed "Bureau of Dams" now changes it. *Portland Oregonian*, 15 April 1994. [4] [8] [12]

____. Oregon officials OK dam spill but criticize request. *Portland Oregonian*, 18 May 1994. [8] [12]

____. Uproar grows as water begins to spill over dams. *Portland Oregonian*, 12 May 1994, p. B1, B3. [4] [8]

Laatz, Joan, and Roberta Ulrich. Spillway plan aims to save salmon. *Portland Oregonian*, 11 May 1994. [8]

Labor trouble slows work on Snake River bridge. *Intercom*, 15 April 1981, p. 1. [4]

LaBounty, Michele. Corps to study levee habitat damage in separate report. *Jackson Hole (WY) News*, 11 April 1990. [8]

____. Corps would rather switch than fight: Army Corps to try and solve environmental problems it created. *Jackson Hole (WY) News*, 13 March 1991. [7] [9]

Lambrecht, Bill. Washington in the news: Army Corps of Engineers. *St. Louis Post Dispatch*, 27 March 2001. [12]

Land acquisition. *Intercom*, winter 1992, p. 13. [8] [9]

Landers, Rich. The Art of compromise. *Spokane Spokesman-Review*, 31 May 1992. [8]

Langlois, Greg. Spatial delivery. *Federal Computer Week*, 26 March 2001. INTERNET: www.fcw.com. [3]

Lanning, Joanna. Pampered geese find new home on Snake River. *Walla Walla Union-Bulletin*, 30 June 1992. [8]

Lanz, Sylvia. The rise and fall of corporate electronic mail. *Ubiquity*, 2001. INTERNET: www.acm.org/ubiquity/views/s_lanz_1.htlml. [3]

Larison, Dennis. Columbia Basin irrigators seek Federal project expansion. *Tri-City Herald*, 19 March 1994. [4]

____. Dams testing fish-saving screens. *Tri-City Herald*, 26 May 1994, p. 1-2. [8]

Latham, Dan. Lower levees goal of Tri-City group. *Tri-City Herald*, 9 March 1991. [6] [11]

Lawmakers: Dredging Columbia crucial. *Spokane Spokesman-Review*, 3 May 1994, p. B5. [4]

Lawsuit filed over fish loss: State Commission seeks $5.5 million. *Pendleton East Oregonian*, 9 February 1994, p. 1A. [8]

Lazaroff, Cat. White house opposes removing Snake River dams. *Environmental News Network*, 20 July 2000. [4] [8]

Learn about birds, rocks and history at McNary speaker series. *Pendleton East Oregonian*, 24 January 2000. [11]

Lee, Antoinette J. Recognizing cultural heritage in the National Historic Preservation Program. *Cultural Resources Management*, no. 16, special issue, 1993, p. 6-8. [10]

Lee, Charles. Booth carries safety message to crowds. *Engineer Update*, September 2001, p. 16. [11]

Lee, Mike. Agencies seek millions more to save salmon. *Tri-City Herald*, 28 July 2000. [12]

____. Cities explore ideas to attract Lewis and Clark tourists. *Tri-City Herald*, 10 February 2000. [11]

____. Cities lost in wake of regulation. *Tri-City Herald*, 19 March 2000. [4] [8] [12]

____. Conditions improving on Walla Walla River. *Tri-City Herald*, 8 March 2000. [9]

____. Corps concerned about flooding if dams breached. *Tri-City Herald*, 22 August 2000. [6] [8]

____. Corps finds new Bonneville turbines safer for fish. *Tri-City Herald*, 10 August 2000. [8]

____. Corps of Engineers to leave terns alone. *Tri-City Herald*, 2 May 2000. [8]

____. Dam supporters strike back: Hearing at Tri-Cities brings anti-breaching crowd out in force. *Tri-City Herald*, 25 February 2000. [4] [8] [12]

____. Dams spill more water to aid fish. *Tri-City Herald*, 15 April 2000. [8]

____. Dry spell conjured up in river system. *Tri-City Herald*, 20 July 2000. [8]

____. Few fish affected in water report. *Tri-City Herald*, 14 January 2000. [8]

____. Ice Harbor lock dried out for repair job. *Tri-City Herald*, 11 March 2000. [4]

____. Irrigators consent to NMFS review. *Tri-City Herald*, 14 July 2000. [4] [8] [12]

____. Lobbyist rides dam fight from start to end. *Tri-City Herald*, 11 February 2000. [8] [12]

____. Official urges reconsideration of “quad-cities” water request. *Tri-City Herald*, 22 March 2000. [8] [12]

____. Plan to move pumps to Columbia goes before U.S. Senate this week. *Tri-City Herald*, 23 May 2000, p. A4. [8]

____. Portland group would cut Tri-City water for fish. *Tri-City Herald*, 25 February 2000. [10]

____. Pullman scientists sort Corps artifacts. *Tri-City Herald*, 27 September 1997. [10]

____. Relocation scheme for terns hits snag. *Tri-City Herald*, 16 March 2000. [8]

____. Tribes, states hook deal over fall fishing. *Tri-City Herald*, 15 July 2000. [8] [12]

____. Walla Walla Corps chief leaving salmon, dams for new post in Alaska. *Tri-City Herald*, 22 June 2000. [2] [8] [10] [11] [12]

____. Year 2000 jitters close 6 dams. *Tri-City Herald*, 7 January 2001. [6]

Lee, Sandra L. Lewiston company to rebuild Lapwai Road. *Lewiston Morning Tribune*, 3 June 2000. [9]

____. Lowry calls spill “right thing to do.” *Lewiston Morning Tribune*, 15 May 1994. [8]

____. National issues and activists swirl around visiting Speaker of the House Tom Foley. *Lewiston Morning Tribune*, 14 February 1994, p. 5A-6A. [12]

Legislators call for hydro moratorium. *Twin Falls (ID) Times-News*, 15 October 1992. [4]

Levee improvements may sink with McNary powerhouse. *Tri-City Herald*, 13 April 1990. [6] [11] [12]

Levees praised. Reprint. *Lewiston Morning Tribune*, 20 May 1981. *Intercom*, 1 July 1981. [11]

Levin, Phillip S., and Michael H. Schiewe. Preserving salmon biodiversity. *American Scientist*, May-June 2001. INTERNET: www.americanscientist.org/articles/01articles/Levin.html. [8]

Lewiston locals, environmentalists blast proposed biological drawdown. *Boise Idaho Statesman*, 18 May 1994. [8] [12]

Lewiston men cited in Hells Gate gun injury. *Lewiston Morning Tribune*, 9 June 1994. [11]

Lindford, Representative Gordon. Water Board wouldn’t make needed changes. Guest commentary. *Idaho Falls Post-Register*, 19 April 1992. [4] [12]

Lindley, Will. Hydro expert plans keyed to growing California market. *Boise Idaho Business*, 18 March 1991, p. 4A, 12B. [4]

Lipman-Blumen, Jean. Connective leadership. *Drucker Magazine* 1, no. 1, spring 1997, p. 12-19, 38. [2] [12] [12]

LMO takes first place in USACE-wide competition. *Intercom*, June 1996, p. 6. [2] [8]

Locke, Governor Gary. Clean, plentiful water is crucial to Washington. *Dayton (WA) Chronicle*, 26 July 2000, p. 2. [4]

Locke won’t join new panel for Columbia dams. *Associated Press*, 10 January 2000. [8]

Loftus, Bill. Andrus says drawdown only answer. *Lewiston Morning Tribune*, 24 April 1994. [8] [12]

____. Barges carry anglers’ hopes. *Lewiston Tribune*, 8 February 1990, p. 3E. [8]

____. Beavers are busy on the levee. *Lewiston Tribune*, 5 September 1992. [6]

____. Bonneville bounty: The Future may be here as anglers find booming shad run hard to resist. *Lewiston Morning Tribune*, 4 June 1992, p. 1C, 5C. [8] [11]

____. Cleanup crews prepare for weekend’s “low tide.” *Lewiston Tribune*, 30 March 1991, p. 1B, 6B. [8]

____. Craig: Drawdowns aren’t enough. *Lewiston Morning Tribune*, 29 March 1991, p. 4A, 7A. [8] [12]

____. Craig: Dump drawdowns. *Lewiston Morning Tribune*, 14 June 1994, p. 1A, 3A. [8] [12]

____. Corps blocks drawdown. *Lewiston Tribune*, 15 March 1991, p. 9A. [4] [8]

____. Corps, BPA get an earful on Dworshak water levels. *Lewiston Morning Tribune*, 21 March 1990. [4] [8] [11]

____. Corps calls for ’96 test drawdown. *Lewiston Tribune*, 24 April 1994, p. 1A. [8]

____. Corps increases Dworshak flow to prevent flood. *Lewiston Morning Tribune*, 17 February 1990, p. 9A. [6] [11]

____. Corps looks at trapping marmots. *Lewiston Tribune*, 29 August 1992. [6] [12]

____. Corps plans massive dam repair project. *Lewiston Morning Tribune*, 29 March 1991, p. 1B, 6B. [4] [5] [8]

____. Corps says consensus needed for drawdown. *Lewiston Morning Tribune*, 22 February 1991, p. 1A, 5A. [4] [8]

____. Corps to poison levee-dwelling marmots. *Lewiston Morning Tribune*, 31 May 1991. [6] [12]

____. Corps, tribe agree to let fish hatchery proceed. *Lewiston Morning Tribune*, 24 March 1990, p. B1. [8] [10]

____. Corps wants review process streamlined. *Lewiston Tribune*, 15 March 1991, p. 7C. [2] [8]

____. Drawdown '94: testing the theory. *Lewiston Morning Tribune*, 20 February 1994. [8]

____. Drawdown plan isn't Andrus' alone, aides say. *Lewiston Morning Tribune*, 21 February 1991, p. 6A, 12A. [8] [12]

____. Drawdowns among council's options. *Lewiston Morning Tribune*, 30 October 1994, p. 7C-8C. [8] [12]

____. Ducks and geese will be available for adoption. *Lewiston Morning Tribune*, 11 March 1994, p. 2. [8] [12]

____. Dworshak drawdown draws fire. *Lewiston Morning Tribune*, 2 June 1994, p. 1C, 8C. [8] [11]

____. F and G hits Chamber ads: Drawdown foes' campaign called misleading. *Lewiston Morning Tribune*, 5 March 1994. [8]

____. Few fish stranded; fears are allayed. *Lewiston Morning Tribune*, 12 March 1992, p. 1E, 3E. [8]

____. First batch of fish rides new flume at Little Goose. *Lewiston Morning Tribune*, 23 March 1990. [8]

____. Fish discovered dead. *Lewiston Morning Tribune*, 13 March 1992. [8]

____. Going with the flow. *Lewiston Tribune*, 29 May 1994. [8]

____. Hatchery to aid restoration of native fish runs. *Lewiston Tribune*, 20 August 1989, p. 5A. [8]

____. Hells Gate State Park. *Lewiston Morning Tribune*, 25 May 1989. [11]

____. Is this the end of Red Wolf Marina? *Lewiston Morning Tribune*, 18 February 1991, p. 1A, 5A. [8] [11]

____. The jury is still out: Will spilling water help the fish or do more harm than good? *Lewiston Morning Tribune*, 13 May 1994, p. 1C, 8C. [8]

____. Key players gather at Lower Granite. *Lewiston Tribune*, 20 March 1992, p. 1C, 8C. [8]

____. Marmot alert: Corps knew of marmot problem since 1990. *Lewiston Morning Tribune*, 18 June 1992. [6] [12]

____. Multimillion-dollar project is about to hatch. *Lewiston Morning Tribune*, 16 January 1992. [5] [8]

____. Nez Perces consider methods of negotiation. *Lewiston Morning Tribune*, 24 August 1994. [8] [12]

____. NMFS team's salmon plan calls for broad approach. *Lewiston Morning Tribune*, 15 January 1994. [8]

____. Orofino chamber: Bring on drawdown. *Lewiston Morning Tribune*, 18 May 1994. [8] [12]

____. Parks imperiled. *Lewiston Morning Tribune*, 1 October 1992. [11]

____. Port-hired biologist questions drawdowns as best solution. *Lewiston Tribune*, 17 April 1992. [8]

____. Power panel gets first-hand look. *Lewiston Morning Tribune*, 17 March 1992. [8]

____. River bills head for a House vote. *Lewiston Morning Tribune*, 29 September 1994. [4] [8] [12]

____. River level rises. *Lewiston Tribune*, 27 March 1992, p. 1A, 7A. [8]

____. A river of change: Clearwater's ebb, flow symbolize struggle with fishery's welfare. *Lewiston Tribune*, 27 September 1992, p. 1A, 7A. [8]

____. Saving young salmon may mean reshaping the Snake. *Lewiston Morning Tribune*, 18 February 1991, p. 1A, 5A. [8]

____. Slackwater returns to Lewiston-Clarkston. *Lewiston Morning Tribune*, 31 March 1992, p. 5A, 11A. [4] [8]

____. Snake yields human skull. *Lewiston Morning Tribune*, 10 March 1992, p. 1A, 3A. [8] [10]

____. Snake's secrets are starting to surface. *Lewiston Tribune*, 4 March 1992, p. 1A, 4A. [8] [10]

____. Southern Idaho folks follow the Snake north. *Lewiston Morning Tribune*, 6 April 1994, p. 3A. [4] [8] [12]

____. Steelhead spill hits the bends. *Lewiston Morning Tribune*, 28 May 1994, p. 1A, 9A. [8]

____. These levees are made for walkin', bikin'. *Lewiston Morning Tribune*, 25 April 1991, p. 1C, 9C. [11]

____. Waterfowl roundup planned. *Lewiston Morning Tribune*, 14 April 1994. [11]

____. We're still not off the hook, says Corps chief. *Lewiston Tribune*, 5 May 1992. [8]

Log causes lock outage. *Intercom*, June 1993, p. 8. [4]

Logistics Management Office. *Intercom*, 30 December 1987. [2]

LoMo stilling basin repairs begin. *Intercom*, August 2001. [6]

Looking back on tragedy. *Intercom*, 30 June 1982, p. 1. [2] [8] [11]

Lookingglass dedicated. *Intercom*, 8 August 1983. [8]

Loomis, Brandon. Effects of levees on habitat are pondered. *Jackson Hole (WY) Guide*, 26 August 1992. [6] [7]

____. Levee is on hold until Corps studies effects. *Jackson Hole (WY) Guide*, 27 May 1992. [6] [8]

____. Levee project jeopardized by dispute about access. *Jackson Hole (WY) Guide*, 11 November 1992. [6] [12]

Lovelin, Bruce. Salmon drawdown unproved, wildly expensive. Guest commentary. *Idaho Falls Post-Register*, 12 May 1994, p. A11. [8] [12]

Lower Granite spillway weir designer wins national award. *Bend (OR) Columbia Basin Bulletin*, 4 April 2003. [5] [8]

Lower reservoirs might help fish, report says. *Portland Oregonian*, 17 August 1994. [8]

Lower Snake River: First easement leased on wildlife mitigation. *Intercom*, 28 August 1986, p. 1. [8]

Lower Snake River Fish and Wildlife Compensation Plan. *Intercom*, 30 December 1987. [8]

Lower Snake River Fish and Wildlife Compensation Plan. *Intercom*, winter 1992, p. 4-5. [8]

Lower Snake River Fish Study examines methods to improve salmon migration. *Intercom*, September 1997, p. 1, 4-5 [8]

Lower Snake River juvenile salmon migration. Series of articles. *Orofino (ID) Clearwater Tribune,* December 1999-January 2000. [4] [8]

Lowering of Snake River reservoirs starts Monday. *Tri-City Herald,* 9 April 1994, p. A7. [8]

LSRRO: Field engineers look forward to the challenge. *Intercom*, 23 October 1984, 1, 6. [8] [11]

Lucky Peak boat-ramp fees cause confusion. *Boise Idaho Statesman*, 7 April 1994. [11]

Lucky Peak master plan. *Intercom*, December 1989, p. 9. [4]

Machine of the year: The Computer moves in. *Time*, 3 January 1983. [3]

MacKay, Wendy E. Diversity in the use of electronic mail. *ACM Transactions on Office Information Systems* 6, no. 4 (October 1989), p. 381-397. [3]

McNamara, Carter. Organizational culture. St. Paul, MN.: Management Assistance Program for Nonprofits, 1999. INTERNET: www.mapnp.org/library/org_thry/culture/culture.htm. [2] [12] [12]

McNary hosts a day focusing on water safety. *Intercom*, September 1996, p. 1, 6. [11]

McNary rigger saves life of Pendleton man. *Intercom*, April 1996. [6]

McNary riggers solve repair problem; build screen transporter. *Intercom*, 22 December 1983. [4] [8]

Magazine speed-up asked. *Intercom*, 15 October 1981, p. 4. [3]

Magic Valley Fish Hatchery completed. *Intercom*, 8 October 1987, p. 1-2. [8]

Magic Valley hatchery dedicated Saturday, April 9. *Intercom*, April 1988, p. 8. [8]

Maierhofer, Lindsay. Workload increases. *Intercom*, 19 February 1987, p. 1, 3. [2] [4] [8]

Major projects tackled during project management's second year. *Intercom*, December 1989, p. 7-8. [2] [8]

Mangat, Annu. Panelists call for cooperation in battle to save NW Salmon. Seattle: Salmon Information Center, 7 September 2000. INTERNET: www.salmoninfo.com/news/cooperation.htm. [8] [12]

The manned lunar outpost (MLO): a NASA/USRA-sponsored study. *Saskawa International Center for Space Architecture Outreach*, 2, no. 4 (October-December 1989). [5]

Mapes, Lynda V. Are we any closer to saving the salmon? *Seattle Times*, 16 March 2000. [8]

____. Farmers and fish. *Seattle Times*, 10 July 2000. [8]

____. Salmon scarce, but blame is plentiful. *Spokane Spokesman-Review*, 16 May 1994. [8]

Mapping GIS milestones. GIS Development, 2000. INTERNET: www.gisdevelopment.net/history. [3]

Margolis, Jon. Making waves over water out West. Reprint from the *Chicago Tribune. Spokane Spokesman-Review*, 15 June 1994. [4] [12]

Marks, Anita. Utilities may sue feds as fish fray heats up. *Portland Business Journal*, 25 May 1992. [4] [8] [12]

Marmot craves hoses. *Intercom*, 15 June 1981, p. 6. [11] [12]

Marshall, Patrick. We look at three GIS packages designed with state and local users in mind. *Federal Computer Week*, 1 January 1998. INTERNET: http://www.fcw.com/civic/articles/1998/CIVIC_010198_8.asp. [3]

Martin, Victor V. Woman power in the Corps. *Intercom*, March 1994, p. 8-9. [2]

Massey, Steve. Pintlar cleanup plan flounders. *Boise Idaho Statesman*, 19 February 1994, p. B2. [9]

Mathews, William. Maintaining a sense of history. *Federal Computer Week*, 22 January 2001. INTERNET: www.fcw.com. [3]

____. Preserving E-history for all. *Federal Computer Week*, 5 March 2001. INTERNET: www.fcw.com. [3]

McBride, Kelly. Corps, sawmill owner clash in Cataldo area. *Spokane Spokesman-Review,* 8 April 1990, p. A1, A20. [9]

McCall, William. Barging of salmon criticized. *Spokane Spokesman-Review*, 4 June 1994, p. B6. [8]

____. BPA drafts Northwest energy conservation plan. *Pendleton East Oregonian*, 18 November 1992. [4] [12]

McClure, Robert. Administration may be putting off dam-breaching ruling. *Seattle Post-Intelligencer*, 17 January 1992. [4] [8] [12]

McConn, Terry. Patrols try to keep boaters safe. *Walla Walla Union-Bulletin*, 25 April 1990, p. 9-10. [11]

McCoy, Patricia A. Stand united, power official warns Idaho water users. *Salem (OR) Capital Press*, 1 May 1992. [8]

McKern, John. Record number of fish transported. *Pomeroy East Washingtonian*, 31 May 1989. [8]

____. Update on fish survival. Ephrata, WA: Save Our Dams, July 1999. INTERNET: http://www.saveourdams.com/update_fish_survival_rev1.doc. [5] [8]

____. Where salmon die. Ephrata, WA: Save Our Dams, [July 1999]. INTERNET: http://www.saveourdams.com/update_fish_survival_rev1.doc. [8]

McKern named Distinguished Civilian Employee. *Intercom*, June 2003, p. 7. [8]

McNary Dam fish facility dedicated. *Intercom*, September 1994, p. 7, 10. [8] [11]

McNary flows get priority over Coulee refill. *Bend (OR) Columbia Basin Bulletin*, 9 June 2000. [8]

McNary retains warehousing and storage service. *Intercom*, 21 December 1984, p. 1. [2] [4]

Measuring unit is talented. *Intercom*, 30 September 1982, p. 3. [3]

Meetings to discuss Corps acquiring land. *Pomeroy (WA) East Washingtonian*, 13 March 1991. [2] [8]

Meeuwsen, Teri. Port clears way for permit. *Pendleton East Oregonian*, 14 July 2000, p. 1A. [4] [8]

Meier, Dutch. 2000 fire may cause 2001 flood. *Engineer Update*, January 2001, p. 12. [6]

Memorial services set Thursday for drowning victim Greg Lords. *Boise Idaho Statesman*, 16 August 1994. [11]

Merriman, Ed. Umatilla project advances on transfer of Columbia River water. *Salem (OR) Capital Press*, 20 March 1992. [8] [12]

Meyers, Steve. Citizens group forms to respond to depot plan. *Pendleton East Oregonian*, 25 January 1994, p. 7A. [9]

____. Depot plans emergency response to incineration. *Pendleton East Oregonian*, 27 January 1992, p. 3A. [9]

____. Fish migration facility to open in July. *Pendleton East Oregonian*, 3 May 1994. [8] [11]

____. Hermiston area studies water plans. *Pendleton East Oregonian*, 27 January 1992. [4] [8] [12]

____. Irrigators question salmon study scope. *Pendleton East Oregonian*, 24 January 1992, p. 3A. [9]

____. John Day drawdown possible. *Pendleton East Oregonian*, 17 March 1994. [8]

____. Officials outline cleanup of depot lead site. *Pendleton East Oregonian*, 5 October 1992, p. 1A-2A. [9]

____. Port of Umatilla examines marina operations. *Pendleton East Oregonian*, 11 December 1992. [11]

____. A powerful opportunity: Proposed natural gas plants good news for Hermiston. *Pendleton East Oregonian*, 9 March 1992, p. 1A-2A. [4]

____. Remedies for drawdown would cost $77 million. *Pendleton East Oregonian*, 9 December 1992. [9]

____. State seeks regional water reserve. *Pendleton East Oregonian*, 19 January 1994. [4]

____. Study will focus on potential uses of army depot. *Pendleton East Oregonian*, 20 November 1992. [9]

____. Umatilla Army Depot awaits word on its incinerator plans. *Pendleton East Oregonian*, 16 September 1992. [9]

Mice tales: Furry creatures want voice in headquarters planning. *Intercom,* 9 September 1985, p. 3. [2]

Miller, C. J. Chukar partridge. Tucson, AZ: Western Game Bird Alliance, 2002. INTERNET: www.gamebird-alliance.org/chukar.html. [8] [11]

Miller, Dean. Expert: Drawdown killing kokanee. *Spokane Spokesman-Review*, 17 April 1992. [8]

____. Snake River choking on too much algae. *Spokane Spokesman-Review*, 5 May 1991. [4] [8]

Minthorn, Antone. Salmon restoration: Paper presented at the Who Owns America Conference, University of Wisconsin, Madison, June 7, 2001. Pendleton, OR: Confederated Tribes of the Umatilla Indian Reservation, 2001. INTERNET: www.Umatilla.nsn.us/acmjune7.html. [8]

Mitigation Bank. Overview. Fort Myers, FL: Mitigation Bank, [n.d.]. INTERNET: http://www.mitigationbank.com/. [9]

MK will build power plant at Arrowrock Dam. *Boise Idaho Statesman*, 15 June 1991. [4]

MOBEX 85 tests District emergency readiness. *Information Bulletin,* 29 November 1985, p. 1, 4. [6]

Montana native heads District Safety Office. *Intercom*, 17 September 1982, p. 2. [2] [4]

Montana plans to sue over salmon. *Tri-City Herald,* 17 July 1994. [8] [12]

Morrison, Jim. The Good flood. *Compressed Air*, January-February 2000, p. 32-39. [9]

Morse saved by quick action. *Intercom*, 23 July 1982, p. 2. [2]

Moser, Pat. Army wants to bury depot lead waste. *Tri-City Herald*, 2 September 1992. [9]

____. 'Gentle' fish flume opens on Snake River. *Hermiston (OR) Herald*, 24 April 1990. [8]

Moskowitz, David A. Forecasting inaccuracies hurt Chinook. *Portland Oregonian*, 13 May 1994. [8]

Most hatchery salmon to be killed. *Walla Walla Union-Bulletin*, 21 March 2000, p. 1. [8]

Mulick, Chris. Developer eyes Wallula site for power plant. *Tri-City Herald*, 12 July 2000, p. A3. [4]

____. Locke soundly against breaching. *Tri-City Herald*, 25 February 2000. [8] [12]

____. Loss of power generation raises NW electricity prices. *Tri-City Herald*, 29 June 2000. [4] [8]

____. Power crisis shorts out expectations. *Tri-City Herald*, 2 July 2000. [4] [8]

____. Utilities eye new source of power. *Tri-City Herald*, 8 May 2000. [4]

Munns Gerkey, Nadine. Explosion rocks Lyons Ferry: Boats destroyed. *Walla Walla Union-Bulletin*, 16 December 1992. [11]

Myers, Dan. Innovative ice boom proves successful in breaking up Portneuf River jamming. *Pocatello Idaho State Journal*, 18 December 1991. [5] [6]

Nakashima, Ellen, and Thomas B. Edsall. Snake River dam removal is deferred. *Washington Post*, 20 July 2000. [4] [8]

National Academies of Sciences. Protecting the Nation's Wetlands. Washington, DC: The Academies, 2003. INTERNET: http://www4.nas.edu/onpi/webextra.nsf/44bf87db309563a0852566f2006d63bb/509c5e93500c7dcd85256a84005925c0?OpenDocument. [9]

National Park Service. Kennewick man. Washington, DC: National Park Service, 2000. INTERNET: www.cr.nps.gov/aad/kennewick. [10]

____. National NAGPRA. Washington, DC.: The Service, [2003]. INTERNET: http://www.cr.nps.gov/nagpra/.

____. The Secretary of the Interior's standards and guidelines for Federal agency historic preservation programs pursuant to the National Historic Preservation Act. Washington, DC: The Service, 24 April 1998. INTERNET: http://www2.cr.nps.gov/pad/sec110.htm. [10]

National Rural Electric Cooperative Association. Retail wheeling update. Rolla, MO: University of Missouri-Rolla, Electrical and Computer Engineering Department, 1997. INTERNET: www.ece.umr.edu/links/power/Energy_Course/energy/Deregulation/ret_whel.html. [4]

Nelson, Lorraine. Ice Harbor lock appears to have been repaired. *Lewiston Morning Tribune*, 25 August 1994. [4]

____. Public opposes Snake drawdowns. *Lewiston Morning Tribune*, 14 January 1994. [8]

____. Whitman County port to put up $3,000 against drawdown. *Lewiston Morning Tribune*, 21 January 1994. [4] [8] [12]

New building to take different shape. *Intercom,* 14 April 1987, p. 1. [2]

New chief counsel reports from St. Paul. *Intercom,* December 1993, p. 4. [2]

New chiefs of Engineering, Information Management named. *Intercom,* April 1996, p. 2. [2] [3]

New computer system installed. *Information Bulletin,* 27 April 1988, p. 1. [3]

New EEOM to defrost soon. *Intercom*, January 1981. [2]

New engineering branch. *Intercom*, December 1990, p. 12. [9]

New filing gadgetry acquired. *Intercom*, 24 October 1986, p. 11. [3]

New flash flood warning system. *Heppner (OR) Gazette-Times*, 29 January 1981. [6]

New headquarters briefing. *Information Bulletin,* 10 August 1988, p. 1. [2]

New headquarters building slated for District. *Intercom*, 30 December 1987, p. 8. [2]

New headquarters land purchased. *Intercom,* June 1988, p. 4. [2]

New headquarters MOA signed. *Intercom,* August 1990, p. 1, 16-19. [2]

New headquarters nears completion. *Intercom,* September 1994, p. 4. [2]

New headquarters: Value engineering teams save big bucks with review. *Information Bulletin,* 6 June 1986. [2]

New HQs update. *Intercom,* 8 August 1986, p. 1. [2]

New hydropower facility to be dedicated Aug. 25. *Orofino (ID) Clearwater Tribune*, 17 August 2000. [4] [8]

New IR head wants to change auditors' image. *Intercom*, fall 1995, p. 9. [2]

New juvenile fish flume to transport fish with less stressful conditions. *Intercom*, August 1989, p. 10-11. [8]

New Mexico congressman favors breaching 4 dams. *Associated Press*, 3 March 2000.

New NPD Commander visits District. *Intercom*, fall 1995. [2] [12]

New RIF regs out. *Intercom*, 1 May 1981, p. 1. [2]

New smoke-free policy adopted. *Intercom*, May 1990, p. 7. [2]

New system in effect. *Intercom*, 23 January 1986, p. 1. [3]

A New way of publishing. *Intercom*, February 1989, p. 16. [3]

New woes on Snake bridge. *Intercom*, 15 August 1981, p. 1. [4]

Nez Perce Tribe. Nez Perce Tribe Web site. Lapwai, ID: The Tribe. INTERNET: http://www.nezperce.org/Main.html. [12]

Nez Perce's protests sink smolt transport study. *Bend (OR) Columbia Basin Journal*, 16 June 2000.

Ng, Hooi-Im, Ying-Jie Pan, and T. D. Wilson. Business use of the World Wide Web. *Information Research* vol. 3, no. 4, March 1998. INTERNET: informationr.net/ir/3-4/paper46.html. [3]

Nine commercial activities studies set. *Intercom*, 15 September 1983, p. 1, 4. [2] [3] [4] [8] [11]

NMFS plan poses challenge region shouldn't pass up. Editorial. *Tri-City Herald*, 5 May 2000. [8] [12]

NMFS requests more water for Snake River. *Boise Idaho Statesman*, 19 June 1993. [8]

NMFS will push for saving dams as well as salmon. *Walla Walla Union-Bulletin*, 27 April 2000. [8] [12]

No drawdown in 1993. *Walla Walla Union-Bulletin*, 13 May 1992. [8]

Nokkentved, N. S. Analysts mull power rate changes due to salmon recovery efforts. *Twin Falls (ID) Times-News*, 5 March 2000, p. 1. [4] [8]

____. Back drawdowns or risk losing water, expert advises. *Twin Falls (ID) Times-News*, 13 May 1992, p. A4-A5. [8]

____. Dreams of hydro plants flow, water doesn't. *Twin Falls (ID) Times-News*, 20 September 1992, p. A1-A2. [4]

____. FERC terminates Auger Falls hydro license. *Twin Falls (ID) Times-News*, 7 June 2000. [9]

____. Irrigation District sues Bureau of Reclamation over dam. *Twin Falls (ID) Times-News*, 20 December 1991. [4] [8]

____. Magic Valley: Hundreds tour proposed hydro project site. *Twin Falls (ID) Times-News*, 2 November 1992. [4]

____. Officials buy out grazing permits to protect salmon stream. *Twin Falls (ID) Times-News*, 5 June 2000. [8]

____. Powerful hydro licensing agency draws wrath of Idaho officials. *Twin Falls (ID) Times-News*, 2 November 1992. [4]

____. Scientists tackle salmon science. *Twin Falls (ID) Times-News*, 21 April 2000. [8]

____. State water boss sees salmon showdown looming. *Lewiston Morning Tribune*, 22 February 1991, p. B1-B2. [8]

____. Water for salmon may alleviate mid-Snake water quality problems. *Twin Falls (ID) Times-News*, 22 June 2000. [8]

____. Water released for salmon brings benefits, concerns. *Twin Falls (ID) Times-News*, 28 June 2000. [8]

Northern Idaho's scenic wonderland could be environmental disaster. *Pendleton East Oregonian*, 3 May 1994. [9]

Northwest Fisheries Science Center. Salmon hatchery Q&As. Seattle: Northwest Fisheries Science Center, 4 February 2003. INTERNET: www.nwfsc.noaa.gov/Q&A. [8]

Northwestern Division moves forward with restructuring. *Intercom*, September 1997, p. 3. [2] [12]

NPD Corporate Board. *Intercom*, August 1991. [2] [12]

NPW cited for support to students. *Intercom*, 25 May 1983, p. 4. [2] [12]

NPW fights flooding in Idaho. *Intercom*, 6 July 1983, p. 1, 7. [6]

NPW hosts Division cultural resources training. *Intercom*, 18 March 1983. [10]

NPW mobilization workload has already been thought out. *Information Bulletin,* 15 October 1981, p. 2. [6]

NPW needs a Pied Piper to rid it of cats. *Intercom*, 1 January 1982, p. 1. [2]

NPW personnel strength in decline. *Intercom*, 7 March 1984, p. 1. [2] [12]

NPW still in safety slump. *Intercom*, 30 September 1982. [4]

NPW tops all districts in Chief of Engineers awards. *Intercom*, 1 January 1982, p. 1. [4] [5] [8]

NPW will rehab Blackfoot. *Intercom*, 30 September 1982, p. 1. [4] [6]

NPW will see some RIFs in April. *Intercom*, 1 April 1982, p. 1. [2]

Nutt, Lynda. Ice Harbor today. *Intercom*, 9 May 1987, p. 8. [4] [8] [11]

NWD prepares disaster response plan for the "Big One." *Nor'wester Alert*, August 2001, p. 1, 3-4. [9] [12]

NW Fishletter, 29 January 1996-1 May 2001. INTERNET: http://www.newsdata.com/enernet/fishletter/. [8]

NW irrigators support tribal supplementation. *Bend (OR) Columbia Basin Bulletin*, 23 June 2000. [8] [12]

O'Boyle, Robert. Downtown and the Corps. *Walla Walla Union-Bulletin*, 22 January 1989, p. 1-2. [2] [12]

O'Bryant, Mike. Corps looks at funding for leaking Lower Granite levee. *Bend (OR) Columbia Basin Bulletin*, 19 May 2000. [6] [8]

____. Court: Corps pumping permit must comply with ESA. *Bend (OR) Columbia Basin Bulletin*, 16 June 2000. [9]

____. Drop in generation puts strain on fish spill. *Bend (OR) Columbia Basin Bulletin*, 30 June 2000. [8]

____. Fish managers blame flood control on water troubles. *Bend (OR) Columbia Basin Bulletin*, 12 May 2000. [6] [8]

____. Groups offer divergent views on 4(D) rules. *Bend (OR) Columbia Basin Bulletin*, 23 June 2000. [8]

____. Nez Perce, Idaho ask for limits on Dworshak. *Bend (OR) Columbia Basin Bulletin*, 21 April 2000. [4] [8] [11] [12]

____. NMFS announces rules to protect salmon, steelhead. *Bend (OR) Columbia Basin Bulletin*, 23 June 2000. [8]

____. NMFS appoints recovery science review panel. *Bend (OR) Columbia Basin Bulletin*, 2 June 2000. [8]

____. River operators clash over use of Dworshak water. *Bend (OR) Columbia Basin Bulletin*, 30 June 2000. [8] [11]

____. River operators offer overview of difficult year. *Bend (OR) Columbia Basin Bulletin*, 3 November 2000. [4] [6][8]

____. Terns arrive; legal maneuvers continue. *Bend (OR) Columbia Basin Bulletin*, 21 April 2000. [8]

____. White House briefs states on breaching, BIOP, ALL-H. *Bend (OR) Columbia Basin Bulletin*, 2 June 2000. [8] [12]

OCLC Online Computer Library Center, Inc., Office of Research. Web Characterization Project. Columbus, Ohio: OCLC, 2003. INTERNET: http://wcp.oclc.org/. [3]

ODFW to destroy surplus Grande Ronde steelhead. *Bend (OR) Columbia Basin Bulletin*, 9 June 2000. [8]

Office of Counsel. *Intercom*, 30 December 1987. [2]

Office of the Comptroller. *Intercom*, December 1987, p. 17. [2]

Officials ID body as that of missing Umatilla man. *Tri-City Herald,* 12 April 1992. [11]

Officials urge toxin tests in Idaho Valley. *Tri-City Herald*, 12 December 1992. [9]

Old Army site razed for industrial park. *Walla Walla Union-Bulletin*, 17 April 2000. [2]

OpenNet Corporation. Many developments occurred to make computers more adaptable to institutional requirements, In *Information Technology Can Be Harnessed by Institutions for Unprecedented Performance and Satisfaction.* OpenNet, 1999. INTERNET: http://www.opennet.net/DualControl/thesis.htm. [3]

Operation Fish Run underway. *Intercom*, 15 April 1981. [8]

Operations. *Intercom*, winter 1995-96, p. 12. [4] [11]

Operations: A Year of challenges. *Intercom*, December 1989, p. 4-5. [2] [11]

Operations Division. *Intercom*, 1 August 1981, p. 1-2. [8]

OPM establishes buyout hotline. *Intercom,* 30 December 1987, p. 12. [2]

Oregon Office of Energy. Oregon's energy facilities. Salem, OR: Office of Energy, 19 September 1992. INTERNET: www.energy.state.or.us/siting/facility.htm. [4] [8]

Oregon, Washington ask judge to limit NMFS' fish allocation. *Tri-City Herald*, 28 June 2000, p. A3. [8]

Oscar-winning actor to speak April 19. *Intercom*, 8 March 1998, p. 5. [2]

Oster, Ellen. Miracle of electricity springs from mighty Columbia. *Grandview (WA) Herald*, 25 March 1992.

Othole, Andrew L. A Tribal perspective on cultural property consultation. *Cultural Resources Management*, no 16, special Issue, 1993, p. 42-45. [10]

Overhead for NPW increasing. *Intercom*, 15 November 1981. [2]

Pacific Northwest National Laboratory. History. Richland, WA: The Laboratory, 5 October 2002. INTERNET: www.pnl.gov/main/welcome/history.html. [12]

____. RTO West. Richland, WA: The Laboratory, 5 December 2002. INTERNET: pnnl-utilityrestructuring.pnl.gov/Electric/RTOs/rtowest.htm. [4]

Painter arrives just in time for HQ's completion. *Intercom*, December 1993, p. 4. [2]

Palmer, Carroll. Misconceptions about Indian fishing rights persist. *Tri-City Herald*, 15 May 1994. [8] [12]

Parker, Patricia L. Traditional cultural properties: what you do and how we think. *Cultural Resources Management*, no 16, special Issue, 1993, p. 1, 3-4. [10]

Part of Hanford declared "clean." *Walla Walla Union-Bulletin*, 2 October 1994. [9]

Peavey: Idaho plan must be adopted. *Lewiston Morning Tribune*, 23 August 1994. [4] [8] [12]

Peck, Adam. Andrus rejects another California bid for water. *Ketchum Idaho Mountain Express*, 6 February 1991. [5] [12]

____. Clean water legislation killed in Boise, again. *Ketchum Idaho Mountain Express*, 19 February 1992. [8] [12]

____. Salmon Middle Fork nominated for unprecedented protection. *Ketchum Idaho Mountain Express*, 15 January 1992. [4] [8] [12]

____. Watching the rivers flow. *Ketchum Idaho Mountain Express*, 22 January 1992. [4] [8] [12]

Pentagon official says U.S. Army Corps has a credibility problem. *Boise Idaho Statesman*, 29 October 1994, p. 5C. [8] [12]

Pentagon stands down on Corps change. *Tri-City Herald*, 7 April 2000, p. A13. [2] [12] [12]

Personnel move proposed, timing uncertain. *Intercom*, 27 June, 1983, p. 1. [2]

Personnel watches NPS-NPA with interest. *Intercom*, 30 September 1983, p. 1. [2]

Petersen, Keith. Seaport in a storm. *Lewiston Tribune*, 31 December 1999. [4] [8]

Peterson, Anne. Murder victim's car found afire by Lucky Peak Dam. *Boise Idaho Statesman*, 26 January 1994. [11]

Peterson, Nick. Area plans taking shape for Lewis and Clark commemoration. *Pendleton East Oregonian*, 22 March 2000. [11]

____. Corps to build $3.6 million fish ladder. *Pendleton East Oregonian*, 2 June 2000. [8]

____. Wheat growers group criticizes Snake River study. *Pendleton East Oregonian*, 28 March 2000. [4] [8] [12]

Philip, Jeff. Rangers teach Scouts valuable water lesson. *Intercom*, September 1993, p. 6. [11]

Phinney, Wil. Hanford investigators finding routine negligence. *Pendleton East Oregonian*, 5 December 1992. [9]

____. Indians plan protest of hatchery policies. *Pendleton East Oregonian*, 14 May 1992, p. 1. [8]

____. Negotiators try to balance area's fish runs, irrigation. *Pendleton East Oregonian*, 9 January 1992, p. 1A-2A. [8] [12]

____. Report says breaching dams would benefit tribes. *Confederated Umatilla Journal*, 3 June 1999. [8] [12]

____. Tribes take irrigators to task over water issues. *Pendleton East Oregonian*, 17 January 1994, p. 3A-4A. [8] [12]

____. Water transfer may aid migrating Umatilla River fish. *Pendleton East Oregonian*, 12 March 1992. [8]

Photographer saves life at Mill Creek. *Intercom*, 1 August 1984, p. 2. [11]

Photographer snaps up first place win. *Intercom*, June 1992, p. 11. [3]

Picard, Ken. Behind the EPA's high cleanup costs. *Missoula Independent*, 16 May 2002. INTERNET: www.missoulanews.com/News/News.asp?no=1631. [9]

Plan to club hatchery salmon is protested: Some irrigators under gun to convert ditches. *Seattle Post-Intelligencer*, 5 June 2000. [8]

Plan would end need for severe drawdowns. *Spokane Spokesman-Review*, 23 October 1992. [8]

Planning. *Intercom*, winter 1995-95, p. 13. [2] [5] [8]

Planning accelerates for headquarters. *Intercom,* 9 September 1985, p. 1. [2]

Planning Division. *Intercom*, 30 December 1987, p. 14. [2] [5]

Planning for the nineties. *Intercom*, December 1989, p. 15. [5] [8] [9]

Planning stops, action begins as water level drops. *Intercom*, May 1992, p. 5. [8]

Plans for small hydroelectric projects draw praise and criticism. *Lewiston Morning Tribune*, 17 February 1991. [4] [8]

Plans made for new headquarters. *Intercom,* 22 May 1985, p. 1, 6. [2]

PNGC files suit against Federal agencies. *Sunnyside (WA) Daily Sun News*, 1 August 1992.

Policies set for new building. *Intercom*, 29 April 1986, p. 3. [2]

Poll: Drawdown loss over $4 million. *Spokane Chronicle*, 7 March 1992.

Polsson, Ken. Chronology of personal computers. [n.p.]: Polsson, 2002. INTERNET: www.islandnet.com/~kpolsson/comphist. [3]

Pomeroy accepted back into NFIP. *Pomeroy East Washingtonian*, 5 February 1992, p. 1, 4. [6]

Port is developing plan to keep Corps jobs in WW. *Walla Walla Union-Bulletin*, 3 August 2000, p. 1. [8]

Portland Cement Association. Concrete Products: Roller Compacted Concrete. Skokie, Ill.: The Association, [2002.]. INTERNET: www.portcement.org/cb/concreteproducts_rcc.sap. [5]

Ports assess damage from drawdown. *Lewiston Morning Tribune*, 23 March 1992. [8] [11]

Power Council: More scientific data needed for drawdown plan. *Lewiston Morning Tribune*, 30 December 1992. [2] [12]

P.O.W.E.R. group holds first public meeting. *Grand Coulee (WA) Star*, 4 March, 1992. [11]

Power plant purchase, shutdown proposed. *Bend (OR) Columbia Basin Bulletin*, 14 July 2000. [4] [9]

Power shift may harm NW salmon. *Walla Walla Union-Bulletin*, 3 August 2000, p. 1. [8]

Powerboat operators protest proposed river restriction plan. *Boise Idaho Statesman*, 15 July 1994. [11] [12]

Powerful R&D center serves USACE, Army, and the nation. *Engineer Update*, September 2000. [3] [5] [12]

Precautionary security measures being taken. *Lewiston Tribune*, 22 January 1991. [11] [8]

President accepts BRAC plan. *Intercom*, August 1991. [2] [12]

President signs omnibus bill. *Intercom*, 21 November 1986. [2] [4] [5] [12]

President's budget includes $102 million of work for District. *Intercom*, April 1996. [2] [4] [8] [12]

President's budget includes $74.3 million for NPW in FY 84. *Intercom*, 18 February 1983, p. 6. [2] [4] [8] [12]

The Press. *Intercom*, 1 July 1981, p. 4. [4]

Preston, Seth. Ahsahka site controversy. *Tri-City Herald*, 28 March 1990. [10]

____. Robbing a people's past: Tribe demands tougher penalties for illegal digging. *Lewiston Morning Tribune*, 10 September 1989. [10]

____. Tribe settle lawsuit over Ahsahka Hatchery. *Tri-City Herald*, 5 April 1990. [10]

Primary function of Corps being reemphasized. *Intercom*, 1 September 1981, p. 1. [4] [5] [6]

Print plant saved. *Intercom*, 2 May 1984, p. 1. [2] [3]

Probart, Judy. St. Charles Creek too shallow to permit dredging operation. *Pocatello Idaho State Journal*, 19 April 1991.

Productivity gain sharing test up for approval. *Intercom*, 25 July 1986, p. 4. [2]

Program and project management. *Intercom*, winter 1995-96, p. 8, 15. [2] [5] [8] [9]

Program management office. *Intercom*, 30 December 1987, p. 19. [2]

Project engineers discuss productivity and computers. *Intercom*, 10 May 1982, p. 2. [2] [3] [4]

Project gets award. *Intercom*, 31 January 1984, p. 1. [5]

Project manager fields questions on the new downtown headquarters location. *Intercom*, October 1982, p. 3-5, 13. [2]

Proposal to reclassify print facility. *Information Bulletin,* 2 March 1988, p. 1. [3]

Proposed Snake River hydro dam gaining approval. *Boise Idaho Statesman*, 13 December 1992. [4]

Prospective land bidders brave stormy waters on District tour. *Intercom*, 3 July 1984, p. 3. [11]

Prototype turbine to be tested at McNary Dam powerhouse. *Information Bulletin*, 19 April 2002, p. 1. [5]

Public Affairs handles news media challenges. *Intercom*, December 1981. [2] [3] [12]

Public Affairs Office. *Intercom*, 30 December 1987, p. 20. [2] [12]

Public Affairs Office installs new Chief. *Intercom*, December 1983. [2] [12]

Public comments lead to revised lock schedule. *Intercom*, 15 April 1993, p. 6.

Public information meetings scheduled. *Spokane Spokesman-Review*, 9 May 1994. [4] [8] [12]

Public interest in hydro project intense. *Twin Falls (ID) Times-News*, 27 November 1990. [9]

Questions answered on new headquarters. *Information Bulletin,* 24 August 1988, p. 1-2. [2]

Quintana, Craig. Feds to tackle flood map dispute. *Boise Idaho Statesman*, 9 August 2000. [6] [12]

____. Floaters take a look at Boise River issues. *Boise Idaho Statesman*, 21 July 2000. [6] [11]

____. Flood in heart of Boise a matter of when, not if. *Boise Idaho Statesman*, 16 January 2002. [6] [12]

Ragz-International World History Center. Archeology. Ragz-International, 2001. INTERNET: ragz-international.com/archeology/htm. [10]

Raloff, Janet. Salmon hatcheries can deplete wild stocks. *Science News*, vol. 159, no. 22, 2 June 2001. [8]

Ratliff, Tonya. Be ready for another dry summer, forecasters warn. *Pocatello Idaho State Journal*, 21 April 1991. [4]

____. Farmers group backs saving salmon but not at expense of NW agriculture. *Pocatello Idaho State Journal*, 16 January 1991. [8]

Rea, Kathy. Regulators have big, tough mission. *Engineer update*, July 2001, p. 5-6. [9]

Real Estate Division. *Intercom*, 30 December 1987, p. 15. [2] [8]

Real Estate manages 117,740 acres. *Intercom*, December 1989, p. 14. [2] [6] [11]

Realignment in Operations Division. *Information Bulletin*, 17 February 1988, p. 1. [2] [4] [8]

Rebuilding dams said to cost billions. *Lewiston Morning Tribune*, 11 December 1992. [8]

Reclamation asks Idaho irrigators not to sue over release for salmon. *Boise Idaho Statesman*, 10 June 1994. [8]

Recreation booming at District park facilities. *Intercom*, 1 August 1984, p. 1. [11]

Rees, Lauri. Hazardous materials team forming at Hermiston. *Pendleton East Oregonian*, 3 October 1992. [9]

Reeves, Richard. Don't tear down dams to roll back time. Syndicated column. *Walla Walla Union-Bulletin*, 3 April 1994, p. 26. [4] [8]

Regulators keep close eye on Idaho waters, wetlands. *Intercom*, 14 April 1987, p. 10. [9]

Regulatory boundaries changed. *Intercom*, 22 December 1987. [9]

Regulatory functions: Process streamlined for Idaho residents to secure use permits. *Intercom*, 17 September 1984. [9]

Reinke, Darrell. Are developers planting seeds leading to West's destruction? Guest commentary. *Idaho Falls Post-Register*, 6 April 1992. [4] [12]

Relocation of fish bypass facilities proposed. *Intercom*, 3 July 1984, p. 1. [5] [8]

Remembering the river. *Intercom*, May 1992, p. 15. [8]

Reorganization and name change. *Information Bulletin*, June 1988. [2]

Report: Plan to destroy chemical weapons safe. *Walla Walla Union-Bulletin*, 9 December 1992. [9]

Researchers look to build a better turbine for salmon. *Idaho Falls Post-Register*, 8 November 1994. [8]

Reservations plus. *Intercom*, 15 June 1981, p. 1. [3] [11] [12]

Reservoir drawdown studied as part of the solution to salmon recovery. *Intercom*, May 1992, p. 4. [8]

Resource manager takes pride in work. *Intercom*, 9 July 1985, p. 3. [8] [11]

Response team travels to earthquake. *Intercom*, March 1994, p. 4. [6]

Restructuring moves forward with roles mix. *Intercom,* September 1994, p. 3. [2] [12]

Reuter, Rob. Irrigation Districts seek cooperation. *Pendleton East Oregonian*, 10 March 1994, p. 6A. [8]

Revised cleanup agreement for Hanford will be expanded, extended. *Walla Walla Union-Bulletin*, 26 January 1994, p. 9. [9]

Rexus, Cecila. Levee improvements may sink with McNary powerhouse. *Tri-City Herald,* 12 April 1990, p. A3. [11] [12]

____. Lower levee plan worth altering rules, says Corps. *Tri-City Herald,* 30 March 1990, p. A1-A2. [6] [11] [12]

____. Money to finish levee study OK'd. *Tri-City Herald,* 12 April 1990. [6] [11] [12]

____. Tri-Citians won't drop fight to cut levees. *Tri-City Herald,* 15 March 1990. [6] [11] [12]

Richardson, Don. BPA: Fish salvage will cost "billions." *Salem (OR) Capital Press*, 1 May 1992. [8]

Richardson, Tim. Cyberslackers are curse of workplace. *The Register (U.K.)*, 19 April 2001. INTERNET: www.theregister.co.uk/content/6/18378.html. [3]

Richert, Kevin. Army Corps tries to block hydro project. *Idaho Falls Post-Register*, 12 June 1991. [9]

____. Controversial project starts: Fall River developers' changes fail to placate critics. *Idaho Falls Post-Register*, 28 April 1991. [9]

____. Dam developer to redesign project. *Idaho Falls Post-Register*, 4 January 1991. [9]

Richland's plans rest on Indian graves. *Tri-City Herald*, 12 January 1992, p. A1-A2. [10]

Riddle named Chief, Logistics Mgmt Office. *Intercom*, 14 April 1987, p. 3. [2]

Riha, Carol Ann. Yakama's seek traditional fishing sites. *Pendleton East Oregonian*, 3 May 1994, p. 9A. [8] [12]

River study comment period ends in March. *Dayton (WA) Chronicle*, 22 March 2000, p. 6. [8]

Robinette, Gale B. Columbia Park planners envision tourist mecca. *Tri-City Herald,* 4 June 1990. [11] [12]

Robinson, Erik. Two groups join opposition to dredging. *Clark County (WA) Columbian*, 10 June 2000. [4]

____. Water quality could be new fish hurdle. *Clark County (WA) Columbian*, 23 June 2000. [8]

Robot mail service starts. *Intercom*, 15 May 1981, p. 1-2. [2] [3]

Roen, David T. Here's my solution to the marmot problem. Guest column. *Lewiston Tribune*, 15 June 1992, p. 7A [6] [12]

Rogers discusses human resources management reform within DOD. *Federal News Online*, 25 September 2003. INTERNET: http://www.fpmi.com/FedNews/september-22-week.html. [12]

Royce, Col. James B. District Commander shares his views. *Intercom*, 9 December 1985, p. 4. [2]

____. District smoking policy outlined. *Intercom*, 9 December 1985, p. 2. [2]

____. Questions answered about complex. From the Commander's Desk. *Intercom*, 26 March 1986, p. 2. [2]

____. There's a lot to look forward to. From the Commander's Desk. *Intercom*, June 1988, p. 2-3. [4] [8] [9]

Russell, Betsy Z. Inspector disputes Otter wetlands claim. *Spokane Spokesman-Review*, 7 June 2000. [9]

Ryan, Randall. Reassembly: Turbine unit expected to return to service in next two months. *Intercom*, October 1999, p. 12. [4]

Safety and Occupational Health Office. *Intercom*, 30 December 1987. [2]

Safety Chief hangs up the hard hat and moves to Montana. *Intercom*, February 1987, p. 7. [2] [4]

Safety conference features new video training series. *Intercom*, September 1994, p. 4. [2]

Salmon 94: Dams spill water, but debate rages on. *Whitman County (WA) Gazette*, 12 May 1994.

Salmon have easy, tough times moving through river basins. *Twin Falls (ID) Times-News*, 18 June 1992. [8]

Salmon must pay for boom used to keep river clean. *Boise Idaho Statesman*, 11 December 1992. [6]

Salmon plan's guarded support: Northwest irrigation utilities pleased with modifications. *Hermiston (OR) Herald*, 24 December 1991. [8]

Salmon recovery comprehensive, controversial, difficult subject. *Clearwater (ID) Tribune*, 18 November 1999. [8] [12]

Salmon running at fever pitch. *Walla Walla Union-Bulletin*, 2 May 2000, p. 1. [8]

Salmon summit again eyes lower Snake reservoirs. *Tri-city Herald*, 7 April 1991. [8]

Sandberg, Jill. Russians study fish passage. *Pendleton East Oregonian*, 21 September 1994. [5] [8]

Sanders, Carol. New culture takes hold in Corps. *Engineer Update*, September 1999. [2] [12]

Sandy Shelin, a real caretaker of the environment. *Intercom*, December 1990, p. 13. [7]

Satterfeld, Paul. Writer finds beauty came with Snake River slackwater. Reprint from the *Seattle Post-Intelligencer* 30 November 1980. *Intercom*, 15 January 1981. [4]

Saving the salmon. Editorial. *Washington Post*, 21 July 2000. [8] [12]

Sawatzki, Jim. Burial ceremonies become focal point of a life's heritage. *Intercom*, 20 August 1982, p. 1. [10]

Sawtooth Chinook hatchery nearing completion. *Intercom*, 10 October 1984, p. 5. [8]

Schafer, Dave. Army depot cleanup ready for next step. *Tri-City Herald*, 22 June 1994, p. A4. [9]

____. Cause of salmon deaths disputed. *Tri-City Herald*, 21 July 1994, p. A3. [8]

____. Corps reopens salmon ponds at McNary. *Tri-City Herald*, 29 July 1994. [8]

____. Forum probes salmon plight. *Pendleton East Oregonian*, 18 May 1992, p. 1A-2A. [8]

____. Group aims to head off John Day drawdown. *Tri-City Herald*, 17 March 1994. [8]

____. Group attacks army depot cleanup plan. *Tri-City Herald*, 24 February 1994, p. A4. [9]

____. Officials line up against drawdown. *Tri-City Herald*, 29 April 1994. [8] [12]

____. Skull likely early white settler. *Tri-City Herald*, 30 July 1996. [10]

____. Umatilla Indians hope plan will fly. *Tri-City Herald*, 31 January 1994. [8] [12]

Schafer, Dave, and John Stang. 8 dams spill water to save fish. *Tri-City Herald*, 12 May 1994, p. A1-A2. [8]

____. Mayors to announce protest of John Day drawdowns. *Tri-City Herald*, 28 April 1994. [8] [12]

Schein, Edgar H. Three cultures of management: The key to organizational learning in the 21st century. Cambridge, MA: Society for Organizational Learning, [n.d.] INTERNET: www.sol-ne.org/res/wp/three.html. [2] [12] [12]

Schlenker, Judith Ann. Total quality management. *HRZone*, 27 August 1998. INTERNET: www.hrzone.com/topics/tqm.html. First published in *Employee Involvement Issues for Agencies to Consider in Designing and Implementing Programs*, GAO/GGD 88-82 (Washington, DC: General Accounting Office, 1988). [2]

Schneider, George. Stop clubbing fish. Editorial. *Portland Oregonian*, 20 March 2000. [8]

Schrader named Engineer of the Year. *Intercom*, 18 February 1983, p. 1. [5]

Schwetz, Gina. Working in wetlands. *Intercom*, July 2003, p. 4-6. [9]

Schwinn, Elizabeth. Tribe seeks Federal funding for cleanup. *Pendleton East Oregonian*, 29 April 1994, p. 2C. [9]

Scientists: Benefits of spillover will be hard to determine. *Boise Idaho Statesman*, 6 June 1994, p. 5C. [8] [9]

Scientists recall birth of atomic age. *Tri-City Herald*, 2 December 1992. p. A1, A11. [9]

Scientists turn to "human" test drug to save salmon. *Boise Idaho Statesman*, 2 October 1994. [8]

Scoop digs up tons of sediment. *Intercom*, April 1988, p. 6-7. [4]

Scott, Craig. Economic predictions clouded by uncertainty. *Pendleton East Oregonian*, 8 July 2000, p. 5A. [4] [8] [11] [12]

____. Wagenaar takes helm of Army Corps' Walla Walla District. *Pendleton East Oregonian*, 8 July 2000, p. 3-4. [8] [12]

____. Warning issued about health implications of dam breaching. *Pendleton East Oregonian*, 6 April, p. 5A. [8]

Sebastian, Lynne. Protecting traditional cultural properties through the section 106 process. *Cultural Resources Management*, no. 16, special issue, 1993, p. 22-26. [10]

Second Commander recalls District's formative years. *Intercom*, October 1988, p. 8.

Security at hatchery stepped up after poaching incident. *Orofino (ID) Clearwater Tribune*, 9 March 2000. [8]

Sellett, Michael. Corps urged to improve Snake River habitat. *Jackson Hole (WY) Guide*, 31 January 1990. [7]

Senator McClure tours fish facilities. *Intercom*, 1989 June, p. 3, 5. [8]

Senators call on Corps to reject salmon plan. *Idaho Falls Post-Register*, 11 May 1994, p. B3. [8] [12]

Service will release fish-protection rules. *Portland Oregonian*, 20 June 2000. [8]

Shallow planning for floating green. Editorial. *Spokane Spokesman-Review*, 21 November 1990. [9]

Shoot-out at Texas Rapids. *Information Bulletin*, 3 August 1988, p. 1. [11]

Shore, Mike. Corps official says lack of information is "Achilles' heel" of drawdown program. *Lewiston Morning Tribune*, 11 January 1994. [8] [12]

____. Washington lawmakers also hear drawdown opponents. *Lewiston Morning Tribune*, 8 March 1994. [8] [12]

Shors, Benjamin. Kennewick man remains to go to tribes, Federal officials decide. *Seattle Times*, 25 September 2000. [10]

Shortfall in NPD funds stalls hiring. *Intercom*, August 1990, p. 4-5. [2]

Shoshone-Bannock Tribes. Shoshone-Bannock Tribes [official Web site]. Fort Hall, ID: The Tribes, 2003. INTERNET: http://www.shoshonebannocktribes.com/. [12]

Showers, Susan. Cold-hearted, uncaring. Letter to the Editor. *Lewiston Morning Tribune*, 10 June 1992. [6]

Shull, Carol D. Traditional cultural properties in the National Register of Historic Places. *Cultural Resources Management*, no. 16, special issue, 1993, p. 6-7. [10]

Siemens to upgrade Grand Coulee generators. *Seattle Daily Journal of Commerce*, 6 August 1992. [5]

Sierra Club to sue over Columbia system dam operations. *Lewiston Tribune*, 6 May 1992, p. 3B. [8]

Sivula, Chris. BPA wants answers on drawdown. *Tri-City Herald*, 10 June 1992, p. A4. [8]

____. Critics say overhead costs too high. *Tri-City Herald*, 15 October 1990, p. A1. [9]

____. Delay sought for Hanford contract choice. *Tri-City Herald*, 19 December 1992. [9]

____. DOE suggest N reactor area as next cleanup target. *Tri-City Herald*, 17 January 1991, p. A8 [9]

____. Hanford bids unfair, subcontractors say. *Tri-City Herald*, 16 October 1990, p. A7 [9]

____. Hanford wildlife protection plan OK'd. *Tri-City Herald*, 31 March 1992. [9]

____. Natural assets brought the war effort to Hanford. *Tri-City Herald*, 22 December 1992. [9]

____. Scenic River Designation urged for Hanford Reach. *Spokane Spokesman-Review*, 30 June 1992. [8] [9]

Skorneck, Carolyn. More parks, recreation mean less crime. *Lewiston Morning Tribune*, 9 June 1994. [11]

Smiley wins national award for suggestion. *Pomeroy East Washingtonian*, 13 February 1991. [2] [5]

Smith, Debra. The human side of salmon recovery: Rally makes the case for the importance of fish in small town economies. *Lewiston Morning Tribune*, 18 May 2000. [8] [12]

____. Steamboat owner mystified over letter: Elmer Earl blames demand for removal of Steamboat Jean on miscommunication between Army Corps of Engineers. *Lewiston Morning Tribune*, 19 July 2000. [11]

Smith, Erik. Industry spokesman says barges can save salmon. *Tri-City Herald*, 18 June 1992. [8]

____. Murray says balance key to salmon solution. *Tri-City Herald*, 3 June 1994. [8]

Smith, George S., et al., compilers. Archeology and the Federal government. *Cultural Resources Management Bulletin*, special issue, v. 11, July 1988. [10]

Smoczyk receives top Army award. *Intercom*, 24 November 1982, p. 1. [8]

Some tout barging to save fish, but others say it's killing them. *Boise Idaho Statesman*, 4 August 1994. [8]

Snail listing may postpone work on bridge. *Boise Idaho Statesman*, 25 December 1992. [9]

Snake dams will stand for 10 or 15 years at least. *Associated Press*, 19 July 2000. [8] [12]

Snake River adjudication process must not stop now. Editorial. *Idaho Falls Post-Register*, 25 January 1994, p. A7. [4] [12]

Snake River drawdown to expose history. *Washington State Evergreen (Pullman)*, 2 March 1992, p. 1, 7. [10]

Snake River flow hits all-time low. *Boise Idaho Statesman*, 6 June 1992. [4]

Snake River restoration plan applauded. *Billings (MT) Gazette*, 9 June 2000. [8] [12]

Snake River salmon death toll. *Spokane Spokesman-Review*, 16 May 1994. [8]

Snake River water trade discussed. *Lewiston Morning Tribune*, 12 July 2000. [8]

Snake River woes have easy solution. *Jackson Hole (WY) News*, 21 September 1994. [11]

Snake yields human skull. *Lewiston Morning Tribune*, 10 March 1992. [10]

So long Ma Bell. *Intercom*, 2 May 1984. [3]

Society for American Archeology. The Secretary of the Interior's September 21, 2000 determination of cultural affiliation for Kennewick Man. *Society for American Archeology Position Paper*, 14 October 2000. INTERNET: www.saa/org/repatriation/lobby/kennewickc8.htlml. [10]

Some Idaho floaters refuse to share sacrifice. Editorial. *Lewiston Morning Tribune*, 24 August 1994. [8] [11]

Some people think drawdowns save fish: Some fish disagree. Paid advertisement. *Lewiston Morning Tribune*, 13 February 1994. [8]

Sonderman, Robert C. Primal fear: Deaccessioning collections. *Common Ground*, vol. 1, no. 2, summer 1996. [10]

Sonner, Scott. Clinton revises logging plan to protect more fish, wildlife. *Spokane Spokesman-Review*, 24 February 1994, p. 6A. [8]

____. Fishery aid plan proposed. *Portland Oregonian*, 4 September 1994. [8]

____. Hatcheries weaken fish, experts warn Congress. *Spokane Spokesman-Review*, 3 March 1994, p. B4. [8]

____. NW lawmakers express concern over handling of salmon crisis. *Portland Oregonian*, 18 May 1994. [8] [12]

____. River threats "large as ever." *Spokane Spokesman-Review*, 20 April 1994, p. B4. [8]

____. Three top lawmakers warn Clinton about salmon. *Boise Idaho Statesman*, 17 May 1994. [8] [12]

Southway bridge topping ceremony would make good documentary. *Intercom*, 15 March 1982. [4]

Special assistants play key roles. *Intercom*, 30 December 1987. [2]

Spence, Mark. Selling out Lewis and Clark. *Portland Oregonian*, 14 May 2000. [11]

Spending bill includes fish mitigation, dredging work. *Bend (OR) Columbia Basin Bulletin*, 23 June 2000. [2] [4] [8] [12]

Spillway deflectors installed at Ice Harbor Dam. *Intercom*, November 1996, p. 1, 5. [5] [8]

Spotlight on women. Series. *Intercom*, March, June, September 1993. [2]

Sprague, Dori. Employees battle in-house flood. *Intercom*, 21 November 1986, p. 6. [4]

Spring RIF update. *Intercom*, 30 September 1982, p. 1. [2]

Stang, John. Bechtel group awarded ERMC. *Tri-City Herald*, 19 February 1994, p. A1-A2. [4] [9]

____. Birds flocking to man-made islands in Columbia River. *Tri-City Herald*, 28 May 1992. [4] [8]

____. Cleanup "ruined" too many plants. *Tri-City Herald*, 15 October 1994. [9]

____. Corps gives OK to lower levees. *Tri-City Herald*, 22 March 1991. [6] [11]

____. DOE sets savings goal of $1 billion. *Tri-City Herald*, 26 January 1994. [9]

____. Groups work to grasp future of Reach. *Tri-City Herald*, 17 January 1994. [8] [9]

____. Inspections target faulty Columbia River fish screens. *Tri-City Herald*, 16 June 1994. [8]

____. Landfill contamination probe grows. *Tri-City Herald*, 12 January 1994. [9]

____. Levee funds would save years of Corps study. *Tri-City Herald*, 17 April 1991. [6] [11]

____. Locked down: Ice Harbor Dam's cracked lock gate makes prisoners of river users. *Tri-City Herald*, 22 September 1994. [4]

____. Lower Granite drawdown likely dead, Corps says. *Tri-City Herald*, 30 November 1994. [8]

____. Lowry, Grumbly praise new deal. *Tri-City Herald*, 25 January 1994, p. A3. [9]

____. Panel continues drawdown study. *Tri-City Herald*, 15 April 1994, p. A8. [8]

____. Power planners want to narrow salmon research. *Tri-City Herald*, 24 May 1994. [8]

____. Scientists to suggest barging salmon. *Tri-City Herald*, 14 June 1994. [8]

____. Skull found on shore of Columbia. *Tri-City Herald*, 29 July 1996. [10]

Stapp, Darby C., and Julia G. Longenecker. Reaching out to the Mid-Columbia in Washington State. *Society for America Archeology Bulletin*, vol. 17, no. 2, March 1999. INTERNET: www.sa.org/publications/saabulletin/17-2/saa13.html.

____. The Times, they are a-changin': Can archeologists and Native Americans change with the times? *Society for America Archeology Bulletin*, vol. 18, no. 2, March 2000. INTERNET: www.sa.org/publications/saabulletin/18-2/saa13.html.

Start to finish, the life of a project. *Intercom*, 1 September 1981. [5]

State and tribe angered over summer flow at Dworshak Reservoir. *Boise Idaho Statesman*, 23 May 2000. [4] [8] [11] [12]

Status of Zenith deliveries. *Information Bulletin*, 3 February 1988, p. 1. [3]

Steele, Karen Dorn. Hanford wastes: 100 million gallons dumped in 1940s, 50s. *Spokane Spokesman-Review*, 10 March 1991, p. A1, A10.

Storm rages over tests as hatchery, Heppner plans jell. *Lewiston Morning Tribune*, 1 February 1981. [5] [8] [12]

Stroud, Bryan. Warped thoughts on the new building. *Intercom*, June 1996, p. 3. [2]

____. A Warped view—to move or not. *Intercom*, September 1993, p. 2. [2]

Student support. *Intercom,* September 1997, p. 8. [2]

Study: Dam breaching would boost employment. *Bend (OR) Columbia Basin Bulletin*, 14 July 2000. [8]

Study dams grazing near streams. *Walla Walla Union-Bulletin*, 2 January 1991. [8]

Study examines what the future holds for the Corps. *Intercom*, 17 December 1982. [4] [12]

Study faults DOE on cleanup cost, magnitude. *Tri-City Herald*, 11 February 1991, p. A1-A2. [9]

Study group wins Corps-wide award. *Intercom*, 6 August 1987, p. 1. [6]

Study indicates salmon recovery's costs manageable. Editorial. *Idaho Falls Post-Register*, 10 July 1994. [8]

Study of Division's future completed. *Intercom*, 6 July 1983, p. 6. [2] [12]

Study refuels fears of more health risks near nuclear factory. *Boise Idaho Statesman*, 29 December 1992. [9]

Stuebner, Stephen. Board votes to protect pristine rivers. *Idaho Falls Post-Register*, 12 January 1992, p. B1, B3. [8]

____. First-come, first served. *Idaho Falls Post-Register*, 1 March 1994, p. A1. [4] [12]

____. Galloway Dam on Weiser draws support. *Boise Idaho Statesman*, 21 January 1989, p. 1C-2C. [5] [8]

____. Water attorneys want moratorium. Editorial. *Idaho Falls Post-Register*, 6 March 1994, p. B3. [4] [12]

Subdivisions should wait for flood study. *Jackson Hole News*. 16 September 1992. [6]

Sudhalter, Richard M. Kennewick chronicles: Research, ritual, rascality. *SunSpot.net*, 17 November 2001. INTERNET: www.sunspot.net/features/arts/bal-bk.kennewich18nov17.story. [10]

Summer aids. *Intercom*, 17 September 1984, p. 1. [2]

Summer lock schedule set for dams on Snake River. *Tri-City Herald*, 14 May 2000, p. A4. [4] [11]

Summertime offers endless possibilities for recreation. *Orofino (ID) Clearwater Tribune,* 1 June 2000. [11]

Summit Technology Consulting Engineers. *Turbine Passage Survival: Baseline Turbine Report*. With contributions from USACE, Portland District and Northwest Hydraulic Consultants. Seattle: Summit Technology, 1996. [5]

Sunde, Scott, and Sam Skolink. Salmon plan silent on Snake dams. *Seattle Post-Intelligencer*, 28 July 2000. [8] [12]

Support offices. *Intercom*, winter 1995-96, p. 7, 14. [2] [3] [4] [8]

Surplus salmon will help restore runs: Hatchery fish, instead of being clubbed, will go into the Okanogan River system. *Portland Oregonian*, 22 June 2000. [8]

Survey: Drawdown for salmon turns people off. *Twin Falls (ID) Times-News*, 20 January 1994, p. D3. [8] [12]

Sutlick, Al, and Pete Poolman. Goslings tallied. *Intercom*, 12 June 1987. [8]

Swisher, Larry. Northwest salmon shouldn't be victim of myopic economic policies. Editorial. *Boise Idaho Statesman*, 11 July 1994. [8] [12]

Symposium on salmon recovery. *Washington Law Review*, vol. 74, no. 3, July 1999, p. 511-798.

Taking the Corps by storm. *Engineering News Record*, 19 October 1992. [2] [12]

Task force explores water storage, including dams. *Walla Walla Union-Bulletin*, 2 August 2000, p. 7. [4]

Tate, Bernard. Chief reflects on time of sweeping change. *Engineer Update*, August 2000, p. 1-9. [8] [12]

Taxpayers say they will pay for salmon. *Tri-City Herald*, 3 June 1994. [8]

Teen saved from river mud. *Spokane Spokesman-Review*, 6 March 1992. [8]

Tennessee counsel joins District. *Intercom*, November 1991, p. 16. [2]

Terns can't be moved to help fish. *Seattle Times*, 15 April 2000. [8]

Testa, Matt. County likes Fed plan to flood old channels. *Jackson Hole News*. 31 August 1994. [8]

Testimonials laud TQM benefits. *Intercom*, November 1991, p. 4. [2]

Thomas, Allen. Salmon fishing may land in tank: Dispute erupts over tribal rights, catch limits and protecting fish. *Clark County (WA) Columbian*, 27 May 2000. [8] [12]

Thomas, Sarah. Columbia River and salmon: A brief history. *Salmon Passage Notes*, special Issue [1998], p. 1-6. [8]

____. Evaluating technologies for improved fish passage. *Salmon Passage Notes*, January 1998, p. 1-6. [5] [8]

Thompson, Wayne. Engineers face mighty feat in felling the dams. *Portland Oregonian*, 23 July 2000. [4] [8]

Three arson fires under investigation. *Lewiston Morning Tribune*, 31 May 1994. [11]

Three-year-old Logistics expands functions. *Intercom*, December 1989, p. 17. [2] [3]

Thuermer, Angus M. Raging river puts rancher at odds with Army Corps. *Jackson Hole (WY) News*, 26 August 1992. [8] [12]

Tickner, Capt. Tom. Corps builds flood control structures for Los Alamos. *Engineer Update,* November 2000. [5]

Tire dumper flees. Reprint *Tri-City Herald*, 2 May 1981. *Intercom*, 1 July 1981, p. 4. [11]

Titone, Julie. BPA gets serious about offsetting dams' impact. *Spokane Spokesman-Review*, 20 December 1992. [8]

____. Columbia River plans go on tour. *Spokane Spokesman-Review*, 7 September 1992. [4] [12]

____. Corps doesn't reject pleas to help sturgeon recover. *Spokane Spokesman-Review*, 28 May 1992. [8]

____. Corps stops preparing for Lower Granite drawdown. *Spokane Spokesman-Review*, 30 November 1994. [8]

____. Dams prepared for experiment with drawdown. *Spokane Spokesman-Review*, 29 February 1992. [8]

____. Fishermen incensed over tribe's steelhead ban. *Spokane Spokesman-Review*, 21 September 1994. [8] [11] [12]

____. Group wants sturgeon on endangered list. *Spokane Spokesman-Review*, 20 May 1992. [8]

____. Hells Canyon dams release less water. *Spokane Spokesman-Review*, 4 November 1992. [8]

____. House panel OKs drawdown damage aid. *Spokane Spokesman-Review*, 10 June 1992. [4] [8]

____. NW Power Council may get new members. *Spokane Spokesman-Review*, 5 October 1992. [4] [12]

____. Preservation of Hanford Reach debated. *Spokane Spokesman-Review*, 5 October 1992. [8] [11]

____. Salmon cure may be as bad as the disease. *Spokane Spokesman-Review*, 1 June 1994, p. A1, A9. [8]

____. Salmon summit drawdown test unlikely in '91. *Spokane Spokesman-Review*, 12 March 1991, p. A1, A5. [8]

____. Studies aim for survival of a species. *Spokane Spokesman-Review*, 16 May 1994. p. A5, A9. [8]

____. Superfund costs questioned. *Spokane Spokesman-Review*, 22 April 2000. [9]

____. Treasure still buried at Bunker: Valuable smelting byproduct could have been recycled, but liability a big concern. *Spokane Spokesman-Review*, 23 April 2000. [9]

____. Tribe to sell steelhead permits; legality uncertain. *Spokane Spokesman-Review*, 30 September 1994. [8] [11] [12]

____. Tribes want to help watch ancestral sites. *Spokane Spokesman-Review*, March 2000, p. B1. [10]

____. Will dams come tumbling down? *Spokane Spokesman-Review*, 13 May 1994, p. A1, A6. [8] [12]

Tonn, Darrell, and Lenny Frasure. A history lesson, memories surface. *Lewiston Morning Tribune*, 5 March 1992, p. 1C, 5C. [4] [8]

Training program changes expand employee opportunities. *Intercom*, 8 February 1988, p. 3. [2] [3]

Trash rake pulls tons of debris from Snake. *Boise Idaho Business Review*, 25 May 1992. [4] [8]

Traveling fish screens. *Spokane Spokesman-Review*, 14 June 1981. [8]

Trebon, Mitchell. Basin plan may affect future water use. *Salem (OR) Capital Press*, 8 May 1992. [4]

____. DOE considers extension of new water rights halt. *Salem (OR) Capital Press*, 5 June 1992. [8]

Tribal fishing conflict resurfaces. *Twin Falls (ID) Times-News*, 11 June 1992. [8] [12]

Tribal officials concerned about toxins in Columbia River salmon. *Walla Walla Union-Bulletin*, 7 October 1994. [8]

Tribe to bar fishing on one-third of Clearwater River. *Idaho Falls Post-Register*, 4 November 1994. [8] [12]

Tribes adopt water-spreading policy. *Pendleton East Oregonian*, 10 March 1994, p. 6A. [8] [12]

Tribes back extra water for smolts. *Pendleton East Oregonian*, 12 May 1992. [8] [12]

Tribes blast Corps operations. *Pendleton East Oregonian*, 21 July 1994, p. 1A, 2A. [8] [12]

Tribes consult on water issues. *Pendleton East Oregonian*, 18 November 1992. [4] [12]

Tribes question Boldt's mind in case. *Tri-City Herald*, 13 June 1992. [8] [12]

Tribes push harvest-production goals. *Confederated Umatilla Journal*, 6 September 2001. [8] [9]

Tribes want to help watch ancestral sites. *Spokane Spokesman-Review*, 15 March 1992, p. B1. [10]

Tribes will hear from board about watershed program. *Pendleton East Oregonian*, 9 March 1994, p. 3A. [4] [8] [12]

Tribes will sell spring Chinook salmon for the first time in decades. *Boise Idaho Statesman*, 5 May 2000, p. 5B. [8] [12]

Tri-Cities headache told. *Intercom*, 15 February 1981. [11]

Trillhaase, Marty. Demo candidates shy away from drawdown. *Lewiston Morning Tribune*, 15 May 1992, p. 1C, 7C. [8] [12]

____. Fish bypass: McClure confident money for dams will be approved. *Lewiston Morning Tribune*, 19 July 1989, p. 1A, 6A. [8] [12]

____. Fish ladder bill climbs major step. *Lewiston Morning Tribune*, 22 July 1989. [8] [12]

____. Regulating the regulator. *Idaho Falls Post-Register*, 19 January 2000. [9]

Triumph opposed to EPA cleanup. *Boise Idaho Statesman*, 14 December 1992. [9]

Trout Unlimited, Washington Council. Fish transportation in the Columbia River. [Olympia, WA]: Trout Unlimited, 16 January 1998. INTERNET: http://www.localaccess.com/troutunlimited/Barging.doc. [8]

Truelove, Tom. Rebuilding fish runs a goal of 90s. *Tri-City Herald*, 10 March 1990, p. E8. [1] [8]

Turbine repair inspires prose. *Intercom*, 8 February 1988. [4]

Twelve management interns graduate. *Intercom*, December 1990, p. 6-7. [2]

Twenty percent increase in contracting workload. *Intercom*, December 1989. [2]

Two Divisions help get the word out on Sawtooth. *Intercom*, 27 January 1983, p. 2. [2] [3] [8]

Two fish hatcheries show progress. *Intercom*, December 1990. [8]

Two new offices tackle Hanford. *Intercom*, August 1991, p. 14. [9]

Ufford, Joy. An historic perspective of the dam. *Jackson Hole (WY) Guide*, 30 September 1992. [6] [8] [12]

Ulrich, Roberta. Corps of Engineers pares 430 jobs. *Portland Oregonian*, 20 November 1992. [2]

____. NW tribes to sign protection treaty. *Portland Oregonian*, 19 March 1994, p. D8. [8] [12]

____. U.S., Indians to discuss fishery dispute. *Portland Oregonian*, 31 July 1994. [8] [12]

____. Willamette Falls open to fishing by Indians. *Portland Oregonian*, 6 May 1994, p. A1, A16. [8] [12]

Ulrich, Roberta, and Joan Laatz. NW tribes to focus on salmon inequity. *Portland Oregonian*, 30 April 1994. [8] [12]

____. State orders Indian nets out of Columbia. *Portland Oregonian*, 29 April 1994. [8] [12]

Umatilla Army Depot construction. *Intercom*, 8 October 1987. [4]

Umatilla Depot activity chemical stockpile disposal program. *Intercom*, December 1989, p. 13. [4]

Umatilla River. [n.p.]: Lewis and Clark Rediscovery Project, 2002. INTERNET: www.l3-lewisandclark.com. [10] [12]

Unfinished business at Asarco: Superfund cleanup 'in limbo' as firm struggles. *Seattle Times*, 3 March 2002. [9]

United Sportsman Alliance of Idaho. Updated salmon science. *For Balanced Solutions* no. 37. INTERNET: www.usa4id.com/Salmon%20Science%2011-00.htm. [8]

Upper Snake River water nearly gone. *Boise Idaho Statesman*, 28 September 1992. [4]

U.S. Air Force. Small business "101." [n.p.]: U.S. Air Force, [2001].
INTERNET: www.miairforcemall.org/training/sbhandbook.pdf. [2]

USACE. Corps and EPA clarify Clean Water Act definition. News release. Washington, DC: USACE, January 2001. [9]

____. CWA guidance. Washington, DC: USACE.
INTERNET: http://www.usace.army.mil/missions/civilworks/regulatoryprogramandpermits/relatedresources/cwaguidance.aspx. Accessed 2012.

____. Environmental Community of Practice: Brownfields. Washington, DC: USACE, 2002.
INTERNET: http://hq.environmental.usace.army.mil/programs/brownfields/brownfields.html. [2] [7]

____. Environmental Operating Principles. Washington, DC: USACE, 2002.
INTERNET: http://www.hq.usace.army.mil/cepa/envprinciples.htm. [1] [7]

____. Project Management Business Process. Washington, DC: USACE, 2002.
INTERNET: www.nws.usace.army.mil/pmbp/Culture.htm. [2] [12]

____. Regulatory Program. Washington, DC: USACE, 2003.
INTERNET: http://www.usace.army.mil/inet/functions/cw/cecwo/reg/

USACE calls on District talent. *Intercom*, March 1994, p. 4. [11]

USACE, Construction Engineering Research Laboratory. Cultural resources risk assessment. Champaign, IL: Construction Engineering Research Laboratory, 27 September 2001.
INTERNET: www.cecer.army.mil/td/tips/indesAREA.cfm?AREA=9. [10]

USACE, Hazardous, Toxic, and Radioactive, Design Center. Bunker Hill superfund site. Seattle: Hazardous, Toxic and Radioactive, Design Center, 23 February 1999.
INTERNET: www.nws.usace.army.mil/geotech/bunker/bunker.htm. [9]

____. Hazardous, Toxic, and Radioactive Waste (HTRW) Design Center for Washington, Oregon, Idaho, and Montana. Seattle: Hazardous, Toxic and Radioactive, Design Center, 17 July 2001.
INTERNET: www.nws.usace.army.mil/geotech/htrw.htm. [9]

USACE, Huntsville Center. Chemical demilitarization: Fact sheet. Huntsville, AL: The Center.
INTERNET: www.hnd.usace.army.mil. [4]

USACE, Mandatory Center of Expertise for the Curation and Management of Archeological Collections. MCX-CMAC projects. St. Louis: The Center, 2000. INTERNET: www.mvs.usace.army.mil/eng/Curation/Projects.htm. [3]

USACE, National Water Safety Program. National Water Safety Program. Walla Walla: The Program, 2000.
INTERNET: watersafety.usace.army.mil/. [2] [3] [6] [11]

USACE, Northwestern Division. Salmon passage notes. Portland: The Division, 1992-1998.
INTERENT: http://www.nwd.usace.army.mil/ps/spnchron.htm. [8]

USACE, Office of History. Welcome to the Headquarters, U.S. Army Corps of Engineers, Office of History. Washington, DC: The Office, 2000. INTERNET: http://www.hq.usace.army.mil/history/index.htm. [1]

USACE, Pacific Salmon Coordination Office. Flow augmentation. Seattle: The Office, 2 March 2000.
INTERNET: www.nwd.usace.army.mil/ps/ropsflow.htm. [8]

____. Juvenile fish transportation program. Seattle: The Office, 2 March 2000.
INTERNET: www.nwd.usace.army.mil/ps/juvetran.htm. [8]

____. Spill for fish. Seattle: The Office, 2 March 2000. INTERNET: www.nwd.usace.army.mil/ps/ropsspill.htm. [8]

USACE, Portland District. Can a new turbine design be safer for juvenile fish? Portland, OR: The District, 7 March 2000. INTERNET: www.nwp.usace.army.mil/PA/NEWS/archive/2000/00-29.htm. [5] [8]

____. Corps turns fishing sites over to Bureau of Indian Affairs. News release. Portland, OR: The District, 24 March 1997. INTERNET: www.nwp.usace.army.mil/PA/NEWS/archive/1997/97-35.htm. [8] [12]

____. Roller compacted concrete. Portland, OR: The District, [n.d.].
INTERNET: www.nwp.usace.army.mil/nwp/rcc.pdf. [5]

USACE, Portland District, Environmental Resources Branch. Fish passage and research page. Portland, OR: The District, [2001]. INTERNET: www.nwp.usace.army.mil/op/fishdata. [8]

USACE, Portland District, Natural Resource Management Section. Adult fish counts. Portland, OR: The District, 8 February 2001. INTERNET: www.nwp.usace.army.mil/pm/ENFISH.htm. [8]

USACE, Walla Walla District. 2000 AFEP annual review abstract.
INTERNET: https://www.nww.usace.army.mil/planning/ep/fishres/reports/book-abstract.pdf. [5]

____. Assistance programs of the Corps of Engineers. Walla Walla: NWW, 2001.
INTERNET: www.usace.army.mil/html/pug/ap/appage.htm. [5] [6] [12]

____. Boise Office. Walla Walla: NWW, [2000].
INTERNET: http://www.nww.usace.army.mil/boise/outreach.html. [2] [12]

____. City of Richland Ecosystem Restoration Project. Walla Walla: NWW, [2000]
INTERNET: www.usace.army.mil/richland/. [7]

____. Coppei Creek flood control project proposed for Waitsburg, Wash. News release. Walla Walla: NWW, 31 January 2003. [6]

____. Corps completes Lower Snake River study on improving fish passage. News release. Walla Walla: NWW, 11 September 2002. [8]

____. Corps receives Interior Dept. results, advises court: Give ancient human skeleton to tribes. News release. Walla Walla: NWW, 25 September 2000. [10]

____. Craig Rockwell, Operations Division, Walla Walla District. Walla Walla: NWW, [n.d.].
INTERNET: www.nww.usace.army.mil/cepa/publicservice/Rockwell.htm. [11]

____. Digital project notebook. Walla Walla: NWW, 2000. INTERNET: www.nww.usace.army.mil/dpn/.
[4] [5] [6] [7] [8] [12]

____. Flood Emergency Responsibilities. Walla Walla: NWW, 1996.
INTERNET: www.nww.usace.army.mil/html/offices/op/em/flodasst.htm. [6]

____. Geographic information systems (GIS). Walla Walla: NWW, 26 June 2000.
INTERNET: www.nww.usace.army.mil/gis/history.htm. [3]

____. History of the Walla Walla District: an Overview. Walla Walla: NWW, [1999].
INTERNET: http://www.nww.usace.army.mil/welcome/npwhist.htm.

____. Land classification/acreage. Walla Walla: NWW, 11 April 2001.
INTERNET: http://www.nww.usace.army.mil/planning/er/landclas. [11]

____. Land classification: General information. Walla Walla: NWW, 30 April 2001.
INTERNET: http://www.nww.usace.army.mil/planning/er/landclas/genlc.htm. [11]

____. Lower Granite removable spillway weir (RSW). Walla Walla: NWW, [2000].
INTERNET: http://www.nww.usace.army.mil/rsw/. [5] [8]

____. Special Emphasis Committee Program goals and objectives. Walla Walla: NWW, 1999. [2]

____. Support for others. Walla Walla: NWW, March 2000.
INTERNET: http://www.nww.usace.army.mil/planning/support.htm. [2] [4]

____. Tsceminicum. Brochure. Walla Walla: NWW, [n. d]. [10] [11]

____. Walla Walla District Leadership Council initiatives. Walla Walla: NWW, 1999. [2]

____. Walla Walla District recreation areas. Walla Walla: NWW, [n.d].
INTERNET: http://www.nww.usace.army.mil/corpsoutdoors/. [11]

____. Walla Walla River Basin feasibility study. Walla Walla: NWW, 2002.
INTERNET: http://www.nww.usace.army.mil/wwrbasin/default.htm. [2] [3] [12]

____. What is a 5-year flood event? Walla Walla: NWW, 2000.
INTERNET: http://www.nww.usace.army.mil/html/offices/op/em/5yrflood.htm. [6]

____. What is a GIS? Walla Walla: NWW, 26 June 2000.
INTERNET: www.nww.usace.army.mil/gis/definition.htm. [3]

____. What we are: Information on the Walla Walla District. Walla Walla: NWW, 2001.
INTERNET: http://www.nww.usace.army.mil/welcome/cewhatwe.htm.

USACE and Environmental Protection Agency. Further Revisions to the Clean Water Act Regulatory Definition of "Discharge of Dredged Material." Proposed rule. *Federal Register* 65:50108.

U.S. Army, Environmental Center. Cultural resources: Federal statutes, regulations and executive orders.
Aberdeen Proving Ground, MD: U.S. Army, Environmental Center, 15 February 2001.
INTERNET: aec-www.apgea.army.mil:8080/prod/usace/eq/conserv/crmp_05.htm. [10]

U.S. Fish and Wildlife Service, Division of Bird Habitat Conservation. Idaho. Washington, DC: The Service, [2001].
INTERNET: http://northamerican.fws.gov/NAWCA/projects/USprojects/ID.htm. [8] [9]

U.S. Geolgogical Survey. Current Water Data for the Nation, INTERNET: http://waterdata.usgs.gov/nwis/rt, accessed March 2011.

U.S. Geological Survey, Independent Scientific Review Panel. Mainstem habitats and aquatic communities: assessment and management options. Cook, WA: The Survey, Biological Resources Division, 28 June 2001. [7]

University of Missouri-Rolla, Electrical and Computer Engineering Department. Electricity deregulation and the consumer. Rolla, MO: The Department, 1997. INTERNET: www.ece.umr.edu/links/power/electric2.html. [4]

Update on new headquarters. *Information Bulletin*, 5 October 1988, p. 1. [2]

Upland game birds. Edgefield, S.C.: Quail Unlimited, 2002. INTERNET: www.qu.org/main/upland/dulandgamebirds.cfm. [8] [11]

USFS outlines claims in Snake River adjudication. *Salmon (ID) Recorder-Herald*, 7 April 1994, p. 14. [4] [8] [12]

Using metaphor to describe organizations. Adapted from new organizational forms in *Managing for the Future* (Cincinnati: South-Western, 1996). INTERNET: www.bsbpa.umkc.edu/classes/heimovicsr/MISC/Using%20Metaphor.htm. [2] [12]

Vanegas, Alex. Policy watch: Diversity—responding to demographic and socio-cultural shifts in the Federal workforce. Blacksburg, VA: Virginia Polytechnical Institute and State University, Center For Public Administration and Policy, 2001. INTERNET: filebox.vt.edu/users/avanegas/Policy%20Watch%20I.htm. [2] [12]

Van Stone, Bud. Retirement. *Intercom*, June 1989, p. 7. [2]

Varon, Elana. DOD upgrades super tech. *Federal Computer Week*, 8 March 1999. [2]

Vision, mission. *Intercom*, December 1989, p. 3. [2]

Vogt, Andrea. Drawdown foes vow to fight to the finish. *Lewiston Morning Tribune*, 7 March 1994. [8]

Vogt, Andrea, and Michael R. Wickline. EchoHawk pans Governor's approach to drawdown. *Lewiston Morning Tribune*, 4 March 1994. [8] [12]

Vollmer, Elizabeth. Intermountain region's cheap, abundant energy seems destined to end. *Pocatello Idaho State Journal*, 17 February 1991. [4] [8] [12]

____. Irrigation delay could save crops later. *Pocatello Idaho State Journal*, 3 March 1991. [4] [12]

____. Jones: Idaho's water problems just beginning. *Pocatello Idaho State Journal*, 22 February 1991. [4] [8] [12]

____. McClure: Water threat is real. *Pocatello Idaho State Journal*, 7 February 1991. [4]

____. Voters OK water pact. *Pocatello Idaho State Journal*, 2 June 1991. [4] [12]

____. Water agreement queries answered. *Pocatello Idaho State Journal*, 17 March 1991. [4] [12]

Volunteers provide extra support in time of need, fill in gaps. *Intercom,* November 1997, p. 1. [2]

Volz, Lt. Col. Robert D. Commander's message. *Intercom,* May 1992, p. 3. [8]

____. Commander's message. *Intercom,* winter 1992, p. 3. [8] [9]

____. Corps of Engineers Tri-City commitment runs deep. *Tri-City Herald*, 28 March 1992. [6] [12]

____. Message from the Commander. *Intercom,* March 1993, p. 3, 16.

____. Message from the Commander. *Intercom,* June 1993, p. 3, 16.

Wald, Matthew L. Government still puzzled over Hanford waste tanks. *Pendleton East Oregonian*, 28 December 1992. [9]

____. Scientist seeks to prove danger posed at Hanford. *Pendleton East Oregonian*, 12 December 1992. [9]

Walla Walla Basin Watershed Council. Subbasin planning process. Milton-Freewater, OR: The Council, 2002. INTERNET: www.wwbwc.org/Main_Pages/Subbasin-Planning.htm. [8] [9]

____. Walla Walla Basin current situation. Milton-Freewater, OR: The Council, 2002. INTERNET: www.wwbwc.org/Main_Pages/WWB_Current_July_2002.htm. [8] [9]

____. Walla Walla River flow restoration. Milton-Freewater, OR: The Council, 2002. INTERNET: www.wwbwc.org/Main_Pages/Projects/Flows.htm. [7] [9]

Walla Walla District, District of the Month Series, *USACE Engineering and Construction News*, August 2001, p. 5-11. [4] [8]

Walla Walla District facts. *Intercom*, winter 1992, p. 14-15.

Walla Walla winces at FY91 "worst-case scenario." *Intercom*, August 1990, p. 1, 5-7. [2]

Wallace, Mark. Work is progressing on cleanup at Hanford. *Seattle Daily Journal of Commerce*, 18 August 1994. [9]

Walter, Lt. Col. James A. A fiscal year salute. *Intercom*, December 1989, p. 2.

____. Initiative 88. *Intercom*, December 1988, p. 2-3. [2] [5]

Washington, Governor's Office. The State of Salmon Report – Hatcheries. [Olympia]: Washington, Governor's Office, [2001]. INTERNET: www.governor.wa.gov/esa/sosreport/hatcheries.htm. [8]

Washington wheat farmers are harvesting bumper crop. *Spokane Spokesman-Review*, 18 June 2000. [4]

Washingtonian returns to take District assignment. *Intercom*, fall 1995. [12]

Water level drops behind second dam. *Tri-City Herald*, 16 March 1992. [8]

Water researcher says outflows of Snake River aquifer showing slight reduction. *Twin Falls (ID) Times-News*, 14 January 1991. [4]

Water Resources orders water users to stop diverting Snake. *Lewiston Tribune*, 28 June 1992. [4] [8]

Water rights issue draws major opposition response countywide. *Baker City (OR) Record-Courier*, 27 February 1992. [4] [8] [12]

Waterman, Pamela J. Beyond FEA software: Tapping into design resources. *DE Online 6*, no. 4 (December 2000). INTERNET: www.deskeng.com/articles/00/Dec/rg_FEA/main.htm. [3]

Watson, Christie. Nez Perces join bicentennial preparations. *Lewiston Morning Tribune*, 3 March 2000. [11]

Webster, John. Don't let courts regulate dams. Editorial. *Spokane Spokesman-Review*, 5 April 1994, p. B4. [8]

Welch, Craig. Scenic-river designation sought for Willow Creek. *Jackson Hole (WY) Guide*, 26 January 1994, p. A10. [9]

Weller, Lt. Col. James S. Commander's Corner. *Intercom*, September 1994, p. 2.

____. Commander's Corner. *Intercom*, fall 1995, p. 2.

____. Commander's Corner. *Intercom*, winter 1995-96, p. 2. [2] [3] [4]

____. Commander's Corner. *Intercom*, April 1996, p. 2.

____. Message from the Commander. *Intercom*, September 1993, p. 3.

____. Reflections on 1993 challenges. Message from the Commander. *Intercom*, December 1993, p. 2. [4]

Wentzel, George. Conservancy tries to protect South Fork. *Pocatello Idaho State Journal*, 30 May 1991. [4] [8] [12]

Wetlands Research, Inc. Mitigation bank. Chicago: Wetlands Research, Inc., [n.d.]. INTERNET: http://www.wetlandsresearch.org/improvin.htm. [9]

Whale, Robert. River improvement plan to be unveiled soon. *Tri-City Herald*, 5 June 2000. [4]

Wheat growers rip Oregon wild fish policy. *Bend (OR) Columbia Basin Bulletin*, 14 July 2000. [4] [8]

Where rock piles litter river, engineers see lush islands: Corps plans to create wildlife haven in the Columbia. *Seattle Times*, 27 February 1992, p. F4. [8] [9]

Wherry, Steve. Galloway Dam is back in the news. *Weiser (ID) Signal American*, 4 January 1990. [6] [8]

Whitehurst, Neil. House approves $21 million for area Corps' projects. *Walla Walla Union-Bulletin*, 30 June 1989. [2] [4] [12]

____. Port could get stuck with Corps' facilities. *Walla Walla Union-Bulletin*, 24 April 1991, p. 1. [2]

____. Port dredging may require improving wildlife areas. *Walla Walla Union-Bulletin*, 15 May 1991, p. 7. [4] [8]

Wickline, Michael R. Drawdown foes storm legislature. *Lewiston Morning Tribune*, 8 March 1994, p. 5A. [4] [8] [12]

____. Drawdown plans draw fire: Dworshak won't be full at all this summer, Cuddy says. *Lewiston Morning Tribune*, 20 May 2000. [8] [11] [12]

____. EchoHawk vows to work for resolution of steelhead conflict. *Lewiston Morning Tribune*, 20 October 1994. [8]

____. Lawmakers want state involved in *Endangered Species Act*. *Lewiston Morning Tribune*, 1 February 1994, p. 1A. [8]

Widner, Tracy. Galloway Dam has small, small town divided. *Ontario (OR) Daily Argus*, 24 February 1991, p. 13H-14H. [6] [8]

Wildlife enhancement study begins. *Intercom*, 1 August 1981, p. 1-2. [8]

Williams, Lauri. We put that river to use, but nature pays a price for Northwest's cheap power: Hydroelectric dams. *Tri-City Herald,* 20 December 1992. [4] [8]

Williams, Marla. Saving salmon: Wise investment or waste of money? Reprint from *Seattle Times*. *Walla Walla Union-Bulletin,* 29 May 1994.

Willow Creek Dam construction proceeds in several ways. *Intercom*, 15 March 1982, p. 3. [5] [6]

Willow Creek Dam to be subject of Heppner vote. *Intercom*, 1 May 1981. [5] [6]

Willow Creek dedicated to "preservation of life." *Intercom*, 8 August 1983, p. 1. [5] [6]

Willow Creek project October 4, 1982. *Intercom*, 26 October 1982, p. 1. [5] [6]

Willow Creek report expected Nov. 16. *Information Bulletin*, 9 November 1988, p. 1. [5] [6]

Willow Creek report to be released Monday, Nov. 21. *Information Bulletin*, 16 November 1988, p. 1. [5] [6]

Willow Creek to be honored in presidential design ceremony. *Information Bulletin*, 26 October 1988, p. 1. [5]

Willow Creek wins Presidential Design Achievement Award. *Information Bulletin*, 23 November 1988, p. 1. [5] [6]

Wilson, Wendy. Environmental regulation flawed. Guest opinion. *Pocatello Idaho State Journal*, 21 June 1992. [9]

Winborg named new chief of Operations Division. *Intercom*, 15 September 1983. [2] [4]

Winborg new head of Project Operations. *Intercom*, 15 January 1981. [2] [4]

Woehler, Robert. Bateman Island not for sale: But an ex-Hanford employee says he has big plans for the property. *Tri-City Herald*, 11 August 1994. [11]

____. Corps' plan: No severe pool cuts. *Tri-City Herald*, 20 October 1992. [8]

____. Drawdown cost study draws fire. *Tri-City Herald*, 7 May 1992, p. A1-A2. [4] [8]

____. Drawdown foe says over 1,000 fish died. *Tri-City Herald*, 13 March 1992. [8]

____. Drawdown isn't answer, irrigator says. *Tri-City Herald*, 21 April 1992. [8]

____. Environmentalist backs drawdowns. *Tri-City Herald*, 30 May 1992. [8]

____. Foley, House panel support $2 million for drawdown loss. *Tri-City Herald*, 11 June 1992. [8] [12]

____. Pasco's Lathim battles ruling against salmon. *Tri-City Herald*, 15 June 1992. [8]

____. Snake River users fear plan to save salmon. *Tri-City Herald*, 27 February 1991. [8]

Wolff, Carol A. District seeks better ties with tribes. *Intercom*, September 1994, p. 11. [10] [12]

Woodward, Charles. Public lands fight. Letter to the Editor. *Jackson Hole (WY) Guide*, 31 May 2000. [11]

Woodward, Tim. Don't let the hordes trash the Middle Fork of the Salmon. Commentary, *Boise Idaho Statesman*, 27 September 1992. [11]

Work for others. *Intercom*, winter 1992, p. 15. [4]

Work for others program. *Intercom*, 30 December 1987. [4]

Work gets under way on new HQ building. *Intercom*, December 1992, p. 5. [2]

Work resumes at Hat'iuhpuh (Windy Place). *Information Bulletin*, 3 August 1988, p. 1. [10]

Workers to continue oil spill cleanup today. *Tri-City Herald*, 29 June 2000, p. A3. [4] [9]

Workers trained to spot danger signs. *Intercom*, October 1988, p. 11. [4]

Wright, M. K. The prehistoric period of the Hanford site and associated portion of the Columbia River, Washington, circa 10,000 B. P.-A. D. 1805. Hanford, WA: U.S. Department of Energy, Hanford Cultural Resources Program, 1997. INTERNET: www.hanford.gov/doe/culres/mpd/sec2.htm. [10]

McInerney, Terra, Stacey Cole and Melissa Pabisz. The Yakama Indian Nation: Unofficial Web site. Pullman: Washington State University, 2002. INTERNET: ceed.wsu.edu/wsu_StudentProjects/Yakama_Indian_Nation/Yakama_Indian_nation.htm. [8] [12]

Yakamas to raise Chinook salmon smolts at Hanford. *Tri-City Herald*, 19 May 1994, p. A11. [8] [12]

Yates, Scott A. Drawdown report card: No bargain for NW salmon. *Salem (OR) Capital Press*, 7 May 1992. [4] [8]

Year's top stories: 6 Corps site contamination. *Walla Walla Union-Bulletin*, 27 December 1992. [2]

Zanotelli, Brian. Army Depot closure lags. *Hermiston (OR) Herald*, 24 December 1991. [9]

____. Comment period re-opened for weapon incineration plan. *Hermiston (OR) Herald*, 25 February 1992. [9]

____. Depot contamination could cost $13.4 million. *Hermiston (OR) Herald*, 25 February 1992. [9]

Zimowsky, Pete. Conservationist appeal for steelhead runs. *Boise Idaho Statesman*, 17 June 1994. [8]

____. Indians plan to block steelhead season. *Boise Idaho Statesman*, 22 September 1994. [8] [11] [12]

____. Owyhee Reservoir fish high in mercury. *Boise Idaho Statesman*, 17 June 1994. [8]

____. Officials won't test other reservoirs for lead. *Boise Idaho Statesman*, 24 March 1994. [8] [12]

____. Steelhead conflicts about more than fish. *Boise Idaho Statesman*, 27 September 1994. [8] [11] [12]

____. Steelhead may be next on endangered species list. *Boise Idaho Statesman*, 13 July 1994. [8]

____. Take a look at the Boise River: It's slowly choking to death. *Boise Idaho Statesman*, 5 November 1992. [4] [8]

Laws, Regulations, Executive Orders, and Court Cases

Civil No. 85-3147, U.S. District Court, District of Idaho. [9]

Code of Federal Regulations (CFR), Title 33, Part 221.1. *Navigation and Navigable Waters*, *Corps of Engineers Work for Others*. [9]

CFR, Title 33, Part 320.3. *Navigation and Navigable Waters*, *Corps of Engineers, Related Laws*. [9]

CFR, Title 36, *Parks, Forests, and Public Property*. [11]

CFR, Title 36, Part 327.30, Shoreline Management at Civil Works Projeces, first published in the *Federal Register*, July 27, 1990. [11]

Executive Order, 12512, *Federal Real Property Managemen*t, April 29, 1985. [11]

Federal Acquisitions Regulations. INTERNET: http://www.acquisition.gov/far/.

Oregon Revised Statutes 537-348. [12]

Public Law (PL) 59-209. *Antiquities Act of 1906*. [10]

PL 66-280. *Federal Water Power Act*. [9]

PL 74-292. *Historic Sites Act of 1935.* [10]

PL 74-738. *Flood Control Act of 1936*. [6]

PL 78-534. *Flood Control Act of 1944*. [6]

PL 79-526 *Flood Control Act of 1946*. [6]

PL 80-858, Section 205. *Flood Control Act of 1948*. [6]

PL 81-516. *River and Harbor Act of 1950*. Title II. *Emergency Watershed Protection Program*. [5] [6]

PL 83-780. *Flood Control Act of 1954*. [6]

PL 86-523. *Reservoir Salvage Act of 1960*. [10]

PL 86-645. *Flood Control Act of 1960.* Section 206. *Floodplain Management Services*. [6]

PL 87-140, authorizing small flood control project appropriations.

PL 87-874, Section 201. *Flood Control Act of 1962*. [4]

PL 89-298. *Flood Control Act of 1965*. [6]

PL 89-665. *National Historic Preservation Act of 1966*. [10]

PL 91-190. *National Environmental Policy Act of 1969*. [2] [7] [10]

PL 91-224. *Federal Water Pollution Control Act of 1970*. [9]

PL 92-500. *Federal Water Pollution Control Act of 1972 (Clean Water Act).* [9]

PL 92-532. *Marine Protection, Research and Sanctuaries Act of 1972*, [9]

PL 93-205. *Endangered Species Act*. [1] [4] [7] [8]

PL 93-291. *Archeological and Historic Preservation Act*. [10]

PL 94-422. *Water Resources Development Act of 1976.* [4]

PL 95-217. *Clean Water Act of 1977*. [4] [7]

PL 95-341. *American Indian Religious Freedom Act*. [10]

PL 96-95. *Archeological Resources Protection Act*. [10]

PL 96-501. *Northwest Power Act.* [1] [4] [12]

PL 96-515. *National Historic Sites Preservation Act Amendments of 1980*. [10]

PL 97-140. [This flood control works bill has no generally recognized common name.]

PL 99-88. *Energy and Water Development Appropriations Act of 1985*. [2]

PL 99-145. *Defense Authorization Act of 1986.* [4]

PL 99-495. *Electric Consumers Protection Act of 1986*. (*Federal Power Act* amendments) [9]

PL 99-662. *Water Resources Development Act of 1986*. [1] [2] [4] [6] [7] [10]

PL 100-707. *Robert T. Stafford Disaster Relief and Emergency Assistance Act*. [12]

PL 101-601. *Native American Graves Protection and Repatriation Act*. [10]

PL 101-640. *Water Resources Development Act of 1990*. Section 307. [9]

PL 102-486. *Energy Policy Act of 1992* (also called the *National Energy Policy Act*). [2]

PL 103-66. *Omnibus Budget Reconciliation Act of 1993.* [11]

PL 104-303. *Water Resources Development Act of 1996*. [6] [7] [10] [11] [12]

PL 105-178. *Transportation Equity Act for the 21st Century*. [9]

PL 106-53. *Water Resources Development Act of 1999*. [10] [11]

PL 106-541. *Water Resources Development Act of 2000*. [4] [10] [12]

U.S. Army. *Cultural Resources Management.* Army Regulation 200-4. Washington, DC: U.S. Army, 1998. [10]

USACE. *Historical Activities - Field Operating Activities Historical Programs*. Engineer Regulation 870-1-1. Washington, DC: USACE, 1990. [1]

____. *The Corps of Engineers Volunteer Program*. Engineer Regulation 1130-2-432. Washington, DC: USACE, 1985. Superceded. [2]

____. *Natural Disaster Procedures.* Engineer Regulation 500-1-1. Washington, DC: USACE, 1991. [6] [9]

____. *Planning Guidance Notebook.* Engineer Regulation 1105-2-100. Washington, DC: USACE, 2000. [5]

____. *Safety and Occupational Health - The Control of Hazardous Energy.* Engineer Regulation 385-1-31. Washington, DC: USACE, 1994. [2] [9]

____. *U.S. Army Corps of Engineers Business Process.* Engineer Regulation 5-1-11. Washington, DC: USACE, 17 August 2001. [2]

United States Code (USC) 5 § 552. *Freedom of Information Act*. [2]

USC , Title 5. *Government Organization and Employees*. INTERNET: http://uscode.house.gov/download/title_05.shtml.

USC 5 § 552a. *Privacy Act*. [2]

USC 33 § 408. *Taking Possession of, Use of, or Injury to Harbor or River Improvements*. [9]

USC 38 § 4212. *Veterans' Readjustment Assistance*. [2]

USC 319 § 61. Jersey Central Power & Light Co. v Federal Power Commission, 1943.

USC 474 § 121. United States v Riverside Bayview Homes, Inc., 1985. [9]

District Letters, Memoranda, Minutes, Presentations

Bulen, Lt. Col. William E., Jr. *New Commander's Briefing.* Slide presentation. Walla Walla, NWW, 1999.

Carlton, Richard. Letter to Mr. Scott Staples, City Manager, City of Walla Walla. NWW, 17 November 1998. [2]

Federal Columbia River Power System Cooperating Group Meeting, Payos Kuus T'Suukwe'. Minutes. Walla Walla: The Group, 1997-2000. [3] [10]

Hood, Brian. *Trip Report, DIM/CIM Conference Apr. 16-18, 2002.* Memorandum for record. Walla Walla: NWW, 2002. [3]

USACE, Walla Walla District. *Eastern Operating Area Briefing, LTC Wagenaar.* Walla Walla: NWW, 5-6 September 2000. [2] [4]

____. *Functional Statements.* NWWOM 10-1-3. Walla Walla: NWW, 1 February, 2001. [2]

____. *FY 98 O&M Program Concerns, Including Dredged Material Management Plan Preliminary Assessment.* Memorandum for Commander, North Pacific Division. Walla Walla: NWW, 2 May 1996. [4]

____. Information Management Office to CECOM-SMC. *Firm Fixed-Price Proposal for PBX Upgrades*, memorandum. Walla Walla: NWW, 19 May 2000. [3]

____. *Retiree Briefing.* Slide presentation. Walla Walla: NWW, June 2000. [2]

____. *Walla Walla River Fish Passage Restoration Project: Section 1135 Facts Sheet.* Walla Walla: NWW, 12 January 1999. [7]

Interviews of NWW Staff

Brown, Jimmie L., Environmental Resource Specialist. Interview by Charlene Grass, tape recording, transcript. Walla Walla: NWW, 23 July 2001.

Carlton, Richard, Chief, Real Estate Division. Interview by Charlene Grass, tape recording, transcript. Walla Walla: NWW, 24 October 2001.

Christianson, Carl J., Supervisory Wildlife Biologist. Interview by Charlene Grass, tape recording, transcript. Walla Walla: NWW, 26 June 2001.

Clausen, Gareth M., Civil Engineer. Interview by Charlene Grass, tape recording, transcript. Walla Walla: NWW, 19 September 2001.

Davis, Diane J., Program Analyst. Interview by Charlene Grass, tape recording, transcript. Walla Walla: NWW, 21 October 2001.

Eastman, Mark G., Park Ranger. Interview by Charlene Grass, tape recording, transcript. Walla Walla: NWW, 25 June 2001.

Greenwald, Wendell L., Project Engineer. Interview by Charlene Grass, tape recording, transcript. Walla Walla: NWW, 17 September 2001.

Hixson, Phil L., Supervisory Outdoor Recreation Planner. Interview by Charlene Grass, tape recording, transcript. Walla Walla: NWW, 10 July 2001.

Leier, John P., Environmental Resource Specialist. Interview by Charlene Grass, tape recording, transcript. Walla Walla: NWW, 12 July 2001.

Lindgren, Mark F., Chief, Hydrology and Hydraulics. Interview by Charlene Grass, tape recording, transcript. Walla Walla: NWW, 22 June 2001.

Nutt, Lynda G., National Water Safety Program. Interview by Charlene Grass, tape recording, transcript. Walla Walla: NWW, 20 September 2001.

Opbroek, David A., Chief, Construction Division. Interview by Charlene Grass, tape recording, transcript. Walla Walla: NWW, 5 December 2001.

Pomraning, Allen N., General Engineer and Outreach Coordinator. Interview by Charlene Grass, tape recording, transcript. Walla Walla: NWW, 24 January 2002.

Quinn, Raymond R., Personnel Officer. Interview by Charlene, Grass, tape recording, transcript. Walla Walla: NWW, 21 September 2001.

Reese, David L., Chief, Hydrology. Interview by Charlene Grass, tape recording, transcript. Walla Walla: NWW, 23 October 2001.

Shelin, Sandra L., Environmental Resource Specialist. Interview by Charlene Grass, tape recording, transcript. Walla Walla: NWW, 14 September 2001.

Tatro, Steven B., Civil Engineer. Interview by Charlene Grass, tape recording, transcript. Walla Walla: NWW, 7 February 2002.

Voss, Steven W., Supervisory Electrical Engineer. Interview by Charlene Grass, tape recording, transcript. Walla Walla: NWW, 26 June 2001, NWW.

Walker, Lawrence P., Retired hydrologist. Interview by Charlene Grass tape recording, transcript. Walla Walla: NWW, 18 June 2001.

Weeks, D. Anthony, General Attorney, Office of Counsel. Interview by Charlene Grass tape recording, transcript. Walla Walla: NWW, 18 June 2001.

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Appendix

Walla Walla District Commanders 1981-2000

COLONEL HENRY J. THAYER, AUGUST 1979 - MAY 1982

13th Commander of the Walla Walla District.

Biography not available

COLONEL ROBERT B. WILLIAMS, MAY 1982 – JUNE 1985

14th Commander of the Walla Walla District.

Biography not available

COLONEL JAMES B. ROYCE, JUNE 1985 – AUGUST 1988

15th Commander of the Walla Walla District.

Colonel James B. Royce accepted command of the Walla Walla District in June 1985.

Previous to his assignment with Walla Walla District, Colonel Royce held numerous responsible command and staff assignments both in the United States and overseas. His command assignments included serving as Company Commander, 13th Engineer Battalion, 7th Infantry Division, 24th Infantry Division, Camp Casey, Korea; Company Commander, 3rd Engineer Battalion, 24th Infantry Division, Munich, Germany; and Commander, 8th Engineer Battalion, 1st Cavalry Division, Fort Hood, Texas. His major staff assignments included serving as Operations Officer, 20th Engineer Battalion, 937th Engineer Group, Pleiku, Vietnam; Assistant Professor, Department of Mechanics, U.S. Military Academy, West Point; Logistics Advisor, U.S. Military Assistance Command, Vietnam; Executive Officer and Operations Officer, 17th Engineer Battalion, 2nd Armored Division, Fort Hood, Texas; and Deputy District Engineer, Baltimore District, U.S. Army Corps of Engineers.

Before reporting for duty in Walla Walla in 1985, Colonel Royce served as Chief, Construction Programs Division in the Office of the Deputy Chief of Staff, Engineer, U.S. Army Europe in Heidelberg, Germany.

After serving as Commander of the Walla Walla District, Colonel Royce, was assigned Deputy Commander of the North Pacific Division, Portland, Oregon.

Colonel Royce was born in Sault Ste Marie, Canada. He is a 1961 graduate of the U.S. Military Academy at West Point, and earned a Master's degree in Civil Engineering from the University of Illinois at Champaign. He is also a graduate of the Army Command and General Staff College and the U.S. Army War College.

Among Colonel Royce's military awards were the Legion of Merit, Bronze Star Medal (two awards), Meritorious Service Medal, Army Commendation Medal (two awards) and the Air Medal.

LIEUTENANT COLONEL JAMES A. WALTER, AUGUST 1988 - NOVEMBER1990

16th Commander of the Walla Walla District.

Lieutenant Colonel James A. Walter accepted command of the Walla Walla District in August 1988.

Before reporting for duty in Walla Walla, Colonel Walter held numerous command and staff assignments in the U.S. and overseas. These included service as battalion Executive Officer, 809th Engineer Battalion, Fort Belvoir, Virginia; Deputy Commander, Humphreys Engineer Center Support Activity, Fort Belvoir, Virginia; Director of Engineering, U.S. Military Training Mission to Saudi Arabia; Civil Engineer, Buffalo District, Facilities Engineer, Sinope, Turkey; and Company Commander, 864th Engineer Battalion (construction), Fort Lewis, Washington.

Previous to his assignment with Walla Walla District, Lieutenant Colonel Walter was Inspector General, U.S. Total Army Personnel Agency, Alexandria, Virginia.

Lieutenant Colonel Walter was born in Youngstown, Ohio. He is a 1971 graduate of the U.S. Military Academy, West Point, New York, and earned a Master of Science degree in Civil Engineering from the University of Washington in Seattle. He is also a graduate of the U.S. Army Command and General Staff College. He is a Registered Professional Engineer and a member of the Society of American Military Engineers and a member of the American Society of Civil Engineers.

Among his military decorations are the Defense Meritorious Service Medal, Meritorious Service Medal (three awards), and the Army Commendation Medal.

LIEUTENANT COLONEL ROBERT D. VOLZ, NOVEMBER 1990 – JULY 1993

17th Commander of the Walla Walla District.

Lieutenant Colonel Robert D. Volz accepted command of the Walla Walla District in November 1990.

Previous to his assignment with Walla Walla District, Lieutenant Colonel Volz held numerous command and staff assignments in the U.S. and overseas. These included service as a staff officer at the Supreme Headquarters Allied Powers Europe (SHAPE), Belgium; Operations Officer, 299th Engineer Battalion, Fort Sill, Oklahoma; Project Officer, U.S. Army Waterways Experiment Station, Vicksburg, Mississippi; Commander, Company C, 54th Engineer Battalion, Wildflecken, Germany; and a Platoon Leader and Company Executive Officer, 54th Engineer Battalion, Wildflecken.

Just prior to coming to Walla Walla, Lieutenant Colonel Volz served as Deputy District Engineer of the Wilmington District, U.S. Army Corps of Engineers.

After leaving Walla Walla District, Lieutenant Colonel Volz served as District Engineer of the Corps' Omaha District.

Lieutenant Colonel Volz was born in Fort Benning, Georgia. He is a 1973 graduate of the Georgia Institute of Technology, Atlanta, Georgia, where he earned a Bachelor of Science degree in Civil Engineering. He also holds a Master of Science degree in Civil Engineering from Rice University, Houston, Texas, and is a graduate of the Army Command and General Staff College, Fort Leavenworth, Kansas. He is a Registered Professional Engineer and a member of the Society of American Military Engineers.

Among his military decorations were the Defense Meritorious Service Medal, the National Defense Service Medal, Army Commendation Medal, Army Achievement Medal, Overseas Service Ribbon, and Parachutist Badge.

LIEUTENANT COLONEL JAMES S. WELLER, JULY 1993 - JUNE 1996

18th Commander of the Walla Walla District.

Lieutenant Colonel James S. Weller accepted command of the Walla Walla District in July 1993.

Upon graduation from West Point, he served assignments at Fort Belvoir, Virginia; Fort Polk, Louisiana; Okinawa; as a Civil Engineering instructor at the U.S. Air Force Academy; and in Korea, where he was aide-de-camp to Lieutenant General William Carpenter, the Combined Field Army Commander in Korea. Lieutenant Colonel Weller was the Executive Officer of the 52nd Engineer Combat Battalion (heavy) at Fort Carson, Colorado. He deployed with the unit to Saudi Arabia in support of Operation Desert Shield/Storm. Lieutenant Colonel Weller is the former Deputy District Engineer of the Omaha District, U.S. Army Corps of Engineers.

Retiring as a Colonel, Weller's last two Corps' assignments were as the Commander of the Engineer Research Development Center in Vicksburg, Mississippi, and as Commander of the Corps' Fort Worth District.

Lieutenant Colonel Weller is a native of Scotia, New York. A graduate of the U.S. Military Academy at West Point, New York, Weller holds Master's degrees from the University of Southern California, the Georgia Institute of Technology, and the U.S. Naval War College.

Among his military honors are the Bronze Star Medal, Meritorious Service Medal, Army Commendation Medal, Air Force Commendation Medal, Air Force Organizational Excellence Award, National Defense Service Medal, Army Service Ribbon, Overseas Service Ribbon, and the Southwest Asia Service Medal.

LIEUTENANT COLONEL DONALD R. CURTIS, JR., JUNE 1996 - JUNE 1998

19th Commander of the Walla Walla District.

Lieutenant Colonel Donald R. Curtis, Jr., accepted command of the Walla Walla District in June 1996.

Lieutenant Colonel Curtis served in military assignments at Fort Belvoir, Virginia; Camp Nimble, Korea, where he commanded an engineer company; and Mannheim, Germany where he served as Operations Officer of the 12th Engineer Battalion, 1st Armor Division. He also served as Assistant Resident Engineer for the Fort Leonard Wood Resident Office under the Kansas City District, U.S. Army Corps of Engineers. Prior to taking command of the Walla Walla District, he was Deputy Civil Engineer of the Defense Intelligence Agency.

After leaving the Walla Walla District, Lieutenant Colonel Curtis did a tour on the Army Staff. He retired from the Army in 2004 after having served his last assignment as the District Engineer for the Fort Leonard Wood Resident Office, Kansas City District.

Lieutenant Colonel Curtis is a native of Newburgh, New York. Curtis is a 1979 graduate of the U.S. Military Academy at West Point, New York and holds a Masters Degree in Civil Engineering from Ohio State University. He also is a graduate of the U.S. Army Command and General Staff College and is a Registered Professional Engineer.

Among his military honors are the Defense Meritorious Service Medal, the Meritorious Service Medal, the Army Achievement Medal, National Defense Service Medal, Army Service Ribbon, Overseas Service Ribbon, Humanitarian Service Medal, Parachutist Badge, Ranger Tab, and the Army Staff Identification Badge.

LIEUTENANT COLONEL WILLIAM E. BULEN, JR., JUNE 1998 - JULY 2000

20th Commander of the Walla Walla District.

Lieutenant Colonel William E. Bulen, Jr., accepted command of the Walla Walla District of the U.S. Army Corps of Engineers in June 1998.

Lieutenant Colonel Bulen's career includes assignments as Engineer Platoon Leader, Battalion Maintenance Officer, and Company Executive Officer with the 317th Engineer Battalion in Eschborn, Germany; Commander, Company A, 307th Engineer Battalion, 82nd Airborne Division, Fort Bragg, North Carolina; Project Engineer, Chief of Construction, and Assistant Resident Engineer in the Fort Richardson Area Office, Alaska District, U.S. Army Corps of Engineers; and Operations Officer, 20th Engineer Brigade; and Operations Officer, 37th Engineer Battalion at Fort Bragg, North Carolina. Prior to taking command of the Walla Walla District, he was the staff engineer for Joint Task Force Bravo in Honduras.

Following his service as Walla Walla District Commander, Colonel Bulen studied for a year at the U.S. Army War College, Carlisle Bank Pennsylvania, and then commanded the Corps' Huntington District. In 2006, Colonel Bulen assumed command of the Afghanistan District, U.S. Army Corps of Engineers.

Colonel Bulen was raised in Fayetteville, North Carolina. A 1980 graduate of Elon College in North Carolina, Lieutenant Colonel Bulen holds a Master's degree in Construction Management from the University of Florida. He is a graduate of the U.S. Army command and General Staff College, the Engineer Officer Basic Course, and the Engineer Officer Advanced Course.

Among his military decorations are the Defense Meritorious Service Medal, the Joint Service Commendation Medal, and the Army Commendation Medal. He holds the Master Parachutist Badge and the Ranger Tab. His service to the Engineer Regiment was recognized with the Bronze de Fleury Medal.

LIEUTENANT COLONEL RICHARD P. WAGENAAR, JULY 2000 – JULY 2002

21st Commander of the Walla Walla District.

Lieutenant Colonel Richard P. Wagenaar., accepted command of the Walla Walla District of the Corps of Engineers in July 2000.

Previous assignments placed him in a variety of command and staff positions in the United States, Korea, and Germany, including: U.S. Army Corps of Engineers' New England Division, Concord, Massachusetts; Fort Knox, Kentucky; 44th Engineer Battalion in Yongsan, Korea; the 194th Armored Brigade at Fort Knox, Kentucky; the Combat Maneuver Training Center – 7th Army in Hohenfels, Germany; and the 10th Mountain Division (Light Infantry), Fort Drum, New York. He has also served as an active duty advisor to the Army National Guard's 34th Infantry Division, Fort Snelling, Minnesota, and as an ROTC Assistant Professor of Military Science at the University of Virginia. Lieutenant Colonel Richard P. Wagenaar came to Walla Walla District from duties as the Assistant Director of Civil Works - Western U.S. and Pacific, Headquarters, U.S. Army Corps of Engineers.

Following his tenure in Walla Walla, Lieutenant Colonel Wagenaar served as the military assistant at the Office of the Assistant Secretary of the Army (Civil Works) at the Pentagon, Washington, D.C. until June 2002. Wagenaar was then assigned to Headquarter, Republic of Korea Combined Forces Command where he served as the Chief of Engineer Plans Division. In 2005, Lieutenant Colonel Wagenaar became the Commander of the New Orleans District, U.S. Army Corps of Engineers, responsible for a $400 million civil works program in south and central Louisiana.

Lieutenant Colonel Wagenaar was raised in Carthage, New York. He is a 1979 graduate of New Mexico Military Institute where he earned an Associate's Degree in Biology and received his Reserve Officer training. He attended Syracuse University where he earned a Bachelor of Science degree in Environmental Science and Forestry. He holds a Master's degree in Management from Cardinal Stritch University.

Lieutenant Colonel Wagenaar's awards and decorations include Meritorious Service Medals; Army Commendation Medals; Army Achievement Medals; Overseas Service Ribbons; Global War on Terrorism Service Medal, Korea Defense Service Medal; National Defense Service Medal; the Army Reserve Service Medal; Army Service Ribbon; and Parachutist Badge.

Walla Walla District Statistics

Table A-1. Walla Walla District Expenditures, 1949-2000

Fiscal Year	Civil $	Military $	Total $	Fiscal Year	Civil $	Military $	Total $
1949	18,911,813		18,911,813				
1950	39,258,833		39,258,833	**1975**	82,945,155	0	82,945,155
1951	44,793,284	4,565,700	49,358,984	**1976***	107,185,598	0	107,185,598
1952	58,970,753	36,731,300	95,702,053	**1977**	86,955,845	0	86,955,845
1953	55,563,162	9,376,690	64,939,852	**1978**	70,859,503	0	70,859,503
1954	37,457,635	15,835,640	53,293,275	**1979**	51,757,914	0	51,757,914
1955	27,911,400	18,473,500	46,384,900	**1980**	58,313,732	0	58,313,732
1956	13,482,138	18,656,734	32,138,872	**1981**	78,970,139	0	78,970,139
1957	16,118,491	20,613,968	36,732,459	**1982**	89,125,563	0	89,125,563
1958	31,738,534	23,152,739	54,891,273	**1983**	71,059,754	0	71,059,754
1959	30,572,223	42,361,993	72,934,216	**1984**	77,188,851	0	77,188,851
1960	48,364,994	31,522,540	79,887,534	**1985**	62,360,493	0	62,360,493
1961	62,006,584	21,531,190	83,537,774	**1986**	63,616,884	0	63,616,884
1962	41,627,404	0	41,627,404	**1987**	67,060,697	0	67,060,697
1963	51,068,256	0	51,068,256	**1988**	49,176,537	0	49,176,537
1964	68,252,336	0	68,252,336	**1989**	69,343,736	0	69,343,736
1965	93,809,281	0	93,809,281	**1990**	61,625,906	0	61,625,906
1966	122,523,509	0	122,523,509	**1991**	93,405,876	0	93,405,876
1967	114,069,306	0	114,069,306	**1992**	95,180,404	0	95,180,404
1968	112,105,511	0	112,105,511	**1993**	90,721,583	0	90,721,583
1969	91,372,607	0	91,372,607	**1994**	99,433,889	0	99,433,889
1970	87,361,361	0	87,361,361	**1995**	131,709,212	0	131,709,212
1971	110,430,642	0	110,430,642	**1996**	125,008,211	0	125,008,211
1972	131,820,133	0	131,820,133	**1997**	111,447,425	0	111,447,425
1973	106,092,305	0	106,092,305	**1998**	106,102,445	0	106,102,445
1974	100,289,667	0	100,289,667	**1999**	104,802,256	0	104,802,256
				2000	112,479,091	668,4330	113,147,524

*End of fiscal year changed to Sept.; 1976 includes July 1975-Sept. 1976.
July 1975-June 1976, Civil Works = $88,126,420; July-Sept. 1976, Civil Works = $19,059,178.

Figures for 1960-1993 from *Annual Summary of Accumulated Historical Materials, Calendar Year 1993*. Walla Walla: NPW, 1994.
Figures for 1994 from *Annual Summary of Accumulated Historical Materials, Calendar Year 1994*. Walla Walla: NPW, 1995.
Figures for 1995-2000 from *Annual Summary of Accumulated Historical Materials, Calendar Year 2000*. Walla Walla: NWW, 2001.

Table A-2. Walla Walla District Workforce, 1950-2000

Fiscal Year	End Strength FTE	Fiscal Year	End Strength FTE
1950	1,060	**1975**	751
1951	945	**1976**	730
1952	1,070	**1977**	730
1953	920	**1978**	700
1954	760	**1979**	718
1955	785	**1980**	775
1956	910	**1981**	797
1957	985	**1982**	783
1958	965	**1983**	816
1959	1,080	**1984**	772
1960	1,175	**1985**	717
1961	1,039	**1986**	676
1962	1,003	**1987**	666
1963	1,023	**1988**	669
1964	1,002	**1989**	643
1965	1,001	**1990**	608
1966	1,034	**1991**	608
1967	1,049	**1992**	636
1968	977	**1993**	669
1969	954	**1994**	689
1970	885	**1995**	689
1971	835	**1996**	670
1972	818	**1997**	642
1973	804	**1998**	587
1974	784	**1999**	594
		2000	611

Figures for 1950-1959 from *A History of the Walla Walla District, 1948-1970,* Walla Walla: NPW, [1971].
Figures for 1960-1993 from *Annual Summary of Accumulated Historical Materials, Calendar Year 1993*. Walla Walla: NPW, 1994.
Figures for 1994 from *Annual Summary of Accumulated Historical Materials, Calendar Year 1994*. Walla Walla: NPW, 1995.
Figures for 1995-2000 from Annual Summary of Accumulated Historical Materials, Calendar Year 2000. Walla Walla: NWW, 2001.

Table A-3. Walla Walla District Equal Employment Opportunity Programs, 1981-2000

Year End	Minorities (% of workforce)	Women (% of workforce)	Year End	Minorities (% of workforce)	Women (% of workforce)
1981	6.5	22.7	**1991**	6.0	25.2
1982	6.2	22.7	**1992**	6.6	25.3
1983	n/a	n/a	**1993**	7.4	26.7
1984	7.2	n/a	**1994**	7.6	27.7
1985	6.5	22.7	**1995**	n/a	n/a
1986	6.2	22.7	**1996**	n/a	n/a
1987	6.6	23.2	**1997**	n/a	n/a
1988	6.0	23.2	**1998**	7.8	24.4
1989	6.2	23.2	**1999**	8.1	24.5
1990	6.5	23.5	**2000**	7.9	24.8

Figures are from the *Annual Summary of Accumulated Historical Materials*, NWW (NPW), published annually.

Table A-4. Walla Walla District Hydropower Production, 1981-2000

Project	Year	Power (Billion Kilowatt Hr)	Year	Power (Billion Kilowatt Hr)
McNary	FY 1981	7.12	FY 1986	6.96
Ice Harbor		2.24		2.66
Lower Monumental		2.33		2.77
Little Goose		2.73		3.37
Lower Granite		2.69		3.38
Dworshak		2.11		
TOTAL		**19.22**		
McNary	FY 1982	6.70	FY 1987	5.90
Ice Harbor		2.80		1.82
Lower Monumental		2.80		1.99
Little Goose		3.51		2.00
Lower Granite		3.58		2.04
Dworshak		1.89		1.24
TOTAL		**21.28**		**14.99**
McNary	FY 1983	6.67	FY 1988	5.60
Ice Harbor		3.41		1.77
Lower Monumental		2.90		1.88
Little Goose		3.20		1.81
Lower Granite		3.20		1.86
Dworshak		1.89		1.44
TOTAL		**21.27**		**14.26**
McNary	FY 1984	7.02	FY 1989	6.24
Ice Harbor		3.50		2.36
Lower Monumental		3.72		2.33
Little Goose		3.88		2.45
Lower Granite		3.92		2.54
Dworshak				1.89
TOTAL				**17.81**
McNary	FY 1985	6.66	FY 1990	6.98
Ice Harbor		2.80		1.96
Lower Monumental		3.72		1.92
Little Goose		2.99		2.19
Lower Granite		3.01		2.21
Dworshak				1.82
TOTAL				**17.08**

Table A-4. Walla Walla District Hydropower Production, 1981-2000, continued

Project	Year	Power (Billion Kilowatt Hr)	Year	Power (Billion Kilowatt Hr)
McNary	FY 1991	7.36	FY 1996	6.8
Ice Harbor		2.01		2.8
Lower Monumental		1.95		3.5
Little Goose		2.20		3.4
Lower Granite		2.28		3.4
Dworshak		2.18		2.4
TOTAL		**17.98**		**22.3**
McNary	FY 1992	5.82	FY 1997	6.4
Ice Harbor		1.39		2.9
Lower Monumental		1.53		3.8
Little Goose		1.63		3.9
Lower Granite		1.65		3.6
Dworshak		1.23		2.2
TOTAL		**13.25**		**22.8**
McNary	FY 1993	5.75	FY 1998	6.7
Ice Harbor		2.03		2.0
Lower Monumental		2.58		3.0
Little Goose		2.46		2.8
Lower Granite		2.69		2.9
Dworshak		1.47		1.4
TOTAL		**16.98**		**18.8**
McNary	FY 1994	5.40	FY 1999	6.61
Ice Harbor		1.40		2.21
Lower Monumental		1.80		3.54
Little Goose		1.66		3.20
Lower Granite		1.75		3.14
Dworshak		0.96		2.00
TOTAL		**12.97**		**20.70**
McNary	FY 1995	6.0	FY 2000	6.61
Ice Harbor		2.1		2.21
Lower Monumental		2.9		3.54
Little Goose		2.7		3.21
Lower Granite		2.9		3.14
Dworshak		1.4		1.99
TOTAL		**18.00**		**17.39**

Figures for 1981-1994 and 1999-2000 from *Annual Summary of Accumulated Historical Material*, Walla Walla: NWW (NPW), published annually.

Table A-5. Walla Walla District Annual Tonnage, 1981-2000

Project	Year	Tonnage	Year	Tonnage
McNary	**1981**	7,995,446	**1986**	5,893,825
Ice Harbor		4,386,471		3,096,340
Lower Monumental		3,754,625		2,723,880
Little Goose		3,536,124		2,629,261
Lower Granite		2,135,284		1,822,154
TOTAL		**21,807,950**		**16,165,460**
McNary	**1982**	6,778,658	**1987**	6,578,615
Ice Harbor		3,771,458		3,800,619
Lower Monumental		3,260,570		3,258,560
Little Goose		3,118,728		3,123,240
Lower Granite		1,889,026		2,114,115
TOTAL		**18,818,440**		**18,875,149**
McNary	**1983**	6,446,035	**1988**	8,199,337
Ice Harbor		3,770,935		4,949,054
Lower Monumental		3,315,635		4,257,796
Little Goose		3,218,032		4,056,396
Lower Granite		1,997,377		2,576,567
TOTAL		**18,748,014**		**24,039,150**
McNary	**1984**	5,719,175	**1989**	6,592,134
Ice Harbor		3,896,607		3,645,388
Lower Monumental		3,315,635		3,169,696
Little Goose		3,165,532		3,057,974
Lower Granite		2,118,148		2,131,516
TOTAL		**18,215,097**		**18,596,708**
McNary	**1985**	5,338,751	**1990**	6,732,465
Ice Harbor		2,708,866		4,024,909
Lower Monumental		2,350,789		3,522,494
Little Goose		2,224,584		3,382,550
Lower Granite		1,557,299		2,207,199
TOTAL		**14,180,289**		**19,869,617**

Table A-5. Annual Tonnage – Walla Walla District, 1981-2000, continued

Project	Year	Tonnage	Year	Tonnage
McNary	**1991**	6,151,333	**1996**	7,885,948
Ice Harbor		3,508,987		3,563,319
Lower Monumental		2,419,668		3,097,396
Little Goose		2,921,135		2,911,889
Lower Granite		1,861,347		1,778,193
TOTAL		**16,862,470**		**19,236,745**
McNary	**1992**	6,729,418	**1997**	8,294,395
Ice Harbor		3,508,987		4,206,988
Lower Monumental		2,995,001		3,675,044
Little Goose		2,921,135		3,178,289
Lower Granite		1,861,347		5,227,713
TOTAL		**18,015,888**		**24,582,429**
McNary	**1993**	7,450,618	**1998**	8,591,046
Ice Harbor		3,905,357		4,570,876
Lower Monumental		3,405,391		4,631,997
Little Goose		3,306,280		3,553,860
Lower Granite		2,200,488		2,226,112
TOTAL		**20,268,134**		**23,573,891**
McNary	**1994**	7,976,125	**1999**	8,461,600
Ice Harbor		4,279,837		4,559,900
Lower Monumental		3,678,206		7,109,500
Little Goose		3,542,685		3,109,100
Lower Granite		2,313,586		2,264,100
TOTAL		**21,790,439**		**25,504,200**
McNary	**1995**	8,677,517	**2000**	8,460,600
Ice Harbor		4,575,656		4,687,300
Lower Monumental		3,923,746		4,109,500
Little Goose		3,776,256		3,103,100
Lower Granite		2,414,283		2,265,000
TOTAL		**23,367,458**		**22,625,500**

Figures on Tonnages from *Annual Report of the Chief of Engineers on Civil Works Activities*, Walla Walla Extract, published annually.

Table A-6. Lower Snake River Fish and Wildlife Compensation Plan Fish Hatchery Facilities

Hatchery	O&M Agency	Fish Type	Pounds	Satellite Facility
Looking Glass	ODFW	Spring chinook	69,600	Big Canyon Creek
				Imnaha
				Looking Glass
				Wallowa
Irrigon	ODFW	Steelhead	279,600	Big Canyon Creek
				Wallowa
				Little Sheep Creek
				Looking Glass
Lyons Ferry	WDFW	Fall chinook	101,800	Curl Lake (Acclimation)
		Spring chinook	8,800	Tucannon River
		Steelhead	116,400	Cottonwood (Acclimation)
		Trout	45,000	Dayton Pond (Acclimation)
				Capt. John (Acclimation)
				Pittsburgh Landing (Acclimation)
				Big Canyon, Idaho (Acclimation)
Sawtooth	IDFG	Spring chinook	149,000	E. Fork Salmon River
				Sawtooth
Dworshak	USFWS	Spring chinook	70,000	Dworshak
Clearwater	IDFG	Steelhead	350,000	Crooked River
		Spring chinook	91,300	Powell
				Red River
Magic Valley	IDFG	Steelhead	291,500	Sawtooth
				E. Fork Salmon River
Hagerman	USFWS	Steelhead	340,000	Sawtooth
				E. Fork Salmon River
McCall	IDFG	Summer chinook	61,300	McCall

Agencies: USFWS = U.S. Fish and Wildlife Service; ODFW = Oregon Department of Fish and Wildlife; WDFW = Washington Department of Fish and Wildlife; IDFG = Idaho Department of Fish and Game operate these hatcheries.

Table A-7. Permitting and other Regulatory Activity in Walla Walla District, 1986-2000

Activity	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
Individual Permits Issued	49	50	56	44	29	32	62	39	37	42	27	29	22	16	6
Letter Permissions Issued	4	7	7	9	15	25	15	18	20	19	12	2	5	4	3
Regional/General Permit Activities	1	4	64	64	55	48	74	49	60	53	47	34	48	70	67
Nationwide Permit Activities	420	482	108	105	209	246	303	333	425	458	652	798	789	641	558
Enforcement Actions Reviewed	44	39	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Enforcement Actions Completed	N/A	N/A	20	19	11	13	23	29	65	41	32	58	46	60	70
Compliance Inspections	N/A	N/A	193	239	183	188	96	114	168	17	49	48	82	N/A	N/A
Public Notices Issued	N/A	N/A	60	56	35	46	106	55	52	44	28	32	28	N/A	N/A
Permit Applications Cancelled or Withdrawn	11	11	3	4	5	9	51	21	45	23	21	20	17	N/A	N/A
Permit Applications Denied	4	4	6	6	3	2	11	5	3	3	2	1	1	1	6

Table A-8. Walla Walla District Timeline of Significant Events, 1981-2000

Date	Event
early 1980s	Serious infectious hematopoietic necrosis (IHN) (a liver disease) outbreaks at Dworshak National Fish Hatchery
1980	*Pacific Northwest Power and Conservation Act;* Northwest Power Planning Council founded
1980	*Clean Water Act*, Section 404(b)(1) guidelines revised, affects regulatory actions
1980	*National Historic Preservation Act* amendment of 1980 (PL 96-515)
1980	Tseminicum sculpture dedicated at confluence of Snake and Clearwater Rivers, Lewis and Clark Visitor Center, Lewiston, Idaho
1981-1995	District Headquarters served by robot mail carrier, "Big Red"
1981	General flooding in the region affecting Weiser, Payette, Imnaha, Salmon, and Tucannon Rivers
1980	Ririe Dam, Willow Creek, Idaho, modified
1981	Juvenile Fish Transportation Program, renamed from Operation Fish Run, becomes permanent
1981	Presidential Task Force on Regulatory Reform recommends federal regulatory programs be realigned on state borders
1981	District registers an all-time high of 22 disabling injuries to employees
1981	Ice Harbor visitor facility opens
1982	Delegation of Korean engineers and administrators visits Willow Creek Dam and McNary Lock and Dam
1982	Southway Memorial Bridge, Lewiston, Idaho, dedicated
1982	Willow Creek Dam, Heppner, Oregon, completed; world's first roller-compacted concrete dam; Walla Walla District employee Ernie Schrader, Engineer of the Year for 1983
1982	McCall Fish Hatchery, McCall, Idaho, completed; wins the Corp's top landscape design award
1982	District designs Umatilla Fish Hatchery for Bonneville Power Administration
1982	Dworshak Project land acquisition completed
1982	Walla Walla District seals a 230-foot long crack in Dworshak Dam and receives a Chief of Engineers Award for engineering innovation for 1981
1983	Ice Harbor lock repaired
1983	Boise River experiences a major flood
1983	For the first time in its history, Walla Walla District's budget for operations and maintenance is larger than the budget for construction activities
1983	Lookingglass Fish Hatchery dedicated
1983	Dworshak timber blown down in major windstorm
1983	First annual Human Resources Development Week; discontinued mid-1990s
1983	OMB Circular A-76 issued; District conducts many commercial activities studies 1983-1990
1984-1986	Forest fires at Dworshak
1984-1985	Ice jam floods on Salmon River in Idaho; Corps commences study
1984-1985	District assists with Environmental Protection Agency construction grants in Idaho related to flood damage
1984	Water Budget Program begins under the Northwest Power Planning Council
1984	Advance flood fight measures; District constructs 24 miles of makeshift canals at Oakley Dam, Burley, Idaho, diverting water flows to avoid major flooding
1984	Lewiston, Idaho, levee system completed
1984	District regulatory program responsible for all of Idaho
mid 1980s	District begins to purchase large numbers of IBM-type microcomputers
mid-1980s	District begins energy conservation measures at projects and headquarters
mid-1980s	District does runway lighting and other design work for Federal Aviation Administration
1985	New District Headquarters building in Walla Walla authorized
1985	District implements a state-of-the art computer-aided design/drafting system
1985	District completes excessing 504 acres of land under Presidential Executive Order 12151

Date	Event
1985	*Joint Water Control Manual - Boise River* used to coordinate flows
1985	Mitigation to produce usable browse for elk on project lands begins at Dworshak
1985	Sawtooth Fish Hatchery, Stanley, Idaho, dedicated
1985	Harold Russell, Oscar winner, speaks at Human Relations Development Week
1986-1996	Drought in the region, especially affects Idaho and the Snake River
1986-1989	Corps of Engineers Time, Attendance, and Labor System (CETALS) implemented
1986	*Water Resources Development Act of 1986* (PL 99-662) institutes major changes in funding water resources projects (cost-sharing); clarifies old and establishes new authorities for spending on water resources-related projects.
1986	Economic and Environmental Principles for Water Related Land Resources Implementation Studies set forth by President Ronald Regan.
1986	District rehabilitates Blackfoot Dam, Blackfoot, Idaho, for Bureau of Indian Affairs
1986	Irrigon Fish Hatchery completed
1986	Three Meadows Group Camp completed at Dworshak
1986	Navigation channel widening completed below Ice Harbor
1986	Lucky Peak second outlet completed
1986	Mail room contracted
1986	District's Information Management Office created
1986	District implements a local area network, or LAN
1986	District's first videotape production (subject: the Engineer-in-Training Program)
1986	District adopts MCACES (Microcomputer-Aided Cost Estimating System) "gold" version running under DOS
1986	Massive cleanup of District Headquarters paper files
1986	National Hydropower Assessment catalogs over 1,000 potential hydropower sites in the District
1986	First annual District Safety Conference; discontinued late 1990s
1986	District's volunteer program initiated
1987-1988	Productivity Gain Share test conducted in District
1987	District staff members develop a method to video tape boreholes
1987	Malheur Lake feasibility study completed; received Corps-wide Outstanding Planning Achievement Award in 1986
1987	*Snake River & Tributaries Basin Summary* published
1987	Tri-Cities Rivershore Enhancement Committee formed
1987	Papers filed re annexation of Columbia Park by local governments (ongoing for years; never completed)
1987	Lower Snake River Resident Office disbanded and Walla Walla District becomes the only District within the Corps to operate without a resident engineering/construction office
1987-1994	District does design work for Umatilla Army Depot for chemical disposal
1988-1989	District privatizes telecommunications services in 1988; returns to Federal Telecommunications Service as provided by the U.S. General Services Administration in 1989
1988-1989	High-frequency single sideband radio system improves District's emergency communication capability
1988	District's telecopier machine was replaced by a telefacsimile (fax) machine
1988	District implements a state-of-the-art geographic information system (GIS) from Intergraph Corporation
1988	Corps introduces the Data Acquisition and Control System (DACS) whereby Snake River hydropower powerhouses were controlled from a central point at McNary Lock and Dam
1988	District automates the acquisitions process using the Standard Army Automated Contracting System (SAACONS) system
1988	*Stafford Act*, PL 100-707) coordinates disaster relief under Federal Emergency Management Agency (FEMA)
1988	President-elect George F. Bush announces Domestic Policy Council initiative calling for "no net loss of wetlands."
1989	Innovative boom installed on Salmon River to prevent ice jam floods

Date	Event
1988	Substantial funding begins for Lower Snake River fish bypass systems
1988	McCall Hatchery transferred from Corps to Department of the Interior; first hatchery transfer under Lower Snake River Fish and Wildlife Compensation Plan
1988	Willow Creek Dam awarded the Federal Design Achievement Award; after concerns surface, independent inspection finds the dam safe and reliable
1988	Nine-person Chinese delegation visits Walla Walla District dam projects
1988	Corps engaged in I-88, initiative designed to increase the efficiency of technology transfer; District expertise in lunar concrete developed
1988	Ice Harbor navigation lock closed for emergency repair of cracks; completed in record time
1988	Lower Monumental turbine Unit No. 2 repaired
1988	Boise Project Board of Control's 87-megawatt power plant at Lucky Peak comes online
1989	District's begins a feasibility study to develop a long-term management plan for sedimentation in Lower Granite Reservoir; to culminate in *Dredged Material Management Plan and Environmental Impact Statement--McNary Reservoir and Lower Snake River Reservoirs,* issued 2002
1989	Tri-Party agreement between U.S. Department of Energy, Washington State Department of Ecology, and Environmental Protection Agency signed to cleanup radioactive and chemical wastes at Hanford Nuclear Reservation over next 30 years
1989	Memorandum of Understanding signed to define Corps support to U.S. Department of Energy for Hanford cleanup
1989	Clearwater and Snake River National Recreation Trial designated on Lewiston, Idaho, levees
1989	Idaho State Department of Parks and Recreation begins operation of Dworshak State Park
1989	District Public Affairs Office uses fax dissemination of news releases
1989	Walla Walla District becomes the first outlying District to implement the cc:Mail system for electronic mail
late 1980s	District becomes responsible for equipment cost data used Corps-wide in Engineer Manual 1110-2-1304 and Engineer Pamphlet 1110-1-8
late 1980s	Tests of in-water disposal of dredged material on lower Snake River indicate beneficial uses for material to create fish habitat
1990-1995	District heavily involved in cleanup work at Hanford Nuclear Reservation
1990-1995	District participates in Columbia River System Operation Review (SOR); report issued 1995
1990, 1993	Hiring freezes
early 1990s	District adopts MAXIMO® for computerized maintenance management
early 1990s	District has one of the largest participatory suggestion program in the Corps with the Army Ideas for Excellence Program
early 1990s	Public debate begins on breaching the four lower Snake River dams
1990s	District adopts the Corps Operations and Maintenance Business Information Link (OMBIL)
1990s	Corps develops large physical models of Columbia and lower Snake River hydropower projects to study fish passage
1990s	Large traveling fish screens installed at McNary and Lower Snake River projects to improve fish passage
1990s	Most District engineering drawings digitized
1990	Defense Automated Printing Service becomes the District's duplication and graphics service
1990	Environmental Engineering Branch established in Walla Walla District, Engineering Division
1990	District staff assist with Loma Prieta Earthquake in San Francisco, California
1990	Juvenile Fish Transportation Program expands to eight barges
1990	Towboat owned by Brix Maritime of Portland, Oregon, collides with lock and nearly sinks at Ice Harbor
1990	Bennington Lake (Mill Creek) refilled after two-year seepage study
1990	Dworshak hydropower generating Units 5 and 6 deauthorized by Congress
1990	Total quality management used in the District

Date	Event
1990	Public Affairs coordinates the external speeches of District employees, results in District Speakers Bureau
1990	District becomes responsible for levees near Jackson Hole in Teton County Wyoming, along Snake and Gros Ventre Rivers
1990	New District Headquarters site in downtown Walla Walla approved
1990	*Native American Graves Protection and Repatriation Act* (NAGPRA; PL 101-601) requires return of human remains and funerary objects to affiliated tribes, including inventory of collections for return to affiliated tribes
1990	*Water Resources Development Act of 1990* (PL 101-640) changes funding limits; clarified old and established new authorities for spending on water resources-related projects; Section 307 instructs the Corps to pursue the goal of "no overall net loss" of wetlands
1990	Lower Snake River Fish and Wildlife Compensation Plan, begun in 1976, is 74 percent complete
1990	Little Goose Lock and Dam new juvenile fish facility completed with innovative flume
1990	District determines Galloway Dam, Weiser, Idaho, could be constructed by a non-federal entity, and the Corps should not pursue the project
1990	Corps Shoreline Management Program regulates private mooring facilities; fees instituted
1990	All District offices and major projects connected via a wide area network (WAN); completed in 1991
1991	McNary second powerhouse cancelled
1991	District staff member becomes the first Corps employee to receive the Secretary of Defense Productivity Excellence award; received for proposing an alternate method of providing emergency closure of hydroelectric turbines at Lower Granite and Little Goose saving $35 million
1991	District first implements a lockage schedule
1991	Visitation Estimation and Reporting System implemented
1991	National Marine Fisheries Service lists Snake River sockeye salmon as endangered species
1991	First prototype extended length submerged bar screens installed at McNary Lock and Dam to improve fish passage
1992-1994	System Configuration Study Phase I looks at the Federal Columbia River Power System and salmon recovery
1992	*Water Resources Development Act of 1992* (PL 102-580) changes funding limits; clarifies old and establishes new authorities for spending on water resources-related projects.
1992	Boise River in Idaho experiences the lowest flows in 15 years while the Snake River flow hits an all-time low
1992	Clearwater Fish Hatchery, Ahsahka, Idaho, completed; largest and most complex hatchery ever constructed up until that time
1992	Road to Lower Granite completed, shortening a 35-mile route to the project
1992	Drawdown '92 conducted, major test of physical effects of lowering Little Goose and Lower Granite reservoirs to improve fish migration,
1992	Red Wolf Marina and other facilities suffer damages during the drawdown test; U.S. Congress authorizes payment for damages
1992	Mill Creek Reservoir was renamed Bennington Lake to honor a local citizen
1992	Big Eddy Marina, Dworshak, severely damaged by wind
1992	District excesses its Harris minicomputer
1992	Kristine Allaman at Walla Walla District becomes first woman Chief of Engineering Division in the Corps
1992	*National Energy Policy Act* (PL 102-486) authorizes power generation improvements in Pacific Northwest and clarifies authority of BPA
1992	An explosion and fire occurs at Lyons Ferry Marina
1993	Two barges overturn in Lower Granite Lock
1993	District institutes a formal records management program using the Modern Army Record Keeping (MARKS) system

Date	Event
1993	GIS system used for Mill Creek Master Plan; presented nationally as first such application of GIS
1993	District's map files digitized for computer
1993	Boise Flood Warning Preparedness Plan updated
1994-2002	Lower Snake River Juvenile Salmon Migration Feasibility Study (System Configuration Study Phase II) looks at alternatives for operation of the Federal Columbia River Power System to promote salmon recovery; draft issued 1999; final study issued 2002
1994-2002	Dissolved Gas Abatement Study examines gases harmful to fish
1994	Pacific Salmon Coordination Office established at North Pacific Division of Corps
1994	Corps reorganized into six divisions; Northwestern Division replaces North Pacific Division
1994	New juvenile fish facility completed at McNary Lock and Dam
1994	Pacific Salmon Visitor Information Center opens at McNary Juvenile Fish Facility in Umatilla, Oregon
1994	National Marine Fisheries Service lists two Snake River chinook salmon species as endangered (listed as threatened 1992)
1994	Land acquistion completed for mitigation under the Lower Snake River Fish and Wildlife Compensation Plan
1994	Public user fees instituted at Corps recreational facilities
1994	District establishes TCP/IP communications protocol allowing connectivity to the Internet and an X.400 Gateway allowing access to universal electronic mail
1994	Zintel Canyon Dam, Kennewick, Washington, dedicated
1994	Five Russian scientists and engineers tour McNary Lock and Dam
1994	Corps National Water Safety Program housed at Walla Walla District
mid-1990s	Drawdown begin of Dworshak Reservoir to assist salmon migration, affecting reservoir recreation
mid-1990s	District implements PROMIS system for project management
mid-to late 1990s	Funds for running the federal government are often appropriated only at the last minute with threats of furloughs for employees
1995-	District works at Bunker Hill Superfund site
1995	National Marine Fisheries Service Biological Opinion issued
1995	New District Headquarters building occupied in downtown Walla Walla
1995	Turbine Passage Survival Workshop held in Portland, Oregon
1995	Big Eddy Marina, Dworshak, repaired and reopened
1995	Crane cable snaps at Dworshak allowing 27-ton gate to pop out of place due to water pressure; causes redesign of gate
1995	Dworshak hydropower generating Unit 4 deauthorized
1995	District implements Real Estate Management Information System (REMIS)
1995	District decentralizes the acquisition and management of periodicals
1995	District leads the Corps of Engineers in establishing its own site on the Internet
1995	ThreatCon2 initiative instituted for facilities security by Department of Defense
1995	District employees came to work on the morning of November 14 with the threat of being furloughed, along with thousands of other federal employees
1995	District experienced its safest year in ten years
1996	*Water Resources Development Act of 1996* (PL 104-303) changes funding limits; clarifies old and established new authorities for spending on water resources-related projects; directs transfer of lands adjacent to the Tri-Cites, Washington
1996-2000	District works to transfer 2,500 acres of land near Tri-Cities, Washington, to local governmental entities; not complete as of end of 2000
1996	General flooding in the region affects the Palouse, Yakima, Touchet, Tucannon, and Walla Walla Rivers, as well as Mill Creek
1996	Ice Harbor navigation lock gate replaced
1996	Further cracks in Dworshak Dam sealed
1996	Surface bypass collector installed at Lower Granite Lock and Dam for fish bypass
1996-1998	Spillway flow deflectors installed at Ice Harbor Lock and Dam

Date	Event
1997	Memorandum of Agreement between Bonneville Power Administration and the Corps for direct funding of power operations and maintenance costs at Corps projects
1997	Idaho flooding affects the Snake River from the Wyoming border to Blackfoot, Payette, and Weiser Rivers
1997	District implements Corps of Engineers Financial Management System (CEFMS)
1998	District celebrates 50th anniversary
1998	Bonneville Power Administration restructured itself into a power-producing/marketing side separate from the power transmitting side
1998	Eastern Oregon flooding with minor flooding of the Grande Ronde, Burnt, and Imnaha Rivers
1998	Behavioral guidance structure installed at Lower Granite Lock and Dam
1998	Federal Columbia River Power System Program implements cooperating groups related to cultural resources
1999	Boise Area Outreach Office opened
1999	OMB Circular A-76 revised; federal agencies look at conducting a new round of competitive sourcing studies
1999	McNary Refuge lands transferred from the Corps to the U.S. Fish and Wildlife Service
1999	Massive mudslides at Dent Acres, Dworshak
1999	A million cubic yards of sediment were dredged from the area near the confluence of the Snake and Clearwater Rivers
1999	Planning for Lewis and Clark Bicentennial begins
1999	Local area network (LAN) backbone in the District Headquarters building upgraded to an optical fiber ring (OC3)
1999	New PBX phone switch installed, ties the voice-mail system into the District's electronic mail system
1999	District develops its own Intranet
1999	Resident Management System (RMS) automates Corps construction functions
late 1990s	RESUMIX and Defense Civilian Personnel Data System implemented related to hiring and maintaining information about staff
2000	Army Benefits Center (ABC) system introduces automated access to employee benefits
2000	District implements the new Standard Procurement System
2000	District produces new draft map of Boise floodplain
2000	Following a forest fire at Los Alamos National Laboratory, New Mexico, the District uses its expertise in roller compacted concrete to help design and construct Pajarito Canyon flood diversion structure in just over 90 days
2000	Fabrication of removable spillway weir for Lower Granite Lock and Dam
2000	Generic Data Acquisition and Control System implemented first at McNary Lock and Dam for computer control of federal hydropower projects along the Columbia and Snake Rivers (replaces 1988 DACS)
2000	Demolition of old District Headquarters buildings
2000	National Marine Fisheries Service Biological Opinion issued
2000	Department of Interior determines Kennewick Man cultural affiliation for return to tribes under NAGPRA; challenged by a court suit
2000	Corps Nationwide permits revised and five new Nationwide permits issued
2000	Corps and Environmental Protection Agency sign new regulation on wetlands protection

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