



Beech Fork Lake and East Lynn Lake Regional Master Plan

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**US Army Corps
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Huntington District

**Draft Regional Master Plan
Beech Fork and East Lynn Lakes**

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Acronyms

ACHP	Advisory Council on Historic Preservation
ADA	Americans with Disabilities Act
AIRFA	American Indian Religious Freedom Act
ARPA	Archaeological Resources Protection Act
ATV	All-terrain vehicle
BAOT	Boats at One Time
BMP	Best Management Practice
BTU	British Thermal Unit
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CFA	Conservation Focus Area
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CNA-Biological	Conditions Not Allowable - Biological
CRMP	Cultural Resource Management Plan
dB	Decibel
dBA	A-weighted decibels
DNA	Deoxyribonucleic acid
DNL	Day/Night average noise levels
DO	Dissolved Oxygen
EA	Environmental Assessment
EM	Engineering Manual
EO	Executive Order
EOP	Environmental Operating Principles
EP	Engineer Pamphlet
ER	Engineer Regulation
ESA	Endangered Species Act of 1973, as amended
ESA	Environmentally Sensitive Area
F	Fahrenheit
FAA	Federal Aviation Administration
FDEP	Florida Dept of Environmental Protection
FONSI	Finding of No Significant Impact
GAP	Gap Analysis Program (USGS)
HP	Horsepower
HPMP	Historic Properties Management Plan
HTRW	Hazardous, Toxic, Radioactive Waste
HUC	Hydrologic Unit Code
HW	Headwater

IPaC	Info for Planning & Consultation (USFWS)
IWR	Institute for Water Resources (USACE)
KY	Kentucky
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NGVD	National Geodetic Vertical Datum
NHPA	National Historic Preservation Act
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NR	National Register
NRI	Natural Resource Inventory
NWI	National Wetland Inventory
OH	Ohio
OMP	Operations and Management Plan
ORB	Ohio River Basin
OSHA	Occupational Safety and Health Admin.
PCBs	Polychlorinated biphenyls
pCi/L	Picocuries per liter
PL	Public Law
PSD	Proportional Stock Density
PSM	Per square mile
RCRA	Resource Conservation and Recovery Act
RM	River Mile
SCORP	Statewide Outdoor Recreation Plan
SGCN	Species of Greatest Conservation Need
SSURGO	Soil Survey Geographic Database
TSCA	Toxic Substances Control Act
TMDL	Total Maximum Daily Load
US	United States
USACE	US Army Corps of Engineers
USBOR	UA Bureau of Reclamation
USCB	US Census Bureau
USDA	US Department of Agriculture
USNPS	US National Park Service
USSCS	US Soil Conservation Service
USEPA	US Environmental Protection Agency
USFWS	US Fish and Wildlife Service
USGS	US Geological Survey
VA	Virginia
VERS	Visitation Estimation and Reporting Systems
WMA	Wildlife Management Area

WRDA	Water Resources Development Act
WV	West Virginia
WVDEP	West Virginia Department of Environmental Protection
WVDHHR	West Virginia Department of Health and Human Resources
WVDNR	West Virginia Division of Natural Resources
WVDO	West Virginia Development Office
WVDOH	West Virginia Division of Highways
WVDOT	West Virginia Department of Transportation

Contents

1. Introduction	1-1
1.1 Project Authorizations	1-1
1.2 Project Purposes.....	1-1
1.3 Regional Master Plan.....	1-2
1.3.1 Purpose and Need of the Regional Master Plan*	1-2
1.4 Watershed and Project Descriptions	1-3
1.5 Prior Master Plans and Significant Supporting Documents.....	1-5
1.6 Process Framework	1-7
1.7 Applicable Federal Laws	1-7
2. Regional Project Setting*	2-1
2.1 Hydrology	2-2
2.2 Water Management.....	2-3
2.3 Sedimentation and Shoreline Erosion	2-4
2.4 Water Quality	2-5
2.5 Climate and Climate Change	2-6
2.5.1 Climate of the Twelvepole Creek Sub-basin.....	2-6
2.5.2 Potential Climate Change Impacts to the Twelvepole Creek Sub-basin...	2-8
2.5.3 Literature Review.....	2-9
2.6 Topography	2-13
2.7 Regional Ecological Setting	2-14
2.7.1 Vegetative Resources.....	2-14
2.7.2 Terrestrial Resources	2-14
2.7.3 Aquatic Resources	2-15
2.7.4 Wetlands.....	2-17
2.7.5 Threatened and Endangered Species	2-18
2.7.6 Exotic and Invasive Species	2-20
2.8 Cultural Resources.....	2-22
2.8.1 Background and Regional Overview	2-22
2.8.2 Cultural History	2-24
2.9 Regional Hazardous, Toxic, and Radioactive Waste (HTRW)	2-26
2.10 Mineral and Timber Resources.....	2-27

2.11	Aesthetics	2-28
2.12	Air Quality	2-28
2.13	Noise.....	2-29
2.14	Regional Access	2-31
2.15	Regional Recreation	2-33
2.15.1	Regional Demographics	2-33
2.15.2	Regional Recreation Setting and Facilities	2-33
2.15.3	West Virginia Statewide Comprehensive Outdoor Recreation Plan	2-34
2.15.4	Regional Recreation Facilities	2-36
2.15.5	Recreation Carrying Capacity.....	2-39
2.16	Real Estate	2-40
2.17	Regional Resource Goals and Objectives	2-41
2.17.1	Environmental Operating Principles	2-41
2.17.2	Master Plan Goals.....	2-41
2.17.3	Regional Resource Objectives	2-42
3.	Beech Fork Lake	3-1
3.1	Project Description	3-1
3.2	Project Setting.....	3-2
3.2.1	Hydrology	3-2
3.2.2	Water Management	3-3
3.2.3	Sedimentation and Shoreline Erosion	3-6
3.2.4	Water Quality	3-6
3.2.5	Topography, Geology and Soils	3-10
3.2.6	Ecological Setting	3-16
3.2.7	Cultural Resources	3-29
3.2.8	Hazardous, Toxic, and Radioactive Waste (HTRW)	3-30
3.2.9	Mineral and Timber Resources.....	3-30
3.2.10	Aesthetics.....	3-33
3.2.11	Noise	3-34
3.2.12	Transportation and Traffic	3-35
3.2.13	Utilities.....	3-35
3.2.14	Real Estate Acquisition Policies	3-36

3.3	Beech Fork Lake Recreation Analysis	3-38
3.3.1	Overview of Recreation Areas	3-39
3.3.2	Beech Fork Lake Recreation Activities and Visitation.....	3-46
3.3.3	Beech Fork Lake Zones of Influence	3-52
3.3.4	Population.....	3-54
3.3.5	Demographics	3-56
3.4	Recreation Carrying Capacity – Beech Fork Lake	3-57
3.4.1	Boating Carrying Capacity – Beech Fork Lake	3-57
3.4.2	Camping Carrying Capacity – Beech Fork Lake State Park	3-60
3.4.3	Picnicking Carrying Capacity – Beech Fork Lake	3-61
3.4.4	Swimming Beach Carrying Capacity	3-62
3.5	Enhancing Recreation Opportunities.....	3-63
3.6	Beech Fork Lake Resource Objectives	3-65
3.6.1	Recreation Resource Objectives – Beech Fork Lake	3-65
3.6.2	Natural Resource Objectives – Beech Fork Lake	3-67
3.6.3	Cultural Resource Objectives – Beech Fork Lake	3-67
3.7	Beech Fork Lake Land Allocation, Classification, and Easements.....	3-68
3.7.1	Beech Fork Lake Land Allocation	3-68
3.7.2	Beech Fork Lake Land Classification	3-69
3.8	Beech Fork Lake Resource Plan.....	3-75
3.8.1	Beech Fork Lake	3-80
3.8.2	Dam Site and Spillway.....	3-81
3.8.3	Upstream Recreation Area	3-82
3.8.4	Downstream Recreation Area.....	3-86
3.8.5	Stowers Branch Beach	3-87
3.8.6	Beech Fork USACE Trails and Low-density Recreation Open Area.....	3-88
3.8.7	Beech Fork Lake State Park.....	3-90
3.8.8	Beech Fork Lake Wildlife Management Area.....	3-92
4.	East Lynn Lake	4-1
4.1	Project Description	4-1
4.2	Project Setting.....	4-1
4.2.1	Hydrology	4-1

4.2.2	Water Management	4-3
4.2.3	Sedimentation and Shoreline Erosion	4-5
4.2.4	Water Quality	4-7
4.2.5	Topography, Geology and Soils	4-10
4.2.6	Ecologic Setting.....	4-14
4.2.7	Cultural Resources	4-24
4.2.8	Hazardous, Toxic, and Radioactive Waste (HTRW)	4-25
4.2.9	Minerals and Timber Resources.....	4-26
4.2.10	Aesthetics.....	4-28
4.2.11	Noise	4-29
4.2.12	Transportation and Traffic	4-30
4.2.13	Utilities.....	4-30
4.2.14	Real Estate Acquisition Policies	4-30
4.3	East Lynn Lake Recreation Analysis.....	4-32
4.3.1	Overview of Recreation Areas	4-33
4.3.2	East Lynn Lake Recreation Activities and Visitation	4-40
4.3.3	East Lynn Lake Zones of Influence	4-44
4.3.4	Population.....	4-45
4.3.5	Demographics	4-47
4.4	Recreation Carrying Capacity	4-48
4.4.1	Camping Carrying Capacity – East Fork Campground.....	4-49
4.5	Enhancing Recreation Opportunities at East Lynn Lake	4-50
4.6	East Lynn Lake Resource Objectives	4-51
4.6.1	Recreation Resource Objectives – East Lynn Lake.....	4-52
4.6.2	Natural Resource Objectives – East Lynn Lake	4-54
4.6.3	Cultural Resource Objectives – East Lynn Lake.....	4-54
4.7	East Lynn Lake Land Allocation, Classification, and Easements	4-55
4.7.1	East Lynn Lake Land Allocation	4-55
4.7.2	East Lynn Lake Land Classification	4-55
4.8	East Lynn Lake Resource Plan.....	4-62
4.8.1	East Lynn Lake	4-68
4.8.2	Dam Site and Project Office	4-70

4.8.3	Dam Overlook.....	4-71
4.8.4	Overlook Area.....	4-72
4.8.5	Tailwater Fishing Area	4-74
4.8.6	Laurel Creek Fishing Area	4-75
4.8.7	East Lynn Lake Open Lands	4-76
4.8.8	East Fork Area.....	4-77
4.8.9	Lick Creek Area	4-81
4.8.10	Lakeside Area	4-83
4.8.11	East Lynn Lake Wildlife Management Area.....	4-84
5.	Environmental Consequences*	5-1
5.1	Purpose and Need	5-1
5.2	Alternatives*	5-2
5.2.1	No Action Alternative	5-2
5.2.2	Proposed Action	5-2
5.3	Potential Environmental Impacts.....	5-4
5.3.1	Hydrology/Floodplains	5-5
5.3.2	Sedimentation and Shoreline Erosion	5-6
5.3.3	Water Quality	5-8
5.3.4	Climate	5-9
5.3.5	Topography, Geology, and Soils	5-10
5.3.6	Mineral and Timber Resources.....	5-11
5.3.7	Ecologic Setting.....	5-13
5.3.8	Aesthetics	5-21
5.3.9	Air Quality	5-22
5.3.10	Noise	5-23
5.3.11	Transportation and Traffic	5-24
5.3.12	Cultural Resources.....	5-25
5.3.13	Hazardous, Toxic, and Radioactive Waste.....	5-26
5.3.14	Socioeconomic/Environmental Justice	5-27
5.3.15	Recreation.....	5-29
5.3.16	Health and Safety	5-30
5.4	Cumulative Impacts.....	5-31

5.4.1	Past and Present Actions Within the Twelvepole Creek Sub-basin.....	5-32
5.4.2	Reasonably Foreseeable Actions within the Twelvepole Creek Sub-basin	5-32
5.4.3	Analysis of Cumulative Impacts.....	5-33
6.	Status of Environmental Compliance	6-1
7.	Special Topics.....	7-1
7.1	Extraction of Mineral Resources on Project Lands.....	7-1
7.2	Unauthorized Off-Road Vehicle Use	7-1
7.3	Management of Invasive Species	7-2
8.	Agency and Public Coordination	8-1
8.1	Scoping	8-1
8.2	Public and Agency Review of Draft Resource Objectives and Resource Plans	8-2
8.3	Public and Agency Review of Draft Regional Master Plan	8-2
9.	Summary of Recommendations	9-1
10.	Acknowledgements	10-1
11.	References*	11-1

Tables

Table 1-1.	Beech Fork Lake supporting documents.....	1-6
Table 1-2.	East Lynn Lake supporting documents	1-7
Table 2-1.	Federally protected threatened and endangered species having the potential to occur within the Twelvepole Creek Sub-basin.....	2-19
Table 2-2.	Federally protected migratory birds occurring within the Twelvepole Creek Sub-basin	2-19
Table 2-3.	NAAQS criteria pollutants.....	2-29
Table 2-4.	Example noise levels	2-30
Table 2-5.	Allowable continuous noise exposure – OSHA Standards.....	2-31
Table 2-6.	Activity preferences of WV residents.....	2-34
Table 2-7.	Park facility preferences among low, casual, and high park users	2-35
Table 2-8.	Park facility priorities among urban and rural WV residents	2-35
Table 2-9.	Recreation sites proximal to Beech Fork and East Lynn Lakes with similar recreational opportunities	2-38
Table 3-1.	Beech Fork Lake pertinent data	3-3
Table 3-2.	Status of designated uses for Beech Fork Lake and tributaries	3-10
Table 3-3.	Land capability classes at Beech Fork Lake	3-13

Table 3-4. Vegetative cover at Beech Fork Lake	3-19
Table 3-5. Beech Fork Lake vegetation acreage summary	3-21
Table 3-6. NWI classified wetlands at Beech Fork Lake	3-24
Table 3-7. Federally protected threatened and endangered species having the potential to occur within the Beech Fork Lake Project area	3-26
Table 3-8. Federally protected migratory birds occurring within the Beech Fork Lake Project Area	3-26
Table 3-9. Invasive plant species found at Beech Fork Lake	3-28
Table 3-10. Invasive animal and disease species found in Wayne County, WV	3-28
Table 3-11. Historic timber sales for the Beech Fork Lake WMA	3-33
Table 3-12. Beech Fork Lake utility providers	3-36
Table 3-13. Beech Fork Lake USACE managed and outgrant lands	3-37
Table 3-14. Primary recreation areas and managing entities at Beech Fork Lake	3-39
Table 3-15. Beech Fork Lake recreation activities and facilities	3-46
Table 3-16. Beech Fork Lake average annual visitation by recreation site	3-48
Table 3-17. Beech Fork Lake zones of influence, state, and national age, housing and income.....	3-56
Table 3-18. Beech Fork Lake zones of influence, state, and national ethnicity, education, and disabilities	3-56
Table 3-19. Appropriate boating density guidelines	3-58
Table 3-20. Boating capacity range evaluation	3-58
Table 3-21. Estimated BAOTs on Beech Fork Lake.....	3-60
Table 3-22. Beech Fork Lake land classifications	3-70
Table 3-23. Water surface classifications at Beech Fork Lake.....	3-73
Table 3-24. Beech Fork Lake Resource Plan recommendations for USACE management areas	3-77
Table 4-1. East Lynn Lake pertinent data.....	4-4
Table 4-2. Status of designated uses for East Lynn Lake and tributaries	4-9
Table 4-3. Land capability classes at East Lynn Lake.....	4-13
Table 4-4. Vegetative cover at East Lynn Lake	4-17
Table 4-5. East Lynn Lake vegetation acreage summary	4-18
Table 4-6. NWI classified wetlands at East Lynn Lake.....	4-21
Table 4-7. Federally protected threatened and endangered species having the potential to occur within the East Lynn Lake Project area	4-22
Table 4-8. Federally protected migratory birds occurring within the East Lynn Lake Project Area	4-22
Table 4-9. Invasive species found at East Lynn Lake in 2017 and 2020.....	4-24
Table 4-10. Historic timber sales for the East Lynn Lake WMA	4-28
Table 4-11. East Lynn Lake utility providers.....	4-30
Table 4-12. East Lynn Lake USACE managed and outgrant lands.....	4-31
Table 4-13. Primary recreation areas and managing entities at East Lynn Lake	4-33
Table 4-14. East Lynn Lake recreation activities and facilities	4-40
Table 4-15. East Lynn Lake average annual visitation by recreation site.....	4-42

Table 4-16. East Lynn Lake zones of influence, state, and national age, housing, and income.....	4-48
Table 4-17. East Lynn Lake zones of influence, state, and national ethnicity, education, and disabilities.....	4-48
Table 4-18. East Lynn Lake land classifications.....	4-56
Table 4-19. Water surface classifications at East Lynn Lake	4-60
Table 4-20. Resource Plan recommendations by management area	4-64

Figures

Figure 1-1. Twelvepole Creek Sub-basin	1-4
Figure 2-1. Middle Ohio Subregion.....	2-10
Figure 2-2. Potential climate change impacts to USACE missions served by Beech Fork and East Lynn Lakes.....	2-12
Figure 2-3. Cumberlands West Conservation Focus Area	2-20
Figure 2-4. Primary and secondary access roads to Beech Fork and East Lynn Lakes	2-32
Figure 2-5. Recreation sites with similar recreational opportunities in the vicinity of the Twelvepole Creek Sub-basin	2-37
Figure 2-6. A recreation opportunity (Hasset et al., 2007).....	2-39
Figure 3-1. Beech Fork Lake and tributaries	3-2
Figure 3-2. Beech Fork Lake pool elevations (feet NGVD)	3-5
Figure 3-3. Beech Fork Lake seasonal pool elevations (feet NGVD)	3-5
Figure 3-4. Beech Fork Lake thermal profile (April – November 2014)	3-8
Figure 3-5. Beech Fork Lake dissolved oxygen profile (April to November 2014)	3-8
Figure 3-6. Beech Fork Lake temperature and dissolved oxygen profiles (9 July 2021)	3-8
Figure 3-7. Beech Fork Lake outflow temperature	3-8
Figure 3-8. Beech Fork Lake land capability classification	3-15
Figure 3-9. Beech Fork Lake land cover	3-17
Figure 3-10. Beech Fork Lake WMA	3-22
Figure 3-11. Beech Fork Lake wetlands.....	3-25
Figure 3-12. Beech Fork Lake within the Cumberlands West CFA	3-27
Figure 3-13. Oil and gas mining operations in the vicinity of Beech Fork Lake	3-32
Figure 3-14. Outgrant and USACE managed lands at Beech Fork Lake	3-38
Figure 3-15. Beech Fork Lake recreation areas	3-40
Figure 3-16. Visitation at Beech Fork Lake recreation sites (2014 – 2020)	3-49
Figure 3-17. Beech Fork Lake State Park annual campsite occupancy	3-51
Figure 3-18. Beech Fork Lake State Park seasonal campsite occupancy.....	3-51
Figure 3-19. Beech Fork Lake State Park cabin occupancy.....	3-52
Figure 3-20. Beech Fork Lake zones of influence and county population centers	3-53
Figure 3-21. Beech Fork Lake primary zone of influence historical and projected population (2010 – 2040)	3-55

Figure 3-22. Beech Fork Lake secondary zone of influence historical and projected population (2010 – 2040)	3-55
Figure 3-23. Beech Fork Lake tertiary zone of influence historical and projected population (2010 – 2040)	3-55
Figure 3-24. Stowers Branch Beach average monthly visitation (2014-2020)	3-62
Figure 3-25. Beech Fork Lake land classification map	3-71
Figure 3-26. Beech Fork Lake water classification map	3-74
Figure 3-27. Beech Fork Lake Management Areas	3-79
Figure 3-28. Beech Fork Lake	3-81
Figure 3-29. Beech Fork Lake Dam Site and Spillway	3-82
Figure 3-30. Upstream Recreation Area management area	3-83
Figure 3-31. Conceptual layout of the Upstream Recreation Area reconfiguration ...	3-85
Figure 3-32. Downstream Recreation Area management area	3-86
Figure 3-33. Stowers Branch Beach management area	3-87
Figure 3-34. USACE Trails and Low-Density Recreation Open Area management area	3-89
Figure 3-35. Beech Fork Lake State Park management area	3-90
Figure 3-36. Beech Fork Lake WMA management area	3-93
Figure 4-1. East Lynn Lake and tributaries	4-2
Figure 4-2. East Lynn Lake seasonal pool elevations (1999 - 2019)	4-5
Figure 4-3. East Fork Lake areas with sediment accumulation	4-6
Figure 4-4. East Lynn Lake thermal profile (May – November 2014)	4-8
Figure 4-5. East Lynn Lake dissolved oxygen profile (May to November 2014)	4-8
Figure 4-6. East Lynn Lake temperature and dissolved oxygen profiles (4 July 2021)	4-8
Figure 4-7. East Lynn Lake outflow temperature	4-8
Figure 4-8. East Lynn Lake land capability classification	4-14
Figure 4-9. East Lynn Lake land cover	4-15
Figure 4-10. East Lynn Lake wetlands	4-21
Figure 4-11. East Lynn Lake within the Cumberland West CFA	4-23
Figure 4-12. Bartram Refuse Pile	4-26
Figure 4-13. Oil, gas, and mining operations in upstream drainage area of East Lynn Lake	4-27
Figure 4-14. East Lynn Lake WMA and USACE managed lands	4-32
Figure 4-15. East Lynn Lake recreation areas	4-34
Figure 4-16. Visitation at East Lynn Lake recreation sites (2014 – 2020)	4-43
Figure 4-17. East Fork Campground annual campsite occupancy (2011-2020)	4-44
Figure 4-18. East Lynn Lake zones of influence and county population centers	4-45
Figure 4-19. East Lynn Lake primary zone of influence historical and projected population (2010 – 2040)	4-46
Figure 4-20. East Lynn Lake secondary zone of influence historical and projected population (2010 – 2040)	4-46
Figure 4-21. East Lynn Lake tertiary zone of influence historical and projected population (2010 – 2040)	4-47

1. Introduction

The Beech Fork Lake and East Lynn Lake Regional Master Plan is the strategic land use management document that guides the management, development, and use of Federal lands for recreation, conservation of natural resources, and preservation of cultural resources. This comprehensive plan is a vital tool for the responsible stewardship of Project resources to benefit present and future generations. This Regional Master Plan has been prepared in compliance with US Army Corps of Engineers (USACE) Master Plan guidance provided in Engineer Regulation (ER) 1130-2-550 and Engineer Pamphlet (EP) 1130-2-550.

The Regional Master Plan includes an integrated Environmental Assessment (EA) which was prepared pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) Regulations (40 Code of Federal Regulations [CFR] 1500-1508), and USACE implementing regulation, Engineering Regulation (ER) 200-2-2. Section headings in this report containing information required by NEPA are marked with an asterisk (*).

1.1 Project Authorizations

Beech Fork Lake and East Lynn Lake Projects were authorized by the Flood Control Act of 1962, Public Law (PL) - 87-874, 87th Congress, 2nd Session as units of the larger comprehensive flood control plan for the Ohio River. The comprehensive flood control plan for the Ohio River Basin was originally authorized under Flood Control Act of 1938, 75th Congress, 3rd Session.

1.2 Project Purposes

The project purposes for the Beech Fork Lake and East Lynn Lake Projects are flood control authorized by the Flood Control Act of 1962 with ancillary authorized project purposes including water conservation for general recreation, fish and wildlife management, and water quality control. Below are the legislative authorities for authorized project purposes.

- Flood Control Act of 1962 (PL 87-874)
- Fish and Wildlife Coordination Act of 1958 (PL 85-624)
- Federal Water Project Recreation Act PL 78-534
- Federal Water Pollution Control Act of 1948 (PL 87-88)

Additionally, the Water Resources Development Act of 1988 (Section 6) specifically authorized enhanced recreation including but not limited to downstream whitewater recreation on lands associated with eleven USACE projects, including Beech Fork Lake and East Lynn Lake. The Act directed the Secretary of the Army to "...manage project lands ... in such manner as will improve opportunities for recreation at the project. Such activities shall be included as authorized project purposes of each project."

1.3 Regional Master Plan

1.3.1 Purpose and Need of the Regional Master Plan*

The purpose of this Regional Master Plan and Integrated EA is to serve as the overall strategic land use management document guiding the comprehensive management and development of recreation, natural resources, and cultural resources pursuant to Federal laws and regulations at the Beech Fork Lake and East Lynn Lake Projects. This Regional Master Plan provides resource objectives and management and development concepts that facilitate the efficient and cost-effective management; provide a framework within which the Operational Management Plan and other planning mechanisms can be developed and implemented; establish a basis on which outgrants and recreational development proposals can be evaluated; and use of projects lands for the next 15 to 25 years.

The existing Beech Fork Lake Master Plan dates back to December 1988 and the Master Plan for East Lynn was last updated in August 1984. Master Plan updates are needed to integrate and update management and development planning for Beech Fork Lake and East Lynn Lake Projects to guide the responsible stewardship and sustainability of project resources for the benefit of present and future generations. The USACE Master Plan guidance encourages the preparation of Regional Master Plans, encompassing multiple projects, when appropriate. Due to the close proximity of Beech Fork and East Lynn Lakes and their location within the Twelvepole Creek sub-basin, this Regional Master Plan includes both projects.

Based on USACE guidance, EP 1130-2-550, the primary goals of a Master Plan are to:

- Provide the best management practices to respond to regional needs, resource capabilities and suitabilities, and expressed public interests consistent with authorized purposes.
- Protect and manage project natural and cultural resources through sustainable environmental stewardship programs.
- Provide public outdoor recreation opportunities that support project purposes and public demands created by the project itself while sustaining project natural resources.
- Recognize the particular qualities, characteristics, and potentials of the project.
- Provide consistency and compatibility with national objectives and other state and regional goals and programs.

This Regional Master Plan is intended to serve as a conceptual land and water resource management plan for up to 25 years. This plan establishes a vision for the future to be achieved through support of three guiding Master Plan products; Resource Objectives (ideas/solutions that support Master Plan goals and Project vision); Land and Water Classification Maps (Project zoning maps); and the Resource Plan (conceptual

descriptions for how the Project could and should be used based on resource objectives).

The Regional Master Plan is not intended to address details of design, management, or daily administration and also does not address the specifics of regional water quality, water level management (lake retention and releases), shoreline management, or the operation and maintenance of project operations facilities. The Regional Master Plan does not plan or approve changes or improvements to Flood Risk Management, Hydropower, Navigation, or Water Supply.

Ideas and concepts of this Regional Master Plan are to be implemented through the strategies prescribed in the Operational Management Plan (OMP) which is developed after the Master Plan. The OMP consists of a five-year work plan focused on prioritizing the concepts of the plan and developing the strategies and actions/measures to achieve the concepts of the Regional Master Plan. The OMP directs the scheduling, means, and methods for procuring the funds, equipment, and labor required to implement the recommendations of the Regional Master Plan.

Regulation and Policy Guidance for the preparation of USACE Civil Works MPs is provided by Engineering Regulation (ER) 1130-2-550, and Engineering Pamphlet (EP) 1130-2-550, Chapter 3, dated 30 Jan 2013.

1.4 Watershed and Project Descriptions

Beech Fork Lake and East Lynn Lakes are located in the Twelvepole Creek Sub-basin which is a 442 square-mile area within the Ohio River Basin (**Figure 1-1**). The sub-basin includes portions of Cabell, Lincoln, Mingo, and Wayne Counties. Twelvepole Creek originates at the base of Guyan Mountain in Mingo County, WV and flows in a northwesterly direction to its mouth at the Ohio River near the Town of Ceredo, WV. The sub-basin is on the western slopes of the Appalachian Mountains in western WV near the Kentucky (KY) border. The Big Sandy River Sub-basin abuts the western limit of the Twelvepole Creek Sub-basin, and the Fourpole Creek Sub-basin is to the east. All these waterways, Big Sandy River, Twelvepole Creek, and Fourpole Creek, discharge to the Ohio River in the vicinity of Huntington, WV.

East Lynn Lake is located on the East Fork of Twelvepole Creek which flows northward to Twelvepole Creek. Beech Fork Lake is located on the Beech Fork of Twelvepole Creek which flows northward to Twelvepole Creek which then discharges to the Ohio River near Huntington, WV. Beech Fork and East Lynn Lakes are the only flood risk management projects in the Twelvepole Creek Sub-basin and the lakes are operated as a system.

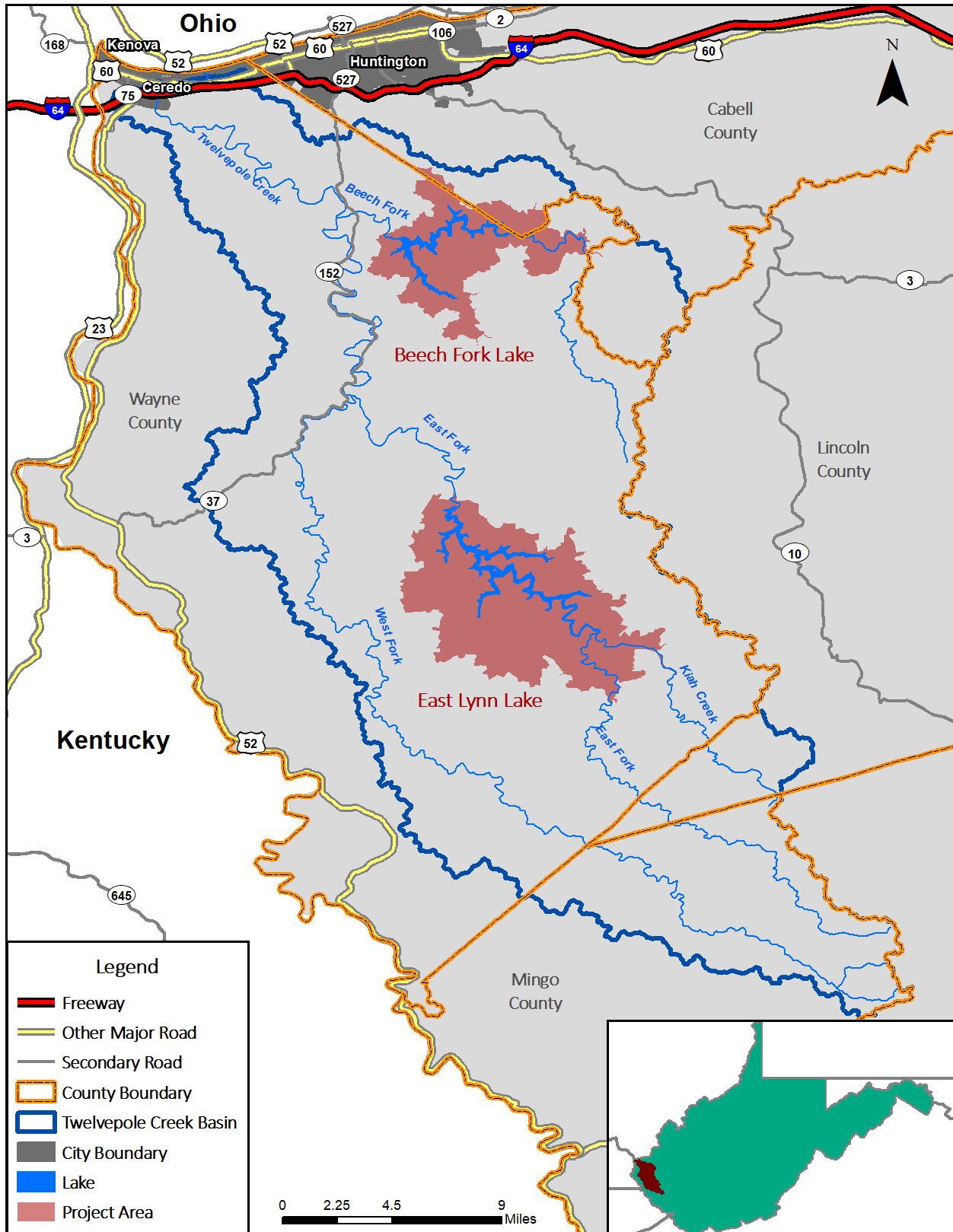


Figure 1-1. Twelvepole Creek Sub-basin

1.5 Prior Master Plans and Significant Supporting Documents

This Regional Master Plan is an update to Master Plans that were prepared for Beech Fork and East Lynn Lakes shortly after construction. These Master Plans were prepared in compliance with ER 1130-2-435 to establish policies, programs, and objectives for development of project resources.

The prior Master Plan for Beech Fork Lake was *Beech Fork Lake, Twelvepole Creek, West Virginia, Master Plan, Design Memorandum No. 11* dated December 1988. It consolidated the original *Public Use Plan, Design Memorandum No. 11* dated May 1977.

The prior Master Plan for East Lynn Lake was *Design Memorandum No. 4c, Master Plan Update for East Lynn Lake, Twelvepole Creek, West Virginia* dated August 1984. The 1984 Master Plan updated the Preliminary Master Plan prepared in 1965 and *Design Memorandum No. 4b, Recreation Master Site Plan – Public Access and Access Road* prepared in 1969.

Design memorandums and other supporting documents prepared for Beech Fork and East Lynn Lakes are described in **Tables 1-1 and 1-2**.

Table 1-1. Beech Fork Lake supporting documents

Design Memorandum No.	Title	Date
1	Hydrology	November 1965
2	General Design Memorandum	December 1967
3	Real Estate – Dam Site, Part I	May 1968
3A	Real Estate – Lake, Part II	September 1969
3B	Real Estate – Lake, Part III	January 1970
5A	Land Requirements Plan – Public Use	May 1969
6	Spillway and Outlet Works	March 1971
6 Supplement	Inspection and Instrumentation	April 1964
6A	Inspection and Instrumentation	April 1964
7	Concrete Aggregates	December 1968
8	School Relocations	April 1969
9	Relocations – Gas Lines	April 1969
10	Power and Telephone Relocations	October 1969
11	Public Use Plan	May 1971
12	Sediment Range Layout	November 1977
11	Beech Fork Lake, Twelvepole Creek, WV, Master Plan	December 1988
NA	Project Manual for Water Control Management, Beech Fork, Twelvepole Creek Basin	August 2000
NA	Beech Fork Lake Natural Resource Inventory–Level 1	September 2017

Table 1-2. East Lynn Lake supporting documents

Design Memorandum No.	Title	Date
1	Hydrology	November 1965
2	General Design Memorandum	December 1967
3	Real Estate – Dam Site, Part I	May 1968
3A	Real Estate – Lake, Part II	September 1969
3B	Real Estate – Lake, Part III	January 1970
5A	Land Requirements Plan – Public Use	May 1969
6	Spillway and Outlet Works	March 1971
6 Supplement	Inspection and Instrumentation	April 1964
6A	Inspection and Instrumentation	April 1964
7	Concrete Aggregates	December 1968
8	School Relocations	April 1969
9	Relocations – Gas Lines	April 1969
10	Power and Telephone Relocations	October 1969
11	Public Use Plan	May 1971
12	Sediment Range Layout	November 1977
4C	Master Plan Update for East Lynn Lake	August 1984
NA	East Lynn Lake Historic Properties Management Plan	February 1995
NA	East Fork Twelvepole Creek Basin, Project Manual for Water Control Management	January 2001
NA	Level II Natural Resources Inventory – Cultural Resources Inventory, East Lynn Lake	February 2017

1.6 Process Framework

The Regional Master Plan and Integrated EA was developed through a participatory planning process with USACE staff, state agencies, stakeholders, and the public. The planning process included site visits, public meetings, and detailed analysis of available data as well as the examination and analysis of past, present, and projected future environmental, recreational, and socioeconomic conditions and trends. Master Plans are intended to have an effective life span of 15 to 25 years with updates at approximately three-to-five-year intervals.

1.7 Applicable Federal Laws

Development and management of Federal reservoirs are regulated by several laws addressing recreation; water resource protection and flood risk management; fish and wildlife resources; forest resources; leases, easements, and rights-of-way; and cultural resources. Decisions about development within USACE fee-owned areas must abide by the relevant laws and regulations, be consistent with Executive Orders (EOs) and policies and be guided by USACE documents.

The Federal Water Project Recreation Act Of 1965 (Public Law 89-72) imposes requirements of non-Federal cooperation and cost-sharing participation in recreation financing and administration. These requirements have been applied administratively to projects authorized before 1965; therefore, all USACE participation in recreation development at Beech Fork Lake and East Lynn Lake Projects is subject to the requirements of P.L. 89-72.

Descriptions of applicable laws, policies, and EOs are provided in **Appendix A**.

2. Regional Project Setting*

This chapter describes the key environmental factors that influence and constrain present and future use, management, and development of land and water resources at the Beech Fork and East Lynn Lakes Projects on a regional basis. These environmental factors fall into three general and interrelated categories: the physical environment, the biological environment, and the human environment. Project-specific descriptions of these key factors is provided for Beech Fork Lake and East Lynn Lake in **Sections 3 and 4**, respectively. Information presented in these sections is used to facilitate an understanding of natural resource capabilities, suitability, and constraints relative to future project development and natural resource-related management activities and aid in determining land classifications, developing project-wide resource objectives, and identifying facility needs.

Beech Fork and East Lynn Lakes are in the Twelvepole Creek Sub-basin (HUC-8 05090102)¹ as shown in **Figure 1-1**. Encompassing 442 square miles and 1,139 miles of streams, the sub-basin's major tributaries are the East Fork, West Fork, and Beech Fork. The sub-basin drains portions of Wayne, Mingo, Cabell, and Lincoln Counties in WV before emptying into the Ohio River near Ceredo, WV (near Ohio River Mile 313.5). Wayne County comprises 79% of the sub-basin's total drainage area.

Beech Fork Lake is located on Beech Fork about 3.5 miles upstream of its confluence with Twelvepole Creek and about 20 miles upstream of the Ohio River. It has a 78-square mile drainage area composed of HUC 12 sub-watersheds 050901020303 (Outlet Beech Fork), 0509010204 (Headwaters Beech Fork), and 050901020302 (Millers Fork). East Lynn Lake is located on the East Fork about 10 miles upstream of its confluence with Twelvepole Creek and about 42 miles upstream of the Ohio River. It has a 133-square mile drainage area composed of HUC 12 sub-watersheds 050901020203 (Middle East Fork Twelvepole Creek) and 050901020201 (Kiah Creek).

The Twelvepole Creek Sub-basin is largely rural, having a 2019 population of 44,900, which produces a density of around 102 individuals per square mile (psm)². The only population center in the sub-basin with more than 5,000 residents is Ceredo, WV, with a 2019 population of 6,705. The remaining residents live in unincorporated towns such as the Town of Wayne, small unincorporated communities, individual rural homesteads, and small farms scattered along roads that traverse the sub-basin.

¹ Watersheds are delineated by USGS using a nationwide system based on surface hydrologic features. This system divides the country into 21 regions (2-digit), 222 subregions (4-digit), 370 basins (6-digit), 2,270 subbasins (8-digit), ~20,000 watershed (10-digit), and ~100,000 subwatersheds (12-digit). A hierarchical hydrologic unit code (HUC) consisting of 2 additional digits for each level in the hydrologic unit system is used to identify any hydrologic area.

² Estimated from US Census Bureau data

(<https://www.census.gov/quickfacts/fact/table/cabellcountywestvirginia,waynecountywestvirginia,mingocountywestvirginia,lincolncountywestvirginia,US/PST045221>)

2.1 Hydrology

The drainage area of Twelvepole Creek is composed of a hydrologic unit code level 8 sub-basin (HUC 05090102) located on the western slopes of the Appalachian Mountains, characterized by moderately rugged and hilly terrain, steep sided valleys, and narrow floodplains on alternate sides of a meandering river valley. The V-shaped valleys can create a rapid conversion of rainfall to runoff.

The basic aspects of the hydrologic cycle include precipitation, evaporation, and runoff. The average annual rainfall, 43.34 inches, is nearly uniform over the Twelvepole Creek Sub-basin. The average annual evaporation rate is roughly 29 inches. Most of the annual evaporation occurs in the warm season months (May to October). The total average evaporation during the warm season is approximately 22 inches. The average winter snow fall is generally mild, producing approximately 20 inches. In winter, the combination of snow melt and/or saturated or frozen ground can greatly increase runoff. Additional information regarding the hydrologic characteristics of Beech Fork and East Lynn Lakes is provided in **Sections 3.2.1 and 4.2.1**, respectively.

The Lower Pennsylvanian Aquifer underlies Beech Fork and East Lynn Lakes. It is a component of the Appalachian Plateaus Physiographic Province which is 86,000-square miles in size and includes parts of nine states from Mississippi to New York (USGS, 2015). The Pennsylvanian aquifer is a sedimentary bedrock aquifer that is nearly horizontal. It is composed predominantly of shale with sandstone, siltstone, coal, and limestone. It is generally unconfined in the hilltop and hillside areas and is partly confined to the valley areas. Groundwater flow is controlled by stress-relief fracturing and by the orientation and permeability of gently dipping and moderately folded sedimentary rocks (USGS, 2015). The aquifer is generally between 50 and 300 feet below the ground surface with yields between 1 and 100 gallons per minute. The aquifer is used mainly for small-scale domestic homestead and farm supplies. The groundwater quality is adequate for most uses, but it is generally hard to very hard and has high concentrations of iron and manganese in some locations.

Hydrologic soil groups are based on estimates of runoff and infiltration potential. Hydrologic soil Group C soils cover the downstream portion of the Twelvepole Creek Basin, which have moderately high runoff potential when thoroughly wet (USGS, 2015). Hydrologic Soil Groups A and B occur in the upstream portions of the basin (USGS, 2015). Hydrologic Soil Group A consists of soils with low runoff potential when thoroughly wet and. Hydrologic Soil Group B soils have moderately low runoff potential when thoroughly wet.

The US Geological Survey (USGS) monitors two wells in the Twelvepole Creek Basin, one near the downstream limit of the Twelvepole Creek Basin and another upstream of East Lynn Lake. The well with the longest period of record began operation in 2001. It is located adjacent to Twelvepole Creek near the Huntington Tri-State Airport just upstream of the Ohio River (USGS, 2001). The median monthly groundwater levels

fluctuated between 33.4 (May/June) and 35.3 (November/December) feet below the ground surface between 2001 and mid-2020. For the period of record, the highest ground water level recorded was 31.4 feet below ground surface and the lowest groundwater level was 37.1 feet below ground surface. The ground surface at this location is 607 feet National Geodetic Vertical Datum (NGVD)³. The second USGS well is in Cabwaylingo State Forest upstream of East Lynn Lake. Only limited data are available at this well, although it reports groundwater levels that are similar depths below the ground surface.

While groundwater may be an important water supply source for rural communities and residences, it is not likely to be a major factor influencing lake levels which are more typically determined by surface water runoff and streamflow volumes.

2.2 Water Management

Beech Fork and East Lynn Lakes are operated in the Twelvepole Creek Sub-basin to provide downstream flood risk reduction in Twelvepole Creek as well as in the Ohio River. The outflows from Beech Fork and East Lynn Lakes combined with other tributaries, flow into Twelvepole Creek and then generally flow northward to the confluence with the Ohio River near Ceredo, WV. The lakes are operated in a coordinated effort to provide flood risk reduction in the Twelvepole Creek Sub-basin. Beech Fork and East Lynn Lakes reduce flood damages to downstream residential areas, industrial areas, and agricultural areas in the Twelvepole Creek Sub-basin and the Ohio River Basin. Along the Ohio River, the major parts of the cities are protected by flood walls while most industrial development occurs in areas that are not protected and are more susceptible to flood damage from the Ohio River.

Due to the flood control operations of Beech Fork and East Lynn Lakes, floods in the Twelvepole Creek Sub-basin are of short duration, and seldom remain above flood stage for more than 24 to 36 hours, unless flooding in the lower reaches is prolonged by backwater from the Ohio River. Daily forecasts are generated to predict the inflows and required outflows based on hydrologic numerical models. On occasion, precipitation forecasts also provide situational awareness to help identify the best balance of inflows and outflows during high-runoff or drought conditions.

In both Beech Fork and East Lynn Lakes, the target pool elevation is lower in the winter period to increase storage capacity for storm runoff. During the period from 16 April to 30 November, the target pool elevation is raised to enhance operations for other project purposes, such as recreation. Lake elevation during the period from 16 April to 30 November is referred to as the summer pool or seasonal pool.

³ All elevations included in the document are referenced to the National Geodetic Vertical Datum of 1929.

Operations specific to Beech Fork and East Lynn Lakes are discussed in **Sections 3.2.2 and 4.2.2**, respectively.

2.3 Sedimentation and Shoreline Erosion

Accumulation of sediment in a lake occurs as a result of two processes: erosion of the shoreline around the lake and sediment from the watershed entering the lake via tributary inflows. While localized shoreline erosion may occur at both lakes, there is no evidence that it is a significant sedimentation-related problem.

Land use in the upstream drainage basin is an important factor influencing the rate of sediment loading delivered to a stream and carried into a lake by tributary inflows. Most land uses in the Twelvepole Creek Sub-basin would not typically produce excessive erosion. More than 82% of the Twelvepole Creek Sub-basin is wooded, dominated by deciduous forest, with mixed hardwood and pine forest being the second most common forest type. Approximately 7% of the sub-basin is classified as developed. The remaining land cover consists of grasslands, pastures, barren land, wetlands, crops, shrubs, and open water. Only 2.7% of the entire basin is covered by impervious surfaces. Timber management on project lands follows management plans intended to protect habitat and avoid erosion that contributes to sedimentation. However, other wooded areas in the sub-basin are actively logged⁴.

In areas within the upper Twelvepole sub-basin where surface mining for coal is performed, the forests are clearcut prior to beginning excavation. In the remaining areas of the sub-basin, timber is generally harvested by select cuts of targeted trees because of the steep gradients of the terrain. This select cut logging method reduces the amount of surface erosion emanating from the areas harvested. Revegetation of logged areas is accomplished by natural revegetation. Productive coal and gas fields are also located within the sub-basin.

A lake acts as an efficient trap to retain eroded sediments delivered from its upstream watershed, periodic surveys of sediment accumulations within the lake serve as excellent indicators of the magnitude of erosion rates within the lake's upstream drainage basin. Past sediment range resurveys conducted in the region indicate that basin-wide erosion was not a serious problem in either of the lakes' upstream drainages. However, updated surveys would be needed to determine more recent sedimentation rates.

Since the accumulation of sediment in a lake tends to be site specific, erosion issues and sediment range resurvey information specific to Beech Fork Lake and East Lynn Lake are addressed in **Sections 3.2.1.3 and 4.2.1.3**, respectively.

⁴ Personal communication, District Forestry Supervisor, WV Division of Forestry, 10 February 2022.

2.4 Water Quality

In accordance with the Clean Water Act, states and authorized tribes have been delegated authority by the US Environmental Protection Agency (USEPA) for developing and adopting water quality standards for their jurisdictions. Water quality standards consist of three components: (1) designated and existing uses, (2) water quality criteria necessary to protect these uses, and (3) an anti-degradation policy (40 CFR Part 131.6). Water quality standards have been developed by the State of WV for surface and groundwater. These standards were developed in compliance with both Chapter 22, Article 11, Section 22 of the West Virginia Water Pollution Control Act and the Clean Water Act and approved by the USEPA.

In accordance with Section 303(d) of the Clean Water Act, the State of WV identified surface waters that do not meet the USEPA-approved water quality standards and they are listed as impaired in the Draft 2018/2020/2022 West Virginia Integrated Water Quality Monitoring and Assessment Report (West Virginia Department of Environmental Protection [WVDEP], 2022). A waterbody is considered impaired if its water quality is not sufficient to meet its designated uses. Designated uses utilized in the WVDEP identification of impaired water bodies are aquatic life, contact recreation, public water supply, and all other uses. Total Maximum Daily Loads (TMDLs) were developed in 2021 for the Twelvepole Creek sub-basin for criteria pollutants included on the Section 303(d) list. The objective of a TMDL is to determine the loading capacity of the waterbody and to allocate that load among different pollutant sources so that the appropriate control actions can be taken, and water quality standards achieved.

According to the Draft 2018/2020/2022 Integrated Report, the entire length of Twelvepole Creek is listed as impaired for CNA-Biological, fecal coliform, and iron (WVDEP, 2022). The reaches of Beech Fork above and below the lake are also listed as impaired for CNA-Biological. CNA-Biological is a narrative standard for streams that is used to assess whether water quality is adequate to support the propagation and maintenance of aquatic life. Elevated fecal coliform indicates that Twelvepole Creek water quality criteria is impaired for designated use of primary contact recreation and to address this impairment, a TMDL was developed in 2021. However, Beech Fork and East Lynn Lakes are not listed as impaired for fecal coliform bacteria.

The State of WV issues annual statewide fish consumption advisories because of the widespread occurrence of elevated levels of mercury and/or polychlorinated biphenyls (PCBs) in WV waters. The statewide advisories are provided by the West Virginia Department of Health and Human Resources ([WVDHHR], 2021).

Annual water quality reports are produced by the USACE's Huntington District. More extensive evaluations of each lake's water quality are conducted every five years on a rotating schedule. The last extensive water quality samplings at Beech Fork and East Lynn Lakes were reported in 2016 (USACE, 2016). Recent sampling efforts occurred at both lakes in 2021 and the water quality report is anticipated to be released in the

summer of 2022. Additional water quality information specific to Beech Fork Lake and East Lynn Lake is addressed in **Sections 3.2.4 and 4.2.4**, respectively.

2.5 Climate and Climate Change

2.5.1 Climate of the Twelvepole Creek Sub-basin

The climate of the Twelvepole Creek sub-basin is typical of the central temperate zone; highly variable temperatures between the summer and winter seasons. The entire basin is affected by frontal air mass activity and is subject to both continental polar and maritime tropical air masses. Frequent and rapid changes in weather occur due to the passages of fronts associated with general low-pressure areas.

The average annual temperature ranges from 53 to 55 Fahrenheit (°F). The average summer temperature is about 73°F and the average winter temperature is about 36°F. Extreme temperature variations are as low as -24°F to a maximum of about 108°F. The growing season is about 6 months and usually runs from mid-April to mid-October. The average annual rainfall of 43.34 inches is nearly uniform over the Twelvepole Creek sub-basin (USACE, 2000).

Two common types of storms, summer and winter, are prevalent in the basin. The summer storm events typically occur between May and October and are characterized by high-intensity, short duration rainfall, relatively small areal extent, and higher frequencies. The summer storms have the greatest possibility of occurrence during June and July. Winter storm events typically occur between December and March and are of lesser intensity, longer in duration, and larger in areal extent. Occasionally, a stalled weather front can produce prolonged precipitation.

Meteorological studies indicate that summer-type storms have the possibility of producing the maximum probable flood (USACE, 2001b). However, meteorological records also show that winter and spring storms occur more frequently and produce more major flood events than those that occur in the summer and fall months. The largest storm of record for the area occurred in February 1939.

From July through October, the prevailing winds are southerly, changing to southwesterly during November and December. In January and February, winds become near westerly. The prevailing winds are generally southwesterly from March through June. During the summer, the average wind is about four miles per hour. The highest average wind speed of seven miles per hour occurs in August. Damaging windstorms are mostly associated with heavy thunderstorms, squall lines, or intense large-area storms.

Increased human development, fragmentation of wildlife and aquatic habitat, impacts of climate change, and the growing demand for recreational access and natural resources management has affected the Twelvepole Creek Basin. The USACE missions of flood

risk management, water supply, and hydropower generation all serve to protect the built and natural resources of a region from the climate extremes of drought and floods. This creates a more resilient and sustainable region for the health, welfare, and energy security of its citizens.

Maintaining a healthy vegetative cover and tree canopy on Federal lands within the constraints imposed by primary project purposes helps reduce stormwater runoff and soil erosion; mitigates air pollution; and moderate's temperatures. The USACE Strategic Sustainability Performance Plan implements EO 13834.

As a prominent Federal entity, a key participant in the use and management of many of the Nation's water resources, a critical team member in the design, construction, and management of military and civil infrastructure, and responsible members of the Nation's citizenry, the USACE strives to protect, sustain, and improve the natural and manmade environment of our Nation and is committed to sustainability and compliance with applicable environmental and energy statutes, regulations and EOs.

Sustainability is a natural part of the USACE decision processes, [and is a] part of our organizational culture. The USACE is a steward for some of the Nation's most important natural resources and must ensure that stakeholders and partners receive products and services that provide for sustainable solutions that address short and long-term environmental, social, and economic considerations.

Further, the USACE has prepared an Adaptation Plan in response to previously existing related EOs and Climate Action Plan. The Adaptation Plan includes the following USACE policy statement:

It is the policy of USACE to integrate climate change preparedness and resilience planning and actions in all activities for the purpose of enhancing the resilience of our built and natural water-resource infrastructure and the effectiveness of our military support mission, and to reduce the potential vulnerabilities of that infrastructure and those missions to the effects of climate change and variability.

The existing ecosystems and water resources infrastructure in the Ohio River Basin (ORB) have demonstrated resiliency to environmental changes in streamflow and temperature changes over the past 60 years, but there have been some notable losses to aquatic species during that period. Numerous fish and mussel species in the basin have been extirpated from some watersheds due mainly to the introduction of anthropogenic stressors. Addition of pollutants through point and non-point discharges has reduced species diversity and productivity in many streams. Changes in natural flow due to the operation of dams for hydropower, flood risk management, and water supply have impacted many aquatic species. Loss of wetlands and vegetation in riparian corridors due to urban growth and cultivation practices has impacted lotic (inhabiting or situated in rapidly moving fresh water) ecosystems.

These environmental stressors are problematic for current species that may be confronted later with yet another stressor—climate changes that disrupt streamflow and introduce warmer water temperatures. Reduction of existing stressors to these systems could greatly increase the survivability and sustainability of the basin aquatic ecosystems before changes in river discharge and temperature are forecasted to begin.

2.5.2 Potential Climate Change Impacts to the Twelvepole Creek Sub-basin

The Twelvepole Creek sub-basin is part of the larger Ohio River Basin (ORB). Although the modeled climatic predictions vary across the ORB and are somewhat uncertain (especially in the latter portion of the 21st century), much of the basin appears likely to experience significantly higher high-flow events and in some cases, lowered low-flow events, interspersed with periods of drought. In the face of changing land use and energy development, and where these projected air temperature and flow changes deviate more than 25% from the current levels, it is likely that fish and mussel populations, wetland complexes, reservoir fisheries, trans-boundary organisms such as migratory fish and water body-dependent birds, and human use and safety will also be noticeably impacted.

The ORB is rich with stream systems of national ecological and recreational significance but does not have many natural lakes or large isolated wetland complexes. However, a number of aquatic systems in the basin have headwater wetland areas or periodically connected wetland features in floodplains, and stream networks with tributary flood control/hydropower projects that create large, artificial reservoirs, such as Beech Fork and East Lynn Lakes. The projected climatic changes in the current study can accelerate or “drive” the dynamics of each of these components of a stream system.

The USACE’s Institute for Water Resources (IWR) and the Ohio River Basin Alliance (IWR, 2017) evaluated climate change impacts for the Ohio River Basin. IWR climate modeling results indicate that climatic conditions in the ORB will remain largely within the mean ranges of precipitation and temperatures, with the exception of a gradual warming that has been experienced between 1952 and 2001. Summer highs and winter lows between 2011 and 2040 are expected to remain generally within what has been observed over the preceding period, but extreme fluctuations (record temperatures, rainfall, or drought) are expected to become more likely than before.

After 2040, temperatures may rise at one degree per decade through 2099. Likewise, there may be significant changes in precipitation with associated increases or decreases in river flow on an annual mean basis and a seasonal maximum and minimum basis. Generally, the northeastern and eastern portions of the ORB are projected to experience greater rainfall and river discharges between 2040 and 2099 amounting to as much as 35% to 50% greater during spring flows within the Allegheny, Monongahela, Kanawha, and Big Sandy River sub-basins.

The Twelvepole Creek sub-basin is located in the Middle Ohio Subregion of the ORB. The Middle Ohio Subregion will experience increases in mean annual maximum stream flows (5% to 15% change) from the base period through 2011–2040 and will show an increase in the maximum flows across portions of Pennsylvania (PA) and WV but little change within the southeast portion of the ORB. During 2040-2070, this higher maximum discharge extends into OH and Indiana (IN). During 2070-2099, the annual percent change in maximum streamflow increases substantially across PA, WV, OH, IN, and Illinois (IL). The model suggest that streamflow increases in the Middle Ohio Subregion for this period would be between 25% and 35%. The southeastern and eastern portions of the ORB will likely experience little change in the base period during the spring season, but it is anticipated there would be some increases between 2040 and 2070 in precipitation and river flow. The fall season is anticipated to be more variable with maximum streamflow increasing in the base period up to 50% and minimum streamflow after 2040 are expected to decrease by up to 15%. Therefore, the fall season increases in maximum flows may enhance flood events in late autumn/early winter.

As part of the Climate and Climate Change review, a Qualitative Climate Change Assessment was conducted, per ECB 2018-14 (USACE, 2018) for inland hydrology. This assessment was performed through an on-line USACE Screening-Level Climate Change Vulnerability Assessment, for the Middle Ohio Subregion (HUC # 0509). However, an assessment of the river hydrology trends (Non-Stationarity Detection Tool) was not conducted, because flows from Beech Fork and East Lynn Lakes are regulated by their respective control structures and were built as flood risk management projects.

The initial blanket assessment that was conducted by querying the Vulnerability Map for the Middle Ohio Subregion, shows no business lines over national thresholds set for the tools. Further analysis was conducted across the range of other tools and business lines in the Vulnerability Assessment package, however, the results repeatedly returned as “not vulnerable”. This indicates that the assessment tools do not statistically support notable climate change impacts for the Middle Ohio Subregion.

It should be kept in mind that the assessment is only a screening level tool and should not be construed as an accurate forecast of site-specific conditions or impacts, or inclusive of all impacts that climate change may present. There are also uncertainties associated with the hydrologic outlooks that the Vulnerability Assessment tool uses, which may impact the conclusions, under any combination of epochs, (wet or dry) scenarios or business lines.

2.5.3 Literature Review

The USACE publication, *Recent US Climate Change and Hydrology Literature Applicable to US Army Corps of Engineers Missions - OHIO REGION 05* (January 2015) is a climate change and hydrology literature synthesis for the USACE missions in

the U.S. Other works have also been referenced in the preparation of this analysis. The text below is a summary of future climate projection findings for the Ohio Region (Water Resources Region 5, the Ohio Region, the boundaries for which are shown in **Figure 2-1**). The entire Ohio Region is within the USACE Louisville, Nashville, Huntington, and Pittsburgh District territories, including south-central Ohio and the Scioto River Basin.

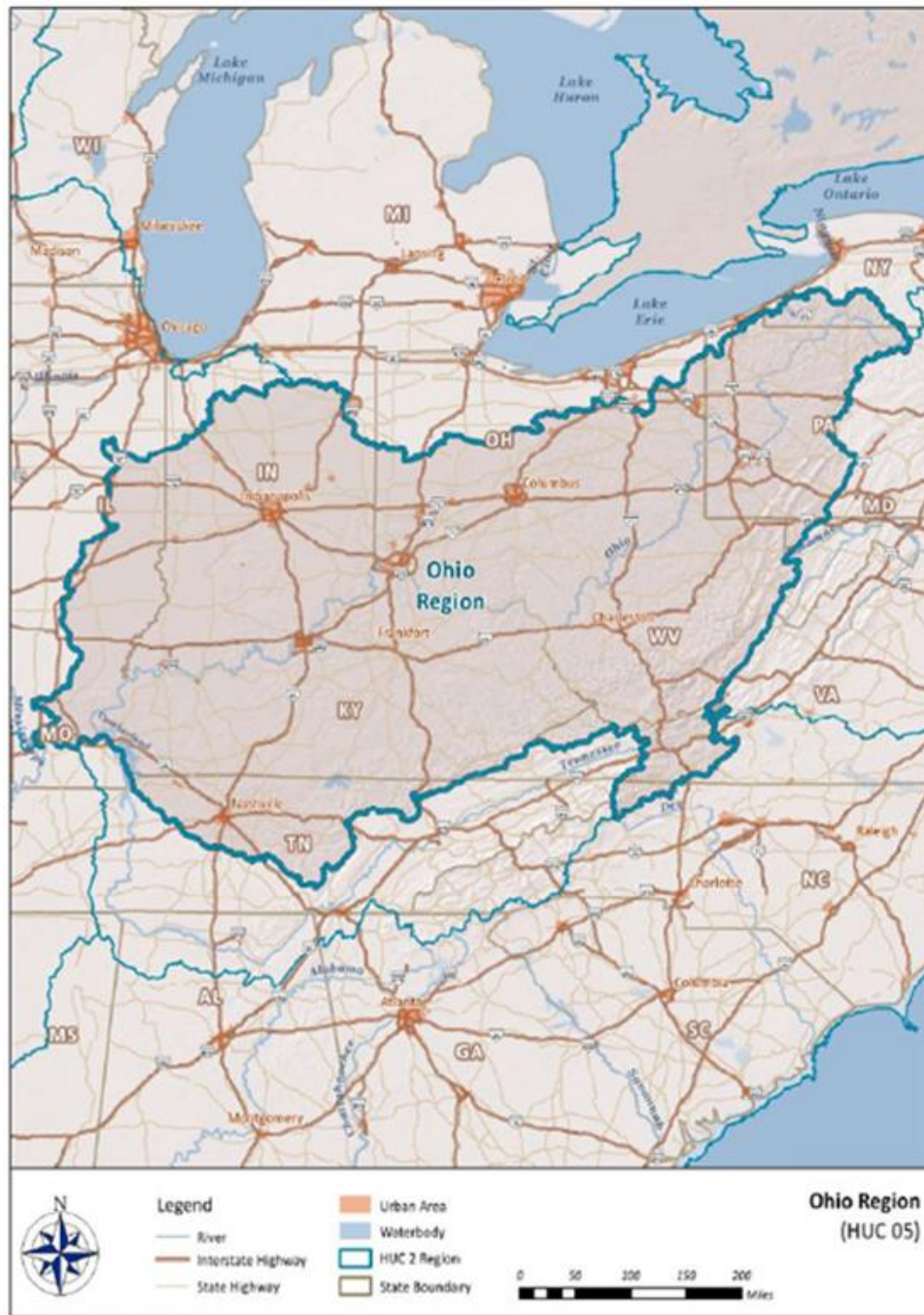


Figure 2-1. Middle Ohio Subregion

Although there is some consensus among some climate scientists that average and extreme temperatures will increase within the region, the amount of projected increase varies between studies. Several studies also show considerable variation within the Ohio Region. There is general agreement among studies that the region spans a transition zone between a century-long warming trend toward the north (Great Lakes) and a cooling trend toward the south (south of the Ohio River). However, there have been inconsistent findings about the geographic extent and seasonality of the warming and cooling zones in the region.

A mild increasing trend in precipitation in the region, in terms of both annual totals and frequency of storm events, has been identified by multiple authors but a clear consensus is lacking. Results show increases in precipitation in some portions of the Ohio Region and show decreases in other portions. Also, seasonally, indications are that fall, winter and spring months in south-central Ohio will likely experience near-to-below average precipitation, while summers will likely be wetter-than-average – some of which already appears to be occurring. At least one study shows that rainfall may be concentrated in larger storms in the latter half of the 21st century as compared with the first half.

The studies reviewed were split on conclusions about streamflow trends in the Ohio Region for the past 60 years. However, more studies indicated an upward trend in streamflow for the region than did not. Projections generated by coupling General Circulation Models (GCMs) with macro-scale hydrologic models in some cases indicate a reduction in future streamflows but in other cases indicates a potential increase in streamflows in the Ohio Region. As considered with precipitation trends, there may very well be a seasonal aspect of climate change impacts to streamflows.

The trends and literary consensus of observed and projected primary variables noted above are summarized for reference and comparison in **Figure 2-2** below:

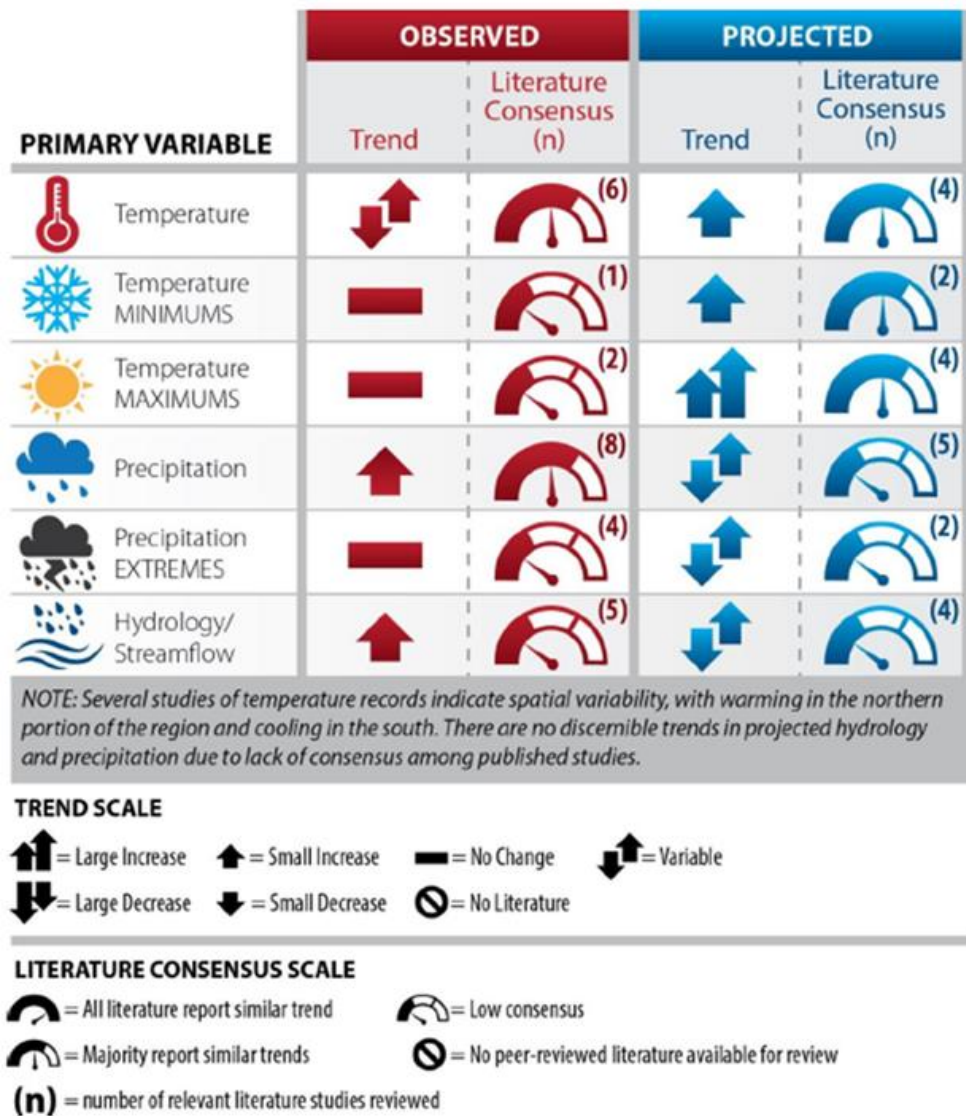


Figure 2-2. Potential climate change impacts to USACE missions served by Beech Fork and East Lynn Lakes

Beech Fork and East Fork Dams were constructed to reduce the risk of flooding in the downstream drainage areas. The ORB is already prone to flooding and increased precipitation is predicted for the region. This may periodically cause increased runoff and may cause flash floods if the storms are intense. Flood risk management projects may be very important for reducing the residual flooding impacts due to increased precipitation and extreme storm events.

Ecosystem maintenance is a key consideration at Beech Fork Lake and East Lynn Lake. Increased ambient air temperatures will result in increased water temperatures. This may lead to water quality concerns, particularly for the dissolved oxygen (DO)

levels, which are an important water quality parameter for aquatic life. Increased air temperatures are associated with the growth of nuisance algal blooms and influence wildlife and supporting food supplies. Higher average temperatures are also shown to support changes in ecosystem composition and allow invasive species to shift the composition of ecosystem character at the lakes.

In addition, possible changes to seasonal precipitation patterns may pose complications to planning for ecosystem needs and lead to variation in flows. This may be particularly true during dry years, when water demands for conflicting uses may outweigh water supply. During wet years, flooding may raise ecological concerns and may threaten ecosystems.

The recreational facilities at both lakes offer several benefits to visitors as well as positive economic impacts. Increases in air temperature along extended heat wave days and the possible increase in extreme storm events have the potential to decrease the number of visitors to USACE recreational facilities. Periods of extreme high heat poses human health concerns and higher water temperatures can result in algal blooms and other water quality issues at the project's lakes, which may cause health risks for those involved in aquatic activities. An increase in extreme storm events may make recreational activity difficult, dangerous, or impossible.

USACE projects are varied, complex, and in the case of Beech Fork and East Lynn Lakes, encompass multiple business lines. The relationships among these business lines, with respect to impacts from climate change, are complicated with cascading effects. The interrelationships between business lines must be recognized as an essential component of future planning efforts when considering the best methods or strategies to adapt.

2.6 Topography

The Twelvepole Creek sub-basin lies within two Level 4 ecoregions. The majority of the basin is in the Monongahela Transition Zone and the upper drainage of East Lynn Lake is in the Dissected Appalachian Plateau.

The unglaciated hills, knobs, and ridges of the Monongahela Transition Zone Ecoregion are typically underlain by interbedded limestone, shale, sandstone, and coal of the Monongahela Group. Entrenched rivers, gently dipping strata, and land slips occur. Elevations range from 575 to 1900 feet and local relief is 200 to 700 feet. Soils are derived from residuum and are typically Alfisols and have a relatively high base saturation. Guernsey, Dormont, Culleoka, Westmoreland, Clarksburg, and Neward soil series are common (Woods et al., 1999).

The Dissected Appalachian Plateau Ecoregion is strongly dissected and extensively forested. Parts of the ecoregion have been severely degraded by coal mining. On a large scale, the region is relatively flat, but locally, it is very rugged. Crest elevations

range from 1,200 to 3,600 feet and tend to be about 350 to 550 feet above the valleys. Slopes are steep and both ridges and valleys are narrow. What little flat land exists is limited to narrow floodplains of larger streams and rivers. The bedrock consists of sandstone, siltstone, shale, and coal. Soils tend to be well-drained and range from moderate to low fertility (bplant.org, 2021).

The East Fork's headwaters are located in the hilly terrain in northern Mingo County. East Fork flows approximately 42 miles from its source to its confluence with Beech Fork and its floodplain gradually widens as it flows downstream. Beech Fork's headwaters are located in the vicinity of Turkeycamp Knob which rises steeply to an elevation of over 1,100 feet. It flows approximately 26 miles to its confluence with Twelvepole Creek.

2.7 Regional Ecological Setting

2.7.1 Vegetative Resources

Over 82% of the 442-square mile Twelvepole Creek Sub-basin is wooded, dominated by deciduous forest, with mixed hardwood and pine forest being the second most common forest type. Most of the wooded areas are classified as "second growth" forests, having recovered through natural regeneration from repeated clearing actions dating back to the 1800s. Like much of WV, few stands of "old growth" forest remain in the basin, with those that do exist usually being located on the steepest remote slopes and along the most isolated stream bottoms.

More than 82% of the basin is wooded, dominated by deciduous forest, with mixed hardwood and pine forest being the second most common forest type. The remaining 18% of the basin is classified as follows: approximately 7% is developed; 2.7% covered by impervious surfaces; and 8.3% covered by grasslands, pastures, barren land, wetlands, crops, shrubs, and open water.

2.7.2 Terrestrial Resources

The sparsely populated nature of the Twelvepole Creek Sub-basin, combined with a rugged landscape and effective management by the WVDNR-Wildlife, has allowed the development of a diverse and sustainable wildlife community in the basin. Particularly effective in creating today's productive wildlife resources was the establishment of the WVDNR in 1961 from various precursor State agencies, the prior existence of which dated back to 1909. Improvement of both regional and local wildlife communities resulted, in large part, from WVDNR-Wildlife's determination of acceptable hunting limits based upon area carrying capacities, protection of non-hunttable species, pursuit of stocking programs aimed at restoring extirpated species, and the enforcement of state wildlife laws.

Important mammal members of the basin's small game wildlife community include the Virginia opossum (*Didelphis marsupialis*), Eastern cottontail rabbits (*Sylvilagus floridanus*), grey squirrel (*Sciurus carolinensis*), fox squirrel (*Sciurus niger*), ruffed grouse (*Bonasa umbellus*), raccoon (*Procyon lotor*), woodchucks (*Marmota monax*), American beaver (*Castor canadensis*), and American mink (*Neovison vison*). Other game species include mourning doves (*Zenaida macroura*), wood ducks (*Aix sponsa*), mallard ducks (*Anas platyrhynchos*), and teal ducks (*Anas* sp.) which either nest or stop over during their annual migrations. Canada geese (*Branta canadensis*) have been introduced as permanent residents and are occasionally hunted along with the species' winter migrants from Canada. Big game species successfully re-introduced into the basin include white-tailed deer (*Odocoileus virginianus*) and wild turkey (*Meleagris gallopavo*).

One of the most ambitious management efforts of WVDNR-Wildlife involves the re-introduction of elk (*Cervus canadensis*) into WV. Elk are believed to have been extirpated from the State around 1875. The goal of the program is to establish and manage a healthy, free ranging, and self-sustaining elk population within a seven-county region of southwestern WV. The upper portion of the Twelvepole Creek Sub-basin, including the entirety of the East Lynn Lake project, is included within the State's designated Elk Management Area. In 2020, four years into the re-introduction program, WV's elk herd is estimated to consist of 80 individuals that were brought in from KY and Arizona between 2016 and 2018 (WVDNR, 2015a).

Lastly, three Wildlife Management Areas (WMAs) managed by WVDNR-Wildlife are located within the basin to enhance local wildlife resources and to provide public hunting opportunities. Two of the WMAs occur on significant acreages of the Beech Fork Lake and East Lynn Lake project lands (see **Sections 3.2.6.2 and 4.2.6.2**). In addition, the 8,296-acre Cabwaylingo State Forest is in the headwater reaches of the basin (WVDEP, 2013a).

2.7.3 Aquatic Resources

The Twelvepole Creek Sub-basin (HUC 05090102) contains 1,139 miles of streams with a drainage area of 442 square miles. The Twelvepole Creek Sub-basin is one of the smaller WV watersheds that drain into the Ohio River. The largest streams are the East Fork, West Fork, and Beech Fork which combine to give rise to the basin's namesake mainstem stream, Twelvepole Creek that eventually flows into the Ohio River. Most of the basin's stream mileage is divided between numerous higher order tributary streams of varying lengths and flows that drain the watershed's rugged terrain before joining one of the above-named principal watercourses.

Two manmade lakes (i.e., Beech Fork Lake and East Lynn Lake) are located within the basin. The two lakes influence today's distribution and abundance of the basin's indigenous aquatic resources.

- First, the former shallow, free-flowing conditions of the stream reaches contained within the impounded areas of each lake were changed to deeper permanent standing water. This habitat transformation caused a change in the type of fish communities that now inhabit the immediate areas affected by the lakes.
- Second, the two impoundments interrupted the former continuous distribution of many aquatic species that formerly characterized the basin's aquatic communities. Those species requiring free-flowing streams for their survival are now restricted to the tributary streams that drain into each lake, with their respective populations being separated from other populations that continue to exist in the mainstem streams and tributaries downstream of the dams.
- Third, the dams prevent the upstream movements of fish from the Ohio River that prefer to spawn in and utilize the tributaries as nursery areas.

The overall ecological health of streams can be inferred from studies of their water quality and fish and macroinvertebrate communities. Pre-impoundment studies of Beech Fork and East Lynn lakes indicated the free-flowing streams in their respective drainage areas supported up to 43 species of fish. Of those species, 14 require flowing stream conditions to reproduce and thrive and were expected to retreat to upstream tributary streams in each lake's drainage area and/or to continue to exist in the streams downstream of the two dams. On the other hand, many of the remaining 29 species were projected to flourish in the new lakes.

A survey of the *Unionacea* superfamily of river mussels inhabiting Twelvepole Creek was conducted (Smith, 1981). These freshwater mussels are a component of a stream's macroinvertebrate community, and their survival is based upon the availability of clean-bottom, free-flowing streams, and the presence of specific host fish necessary for the successful propagation of the mussels. The survey collected 23 species of unionid mussels that were represented by 16 genera and 2 families. The survey also found that while Twelvepole Creek Sub-basin supported a diverse assemblage of mussels, the West Fork for some inexplicable reason did not, and no unionid mussels were collected from the East Fork. At the time of the study, the introduced Asian clam (*Corbicula fluminea*) was found to already be established in the basin, but largely confined to the main branch of Twelvepole Creek. Because of the diversity of the mussel fauna, Twelvepole Creek was determined to be a healthy stream.

A 10-year study of the East Fork's fisheries, macroinvertebrates, and water chemistry was conducted between 2000 and 2010 to evaluate the effects of coal mining on the stream's ecology (Hart, et al., 2011). That study concluded that despite experiencing elevated conductivity levels, neither fish populations nor macroinvertebrate assemblages had been extensively degraded based upon multi-metric indices designed to evaluate their wellbeing.

In conclusion, the major streams of the Twelvepole Creek Sub-basin and their respective smaller tributaries continue to support a diverse and healthy environment for aquatic resources.

2.7.4 Wetlands

Wetlands are transitional lands between terrestrial and aquatic systems where the water table is usually at or near the surface of the land and may be covered by shallow water. Wetlands must have one or more of the following three attributes:

- 1) At least periodically, the land supports predominantly hydrophytes (plants that grow in water or in water-logged soil),
- 2) The substrate (living surface) is predominantly undrained hydric soil, and
- 3) The substrate is non-soil and is saturated with water or covered by shallow water at some time during the growing season of each year.

Wetlands typically contain diverse vegetation which attracts a variety of wildlife species, especially when standing water is present. Some wildlife species are dependent on wetland ecology for food, water, and shelter and cannot survive in other environments. Because of the link between upland and aquatic systems, wetlands attract and support many species from adjacent ecosystems.

Wetlands located adjacent to streams and rivers are important, in part, because they hold and slowly release floodwater and snow melt. Wetlands also filter impurities out of surface water, recycle nutrients, and trap sediment. Lastly, wetlands provide recreational opportunities for bird watching, hunting, wildlife observation, and possibly fishing, canoeing, and kayaking.

The US Fish and Wildlife Service's (USFWS's) National Wetland Inventory (NWI) provides generalized maps that give approximate locations of wetlands and deep-water habitats based on remote sensing data and ground-truthing of mapped wetlands.

The rugged terrain that characterizes most of the Twelvepole Creek Sub-basin is not conducive to the formation and maintenance of expansive wetlands in the landscape. However, small areas of wetlands are scattered throughout the basin, with the greatest opportunity to be encountered in those areas having the lowest elevations.

Two of the basin's largest wetland features are associated with the lacustrine habitats created by Beech Fork and East Lynn Lakes (**Sections 3.2.6.4 and 4.2.6.4**). The next most frequently encountered wetland types are the palustrine forest and shrub communities that occur within the narrow floodplains bordering the Twelvepole Creek, Beech Fork, East Fork, and West Fork mainstem streams and the lowest reaches of the basin's largest tributaries. Finally, emergent wetlands also occur around the margins of small manmade and beaver ponds that are occasionally found in those areas of the basin having relatively flat slopes.

2.7.5 Threatened and Endangered Species

Under the Federal Endangered Species Act (ESA) of 1973, as amended, an “endangered species” is defined as any species in danger of extinction throughout all or a significant portion of its range. A “threatened species” is defined as any species likely to become an endangered species in the foreseeable future. Although not defined in the ESA, “species of concern” typically refers to species that need proactive protection, but for which insufficient information is available to indicate a need to list the species as endangered.

In accordance with Section 7(a)(2) of the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) (ESA), Federal agencies are required to ensure that any actions they carry out, fund, or authorize are not likely to jeopardize the continued existence of federally listed threatened or endangered species or result in destruction or adverse modifications of the critical habitat of such species. If the Federal agency determines that its proposed action may affect federally listed species or critical habitat, it must consult with the USFWS. Also, USACE considers State-listed sensitive species by reviewing proposed actions to assure adverse impacts are avoided when possible.

ER 1130-2-540, Environmental Stewardship and Maintenance Guidance and Procedures requires that “special status species” having the potential to occur on USACE project lands be documented. “Special status species” include:

“...any species which is listed, or proposed for listing, as threatened or endangered by the US Fish and Wildlife Service (USFWS) or National Marine Fisheries Service, under the provisions of the Endangered Species Act (ESA); any species covered by the Migratory Bird Treaty; any species designated by the USFWS as a “candidate” or “listing” species or “sensitive” species; and any species which is listed and protected by State statute in a category implying potential endangerment or extinction.”

A query of the USFWS’s Information for Planning and Consultation (IPaC) identified a total of 218 special status species as occurring or potentially occurring within the Twelvepole Creek Sub-basin (USFWS, 2020). Of the 218 total special status species identified, ten are federally protected under the ESA, as amended, seven of which are federally listed as endangered, two are listed as threatened, and one is a candidate for listing (**Table 2-1**). In addition, twelve migratory birds of conservation concern, including the Bald Eagle which is protected under the Bald and Golden Eagle Protection Act are identified as occurring at both projects and throughout the Twelvepole Creek Sub-basin, as either year-round residents or seasonal visitors for breeding purposes or wintering only.

Table 2-1. Federally protected threatened and endangered species having the potential to occur within the Twelvepole Creek Sub-basin

Common Name	Scientific Name	Status
Clubshell Mussel	<i>Pleurobema clava</i>	Endangered
Fanshell Mussel	<i>Cyprogenia stegaria</i>	Endangered
Sheepnose Mussel	<i>Plethobasus cyphus</i>	Endangered
Pink Mucket (pearlymussel)	<i>Lampsilis abrupta</i>	Endangered
Snuffbox Mussel	<i>Epioblasma triquetra</i>	Endangered
Gray Bat	<i>Myotis grisescens</i>	Endangered
Indiana Bat	<i>Myotis sodalis</i>	Endangered
Northern Long-eared Bat	<i>Myotis septentrionalis</i>	Threatened
Big Sandy Crayfish	<i>Cambarus callainus</i>	Threatened
Monarch Butterfly	<i>Danaus plexippus</i>	Candidate

Source: USFWS, 2022

Table 2-2. Federally protected migratory birds occurring within the Twelvepole Creek Sub-basin

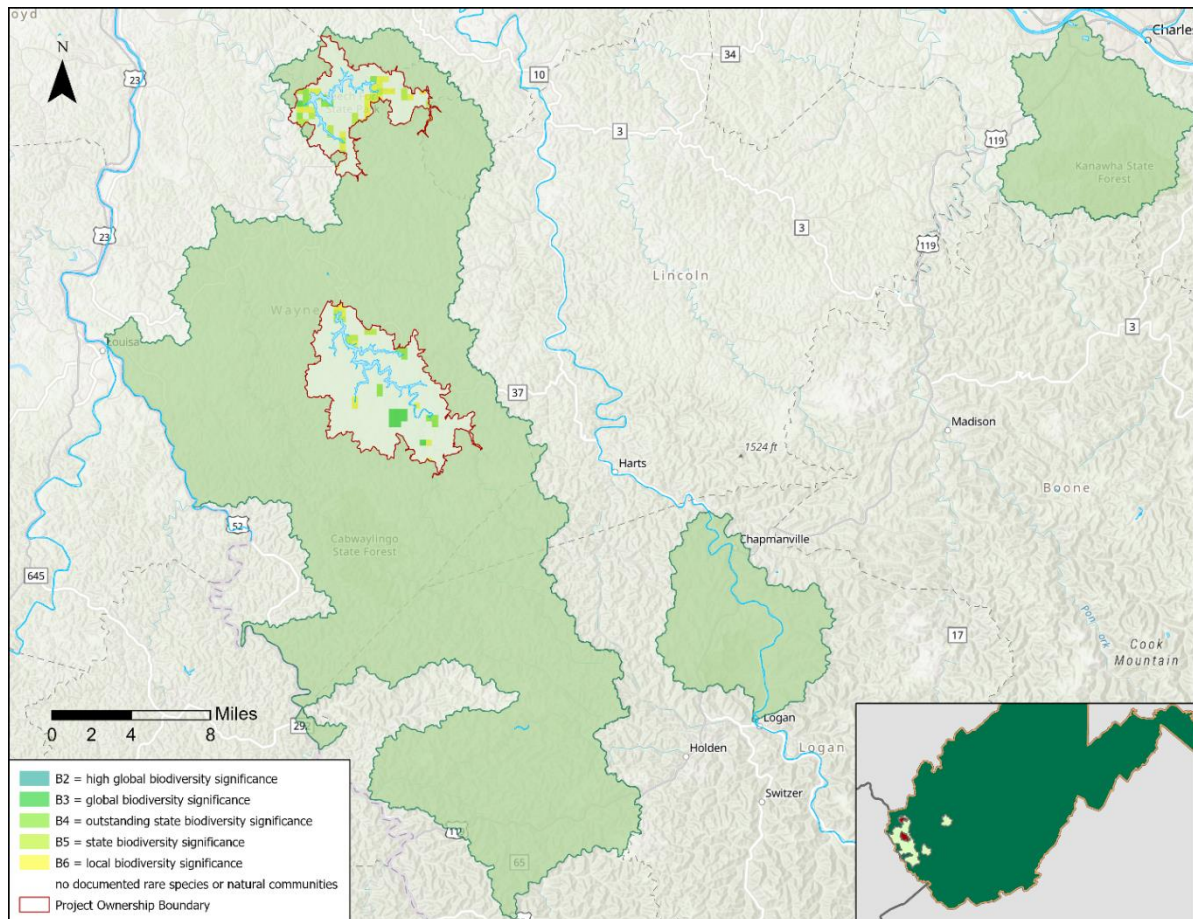
Common Name	Scientific Name	Season Found
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Year-Round
Bobolink	<i>Dolichonyx oryzivorus</i>	Breeding
Canada Warbler	<i>Cardellina canadensis</i>	Breeding
Cerulean Warbler	<i>Dendroica cerulean</i>	Breeding
Eastern Whip-poor-will	<i>Antrostomus vociferus</i>	Breeding
Golden-winged Warbler	<i>Vermivora chrysoptera</i>	Breeding
Kentucky Warbler	<i>Oporornis formosus</i>	Breeding
Prairie Warbler	<i>Dendroica discolor</i>	Breeding
Prothonotary Warbler	<i>Protonotaria citrea</i>	Breeding
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	Breeding
Rusty Blackbird	<i>Euphagus carolinus</i>	Wintering
Wood Thrush	<i>Hylocichla mustelina</i>	Breeding

Source: USFWS, 2022

The vast majority of the 218 special status species identified as occurring or potentially occurring within the Twelvepole Creek Sub-basin are State protected species. The WV species protection strategy is administered through the Natural Heritage Program and WVDNR-Wildlife which maintains lists of “Rare, Threatened and Endangered” plant and animal species occurring within the State by county.

WVDNR-Wildlife (2015a) has developed the WV State Wildlife Action Plan that identifies “Species of Greatest Conservation Need” (SGCN) in the State. These species require conservation efforts to avoid their disappearance from the landscape. The

action plan established Conservation Focus Areas (CFA) based on geographic areas identified across the state where conservation resources can potentially be more efficient, effective, and provide more opportunities for leveraging successful outcomes. The Twelvepole Creek Sub-basin is included in the Cumberlands West CFA (**Figure 2-3**). A total of 161 taxa listed as SGCN occur or have historically occurred in the Cumberlands West CFA, with the majority of those listed as occurring in the habitat types that are present at both Beech Fork and East Lynn Lakes.



Source: WVDNR, 2015b

Figure 2-3. Cumberlands West Conservation Focus Area

2.7.6 Exotic and Invasive Species

Invasive species are defined at the federal level in EOs 13112 and 13751 as “...non-native organisms whose introduction causes or is likely to cause economic or environmental harm, or harm to human, animal, or plant health (EO, 1999, 2016).” Invasive species can be microbes, plants, or animals that are non-native to an ecosystem. Common adverse consequences attributed to exotic species result from the competition for resources, the destruction of habitats, and/or the elimination of

native species. Invasive species can be accidentally transported, or they can be deliberately introduced because they are thought to be helpful in some way. Invasive species cost local, state, and federal agencies billions of dollars every year.

The two referenced EOs direct any federal agency whose actions may affect the introduction, establishment, or spread of invasive species to develop measures to control the introduction and spread of such species.

In 2014, WV developed an Invasive Species Strategic Plan and Voluntary Guidelines for the State. Invasive plants and animals pose a significant threat to WV's ecosystems. Invasive terrestrial animals in the State include rodents, birds, feral cats, and feral hogs. Approximately greater than 800 non-native plant species are found within WV. Over 270 have been documented as being invasive in West Virginia, and approximately 36 percent of these are ranked as posing moderate to high threats.

Additionally, dozens of non-native insect pest species cause impacts to WV forests, agriculture, parks, and other properties. Some of the most widely known include the gypsy moth (*Lymantria dispar*), emerald ash borer (*Agrilus planipennis*), hemlock woolly adelgid (*Adelges tsugae*), and brown marmorated stink bug (*Halyomorpha halys*). The Balsam woolly adelgid and Asiatic ladybug beetles are also having significant impacts.

The estimated damage to agricultural and livestock production from invasive species in the United States (U.S.) totals approximately \$65 billion every year (Pimentel, 2011). Additionally, control measures cost the U.S. \$14 billion a year (Pimentel, 2011). WV spends millions of dollars every year to mitigate the impacts of invasive species on forestry, agriculture, natural resources, and recreation (WVDNR, 2014).

WVDNR-Wildlife also maintains a database of invasive plant species occurring within WV and establishes their threat level. These threats are described in terms of propensity to invade an area, establish itself, and to outcompete the native species in an area.

Threat Level 1: Highly invasive species exhibit the most invasive tendencies in natural areas and native plant habitats. They may disrupt ecosystem processes and cause major alterations in plant community composition and structure. They establish readily in natural systems and spread rapidly.

Threat Level 2: Moderately invasive species may have minor influence on ecosystem processes, alter plant community composition, and affect community structure in at least one vegetative layer. They may become dominant in the understory layer without threatening all species found in the community. These species usually require a minor disturbance to become established.

Threat Level 3: Occasionally invasive species generally do not affect ecosystem processes but may alter plant community composition by outcompeting one or more native plant species. They often establish in severely disturbed areas. The

disturbance may be natural or of human origin. These species may spread slowly from disturbed sites.

As described in **Sections 3.2.2.6 and 4.2.2.6**, several non-native fish species have been intentionally stocked by WVDNR-Wildlife at either one or both lakes to increase the forage base for game species and to enhance recreational fishing opportunities. Rarely do stocked fish remain where they are released; they could move either to tributary streams flowing into the lakes or to areas downstream of the dams.

2.8 Cultural Resources

2.8.1 Background and Regional Overview

Cultural resources are a non-renewable element of the landscape. In the absence of written records, artifacts and other cultural remains provide thousands of years of unedited portrayals of human lifeways and adaptations. Cultural resources preservation and management is an equal and integral part of all resource management at USACE-administered operational projects. Although the term “cultural resources” does not have a consistent or legal definition (Advisory Council on Historic Preservation [ACHP], nd) the term generally includes, but is not limited to pre-contact and historic archaeological sites, deposits, and features. An “archaeological site” is a location that contains the physical evidence of past human behavior that allows for its interpretation.

The National Historic Preservation Act (NHPA) treats prehistory as a part of history thus the terms “historic,” and “historical,” refer to both pre- and post-contact periods. Pre-contact, often termed “prehistoric archeology,” refers to the archeological remains of indigenous American societies as they existed before substantial contact with Europeans and resulting written records. The date of contact varies across the country (Little et al., 2000) and can represent either direct or indirect contact with Europeans⁵.

Cultural resources also refer to historic and pre-contact districts comprised of groups of structures or sites; cultural landscapes; built environment resources such as buildings, structures (such as bridges), and objects; and traditional cultural properties and sacred sites such as burials, cemeteries, and features or sites associated with significant events or practices in the traditional culture of an ethnic group. Cultural resources that are identified as eligible for listing in the National Register of Historic Places (NRHP) are referred to as “historic properties,” regardless of category (ER 1130-2-438 [for more detailed discussion on Cultural Resources and Traditional Cultural Properties visit the USNPS website, nd]).

⁵ What constitutes contact between Native Americans and Europeans varies. In most areas of the US, Native American groups experienced European contact via long-range trade and the diffusion of diseases prior to direct, face-to-face interactions with Europeans (Little et al., 2000).

A NRHP listing promotes the site's preservation rather than destruction, thereby fostering stewardship of significant places. A site deemed "eligible" (Section 106 NHPA) is a legal recognition that a property meets the criteria for the NRHP, including concepts of significance and integrity. Such properties are given the same legal status as properties formally listed on the NRHP, thus requiring the Federal agency to "take into account" the effects of any undertakings upon them. For resources to be taken into account, they must be at least 50 years old unless relevant to an event of National interest. Every year, new resources become eligible for consideration as they age. Cultural resources can potentially be affected by land management, water resources facilities and operations, recreation facilities, wildlife, development, and project visitors.

Federal regulations, EOs, state and local laws and documents provide guidance regarding the management, disposition, preservation, and repatriation of cultural resources on federal properties. The most notable are the NHPA of 1966 (16 U.S.C. 470 et. seq., as amended), the NEPA of 1969 (42 U.S.C. et seq.); The Native American Graves Protection and Repatriation Act (NAGPRA) [25 U.S.C. 3001 et seq.], and the Archaeological Resources Protection Act of 1979 (ARPA) [16 U.S.C. 470aa-mm]. These regulations provide guidance centered on the cultural interests of the public and federally recognized Tribes on federal lands and they play an integral part of the overall Federal responsibility on USACE Civil Works water resources projects. Stewardship of cultural resources on USACE Civil Works water resources projects is an important part of the overall Federal responsibility. The USACE summarizes the guidance provided in these laws in ER and EP 1130-2-540.

Pre-contact and historic settlement and land use patterns are tied to the geographical environment and larger sociopolitical events. Topography, resource availability, technology and politics play an integral role in the history of a region. The Beech Fork and East Lynn Lake Projects are in the Twelvepole Creek Sub-basin. The sub-basin is located on the western slopes of the Appalachian Mountains and generally characterized by moderately rugged and hilly terrain (cresting upwards to 500 feet), steep sided valleys, and narrow floodplains on alternate sides of a meandering river valley. The ruggedness of the region and the winding dendritic streams provided natural resources such as game and wild plant foods to the earliest inhabitants. This same state of affairs hindered economic development until the rise of timber and coal industries in the late 19thearly 20th centuries. Difficult terrain to this day delivers challenges to modern infrastructure.

The Twelvepole Creek Sub-basin is the backdrop to unique pre-contact and historic adaptative strategies actively responding to natural and external forces. Existing information indicates that Native American inhabitants of sites in the region would have had access to a wide variety of natural resources. Numerous terrestrial, aquatic, and avian faunal resources would have been available from upland and valley environs, possibly including some species that are now extinct, extirpated from the region, or rare.

The local diversity of natural settings would also have supported a wide range of plant species for use in subsistence and as building materials and fuel as well as providing lithic material suitable to produce chipped-stone artifacts. These resources continued to be available during the Protohistoric and early Historic periods thus providing European and Euro Americans similar economic restrictions and opportunities. Timber and mineral resources would develop importance during the early 19th century.

The information presented in this section is not intended to be a complete analysis of all available information but attempts to characterize the major factors affecting the management of USACE lands for environmental stewardship and outdoor recreation purposes.

2.8.2 Cultural History

In general, the cultural resources for the Twelvepole Creek Sub-basin fall under the larger umbrella of the cultural resources found in the Middle Ohio River Valley. The Twelvepole Creek Sub-basin also exhibits general cultural similarities to those of the neighboring Kanawha Valley. Many of the cultural resources in the Beech Fork, East Lynn Lake area are of an indeterminate nature. Precontact archaeological sites are generally characterized as mostly open habitation sites without mounds reflecting a variety of occupation types and functions including small resource extraction camps to semi-permanent hamlets. Post contact resources include early following initial migration into the area by fur trappers and early explorers, Euromerican settlements, farmsteads and extractive industries initially developed to meet the demands of the industrial revolution and continued to support burgeoning industries along the Ohio River and national electricity demands.

Most archaeological evidence and reports in the region begin in the Archaic Period, although it cannot be ruled out that Paleo-Indians existed previously (12,500 - 8,000 years ago) in the overall general area of WV. Clovis points, or fluted points associated with these nomadic hunting bands have been found along the Elk River in Charleston as well as in the WV towns of Winfield, Poca and Fraziers Bottom near the John Amos Power Plant, and Crown Hill (Maslowski, 2002). The Meadowcroft rockshelter in Western PA and the Cactus Hill site in VA are also important evidence of these early game hunter populations. The Paleo-Indian sites are most often recognized by the presence of morphologically and technologically distinct (tool kits) fluted and unfluted lanceolate bifaces, often made of high-quality tool stone. Despite exploiting a wide variety of natural settings within the dissected uplands and terrace settings of major drainages (Cultural Resources Analysts, Inc. [CRA], 2020) population density in the general area appears to have been extremely low during this period (USACE, 1977).

Sites from the Archaic Period (8000 B.C. – 1000 B.C.) fall into a roughly 7,000-year span characterized by gradual development and change in the technological, adaptive, and socio-cultural dimensions of indigenous hunter-gatherer cultures as they adapted to

increasingly modern environmental conditions. The period exhibits the domestication of native plants, hunting of smaller game, the use of riverine resources (fish and shellfish) mortuary ceremonialism, and the rise of inter-regional trade systems.

Woodland Period (1000 B.C. – 1000 A.D.) sites represent a time period in which great advances in horticulture, and dispersed settlement patterns. Large ceremonial earthworks (mounds) appear, and settlement patterns of small, dispersed hamlets/villages are established. Evidence of exchange of exotic goods is also prevalent.

Some of the most significant cultural developments occur in the Late Prehistoric Period (1000 A.D. – 1500 A.D.). The period is characterized by an increased emphasis on agriculture, increased sedentism, and a rise in socio-political complexity. In WV, the sites tend to be small villages or small extractive camps.

Overlapping this period was the Monongahela culture extending from southwestern PA, through WV, Maryland, and Ohio from approximately 1000 A.D. – 1635 A.D. (Johnson, 2001). In contrast to the Fort Ancient settlements in the floodplains, these villages were usually situated in the uplands. CRA, (2009) state that it is unknown when the protohistoric groups abandoned the Ohio River Valley and where they may have gone. They suggest that one factor may have been pressure from the Haudenosaunee (Five Nations Iroquois) to the north, as well as the imminent arrival of Europeans. They conclude that by the end of the 17th Century, the Upper Ohio River Valley, including Fort Ancient territory in WV had been depopulated.

As mentioned previously, contact with Europeans most likely took place indirectly before direct contact. The post-contact period, or historic period in the general region roughly ranges between 1550 and the 1950s. The first European presence in the current limits of Wayne County were those of the Sandy Creek Expedition in 1756. The expedition, which occurred during the French and Indian War, was a joint venture between British and Cherokee forces in retaliation against the Shawnee, Delaware and Seneca; all allies of the French for their attacks on English settlements in the West. The expeditionary forces composed of 200 to 230 rangers and 80 to 130 Cherokee, set out from Fort Frederick near Ingles Ferry on the New River in VA on 18 February 1756, under the command of Major Andrew Lewis. The expedition reached the headwaters of the Tug Fork (of the Big Sandy River) on 28 February and headed downstream toward Indian villages on the Ohio River. Due to a series of logistical, supply, and other problems, the expedition was abandoned on 15 March 1756.

Later in 1772, soldiers who helped defeat the French in the French and Indian War were rewarded by King George III. Parcels of land, in what was VA at that time, were granted to those entitled. The first land patent in what is now Wayne County was issued on 15 December 1772 to John Savage and to soldiers who had served in his company. John Savage obtained the services of George Washington to survey the lands. His tract

included 27,672 acres. Many of the landmarks bear the letters "G.W.S." for George Washington, Surveyor (USACE, 1988).

The first major land grants in the Beech Fork area were awarded to John P. Duval and Samuel M. Hopkins. Duval received a chain of grants from 1785 to 1793 along Twelvepole Creek near the mouth of Beech Fork, amounting to nearly 10,000 acres. Hopkins was granted 70,000 acres in 1796, including parts of Butler, Ceredo, Union, and Stonewall Districts of present-day Wayne County, in addition to sections of present-day Cabell County. In some instances, the Duval and Hopkins grants overlapped. In these instances, the Duval grant was recognized (Taylor, 1963; USACE, 1988).

Settlement in the area began with Samuel Hatton in 1796, Peter Loar in 1797 and Henry Haney in 1802. Major settlements did not occur until after the transfer of the Duval and Hopkins deeds in 1803 and 1808 following those landowners' deaths. Known settlers after this time included Reuben Booton, Berry Adkins, Asa Booton and Jefferson Bowen. Agriculture was the dominant enterprise (Taylor, 1963; USACE, 1974; USACE, 1988).

On 20 June 1863, at the height of the Civil War, Wayne County joined 47 other VA counties to become the State of WV. Two additional counties would officially join in 1866. The region initially developed as a rural landscape dotted with small villages along tributaries and stream confluences. Proximity to water provided transportation and a power source for grain mills. These villages provided local farms with access to goods and services otherwise not available to individual farms and outlets to regional markets for their agricultural commodities. Communities experienced boom and bust cycles throughout the 20th century. The development of the East Lynn Coal Company and the Big Sandy East Lynn and Guyan Railroads spurred population growth at centers such as the community of East Lynn (formerly Twin Creek and Adkins Mills). Peak economic and population growth of the area occurred in 1917 when 11 coal companies were in simultaneous operation. The shift from agricultural to coal as the main economic driver in the area resulted in rapid growth of towns that were often decimated by fires; some of dubious origin. When this inherent instability became coupled with a shift in economic opportunities to other regions, the town fell into decline and did not recover (Thompson, 2019). Remnants of these farms and towns still exist within the area.

2.9 Regional Hazardous, Toxic, and Radioactive Waste (HTRW)

In the drainage areas above the Beech Fork and East Lynn Projects, coal mining and oil and gas exploration and production facilities employ a variety of hazardous and toxic materials that generate a variety of wastes in their operations. An important mission of the WVDEP's Division of Mining and Reclamation is to assure compliance with the WV Surface Mining and Reclamation Act and other applicable State laws and rules by: (1) assuring effective and high-quality reclamation of mining sites, (2) conducting an

efficient permitting program, and (3) facilitating communications between the public and regulated industry. Similarly, the WVDEP's Office of Oil and Gas is responsible for monitoring and regulating all actions related to the exploration, drilling, storage and production of oil and natural gas. This includes maintaining records on all active and inactive wells, managing WV's Abandoned Well Plugging and Reclamation Program, and ensuring surface/groundwater resources are protected from oil and gas activities.

No commercial or industrial activities involved in the generation of radioactive wastes are in the Twelvepole Creek Sub-basin. The only radioactive material of potential concern within the drainage basins is radon. Radon is a naturally produced radioactive gas that is released into the air. It is produced from the natural breakdown of uranium found in most rocks and soils. As radon breaks down, it emits atomic particles into the air. Once inhaled, they can be deposited in the lungs, where the energy associated with the particles can alter cell deoxyribonucleic acid (DNA) and increase the risk of lung cancer.

Radon usually does not present a health risk outdoors because it is diluted in the open air. However, radon can build up to dangerous levels inside a structure. Exposure to radon gas is the second-leading cause of lung cancer (after smoking) in the US. About 14,000 people die each year from radon-related lung cancer. Generally, radon is not a problem with public drinking water systems because during the water treatment process aeration releases dissolved radon to the atmosphere. However, if the water supply comes from a private well, radon levels could be unacceptably high.

The unit of measurement required by Federal law for the speed of decay of radon is picocuries per liter of air (pCi/L). A pCi is equal to one trillionth of a curie. The national average of outside radon levels is 0.4 pCi/L. Based on USEPA data, WV's counties have been assigned to one of three zones based upon average indoor screening levels for emitted radon:

- Zone 1 - High Potential (greater than 4 pCi/L)
- Zone 2 - Moderate Potential (between 2 and 4 pCi/L)
- Zone 3 - Low Potential (below 2 pCi/L)

Although none of the four counties in the Twelvepole Creek Sub-basin are in Zone 1, three are in Zone 2 (Wayne, Cabell, and Lincoln) and one is in Zone 3 (Mingo).

2.10 Mineral and Timber Resources

Exploitation of mineral resources in the Twelvepole Creek Sub-basin primarily concentrates on gas, oil, and coal. Numerous wells are scattered across the basin, with gas production being the most prevalent. Coal is mined where coal seams are thick enough to be profitable. Numerous abandoned coal mines can be seen on hillside slopes throughout the sub-basin. Efforts to extract oil and gas date back approximately

100 years, with coal mining having a longer history. Rock mining for road surfacing and construction use also occurs at a few scattered locations.

WV established the Managed Timberland Program to promote the practice of sustainable forestry (WV Division of Forestry [WVDF], 2021). The program provides significant tax incentives for forest landowners who practice sustainable forestry on their privately owned forestland. The program helps create a diverse environment, including wildlife habitat and overall use and appreciation of the land.

Timber harvesting is also practiced throughout the basin because of the extensive tracts of hardwood and mixed hardwood-pine forests that dominate the landscape. WVDNR-Wildlife provides timber management on both WMAs and presents annual timber management plans to the Huntington District for review and approval. The goals of WVDNR-Wildlife's timber management are to protect and enhance wildlife habitat for hunting, trapping, and other recreational opportunities.

Sections 3.2.9 and 4.2.9 discuss the mineral and timber resources occurring on project lands at Beech Fork Lake and East Lynn Lake, respectively.

2.11 Aesthetics

The Twelvepole Creek Sub-basin is sparsely populated and rural in nature. The basin is characterized by rugged terrain with hills having steep slopes and cresting upwards to 500 feet. The extremely hilly terrain has formed many valleys with incised smaller tributary drainage areas that drain the flanking slopes. Elevations gradually increase as one proceeds from the stream's confluence with the Ohio River upstream to the basin's headwater sources in the Cumberland Mountains portion of the vast Appalachian Mountain Range in the Eastern U.S. Forests are the dominant land covering the hills and give the impression of stretching endlessly in all directions. The basin's extensive forest cover is disrupted by a handful of small towns, the connecting roads, numerous small homesteads, and a few surface mining operations in the upper half of the basin.

2.12 Air Quality

Under the Clean Air Act, the USEPA establishes National Ambient Air Quality Standards (NAAQS) (40 CFR part 50) for pollutants considered harmful to public health and the environment. Such pollutants are referred to as "criteria air pollutants." There are two types of standards: primary and secondary (**Table 2-3**). Primary standards provide public health protection, including for sensitive populations such as asthmatics, children, and the elderly; and secondary standards provide public welfare protection, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings (USEPA, 2020a). Nonattainment status is designated to an area that does not meet the NAAQS for one or more criteria pollutants. As of June 2020, none of the WV counties in the Twelvepole Creek Sub-basin are in nonattainment status for any of the NAAQS criteria pollutants. Moreover, none of the WV, OH, or KY

counties within a two-hour driving distance from Beech Fork Lake or East Lynn Lake are currently nonattainment counties (USEPA, 2020b).

Table 2-3. NAAQS criteria pollutants

Pollutant		Primary/Secondary
Carbon Monoxide (CO)		Primary
Lead (Pb)		Primary and Secondary
Nitrogen Dioxide (NO ₂)		Primary and Secondary
Ozone (O ₃)		Primary and Secondary
Particle Pollution (PM)*	PM _{2.5}	Primary and Secondary
	PM ₁₀	Primary and Secondary
Sulfur Dioxide (SO ₂)		Primary and Secondary

*Particulate matter, classified by size as follows

- An aerodynamic size less than or equal to 10 micrometers (PM₁₀)
- An aerodynamic size less than or equal to 2.5 micrometers (PM_{2.5})

A designation of maintenance indicates an area that was formerly in nonattainment and is now under a maintenance plan. Prior to 2012, Boyd County, KY, a county within the two-hour driving distance of either lake, was in nonattainment status for PM_{2.5}. The county is currently in attainment through an approved maintenance plan and there have been no violations of this standard since 2012. Additionally, a revision of the Huntington-Ashland area WV-KY 1997-Hour Ozone National Ambient Air Quality Standard, comprising of Cabell, and Wayne Counties, was approved for a Second Maintenance Plan in March 2021.

2.13 Noise

Under the Noise Control Act of 1972 and its amendments, states have authority to regulate environmental noise, and governmental agencies are directed to comply with local community noise policies and regulations. Noise is unwanted or disturbing sound. Sound becomes unwanted when it either interferes with normal activities such as sleeping, conversation, or disrupts or diminishes one's quality of life. Persistent and escalating sources of sound have the potential to affect public health.

The decibel (dB) is a unit used to express the intensity of a sound wave and to measure noise levels and set noise regulations. The unit of measurement is generally adjusted to the A scale (dBA) to approximate the human ear's range of sensitivity to sounds of different frequencies. A noise level of 0 dBA is considered the threshold of human hearing, and a noise level of 140 dBA is considered the threshold of pain. Sound levels typically range from 30 to 90 dBA, where 30 is very quiet and 90 is very loud. **Table 2-4** provides examples of the dBA levels associated with typical conditions and activities regularly experienced (Center for Hearing and Communication, nd).

Table 2-4. Example noise levels

Noise Level (dBA)	Sound
0	The softest sound a person can hear with normal hearing
10	Normal breathing
20	Whispering at 5 feet
30	Quiet library, soft whispers
40	Refrigerator
50	Rainfall
50	Light traffic, normal conversation
60	Normal conversation
60	Air conditioner at 20 feet
70	Vacuum cleaner, hair dryer, noisy restaurant
80	City traffic, garbage disposal, alarm clock at 2 feet
110	Shouting in a car
120	Thunder

Source: Center for Hearing and Communication

Noise is measured as Day Night average noise levels (DNL) in “A-weighted” decibels (dBA) most sensitive to the human ear. There are no Federal standards for allowable noise levels. According to Department of Housing and Urban Development Guidelines, DNLs below 65 dBA are normally acceptable levels of exterior noise in residential areas. The Federal Aviation Administration (FAA, 2021) denotes a DNL above 65 dBA as the level of significant noise impact. Several other agencies, including the Federal Energy Regulatory Commission, use a DNL criterion of 55 dBA as the threshold for defining noise impacts in suburban and rural residential areas. According to Dr. Paul Schomer in his 2001 Whitepaper, while there are numerous thresholds for acceptable noise in residential areas, research suggests an area’s current noise environment, which has experienced noise in the past, may reasonably expect to tolerate a level of noise about 5 dBA higher than the general guidelines. The USACE Safety and Health Requirements Manual (EM 385-1-1) provides criteria for temporary permissible noise exposure levels (**Table 2-5**), for consideration of hearing protection or the need to administer sound reduction controls (USACE, 2014). Ambient noise around the project area is representative of a mixed commercial and residential area.

Table 2-5. Allowable continuous noise exposure – OSHA Standards

Duration per day (hrs)	Permissible sound- pressure level (dBA)
8	85
4	88
2	91
1	94
0.5 (30 min)	97
0.25 (15 min)	100

Source: EM 385-1-1

Ceredo, WV is the largest population center in the Twelvepole Creek Sub-basin. It represents a very small portion of the sub-basin and is located on the south shoreline of the Ohio River at the mouth of Twelvepole Creek. Because of the Twelvepole Creek Sub-basin's rural, undeveloped, rugged landscape, and forested conditions, its overall noise on average is generally quiet except at small, isolated locations and/or of usually short duration activities. Noise at each lake is discussed further in **Sections 3.2.11 and 4.2.11**.

2.14 Regional Access

The largest airport in WV is Yeager Airport located in Charleston. The airport services approximately 75,000 passengers per year. The second largest airport in the state is the Huntington Tri-State Airport located in Huntington. Mass transit is available only in the Charleston and Huntington, WV metropolitan areas.

The primary mode of transportation within the Twelvepole Creek Sub-basin region is by automobile. The primary highway in the region is I-64 which generally runs east – west through Huntington, WV north of Beech Fork and East Lynn Lakes. Huntington is the largest population center within a one-hour driving distance from Beech Fork or East Lynn Lakes.

WV Route 152 runs south from I-64 and passes west of Beech Fork and East Lynn Lakes. WV Route 10 crosses I-64 running in a generally southerly direction and passes Beech Fork and East Lynn Lakes to the east. A series of secondary WV Routes provide access from WV Routes 152 and 10 to the facilities at both lakes (**Figure 2-4**).

Traffic is typical of rural settings and is light throughout the region. The WV Department of Transportation (WVDOT) developed 2010 average daily traffic counts for many locations throughout the state (WVDOT, 2020). Small towns along Route 152 such as Lavalette, Ardel, and Wayne, WV have traffic counts generally ranging from 5,000 to 10,000 per day. Outside these population centers, average daily traffic counts in 2010 were generally less than 500. Within the small towns, average daily traffic counts in 2010 were less than 5,000.

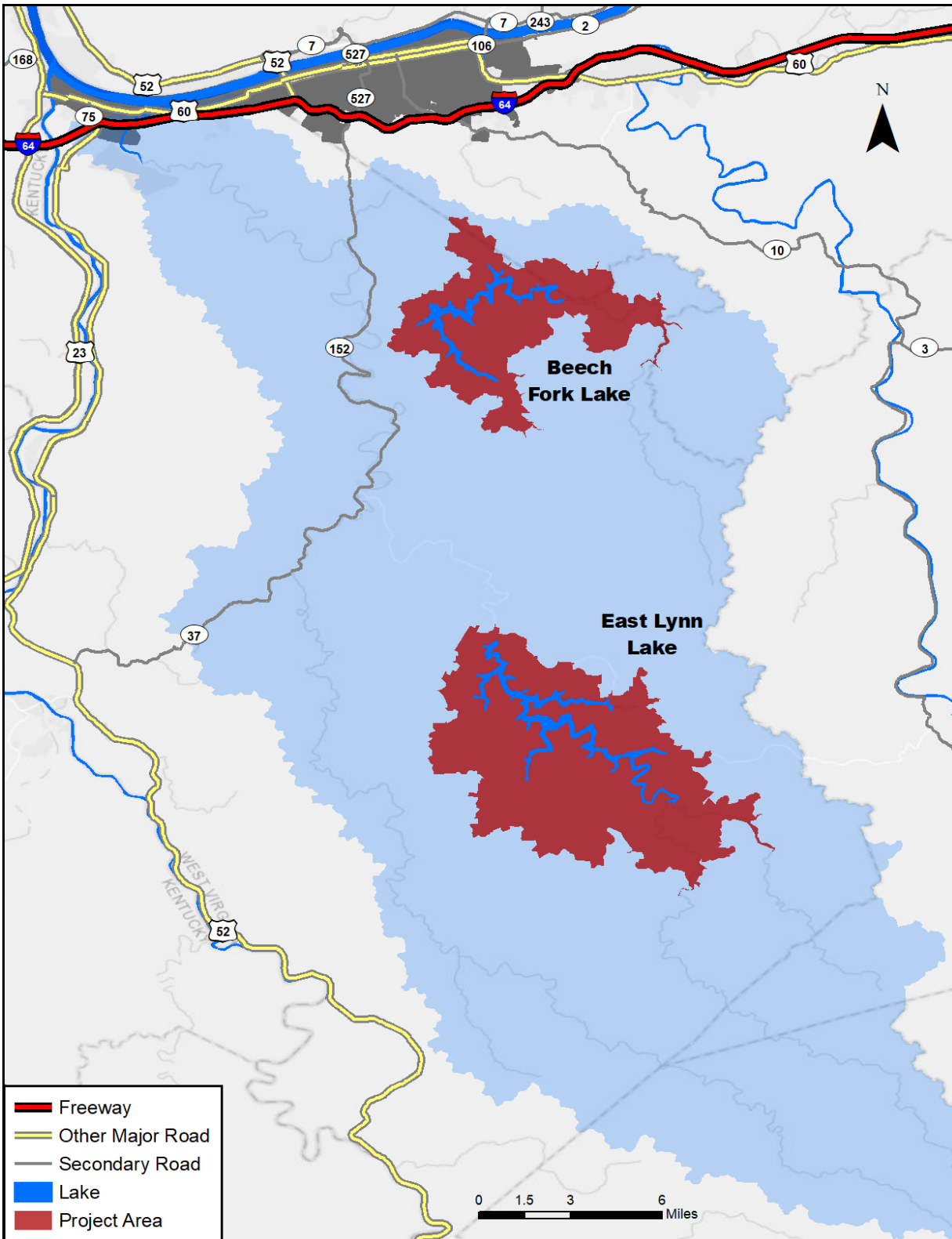


Figure 2-4. Primary and secondary access roads to Beech Fork and East Lynn Lakes

2.15 Regional Recreation

2.15.1 Regional Demographics

The economy in the Twelvepole Creek Sub-basin is generally behind the US economy in most economic indicators. Economic conditions in the Twelvepole Creek Sub-basin are also less robust than the statewide averages. Statewide losses in traditional manufacturing industries have reinforced the population decline and social isolation of people living in predominantly rural areas of the State, especially among the elderly and retired (West Virginia Development Office [WVDO], 2015).

A lack of physical activity has contributed to major health issues related to WV's high obesity rate and rates of other chronic diseases (WVDO, 2015). The percentage of WV residents under the age of 65 with disabilities is 14.1% compared to the national average of 8.6% for 2019 (US Census Bureau [USCB], 2020).

WV has the third oldest population in the US. A 2014 survey found that 29% of the respondents classified themselves as having a low level of physical activity (WVDO, 2015). This is consistent with WV Bureau of Public Health's finding that 31% of WV adults participate in no leisure-time physical activity or exercise, only two states have higher percentages of their residents that do no leisure-time physical activity.

2.15.2 Regional Recreation Setting and Facilities

Overall, outdoor recreation has grown nationally, and public lands continue to offer the majority of recreation opportunities (USACE, 2017a). On a national scale, traditionally popular activities such as hunting, fishing, backcountry activities, and motorized activities have remained flat or declined. Nature based activities, such as viewing and photographing wildlife, birds, wildflowers/trees, historic sites, and natural scenery have increased in popularity. Motorized water activities are projected to increase significantly in popularity (Cordell, 2012).

The State of WV enjoys an abundance of outdoor recreation areas that are managed by both Federal and State agencies. There are approximately 1.8 million acres of public recreation lands in WV (USACE, 2017a). That translates to about one acre of land devoted to recreation per WV State resident based on USCB 2020 population data.

The Covid-19 pandemic had a substantial impact on recreation activities in 2020 throughout the US. Perceived as a safe activity by many, camping increased significantly at most campgrounds, including at Beech Fork and East Lynn Lakes. Nationally, growing interest in recreational water sport activities, such as boating and fishing, and rising water-based tourism are expected to continue (Allied Market Research, 2022).

2.15.2.1 West Virginia Statewide Comprehensive Outdoor Recreation Plan

The Statewide Comprehensive Outdoor Recreation Plan (SCORP) is prepared by the State and updated at least once every five years for the State to be eligible for Land and Water Conservation Fund (LWCF) assistance for acquisition and development grants. A SCORP evaluates both public demand and supply of recreation resources throughout a State and informs the Regional Master Plan regarding recreation trends and needs.

To help provide West Virginia communities statewide with information resources for recreational needs and trends across the state, the West Virginia Development Agency published the 2015 WV SCORP, and the draft 2020 WV SCORP is currently available for review. Relevant components of the 2015 WV SCORP are summarized below.

A survey of WV residents was conducted in 2014 in support of preparation of the 2015-2020 Statewide Comprehensive Outdoor Recreation Plan (SCORP) (WVDO, 2015). The purpose of the survey was to determine recreational preferences in terms of activities and facilities. Consistent with national trends and prior WV SCORP surveys, walking is most popular physical activity among WV residents (**Table 2-6**). Therefore, the availability of trails was either a first or second facility priority. The low, casual, and high park user designations in **Table 2-7** refer to the physical activity levels of the individuals surveyed. A “Low Park User” is a person that typically has limited or no physical activity; a “Casual Park User” is a person that typically has occasional physical activity; and a “High Park User” is a person that typically has daily or near-daily physical activity. The 2014 survey found that good views and trails were the top priorities for park amenities among both urban and rural park users (**Table 2-8**).

Table 2-6. Activity preferences of WV residents

Residents	Walking	Running	Cycling
Urban Areas	15%	15%	15%
Rural Areas	43%	9%	8%

Source: WVDO, 2015

Table 2-7. Park facility preferences among low, casual, and high park users

Priority	Low Park Users
1	(tie) Good views and picnic areas
2	Trails
3	Water features
Priority	Casual Park Users
1	Trails
2	Picnic areas
3	Good views
Priority	High Park Users
1	Trails
2	Water features
3	Good views

Source: WVDO, 2015

Table 2-8. Park facility priorities among urban and rural WV residents

Priority	Urban Residents
1	Good views
2	Trails
3	Water features
4	Picnic Areas
5	Courts & Playgrounds
Priority	Rural Residents
1	Trails
2	Good Views
3	Picnic Areas
4	Water Features
5	Courts & Playgrounds

Source: WVDO, 2015

Similar surveys were not conducted for the 2020 WV SCORP. However, walking, jogging, and hiking were still found to be top-rated activities. Preferences have shifted to a more passive recreation interest. The surveys conducted for the 2020 update showed that recreationists valued, in order of importance, the following experiences or feelings: fresh air, a sense of freedom, relaxation, the landscape or view, security, adventure, openness or open areas, exercise, escape, play, a sense of community, and a sense of inspiration.

The 2010 Census reveals that 80.7% of the nation's population now lives in urban areas. Significantly, the rural-to urban shift is occurring nearly three times faster than

the overall population growth rate of 9.7%. The land conversion accompanying this population shift accounts for the “sanctuary in rural greenery” US east coast visitors see in WV’s available natural areas. In large part, this demographic accounts for WV’s exponential growth in big game hunting and All-terrain vehicle (ATV) ridership. The Hatfield-McCoy Trail System, a public-private [partnership, maintains over 800 miles of trails in WV (WVDO, 2020).

2.15.3 Regional Recreation Facilities

Only recreation sites that offer similar recreational opportunities within a two-hour driving distance of either Beech Fork Lake or East Lynn Lake were inventoried for this analysis. These nine recreation sites offer boating, fishing, camping, and hiking and could compete for visitors with Beech Fork or East Lynn Lakes (**Figure 2-5**).

Recreational opportunities provided at the nine recreation sites are summarized in **Table 2-9**. Of these sites, Fishtrap Lake, Grayson Lake, Paintsville Lake, and Yatesville Lake are USACE operated lakes.

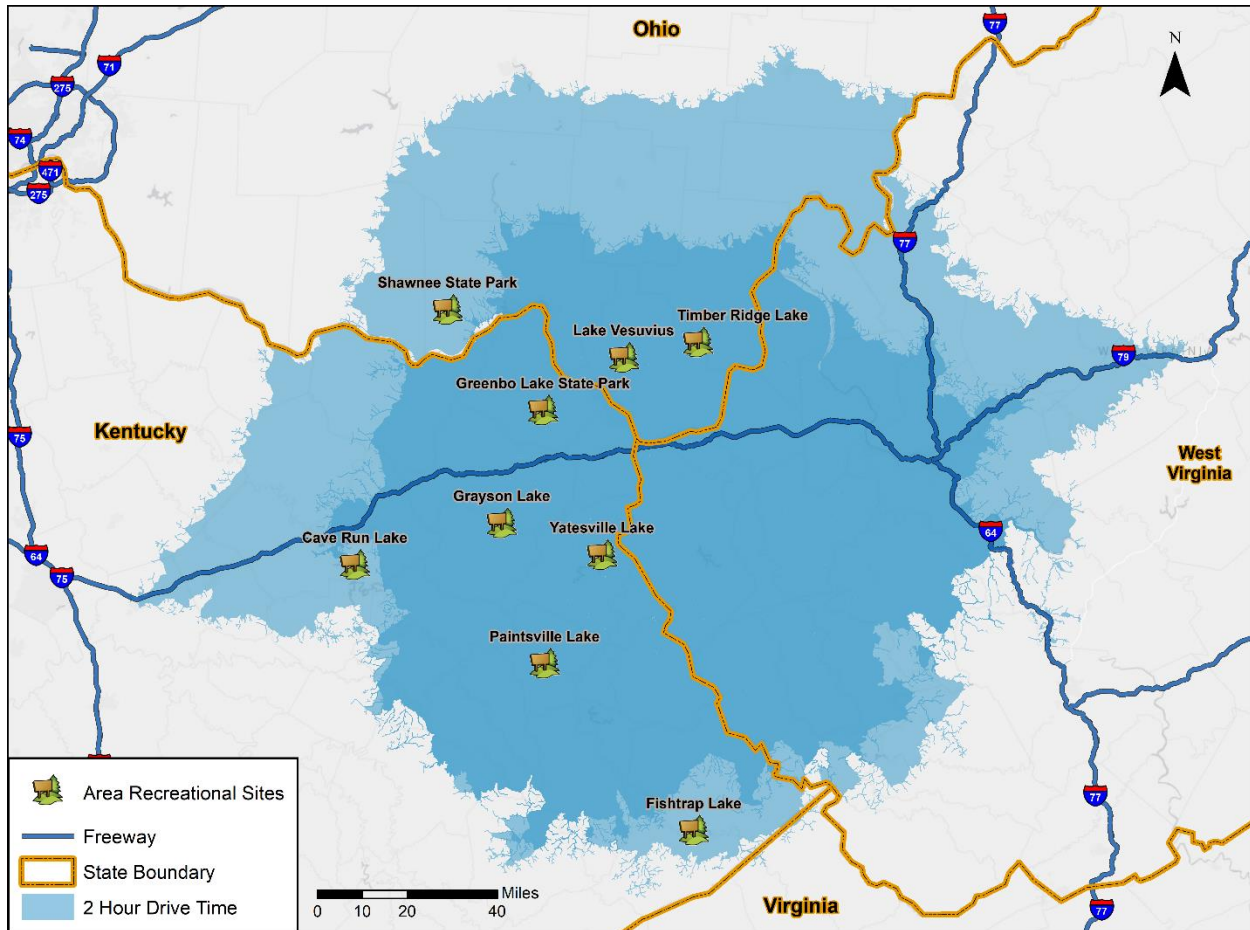


Figure 2-5. Recreation sites with similar recreational opportunities in the vicinity of the Twelvepole Creek Sub-basin

Table 2-9. Recreation sites proximal to Beech Fork and East Lynn Lakes with similar recreational opportunities

Recreation Site	Boat Ramps	Fishing	Shooting Range	Hiking	Horseback Riding	Biking	Hunting	Sport Fields	Playground	Golf	Restaurant/Snacks	Marina	Water Skiing	Swimming	Lodge	Picnicking	Primitive	Electric& water	RV	Cabins	Bathhouse	Group Site
Ohio																						
Lake Vesuvius	X	X		X	X											X	X	X	X			X
Shawnee State Park	X	X		X	X				X	X	X	X		X	X	X		X	X	X	X	
Timber Ridge Lake	X	X		X			X										X				X	
Kentucky																						
Cave Run Lake	X	X	X	X								X	X	X		X	X	X	X		X	
Fishtrap Lake	X	X		X	X	X	X					X				X		X			X	
Grayson Lake	X	X		X					X	X		X				X		X	X		X	
Greenbo Lake State Park	X	X			X	X		X	X		X	X			X		X	X	X		X	
Paintsville Lake	X	X		X				X	X			X		X		X	X	X	X			
Yatesville Lake	X	X		X	X		X	X	X	X	X	X	X	X		X	X	X	X	X	X	

2.15.4 Recreation Carrying Capacity

Recreationists seek to participate in recreation activities, but also seek specific settings in which to enjoy a recreation experience and its benefits. These four components (activities, settings, experiences, and benefits) constitute a recreation opportunity. In other words, a recreation opportunity constitutes, "... an opportunity for a person to participate in a particular recreation activity in a specific setting in order to enjoy a particular recreation experience and the benefits that it affords" (US Bureau of Reclamation [USBOR], 2011).

Of the four components of a recreation opportunity, managers influence the activities and the setting (**Figure 2-6**). Recreationists enjoy the experience, and the benefits are experienced by the recreationists, the community, and the economy.

Recreation Activity	+	Setting	=	Experience	=>	Benefits
Boating Fishing Camping Hiking Picnicking Birding Etc.		Physical Attributes Managerial Attributes Social Attributes		Many Dimensions Multiple Senses		Individual Community Economic Environmental
Managers Manage				Recreationists Consume		Society Gains

Figure 2-6. A recreation opportunity (Hasset et al., 2007)

Engineering Pamphlet (EP) 1130-2-550 provides guidance for the administration and management of USACE recreation programs and facilities at civil works projects. It states that USACE will employ management measures to increase the public's opportunity for a high-quality recreation experience by (among other things) establishing "maximum use limitations" to prevent overcrowding or site deterioration based on social and resource carrying capacities.

Determining carrying capacity of a recreation activity is based on its social capacity and resource capacity for the recreation activity. A recreation area's social capacity refers to visitors' perceptions of crowding. This capacity is reached when conflict arises, when there are safety concerns, or when the user chooses to no longer use the recreation area (CDM, 2017). A recreation area's resource capacity refers to the ability of the ecosystem to cope with human impacts associated with a recreational activity without degradation. Because a recreation opportunity requires availability of a recreation

activity in a specific setting to realize the recreation experience and its benefits, both factors (activity and setting) must be considered when determining recreational carrying capacity.

At Beech Fork and East Lynn Lakes, the infrastructure supporting camping, picnicking, and swimming has been designed using USACE design criteria to prevent or minimize adverse impacts to the environment. Roads, parking areas, walkways, shelters, restrooms, showers, and other infrastructure allows visitors to participate in these recreational activities in a sustainable manner without degrading the natural resources. As a result, the resource capacities for camping, picnicking, and swimming will exceed the social capacities of these activities. Consequently, the social capacities will be the limiting factors and will determine the carrying capacities.

Desktop carrying capacity analyses were conducted for recreation areas where there was an indication that the area may be approaching its carrying capacity based on: review of available data, consultation with resource managers, rangers, stakeholders, and lessees, and public comments. No field investigations were conducted for these evaluations.

Recreation carrying capacity analyses for Beech Fork and East Lynn Lakes are presented in **Sections 3.4 and 4.4**, respectively and are based on:

- 1) Consultation through telephone interviews with individuals knowledgeable about recreational activities and conditions at the project,
- 2) A literature review that identified guidelines for generally acceptable and safe area requirements for specific recreational activities,
- 3) Application of the guidelines to the site-specific conditions at the recreation areas, and
- 4) Review of historic visitation and occupancy data and trends when available.

2.16 Real Estate

Project lands at Beech Fork and East Lynn Lakes were acquired in compliance with the Joint Land Acquisition Policy for Reservoir Projects published in the 22 February 1962 *Federal Register*. The policy called for fee acquisition of all lands up to a “guide taking limit” which extends 300 feet horizontally from the water’s edge at the seasonal pool elevation. Some lands above the guide taking limit were acquired in fee for construction, operation and maintenance, and public-use facilities, rights-of-way for relocated highways, and when access to property was severed and could not be economically restored. Flowage easements were acquired along the upstream tributaries up to five feet above the dam spillway.

2.17 Regional Resource Goals and Objectives

EP 1130-2-550 defines resource objectives as, “Clearly written statements that set forth measurable and attainable current and future management and development activities that support the stated goals of the MP, Environmental Operating Principles (EOPs), and applicable national performance measures”. Resource objectives must be consistent with authorized project purposes, Federal laws and directives, regional needs, resource capabilities, and take public input into account as well as State Comprehensive Recreation Plans (SCORP). The objectives are intended to maximize project benefits, meet public needs, and foster environmental sustainability. The Master Plan provides resource objectives for the stewardship of project resources, both natural and manmade. EOPs and the Master Plan goals are presented in the following sections.

2.17.1 Environmental Operating Principles

The USACE has reaffirmed its commitment to the environment by formalizing a set of EOPs applicable to all its decision-making and programs. These principles 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 USACE activities.

By implementing these principles, the USACE will continue its efforts to develop the scientific, economic, and sociological measures to judge the effects of management of the projects on the environment and to seek better ways of achieving environmentally sustainable solutions. The following principles are being integrated into all project management processes throughout the USACE.

- Foster sustainability as a way of life throughout the organization.
- Proactively consider environmental consequences of all USACE activities and act accordingly.
- Create mutually supporting economic and environmentally sustainable solutions.
- Continue to meet corporate responsibility and accountability under the law for activities undertaken by the USACE, which may impact human and natural environments.
- Consider the environment in employing a risk management and systems approach throughout the life cycles of projects and programs.
- Leverage scientific, economic, and social knowledge to understand the environmental context and effects of USACE actions in a collaborative manner.
- Employ an open, transparent process that respects views of individuals and groups interested in USACE activities.

2.17.2 Master Plan Goals

Master Plan goals are defined in EP 1130-2-550 as follows:

- Provide the best management practices to respond to regional needs, resource capabilities and suitability, and expressed public interests consistent with authorized project purposes.
- Protect and manage project natural and cultural resources through sustainable environmental stewardship programs.
- Provide public outdoor recreation opportunities that support project purposes and public interests while sustaining project natural resources.
- Recognize particular qualities, characteristics, and potentials of the project.
- Provide consistency and compatibility with national objectives and other state and regional goals and programs.

2.17.3 Regional Resource Objectives

For this Master Plan, regional resource objectives have been developed to meet regional needs, address state and national trends for recreation, and identify natural and cultural resource capacities and stewardship measures. Site specific objectives were also developed for each lake based on detailed analyses of existing conditions and identification of the issues and needs (**Sections 3.6 and Section 4.6**). Resource objectives were developed considering input from stakeholder, agency, and public coordination. Lake specific resource objectives are designed to meet the needs of the region where applicable. For each objective, a short issue and need statement was developed and an objective statement was provided to address the issue and need.

These resource objectives will be achieved through the recommendations in the Resource Plans for each lake (**Sections 3.6 and 4.6**). The resource objectives and resource plan would not be implemented directly after Master Plan approval. Ideas and concepts of this Master Plan are to be implemented through the strategies prescribed in the OMP and consistent with all laws, regulations, and policies. As mentioned previously, the OMP is developed after the Master Plan and consists of a five-year work plan focused on prioritizing the concepts of the plan and developing the strategies and actions/measures to achieve the concepts of the Master Plan. The OMP directs the scheduling, means, and methods for procuring the funds, equipment, and labor required to implement the recommendations of the Master Plan.

2.17.3.1 Regional Recreation Objectives

Recreation Resource Objectives 1 and 2:

Issue/Need: There has been a downward trend in recreation funding since 2008 that is anticipated to continue. As the nation's largest federal provider of outdoor recreation, USACE must change the way it delivers recreation services to the public through strong partnerships and reduced direct delivery of recreation services and opportunities.

Resource Objective Statement (RR 1): Continue the USACE legacy of providing quality access to recreation on public lands by providing recreational opportunities

through a variety of operational alternatives. Utilize authorities and policies to fully engage current and potential partners, volunteers, and service providers. Optimize existing partnerships and establish new partnerships to ensure quality services to the public.

Resource Objective Statement (RR 2): Work with partners to identify potential alternative funding sources (i.e., grants and scholarships) and seek appropriate processes to acquire such funds to augment appropriated recreation funding.

Recreation Resource Objective 3 (RR 3)

Issue/Need: A National Recreation and Parks Association study found that a lack of awareness and information regarding recreation facility locations, offerings, and programs led to less participation and visitation. Increase public awareness of USACE recreation programs, outreach opportunities, and understanding of all aspects of the Corps Civil Works Mission.

Resource Objective Statement: Enhance communications and marketing by encouraging innovation and utilization of the latest technologies to engage a more targeted audience of current and potential partners, volunteers, service providers, and current and future users. Identify an effective communication strategy that will resonate with each target audience and result in positive understandings of the importance of outdoor recreation, public safety, land use management, and the natural resource management role in protection of project purposes.

Recreation Resource Objective 4 (RR 4)

Issue/Need: USACE uses a recurring cycle of planning, execution, measurement, performance review, and annual course-correction that will integrate sustainability more deeply into its mission and the organizational culture annually.

Resource Objective Statement: Assist in achieving federal sustainability goals, accomplished through more energy, water, and fuel-efficient operations, and reduction of our footprint on the land by expanding recycling, composting, and renewable energy programs.

Recreation Resource Objective 5 (RR 5)

Issue/Need: A public need for multiuse trails has been identified within the region.

Resource Objective Statement: Continue to manage and provide natural, cultural, and recreation resources consistent with established land use practices and authorized project purposes and explore opportunities to expand trail use for a variety of recreation opportunities at Beech Fork and East Lynn Lakes.

Recreation Resource Objective 6 (RR 6)

Issue/Need: Some high density developed recreation facilities do not fully accommodate modern recreational preferences and equipment (i.e., larger campers) that require increased facility size, connectivity, and power availability.

Resource Objective Statement: Continue infrastructure upgrades as needed at recreation facilities to accommodate modern recreational equipment, respond to recreational trends, and support evolving technologies that enhance the user experience.

Recreation Resource Objective 7 (RR 7)

Issue/Need: Elevated levels of methylmercury occur throughout WV reservoirs, including Beech Fork and East Lynn Lakes. The State of WV issues annual fish consumption advisories with guidelines for how frequently various species and sizes of fish can be consumed safely.

Resource Objective Statement: Work with partner agencies to inform anglers about fish consumption advisories and where information can be found.

Recreation Resource Objective 8 (RR 8)

Issue/Need: There is a need for additional facilities to accommodate for recent national and statewide trends in increased use of non-motorized watercraft such as kayaks and paddleboards.

Resource Objective Statement: Provide additional facilities or improved functionality of current facilities within public lands to better accommodate water based recreational use.

Recreation Resource Objective 9 (RR 9)

Issue/Need: The WV SCORP is updated every five years and provides information on recreational use trends in West Virginia and analysis of these trends throughout the state. The plan should be reviewed to help gain an understanding of regional statewide demands and current trends.

Resource Objective Statement: Monitor comprehensive publications such as the SCORP to ensure that USACE is responsive to outdoor recreation trends, public needs, and resource protection within a regional framework.

Recreation Resource Objective 10 (RR 10)

Issue/Need: Based on regional demographics (i.e., aging population), a need has been identified to provide increased availability for passive recreation opportunities and accessibility.

Resource Objective Statement: Pursue opportunities to promote active lifestyles for all individuals regardless of ability through facility design, operation, and maintenance.

Recreation Resource Objective 11 (RR 11)

Issue/Need: There is a need to explore opportunities to reach new user groups such as those that do not typically recreate.

Resource Objective Statement: Promote and engage members of the community, military, and public to participate in healthy outdoor activities on Corps lands and waters.

Recreation Resource Objective 12 (RR 12)

Issue/Need: The District receives numerous and diverse proposals for development of lands and waters at the projects.

Resource Objective Statement: Conduct evaluations of proposals to support authorized project purposes and meet public demand in accordance with all federal laws, regulations, and guidance, including NEPA.

2.17.3.2 Regional Natural Resource Objectives

Natural Resource Objective 1 (RN 1)

Issue/Need: Incorporate National and State initiatives to enhance pollinator health such as the Presidential Memorandum “Creating a Federal Strategy to Promote the Health of Honeybees and Other Pollinators” dated June 20, 2014. The USACE has developed plans to incorporate conservation practices for pollinator habitat improvements at all water resource projects.

Resource Objective Statement: Implement conservation and best management practices for pollinator health. Preserve existing pollinator habitat and incorporate new habitat within budget guidance to establish pollinator gardens on project lands and pursue partnerships with other agencies and/or organizations.

Natural Resource Objective 2 (RN 2)

Issue/Need: Expansion of invasive species of plants and animals can substantially reduce the quality of fish and wildlife habitat. Invasive species are found within the region, including at Beech Fork and East Lynn Lakes.

Resource Objective Statement: Develop and implement an invasive species management plan to control the expansion of these species within project lands. Optimize partnerships for the prevention and control of invasive species to help avoid or minimize damages to the water resource project.

Natural Resource Objective 3 (RN 3)

Issue/Need: The Master Plan guides and articulates USACE responsibilities pursuant to Federal laws to preserve, conserve, restore, maintain, manage, and develop the project lands, waters, and associated resources.

Resource Objective Statement: Continue to maintain compliance with Federal laws and regulations for the stewardship of natural and cultural resources. Integrate EOPs and other environmental regulations/initiatives in day-to-day decision making and long-range planning.

Natural Resource Objective 4 (RN 4)

Issue/Need: As one of the federal agencies managing public lands and waters in the U.S., USACE has the responsibility to protect these resources for present and future generations to use and enjoy.

Natural Resource Objective: Increase community involvement in and stewardship of USACE recreation areas through leveraging of existing national stewardship opportunities, expanding partner involvement and volunteer program support. Promote sustainable behavior and incorporate environmental sustainability into USACE messages related to recreation areas and activities.

Natural Resource Objective 5 (RN 5)

Issue/Need: Exploration or extraction of mineral, gas or oil resources occurs within the region. Additional mineral exploration and extraction conflicts with the management and provision of Congressionally authorized purposes of Beech Fork and East Lynn Lakes.

Resource Objective Statement: Continue to manage and provide natural, cultural, and recreation resources consistent with established land use practices and authorized project purposes, excluding the exploration or extraction of mineral, gas (e.g., coal), or oil resources.

Natural Resource Objective 6 (RN 6)

Issue/Need: High quality native habitat is critical for maintenance of healthy populations of terrestrial and aquatic organisms.

Resource Objective Statement: Protect and/or restore important native habitats such as bottomland hardwoods, riparian zones, and wetlands where they occur, or historically occurred, on project lands. Special emphasis should be taken to protect and/or restore special or rare plant communities.

Natural Resource Objective 7 (RN 7)

Issue/Need: Cut trees and shrubby vegetation placed by WVDNR-Wildlife to enhance fish habitat can become dislodged and pose a safety concern.

Resource Objective Statement: Collaborate with WVDNR-Wildlife to identify any feasible alternatives for enhancing fish habitat such as evaluating anchoring methods for cut trees

2.17.3.3 *Regional Cultural Resource Objectives*

Cultural Resource Objective 1 (RC 1)

Issue/Need: In order to comply with requirements of the National Historic Properties Act (NHPA) in support of existing and ongoing project activities a comprehensive knowledge base of cultural resources is a prerequisite. Archaeological sites, buildings, and structures 50 years old or older are identified and assessed in terms of integrity or condition and significance to our understanding of prehistory and history. Cultural resources are managed through comprehensive CRMPs or HPMPs. Systematic surveys of historic and prehistoric cultural resources are conducted and updated to account for new discoveries and monitoring of resource condition.

Resource Objective Statement: Perform surveys for prehistoric and historic sites periodically for both project areas. Particular attention should be given to shoreline surveys in areas located between winter and summer pool as well as areas leased for agriculture and wildlife food plots, areas where modifications are proposed, or areas that are leased for oil, gas or coal exploration and timbering.

Cultural Resource Objective 2 (RC 2)

Issue/Need: Coal, gas, and oil are of commercial interest within the Twelvepole Creek Sub-basin. The Pittsburgh coal seam, at the base of the Monongahela series, generally outcrops about halfway up the slopes of hills at elevations well above the floodplains. Several old openings in that seam presented opportunities for domestic coal production prior to the purchase of project lands. Horizontal tunnels were dug to exploit the coal seams. This coal extraction method is referred to as “drift mining”. The drift mines are not documented and should be assessed for eligibility for National Register (NR) listing and might be of historical or cultural interest to visitors.

Resource Objective Statement: Evaluate the drift mines on project lands for their eligibility or potential eligibility for NR listing and for development of interpretive programs.

3. Beech Fork Lake

3.1 Project Description

Beech Fork Lake is located on the Beech Fork of Twelvepole Creek about 3.5 miles upstream of its confluence with Twelvepole Creek and about 20 miles upstream of the Ohio River (**Figure 1-1**). The Beech Fork Lake Project encompasses a total of 12,609⁶ acres of land that includes Beech Fork State Park and Beech Fork WMA managed by WVDNR-Wildlife.



Beech Fork Lake

The rolled earth-fill dam is 86-feet high. 1,080 feet long, with a top elevation of 640 feet. The 80-foot-long uncontrolled spillway crest is at elevation 614.5 feet.

At its summer (or seasonal) pool stage, the lake has a surface area of 716 acres. Water levels at the seasonal (summer) pool level are 592 feet from April through October. Water levels at the minimum (winter) pool elevation are 583.5 feet. The width of the lake varies from about 1,000 feet near the dam to about 600 feet for most of its length. The mean depth at the seasonal pool is 12.7 feet. The largest tributary is Miller's Fork which is about 3 miles long (**Figure 3-1**). Beech Fork Lake includes recreation areas above and below the dam including Stowers Branch Beach, Beech Fork Lake State Park, and Beech Fork Lake WMA.

Beech Fork Lake is dendritic in shape with numerous coves and flooded tributaries. Shoreline areas are typically wooded and steep, except in the cove areas. The surrounding area consists of rugged terrain with steep hillsides and sinuous ridgelines.

⁶ The 12,609 acre size of fee lands was estimated based on a survey by a professional land surveyor and is the most accurate estimate available. Other area estimates presented in this Master Plan were developed using GIS applications and may differ slightly.

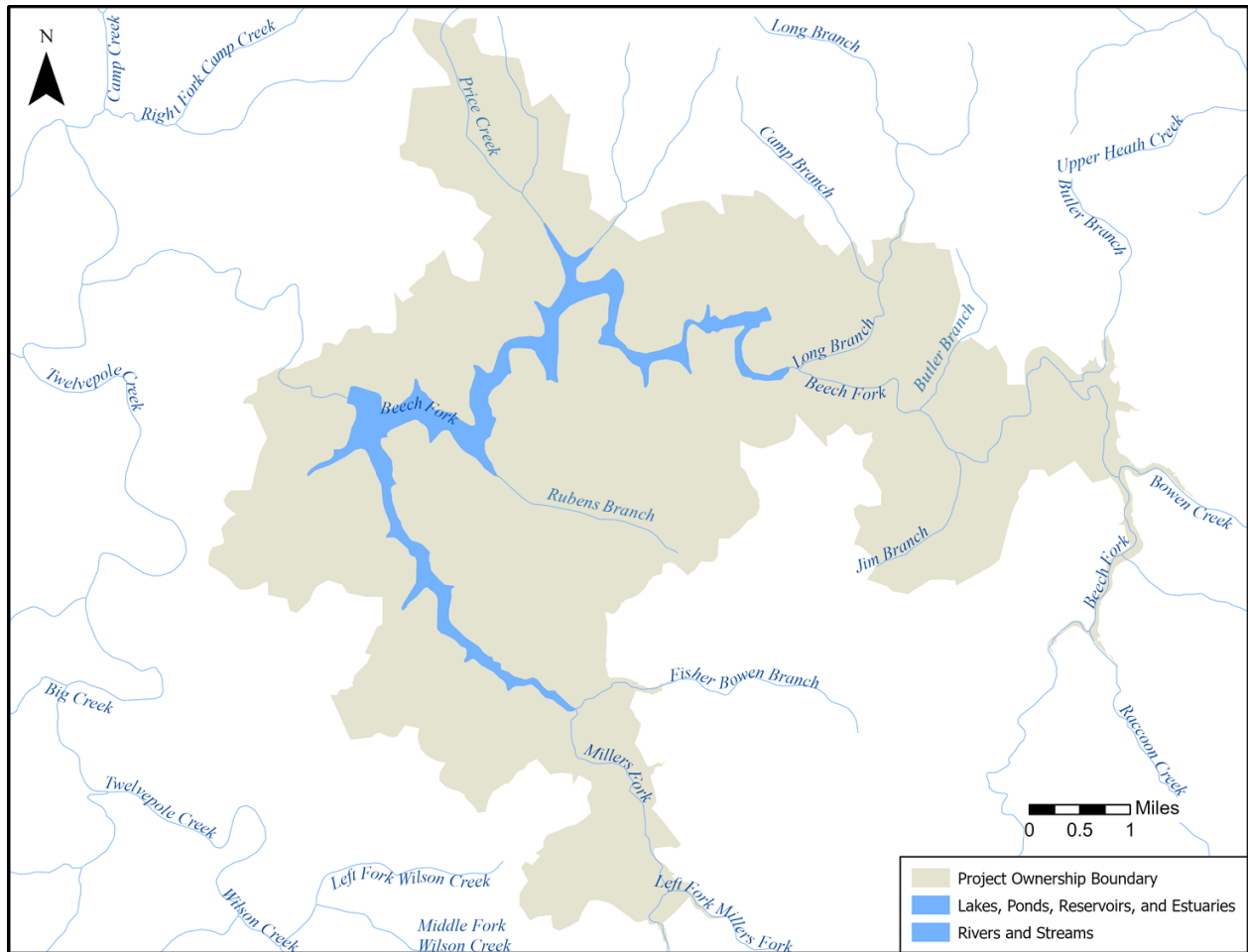


Figure 3-1. Beech Fork Lake and tributaries

3.2 Project Setting

3.2.1 Hydrology

The general aspects of precipitation, runoff, evapotranspiration and climate were covered earlier in **Sections 2.1 and 2.5**. This section provides the basic information related to the lake's location, runoff, and the overall characteristics of Beech Fork Lake.

The Beech Fork Dam is located on Beech Fork, which flows into Twelvepole Creek 20 miles above its confluence with the Ohio River. The entire Beech Fork drainage area is 82-square miles. Seventy-eight square miles of the Beech Fork drainage area is above the Beech Fork Dam. The lake's drainage area is about 14 miles long and 9 miles wide, with the longest dimension being in a general northwest-southeast direction. The area that drains into Beech Fork Lake is composed of three HUC 12 sub-watersheds. The average slope of the lakebed falls about 15.9 feet per mile.

A minimum discharge of five cfs is maintained to protect fish habitat in Beech Fork below the dam. This discharge is always maintained, even during closure for flood control operations. The selective withdrawal system provides water managers with the ability to maintain water temperatures and DO levels to benefit downstream fisheries.

The major aquifer underlying Beech Fork Lake is the Lower Pennsylvanian Aquifer which is described in **Section 2.1**. The ground water table in the lake area has the following characteristics: a colluvium mantle and zone of weathered rock on the slopes and colluvial and alluvial materials in the valley fill are slightly to moderately permeable. During the late spring months these materials approach complete saturation, with a water table at or near the ground surface. This is evidenced by the many seeps along the valley walls and is indicated by the higher frequency of slides during March, April, and May. Within these zones, water levels customarily recede during the summer months, despite higher quantities of rainfall, primarily because of higher rates of evapotranspiration.

3.2.2 Water Management

Beech Fork Lake reached the seasonal pool elevation of 592 feet on 2 May 1978, the date on which full water management activities began. The Beech Fork Lake pool elevation targets and storage amounts are shown in **Table 3-1**.

Table 3-1. Beech Fork Lake pertinent data

Pool	Surface Elevation (feet)	Area (acres)	Stream Miles	Net Acre-feet	Gross Acre-feet	Net Runoff (Inches)	Gross Runoff (inches)
Year – Round Minimum (Winter)	583.5	450	-	4,200	4,200	1.0	1.0
Seasonal Storage (Summer)							
Recreation/ Water Quality	592.0	720	8.3	4,980	9,180	1.2	2.2
Flood Storage *							
Summer	614.5	1847	-	28,400**	37,580	6.8	9.0
Winter	614.5	1847	-	33,360***	37,580	8.0	9.0

*At maximum pool elevation 614.5 feet NGVD

** Between elevations 592.0 and 614.5 feet NGVD

*** Between elevations 583.5 and 614.5 feet NGVD

The principle hydrologic function of Beech Fork Lake is to provide flood risk reduction. The risk of flooding along Beech Fork downstream of the dam to its confluence with Twelvepole Creek caused by high flows from the upstream drainage area is very low. However, this area can flood from water backing up from Twelvepole Creek and/or the Ohio River during floods. The 1939 flood of record produced high stages in the Ohio

River at Huntington, WV, which backed water up Twelvepole Creek for 25 miles. Beech Fork Dam is located about 20 miles upstream of its confluence with the Ohio River. As of 2020, the Beech Fork Lake Project has prevented over 79 million dollars in flood damage from occurring (USACE, 2020a).

The Beech Fork Lake Project's outlet works consist of an approach channel, intake structure, control gates, stilling basin and outlet channel. The two bottom level sluice gates have dimensions of 4-feet, 6-inches by 10- feet and are designed to operate under the maximum flood control pool of 614.5 feet. There are two low-flow intake wells having three 5-foot by 4-foot gate openings at invert elevations of 582, 573, and 564 feet which are crucial to managing downstream water quality and low-flow releases. Important in-lake water quality considerations related to thermal stratification are used to determine the proper low flow gate elevation to use for releases for downstream water quality purposes. Each fall, the summer pool is gradually lowered over the course of two months or less (depending on hydrologic and water quality considerations) to winter pool elevation to help maintain water quality, to enhance downstream fisheries, and to allow for a more gradual release of flood waters. The rate of the drawdown is dependent on when the lake mixes and how much time is left until the winter pool date. Maintenance of a five cfs minimum outflow is desirable.

Additional growth downstream at Lavalette has caused certain flooding problems to develop. First, home encroachments directly below the dam have required a decrease in the official maximum release to prevent flooding of basements and electrical mechanical units. Also, the elevation of the Lavalette water system expansion has constrained the rate of release of flood water to avoid flooding the plant. That constraint has increased delays in releasing flood storage as the project was originally designed to do.

A review of the past 21 years of daily lake stages, from July 1999 to July 2020, indicate a balanced and well-managed lake for supporting project purposes. **Figure 3-2** shows the minimum and seasonal target pool elevations compared to the observed water level fluctuations. There were occasional flood peaks in both seasons. To visualize the recreational impacts, **Figure 3-3** shows a plot of the observed seasonal lake levels between 1 May 1999 and 30 October 2019 of each year in comparison with the target seasonal water level. It should be noted that the lake reached 602.3 feet in the spring of 2021. **Figure 3-3** shows that lake level rises of two feet are not uncommon with occasional increases of four feet or more.

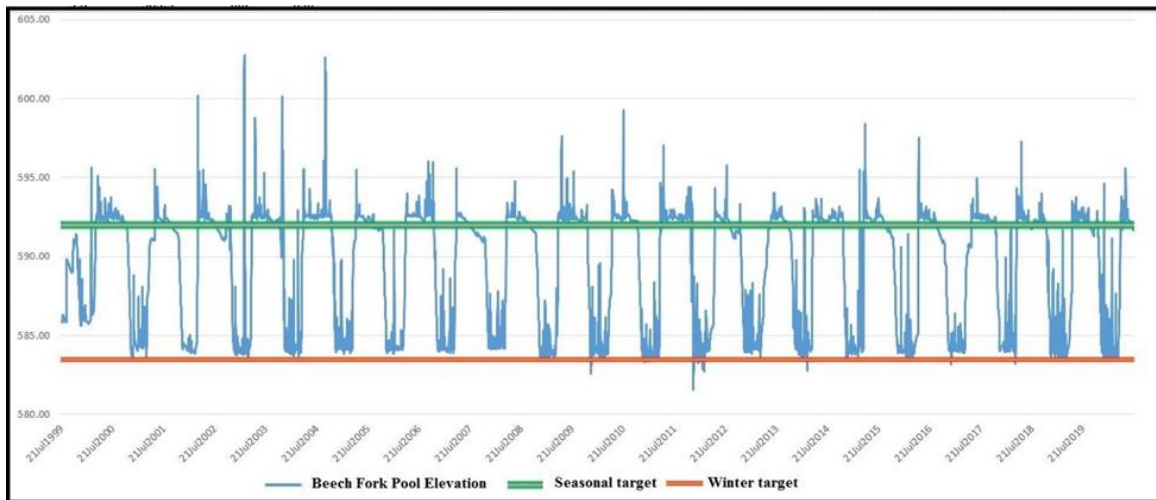


Figure 3-2. Beech Fork Lake pool elevations (feet NGVD)

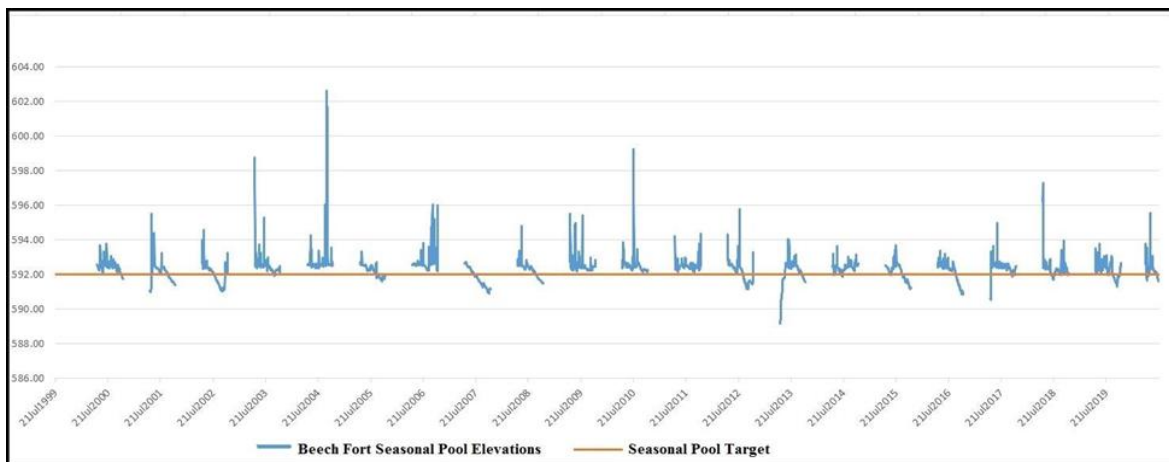


Figure 3-3. Beech Fork Lake seasonal pool elevations (feet NGVD)

A frequency analysis (from 1 May 2000 to 19 July 2020) showed that the lake only went above 593.6 feet for about 7% of the time for the last 20 seasonal periods. At that elevation, the State Park Day Use Area and Campground Boat Launch, and courtesy dock are closed. Since 2000, the lake has gone above 594 feet about 6% of the time. At that elevation, the Stowers Branch Beach, and the wheelchair accessible fishing platform upstream of the dam are closed. These recreation areas are described in **Section 3.3**. The analysis also showed that the lake went above 597 feet for less than 1% of the time. When that elevation is reached, the State Park camp sites are closed. The highest pool for the last 20 seasonal periods was 602.6 feet and occurred during 2004. At that elevation, all recreation areas are closed and only the State Park Administration Building Parking Lot, Wastewater Treatment Control Building, Visitor Center Parking Lot, and Visitor Center are not flooded.

As shown in **Figure 3-3**, it is common for the summer pool to draw down below 592 feet NGVD. When the pool drops below 589 feet NGVD, the Stowers Branch Beach is closed. During the past 20 seasonal periods between 1 May 2000 and 19 July 2020, the lake dropped below 589 feet for less than 1% of the time.

3.2.3 Sedimentation and Shoreline Erosion

Beech Fork Lake has a 9.9-HP limit on all boats. This restriction minimizes any potential shoreline erosion due to recreational boating. Wind-generated wave action has not been identified as a significant issue. Some bank sloughing related to the drawdown from the seasonal pool to the winter pool has caused localized bank erosion. While this type of bank erosion has not been detrimental to project purposes, it can make it difficult for boaters to approach the shore to enjoy bank activities such as picnicking or observing nature.

In Beech Fork Lake, a sediment pool containing 4,200 acre-feet of storage was established for the lake at elevation 583.5 feet NGVD. The initial estimate was that the minimum pool would have a life of about 143 years. In 1987, the USACE conducted a resurvey of the lake's bottom. In the period since full operations began in 1978, the rate of deposition was 0.27 acre-feet of sediment psm of contributing drainage area. That measured sedimentation rate was not considered excessive. At that rate, the minimum pool would still have a life expectancy more than the 100-year economic life of the project. A resurvey of the downstream area also indicated no significant change in the channel. Currently, there are no apparent large-scale mining operations in the Beech Fork Lake drainage area that might contribute to sedimentation in the lake.

Sediment deposition within areas of the lake has become an increasing concern to recreational boating in the upper reaches of the lake where tributary water velocities and sediment settles out of suspension. Boating in the lake's upstream in the vicinity of Beech Fork Lake State Park requires careful boating operation to stay in a channel of sufficient depth. Areas with shallow depths are marked with buoys at the State Park and many coves where tributaries enter the lake and tend to collect sediment.

Sediment has accumulated in the vicinity of the State Park to the extent that navigation is limited to a very narrow channel. Areas outside the channel are shallow enough that submerged aquatic vegetation has established itself which exacerbates navigation challenges. WVDNR-Parks is planning to dredge approximately 60,000 to 70,000 cubic yards of accumulated sediment from the lake area at the State Park to provide a depth of four feet. The proposed dredging effort is anticipated to be conducted over a three-year period during the winter months.

3.2.4 Water Quality

Beech Fork Lake is located in a temperate zone which contributes to routine changes in the lake's stratification throughout the year. During cold months, the water profile is

nearly isothermal (i.e., water temperatures vary little with depth) from the surface to bottom of the lake. As spring progresses, lake surface waters warm more quickly and thermally stratify with depth. The cooler, lower part of the lake (i.e., hypolimnion) mixes very little with the warmer, upper part of the lake (epilimnion). **Figure 3-4** illustrates the thermal stratification pattern at Beech Fork Lake that typically develops during the months of April to November. Warmer surface temperatures can have small diurnal temperature fluctuations. There is a relatively narrow temperature zone near the lake's mid-depth, characterized by a transition from warm to cold temperatures (i.e., metalimnion). Thermal stratification in nutrient-enriched lakes can result in dramatic water quality differences within the lake's depth profile.

Beech Fork Lake is eutrophic which means there is a sufficient nutrient load to cause water quality differences in the lake's profile for specific parameters. The epilimnion contains an oxygen rich surface layer due to the oxygen production of the algal community and the water's interaction with atmospheric oxygen. However, in the hypolimnion where sunlight does not penetrate and decaying matter exists, the bottom layer can become anoxic (i.e., depleted of dissolved oxygen). Anoxic conditions do not support fish, and the conditions create higher concentrations of hydrogen sulfide, dissolved metals, and other undesirable water quality indicators. **Figure 3-5** illustrates the typical adverse effect that stratified conditions can have on dissolved oxygen (DO) within Beech Fork Lake during April through November.

Fine suspended sediments block light penetration throughout the lake reducing the depth of the epilimnion and decreasing primary production. Decreased primary production limits food sources for fish, and as a result, the sport fishery in Beech Fork Lake is negatively impacted.

Selective releases from Beech Fork Lake can act as a buffer by protecting the downstream water quality from pollutants that originate in the headwater tributaries that drain into the lake. The low-flow operating system available at the dam allows for the release of water having more natural temperatures and DO concentrations than would be available from releases provided through the sluice gates. **Figure 3-6** shows an example of the temperature and oxygen profile within Beech Fork Lake and the low flow gate being used (i.e., in blue on the right) to help meet desired downstream water quality conditions. The effectiveness of the low-flow system in meeting downstream temperature curve for the months of May through July 2020 is demonstrated in **Figure 3-7**.

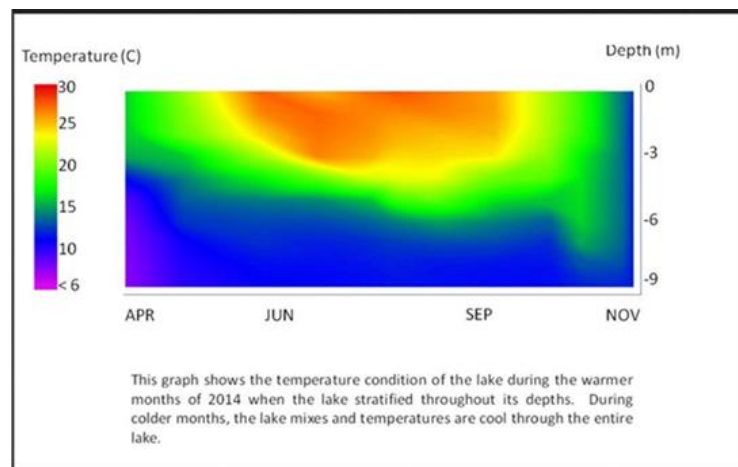


Figure 3-4. Beech Fork Lake thermal profile (April – November 2014)

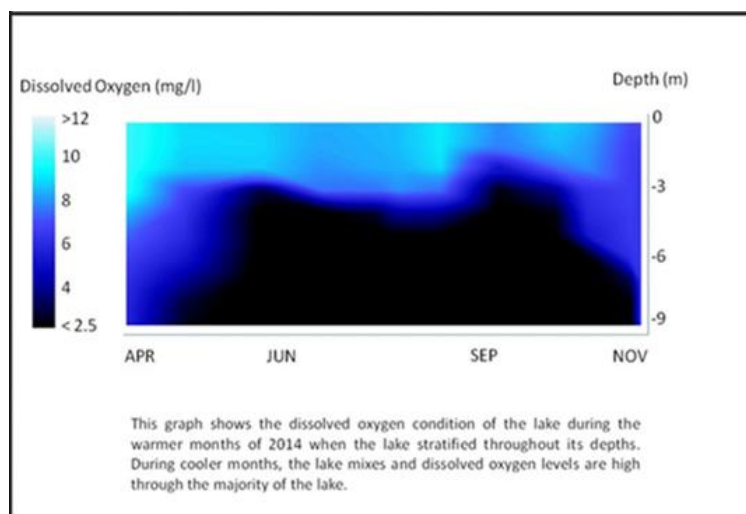


Figure 3-5. Beech Fork Lake dissolved oxygen profile (April to November 2014)

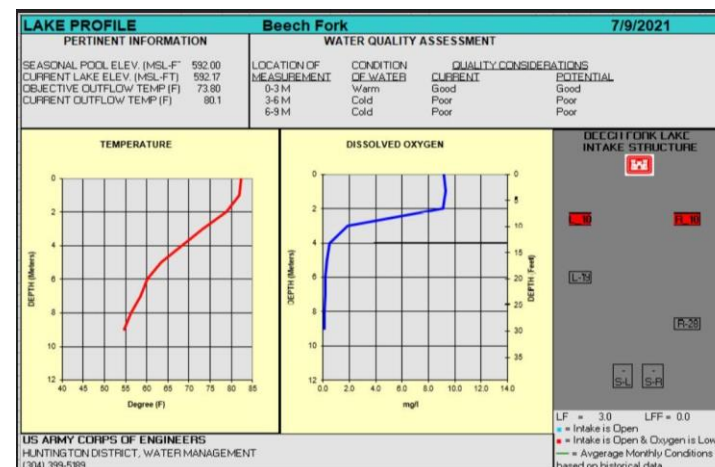


Figure 3-6. Beech Fork Lake temperature and dissolved oxygen profiles (9 July 2021)

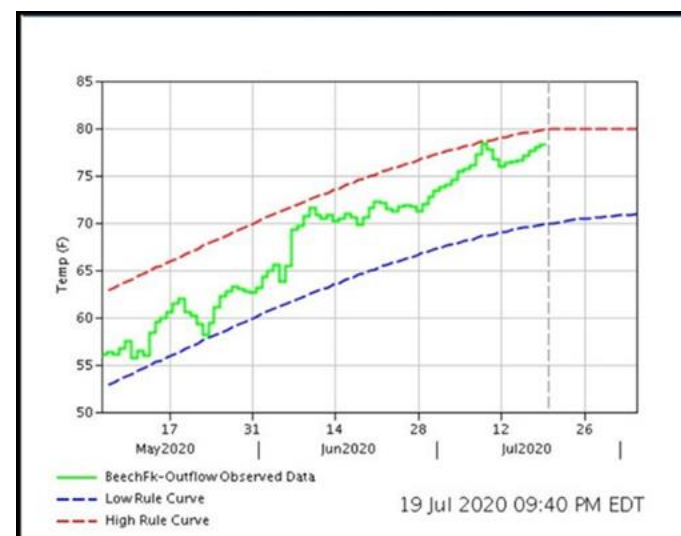


Figure 3-7. Beech Fork Lake outflow temperature

In the 2021 draft Annual Water Quality Report (USACE, 2021), water quality samples of select inflow and outflow at Beech Fork Lake exceeded screening values⁷ of total aluminum, total iron, Kjeldahl nitrogen, total manganese, total phosphorus, and strontium. Land uses in the upstream drainage area of a lake can be the source of pollution. Only 5% to 6% of the total Beech Fork Lake drainage area is recently disturbed or modified, or are agricultural, rural, or developed lands. The remainder of the drainage area is forested lands and open water. The erodible geology is a primary source of the pollutants that are exceeding state water quality standards (i.e., total aluminum and total iron). These pollutants are the main constituents of the suspended sediments that are a problem in the headwater streams.

The WVDEP uses CNA-Biological as one of the metrics to determine if a stream's water quality is suitable for a designated use of supporting aquatic life. Beech Fork (downstream of the dam and upstream of the lake) and several Beech Fork Lake tributaries (Rubens Branch, Long Branch, and Butler Branch) are listed as impaired based on CNA-Biological⁸. Currently, TMDLs are anticipated to be developed for Beech Fork Lake's CNA-Biological impaired tributaries. The objective of a TMDL is to determine the pollutant loading capacity of the waterbody and to allocate that load among different pollutant sources so that the appropriate control actions can be taken, and water quality standards can be achieved.

Beech Fork Lake was also listed as an impaired waterbody due to excessive phosphorus levels in 2016 and is a high priority for preparation of a TMDL. High concentrations of phosphorus can lead to dense algal blooms and reduced water clarity which have the possibility of creating adverse conditions for the in-lake fishery. Millers Fork was listed as impaired for Iron and Fecal Coliform in 2020.

Table 3-2 identifies the specific areas of concern for Beech Fork Lake and its tributaries in terms of WV water body designated uses. **Figure 3-1** shows the locations of the Beech Fork Lake tributaries included in the table.

⁷ Values exceeding State criteria and/or USACE's Huntington District's levels of concern.

⁸ CNA Biological indicates aquatic life could be adversely impacted.

Table 3-2. Status of designated uses for Beech Fork Lake and tributaries

Location	Category	Warm Water Fishery	Public Water Supply	Water Contact Recreation	Agriculture & Wildlife	Water Supply Industrial
Beech Fork Lake A (503 acres)	5	Not Supporting	Not assessed	Not supporting	Fully Supporting	Fully Supporting
Stowers Branch RM .6 to headwaters	2	Fully Supporting	Not assessed	Not assessed	Not assessed	Not assessed
Millers Fork	4a	Not Supporting	Not Supporting	Not Supporting	Fully Supporting	Fully Supporting
Childers Branch RM.4 to headwaters	3	Not assessed	Not assessed	Not assessed	Not assessed	Not assessed
Rubens Branch Mouth to RM .4 to headwaters	3	Not assessed	Not assessed	Not assessed	Not assessed	Not assessed
Mary Davis Branch RM .2 to headwaters	3	Not assessed	Not assessed	Not assessed	Not assessed	Not assessed
Price Creek RM .7 to headwaters	2	Fully Supporting	Fully Supporting	Fully Supporting	Fully Supporting	Fully Supporting

Category definitions

1. Fully Supporting all designated uses
2. Fully Supporting some but insufficient data for other designated use assessment
3. Insufficient or no data for assessing designated uses
- 4a. Waters that are impaired for one or more uses and have a TMDL
- 4b. Waters that are reasonably expected to return to supporting designated uses
- 4c. Waters that are impaired but not by a pollutant
5. Waters that are impaired for one or more uses and are expected to need a TMDL

Source: WVDEP, 2022a

3.2.5 Topography, Geology and Soils

Topography: The drainage area upstream of Beech Fork Dam is irregularly shaped. Its greatest length is 15 miles and greatest width is 9 miles. The hills parallel Beech Fork, becoming higher with respect to the riverbed as the stream ascends to its source, thus causing the tributaries to rise abruptly in steep slopes from narrow floodplains. Flat or gently sloped areas are relatively rare in the project area. Almost 80% of the total project area has slopes greater than 25%. Elevations vary from about 552 feet near the dam site to about 1,260 feet at the highest point in the Beech Fork Lake drainage area (USACE, 1965). The Beech Fork floodplain width varies from a few feet at its source to about 2,000 feet at its mouth.

Beech Fork's source is in the hilly terrain near the Wayne-Lincoln County boundary. The stream flows 27.6 miles northwestward to its confluence with Twelvepole Creek near Lavalette, WV. Total fall of the streambed over its length is 440 feet with an average gradient of 15.9 feet per mile. Miller's Fork is the largest tributary of Beech Fork, draining approximately 26% of the Beech Fork drainage area. It has a length of 8.6 miles and an average fall of 38.4 feet per mile.

Geology and Soils: The Beech Fork drainage area lies within the sedimentary strata of the Pennsylvania age (USACE, 1974a). The Monongahela and Conemaugh Groups comprise the formations at the lake. The depositional environment of the Conemaugh Group in the Beech Fork Lake project area consists of repeated marine advances and retreats. The fluctuations are indicated by lenticular deposits⁹ of varying thickness. Numerous redbed¹⁰ sequences occur, some of these grades laterally to gray nodular limestones. In some areas, sands were deposited in channels which cut through underlying deposits and into older sandstones.

The formations found in the project area consist of clays, indurated clays, claystones, shales, siltstones, sandstones, and thin limestones and coals (USACE, 1974a). The clays occur as inclusions in the indurated clay and claystone strata. These clays are soft, gray, and slightly to moderately plastic. Much of the rock encountered at the site (70 to 75%) consists of indurated clay. These redbeds are soft to moderately hard and slake readily on exposure to alternate wetting and drying. The redbeds are calcareous, slickensided, and contain thin limestone stringers and nodules. The claystones in the project area are soft to moderately hard, gray, and slickensided. They contain discontinuous silty and calcareous lenses. The siltstones in the project area are sandy to clayey, soft to moderately hard, gray to brown, slightly calcareous, and slightly micaceous. The sandstones are silty to clayey, moderately hard to hard, fine grained, brown to gray, and fractured. Limestones in the area are hard, gray, and lithographic. The coal seams occur as thin lenses and as blossoms in the clays and claystones.

Under the Farmland Protection Policy Act (FPPA), Federal agencies are required to minimize unnecessary and irreversible conversion of farmland to nonagricultural uses. The Natural Resource Conservation Service (NRCS) is the agency responsible for ensuring that FPPA is implemented. For the purpose of FPPA, farmland includes prime farmland, unique farmland, and land of statewide or local importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. The NRCS Web Soil Survey identified 16 soil complexes comprising approximately 3,400 acres of

⁹ Lenticular deposits are a sedimentary bedding pattern displaying alternating layers of mud and sand. Formed during periods of slack water, mud suspended in the water is deposited on top of small formations of sand once the water's velocity has slowed.

¹⁰ Redbeds (or red beds) are sedimentary rocks, typically consisting of sandstone, siltstone, and shale, that are predominantly red in color due to the presence of ferric oxides.

farmland statewide importance and nine soil complexes comprising approximately 1,120 acres as prime farmland. Full NRCS soil reports can be found in Appendix C

Land Capability Classifications (Soils): Soils information should influence land use planning. For example, some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Steep terrain can pose significant erosion problems when native vegetation is damaged or removed. “Land capability” is the suitability of land for use without permanent damage. It is an expression of the effect of physical land conditions, including climate, on the total suitability for use, without damage, for crops, grazing, woodlands, and wildlife. “Land capability” involves the consideration of the risks of land damage from erosion and other consequences, and the difficulties in land use owing to physical land characteristics (US (US Soil Conservation Service [USSCS], 1961; USACE, 2017b). Soil types contribute to the following eight classes used to distinguish “land capability” distinctions.

Class 1 - These soils have slopes of 0 to 3% and few limitations that restrict their use. Soils in this class are suited to a wide range of plants and may be used safely for cultivated crops, pasture, range, woodland, and wildlife. The soils are nearly level and erosion hazard (wind or water) is low. They are deep, generally well drained, and easily worked. They hold water well and are either well supplied with plant nutrients or highly responsive to inputs of fertilizer.

Class 2 - These soils generally have slopes of 3 to 8% and moderate limitations that reduce the choice of cultivated plants or require moderate conservation practices. Soils in this class require careful soil management, including conservation practices, to prevent deterioration or to improve air and water relations when the soils are cultivated. The limitations are few and the practices are easy to apply. The soils may be used for cultivated crops, pasture, range, woodland, or wildlife food and cover.

Class 3 - These soils have slopes of 8 to 15%, with severe limitations that reduce the choice of plants or require special conservation practices or both. Soils in this class have more restrictions than those in Class 2 and, when used for cultivated crops, the conservation practices are usually more difficult to apply and to maintain. They may be used for cultivated crops, pasture, woodland, range, or wildlife food and cover.

Class 4 - These soils have slopes of 15 to 25%, with very severe limitations that restrict the choice of plants or require careful management, or both. When these soils are cultivated, more careful management is required with more intensive or frequent treatments to protect from erosional forces.

Class 5 - These soils have little or no hazard of erosion but have other limitations, which are impractical to remove and limit their use mainly to pasture,

range, forestland, or wildlife food and cover. For example, such soils occur in areas that frequently experience overflows from nearby water sources.

Class 6 - These soils have slopes of 25 to 35%, with severe limitations that make them generally unsuitable for cultivation and that limit their use mainly to pasture, range, forestland, or wildlife food and cover. These soils can be safely used for cultivation of common crops provided they are intensively managed or may be adapted to specialty crops. Given their specific conditions, these soils may be particularly suited for woodlands and wildlife management.

Class 7 - These soils have slopes of 35 to 65%, with very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife. Physical conditions make application of pasture or range improvements or water control improvements impractical. Some areas of Class 7 soils may need to be seeded or planted to protect the soil or prevent damage to adjoining areas.

Class 8 - These soils and miscellaneous areas have limitations that preclude their use for commercial plant production and limit their use to recreation, wildlife, or water supply or for aesthetic purposes. It may be necessary to protect and manage lands having these soils to prevent or limit damage to adjoining areas.

Table 3-3 identifies the land capability classes assigned to the Beech Fork Lake Project lands. **Figure 3-8** illustrates how these classes are distributed throughout the project. No Class 5 or 8 lands occur at the project. In addition, 1,087 acres of project lands were not assessed. Much of the unassessed land is underwater beneath the lake or is generally associated with developed recreation areas, project operation and maintenance facilities, or food plots and other small open areas.

Table 3-3. Land capability classes at Beech Fork Lake

Land Capability Class	Dominant Condition	Acres	Percent Project Area
Unassessed	Unknown	1,087.23	8.7%
Class 1	Slight Limits	22.62	0.2%
Class 2	Moderate Limits	1,091.14	8.8%
Class 3	Severe Limits (plants)	342.30	2.8%
Class 4	Very Severe Limits (plants)	2,934.27	23.5%
Class 6	Severe Limits (cultivation)	2,357.52	18.9%
Class 7	Very Severe Limits (cultivation)	4,636.35	37.2%
Total Acreage		12,471.42	100%

Source: USACE, 2017a

Three classes (i.e., 4, 6, and 7) cover a total of over 9,928 acres, or 80% of the project lands. **Table 3-3** indicates these three classes pose severe limitations on the types of management actions that can be pursued on them. The limitations are due in large part to their steep slopes that can range from 15 to 65% and the potential for soil erosion when the native plant cover is disturbed.

The most abundant Class 7 lands comprise 4,636 acres, representing over 37% of the project area. These steep and stony soils, which have slopes ranging from 35 to 65%, are the most severely restrictive of the landscape at the Beech Fork Lake Project. The steep terrain restricts their reasonable use to wildlife habitat, forest ecosystem functions, recreational purposes, and/or passive aesthetic enjoyment.

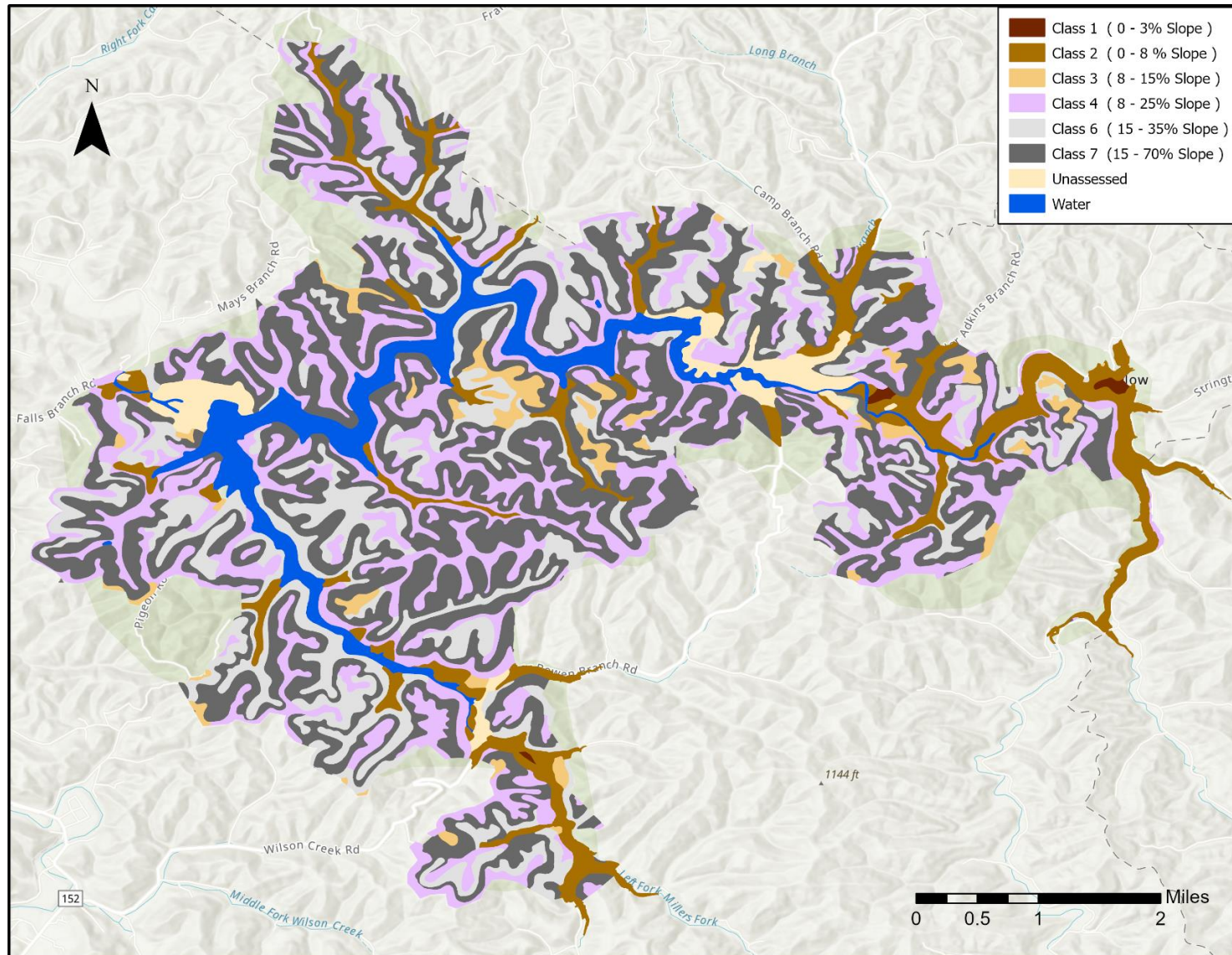


Figure 3-8. Beech Fork Lake land capability classification

3.2.6 Ecological Setting

The ecological setting section provides a summary of the biological features of the project area and planning constraints. The biological environment includes vegetation, terrestrial wildlife, aquatic resources, invasive species, threatened and endangered species that may inhabit the Project, and any critical and sensitive wildlife habitat that may be present.

Relevant and applicable baseline information from the 2017 Beech Fork Lake Level One Natural Resource Inventory (NRI) (USACE, 2017b) and other information sources have been used to: (1) describe the “Affected Environment” at Beech Fork Lake, and (2) be considered in developing future resource management needs for the Project.

3.2.6.1 Vegetative Resources

Beech Fork Lake project lands are dominated by forests as shown in **Figure 3-9**. Land cover data was acquired from the USGS Biologic Resource Division’s National Gap Analysis Program (GAP) Land Cover Data Portal (USGS, 2021b) and shows the most prevalent forest cover at Beech Fork Lake is referred to as Allegheny-Cumberland Dry Oak Forest and Woodland – Hardwood. **Table 3-4** shows this forest type covers 8,850 acres, or over 69% of the project area, providing the largest and most continuous habitat. This forest type encompasses the expanses of dry hardwood forests that occur on the hilly, predominately acidic substrates in the Allegheny and Cumberland plateaus and the ridges of the Southern Ridge and Valley that characterize much of WV. The forest community is typically dominated by white oak (*Quercus alba*), southern red oak (*Quercus falcata*), chestnut oak (*Quercus prinus*), scarlet oak (*Quercus coccinea*), with lesser amounts of red maple (*Acer rubrum*) and hickory (*Carya glabra* and *Carya alba*).

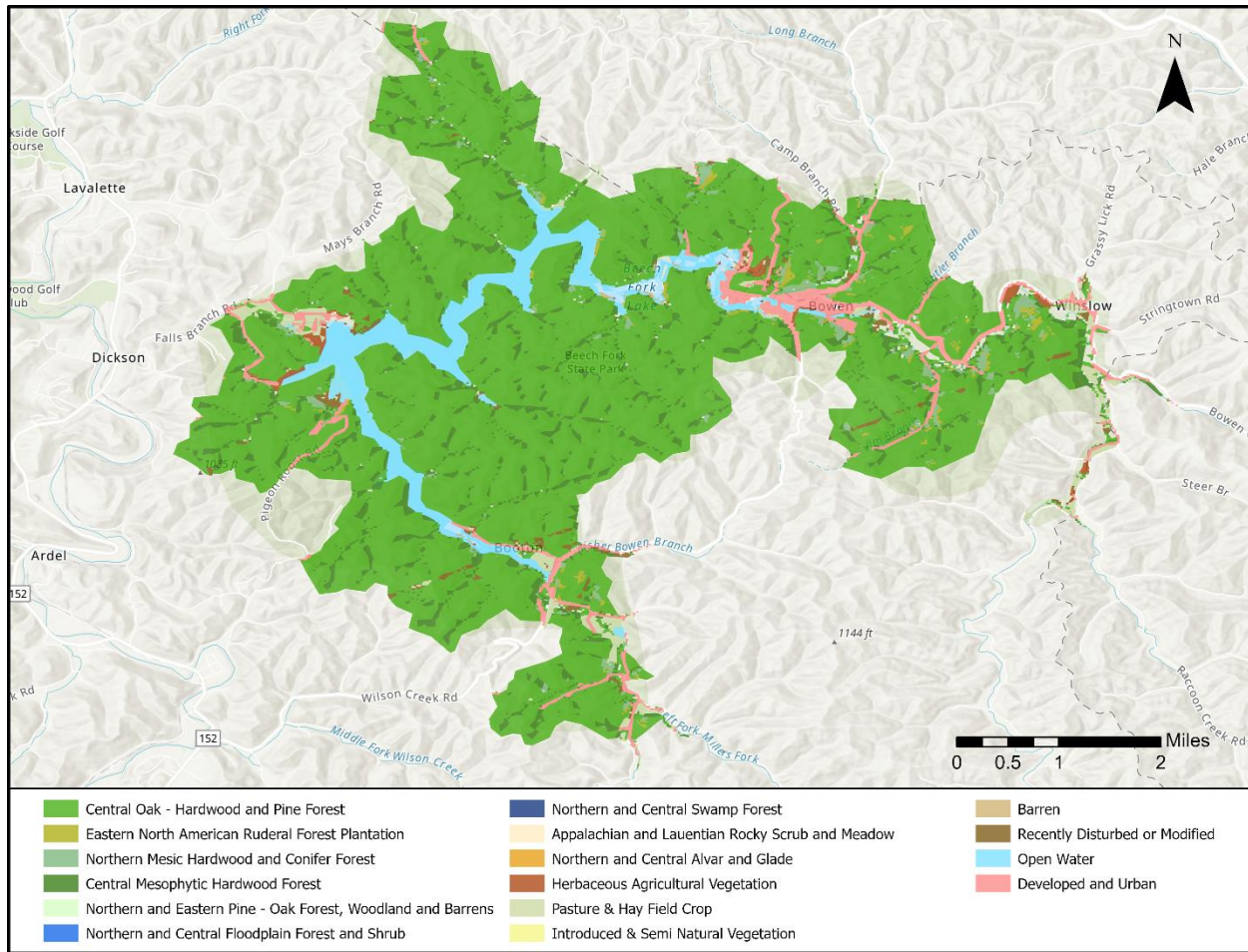


Figure 3-9. Beech Fork Lake land cover

Covering around 1,371 acres, the second largest forest type occurring on project lands is known as South-Central Interior Mesophytic Forest which formerly dominated the landscape prior to repeated disturbances by man. This high-diversity, predominately deciduous forest type occurs within areas having deep enriched soils. Dominant species include sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), yellow poplar (*Liriodendron tulipifera*), American Basswood (*Tilia americana*), northern red oak (*Quercus rubra*), cucumber tree (*Magnolia acuminata*), and black walnut (*Juglans nigra*). Remnants of typical Mixed Mesophytic Forest are supported in some coves and lower ravine slopes. These areas contain about 30% beech, 30% oak, 15% yellow poplar, and a 25% mixture of hickory, maple, white ash (*Fraxinus americana*), and sweet buckeye (*Aesculus flava*). Some of the beech, tulip poplars, sugar maples and red oak are 36 inches in diameter and 80-100 feet high. In the floodplain and on lower slopes, American sycamore (*Platanus occidentalis*) is the dominant species in both diameter and crown size. Multiflora rose (*Rosa multiflora*) is a common invasive

shrub, and box elder (*Acer negundo*) and slippery elm (*Ulmus rubra*) are common on the first terrace areas within the narrow floodplains.

A total of 137 acres of Small Stream and Riparian Forest and Woodlands forms a narrow border of tree cover immediately surrounding Beech Fork Lake and flanking the streams draining into the lake. Also closely associated with the tributary streams are 207 acres of Appalachian Hemlock-Hardwood Forest that occur in areas with steeper and more deeply shaded slopes. These two forest types are also influenced by periodic wet soils and annual flood events. The vegetation is a mosaic of forest, woodlands, shrub lands, and herbaceous communities. Canopy cover can vary within different systems, but typically tree species may include American sycamore (*Platanus occidentalis*), Carolina red maple (*Acer rubrum* var. *trilobum*), and river birch (*Betula nigra*). Shrubs and herbaceous layers can vary in richness and cover and may include bushy St. John's-wort (*Hypericum densiflorum*) and different types of willow (*Salix* sp.). Healthy ecosystems with large biodiversity occur in riparian areas.

Table 3-4 shows that the project lands also include over 140 acres of recently disturbed or modified areas and almost 300 acres of herbaceous agricultural vegetation. These relatively small open areas are generally associated with wildlife management activities on the 7,531 acres of project lands included within the Beech Fork Lake WMA. Lastly, 290 acres are designated as various levels of Developed and Urban areas. These areas are associated with the project's recreation areas and administrative and operation and maintenance facilities. Developed open areas have been established for agriculture, recreation, or wildlife management purposes. Also, cropland and pasture fields are scattered throughout the WMA to produce crops and serve as food plots for wildlife.

Table 3-4. Vegetative cover at Beech Fork Lake

National Vegetation Classification Division	Ecological System Level	Acres	Percent of Total Project
Eastern North American Cool Temperate Forest	Allegheny-Cumberland Dry Oak Forest & Woodland – Hardwood	8,850	69.3%
	Allegheny-Cumberland Dry Oak Forest & Woodland – Pine Modifier	691	5.4%
	Appalachian Hemlock-Hardwood Forest	207	1.6%
	South-Central Interior Mesophytic Forest	1,371	10.8%
	Total	11,120	87.1%
Eastern North American Flooded & Swamp Forest	South-Central Interior Small Stream and Riparian	137	1.0%
	Total	137	1.0%
Herbaceous Agricultural Vegetation	Cultivated Cropland	82	0.6%
	Pasture/Hay	205	1.6%
	Total	287	2.2%
Recently Disturbed or Modified	Disturbed/Successional – Grass/Forb Regeneration	129	1.0%
	Disturbed/Successional – Shrub Regeneration	13	0.1%
	Total	141.5	1.1%
Open Water	Open Water (Fresh)	782	6%
	Total	782	6%
Developed & Urban	Developed, High Intensity	0.4	0.003%
	Developed, Medium Intensity	12	0.1%
	Developed, Low Intensity	96	0.75%
	Developed, Open Space	182	1.4%
	Total	289	2.2%
	Total Project	12,757	99.7%

Source: USACE, 2017b

Vegetative Condition Assessment: The USACE's goal for all lands and water is to assure sustainable resource stewardship and management is in balance with regional needs and public interests. The NRI system assigns condition ratings for assessed acreage of each vegetative subclass occurring on a project as: (a) sustainable, (b) transitioning, (c) degraded, or (d) not assessed. The following definitions have been developed to standardize condition ratings:

Sustainable – Meeting desired state. The acreage is not significantly impacted by any factors that can be managed and does not require intensive management. The acreage also meets operational goals and objectives set forth in the project Operations and Management Plan (OMP) or other applicable management documents. These acres are considered healthy and sustainable for future generations. Only minor management practices may be required to maintain the health of this acreage.

Transitioning – Managed to meet desired goals. The acreage is impacted by human or other environmental factors that require management of the acreage to meet goals and objectives outlined in the project OMP or other applicable management documents.

Degraded – Does not meet desired goals. The acreage is significantly impacted by human or other environmental factors that prevent the acreage from meeting desired goals outlined in the project OMP or other management documents. The acreage is not considered healthy. Intense management may be required to meet desired goals.

Not Assessed - Acreage that has not been evaluated or impacts are not understood.

These ratings are applied to each vegetation category by assessing the land or water components or parcels that make up each vegetative sub-class. The assessment of the condition of these resources provides valuable information to project managers, the District, Division, or USACE Headquarters to assess the state of natural resource projects locally or across the nation. Project staff are to evaluate project OMP objectives and environmental impacts against the stated definitions to assess acreages within the different vegetation types. Impacts may be any factor that potentially degrades a resource such as erosion, foot traffic, invasive species, over browsing by deer, lack of desired species diversity, and/or development.

The 2017 Beech Fork Lake NRI assessed the project's vegetation classes as shown in **Table 3-5** (USACE, 2017b). Based on remote sensing data, the assessment identified approximately 140 acres of project lands that are in transition. The assessment also recommended the need for future field verification to evaluate the status of the lands in transition to determine if the involved acreage is moving into a sustainable condition or being degraded.

Table 3-5. Beech Fork Lake vegetation acreage summary

National Vegetation Classification	Acres
Forest & Woodland	11,257
Open Water	782
Agricultural Vegetation	287
Developed & Other Human Use	290
Recently Disturbed or Modified	142

Source: USACE, 2017b

3.2.6.2 Terrestrial Resources

The vegetation types described in **Section 3.2.6.1** provide a variety of habitats for a healthy, biodiverse ecosystem in the Beech Fork Lake project area. Based upon reported range information, between 30 and 40 species of mammals have the potential to be found at the Beech Fork Lake Project. These include Virginia opossum (*Didelphis marsupialis*), moles, shrews, bats and other species of rodents, Eastern cottontail rabbits (*Sylvilagus floridanus*), white-tailed deer (*Odocoileus virginianus*), and wild turkey (*Meleagris gallopavo*). The abundance of suitable habitats and the activities of humans significantly influence the actual distributions and numbers of species and individuals within a species that occur on project lands.

The white-tailed deer and wild turkey are the primary big-game species hunted on the WMA. Squirrel (*Sciurus* sp.), rabbit, and furbearers are the most sought small game species (Glottelty, 2019a). Raccoon (*Procyon lotor*) and woodchucks (*Marmota monax*) are often hunted. Deer numbers have increased since the project was constructed and hunting strictly controlled. American beaver (*Castor canadensis*) and American mink (*Neovison vison*) are found in low numbers.

The Beech Fork Lake WMA, which comprises around 59% of the project's total land area, is managed under a lease agreement by WVDNR-Wildlife. The WMA is effectively divided into four separate sections: the area north of Beech Fork, the area east of the Beech Fork State Park, the area between Beech Fork and Miller's Fork, and the area south of Miller's Fork. The WMA is managed under a five-year plan that is regularly updated by WVDNR-Wildlife (Glottelty, 2019a). **Figure 3-10** shows the relationship of the WMA to the overall Project.

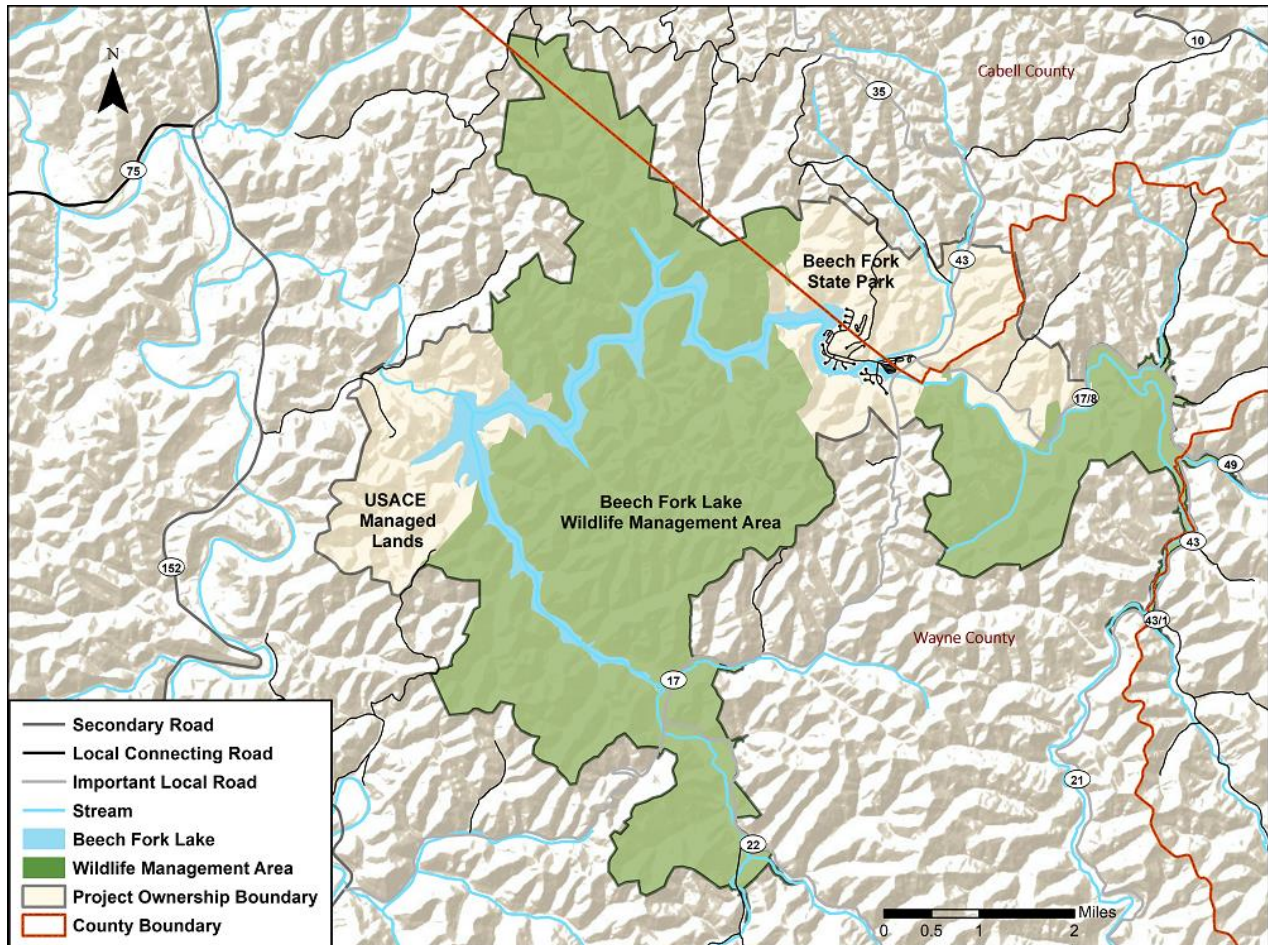


Figure 3-10. Beech Fork Lake WMA

Section 3.2.2.1 describes the condition of the forest communities that now exist on project lands.

3.2.6.3 Aquatic Resources

Prior to impoundment, a total of 43 species of fish were known to occur within the Beech Fork drainage area. Of those, 14 species require free-flowing stream conditions to reproduce and thrive. In the years since the lake was impounded, the surviving representatives of these species are now restricted to the upstream tributaries in the drainage area above Beech Fork Lake where suitable habitats continue to exist.

Many of the remaining 29 species were expected to flourish in the new lake. Among those were green sunfish (*Lepomis cyanellus*), bluegill (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), white crappie (*Pomoxis annularis*), gizzard shad (*Dorosoma cepedianum*), and black bullhead (*Ameiurus melas*), and a number of minnow species.

Following impoundment in 1977-78, Beech Fork Lake experienced a growing fishery due to the expansion of the above identified species. In addition, WVDNR-Wildlife has stocked channel catfish (*Ictalurus punctatus*), walleye (*Sander vitreus*), largemouth bass, black crappie (*Pomoxis nigromaculatus*) and hybrid saugeye. WVDNR-Wildlife also constructed and stocked a sub-impoundment adjacent to the upper reaches of Beech Fork Lake for the raising and stocking of hybrid bass and hybrid tiger muskies. Beech Fork Lake affords fishing for trout, bluegill, crappie, saugeye, tiger muskie, and bass (catch-and-release). WVDNR-Wildlife management enhances fish habitat throughout the lake as part of their management.

Operation of Beech Fork Lake for flood control results in pool fluctuations which can have a negative effect on fish and other aquatic organisms within the lake. Fluctuating water levels inhibit the establishment of rooted aquatic vegetation. The absence of such vegetation influences aquatic life since vegetation provides places where insects are produced, small fish species reproduce and seek shelter from larger predacious fish, and large fish feed, hide, and construct nests for reproduction. Although a regular seasonal drawdown-refill schedule exists for the operation of the lake that is sensitive to the annual reproduction requirements of fish, extended rainy periods can occur that can require flood storage above seasonal pool levels during May and June. This is followed by the drawdown to the seasonal pool level that can occur during the critical point of spawning. Such events can expose nests and eggs to drying, resulting in the loss of a large part of the year class for the affected species. However, the large volume of water stored within Beech Fork Lake and regulation capabilities provided by the dam, allows releases to be made to augment downstream flows and improve water quality during periods of low flow.

3.2.6.4 Wetlands

The USFWS NWI system (Cowardin, et al., 1979) was used to identify and map wetlands in the Beech Fork Lake project area. In addition, the NRCS Soil Survey Geographic Database (SSURGO) (digital soil survey) (NRCS, nd) was evaluated to identify hydric soil complexes.

Three types of wetlands are found within the Beech Fork Lake Project area: lacustrine, palustrine, and riverine systems. Lacustrine wetlands and deepwater habitats have all of the following characteristics: (1) situated in a topographic depression or a dammed river channel; (2) lacking trees, shrubs, persistent emergents, emergent mosses or lichens with 30 percent or greater areal coverage; and (3) total area of at least 8 hectares (ha) (20 acres). A palustrine wetland is an inland freshwater area dominated by vegetation and riverine wetlands depend on the flow of water conveyed by natural or artificial channels, including rivers, streams, ditches, and canals. Riverine wetlands lie adjacent to rivers or streams and are dependent on the flow of water. In the Beech Fork

Lake project area, lacustrine wetlands are the most prevalent, comprising 729 acres; followed by riverine wetlands comprising 367 acres; and palustrine wetlands with 22 acres. The 22 acres of palustrine wetlands consist of 11 acres of freshwater forested/shrub wetlands and over 7 acres of freshwater emergent marsh. In addition, 3.5 acres of freshwater ponds occur on project lands.

Table 3-6 provides a wetland breakdown to class level, while **Figure 3-11** shows the locations of the wetlands occurring at the Beech Fork Lake Project.

Table 3-6. NWI classified wetlands at Beech Fork Lake

NWI Code	System	Class	Acreage
L1UBHh	Lacustrine	Lake	728.90
R5UBH	Riverine	Stream	304.95
R4SBC	Riverine	Stream	62.30
PUBH	Palustrine	Freshwater Pond	0.20
PUBFh	Palustrine	Freshwater Pond	0.40
PUBHh	Palustrine	Freshwater Pond	2.00
PUBHx	Palustrine	Freshwater Pond	0.23
PUB/FO5Hh	Palustrine	Freshwater Pond	0.88
PFO1A	Palustrine	Forested/Shrub	0.86
PFO1E	Palustrine	Forested/Shrub	0.60
PFO1Fh	Palustrine	Forested/Shrub	1.77
PSS1A	Palustrine	Forested/Shrub	0.30
PSS1C	Palustrine	Forested/Shrub	1.00
PSS1Ch	Palustrine	Forested/Shrub	0.77
PSS1E	Palustrine	Forested/Shrub	2.12
PSS1Fh	Palustrine	Forested/Shrub	2.22
PSS5Hh	Palustrine	Forested/Shrub	1.36
PEM1A	Palustrine	Emergent	1.00
PEM1B	Palustrine	Emergent	1.30
PEM1C	Palustrine	Emergent	5.18
Total			1,118.34

Source: USACE, 2017b

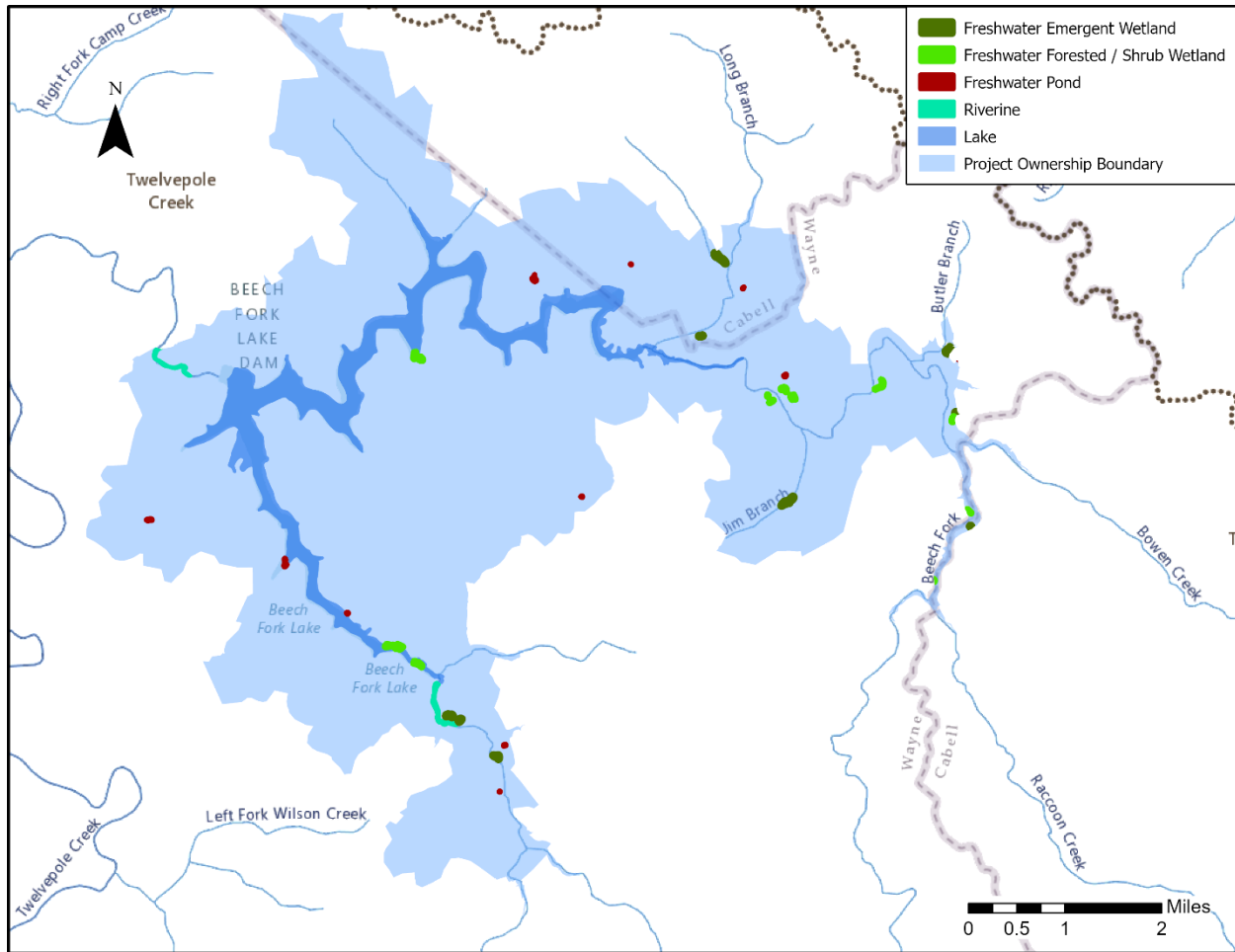


Figure 3-11. Beech Fork Lake wetlands

3.2.6.5 Threatened and Endangered Species

Section 2.7.5 discusses the Special Status Species reported from or having the potential to occur within the Twelvopole Creek Sub-basin. All the Special Status Species that potentially occur in the Twelvopole Creek Sub-basin except the Big Sandy Crayfish are found in the Beech Fork Lake Project area (**Table 3-7**). IPaC does not list the Bobolink as occurring in the Beech Fork Lake Project area, but all other migratory birds of conservation concern potentially occurring in the Twelvopole Creek Sub-basin occur in the Beech Fork Project area as year-round residents, seasonal visitors for breeding purposes, or wintering only are identified (**Table 3-8**). No terrestrial or aquatic critical habitat is designated within the Beech Fork Lake Project area (USFWS, 2020).

Table 3-7. Federally protected threatened and endangered species having the potential to occur within the Beech Fork Lake Project area

Common Name	Scientific Name	Status
Clubshell Mussel	<i>Pleurobema clava</i>	Endangered
Fanshell Mussel	<i>Cyprogenia stegaria</i>	Endangered
Sheepnose Mussel	<i>Plethobasus cyphus</i>	Endangered
Pink Mucket (pearlymussel)	<i>Lampsilis abrupta</i>	Endangered
Snuffbox Mussel	<i>Epioblasma triquetra</i>	Endangered
Gray Bat	<i>Myotis grisescens</i>	Endangered
Indiana Bat	<i>Myotis sodalis</i>	Endangered
Northern Long-eared Bat	<i>Myotis septentrionalis</i>	Threatened
Monarch Butterfly	<i>Danaus plexippus</i>	Candidate

Source: USFWS, 2022

Table 3-8. Federally protected migratory birds occurring within the Beech Fork Lake Project Area

Common Name	Scientific Name	Season Found
Bald Eagle	<i>Haliaeetus leucocephalus</i>	Year-Round
Canada Warbler	<i>Cardellina canadensis</i>	Breeding
Cerulean Warbler	<i>Dendroica cerulean</i>	Breeding
Eastern Whip-poor-will	<i>Antrostomus vociferus</i>	Breeding
Golden-winged Warbler	<i>Vermivora chrysoptera</i>	Breeding
Kentucky Warbler	<i>Oporornis formosus</i>	Breeding
Prairie Warbler	<i>Dendroica discolor</i>	Breeding
Prothonotary Warbler	<i>Protonotaria citrea</i>	Breeding
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	Breeding
Rusty Blackbird	<i>Euphagus carolinus</i>	Wintering
Wood Thrush	<i>Hylocichla mustelina</i>	Breeding

Source: USFWS, 2022

The Twelvepole Creek Sub-basin is included in WVDNR-Wildlife's Cumberland West CFA (**Figure 3-12**). A total of 161 taxa listed as SGCN occur or have historically occurred within the Cumberland West CFA, with the majority of those listed as occurring in the habitat types present in the Beech Fork Project area.

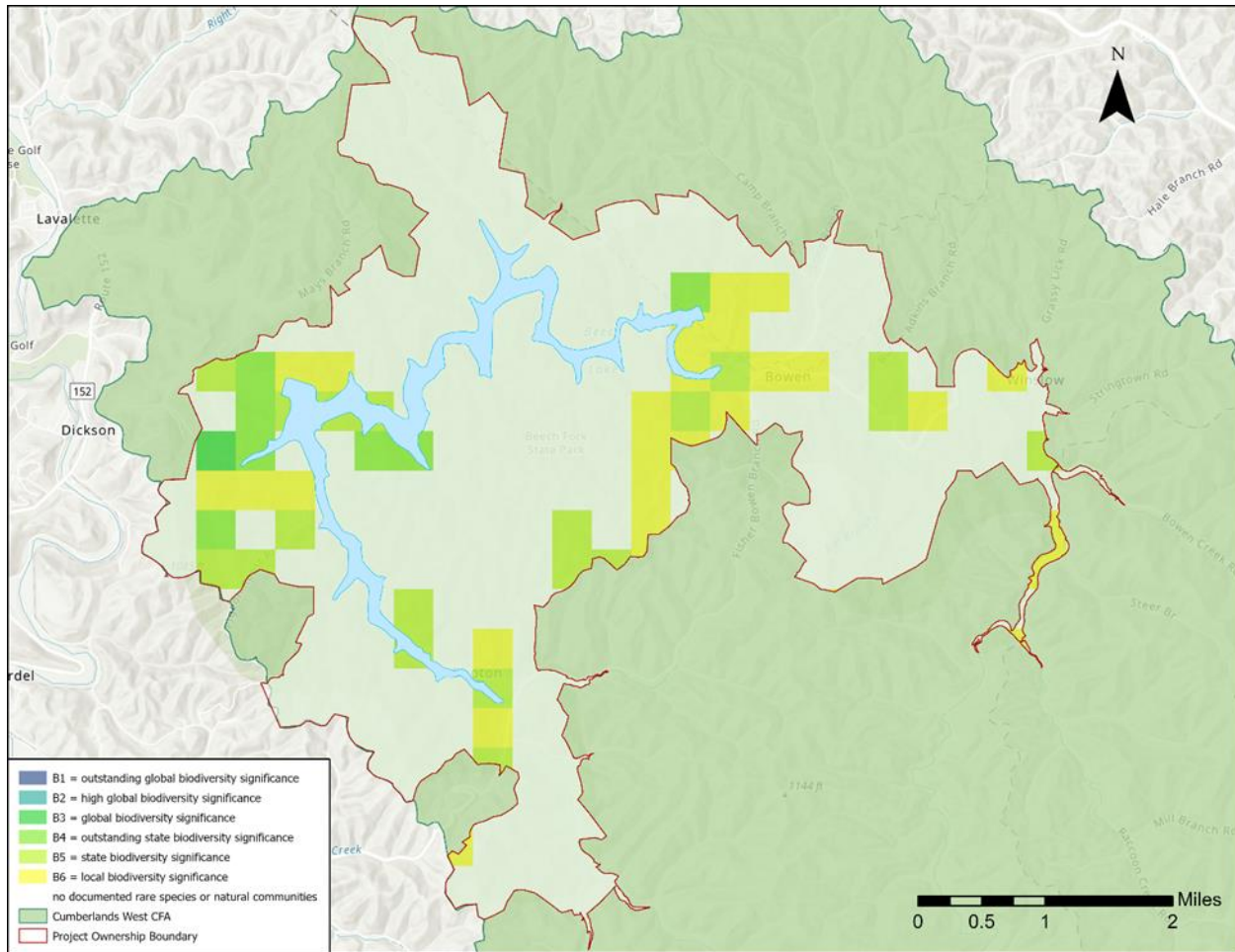


Figure 3-12. Beech Fork Lake within the Cumberland West CFA

3.2.6.6 Invasive Species

The exotic species discussion in **Section 2.7.6** addressed the occurrence of invasive species within the Twelvepole Creek Sub-basin. A total of 204 invasive species of various taxonomic groups have been identified in the project area. Of these, six invasive plant species were listed in the 2017 Natural Resources Inventory (USACE, 2017b) to be present in the Beech Fork Lake Project area as shown in **Table 3-9**. According to the 2017 report, these six invasive plant species had affected a total of 536 acres or 4.25% of the project lands. The Huntington District's 2020 O&M Budget Request Package to USACE Headquarters identified the acreage covered by three of the six known invasive species had remained the same. For these three species with acreage available, there has not been a significant change in acreage between 2017 and 2020. The 2020 acreage for two of the invasive species is unknown, and there is no information on the coverage of multiflora rose (**Table 3-9**). Future attention should be devoted to controlling the spread of these invasive plant species, particularly the shrub autumn olive (*Elaeagnus umbellata*).

Table 3-9. Invasive plant species found at Beech Fork Lake

Invasive Species		Type of impact	Acres impacted		Acres Treated
Common Name	Scientific Name		2017	2020	
Autumn olive	<i>Elaeagnus umbellata</i>	Habitat Loss	357	342	15
Japanese knotweed	<i>Polygonum cuspidatum</i>	Habitat Loss	59	59	0
Tree-of-heaven	<i>Ailanthus altissima</i>	Habitat Loss	12	12	0
Russian olive	<i>Elaeagnus angustifolia</i>	Habitat Loss	90	unavail.	-
Crown Vetch	<i>Securigera varia</i>	Habitat Loss	18	unavail.	-
Multiflora rose	<i>Rosa multiflora</i>	Habitat Loss	unavail.	unavail.	-

*Multiflora rose is present, but the extent of its coverage is unknown.

Source: USACE, 2017b; USACE, 2020a

In addition, **Table 3-10** lists four invasive insect species, four disease-causing fungi species, and five aquatic organisms are known to occur in the Wayne County. Presence of these species is unknown for Cabell County. These species have a very strong likelihood of becoming established at the Beech Fork Lake Project in the very near future if they have not already done so and have thus far escaped detection.

WVDNR-Wildlife stocks fish at Beech Fork Lake including saugeye, (a hybrid of sauger (*Sander canadensis*) and walleye (*Sander vitreus*)); hybrid bass (a cross between striped bass (*Morone saxatilis*) and white bass (*M. chrysops*)); and tiger musky (a sterile hybrid of muskellunge (*Esox masquinongy*) and northern pike (*Esox lucius*)). Since these three hybrid crosses are sterile and incapable of reproduction, they do not pose significant problems for native species. However, it is possible that some individuals from each of the species and hybrid crosses stocked in Beech Fork Lake have migrated both upstream into the headwater reaches of the drainage area and downstream of the dam.

Table 3-10. Invasive animal and disease species found in Wayne County, WV

Species Group	Common Name	Scientific Name	Type of Threat
Insect	Southern Pine Beetle	<i>Dendroctonus frontalis</i>	Bark and phloem feeding of pines
Insect	Large Aspen Tortrix	<i>Choristoneura conflictana</i>	Boring of tree trunks
Insect	Hemlock Woolly Adelgid	<i>Adelges tsugae</i>	Piercing and sucking insect
Insect	Brown Marmorated Stink Bug	<i>Halyomorpha halys</i>	Agricultural pest
Disease	Butternut Canker	<i>Ophiognomia clavigneti-juglandacearum</i>	Stem decay and cankers
Disease	Oak Wilt	<i>Ceratocystis fagacearum</i>	Wilt of plant vascular tissue
Disease	Dogwood Anthracnose	<i>Discula destructive</i>	Foliage disease

Species Group	Common Name	Scientific Name	Type of Threat
Disease	White Pine Blister Rust	<i>Cronartium ribicola</i>	Stem and leaf rusts
Mussel	Asian Clam	<i>Corbicula fluminea</i>	Freshwater exotic
Hydrozoan	Freshwater Jellyfish	<i>Craspedacusta sowerbii</i>	Freshwater exotic
Fish	Threadfin Shad	<i>Dorosoma petenense</i>	Freshwater native transplant
Fish	Tiger Trout	<i>Salmo trutta x Salvelinus fontinalis</i>	Freshwater exotic hybrid
Fish	Saugeye	<i>Sander canadensis</i>	Freshwater native transplant

Source: USACE, 2017b

3.2.7 Cultural Resources

Background

Beech Fork Lake is located in Cabell and Wayne Counties, WV about two miles southeast of Lavalette, about ten miles south of Huntington WV, and approximately three and a half miles above the mouth of the Beech Fork of Twelvepole Creek. Construction of the project began in June 1970 and the lake was impounded in May 1978.

Cultural Resource Investigations

Previous work in the project area includes an archeological survey completed by Baker and Fowler (1975) and a survey related to a fishpond (Anslinger, 1996). Limited test excavations have been performed at a few other locations. Artifacts recovered from the archaeological sites, primarily from the early survey by Baker and Fowler (1975) were re-catalogued and reevaluated as part of an academic research project in 2000. Approximately 85% of the original collection has been recovered and the collection is considered stable and well documented. Artifacts from the 1975 survey are curated at the Delf Norona Museum in Moundsville, WV. Some of the artifacts (as well as some artifacts from sites not in the project area) are also on permanent display at the Beech Fork Visitor Center (USACE, 2001a).

Cultural Resources

Cultural resources in the Beech Fork Lake Project area range from prehistoric through historic. Several archaeological sites range over the numerous temporal periods and exhibit varying cultural components. Several sites, previously described in the Beech Fork Lake Master Plan (USACE, 1988) covered Early Archaic (8000 – 6000 B.C.), Late Archaic (4000-1000 B.C.), Early Woodland (1000—200 B.C.), Middle Woodland (200 B.C. – 400 A.D.), Late Woodland (A.D. 400 – 1200) and Late Prehistoric (A.D. 1200 - 1550) periods. Cultural components include Buck Garden, Fort Ancient, Buffalo, Brewerton and Adena cultures. The sites occur in a variety of types with many of them being of indeterminate function. The Cultural Resources Management Plan (CRMP) indicated that one site had been excavated and determined to be eligible for the NRHP

by the WV Geologic Survey. As of 2001, the site had not been formally evaluated. All other sites are currently not assessed (USACE, 2001a).

Additionally, there is evidence of early historic settlements in the form of log houses in the general area, built circa 1825-1850 (hand hewn logs with half dove-tail notching, lacking log gables and eve beams, with exterior chimneys on the gabled ends with exterior fire boxes). One log structure has been moved to the camping area and is being managed by Beech Fork State Park staff. Recommendations have been made that an official Determination of Eligibility for the NRHP be made for the log structure. A priority in the CRMP (USACE, 2001a) stated that the log cabin should be evaluated for the NR and that a history of the log cabin be prepared and used in the interpretation of the site. Further historic features on project lands are several drift mines that should be evaluated for the NR and developed for interpretive programs.

3.2.8 Hazardous, Toxic, and Radioactive Waste (HTRW)

Management of the Beech Fork Lake Project involves maintenance of a wide variety of facilities. Those facilities include the dam, structures of all types, numerous recreation assets, campgrounds, signage, roads, open lands, vegetation management, the state park, and the WMA. The maintenance actions include not only those accomplished by the USACE staff, volunteers, and contractors on lands under the USACE's direct control; but those actions performed by the marina lessee and WVDNR personnel on the state park and WMA lands leased from the USACE. Maintaining such a diverse project requires the use and application of a variety of fuels, oils, greases, paints, pesticides, and other chemicals. The storage, use, and disposal of many of these materials are governed by various federal and state rules, regulations, and guidelines which must be adhered to in order to protect maintenance personnel, the visiting public, and the overall environment.

A comprehensive search of records related to HTRW issues for Beech Fork Lake was conducted by Huntington District in March 2021 (USACE, 2021). The search revealed one record. An Environmental Baseline Study was found for Beech Fork Lake Project, Tract No. 1123A, dated 20 July 2010. The study addressed concerns over the fueling area at the State Park's maintenance building where fuel dispensing was being done over the soil. This problem was corrected during a subsequent Environmental Compliance Review.

3.2.9 Mineral and Timber Resources

Mineral Resources: Coal, gas, and oil are the three minerals of commercial interest occurring within the Twelvepole Creek Sub-basin. The No. 5 Block coal seam of the Allegheny series occurs below the valley floor throughout the entire Beech Fork reservoir area. The seam is not considered to be mineable at present within the vicinity

of Beech Fork Lake. The Pittsburgh coal seam, at the base of the Monongahela series, generally outcrops about halfway up the slope of hills at elevations well above the floodplain throughout portions of the Beech Fork reservoir area. The only known commercial production from the Pittsburgh coal seam was at a discontinued strip mine location at Moxley Branch. All proven coal resources within the reservoir area are in the Pittsburgh coal seam and are not expected to be commercially mineable because of the poor quality of the coal. The reserves are not sufficient to justify installation of rail facilities and would require a long and expensive truck haul.

The area within, and surrounding Beech Fork Lake was producing natural gas 60 years before the USACE acquired the lands to construct the project in the late 1960s. Some oil was associated with the gas wells but not in sufficient abundance to justify production drilling. Some gas well access roads that connect with the public roads remain within the project area.

At the time lands were acquired for the Beech Fork Lake Project, except for oil and gas, all other mineral rights were purchased on the entire 12,609 acres of fee-owned surface lands. Oil and gas interests were also acquired on 9,000 acres of fee lands. On the remaining 4,000 acres of fee lands, operation of a developed oil and gas field was allowed to continue with subordination of mineral rights to other project purposes (i.e., subject to certain restrictions for pollution and debris control and to avoid interference with the authorized project purposes). All other existing oil and gas leases on undeveloped project lands were extinguished. When flowage easements were acquired for the project, they did not include mineral rights.

Currently, no mining occurs within the Beech Fork Lake fee owned boundary. One gas well is currently located within project lands. As shown in **Figure 3-13**, there is limited active mining occurring within the Beech Fork Lake drainage area.

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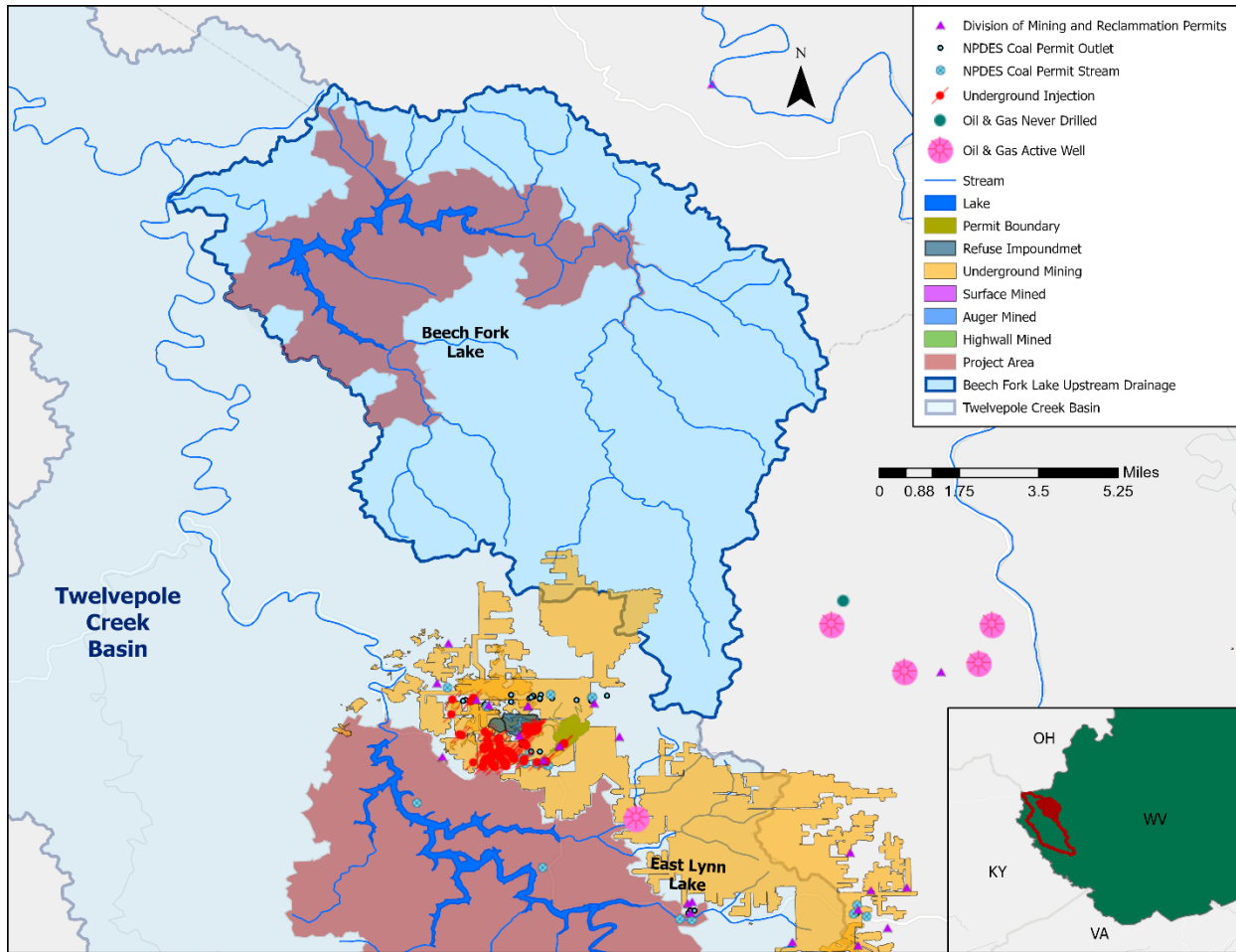


Figure 3-13. Oil and gas mining operations in the vicinity of Beech Fork Lake

Timber Resources: The Beech Fork Lake Project is in the Low Hills Belt of the Cumberland and Allegheny Plateau region. Prior to the acquisition of lands for the project, most of the area's native Mixed Mesophytic Forest had been replaced by second growth forest due to timber harvesting, fires, and the loss of topsoil from erosion, or converted to other land uses. By the time the USACE obtained control of the lands in the project area, the succeeding forest communities were predominately oak-hickory and scrub pine, being generally of poor quality and reflecting a history of land abuse.

During the intervening 70 years since the USACE purchased the project lands, the condition of the forest communities has experienced a steady improvement in overall quality. This is a direct result of the USACE's environmentally oriented stewardship policies that require timber management to place an emphasis on ecosystem improvements and aesthetics.

As the entity responsible for managing the Beech Fork Lake WMA under a lease arrangement with the USACE, WVDNR-Wildlife is responsible for timber management activities on that area. According to the most recent 5-year management plan, WVDNR-Wildlife harvests timber from a different 100-acre tract every other year, with the primary purpose being to improve habitat conditions for wildlife (Glotfelty, 2019a). **Table 3-11** identifies the acreages, volumes, dates, and locations of the three most recent selective timber harvests conducted by the WVDNR on the Beech Fork Lake WMA.

Table 3-11. Historic timber sales for the Beech Fork Lake WMA

Timber Sale Name	Date Sold	Acres	Volume (BDFT)
Ruben's Branch	April 17, 2016	75	444,694
Jim's Branch	October 11, 2018	111	408,241
Booton Branch	November 26, 2020	74.5	344,050

3.2.10 Aesthetics

Visual quality describes the aesthetic traits of an area based on the natural and artificial features of its environment. The compatibility of a project with existing structures and the natural environment is known as "landscape characteristics". Landscape characteristics define whether the project blends with the existing features of the area, or contrasts with the setting and appears out of place. Visual sensitivity includes public values, goals, awareness, and concerns regarding visual quality.

Beech Fork Lake sits in the floor of a valley flanked by steep slopes of the surrounding hills that crest upwards to 500 feet above the lake. The numerous incised small tributary drainage areas that drain into the lake form an abundance of coves along its entire length. The surrounding extensive acreages of forested project lands are essentially managed and maintained in a natural condition. Visitors to the project are generally concentrated at designated recreation areas.

Beech Fork Lake adds visual diversity to Beech Fork Creek and the larger Twelvepole Creek Sub-basin. Although the dam, lake, and associated features are manmade, they do not detract from the aesthetic qualities of the larger natural area of the Project. The dam site area highlights the surrounding landscape and scenery which includes the lake, and forest covered mountainous background. The lake is enhanced by the rugged scenic shoreline that is backed by steep slopes which make the lake an attractive recreation resource in the region. Surrounding the lake and the immediate shoreline, land use in the project area includes operational, recreational, and wildlife management.

3.2.11 Noise

Beech Fork Lake is located within a rural setting characteristic of much of the Twelvepole Creek Sub-basin. The project is dominated by a rugged terrain of numerous hills and valleys with steep slopes that are covered by expansive tracts of forested woodlands. The lake and its associated project lands are essentially operated and managed with limited access provided for recreational pursuits. With the exception of the recreation and project operational areas, the overall soundscape for most of the Beech Fork Lake Project is natural and largely peaceful (Buxton et al., 2019; LSA Associates, 2003; Soft dB, 2019; USNPS, 2020; Schmidt, nd;).

The primary sources of unnatural noise at the lake are generated by recreational activities associated with boating, swimming, picnicking, camping, hiking activities, the shooting range on the WMA and the occasional shot fired by hunters. Much of the recreation generated noise is limited to relatively small fractions of the total project area.

Recreational use at Beech Fork Lake experiences both seasonal (i.e., summer) and weekly peaks (i.e., Saturdays and Sundays). The highest public use typically occurs on the major recognized holidays, especially if the holidays coincide with a weekend. Consequently, the greatest noise levels are produced on those days having the highest visitations.

Although no noise studies have been conducted at Beech Fork Lake, it is possible to make some generalizations about the scope of noise levels generated by the recreational activities that occur at the project. Recreational noise is generally a combined product of human voices, radios, vehicular traffic, and power boat usage. However, it is likely that even on the highest visitor use days, overall noise levels occurring within the project's recreation areas having campgrounds, picnic areas, swimming areas, recreation fields, and boat launches probably rarely exceed 50 to 60 dBA (LSA Associates, 2003; USNPS, 2020; Schmidt, nd) (**Table 2-4**).

It should be noted that noise levels are attenuated with increasing distance from the source. Thus, the proximity of a receptor to a sound source contributes to determining the severity of an individual's reaction to the source. The abundance of trees and other vegetation is helpful in diminishing the intensity of noise levels that reach the receptor.

Of the various recreational noise sources at Beech Fork Lake, outboard motors produce the highest levels. Studies show the noise produced by outboard motors is attenuated by only 25% over 1,600 feet (Lanpheer, 2000). Further, the higher the HP rating of an outboard motor, the higher the noise levels produced. The restriction at Beech Fork Lake limiting outboard motors to 9.9 HP serves to reduce the magnitude and intensity of that noise source.

Another important, but more passive recreational use of project lands, involves hunting and wildlife observation on the State Park and WMA operated by WVDNR-Parks at Beech Fork Lake. A considerable acreage of the project lands is included in these two

areas: 3,144 acres in the Beech Fork Lake State Park and 7,531 acres in the Beech Fork Lake WMA. Hunting and wildlife observation require considerable stealth and the avoidance of artificial noise to prevent detection by and disturbance of the wildlife resource being pursued/observed. Although extremely loud when it occurs, the extreme noise associated with the occasional firing of a hunting shot is fleeting and quickly dissipates into the background soundscape of the natural environment (EAR, 2021).

Although quiet in comparison to the background noise created by the “hustle and bustle” of cities, the natural wooded environment is not absent of sounds. Much of what is attractive about a forested environment is the sound generated by natural events, such as birds singing, wind rustling tree leaves, animals moving across the ground, gurgling of a stream, etc. Even the most undeveloped project lands at Beech Fork Lake should be expected to routinely experience low noise levels from natural sources on any given day and higher during rainfall (**Table 2-4**).

3.2.12 Transportation and Traffic

Beech Fork Lake is south of I-64 and between two north/south WV highways: Route 152 (5th Street Road) to the west of the lake and Route 10 (Hal Greer Blvd.) to the east. The Visitor Center, Dam Site, and Stowers Branch Beach are accessed from Route 152 via Route 52/4 (Falls Branch Road) or Route 13 (Beech Fork Road). Traffic is light on these access roads. In 2010, the average daily traffic count in the vicinity of the project was 213 and 1,027 on Routes 13 and 52, respectively (WVDOT, 2020).

The shooting range, located in the Beech Fork Lake WMA, is accessible from Route 152, but can also be accessed from Route 10 via Route 17 (Left Fork Wilson Creek Road). The 2010 average daily traffic count on Route 17 in the vicinity of the shooting range was 498 (WVDOT, 2020).

The Beech Fork Lake State Park facilities are also accessible via Route 17 from either Routes 152 or 10, but the park is closer to Route 10. There is a little more traffic near the State Park although, it is still light. Average daily traffic counts on Route 17 between the Beech Fork Lake State Park and Route 10 in 2010 ranged from 638 near the park to 1,345 near Route 10 (WVDOT, 2020).

3.2.13 Utilities

Utility providers for Beech Fork Lake are described in **Table 3-12**.

Table 3-12. Beech Fork Lake utility providers

Utility	Provider
Solid Waste	Trash is placed in trash receptacles and then deposited in dumpsters where it is picked up by a contractor and transported to landfills in Cabell and Wayne Counties.
Electricity	The Appalachian Power Company is the only power company serving the project and adjacent area. A high-tension power transmission line crosses the upper end of Millers Fork and crosses the upper end of Beech Fork in the Beech Fork State Park campground area. Solar panels supplement electric power at the dam site.
Gas	Easements for gas pipelines through Project lands are held by Cranberry Power Corp., Gas Supply Corp., Tennessee Gas Pipeline, and Stoney Brunty. H. H. Lusher holds a lease agreement for oil and gas.
Telephone	Frontier West Virginia, Inc. furnishes telephone service to the project area and has a lease for telephone line on Project lands.
Water	Water for the dam area and Stowers Branch is provided by water distribution lines from the Lavalette Public Service District, based in Lavalette, WV. The State Park is served by the Salt Rock Public Service District.
Wastewater	There are two sewage treatment plants located in the project area. The dam area and Stowers Branch are serviced by a plant located below the dam. The Beech Fork State Park has a plant located in the campground.

3.2.14 Real Estate Acquisition Policies

Acquisition policies during land purchase for the Beech Fork Lake Project were based upon the fee acquisition of a 300-foot minimum horizontal guideline¹¹. Minimum requirements usually included all valuable bottomland and the lower hill slopes, including all improvements. Residual portions of these properties were hill lands of relatively low value. All roads occurring within the minimum acquisition area were also purchased. In many cases, acquisition of the land within the 300-foot minimum horizontal guideline did not include an entire parcel. Good real estate practices dictated entire properties be acquired to preclude demands for access or the payment of severance that would closely equal the land values.

Access evaluation studies determined which lands would be left without adequate access due to flooding by Beech Fork Lake and where provision of such access would cost more than acquisition. In those cases, the remaining land was purchased. It was determined that providing access for about 800 acres originally slated for acquisition was more cost-effective than buying the lands, thus, those lands were not purchased for the project, with alternative access roads being constructed instead. The total

¹¹ The 300-foot minimum horizontal guideline is the intersection of the natural ground with a line that is a 300-foot horizontal distance from the water's edge when the lake is at the maximum pool.

acquisition of 12,609 acres in fee and 144 acres in easement included all lands required for construction, sites designated for public use, rights-of-way for relocated highways, and the areas severed by the lake.

Except for oil and gas, all other mineral rights were purchased on the entire 12,609 acres of fee-owned surface lands. Oil and gas interests were acquired on 9,000 acres of fee lands. On the remaining 4,000 acres of fee lands, operation of a developed oil and gas field was allowed to continue with subordination of mineral rights to other project purposes (i.e., subject to certain restrictions for pollution and debris control and to avoid interference with the authorized project purposes). All other existing oil and gas leases on undeveloped project lands were extinguished. When flowage easements were acquired for the project, they did not include mineral rights. **Appendix A** includes a comprehensive description of laws, regulations, and EOs that apply to real estate acquisition and real property management.

3.2.14.1 Outgrant Lands

Outgrant lands are federal lands on which a right for use of the property has been granted through a lease, easement, license, or permit. Beech Fork Lake Project lands include outgrants to a concessionaire for operation of the marina and to WVDNR-Wildlife for fish and wildlife and forestry management and WVDNR-Parks for parks and recreation purposes. **Table 3-13** and **Figure 3-14** depict the federal lands required for operations and recreation, outgrant lands, and flowage easements at Beech Fork Lake.

Table 3-13. Beech Fork Lake USACE managed and outgrant lands

Land Management	Acres
USACE operations and recreation	1,929
State Park outgrant	3,144
State WMA outgrant	7,531
Marina concession outgrant	5
Total fee	12,609
Total flowage easement	144

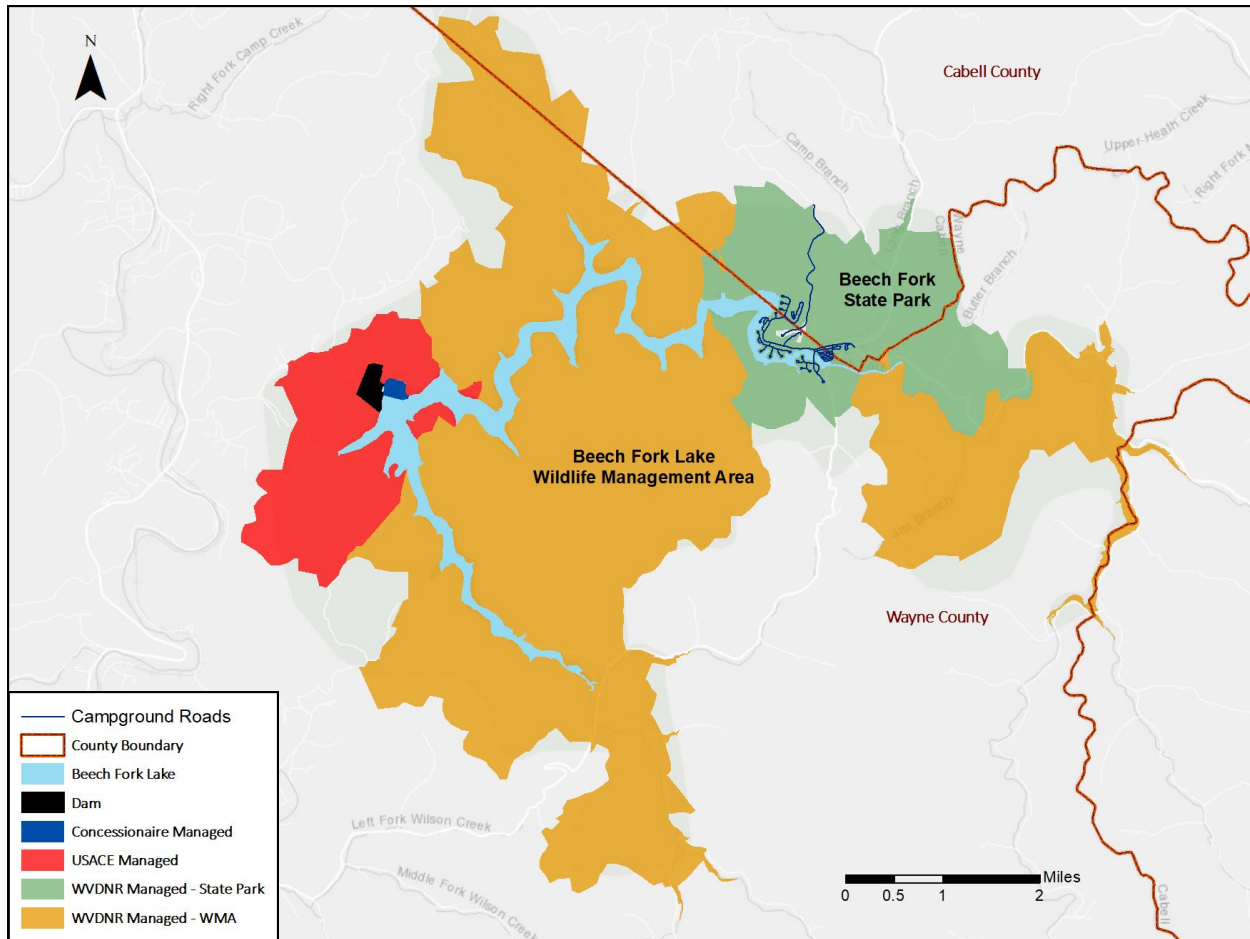


Figure 3-14. Outgrant and USACE managed lands at Beech Fork Lake

3.3 Beech Fork Lake Recreation Analysis

Beech Fork Lake offers a variety of recreation opportunities, including boating, fishing, camping, hiking, and picnicking. The lake's relatively small size (720-acres at the seasonal pool), shallow depths, and the potential for bank erosion require that boats be limited to motors with no more than 9.9 HP. This helps insure a safe, quiet, and enjoyable boating experience for all users, while protecting the shoreline from erosion. Camping at Beech Fork Lake is restricted to developed camping areas at the Beech Fork State Park. No backcountry camping is allowed.

There are hiking trails located in the USACE recreation sites and the State Park. Bicycling is allowed on the main roads only; there are no bike trails on USACE managed lands but there is a bike trail at the State Park. There are no horseback riding trails.

Shelters are provided at several recreation sites at Beech Fork Lake as described below. The shelters vary in their amenities, with some providing electricity, a grill, and

tables. They are available on a first come-first-serve basis if not already reserved. All Beech Fork Lake shelters can be reserved for a fee on www.recreation.gov.

3.3.1 Overview of Recreation Areas

The Beech Fork Lake Project includes recreation areas that are managed by USACE, WVDNR, and a private lessee. The primary recreation areas and managing entities are summarized in **Table 3-14**. **Figure 3-15** shows the locations of the Beech Fork Lake recreation areas. More detailed descriptions of the recreation areas and opportunities they provide are provided in the following sections.

Table 3-14. Primary recreation areas and managing entities at Beech Fork Lake

Primary Area	Managing Entity
Upstream Recreation Area	USACE
Downstream Recreation Area	USACE
Stowers Branch Beach and Picnic Area	USACE
Beech Fork Lake	USACE/WVDNR-Wildlife
Beech Fork State Park	WVDNR-Parks
Beech Fork Lake WMA	WVDNR-Wildlife
Beech Fork Lake Marina	Concessionaire

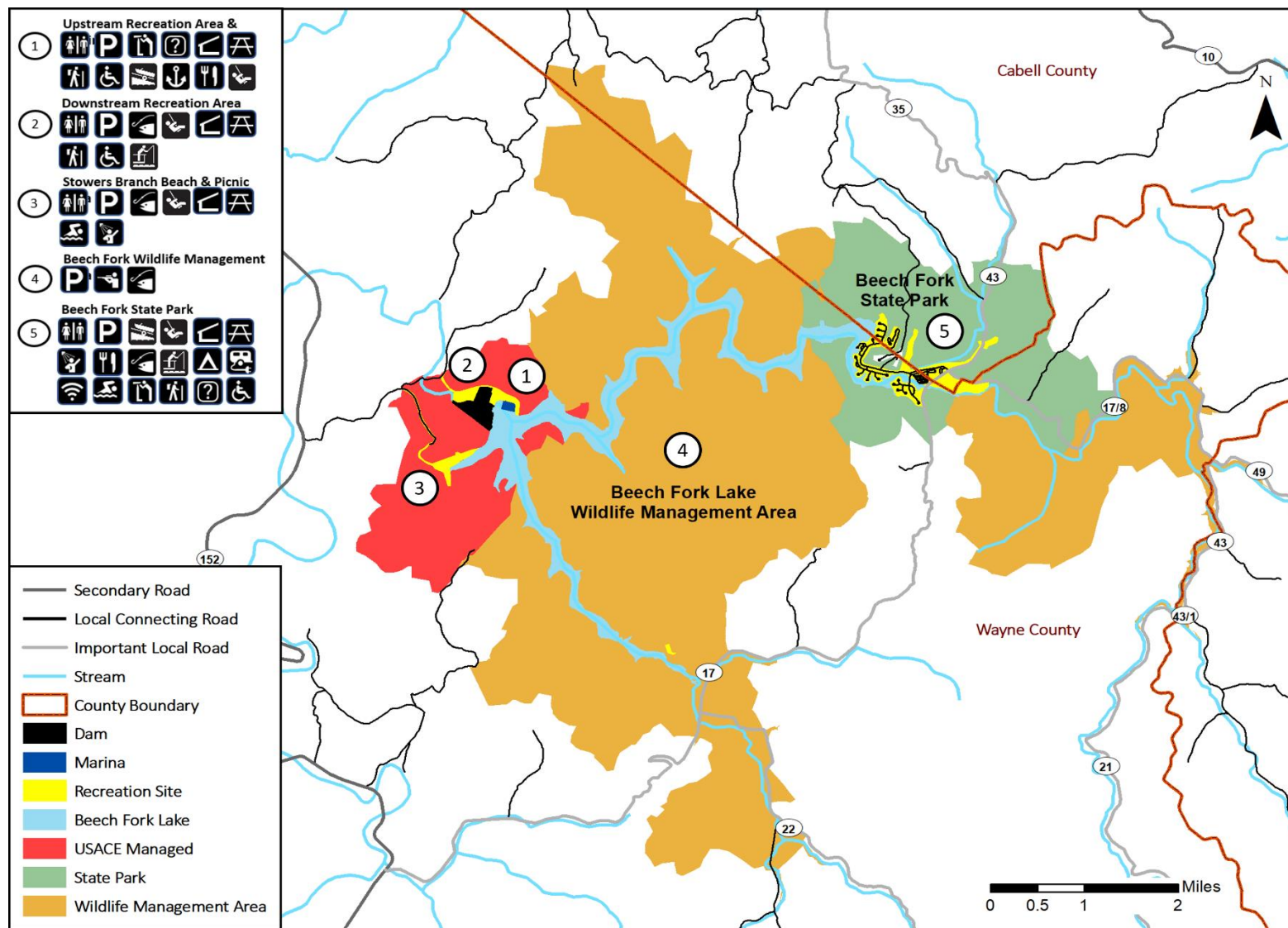


Figure 3-15. Beech Fork Lake recreation areas

3.3.1.1 Upstream Recreation Area

The 27-acre Upstream Recreation Area is located above the dam. It is managed by the USACE and includes a combined Visitor Center and overlook, two shelters and picnic sites, a four-lane boat launch, hiking trail heads, restrooms, and fishing pier. All facilities are wheelchair accessible. A daily fee is charged for use of the boat launch. The Visitor Center provides information, interpretive displays, Wi-Fi, theater, and restrooms.



Upstream recreation area – fishing pier

There is also a stand-alone restroom that serves the boat launch, marina, and shelters. The eight-lane paved boat launch is adjacent to the Beech Fork Lake Marina. Three parking areas are provided: (1) spaces for 130 cars and 11 car-trailer combinations at the Marina, (2) spaces for 60 car-trailer combinations adjacent to the boat launch, and (3) spaces for 36 cars at the Visitor Center. A playground and basketball court are also located near shelter and picnic areas located west of the boat launch. Another shelter is located in the eastern portion of the recreation area where there is another playground, a volleyball court, and more picnic tables.

3.3.1.2 Downstream Recreation Area

This area, located below the dam, is seven acres in size and consists of a fishing platform, two shelters (each with a playground), picnic tables, restroom, and a 40-space paved parking area. The section of Twelvepole Creek below the dam is stocked with trout each year from February through April by WVDNR-Wildlife and offers excellent spring trout fishing. Four benches are placed along the tailwater near Shelter 3. There is also a fishing pier



Aerial view of Downstream recreation area

near Shelter 3. A footbridge over a drainage channel and a trail to the bank of the discharge channel provide another fishing location.

3.3.1.3 Stowers Branch Beach and Picnic Area

This eight- acre area provides 204 car-parking spaces in three parking areas, 800 feet of shoreline beach area with a designated swimming area, a playground, a picnic deck that can accommodate up to 50 people, picnic tables on decks along the beach, restrooms, and eight outdoor shower stalls. A trailhead for the Beaver Pond Trail (1.3-miles long) and the Twin Coves Trail (1.7-miles long) is located adjacent to the overflow parking area.



Stowers Branch Beach- picnic deck and beach

These trails are interconnected and when combined these trails total a 3-mile loop. Pathways provide access to bank fishing areas.

3.3.1.4 Beech Fork Lake

Recreationists use Beech Fork Lake for boating, fishing, and swimming. There is a 9.9 HP limit that maintains a quiet and peaceful atmosphere that is family friendly. Non-motorized watercraft have been gaining in popularity the last few years which could be related to the HP limit.

The lake provides a warmwater fishery for largemouth and spotted bass, hybrid striped bass, crappie, saugeye, tiger muskellunge, channel catfish, and bluegill. Fishing is the most popular activity on the lake and fishing tournaments occur most weekends, in the summer. Night fishing is allowed and often leads to some of the best catfish action on the lake and evening fishing tournaments are also held on the lake. Bass fishing peaks in late spring and early summer. The USACE and WVDNR-Wildlife manage the fishery program through habitat improvements and an aquatic vegetation program which benefits all fish species. WVDNR-Wildlife stocks the lake with saugeye fry, channel catfish, largemouth bass, black crappie, and hybrid bass.

3.3.1.5 Beech Fork Lake State Park

Beech Fork Lake State Park is managed by the WVDNR-Parks. It provides opportunities for camping, hiking, swimming, fishing, and biking. The park office includes a conference area with a large, covered meeting area that can accommodate up to 120 people and is often used for special events. There are seven hiking trails and one physical fitness trail at the park. There is a total of 275 campsites in four campgrounds. This includes 99 campsites located on the lake's



Universally accessible fishing pier – Old Orchard Campground

shoreline. All campsites have a paved parking pad, grill, and picnic table. There are fully equipped bathhouses and restroom facilities at each campground. An Olympic-sized swimming pool with bathhouse and snack bar is located near the park office. Wi-Fi is available at the park headquarters and the Old Orchard Campground. Campsites can be reserved on-line. A parking area is provided near trail heads that offer access to six of the park's trails. Descriptions of the park's amenities are provided below.

Old Orchard Campground: Old Orchard Campground is open year-round and is located near the park office. It includes the Camper's Corner Store, game room, and swimming pool complex. The Camper's Corner Store offers basic groceries, gift shop items, ice cream, camping supplies, fishing supplies, bait, ice, and firewood. Of the 49 total campsites, two have enlarged paved surfaces that are equipped with wheelchair accessible picnic tables. Ten campsites are located on the shoreline. The campground also has a wheelchair accessible full-service bathhouse complete with a coin-operated laundry. The campground provides access to the fitness trail. Full hook-ups (electric, water, and sewer) are provided at all campsites.

Four Coves Campground: Four Coves Campground, located along the lakeshore, is open seasonally. A playground is centrally located within the campground. There are 88 campsites; all are equipped with electric service only. Of the total, 55 campsites are on the shoreline. Amenities include a full-service bathhouse with restroom facilities and a coin-operated laundry.

Moxley Branch Campground: Moxley Branch Campground is open seasonally. It is located upstream of the other campgrounds and is on the other side of the lake which is

relatively narrow at this location. A bridge over the lake provides access. A playground is located next to the restroom facility. All 59 campsites have electric service, with 26 campsites situated on the shoreline. Amenities include a full-service bathhouse with restroom facilities and a coin-operated laundry. The Overlook and Long Branch Trails are accessible from the campground.

Lakeview Campground: Lakeview Campground is open seasonally and is located along the lake's shoreline furthest from the park office. A playground is centrally located in the campground. The campground's 51 sites are equipped with electric service only. Two campsites have enlarged paved surfaces and are equipped with wheelchair accessible picnic tables. Twelve campsites are on the shoreline. Amenities include a wheelchair accessible full-service bathhouse with restroom facilities and a coin-operated laundry.

The campground includes a two-lane boat launch with parking spaces. Canoes, kayaks, Jon boats, paddle boats, and stand-up paddle boards can be rented at the boat dock adjacent to the boat launch. The boat dock and launch are open from mid-April to mid-October. There is no launching fee. A wheelchair accessible fishing pier is also provided.

Group Camping: Group Camping is available at an area that is well-suited for large groups to enjoy tent camping in a streamside setting. The site is close to the swimming pool complex, the paved fitness trail, and day-use restroom facilities. A covered shelter is included, complete with tables, a water spigot, and a grill/fire pit. Campers may use the Old Orchard bathhouse. Electricity is not available at this site.

Cabins: There are six fully equipped vacation cabins that sit on a ridgeline above Beech Fork Lake that are available year-round. Two cabins are pet friendly. The cabins have heat and air conditioning and contain a big screen TV, gas fireplace, microwave, wireless internet, and outdoor grills. Cookware and linens are provided. Cabins range in size from 2 bedrooms and one bath to four bedrooms and two baths.

3.3.1.6 Beech Fork Lake Wildlife Management Area

This area is comprised of 7,531 acres of project lands managed by WVDNR-Wildlife. The management area provides for fishing and hunting. Game includes white tailed deer, fox, grouse, mourning dove, rabbit, raccoon, squirrel, turkey, waterfowl, coyote, and woodcock. White-tailed deer and turkey are the most popular game species for hunters. About 20 acres of food plots are managed in the WMA to attract deer. Hunting access is provided via WV Routes 17 and 13.

Beech Fork Lake WMA is one of seven WV WMAs and State Forests that are designated Older-aged Deer Management Areas where it is illegal to take deer with

antler spreads of less than 14 inches. The annual antlered deer bag limit at Beech Fork WMA is one deer for all archery, crossbow, and firearms seasons combined.

The Wildlife Manager's Office is located off WV Route 19 near Millers Fork in the WMA. This office services both Beech Fork and East Lynn WMAs. There is a 100-yard shooting range about 0.4 miles from the office with eight covered shooting benches. There is no fee for its use. It is open during daylight hours and is very popular on weekends especially before hunting season.

WVDNR-Wildlife funded construction of the five-acre Millers Fork Pond. A gravel surfaced parking area is located adjacent to the pond. The pond is stocked with trout and is intended for use by children under the age of 14 and Class Q¹² permit holders. WVDNR-Wildlife has a year-round catch and release policy for all bass caught in the pond.



3.3.1.7 Beech Fork Lake Marina

Beech Fork Lake Marina has 225 slips for docking, either for the season or year-round. It is managed through a lease agreement with a concessionaire. It is located adjacent to the Upstream Recreation Area, between the boat launch to the west and Shelter 1 and playground to the east. The Marina maintains a rental fleet that includes pontoon boats, fishing boats, canoes, and kayaks. Boating accessories, fishing tackle, live bait, gasoline, snacks, soft drinks, ice, and fishing and hunting licenses are available for purchase at the marina store.



Beech Fork Lake Marina

¹² A Class Q license is a special permit for disabled individuals. It entitles the holder to fish or hunt for legal species. A Class Q permit holder may hunt game from a motor vehicle.

3.3.2 Beech Fork Lake Recreation Activities and Visitation

3.3.2.1 Outdoor Recreation Activities

The Project provides opportunities to enjoy a wide range of recreational activities.

Table 3-15 lists the major activities that are available, their locations, and the associated facilities.

Table 3-15. Beech Fork Lake recreation activities and facilities

Activity	Location	Facilities
Boating	Dam Site & Visitor Center	<ul style="list-style-type: none"> • Four-lane paved boat launch • Courtesy loading dock • Parking for cars and trailers • Restrooms
	Beech Fork Lake State Park	<ul style="list-style-type: none"> • Two-lane paved boat launch • Parking • Restrooms • Boat dock • Boat rental • Gas
	Beech Fork Lake Marina	<ul style="list-style-type: none"> • Boat rental • Marina store
Camping	Beech Fork Lake State Park	<ul style="list-style-type: none"> • Group campsite • Six fully equipped cabins
	Old Orchard Campground (in State Park)	<ul style="list-style-type: none"> • Open year-round • 49 campsites • Electric, water, sewer hookups • Paved pads with grills and tables • Bathhouse with laundry • Wheelchair accessible campsites
	Four Coves Campground (in State Park)	<ul style="list-style-type: none"> • 88 campsites • Electric and water hookups • Paved pads with grills and tables • Bathhouse with laundry • Playground
	Moxley Branch Campground (in State Park)	<ul style="list-style-type: none"> • 86 campsites • Electric and water hookups • Paved pads with grills and tables • Bathhouse with laundry • Playground

Activity	Location	Facilities
	Lakeview Campground (in State Park)	<ul style="list-style-type: none"> • 51 campsites • Electric and water hookups • Wheelchair accessible campsites • Bathhouse and laundry
Fishing	Upstream Recreation Area	<ul style="list-style-type: none"> • Bank Fishing • American with Disabilities Act (ADA) fishing pier
	Downstream Recreation Area	<ul style="list-style-type: none"> • Fishing platform • Stocked with trout Feb - April
	Beech Fork Lake State Park	<ul style="list-style-type: none"> • Fishing pier • Bank fishing
	Beech Fork Lake WMA	<ul style="list-style-type: none"> • Bank fishing
Other Activities	Upstream Recreation Area	<ul style="list-style-type: none"> • Overlook • Information and interpretive displays • Picnic tables and two shelters • Two Playgrounds • Hiking trailhead
	Tailwater Fishing Area	<ul style="list-style-type: none"> • Picnic tables and shelter • Hiking trailhead
	Stowers Branch Beach	<ul style="list-style-type: none"> • Designated swimming area • 800 feet of shoreline beach • Picnic tables • 50-person capacity picnic deck
	Beech Fork State Park	<ul style="list-style-type: none"> • Swimming pool complex • Camper's Corner Store • Game room • Wi-Fi • Hiking trails
	Beech Fork Lake WMA	<ul style="list-style-type: none"> • Hunting • 100-yard shooting range

* Old Orchard, Moxley Branch, Lakeview, and Four Corners Camping Areas are components of Beech Fork Lake State Park.

3.3.2.2 Visitation by Recreation Area

The USACE Visitation Estimation and Reporting System (VERS) utilizes strategically placed traffic counters at project sites to estimate visitation. The 2020 annual visitation (the most recent year with VERS data available) and the annual average for the 2014-2020 period shown by site in **Table 3-16** is based on VERS data. The methodologies for estimating visitation at USACE recreation areas changed in 2014 and as a result,

earlier visitation estimates are not comparable with the recent estimates (i.e., after 2014). Note that the VERS visitation is estimated separately for the Visitor Center and the Upstream Recreation Area.

The Beech Fork Lake State Park accounts for about half the total visitation at the lake. Compared to other recreation areas at Beech Fork Lake, the Park provides the largest variety and most extensive recreation facilities. Visitation to the Upstream Recreation Area is the second highest. This is because the area includes the Visitor Center, marina, and a variety of additional activities.

Table 3-16. Beech Fork Lake average annual visitation by recreation site

Site	2020		2014-2020 Average	
	Visitation	% of Total	Visitation	% of Total
Marina	20,673	5%	20,179	6%
Visitor Center	22,528	6%	10,507	3%
State Park	184,620	48%	179,009	51%
Tailwater	21,498	6%	35,475	10%
Stowers Beach	48,171	13%	34,693	10%
Upstream Rec Area	84,593	22%	72,374	21%
Total	382,083	100%	352,237	100%

VERS visitation data was also evaluated by recreation area and yearly totals for the entire project for the period 2014 through 2020. A linear trend line fitted to the visitation estimates for individual recreation areas and for the total project visitation shows a generally increasing trend (**Figure 3-16**).

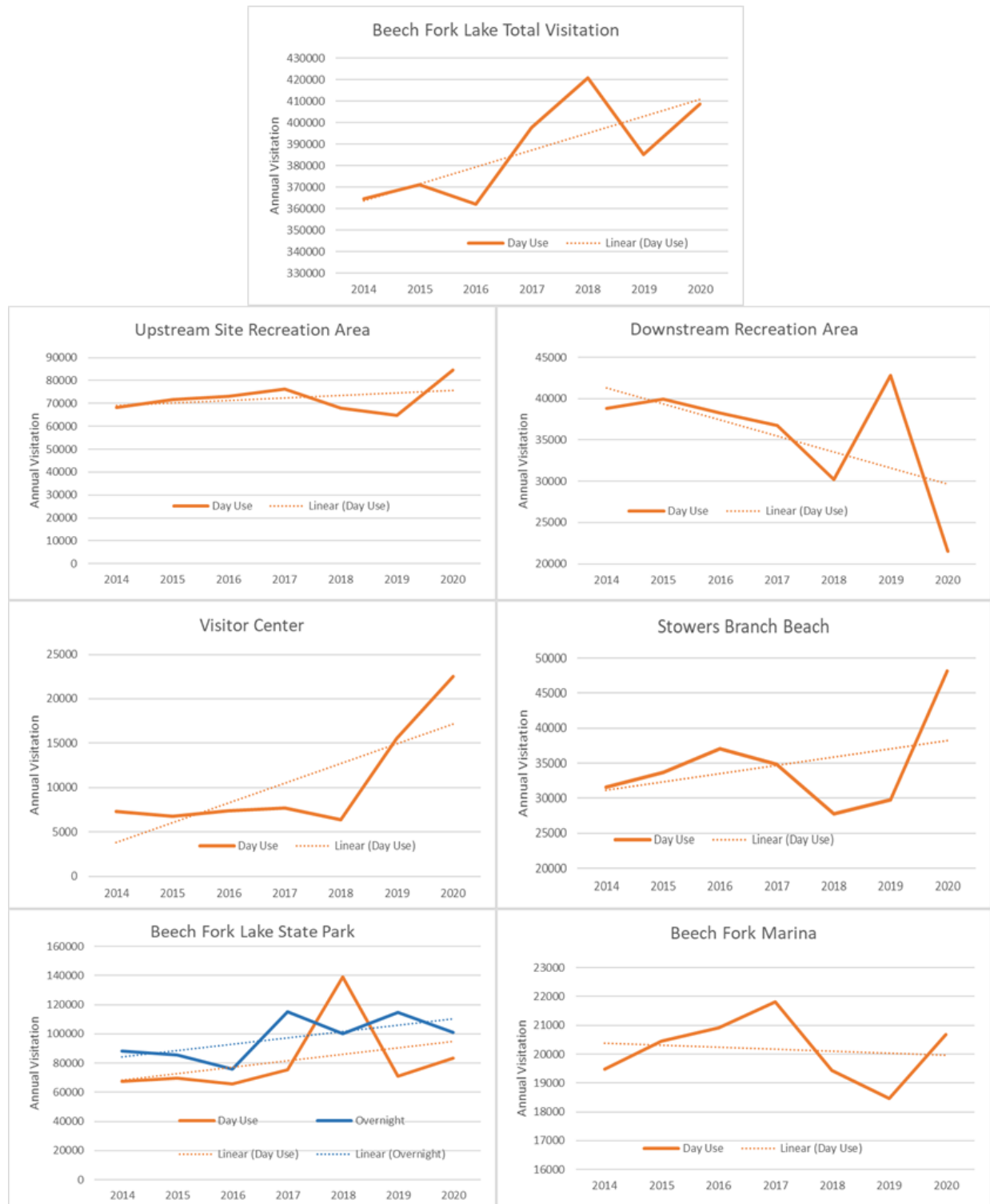


Figure 3-16. Visitation at Beech Fork Lake recreation sites (2014 – 2020)

3.3.2.3 Beech Fork Lake State Park Occupancy

Occupancy data was obtained from WVDNR-Parks for Beech Fork Lake State Park cabins and campsites. Available campsite-nights are calculated by summing the number of campsites that are available each day during the year. Availability varies each year due to flooding of campsites by high lake stages or maintenance issues that require temporary closure. Occupied campsite-nights are calculated by summing the number of campsites occupied each day in the year. The annual occupancy rates for campsites are calculated as the number of occupied campsite-nights divided by the number of available campsite-nights.

Since 2011, the occupancy rate for campsites at Beech Fork Lake State Park has remained around 35% (**Figure 3-17**). It should be noted that the 35% occupancy rate is for Beech Fork State Park for the entire period when campsites are available. During the peak season, the occupancy rate will be significantly higher. Moreover, since the primary demand for camping is focused on the weekends, available campsites are often limited on weekends. The State Park has the largest number of campsites in the WV state park system and the park's Old Orchard Camping Area is one of only five state campgrounds that are open year-round. The large number of campsites combined with the year-round availability of Old Orchard Campground results in the State Park having the largest number of available campsite-nights of any of the 18 WV state park campgrounds. For example, in June 2019, the Park had 8,130 available campsite-nights – exceeding the second highest number of available campsite-nights (2,640) at Watoga State Park. The Beech Fork Lake State Park campground occupancy rate in 2019 was the fourth highest of all state park campgrounds. Occupancy rates in 2020 were higher than normal at most USACE campgrounds because of the restrictions on other activities required during the COVID-19 pandemic. The 2020 occupancy was 42% which produced a slight upward slope on the linear trend line in **Figure 3-17**. Without the 2020 occupancy, the linear trend is relatively flat.

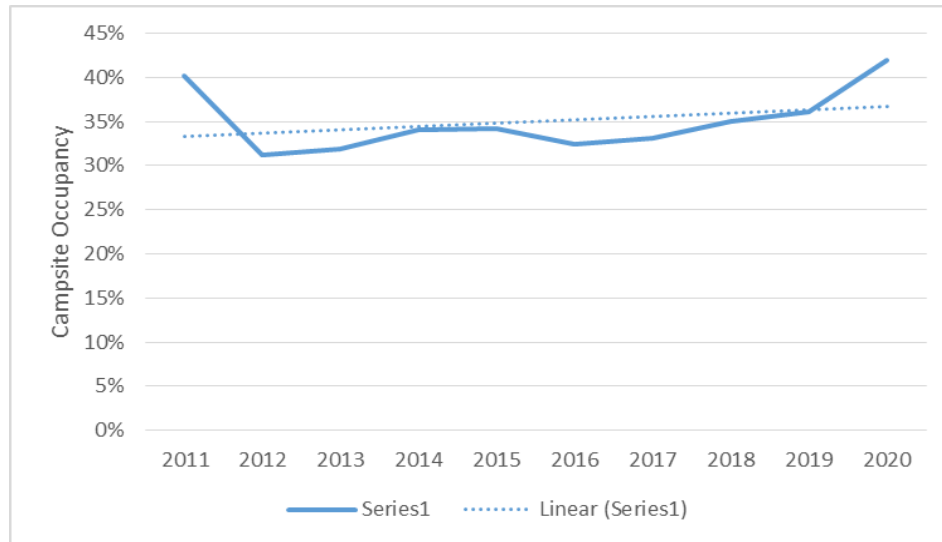


Figure 3-17. Beech Fork Lake State Park annual campsite occupancy

During the typical camping season (April – October), campsite occupancy rates have remained around 40% (**Figure 3-18**) and appear to be on a slightly declining trend. Data on seasonal campsite occupancy is not available after 2018 so it is not clear that the declining trend has continued.

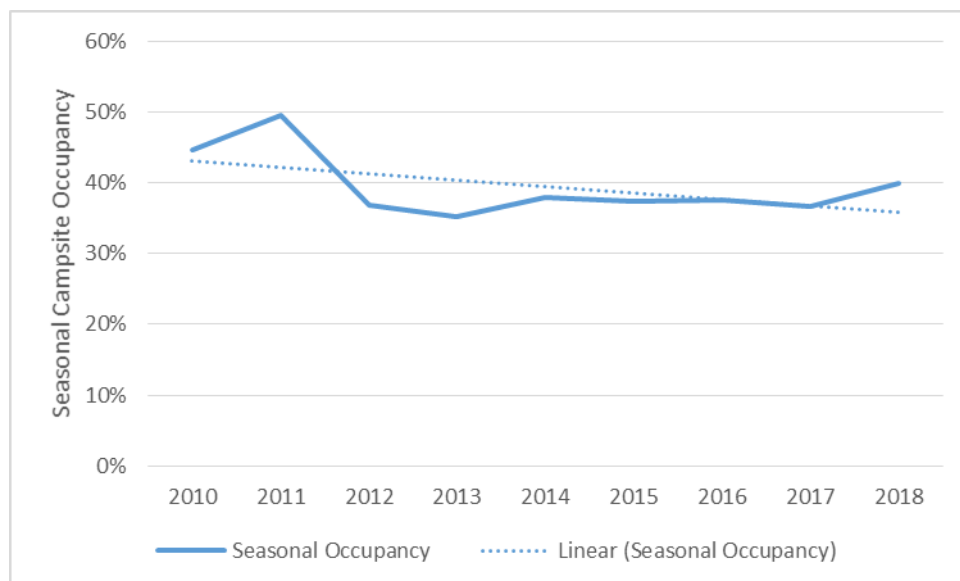


Figure 3-18. Beech Fork Lake State Park seasonal campsite occupancy

Beech Fork Lake State Park has six cabins. Available bedroom-nights are calculated by summing the number of bedrooms in each available cabin each day of the year.

Occupied bedroom-nights are calculated by summing the number of bedrooms in occupied cabins each day of the year. For example, if a four-bedroom cabin is rented for one night, it is counted as four occupied bedroom nights. The cabin occupancy rate is calculated by dividing the occupied bedroom nights by the available bedroom nights. The occupancy rate of the Beech Fork Lake State Park cabins has remained around 50% or higher and appears to be on a steady trend (**Figure 3-19**). However, unlike campsite occupancy rates, the effect of the pandemic seems to have caused a decrease in cabin occupancy rates in 2020. Most WV parks with cabins experienced lower occupancy rates in 2020 as did Beech Fork Lake State Park. As of 2022, it is assumed that cabin occupancy rates have returned to pre-pandemic numbers.

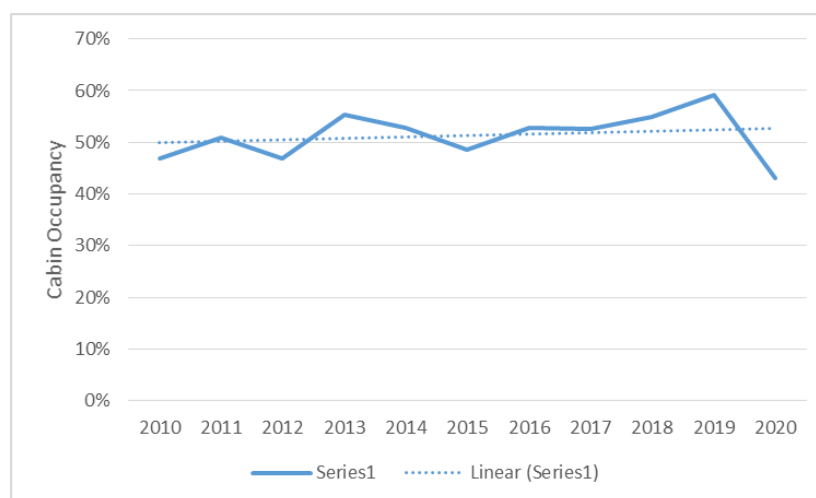


Figure 3-19. Beech Fork Lake State Park cabin occupancy

3.3.3 Beech Fork Lake Zones of Influence

The zone of influence (or market area) is the area within which the majority of visitors to a recreation site live. Identifying the zone of influence and evaluating the demographic characteristics of the area are important for assessing future recreational demands for the site.

Most visitors to a recreation area will usually reside within a two-hour driving distance. For planning purposes, the area of influence was divided into three sub-areas: the primary zone is the area within a 30-minute drive from the project, the secondary zone is the area within a one-hour drive from the project, and the tertiary zone includes the entire area within a two-hour driving distance.

Residents in the **primary zone of influence** are expected to make Beech Fork Lake the principal destination for all the available recreational opportunities. Residents in the **secondary zone of influence** are not expected to make the lake their sole destination for general day-use activities (i.e., picnicking) that are also available in their local area.

Residents in the **tertiary zone of influence** are expected to make Beech Fork Lake a destination for activities that are unique, provide a high-quality recreational experience, or are significantly different from what is available in their local area (i.e., boating, fishing, camping, etc.).

To assess population and demographics of the populations within the zones of influence, county data was obtained. The counties within each zone of influence were identified. Counties that did not fall entirely within a zone of influence were evaluated based on the locations of population centers. If the primary population centers were inside the zone of influence, the county was included. But if the primary population centers were outside the zone of influence, the counties were not included in the zone of influence.

Beech Fork Lake's primary zone of influence is entirely in WV and includes parts of Wayne and Cabell Counties. The secondary zone of influence includes portions of WV (four counties), OH (one county), and KY (four counties). The tertiary zone of influence consists of all, or parts of 12 WV counties, 10 OH counties, and 14 KY counties (**Figure 3-20**).

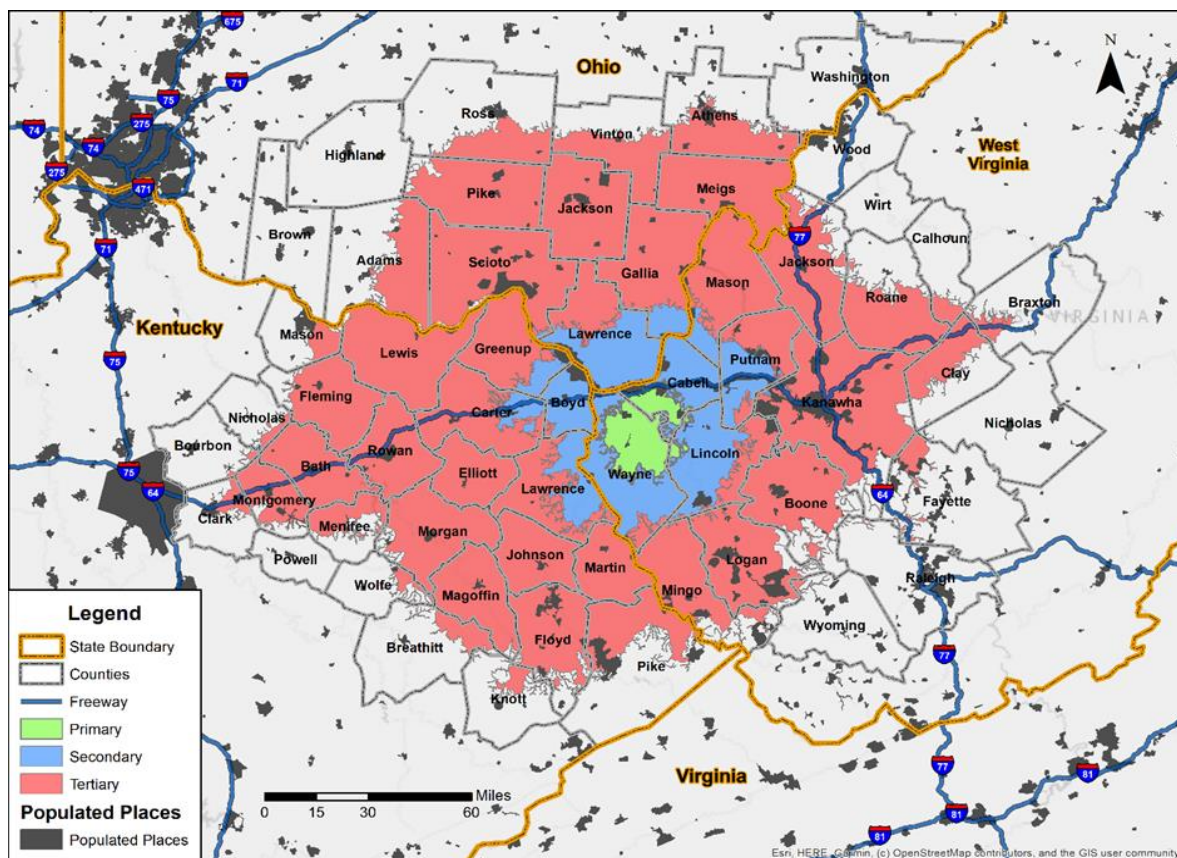


Figure 3-20. Beech Fork Lake zones of influence and county population centers

3.3.4 Population

Population data was obtained by county for each zone of influence. Historical population data was obtained from the USCB (2020). Projected populations for each county were obtained for WV from West Virginia University (Christiadi et al., 2014); for OH from the Ohio Development Services Agency (ODSA, 2018); and from the University of Louisville (KY State Data Center [KSDC], 2020) for KY.

The demand for recreation opportunities is a function of the population size of the zones of influence. When the population in the zone of influence is large, a large demand can be expected and vice versa. The 2019 population of Beech Fork Lake's three zones of influence are:

- Primary zone of influence = 138,811
- Secondary zone of influence = 408,603
- Tertiary zone of influence = 1,489,749

Figures 3-21 through 3-23 show the historical (2010 – 2019) and projected (2020 – 2040) populations of the three zones of influence. In all cases, population is projected to gradually decline between 2020 and 2040.

The tertiary zone of influence includes one of top five fastest growing WV counties (Putnam County) and two of the five counties that have experienced the greatest population declines (Boone and Mingo Counties) since 2010 (O'Leary, 2018). West Virginia's rural population is declining at a greater rate than the urban population. Between 2010 and 2018, the urban population declined 1.7% compared to a 4.6% rural population decline.

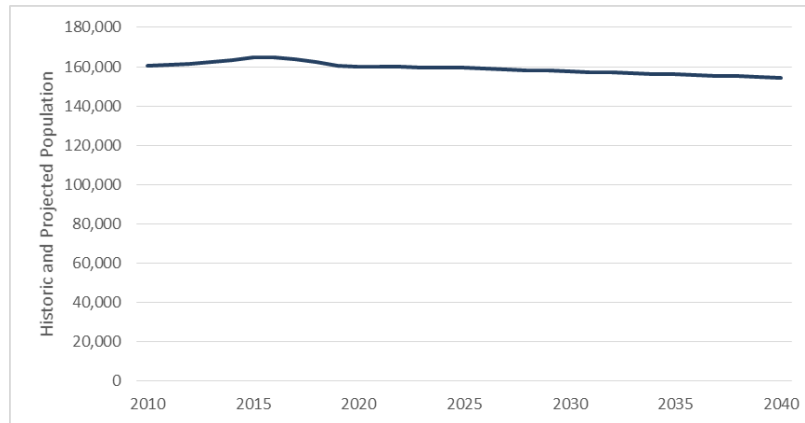


Figure 3-21. Beech Fork Lake primary zone of influence historical and projected population (2010 – 2040)

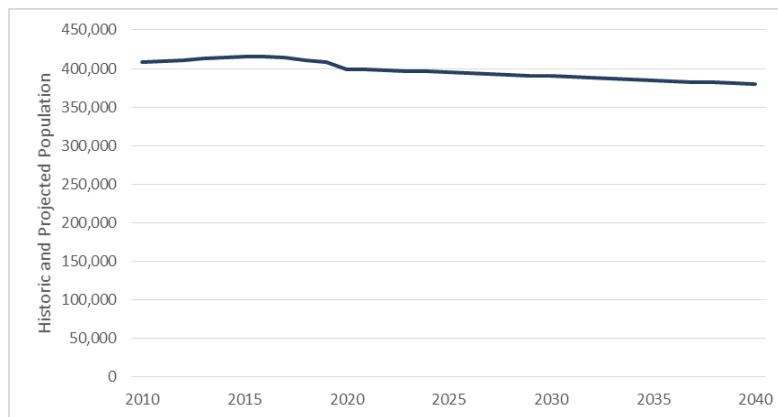


Figure 3-22. Beech Fork Lake secondary zone of influence historical and projected population (2010 – 2040)

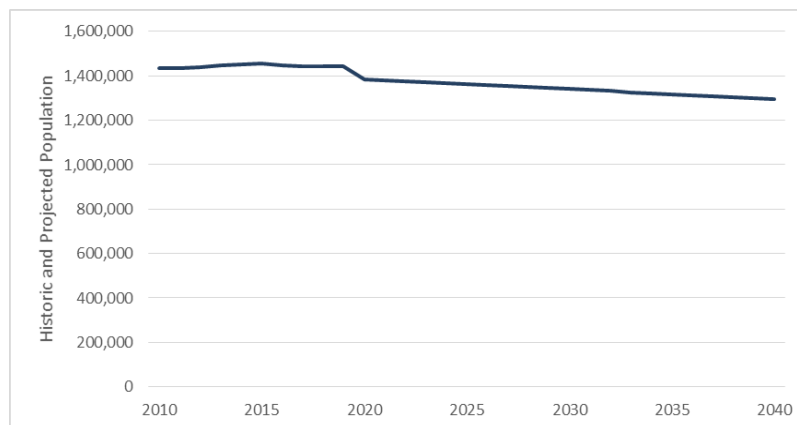


Figure 3-23. Beech Fork Lake tertiary zone of influence historical and projected population (2010 – 2040)

3.3.5 Demographics

Demographic data was obtained from the USCB (2020) for the counties in the Beech Fork Lake zones of influence. For a regional and national comparison, demographic data was also obtained for each of the three states in the tertiary and secondary zones of influence and the national averages (see **Tables 3-17 and 3-18**).

Table 3-17. Beech Fork Lake zones of influence, state, and national; age, housing, and income

Area	Ages				% Owner-Occupied Housing	Persons per Household	Median Household Income	% Population in Poverty
	< 5 yrs	5 yr - 17 yrs	18 yrs - 65 yrs	> 65 yrs				
Primary	5.3%	14.9%	59.7%	20.1%	67.1%	2.41	\$ 37,880	20.3%
Secondary	5.4%	15.7%	59.1%	19.8%	72.0%	2.50	\$ 43,327	19.0%
Tertiary	5.5%	15.5%	59.5%	19.1%	70.6%	2.45	\$ 41,364	21.1%
West Virginia	5.2%	20.1%	59.4%	20.5%	72.9%	2.42	\$ 44,921	17.2%
Ohio	5.9%	22.1%	60.4%	17.5%	66.0%	2.43	\$ 54,533	13.9%
Kentucky	6.1%	22.4%	60.8%	16.8%	67.0%	2.49	\$ 48,392	16.9%
US	6.0%	22.3%	61.2%	16.5%	63.8%	2.63	\$ 60,293	11.8%

Source: USCB, 2020

Table 3-18. Beech Fork Lake zones of influence, state, and national; ethnicity, education, and disabilities

Area	% White	% Black	% Asian	% Mixed Race	% Hispanic	% High School	% Bachelor or Higher	Disability under 65
Primary	93.3%	3.5%	1.0%	2.0%	1.2%	82.6%	20.3%	15.3%
Secondary	95.3%	2.2%	0.7%	1.6%	1.2%	85.1%	15.6%	15.3%
Tertiary	94.6%	2.8%	0.7%	1.6%	1.3%	83.2%	16.3%	16.8%
West Virginia	93.5%	3.6%	0.8%	1.8%	1.7%	86.5%	20.3%	14.1%
Ohio	81.7%	13.1%	2.5%	2.4%	4.0%	90.1%	22.8%	10.1%
Kentucky	87.5%	8.5%	1.6%	2.0%	3.9%	85.7%	23.6%	13.1%
US	76.3%	13.4%	5.9%	2.8%	18.5%	87.7%	31.5%	8.6%

Source: USCB, 2020

A review of the demographic data in **Tables 3-17 and 3-18** leads to the following observations:

- People in WV and OH living in the lake's zones of influence are generally older than the national average. This is consistent with the WV SCORP finding that WV has the third oldest population in the US (WVDO, 2015). However, the ages of residents of KY are similar to the national average.
- The percentage of homes that are occupied by the owners is significantly higher in the zones of influence than the national average. All but two of the 41 counties in the tertiary zone of influence were greater than the national average for owner-

occupied housing. Notably, three WV counties had more than 80% owner-occupied housing. The WV statewide average was also significantly higher than the national average.

- Incomes are lower and poverty rates are higher in the zones of influence than the national averages. The same is true for the WV, OH, and KY statewide averages.
- The percentage of white people in the zones of influence is significantly higher than the national average. Similarly, the percentages of white people in WV and KY are higher than the national level. Racial diversity in OH is closer to the national average.
- There is a smaller percentage of the population within the zones of influence that graduate high school compared to the national average. State average High school graduation rates in WV and KY are close to the national average, but OH graduation rates are above the national average.
- A significantly smaller percentage of residents in all three zones of influence have bachelor's degrees than the national average. The same is true of the WV, OH, and KY state average percentages.
- The percentage of people under 65 years of age with disabilities in the zones of influence is almost double the national average. While the state average percentages of people with disabilities in WV, OH, and KY are lower than the zones of influence, they are still greater than the national average.

3.4 Recreation Carrying Capacity – Beech Fork Lake

A preliminary analysis of carrying capacity was conducted for boating, camping, picnicking, and swimming at Beech Fork Lake.

3.4.1 Boating Carrying Capacity – Beech Fork Lake

Boating density is evaluated in terms of lake surface area (acres) available for each boat on the lake or acres per boat. A high boating density would provide fewer acres per boat while a low boating density would provide more acres per boat. An acceptable boating density would provide enough acres per boat to allow safe and enjoyable boating for the types of activities underway (i.e., fishing, skiing, cruising, paddling, etc.),

A literature review identified acceptable boat density ranges utilized by others for similar analyses. **Table 3-17** lists acceptable boating densities found in the literature for a variety of boating activities. Most of the published spatial boating requirements were determined based on user satisfaction levels under varying conditions. How safe a boating experience feels to a boater is an important component of user satisfaction. The most common boating activities on Beech Fork Lake are fishing, kayaking, and pontoon boat cruising. The density guidelines most applicable to Beech Fork Lake are highlighted in green in **Table 3-19**. For the common types of boating activities found at

Beech Fork Lake, the appropriate range of boating densities appears to be between 4 and 25 acres per boat.

Table 3-19. Appropriate boating density guidelines

Source	Boating Activities	Suggested Density (acres/boat)
Ashton, 1971	All uses combined	4 to 11
Kusler, 1972	Waterskiing with other uses	40
	Waterskiing only	20
	Coordinated waterskiing	15
Jaakson et al., 1989	Waterskiing & motorboat cruising	20
	Fishing	10
	Canoeing, kayaking, sailing	8
	All uses combined	10
Wagner, 1991	All boating activities	25
Warbach et al., 1994	All motorboats (> 5 HP)	30
FL Dept of Environ. Protection (FDEP, nd)	Limited power (< 10 HP)	5 to 10
	Unlimited power	10 to 20
	Water skiing	20 to 50
	No power, still water	5 to 10

An evaluation was performed using criteria developed by the US Bureau of Reclamation (USBOR, 2011) to narrow the range of acceptable boating densities for conditions specific to Beech Fork Lake (**Table 3-20**). The boating and lake characteristics related to Beech Fork Lake are shown in red in the table.

Table 3-20. Boating capacity range evaluation

Factor	Recommended Boat Density		
	Higher Boat Density	Medium Boat Density	Lower Boat Density
Typical size of boats	<15 feet	16 to 25 feet	>25 feet
Typical speed of boats	<10 mph	10 to 25 mph	>25 mph
Diversity of boating <ul style="list-style-type: none"> Different types of boats Different sizes of boats Different speed of boats 	Little variation Little variation Little variation	Moderate Moderate Moderate	Highly variable Highly variable Highly variable
Level of boater stewardship/civility/ Respect for resource and other visitors	High	Moderate	Low
Shoreline configuration	Simple/ circular	Moderate	Complex/ meandering

Factor	Recommended Boat Density		
	Higher Boat Density	Medium Boat Density	Lower Boat Density
Boater destination or pass-through area	Pass-through corridor/in-transit	Mixed	Destination area/overnight area
Extent of sensitive resources/potential impact	Low	Medium	High
Compatibility with adjacent recreation/non-recreation land uses	High	Moderate	Low
Islands/shallows/hazards	Infrequent	Occasional	Frequent
Historical public safety record/accidents	Infrequent	Moderate	Frequent
Level of boater management/rules/information/education/compliance	High	Moderate	Low

Boating density is estimated based on the number of recreational “boats at one time” (BAOT) on the lake. BAOT refers to the number of boats that are untethered from the shoreline or any docking apparatus and whose occupants are pursuing recreational opportunities. Inactive recreational boats moored at a dock, marina, or along the shoreline, or non-recreational boats (i.e., law enforcement, operations, etc.) are not included in the BAOTs.

Fishing tournaments at Beech Fork Lake typically occur on weekend mornings, while some are held during the evenings or at night. Each tournament will usually draw 20 to 30 boats. Fishing tournaments were not considered in the carrying capacity analysis because they tend to occur during non-peak hours and do not significantly add to normal BAOTs.

To obtain relevant information for estimating BAOTs for a typical summer weekend, individuals with extensive knowledge of boating on Beech Fork Lake were interviewed. The following estimates were made, as applicable for typical summer weekend days:

- Percentage of car/trailer combination parking places occupied at each boat launch parking area,
- Percentage of rented marina slips that are empty with boats on the lake, and
- Percentage of occupied campsites that have boats, and the percentage of those boats that would be on the water at any given time.

Based on these estimates and using the total parking capacities and number of marina boat slips, the BAOTs are estimated for each potential entry point and then summed for the lake. The total BAOTs for Beech Fork Lake on a typical summer weekend is estimated to be between 178 and 215 (**Table 3-21**).

Table 3-21. Estimated BAOTs on Beech Fork Lake

Source of BAOTs	Number of BAOTs	
	Lower Range	Upper Range
State Park boat launch	38	40
State Park campsites	29	37
Marina	61	81
Upstream Boat Launch	50	57
Total BAOT	178	215

Based on this desk-top analysis, the estimated BAOTs utilizing Beech Fork Lake on a typical summer weekend may be approaching the guidelines for desirable boat density. The boat density on Beech Fork Lake on a typical summer weekend could be between three and four acres per boat. Therefore, it is recommended that a more thorough carrying capacity analysis be performed for boating on Beech Fork Lake.

3.4.2 Camping Carrying Capacity – Beech Fork Lake State Park

As a first step in evaluating carrying capacity, historical campsite occupancy levels were examined to assess current conditions and to identify trends. Interviews with individuals knowledgeable of conditions at the campgrounds were conducted to assess camper satisfaction, frequency of conflicts or complaints, and adequacy of parking areas, restrooms, bathhouses, dump stations, etc. Based on the campground's occupancy rates and in consideration of campers' satisfaction and the adequacy of facilities, a qualitative assessment was made regarding carrying capacity.

Beech Fork Lake State Park includes the only campgrounds at Beech Fork Lake. The Park is easily accessible from Huntington and Charleston, WV and enjoys very high visitation. The campgrounds have more campsites than any other WV state park and the occupancy rates are relatively high, around 35% on an annual basis and around 40% during the warm weather season (**Section 3.3.2.3**). A 40% occupancy rate is equivalent to having all campsites at all four campgrounds occupied by campers every Friday, Saturday, and Sunday night throughout the season. There are no obvious trends of increasing or decreasing occupancy rates over the last ten years.

It is reported that parking lots fill every weekend during the season. On holidays and weekends when special events occur, overflow parking occurs in areas that are not designated for parking. Park managers enforce a two-car per campsite limit and traffic into and out of the campgrounds is limited after 10:00 PM. It is also reported that lines form at the dump station each Sunday morning as campers leave.

The USBOR guidelines (2011), specify that an acceptable standard for percent of campers that feel crowding is extremely high or very high is between 5% and 10% for a

rural, natural, or primitive setting¹³. If the percentage is higher, steps should be considered to address the perceived overcrowding problem. No formal surveys have been performed to determine the percentage of campers that feel overcrowded. However, Park staff do receive feedback from campers indicating they feel the campground is overcrowded.

Campground occupancy rates, the full utilization of parking areas on weekends, and anecdotal reports of complaints of overcrowding suggests that the demand for camping opportunities at Beech Fork State Park may exceed the availability of the campsites and cabins during peak recreation season.

3.4.3 Picnicking Carrying Capacity – Beech Fork Lake

There are four shelters and four picnic decks at Beech Fork Lake – all can be reserved for the day on www.recreation.gov and each shelter has a nearby playground. There are also restrooms near the shelters. If shelters have not been reserved, they are available on a first come-first-serve basis. Shelters 1 and 2 are east and west of the marina, respectively. Shelters 3 and 4 are at the Downstream Recreation Area.

Shelter 1 is very popular. It has adequate parking nearby and, along with Shelter 3, gets the greatest utilization.

Shelter 2 is west of the marina, adjacent to the boat launch. Conflicts between boaters and picnickers related to parking sometimes occur, but they are rare. There is typically enough parking to accommodate both uses.

Shelter 3, below the dam, is very well utilized. It has ample nearby parking.

Shelter 4 is the least utilized. It is the only ADA compliant shelter, but it has very limited parking nearby and the restroom is an uphill walk from the shelter.

The picnic decks are located at Stowers Branch Beach. The largest deck is reservable and is used almost every summer day. There are also smaller decks available on a first come-first-serve basis at Stowers Branch Beach and are also used almost every day during the summer.

All shelters are reserved almost every weekend in the summer and on many weekdays. Picnic tables are also well utilized and are frequently full. Based on reservations for the deck, a preliminary need for additional picnic tables at Stowers Branch Beech has been identified

¹³ The USBOR's guidelines (2011) provide recommendations specific to various types of parks from urban to primitive. Although a formal analysis has not been performed, Beech Fork Lake's characteristics would meet the guidelines for a rural, natural or a primitive park setting.

3.4.4 Swimming Beach Carrying Capacity

Stowers Branch Beach is the only swimming beach at Beech Fork Lake. It is a popular destination, with 13% of the total Beech Fork Lake visitation in 2020. There appears to be an upward trend in total annual visitation at Stowers Branch Beach. **Figure 3-24** shows average monthly visitation based on VERS data. June has the highest visitation with 28% of the total annual visitation.

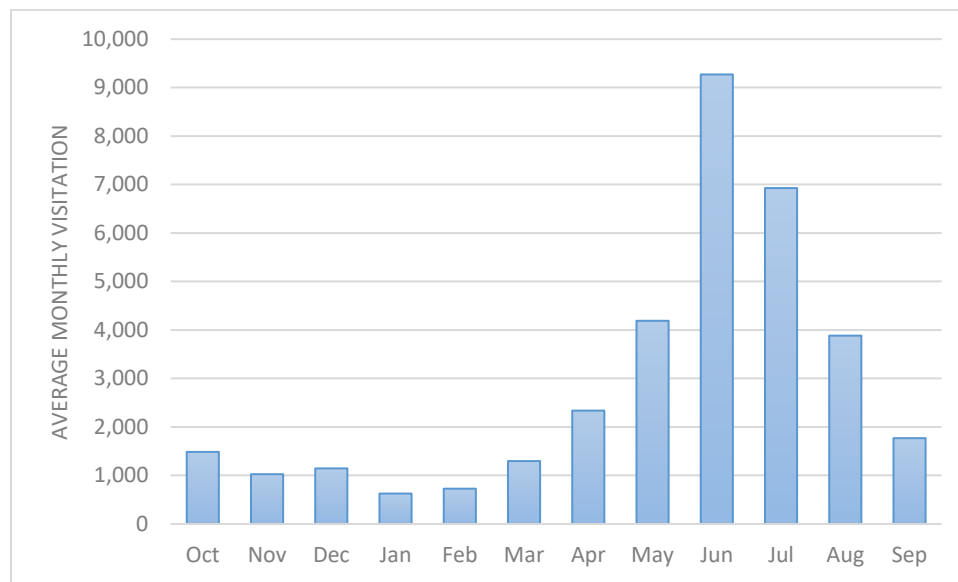


Figure 3-24. Stowers Branch Beach average monthly visitation (2014-2020)

A desk-top estimate of the number of people that might be at Stowers Branch Beach on a weekend in June was based on the following:

- VERS data show that from 2014 to 2020, an average of 9,272 vehicles visited Stowers Branch Beach in June, the month with the highest visitation.
- An average of three people arrived in each vehicle, which indicates that an average of about 27,800 people visited the beach in June.
- The four weekends in June receive about 50% of the total June visitation – about 3,400 people per weekend or about 1,700 people per weekend day.
- If the turn-over rate is 3 (i.e., equivalent to each visitor spending one third of the day at the beach), there could be 290 people visiting the beach at the same time.

It should be noted that this analysis does not account for bad weather that may reduce the number of weekend days that are suitable for swimming/picnicking. A rainy weekend day would concentrate more of the average visitation on weekend days with good weather.

The Florida Department of Environmental Protection (FDEP) Recreational Carrying Capacity Guidelines (FDEP, nd) recommend between 200 and 500 square feet of dry beach area per person and between 50 and 200 square feet of water surface per swimmer. The FDEP guidelines are intended for both coastal and inland beaches. It is reasonable to assume that for a swimming beach on an inland lake where space is limited, the lower range of the guidelines would be more appropriate. For this analysis, an acceptable dry beach area of 200 square feet per visitor was used.

The beach is about 800 feet long and 60 feet wide, resulting in a total of 48,000 square feet of dry beach. The designated swimming area is about 800 feet long and 100 feet wide, producing a total water surface area of 80,000 square feet.

Using the lower range of the FDEP guidelines for dry beach area per visitor (200 square feet), Stowers Branch Beach has space for about 240 visitors at one time. Using the FDEP guidelines, the water surface area of the designated swimming area has the capacity to accommodate between 400 and 1,600 swimmers at one time. Therefore, the dry beach area is the limiting factor for the swimming carrying capacity at Stowers Branch Beach.

With 290 visitors to Stowers Branch Beach, the minimum recommended dry beach space would not be available. However, all visitors to the beach may not be swimming at the same time. Some visitors may choose to picnic, play volleyball, visit the playground, etc. The results of this desk-top analysis suggest that a more in-depth carrying capacity analysis is warranted.

3.5 Enhancing Recreation Opportunities

Comprehensive descriptions of recreation activities, recreation facilities, visitation, and campground occupancy were described in the preceding sections, as well as related factors that affect recreation at Beech Fork Lake such as the zones of influence, demographics, carrying capacity, and the regional recreation setting. This section describes that information in a format that can be used to support development of resource objectives and the resource plan.

Factors that should be considered in the development of resource objectives include trends in population and demographics of the residents in the zones of influence, the regional recreation setting, trends in visitation and occupancy, trends in demands by recreationists, and the functionality of the various recreation facilities available at the lake.

Accessibility

Beech Fork Lake is only a short drive from the state's second largest population center, Huntington. It is also closer than East Lynn Lake to major population centers and the Interstate. From Huntington, WV, the Upstream Recreation Area and Marina are about

a 45-minute drive via Routes 13 and 30 and Beech Fork Lake State Park is about a 30-minute drive via Routes 10 and 43. Past and projected population declines and depressed economic conditions in the zones of influence suggest that the demand for recreation opportunities is likely to remain flat or even decline or change in facility preferences in the future. However, examination of historical visitation data does not show any obvious signs of declining visitation although gaps in the data do exist. Recent visitation/use changes resulting from the COVID-19 pandemic also present forecasting challenges, as it is unclear whether these trends may endure.

Nearby Competing Recreation Areas

There are nine recreation areas that offer similar recreation opportunities in KY and OH within a two-hour driving distance of Beech Fork Lake, including four USACE lakes. All these areas have similar recreation opportunities to Beech Fork Lake and offer direct competition for visitation.

Demographics

WV has the third oldest population in the US, it has almost double the percentage of individuals with disabilities compared to the US average; only two other states have a higher percentage of physically inactive individuals. As a result, passive recreation opportunities that do not require strenuous activity would remain popular. The WV SCORP survey found that walking and enjoying good views were the most popular recreation facility preferences among all groups surveyed.

Recreation Trends

There is an increasing trend in campers bringing larger recreation vehicles with greater electrical requirements, more ancillary recreation equipment, and more vehicles. Campers prefer campsites with full hookups including electric, water, and sewer. Additionally, 50-amp electric hookups are currently the preferred standard and there is evidence that 70-amp hookups, or higher, may be desired in the future. There is also an increasing desire for Wi-Fi facilities to be available.

Site Functionality

The benefits provided by a recreation area are a function of the number of recreationists participating in an activity and the quality of their experience. For activities that have not reached their carrying capacity, benefits may be increased by increasing the number of participants, improving the quality of their recreation experience, or both. For activities that are enjoyed by many visitors, it may not be possible to allow for increased participation due to space limitations. As a result, increasing benefits may only be possible by improving the quality of the recreation experience for these activities or encouraging utilization of nearby recreation areas such as East Lynn Lake.

3.6 Beech Fork Lake Resource Objectives

The resource objectives described below were developed for Beech Fork Lake based on detailed evaluations of existing conditions and the issues and needs identified through agency, stakeholder, and public coordination. Resource objectives were developed for three categories: recreation, natural resources, and cultural resources.

3.6.1 Recreation Resource Objectives – Beech Fork Lake

Recreation Resource Objective 1 (R1)

Issue/Need: The Beech Fork Lake State Park campground and cabins are usually at capacity during recreation season. Additional lodging may be needed to meet demand.

Objective Statement: Continue coordination with WVDNR-Parks and other interested parties to meet lodging facility demand through the Report of Availability Real Estate request process.

Recreation Resource Objective 2 (R2)

Issue/Need: Vandalism is a problem at Stowers Branch Beach. Damages can render the facilities unusable, and repairs are often costly.

Objective Statement: Identify and implement proper measures to reduce or eliminate vandalism using established programs such as Crime Prevention Through Environmental Design, Corps Watch Property Protection Program or similar.

Recreation Resource Objective 3 (R3)

Issue/Need: Recreation day-use areas such as Stowers Branch Beach experience high demand during the recreation season. Site degradation, overcrowding, and public perception (i.e., user enjoyment) have created a need for evaluation of mitigation measures at day use areas such as Stowers Branch Beach.

Objective Statement: Seek opportunities to increase public enjoyment, optimize efficiencies, and reduce congestion in public day use areas.

Recreation Resource Objective 4 (R4)

Issue/Need: The Upstream Recreation Area is heavily populated during peak season by multiple user groups resulting in user conflict and delays such as vehicular circulation vs pedestrian circulation patterns, motorized vs non-motorized watercraft access and frequent site user vs nonfrequent site user orientation are amongst the more obvious issues. There are indications of various site modifications that may have occurred since the implementation of the 1978 master plan. These modifications combined with the

topographic constraints of the site has resulted in a disjointed spatial program and problematic circulation patterns.

Resource Objective Statement: Analyze the site's opportunities and constraints for the development of feasible conceptual alternatives to resolve site circulation issues, avoid user groups conflicts, and improve the overall recreational experience. The analysis should include consideration of adding a non-motorized watercraft launching area.

Recreation Resource Objective 5 (R5)

Issue/Need: USACE trail improvements such as more convenient trail heads, mapping/signage, and enhanced accessibility are needed.

Objective Statement: Enhance trail accessibility, improve the existing trail system, and increase connectivity.

Recreation Resource Objective 6 (R6)

Issue/Need: Recreation facilities at Beech Fork Lake need maintenance, repair, rehabilitation, upgrade, and replacement. Funding requests for maintenance, repair, and replacement of aging facilities must compete with the needs of other projects on a nationwide basis.

Objective Statement: Assess the need for rehabilitation or replacement of existing recreation facilities and prioritize needed improvements using performance-based criteria such as costs per visit, utilization, facility condition, public use patterns, etc.

Recreation Resource Objective 7 (R7)

Issue/Need: There are areas at the mouths of tributaries and in the upper reaches of the lake where sedimentation has accumulated which makes boat launching and navigation difficult.

Objective Statement: Maximize boat launching opportunities and safe navigation in the upper reaches of the lake. Work with partners to evaluate broad alternatives to address larger scale sedimentation problem areas, such as comprehensive sediment removal or boat launch relocation.

Recreation Resource Objective 8 (R8)

Issue/Need: Providing broader Wi-Fi at recreation facilities and cell phone coverage throughout project areas would improve the recreation experience and provide a means of increasing public safety.

Resource Objective Statement: Pursue opportunities to expand Wi-Fi and cell phone coverage at Beech Fork Lake.

3.6.2 Natural Resource Objectives – Beech Fork Lake

Natural Resource Objective 1 (N1)

Issue/Need: USACE Environmental Stewardship Operations and Maintenance Guidance and Procedures as outlined in ER 1130-2-540 requires the USACE to manage natural resources on USACE administered land and water in accordance with ecosystem management principles to insure their continued availability. The need for specific resource management evaluations (i.e., special status species changes) should be identified when Master Plan updates are undertaken.

Resource Objective Statement: Prepare Level 2 Natural Resource Inventory for Beech Fork Lake as necessary.

Natural Resource Objectives 2 and 3

Issue/Need: Invasive species affect a significant percentage of project lands.

Objective Statement: Develop and implement a regular monitoring program and control measures to manage the spread of invasive species (plants, animal, insects, and fish) on USACE managed lands. **(N2)**

Objective Statement: Optimize partnerships for the prevention and control of exotic and invasive species to help prevent or reduce damages to the water resource project. **(N3)**

Natural Resource Objective 4 (N4)

Issue/Need: Conflicts between routine maintenance and stewardship of existing natural resources have been identified.

Objective Statement: Identify opportunities to minimize natural resource impacts due to routine maintenance.

3.6.3 Cultural Resource Objectives – Beech Fork Lake

Cultural Resource Objective 1 (C1)

Issue/Need: In order to comply with requirements of the NHPA in support of existing and ongoing project activities a comprehensive knowledge base of past and current cultural resources is a prerequisite as well as updated/current CRMP or HPMPs. Systematic surveys of historic and prehistoric cultural resources are either lacking or are outdated. Status of the resources also require monitoring.

Objective Statement: Complete the 2001 draft CRMP for Beech Fork Lake.

Cultural Resource Objectives 2 and 3

Issue/Need: At Beech Fork Lake, one cultural resource has been cited as eligible for the NRHP and another recommended for a determination of eligibility (log cabin relocated to campground). The 2001 CRMP recommended that such determinations be made to chronicle and document the value of these resources.

Objective Statement: Perform a formal evaluation of the eligible resource for NR listing. As of 2001, no such evaluation had been performed. **(C2)**

Objective Statement: Evaluate the log cabin relocated to the State Park campground for NR stature. In addition, a history of the log cabin should be prepared and used in the interpretation of the structure. **(C3)**

3.7 Beech Fork Lake Land Allocation, Classification, and Easements

The land allocation and land classification information presented in this section provides for the orderly development, use, and management of Project lands and waters. Land allocation and classification categories are established for projects and are based on ER 1130-2-550, Recreation Operations and Maintenance Policies.

3.7.1 Beech Fork Lake Land Allocation

Land allocation refers to the congressionally authorized purpose(s) for which the project lands were originally acquired. There are four possible land allocation categories listed below for which USACE project lands were purchased.

- 1) Operations. These are the lands acquired for the congressionally authorized purpose of constructing and operating the project. Most project lands are included in this allocation.
- 2) Recreation. These lands were acquired specifically for the congressionally authorized purpose of recreation. These lands are referred to as separable recreation lands. Lands in this allocation can only be given a land classification of "Recreation".
- 3) Fish and Wildlife. These lands were acquired specifically for the congressionally authorized purpose of fish and wildlife management. These lands are referred to as separable fish and wildlife lands. Lands in this allocation can only be given a land classification of "Wildlife Management".
- 4) Mitigation. These lands were acquired specifically for the congressionally authorized purpose of offsetting losses associated with development of the project. These lands are referred to as separable mitigation lands. Lands in this allocation can only be given a land classification of "Mitigation".

The entire Beech Fork Lake Project has a land allocation of Operations. All project lands were acquired to provide safe, efficient operation of the project for its authorized

purposes. The project purposes are flood control, recreation, fish and wildlife management, and maintaining minimum flows. No separable lands authorized specifically for recreation, fish and wildlife, or mitigation were acquired for the project.

3.7.2 Beech Fork Lake Land Classification

Land classification designates the primary use for which project lands are managed. Land classification categories are prescribed by EP 1130-2-550 as described below.

Table 3-22 summarizes land classifications for the Beech Fork Lake Project area. The acreages shown below for areas and land classifications are based on GIS estimates using West Virginia Coordinate System of 1983 South Zone in compliance with the WV State Code (1931), Chapter 30. Area measurements by Professional Land Surveyors are more accurate and differ slightly (about 1%) from the acreages provided below.

Figure 3-25 shows the areas of the various land classifications at Beech Fork Lake.

Table 3-22. Beech Fork Lake land classifications

Land Classification	Area	Acreage
Project Operations	Dam Site	33
	Volunteer Camping Area	8
	Maintenance Area (below the dam)	6
	Outlet Channel	7
	Radio Tower Area	2
Project Operations Total =>		56
High Density Recreation	Upstream Recreation Boat Launch	4
	Visitors Center	3
	Beech Fork Road (Route 13)	5
	Upstream Day Use Area	8
	Downstream Recreation Area	6
	Stowers Branch Beach & Falls Branch Road	24
	Beech Fork Lake State Park	163
	Beech Fork Lake Marina	5
	Shooting Range	2
	High Density Recreation Total =>	215
Mitigation	No applicable lands	0
Environmentally Sensitive Areas	No applicable lands	*
Multiple Resource Management		
Recreation Low Density	USACE	1,109
	Beech Fork State Park	1,771
Wildlife Management General	Beech Fork Lake Wildlife Management Area	8,881
Vegetative Management	No applicable lands	0
Inactive and/or Future Recreation	No applicable lands	0
Multiple Resource Management Total =>		11,761
Total Fee Lands =>		12,032
Easement Lands		
(a) Operations Easement	No applicable lands	0
(b) Flowage Easement		144
(c) Conservation Easement	No applicable lands	0
Total Flowage Easement Lands =>		144

*Environmentally sensitive lands are currently being mapped.

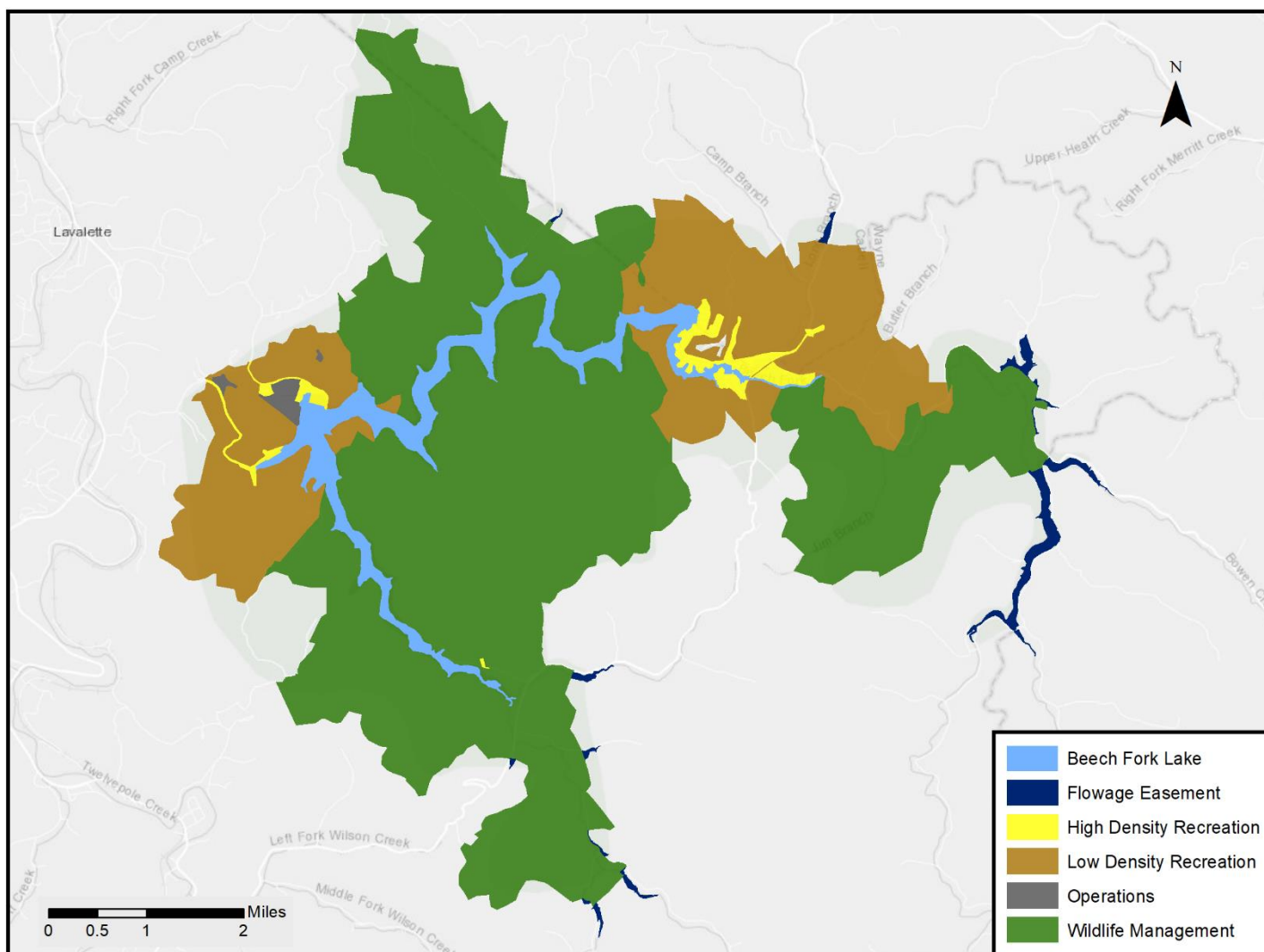


Figure 3-25. Beech Fork Lake land classification map

3.7.2.1 Project Operations

This category includes those lands required solely for the operation of the project and includes the dam, spillway, levees, and discharge channel and maintenance area below the dam. The operations classification also includes the volunteer camping area on Stowers Branch Road (which is not open to the public) and the radio tower area just north of the Upstream Recreation Area.

3.7.2.2 High-Density Recreation

The high-density recreation land classification consists of lands developed for intensive recreational activities for the visiting public. The Upstream Recreation Area, including the visitors center/project office, marina, upstream boat launch and day use area, and the marina, the Downstream Recreation Area, Stowers Branch Beach, the shooting range, and Beech Fork State Park campgrounds (including park maintenance facilities and the superintendent's residence) are classified as high-density recreation.

Additionally, roads that are exclusively used to provide access to a high-density recreation area are also included. This includes Beech Fork Road (Route 30) to the upstream recreation area and Falls Branch Road to Stowers Branch Beach. These access roads are also utilized for project operations.

3.7.2.3 Mitigation

This classification is only used for lands with an allocation of Mitigation and that were acquired specifically for the purposes of offsetting losses associated with development of the project. There are no lands in the Beech Fork Lake Project area that are classified as mitigation lands.

3.7.2.4 Environmentally Sensitive Areas

This land classification consists of areas where scientific, ecological, cultural, or aesthetic features have been identified. Designation of these lands is not limited to only lands that are otherwise protected by laws such as the Endangered Species Act, the National Historic Preservation Act or applicable State statutes. These areas must be considered by management to ensure they are not adversely impacted. Typically, limited or no development of public use is allowed on these lands. No agricultural or grazing uses are permitted on these lands unless necessary for a specific resource management benefit, such as prairie restoration. These areas are typically distinct parcels located within another, and perhaps larger, land classification area.

3.7.2.5 Multiple Resource Management Lands

This classification allows for the designation of a predominate use as described below, with the understanding that other compatible uses may also occur on these lands. For

example, a trail through an area designated as Wildlife Management. Land classification reflects the predominant sub-classification, rather than just Multiple Resource Management.

3.7.2.5.1 *Low Density Recreation*

This classification includes lands with minimal development or infrastructure that support passive public recreational use. At Beech Fork Lake, this classification includes the USACE managed lands surrounding the dam and the areas in Beech Fork Lake State Park surrounding the campgrounds.

3.7.2.5.2 *Wildlife Management*

This classification consists of lands designated for stewardship of fish and wildlife resources. The Beech Fork Lake WMA is generally classified as wildlife management. The water surface area and the shooting range in the WMA are not classified as wildlife management.

3.7.2.5.3 *Vegetative Management*

This classification consists of lands designated for stewardship of forest, prairie, and other native vegetative cover. There are no lands at Beech Fork Lake that are classified as vegetation management.

3.7.2.5.4 *Future or Inactive Recreation Areas*

Areas with site characteristics compatible with potential future recreational development or recreation areas that are closed fall under this classification. Until there is an opportunity to develop or reopen these areas, they will be managed for multiple resources. There are no lands in the Beech Fork Lake Project area that are classified as future or inactive recreation areas.

3.7.2.6 *Water Surface*

Classifications for water surface area at Beech Fork Lake are provided in **Table 3-23 and Figure 3-26** and the classifications are defined in the following subsections.

Table 3-23. Water surface classifications at Beech Fork Lake

Water Surface	
(a) Restricted	12
(b) Designated No-Wake	237
(c) Fish & Wildlife Sanctuary	0
(d) Open Recreation	470
Total Water Surface Area =>	719

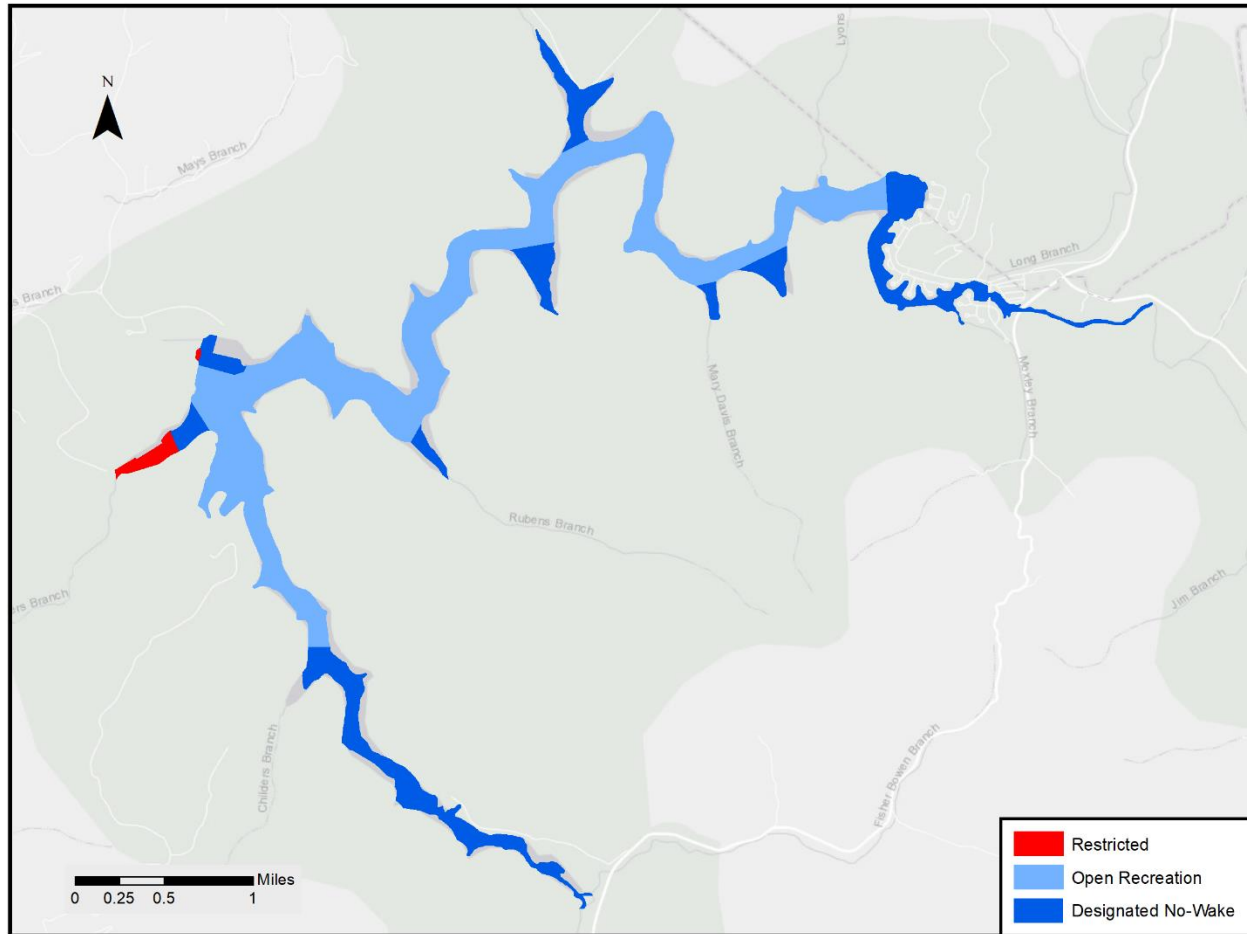


Figure 3-26. Beech Fork Lake water classification map

3.7.2.6.1 *Restricted*

The restricted water surface classification consists of water areas restricted for project operations, safety, and security purposes. This includes the area immediately surrounding the intake structure and the buoyed water surface area at Stowers Branch Beech. It should be noted that some kayakers launch in the area adjacent to the beach and paddle over the buoys to open water. There are no safety concerns related to this activity and it is not considered to conflict with the restricted water surface classification.

3.7.2.6.2 *Designated No-Wake*

The designated no-wake water surface classification is utilized to protect environmentally sensitive shoreline areas, recreational water access areas from disturbance, and for public safety. No-wake areas are adjacent to the marina and in Stowers Branch between the restricted area and the open lake. At Beech Fork Lake, no-wake designations also identify areas where shallow water depths require that boats travel at a slow speed to avoid damage. Shallow areas typically occur at the mouths of

tributaries and the upstream portion of the lake in the vicinity of Beech Fork State Park. The water surface area surrounding the marina is also designated as a no wake area.

3.7.2.6.3 *Fish and Wildlife Sanctuary*

The fish and wildlife sanctuary water surface classification places annual or seasonal restrictions on areas to protect fish and wildlife species during periods of migration, resting, feeding, nesting, and/or spawning. There are no water surface areas in Beech Fork Lake that fall under this classification.

3.7.2.6.4 *Open Recreation*

Waters classified as open recreation are available for year-round or seasonal water-based recreational use. At Beech Fork Lake, a 9.9-horsepower limit applies to all boats using the open recreation area.

3.7.2.7 Easement Lands

These are all lands for which the USACE holds an easement interest, but not fee title. Use and management of easement lands must be in strict accordance with the terms and conditions of the easement estate acquired for the project. Easements were acquired for specific purposes and do not convey the same rights or ownership to the USACE as other lands. The easement categories are described below:

3.7.2.7.1 *Operations Easement*

USACE retains rights to these lands necessary for project operations such as access. There are no operations easements on lands in the Beech Fork Lake Project area.

3.7.2.7.2 *Flowage Easement*

USACE retains the right to inundate these lands for project operations. The USACE owns 144 acres of flowage easements in areas that can be impacted by high lake levels in the headwaters of the lake and its tributaries.

3.7.2.7.3 *Conservation Easement*

USACE retains rights to conservation easement lands for aesthetic, recreation, and environmental benefits. There are no conservation easements held by USACE at the Beech Fork Lake Project area.

3.8 Beech Fork Lake Resource Plan

The resource plan for Beech Fork Lake follows the management by area framework.

Table 3-24 provides a summary of the resource plan recommendations and the resource objectives they address for each management area. **Table 3-24** also includes over-arching project-level recommendations for the Beech Fork Lake Project that are based on descriptions of the current conditions and management of the project

described in **Section 3** and the regional resources objectives described in **Section 2.17**. **Figure 3-27** identifies the location of the management areas at Beech Fork Lake.

Within the project boundary, seven management areas have been identified. Descriptions of the current land use conditions at each management area and the recommendations for the future use of the areas are provided in the following sections.

Table 3-24. Beech Fork Lake Resource Plan recommendations for USACE management areas

Management Area	Recommendation	Resource Objective
Beech Fork Lake Project	Continue to pursue partnerships with other agencies and organizations for management of existing recreation facilities and development of new recreation opportunities.	RR2, RN4
Beech Fork Lake	Continue WVDNR's management of the fisheries in Beech Fork Lake with the goal of maintaining healthy and stable populations of native aquatic species, including sports fish.	RN3, RN5, RN6
	Continue USACE's current management of the lake to maintain conditions for safe boating and swimming.	RR1
Dam Site and Spillway	Continue to operate and maintain the dam and outlet structures to meet the authorized project purposes.	RR1
Upstream Recreation Area	Continue to manage the area for the current water-based recreation activities and accommodate future trends in the public's recreation preferences to the extent practicable.	RR1, RR6, RR8
	Analyze the site's opportunities and constraints for the development of feasible conceptual alternatives to resolve site circulation issues, avoid user group conflicts, and improve the overall recreational experience.	R3, R4
	Collaborate with WVDNR to inform anglers of current fish consumption advisories.	RR7
	Explore opportunities for gateway improvements such as adding natural areas (i.e., pollinator habitat).	RN1, RN6
	Evaluate options for adding a launch for non-motorized watercraft.	RR8, R4
	Evaluate repair strategies for Beech Fork Road to provide comprehensive rehabilitation of the road to maintain efficient and safe access for operations and maintenance vehicles and visitors	RR1
Downstream Recreation Area	Enhance the visitor experience based on future analysis and evaluation of circulation and efficiency the area.	RR1, R3

Management Area	Recommendation	Resource Objective
Stowers Branch Beach	An evaluation of circulation patterns and a more detailed assessment of recreation use patterns of different user groups should be conducted to identify options for alleviating the perception of overcrowding at the area and utilize the available space more efficiently.	RR1, R3
	Evaluate available options for reducing crime and vandalism.	R2
	Assess options and implement modifications to maintain visibility of the no-wake sign without mowing the surrounding wetland.	RN3, RN6, N5
	Modify the universally accessible ramp so that it is visible and functional.	RR10
	Evaluate and implement potential options for improving the trails that originate at Stowers Branch Beach.	RR5, R5
Beech Fork USACE Trails and Low-Density Recreation Open Area	Pursue options for expanding the existing trails in the area to include opportunities for 6 trails.	RR5, R5

Sections 2.17 and 3.6 designate a code for each of the regional and project specific resource objectives. The resource objective codes are provided in the last column to identify the resource objective that is addressed by each recommendation.

RR indicates a regional recreation objective; **RN** indicates a regional natural resource objective; and **RC** indicates a regional cultural resources objective. For resource objectives specific to Beech Fork Lake, **R**, **N**, and **C** indicate recreation, natural resource, and cultural resource objectives, respectively.

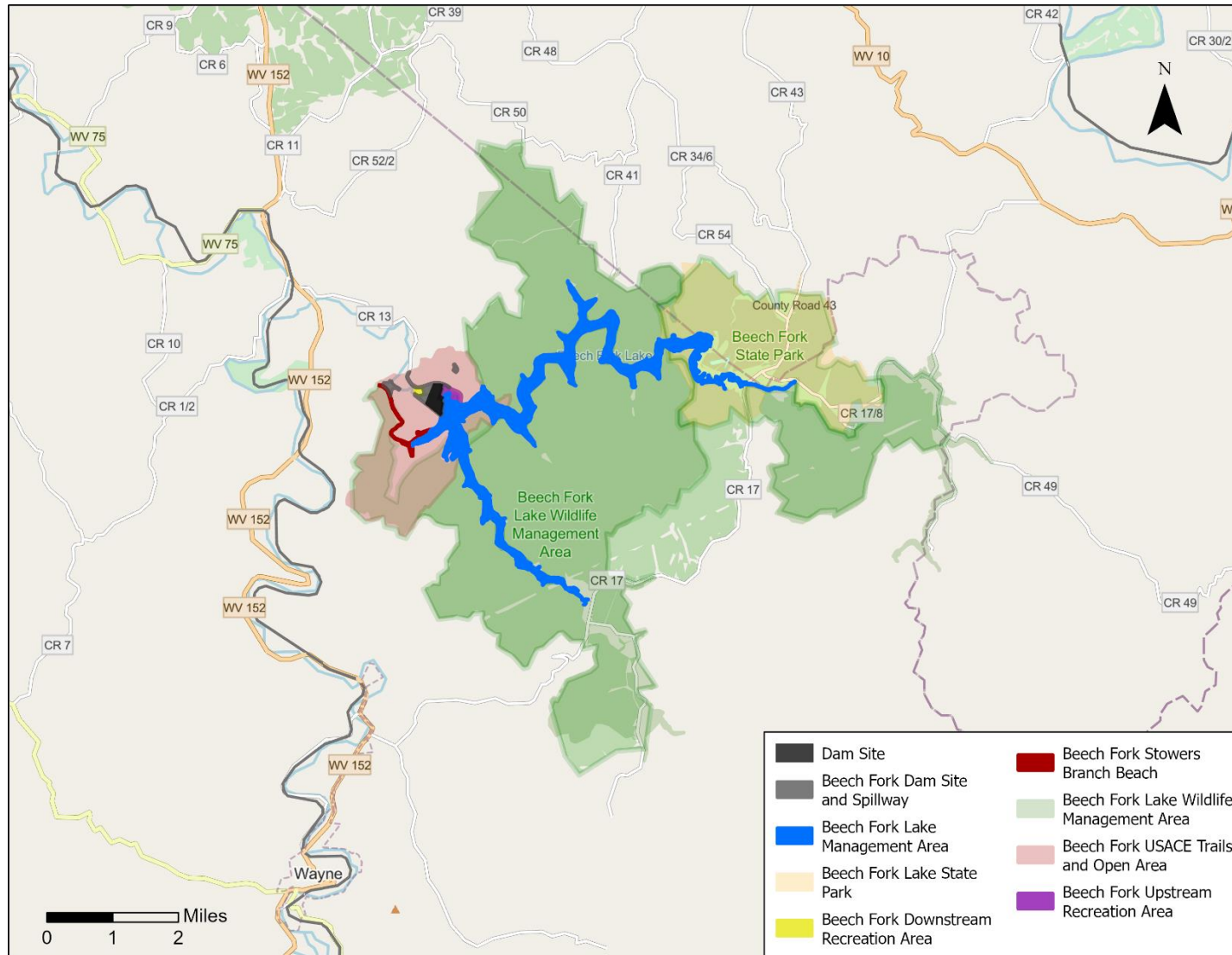


Figure 3-27. Beech Fork Lake Management Areas

3.8.1 Beech Fork Lake

Current Use Condition

Beech Fork Lake (**Figure 3-28**) is managed by USACE and WVDNR-Wildlife Resources for boating, fishing, swimming, and preservation of a healthy aquatic habitat. USACE places buoys to mark no-wake zones and shallow areas along the shoreline where it is unsafe to boat.

Recreationists use the lake for boating, fishing, and swimming. Boaters access the lake from the Upstream Recreation Area and the Beech Fork State Park. Boating, fishing, and swimming occur throughout the lake; however, the only designated shoreline accessible swimming area is Stowers Branch. Pontoon boats and bass boats are the most common types of motorized watercraft, but Jon boats and houseboats are also seen on the lake. There is a trend of increasing use of the lake by non-motorized watercraft such as kayaks and paddleboards. Fishing and cruising are the most common boating activities.

WVDNR-Wildlife manages the lake's fisheries and is responsible for issuing permits for fishing tournaments. Beech Fork Lake is a popular recreational fishing area and fishing tournaments are held almost every weekend from April through October. Despite heavy fishing pressure, surveys by WVDNR indicate that bass populations have remained stable¹⁴. The lake is stocked with trout once a month from February through May. The featured fish species at Beech Fork Lake is the hybrid striped bass.

Management of the lake by WVDNR-Wildlife Resources includes placement of Christmas trees during winter pool. The trees are anchored along the shoreline, so they are submerged during summer pool conditions. This creates good habitat and attracts fish. Native trees along the shoreline are sometimes cut for the same purpose. WVDNR places signs showing where the trees have been placed and posts maps of their locations.

Proposed Future Use

Beech Fork Lake will continue to operate for authorized project purposes. The trend toward greater utilization of Beech Fork Lake by non-motorized watercraft is expected to continue in the future. The USACE and the WVDNR-Wildlife will continue current management responsibilities.

¹⁴ Personal communication, , WVDNR-Wildlife Resources Fisheries Biologist, 22 June 2021



Figure 3-28. Beech Fork Lake

3.8.2 Dam Site and Spillway

Current Use Condition

The Dam Site and Spillway Management Area (**Figure 3-29**) includes the dam, emergency spillway, the maintenance area immediately south of the dam abutment, and the maintenance area below the dam. The maintenance building on the south dam abutment is used for maintenance activities, storage, and office space. It is accessible from Beech Fork Road via the road crossing the dam. Solar panels are adjacent to the maintenance building and supplement commercial power for the project. There is another maintenance area below the dam off Beech Fork Road adjacent to the Downstream Recreation Area. The area is used by USACE personnel for operation and maintenance of the project in support of its authorized project purposes.



Figure 3-29. Beech Fork Lake Dam Site and Spillway

Proposed Future Use

The Dam Site and Spillway will continue to be managed for operations.

3.8.3 Upstream Recreation Area

Current Use Condition

The Upstream Recreation Area (**Figure 3-30**) is managed as a water-based recreation area that provides boating, picnicking, sight-seeing, and other recreation opportunities for visitors. The Visitors Center includes the project offices and offers displays related to local history, wildlife, and historical artifacts.

Beech Fork Road provides access for the Upstream Recreation Area, the Downstream Recreation Area, and the Dam Site and Spillway Management Areas. Project personnel utilize the road for operation and maintenance activities. It is heavily

traveled; over 80,000 visitors to the upstream recreation area use the road each year. This road is currently in poor condition. Filling potholes and other minor repairs have been made in the past. However, insufficient maintenance and heavy use have resulted in deteriorating road conditions.

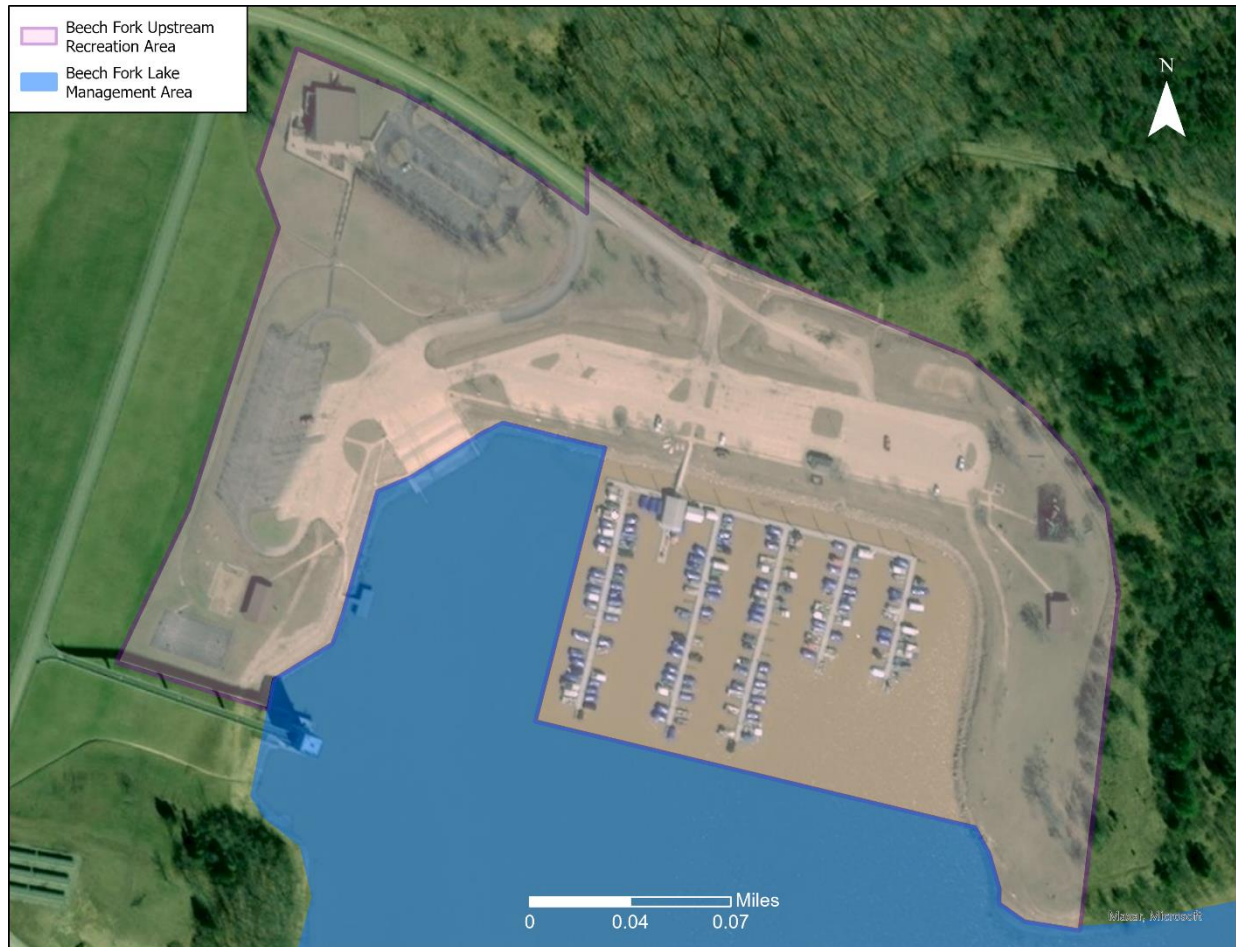


Figure 3-30. Upstream Recreation Area management area

The parking areas are full or near full most summer weekends although overflow parking is rarely needed. Shelter 1 is the most popular of the two picnic shelters. This shelter is located east of the marina parking area and is the shortest distance from the restrooms. Users of Shelter 2 sometimes park cars in the car-trailer spots because they are closest to the shelter. However, the car-trailer combination spots are rarely full and are usually available for cars. Parking related conflicts between boaters and picnickers are rare.

The boat launch in the Upstream Recreation area is heavily used by motorized and non-motorized watercraft. Conflicts can occur if non-motorized boaters crowd the boat

launch and cause delays to motorized boat launching. Additionally, this boat launch is the only operable launch during winter.

Daytime and nighttime fishing tournaments are based out of the Upstream Recreation Area almost every weekend from April through October. Participation varies between 20 and 30 boats for each tournament.

The marina is operated by a concessionaire. During the season, almost all slips are rented. The marina also has a store and offers rental of a variety of motorized and non-motorized watercraft.

Proposed Future Use

The proposed future use of the Upstream Recreation Area is to continue management for the current recreation opportunities. To the extent practicable, adjust management to accommodate future trends in the public's preferences for recreation opportunities. USACE will cooperate with WVDNR and WVDHHR to help inform anglers that fish consumption advisories exist and where information can be found.

Future evaluation of repair strategies for Beech Fork Road is recommended to provide comprehensive rehabilitation of the road to maintain efficient and safe access for operations and maintenance vehicles and visitors. Other gateway improvements should be explored such as adding natural areas (i.e., pollinator habitat). To address site circulation issues, user group conflicts, and to improve the overall recreational experience, a comprehensive analysis is recommended in the future. The evaluation should include placement of a non-motorized watercraft launch. A conceptual configuration of the Upstream Recreation Area is shown below in **Figure 3-31**.

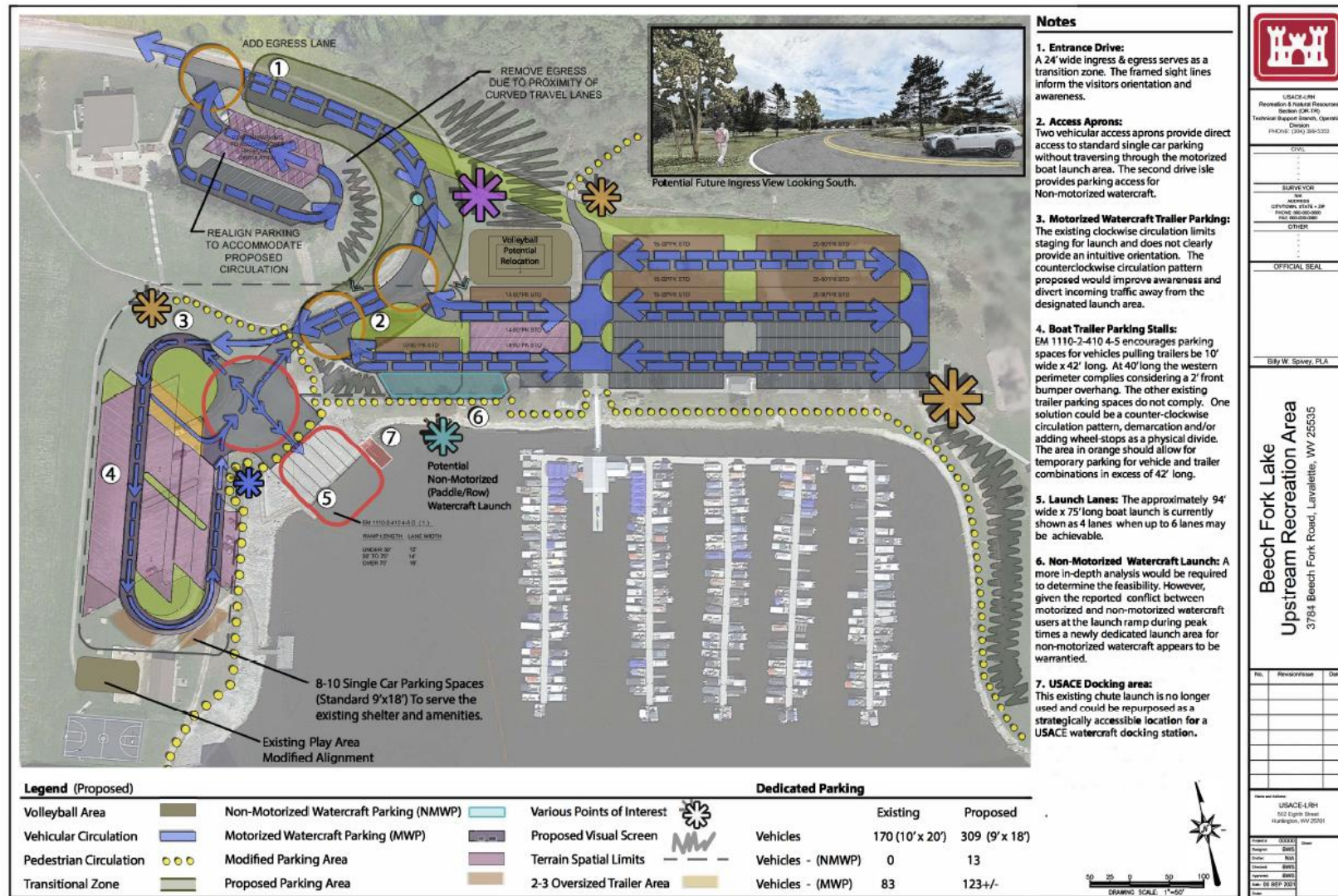


Figure 3-31. Conceptual layout of the Upstream Recreation Area reconfiguration

3.8.4 Downstream Recreation Area

Current Use Condition

The Downstream Recreation Area (**Figure 3-32**) is managed for picnicking, fishing, and enjoying nature. Shelter 3 is well utilized because it is close to the parking area and provides a view of, and access to, the Beech Fork outlet channel. Shelter 4 has a 2-car parking area adjacent to it to facilitate universal access. A long up-hill walk is required to get from Shelter 4 to the restroom and is also further from the main parking area.

The Downstream Recreation Area is a popular place to fish for trout and hybrid striped bass. WVDNR-Wildlife stocks the tailwater with trout each year from February through April.



Figure 3-32. Downstream Recreation Area management area

Proposed Future Use

Management of the Downstream Recreation Area will continue to support of the current recreation opportunities. Recommendations for this management area include

enhancing the visitor experience based on future analysis and evaluation of circulation and efficiency the area. Options should be evaluated to increase utilization of Shelter 4, such as improving accessibility and parking.

3.8.5 Stowers Branch Beach

Current Use Condition

Stowers Branch Beach (**Figure 3-33**) is currently managed to support picnicking and swimming beach recreation activities. Visitation at the area is high. It has the only swimming beach available at Beech Fork Lake and is very popular. The main parking area and two overflow parking areas fill often. The WVDEP samples the water quality at Stowers Branch Beach from May to September to ensure that it meets the criteria for contact recreation. The water quality has continued to meet the contract recreation criteria, and the beach has not been closed due to water quality concerns in many years. There is a universal access ramp into the swimming area, but it is not well marked, and sedimentation has reduced its depth. As a result, it is not used often.



Figure 3-33. Stowers Branch Beach management area

There are three picnic decks located along the hillside that slopes down to the beach. The largest of the three picnic decks is reservable, while the other two decks are available on a first come-first-serve basis. Immediately east of the swimming beach, buoys have been placed across the mouth of Stowers Branch to prevent motorized boats from entering the area. Non-motorized watercraft users launch from the shoreline along the parking area and paddle around the swimming area and over the buoys to the open lake.

A “No Wake” sign is posted in a small wetland near the mouth of Stowers Branch. The area around the sign must be mowed periodically for visibility. Mowing in the spring can impact flowering wetland plants such as sedges and rushes that are native to the project area. These wetland plants including milkweed, support pollinators such as the Monarch butterfly which USFWS has designated as a candidate for listing. This wetland also provides habitat for other aquatic and terrestrial species.

Management challenges are mainly related to the heavy use of the area and include complaints of overcrowding and vandalism. Although the area is patrolled by the Wayne County Sheriff, vandalism has not been fully mitigated.

Proposed Future Use

The proposed future use of Stowers Branch Beach is to continue management of the area to support improved picnicking, hiking, and swimming beach recreation activities. A land use analysis and evaluation of measures for improvements to the management area is recommended for more efficient use of the land to help alleviate public perception of overcrowding and to improve visitor experience.

To address vandalism of the restrooms and showers, a program that discourages vandalism and crime using available approaches such as Crime Prevention Through Environmental Design or a similar program should be pursued.

Evaluate options to reduce or eliminate the need to mow the wetland area to maintain visibility of the no-wake sign. Options should include adjusting mowing schedules, reducing the area mowed, relocating the sign, etc.

Evaluate potential options for improving the trails that originate at Stowers Branch Beach.

3.8.6 Beech Fork USACE Trails and Low-density Recreation Open Area

Current Use Condition

This area surrounds the dam site and Stowers Branch Beach (**Figure 3-34**) and is managed by the USACE. It is managed for hiking, observing nature, and other passive recreation activities and for the preservation of fish and wildlife habitat. Trailheads for trails that run through the area are located in other management areas as described

above (at the spillway, Stowers Branch Beach, and the Visitor Center). Hunting is allowed in the southwestern portion of the area.

The three trails in the area are limited to hiking only – no bicycles, horses, or off-road vehicles are allowed. Because the trails pass through USACE-managed areas where hunting is allowed, hikers are discouraged from using this trail during hunting season.

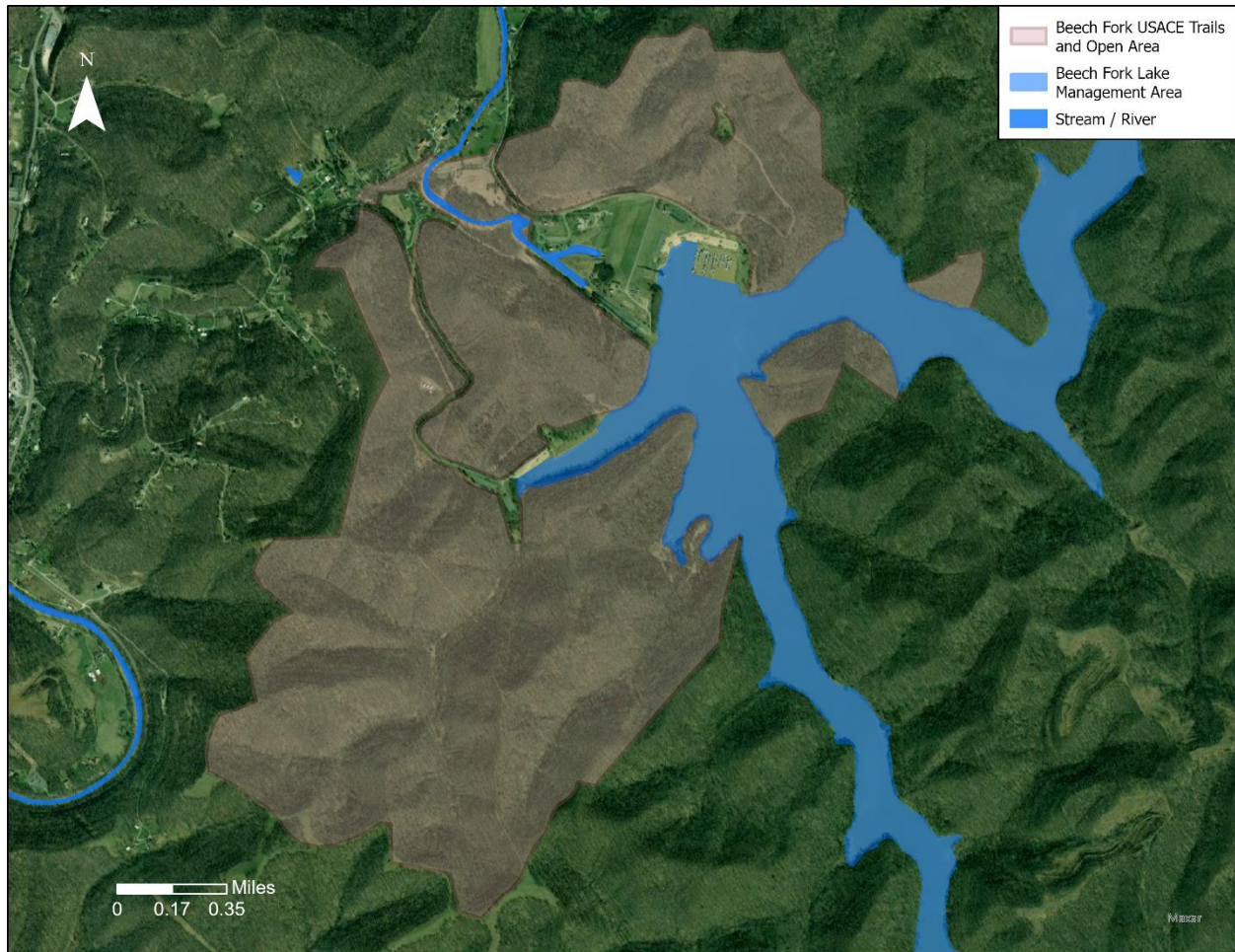


Figure 3-34. USACE Trails and Low-Density Recreation Open Area management area

Proposed Future Use

The proposed future use of this area will continue management for authorized project purposes including the current recreation uses and preservation of fish and wildlife habitat. It is recommended that options for evaluation of expanding the existing trails in the area be pursued to include opportunities for multi-use and other various types of trails.

3.8.7 Beech Fork Lake State Park

Current Use Condition

WVDNR-Parks manages the area for a variety of water-based recreation activities, including boating, fishing, camping, and hiking, while preserving and protecting natural areas (**Figure 3-35**). The West Virginia State Parks system's mission is "to promote conservation by preserving and protecting natural areas of unique or exceptional scenic, scientific, cultural, archaeological, or historical significance and to provide outdoor recreational opportunities for the citizens of this state and its visitors. A description of the park's four campgrounds and their respective amenities is provided in **Section 3.3.1.5**. The Park has the highest revenue of any park in the WVDNR-Park system. Average Campsite occupancy rates are over 40% which makes it difficult to get reservations for a weekend. Occupancy rates for the state park's cabins is around 50%.

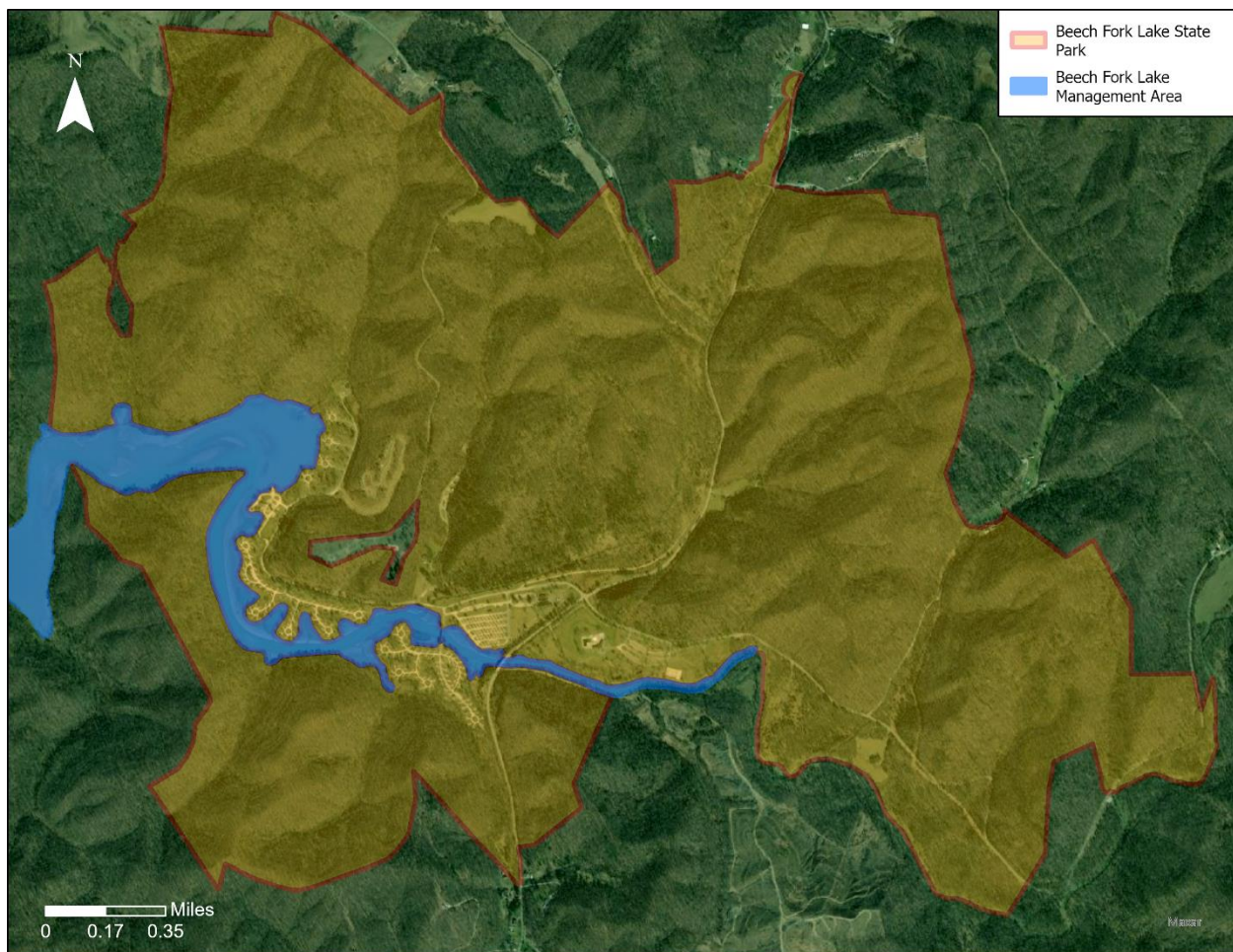


Figure 3-35. Beech Fork Lake State Park management area

The State Park is located near the headwaters of the lake in an area where significant sedimentation occurs. As a result, WVDNR-Parks regularly clears sediment from the boat launch to enable its use. However, sedimentation has now accumulated to the point that navigation is not possible, or is difficult, throughout much of Beech Fork at the State Park. As a result of the reduced water depths, aquatic vegetation has become established which further reduces navigability.

Several trailheads and a parking area are located in the park south of the lake, adjacent to the Moxley Campground. The trailheads provide access to 7 trails with a total length of 13.2 miles. The Mary Davis Trail is the longest (5 miles) and extends from State Park land through a portion of the WMA. The Coal Mine Trail also extends into the WMA. Hunting is not allowed in the State Park. Hikers are advised to wear blaze orange when hiking during the hunting season. Firearms, bows, and arrows are required to be cased while on State Park lands. The North Ridge, Coal Mine, and Nature Trails are used by both hikers and bikers.

A log structure that originally sat along Fisher Bowen Creek near Booten-Miller's Fork has been moved to the camping area and is being managed by Beech Fork State Park staff.

Proposed Future Use

The proposed future use of the Beech Fork State Park is to continue management of the area for the existing recreation activities and preserving and protecting natural areas. The proposed future use could include additional recreational amenities such as cabins or campsites to meet user demand and provide greater access to visitors. A proposal for additional cabins is being considered by Beech Fork State Park. Any future proposals would go through the USACE Report of Availability (ROA) process for outgranted lands.

Current proposed future uses that the State Park is preparing to implement include improvements to the fitness trail and the Great Blue Heron kayak launch. The park has received grants to pave 1.1 miles of the fitness trail and improve the kayak launch and upgrade the access, parking, and interpretive signage for the Great Blue Heron Water Trail. The State Park has received a grant to relocate a portion of the Mary Davis Trail away from hunting areas in WMA and private property.

To improve navigability at the State Park and allow for visitors to moor their boats at campsites, WVDNR-Parks is planning to dredge sediment around the campground.

A Cultural Resource Management Plan (CRMP) was prepared for Beech Fork Lake in 2001. It is recommended that a formal evaluation be conducted of the log cabin for its eligibility for listing in the National Register.

3.8.8 Beech Fork Lake Wildlife Management Area

Current Use Condition

Based on the Wildlife Management Plan submitted to USACE each year, WVDNR-Wildlife's primary goals for management of the Beech Fork Lake WMA are:

1. To protect and enhance wildlife habitat to provide maximum hunting, trapping, and non-consumptive recreational opportunities which are compatible with the habitat.
2. Manage wildlife populations for hunting, trapping and non-consumptive recreational opportunities.
3. Reduce illegal use of ATV's/ORV's on the management area which destroys and degrades habitat for wildlife as well as having a negative impact on hunting, trapping, and non-consumptive recreational opportunities.
4. Continue public information efforts to facilitate management of the area.

The Beech Fork Lake WMA includes the following facilities: headquarters, gas shed, storage building, shooting range, roads and access trails, and parking areas (**Figure 3-36**).

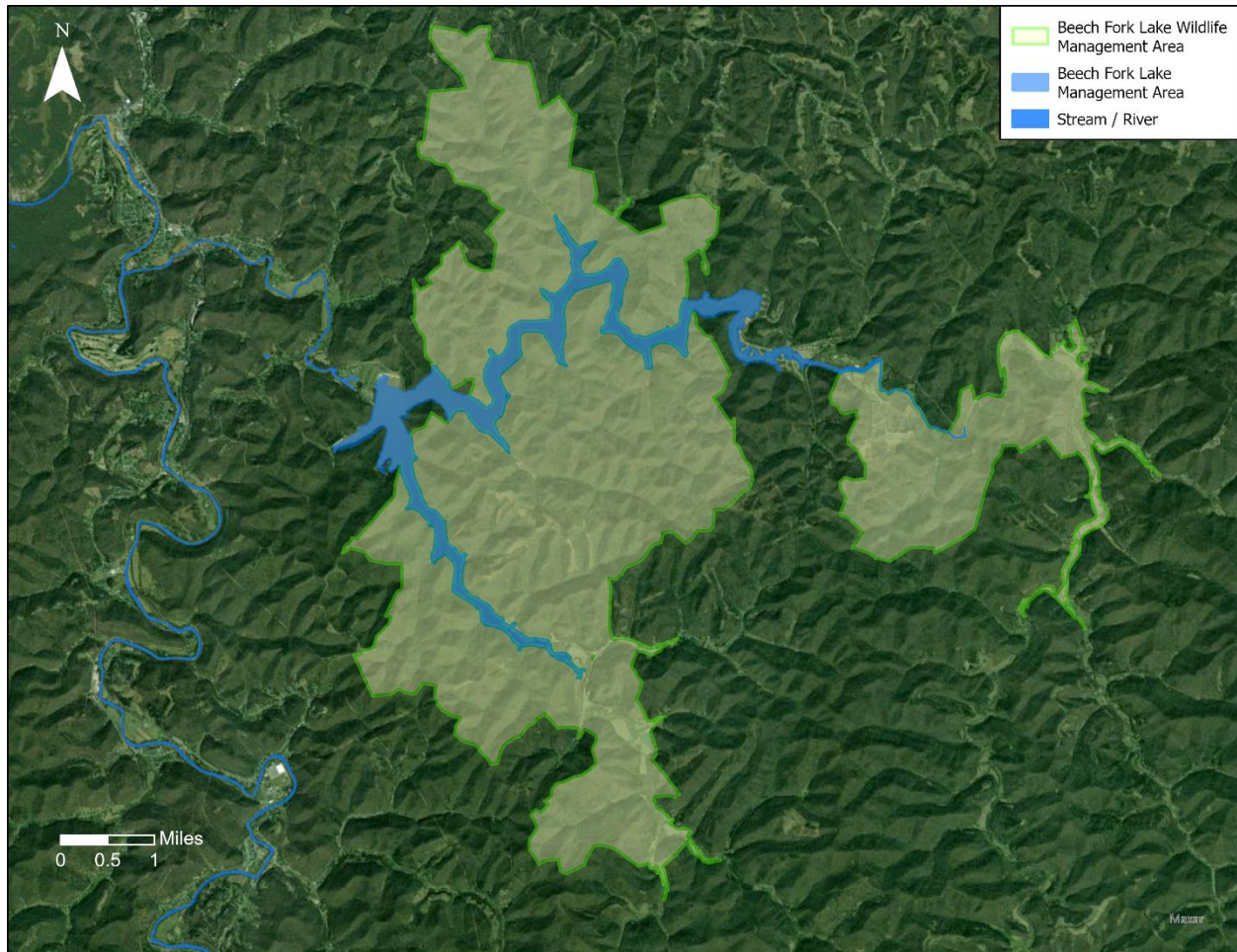


Figure 3-36. Beech Fork Lake WMA management area

Hunting and fishing are the primary recreation activities at the WMA. There are 10 parking areas for hunter access in the WMA, as well as 20 miles of hunter access trails and roads. These roads and access trails are maintained by the area manager and various utility companies.

Timber management is an important management tool to maintain good quality habitat. WVDNR-Wildlife prepares a timber management plan each year and submits it to USACE for review and approval. Proceeds from timber harvests are required to be invested in management and development of the WMA.

Beech Fork Lake WMA is a heavily forested area and therefore management efforts are directed toward forest game species such as deer, mourning dove, grouse, rabbit, squirrel, turkey, and waterfowl. Under the featured species management approach, much of the area will be managed for the white-tailed deer, specifically older aged deer management. The goal of this management strategy is to provide opportunities for

hunters to harvest older bucks. It is illegal for hunters to take deer with antler spreads of less than 14 inches.

Miller's Pond, a 13-acre open water reservoir, is located in the WMA and is open to the public for fishing year-round except for 1 March to 31 May. During this period, Miller's Pond is only open for class Q fishing including children under 14 years of age and individuals with disabilities. The pond is stocked with trout once during the first week of March. There is a catch and release policy for bass. A universally accessible fishing pier is open to the public year-round.

A 100-yard shooting range is located in the WMA and is a popular attraction, especially during the summer and fall months. The range is open year-round, 7 days/week from 9:00 a.m. to sunset. It is equipped with 8 covered shooting benches. Earthen backstops with target holders are located at 25, 50 and 100 yards. The range shelter is universally accessible by way of a concrete walkway to a multi-purpose shooting bench. The WVDNR also subleases 92 acres to local farmers for hay and grain production on the area.

Proposed Future Use

The proposed future use for the WMA is for WVDNR-Wildlife to continue management for the protection and enhancement of fish and wildlife habitat and to support use of the area for hunting and fishing. It is anticipated that WVDNR-Wildlife would continue current management practices on all facilities within the WMA such as maintaining the shooting range as a popular attraction for visitors.

4. East Lynn Lake

4.1 Project Description

East Lynn Lake is located entirely within Wayne County on the East Fork of Twelvepole Creek about 10 miles upstream of its confluence with Twelvepole Creek and roughly 42 miles upstream of Twelvepole Creek's confluence with the Ohio River (**Figure 1-1**). East Lynn Lake impounds runoff from a 133-square mile drainage area in Wayne and Mingo Counties, representing about 31% of the Twelvepole Creek drainage area.



The East Lynn Dam is a rolled earth-fill constructed dam at a height of 113 feet above the streambed, with a crest length of 652 feet. The summer (or seasonal) pool is maintained at a water surface elevation of 662.0 feet from April through October. In winter, the pool is maintained at 656 feet from November through March to store high water flows. Actual lake levels during summer and winter may vary from the target elevations due to flood runoff or the need to maintain the minimum discharge of 10 cfs from the dam.

At its summer pool water surface elevation of 662 feet, the lake covers 1,005 acres and stretches about 12.7 miles up the East Fork. The lake is dendritic in shape and is surrounded by hills and ridges ranging in elevation from 800 to over 1,600 feet. Major tributaries to the lake include Brushy Creek, Lick Creek, Rich Creek, and Cove Creek. The area surrounding the project is rural and sparsely populated. There are no large population centers, only small unincorporated communities. According to the 2020 US Census (USCB, 2020), the population per square mile in Wayne County is only 84.

4.2 Project Setting

4.2.1 Hydrology

The general aspects of precipitation, runoff, evapotranspiration, and climate were covered earlier in **Sections 2.1 and 2.5**. Information in this section provides the basic information related to the location, runoff, and lake characteristics.

East Lynn Dam is located on the East Fork tributary to Twelvepole Creek, about 41.7 miles upstream of the latter's confluence with the Ohio River. The East Fork joins with the West Fork to form Twelvepole Creek.

East Lynn Lake's 133-square mile drainage area includes all the upper reaches of the East Fork. The lake is dendritic in shape and approximately 12.7 miles in length with a surface area of 1,005 acres at the summer pool. Other significant lake inflow tributaries are Lick Creek, Rich Creek, Brush Creek, Kiah Creek, and Cove Creek (**Figure 4-1**). The average slope of the lakebed falls about 13.5 feet per mile. The lake has a maximum depth of about 50 feet and a water volume residence time of approximately 42 days.

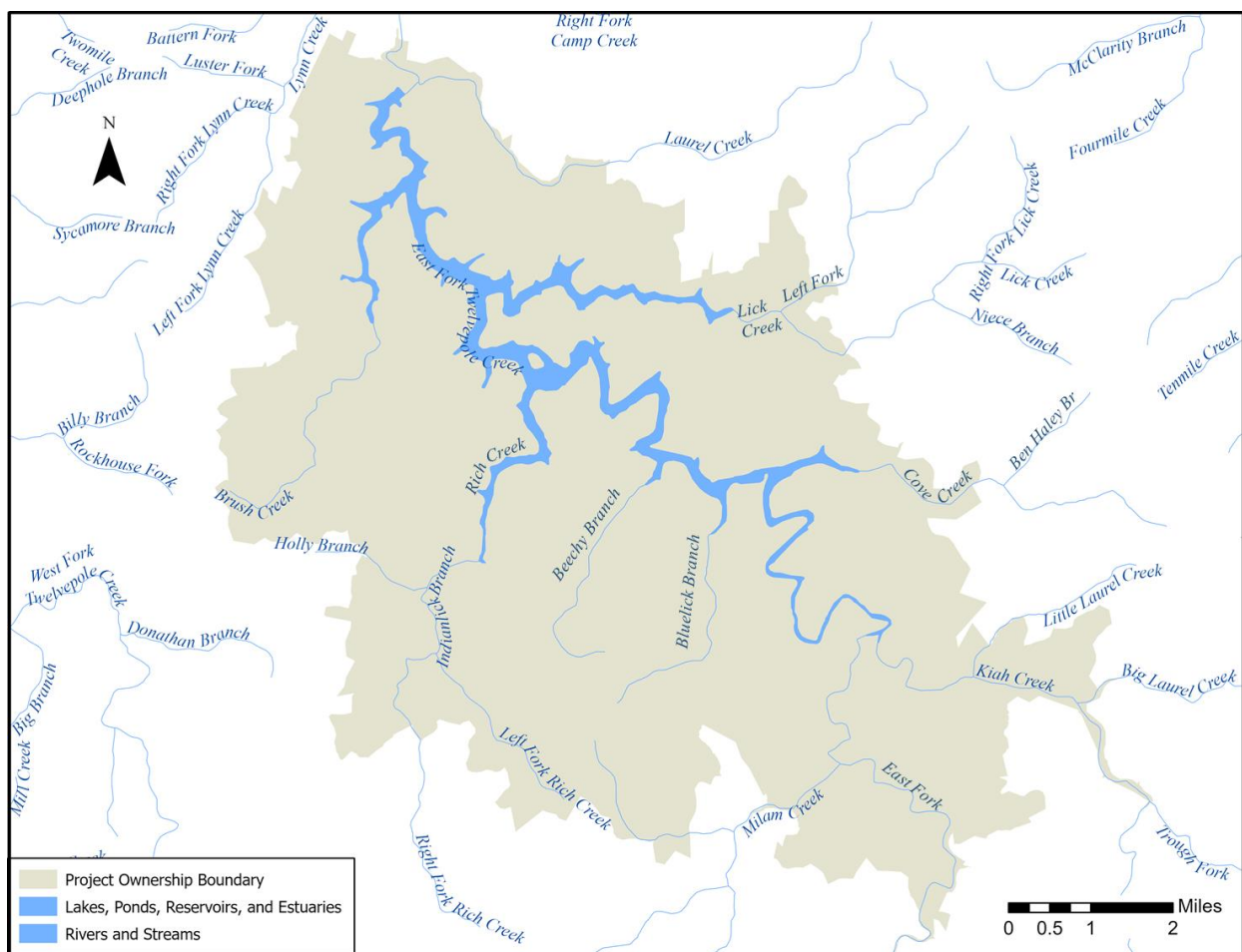


Figure 4-1. East Lynn Lake and tributaries

To protect downstream aquatic habitat in the East Fork below the dam, a minimum flow of 10 cfs is always maintained. The low-flow selective withdrawal system is normally used to maintain the designated minimum flow, up to the capacity of the low-flow system. The selective system enables withdrawals of water from varying depths to

address thermal stratification which occurs in East Lynn Lake during the summer. It may also be used as a fine-tuning control of the quantity of discharge from the slide gate system. The selective withdrawal system allows control of water temperatures and quality of discharged water up to the capacity of the control valves.

The ground water table in the lake area has the following characteristics: a colluvium mantle and zone of weathered rock on the slopes and colluvial and alluvial materials in the valley fill are slightly to moderately permeable. During the late spring months these materials approach complete saturation, with a water table at or near the ground surface. This is evidenced by the many seeps along the valley walls and is indicated by the higher frequency of slides during March, April, and May. Within these zones, water levels customarily recede during the summer months, despite higher quantities of rainfall, primarily because of higher rates of evapotranspiration.

4.2.2 Water Management

East Lynn Lake first reached its winter pool elevation of 656 feet on 1 February 1972, the date on which full water management activities began. **Table 4-1** summarizes pertinent data relative to the operation of East Lynn Lake.

The principle hydrologic function of East Lynn Lake is to provide flood risk reduction. The reservoir controls runoff from the drainage area and significantly reduces headwater flooding along East Fork below the dam and provides substantial protection along Twelvepole Creek. Normally, East Lynn Lake is operated to control the downstream stage at the town of Wayne so as not to exceed 18.0 feet (summer control) and 22.0 feet (winter control). During the maximum flood of 1939, the stage at Wayne reached 31.03 feet and caused significant flood damage. As of 2020, the East Lynn Project has prevented over 166 million dollars in flood damage from occurring (USACE, 2020a).

Table 4-1. East Lynn Lake pertinent data

Pool	Surface Elevation (Ft NGVD)	Area (acres)	Stream Miles	Net Acre-ft	Gross Acre-ft	Net Runoff (Inches)	Gross Runoff (Inches)
Year –Round Minimum (Winter)	656	823	11.4	11,700	11,700	1.6	1.6
Seasonal Storage (Summer)							
Recreation/ Water Quality	662	1,005	12.7	5,500	17,200	0.8	2.4
Flood Control Storage *							
Summer	701	2,351	17.0	70,800**	82,500	10.0	11.6
Winter	701	2,351	17.0	65,300***	82,500	9.2	11.6

*At maximum pool elevation 701 feet NGVD

** Between elevations 656 and 701 feet NGVD

*** Between elevations 662 and 701 feet NGVD

The low-flow system is crucial to water quality and low-flow management of downstream releases from the dam. Each fall, the summer pool is gradually lowered to the winter pool to increase the storage availability to help maintain water quality, to enhance downstream fisheries, and to allow for the containment and gradual release of seasonal flood waters. Maintenance of a 10 cfs minimum outflow is desirable.

To characterize the frequency of events that may have recreational impacts, a plot of the seasonal operations is shown in **Figure 4-2**. A frequency analysis of that 20-year period shows the lake only went above 663 feet about 7% of the time. At that elevation, the East Fork Campground Area's #2 boat boarding dock goes under water. The analysis also showed that the lake went above 664 feet about 6% of the time for the last 20 years. Above that elevation, the East Fork Campground boat launch is inundated. Finally, the analysis showed the lake only went above 666.8 feet less than 1% of the time for the last 20 years. The highest pool reached during the season for the last 20 years was 673.22 feet in 2004. The highest pool of record was 684.55 feet on 12 December 1978. At that elevation, all recreation areas were flooded.

Once the pool drops below 659 feet, the East Fork Beach is closed, 25 bank boat dock sites at the marina are out of water, and the Water Plant and East Fork Campground water intakes are exposed. During the summer recreation seasons of the past 20 years, lake levels dropped below 659.0 feet less than 1% of the time.

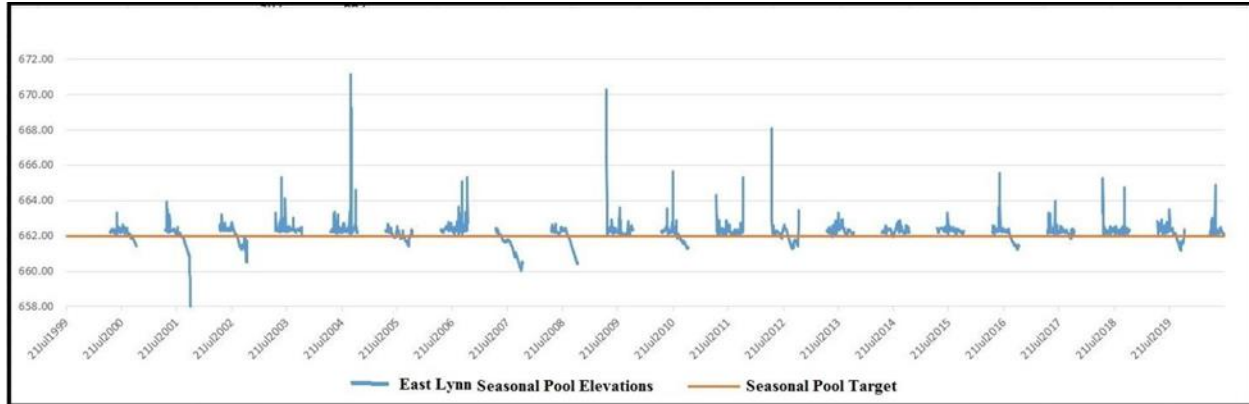


Figure 4-2. East Lynn Lake seasonal pool elevations (1999 - 2019)

4.2.3 Sedimentation and Shoreline Erosion

In East Lynn Lake, a sediment pool containing 11,700 acre-feet of storage was established for the lake at elevation 656.0. In 1980, the USACE conducted a re-survey of the lake's bottom. In the 8.33-year period since full operations began in 1972, the rate of deposition was 0.18 acre-feet of sediment psm of contributing drainage area. That measured sedimentation rate was not considered excessive. This was validated with an additional survey in 1985. A 1997 re-survey determined the sedimentation rate to be 0.15 acre-feet of sediment psm of contributing drainage area. At that rate, the minimum pool would still have a life expectancy in excess of the 100-year economic life of the project.

While the total accumulation of sediment is not excessive, there are two areas where sediment deposition is evident and adversely impacts boating recreation: the upper reach of Rich Creek and the mainstem of East Lynn Lake above the confluence of Blue Lick Creek (**Figure 4-3**). The East Fork boat launch has periodic sediment build-up and requires clearing to maintain boating access.

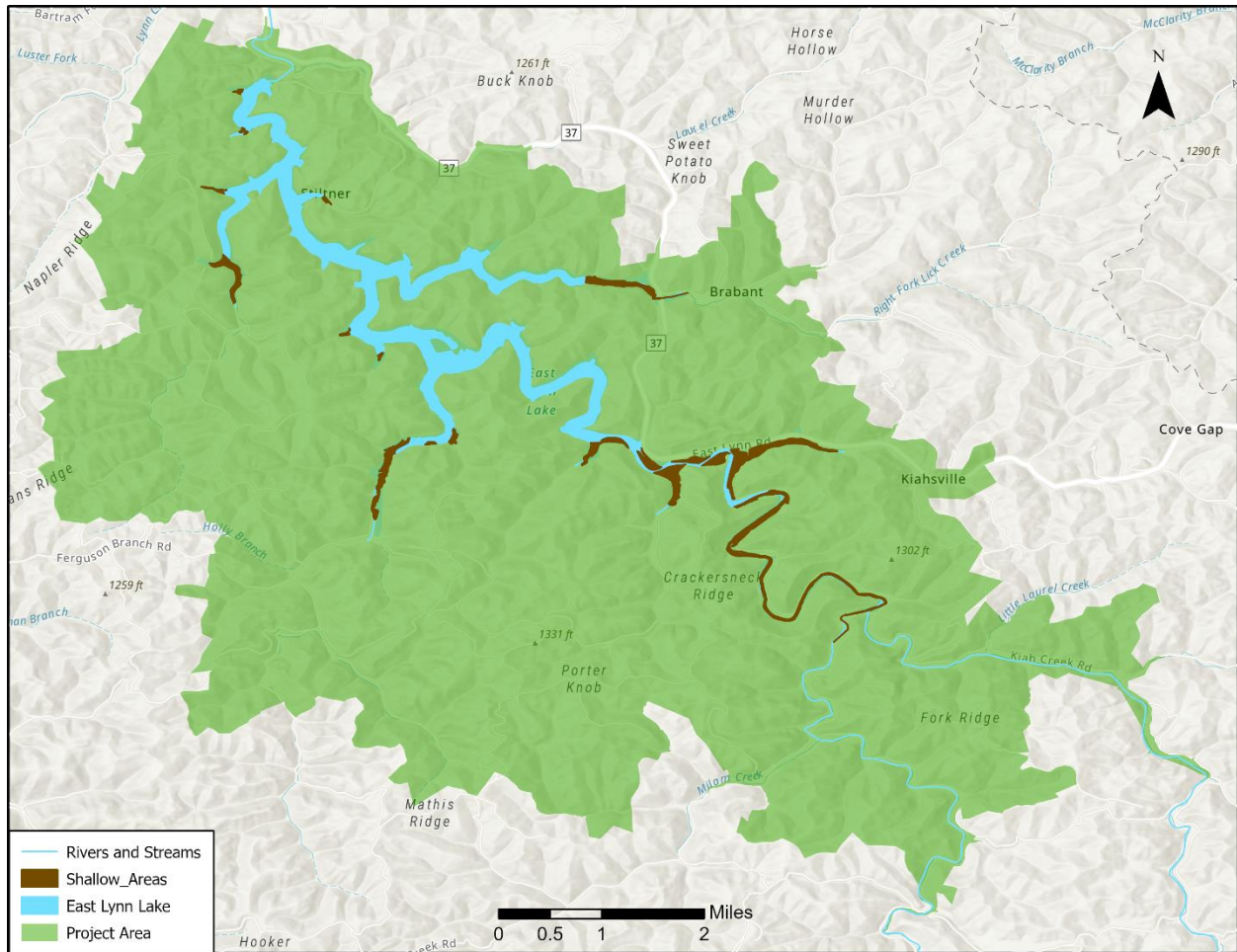


Figure 4-3. East Fork Lake areas with sediment accumulation

Even though East Lynn Lake does not have a HP limit on boat motors, recreational power boating does not appear to be an issue for shoreline erosion. Generally, bank erosion has not been identified as an issue, except for the East Fork Campground area. In this area, rapid inflows through the lake's meanders impinge upon some shoreline areas, causing localized bank erosion. Although bank erosion has been minimized by bank stabilization actions, this type of erosion continues to be problematic.

Unimproved roads, originally constructed in connection with historic gas exploration and production efforts, remain on portions of the East Lynn Project lands. These roads are frequently used for off-road vehicle recreational activities. Such uses of project lands are unauthorized. These activities contribute to localized erosion of the watershed's thin soils; resulting in the delivery of sediments to tributary streams to East Lynn Lake, and ultimately to increased lake sedimentation.

4.2.4 Water Quality

East Lynn Lake is in the temperate zone which contributes to routine changes in the lake's thermal stratification throughout the year. During cold months, the profile is nearly isothermal (i.e., water temperatures vary little with depth) from the surface to bottom of the individual lakes. As spring progresses, lake surface waters warm more quickly and thermally stratify with depth. The cooler, lower part of the lakes (i.e., hypolimnion) mixes very little with the warmer, upper part of the lake (epilimnion).

Figure 4-4 illustrates the thermal stratification pattern at East Lynn Lake that typically develops during the months of April to November. Warmer surface temperatures can have small diurnal temperature fluctuations. There is a relatively narrow temperature zone near the lake's mid-depth, characterized by a transition from warm to cold temperatures (i.e., metalimnion). Thermal stratification in nutrient-enriched lakes can result in dramatic water quality differences within the lake's depth profile.

East Lynn Lake is eutrophic which means there is a sufficient nutrient load to cause water quality differences in the lake's profile for specific parameters. The epilimnion will interact with atmospheric oxygen and it will have viable algal populations that can produce oxygen which creates an oxygen rich surface layer. However, in the hypolimnion where sunlight does not penetrate and decaying matter exists, the bottom layer can become anoxic (i.e., depleted of dissolved oxygen). Anoxic conditions do not support fish, and the conditions create higher concentrations of hydrogen sulfide, dissolved metals, and other undesirable water quality indicators. **Figure 4-5** illustrates the typical adverse effect that stratified conditions can have on DO within East Lynn Lake during April through November.

Selective releases from East Lynn Lake can act as a buffer by protecting the downstream water quality from pollutants that originate in the headwater tributaries that drain into the lakes. The low-flow operating system allows for the release of water having more natural temperatures and DO concentrations than would be available from releases provided through the sluice gates. **Figure 4-6** shows an example of the temperature and oxygen profile within East Lynn Lake and the low-flow gate being used (i.e., in blue on the right) to help meet desired downstream water quality conditions. The effectiveness of the low-flow system in meeting downstream temperature curve for the months of November through January 2020 is demonstrated in **Figure 4-7**.

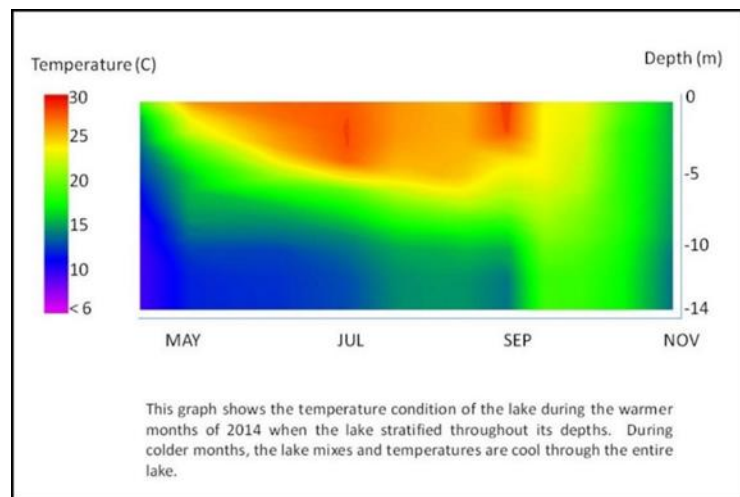


Figure 4-4. East Lynn Lake thermal profile (May – November 2014)

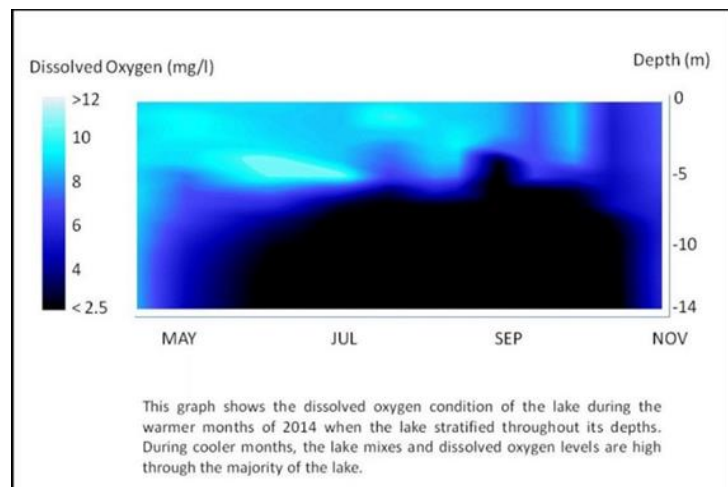


Figure 4-5. East Lynn Lake dissolved oxygen profile (May to November 2014)

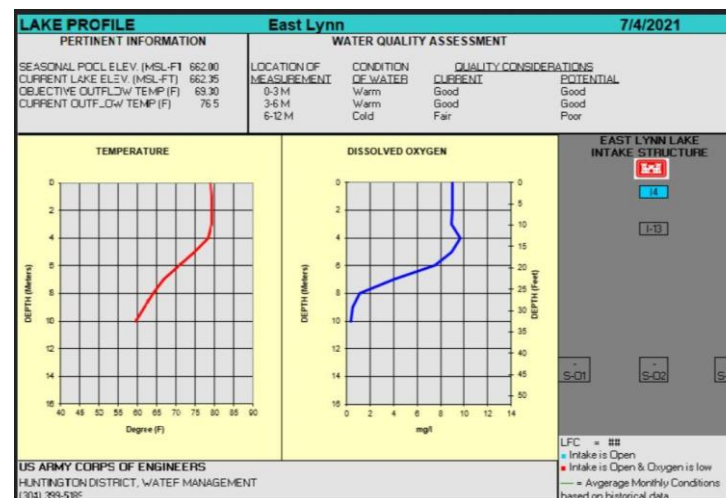


Figure 4-6. East Lynn Lake temperature and dissolved oxygen profiles (4 July 2021)

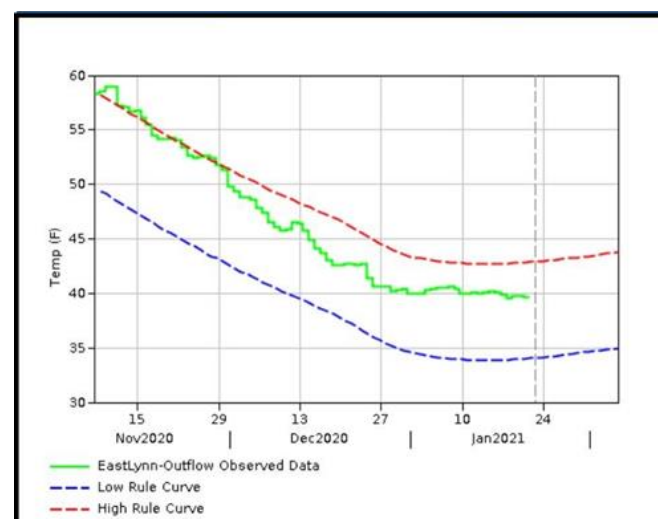


Figure 4-7. East Lynn Lake outflow temperature

Water quality samples of watershed inflows into the lake had screening values that exceeded State criteria and/or District levels of concern for total aluminum, total iron, Kjeldahl nitrogen, specific conductance, total manganese, total phosphorus, total strontium, and total sulfate (USACE, 2016).

WVDEP uses CNA-Biological as one of the indicators whether the water quality of a stream is suitable for supporting aquatic life as a designated use. The entire length of the East Fork of Twelvepole Creek below East Lynn Lake is listed by WVDEP as impaired due to exceedances in CNA Biological (WVDEP, 2022). CNA-Biological exceedance does not indicate the water body is not suitable for contact recreation. Rich Creek is impaired due to exceedances of Iron and a TMDL has been completed. In 2022, Cove Creek was listed as impaired due to exceedances of CNA-Biological, Iron, and Fecal Coliforms. Kiah Creek is listed as impaired due to exceedances of Iron and Fecal Coliform and a TMDL is in place.

Table 4-2 identifies the specific areas of concern for East Lynn Lake and its tributaries in terms of WV water body designated uses. **Figure 4-1** shows the locations of the East Lynn Lake tributaries included in the table.

Table 4-2. Status of designated uses for East Lynn Lake and tributaries

Location	Category	Warm Water Fishery	Public Water Supply	Water Contact Recreation	Agriculture & Wildlife	Water Supply Industrial
East Lynn Lake	2	Insufficient Data	Fully Supporting	Fully Supporting	Fully Supporting	Fully Supporting
East Fork/ Twelvepole above lake to RM 35.7	4a	Not Supporting	Fully Supporting	Fully Supporting	Fully Supporting	Fully Supporting
Brush Creek RM 1.6 to headwaters	4a	Not Supporting	Fully Supporting	Fully Supporting	Fully Supporting	Fully Supporting
Bartram Branch RM 0.4 to headwaters	2	Insufficient data	Fully Supporting	Fully Supporting	Fully Supporting	Fully Supporting
Lick Creek RM 2.7 to headwaters	5	Fully Supporting	Not Supporting	Not Supporting	Not Supporting	Not Supporting
Big Branch RM 0.3 to headwaters	2	Insufficient data	Insufficient data	Insufficient data	Fully Supporting	Fully Supporting
Mudlick Branch RM 0.2 to headwaters	3	Unassessed	Unassessed	Unassessed	Unassessed	Unassessed

Location	Category	Warm Water Fishery	Public Water Supply	Water Contact Recreation	Agriculture & Wildlife	Water Supply Industrial
Right Fork Lick Creek	4a	Not Supporting	Fully Supporting	Fully Supporting	Fully Supporting	Fully Supporting
Rich Creek RM 2.3 to headwaters	4a	Not Supporting	Fully Supporting	Fully Supporting	Fully Supporting	Fully Supporting
Beechy Branch RM 0.4 to headwaters	4a	Fully Supporting	Not supporting	Not supporting	Fully Supporting	Fully Supporting
White Oak Creek RM 0.1 to headwaters	2	Fully Supporting	Fully Supporting	Fully Supporting	Fully Supporting	Fully Supporting
Bluelick Branch RM 0.6 to headwaters	4a	Not supporting	Fully Supporting	Fully Supporting	Fully Supporting	Fully Supporting
Cove Creek RM 0.9 to headwaters	4a	Not Supporting	Not Supporting	Not Supporting	Fully Supporting	Fully Supporting
Alum Fork	4a	Fully Supporting	Not Supporting	Not Supporting	Fully Supporting	Fully Supporting
Kiah Creek RM 0.1 to RM 2.7	5	Not Supporting	Not Supporting	Not Supporting	Fully Supporting	Fully Supporting
Milam Creek RM 1.9 to headwaters	4a	Not Supporting	Fully Supporting	Fully Supporting	Fully Supporting	Fully Supporting

Category definitions

- 1 Fully Supporting all designated uses
- 2 Fully Supporting some but insufficient data for other designated use assessment
- 3 Insufficient or no data for assessing designated uses
- 4a. Waters that are impaired for one or more uses and have a TMDL
- 4b. Waters that are reasonably expected to return to supporting designated uses
- 4c. Waters that are impaired but not by a pollutant
- 5 Waters that are impaired for one or more uses and are expected to need a TMDL

Source: WVDEP, 2022

4.2.5 Topography, Geology and Soils

Topography: The East Lynn Lake drainage area lies within the maturely dissected Appalachian Plateau of the Kanawha physiographic province. This physical section is characterized by a mature plateau of fine texture with moderate to strong relief. Numerous hills and ridges ranging in elevation from 800 to over 1,600 feet are capped with near level resistant rock strata which manifests an ancient plateau. The older

streams are entrenched from 400 to 450 feet below the plateau level and meander in narrow valleys between moderately steep walls.

The East Lynn Lake drainage area is about 10 miles long and 8 miles across its widest point. The area surrounding the lake is very steep with 67% of the drainage area having slopes greater than 35%. Elevations range from about 660 feet near the lake to peaks of over 1,100 feet within a horizontal distance of 1,200 to 1,500 feet from the lake.

The floodplains are represented by narrow alluvial strips on alternate sides of meandering streams at several levels. The two upper tributaries, East Fork and West Fork, have similar characteristics as to length and steepness both being about 50 miles long and having a fall of 13.5 feet per mile and 13.0 feet per mile, respectively. According to USGS national map elevation data, the land surface in the project area varies by 784 feet from the lowest to the highest points. The relatively low elevations of some recreational facilities at East Lynn Lake result in flooding when lake stages exceed the seasonal pool elevations.

Geology and Soils: The East Fork of Twelvepole Creek's drainage area is underlain by sedimentary strata of Pennsylvanian age. Sedimentation took place upon a broad, constantly subsiding basin and great thicknesses of shallow water sediments were accumulated. The bedrock in descending geologic order (i.e., from youngest to oldest) consists of 3 series, the Conemaugh, Allegheny, and Pottsville.

The Conemaugh Series constitutes bedrock in the drainage area's ridges above an approximate elevation 850 feet and is underlain by 225 to 350 feet of rock comprising the Allegheny Series. Beneath the Allegheny Series, the Pottsville Series varies in thickness from 250 to 2,000 feet. The three series consist of a monotonous succession of sandstone, shale, and coals with an occasional thin limestone stratum.

The valley slopes are steep throughout the lake area above the floodplain; the overburden cover on the slopes averages 3 to 10 feet. Erosion of the weathered rocks keeps pace with disintegration by weathering so that thick accumulations of residual soils do not exist.

The U.S. Soil Conservation Service mapped the soils at East Lynn Lake identifying and characterizing specific soil types. Most soils are from old stream deposits washed from soils that were developed on acid shale, siltstone, and sandstone. Surface materials are characterized as fine and either sandy or silty loam, while all but two are less permeable sub-soils characterized as clay loam or clay. Nearly all soils are rated as "good" to "excellent" for growing trees and farming, if adequately drained. In a comprehensive grouping of the soils of the entire drainage area, the Soil Conservation Service places them in the "Gilpin-Upshur" series which has a fairly high clay or silt content.

As stated in Section 3.2.5, Federal agencies should comply with the FPPA. Soil information including Farmland information was gathered from the NRCS Web Soil Survey. The survey identified seven soil complexes comprising approximately 2,800 acres of farmland statewide importance and three soil complexes comprising approximately 975 acres as prime farmland. Full NRCS soil reports can be found in Appendix C.

Land Capability Classifications (Soils): *Section 3.2.5* discusses “land capability” as a measure of the suitability of land for use without resulting in permanent damage. Eight classes define the soil characteristics considered to determine the capability of lands to support specific actions. The eight classes are briefly described below and are described in more detail in *Section 3.2.5*.

Class 1 - Slopes of 0 to 3% and few limitations.

Class 2 - Slopes of 3 to 8% and moderate limitations.

Class 3 - Slopes of 8 to 15%, with severe limitations.

Class 4 - Slopes of 15 to 25%, with very severe limitations.

Class 5 - Little or no hazard of erosion but have other limitations. For example, such soils occur in areas that frequently experience overflows from nearby water sources.

Class 6 - Slopes of 25 to 35%, with severe limitations that make them generally unsuitable for cultivation and that limit their use mainly to pasture, range, forestland, or wildlife food and cover.

Class 7 - Slopes of 35 to 65%, with very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife.

Class 8 - These soils and miscellaneous areas have limitations that preclude their use for commercial plant production and limit their use to recreation, wildlife, or water supply or for aesthetic purposes. It may be necessary to protect and manage lands having these soils to prevent or limit damage to adjoining areas.

Table 4-3 identifies the land capability classes assigned to the East Lynn Lake Project lands. **Figure 4-8** illustrates how these classes are distributed throughout the project. No Class 1, 5, or 8 lands occur at East Lynn Lake. In addition, 1,414 acres of the project area were not assessed. Much of the unassessed land is submerged beneath the reservoir or is generally associated with the developed recreation areas, project operation and maintenance facilities, or with food plots and other small open wildlife management areas.

Three classes (i.e., 4, 6, and 7) cover a total of over 22,112 acres, or 89% of the project lands. **Table 4-3** indicates these three classes pose severe limitations on the types of management actions that can be pursued on them. The limitations are due in large part to these three classes having steep slopes that can range from 15 to 65%, and the potential for their soils to erode when the native plant cover is disturbed.

The most abundant Class 7 lands comprise 15,997 acres, representing 64% of the project area. These steep and rocky soils, having slopes ranging from 35 to 65%, are the most severely restrictive of the landscape at the East Lynn Lake Project. The steep terrain restricts their reasonable use to forest ecosystem functions, wildlife habitat, passive recreational pursuits, and/or aesthetic enjoyment.

Table 4-3. Land capability classes at East Lynn Lake

Land Capability Class	Dominant Condition	Acres	Percent Project Area
Unassessed	Unknown	1,414	6%
Class 2	Moderate Limits	970	4%
Class 3	Severe Limits (plants)	334	1%
Class 4	Very Severe Limit (plants)	2,514	10%
Class 6	Severe Limits (cultivation)	3,601	15%
Class 7	Very Severe Limits (cultivation)	15,997	64%
Total Acreage		24,832¹⁵	100%

Source: USACE, 2017c

¹⁵ The total area of the East Lynn Lake Project is 24,798. Acreages shown in **Table 4-3** are estimated using GIS.

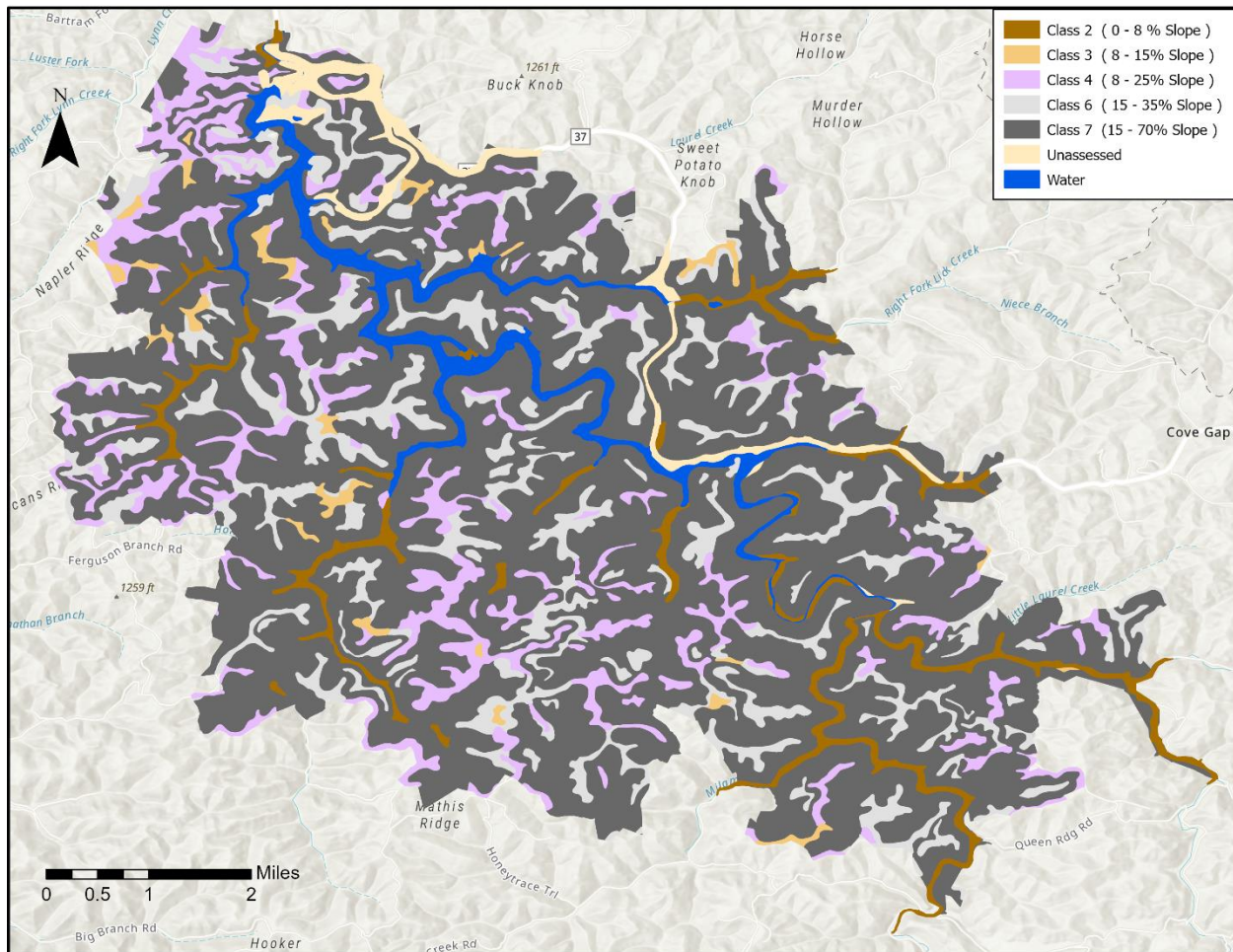


Figure 4-8. East Lynn Lake land capability classification

4.2.6 Ecologic Setting

The ecologic setting section provides a summary of the biological features of the project area and planning constraints. The biological environment includes vegetation, terrestrial wildlife, aquatic resources, invasive species, threatened and endangered species that may inhabit the Project, and any critical and sensitive wildlife habitat that may be present.

Relevant and applicable baseline information from the 2017 East Lynn Lake Level One Natural Resource Inventory (NRI) (USACE, 2017c) and other information sources have been used to describe the “Affected Environment” at East Lynn Lake, and for consideration in developing future resource management needs for the Project.

4.2.6.1 Vegetative Resources

East Lynn Lake Project lands are dominated by forests. **Figure 4-9** shows the project’s most prevalent forest type is Allegheny Cumberland Dry Oak and Woodland which is

dominated by a variety of hardwood tree species. **Table 4-4** demonstrates this forest type covers almost 18,880 acres, or 76% of the project lands, providing the largest and most continuous habitat (USACE, 2017c). This dry forest type covers the hilly, predominately acidic substrates in the Allegheny and Cumberland plateaus and the ridges of the Southern Ridge and Valley that characterize much of WV. The forest community is typically dominated by white oak (*Quercus alba*), southern red oak (*Quercus falcata*), chestnut oak (*Quercus prinus*), scarlet oak (*Quercus coccinea*), with lesser amounts of red maple (*Acer rubrum*) and hickory species. Intermixed within this forest type are approximately 1,266 acres of a subset habitat in which pines are more abundant.

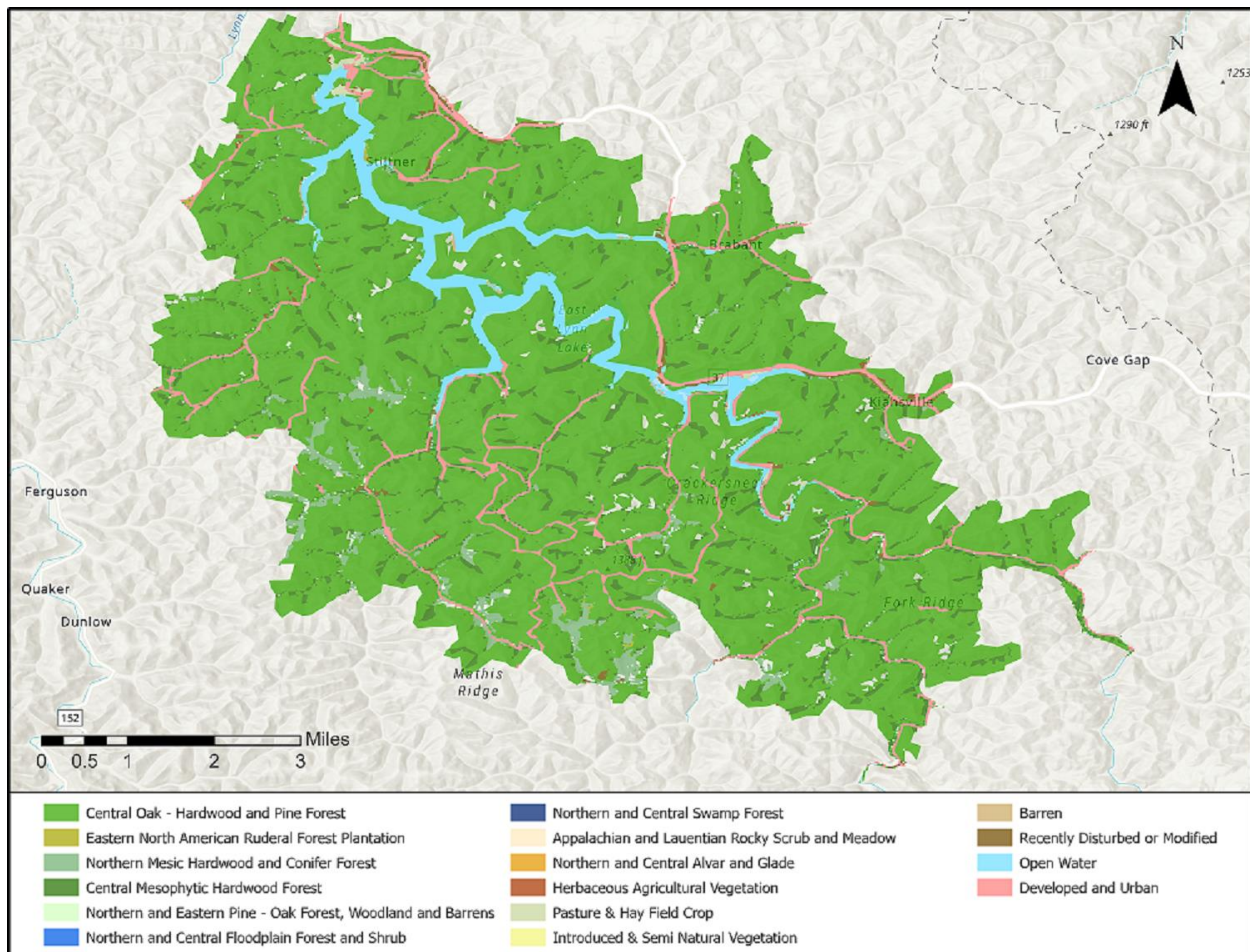


Figure 4-9. East Lynn Lake land cover

South-Central Interior Mesophytic Forest is the second largest forest type occurring on project lands, covering 2,293 acres. This high-diversity, predominately deciduous forest type occurs within areas having deep, enriched soils. Dominant species include sugar maple (*Acer saccharum*), American beech (*Fagus grandifolia*), yellow poplar

(*Liriodendron tulipifera*), American basswood (*Tilia americana*), northern red oak (*Quercus rubra*), cucumber tree (*Magnolia acuminata*), and black walnut (*Juglans nigra*).

The two most uncommon forest types occurring on project lands are 44 acres of Southern Appalachian Low Mountain Pine Forest and two acres of Eastern North American Grassland, Meadow and Shrubland.

Table 4-4 shows that the project lands also include over 206 acres of recently disturbed or modified areas and almost 84 acres of herbaceous agricultural vegetation. These relatively small open areas are generally associated with wildlife management activities on the 22,928 acres of project lands included within the East Lynn Lake WMA located on project lands. Lastly, 567 acres are designated as various levels of Developed and Urban areas. The developed areas are associated with the project's recreation assets along with the project's limited administrative and operation and maintenance facilities footprint.

Table 4-4. Vegetative cover at East Lynn Lake

National Vegetation Classification Division	Ecological System Level	Acres	Percent of Total Project
Eastern North American Cool Temperate Forest	Allegheny-Cumberland Dry Oak Forest and Woodland – Hardwood	18,879.7	76.0%
	Allegheny-Cumberland Dry Oak Forest and Woodland – Pine Modifier	1,265.7	5.0%
	Appalachian Hemlock-Hardwood Forest	504.5	2.0%
	South-Central Interior Mesophytic Forest	2,292.7	9.0%
	Southern Appalachian Low Mountain Pine Forest	44.0	0.2%
	Total	22,986.6	92.55%
Eastern North American Flooded & Swamp Forest	South-Central Interior Small Stream and Riparian	113.8	0.5%
	Total	113.8	0.5%
Eastern North American Grassland, Meadow & Shrubland	Central Appalachian Pine-Oak Rocky Woodland	2.0	0.008%
	Total	2.0	0.008%
Herbaceous Agricultural Vegetation	Cultivated Cropland	27.0	0.1%
	Pasture/Hay	56.7	0.23%
	Total	83.7	0.33%
Recently Disturbed or Modified	Disturbed/Successional – Grass/Forb Regeneration	121.5	0.5%
	Disturbed/Successional – Shrub Regeneration	85.0	0.3%
	Total	206.5	0.3%
Open Water	Open Water (Fresh)	879.6	3.5%
	Total	879.6	3.5%
Developed & Urban	Developed, High Intensity	90.0	0.4%
	Developed, Medium Intensity	8.0	0.03%
	Developed, Low Intensity	0.2	0.0008%
	Developed, Open Space	468.4	1.9%
	Total	566.6	2.3%
	Project Total	24,838.8	100.0%

Source: USACE, 2017c

Vegetative Condition Assessment: The USACE goal of having all land and water resources sustainable for future generations also applies to the East Lynn Lake project. The four categories used to assess the condition of the project's vegetation classes are described briefly below and more detailed descriptions are provided in **Section 3.2.6.1**.

Sustainable	Meeting desired state.
Transitioning	Managed to meet desired goals.
Degraded	Does not meet desired goals.
Not Assessed	Acreage that has not been evaluated or impacts are not understood.

The 2017 NRI (USACE, 2017c) assessed East Lynn Lake's vegetation classes. As shown in **Table 4-5**, based on remote sensing data, the assessment identified approximately 207 acres of project lands as transitional. The assessment also recommended the need for future field verification to evaluate the status of the lands in transition to determine if the involved acreage is trending toward a sustainable condition or being degraded.

Table 4-5. East Lynn Lake vegetation acreage summary

National Vegetation Classification	Acres
Forest & Woodlands	23,100.6
Temperate Shrubland & Grassland	2.0
Open Water	880.0
Agricultural Vegetation	83.9
Developed & Other Human Use	566.9
Recently Disturbed or Modified	206.7

Source: USACE, 2017c

4.2.6.2 Terrestrial Resources

The terrestrial vegetation communities described in **Section 4.2.6.1** provide a variety of habitats for a healthy, biodiverse ecosystem on East Lynn Lake project lands. Because of the similarity of the dominant forest types and habitats that occur at both East Lynn Lake and Beech Fork Lake and their proximity, the wildlife and avian communities occurring at both projects are also similar (**Section 3.2.6.2**). Based upon reported range information, between 30 and 40 species of mammals have the potential to be found at the East Lynn Lake Project. These include but are not limited to the Virginia opossum (*Didelphis marsupialis*), moles, shrews, bats and other species of rodents, Eastern cottontail rabbits (*Sylvilagus floridanus*), white-tailed deer (*Odocoileus virginianus*), and wild turkey (*Meleagris gallopavo*).



White tail deer

The 22,928-acre East Lynn Lake WMA, comprising over 92% of the project's total land area, is managed under a lease agreement by WVDNR-Wildlife. The white-tailed deer and wild turkey are the primary big-game species hunted on the WMA (Glottfelty, 2019a). Deer numbers have increased since the project was constructed and hunting strictly controlled.

4.2.6.3 Aquatic Resources

East Lynn Lake's summer pool covers 1,005 acres. Prior to impoundment of the lake, a total of 38 species of fish were known to occur in the East Fork. That is compared to the 43 species reported from downstream of Beech Fork Lake (see **Section 3.2.6.3**). Due to the proximity and the general similarity of the stream habitats of the Twelvepole Creek Sub-basin's tributaries, their respective watersheds probably supported similar native fish populations prior to their impoundments. The habitat changes created by the two impoundments and the subsequent stocking activities have also had similar consequences at the two lakes (see **Section 3.2.6.3**). This is illustrated by the fact that 16 native fish species requiring flowing stream conditions no longer occur within the area covered by East Lynn Lake, compared to the 14 species that are no longer found in Beech Fork Lake. The communities of native fish species requiring flowing streams that were displaced by East Lynn Lake are now restricted to the lake's upstream tributaries that still possess suitable habitats (USACE, 1974a and 1974b).

East Lynn Lake supports 29 species of fish indigenous to southern WV. In addition, the WVDNR-Wildlife continues to stock fish at East Lynn Lake, including saugeye, (a hybrid of sauger (*Sander canadensis*) and walleye (*Sander vitreus*)); hybrid bass (a cross between striped bass (*Morone saxatilis*) and white bass (*M. chrysops*)); and tiger musky (a sterile hybrid of muskellunge (*Esox masquinongy*) and northern pike (*Esox lucius*)). Since these three hybrid crosses are sterile and incapable of reproduction, they do not pose significant problems for native species. It is probable that some individuals from each of the species and hybrid crosses stocked in the lake have migrated both upstream into the headwater reaches of East Lynn Lake watershed and downstream of the dam.

WVDNR-Wildlife enhances fish habitat by placing cut trees and other shrubby vegetation in shallow sections of the lake. This attracts game fish, and the locations of these areas are mapped and made available to anglers. However, the vegetation can become dislodged and pose a safety concern to boaters.

Operation of East Lynn Lake for flood control results in pool fluctuations which can have a negative effect upon fish and other aquatic organisms within the lake. Fluctuating water levels can inhibit the establishment of rooted aquatic vegetation. The absence of such vegetation can adversely affect aquatic life since vegetation provides places where insects are produced, small fish species reproduce and seek shelter from larger predacious fish, and large fish feed, hide, and construct nests for reproduction.

Although a regular seasonal drawdown-refill schedule exists for the operation of the lake that is sensitive to the annual reproduction requirements of fish, extended rainy periods can occur requiring storage of flood volumes above summer pool levels during May and June. To restore the flood storage capacity of the lake, the subsequent drawdown of lake levels can occur during a critical spawning period. Such events can expose nests and eggs to drying, resulting in the loss of a large part of the year class for the affected species. However, the large volume of water stored within East Lynn Lake and regulation capabilities provided by the dam, allows releases to be made to augment downstream flows and improve water quality during periods of low flow.

4.2.6.4 Wetlands

The USFWS's NWI system (Cowardin, et al., 1979) was used to identify and map wetlands at the project. The NRCS's SSURGO (digital soil survey) (NRCS, nd) was evaluated to identify hydric soil complexes.

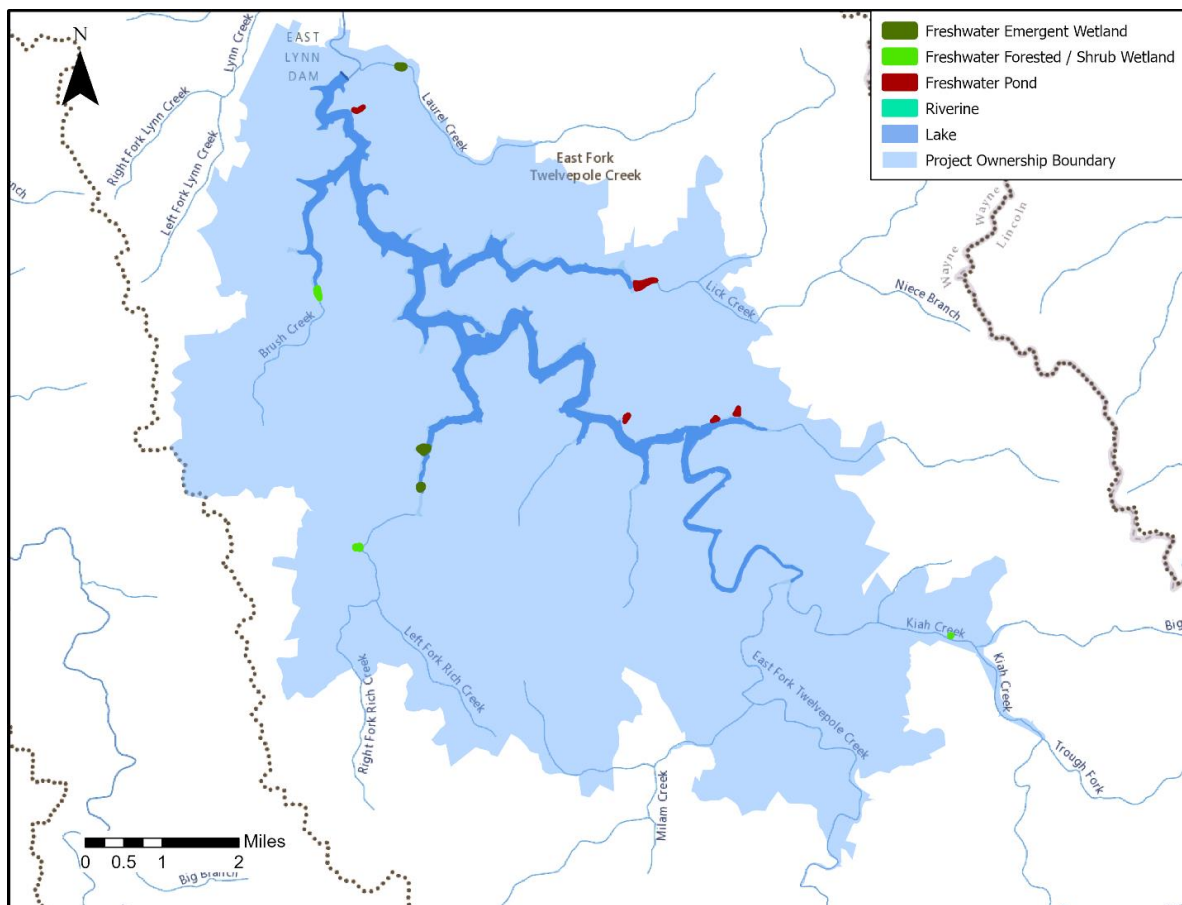
Wetlands are classified into one of five distinct systems. Three of the wetland systems can be found at the East Lynn Lake Project area: lacustrine, palustrine, and riverine systems. Lacustrine wetlands and deep-water habitats have all of the following characteristics: (1) situated in a topographic depression or a dammed river channel; (2) lacking trees, shrubs, persistent emergents, emergent mosses or lichens with 30 percent or greater areal coverage; and (3) total area of at least 8 hectares (ha) (20 acres). A palustrine wetland is an inland freshwater area dominated by vegetation and riverine wetlands depend on the flow of water conveyed by natural or artificial channels, including rivers, streams, ditches, and canals. Riverine wetlands lie adjacent to rivers or streams and are dependent on the flow of water. In the East Lynn Lake project area, lacustrine wetlands are the most prevalent, comprising 1,008 acres; followed by riverine wetlands comprising 488.5 acres; and palustrine wetlands with 6.4 acres.

Table 4-6 provides a wetland breakdown to class level, while **Figure 4-10** contains a map showing the locations of the wetlands occurring at the East Lynn Lake project.

Table 4-6. NWI classified wetlands at East Lynn Lake

NWI Code	System	Class	Acreage
L1UBHh	Lacustrine	Lake	1,008.00
R3UBH	Riverine	Stream	37.20
R4SBC	Riverine	Stream	195.10
R5UBH	Riverine	Stream	256.20
PUBHh	Palustrine	Freshwater Pond	1.84
PFO1C	Palustrine	Forested/Shrub	0.10
PSS1Ah	Palustrine	Forested/Shrub	1.22
PSS1C	Palustrine	Forested/Shrub	0.40
PSS1E	Palustrine	Forested/Shrub	0.40
PEM1A	Palustrine	Emergent	0.56
PEM1Ch	Palustrine	Emergent	1.50
PEM1Fh	Palustrine	Emergent	0.40
Total			1,502.90

Source: USACE, 2017c



Source: USACE, 2017b

Figure 4-10. East Lynn Lake wetlands

4.2.6.5 Threatened and Endangered Species

Section 2.7.5 discusses the Special Status Species reported or having the potential to occur within the Twelvepole Creek Sub-basin. Of the eight federally listed endangered and threatened species found in the Twelvepole Creek Sub-basin (**Table 2-2**), four species have the potential to reside in the East Lynn Lake Project area (**Table 4-7**). There are three species of migratory birds protected by the Migratory Bird Treaty Act in the East Lynn Lake Project area (**Table 4-8**).

Table 4-7. Federally protected threatened and endangered species having the potential to occur within the East Lynn Lake Project area

Common Name	Scientific Name	Status
Gray Bat	<i>Myotis grisescens</i>	Endangered
Indiana Bat	<i>Myotis sodalis</i>	Endangered
Northern Long-eared Bat	<i>Myotis septentrionalis</i>	Threatened
Monarch Butterfly	<i>Danaus plexippus</i>	Candidate

Source: USFWS, 2022

Table 4-8. Federally protected migratory birds occurring within the East Lynn Lake Project Area

Common Name	Scientific Name	Season Found
Cerulean Warbler	<i>Dendroica cerulean</i>	Breeding
Eastern Whip-poor-will	<i>Antrostomus vociferus</i>	Breeding
Wood Thrush	<i>Hylocichla mustelina</i>	Breeding

Source: USFWS, 2022

Section 2.7.5 also pointed out that the Twelvepole Creek Sub-basin, is included in WVDNR-Wildlife's Cumberland West CFA (**Figure 4-11**). A total of 161 taxa listed as SGCN occur or have historically occurred in the Cumberland West CFA, with the majority of those listed as occurring in the type of habitats present in the East Lynn Project area.

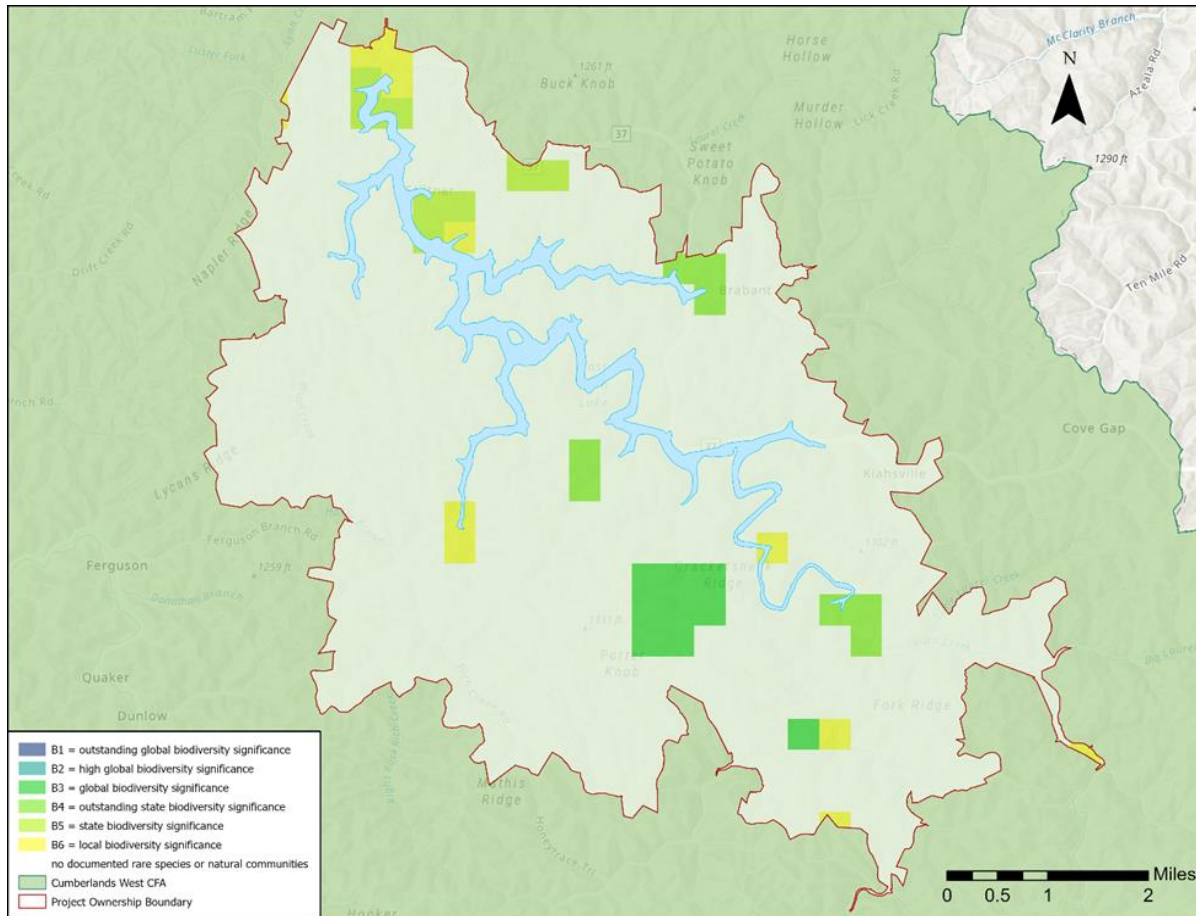


Figure 4-11. East Lynn Lake within the Cumberland West CFA

4.2.6.6 Invasive Species

The exotic species discussion in **Section 2.7.6** addressed invasive species occurring within the Twelvepole Creek Sub-basin. A total of 199 invasive species representing various taxonomic groups have been identified in Wayne County (USACE, 2017b).

Table 3-9 in **Section 3.2.6.6** lists four invasive insect species, four disease-causing fungi species, and five aquatic organisms known to occur in Wayne County that have a very strong likelihood of becoming established at the East Lynn Lake Project.

Of the 199 invasive species reported in Wayne County, the occurrence of six invasive plant species were listed in the 2017 Natural Resources Inventory (USACE, 2017c) to be present in the East Lynn Lake Project area as shown in **Table 4-9** (USACE, 2017c). According to the 2017 report, three of the six invasive plant species had affected a total of 11 acres or 0.005% of the project lands. However, the Huntington District's 2020 O&M Budget Request Package to USACE Headquarters indicated the acreage covered by two of the three invasive species had significantly increased between 2017 and 2020, with three new invasive species having become established on project lands by

2020 (**Table 4-9**). Future attention should be devoted to controlling the spread of these invasive species.

Table 4-9. Invasive species found at East Lynn Lake in 2017 and 2020

Invasive Species		Type of impact	Acres impacted		Acres treated
Common Name	Scientific Name		2017	2020	
Emerald ash borer	<i>Agrilus planipennis</i>	Habitat Loss	-	15	0
Japanese knotweed	<i>Polygonum cuspidatum</i>	Habitat Loss	1	25	0
Kudzu	<i>Pueraria montana</i>	Habitat Loss	-	10	0
Multiflora rose	<i>Rosa multiflora</i>	Habitat Loss	5	30	0
Tree-of-heaven	<i>Ailanthus altissima</i>	Habitat Loss	-	5	0
Autumn Olive	<i>Elaeagnus umbellata</i>	Habitat Loss	5	unknown	unknown

Source: USACE, 2017c; [USACE, 2020a](#)

Fish species considered invasive include the common carp (*Cyprinus carpio*) which is an established member of the East Lynn Lake fishery resulting from historic introductions in the 1800s that preceded impoundment of the lake and occurred at countless locations across the country.

4.2.7 Cultural Resources

Background

East Lynn Lake is in Wayne County, WV roughly ten miles south of Wayne, WV. Construction of the dam began in 1968 and it was completed in 1972. The dam is now nearly 50 years of age. Construction of the Lake resulted in the destruction of the town of Stiltner at the mouth of Brush Creek. It also required the relocation of a large stretch of WV Route 37, which formerly followed the East Fork Twelvepole Creek valley that was inundated by the lake.

Cultural Resource Investigations

An early survey by McMichael and Mairs (1965) was followed up by additional work in 2011 (Schwarz et al., 2011). A recent Level II NRI (CRA, 2017) examined cultural resources in the project area, generally corresponding to earlier descriptions from the 1960s. A variety of sites were examined. Site locations and contents were inconclusive and need to be re-evaluated and inventoried. CRA reports that in general, no evidence shows that the sites suffer from impacts resulting from external pressure. Materials from the 1965 work by McMichael and Mairs is curated at the Blennerhassett Museum, Parkersburg, WV, under Accession Nos. 436, 483, 484, 485, and 486 (USACE, 1995).

Cultural Resources

There are several cultural resources in the East Lynn Lake project area ranging from prehistoric to historic. Sites exist that require NRHP significance assessment or reassessment. As previously discussed, there are also numerous drift mines in the area which should be researched for the development of interpretive programs. Finally,

the dam at East Lynn Lake is nearing 50 years of age; it also could be evaluated for NRHP eligibility status.

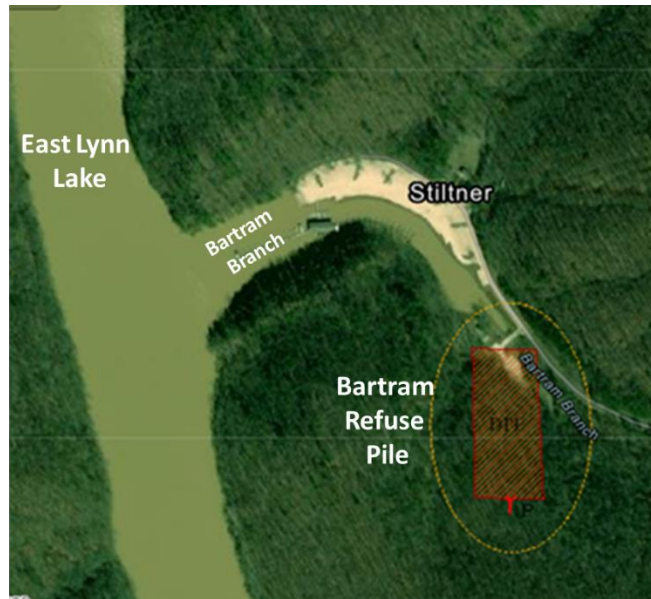
4.2.8 Hazardous, Toxic, and Radioactive Waste (HTRW)

Management of the East Lynn Lake Project involves maintenance of a wide variety of facilities. Those facilities include the dam, structures of all types, numerous recreation assets, campgrounds, roads, open lands, WMA, etc. The maintenance actions include not only those accomplished by the USACE staff, volunteers, and contractors on lands under the USACE's direct control; but those actions performed by the lessees such as the WVDNR-Wildlife on the WMA. Maintaining such a diverse project requires the use and application of a variety of fuels, oils, greases, paints, pesticides, and other chemicals. The storage, use, and disposal of many of these materials are governed by various federal and state rules, regulations, and guidelines which must be adhered to in order to protect maintenance personnel, the visiting public, and the overall environment.

A comprehensive search of records related to HTRW issues for East Lynn Lake was conducted by Huntington District in March 2021 (USACE, 2021). The Search revealed the following two records:

- A record was found stating that on 20 August 1992, a gasoline line ruptured at the lake's marina spilling fuel into the lake. Efforts were made to contain and cleanup the gasoline.
- A second record stated that on 21 and 22 April 1995, during the removal of gasoline storage tanks at Lakeside Marina it was discovered that piping had leaked and contaminated the soil. The impacted area was cleaned up and the affected soil was disposed of in accordance with applicable criteria.

The WVDEP coal database includes the Bartram Refuse Pile, a 13 acre abandoned mine area immediately south of the Lakeside Area (**Figure 4-12**). WVDEP indicates that there are "dangerous piles and embankments" on the site. No other information is available. Additional investigation should be performed prior to any disturbance of the area (WVDEP, 2022b).



Source: WVDEP, 2022b

Figure 4-12. Bartram Refuse Pile

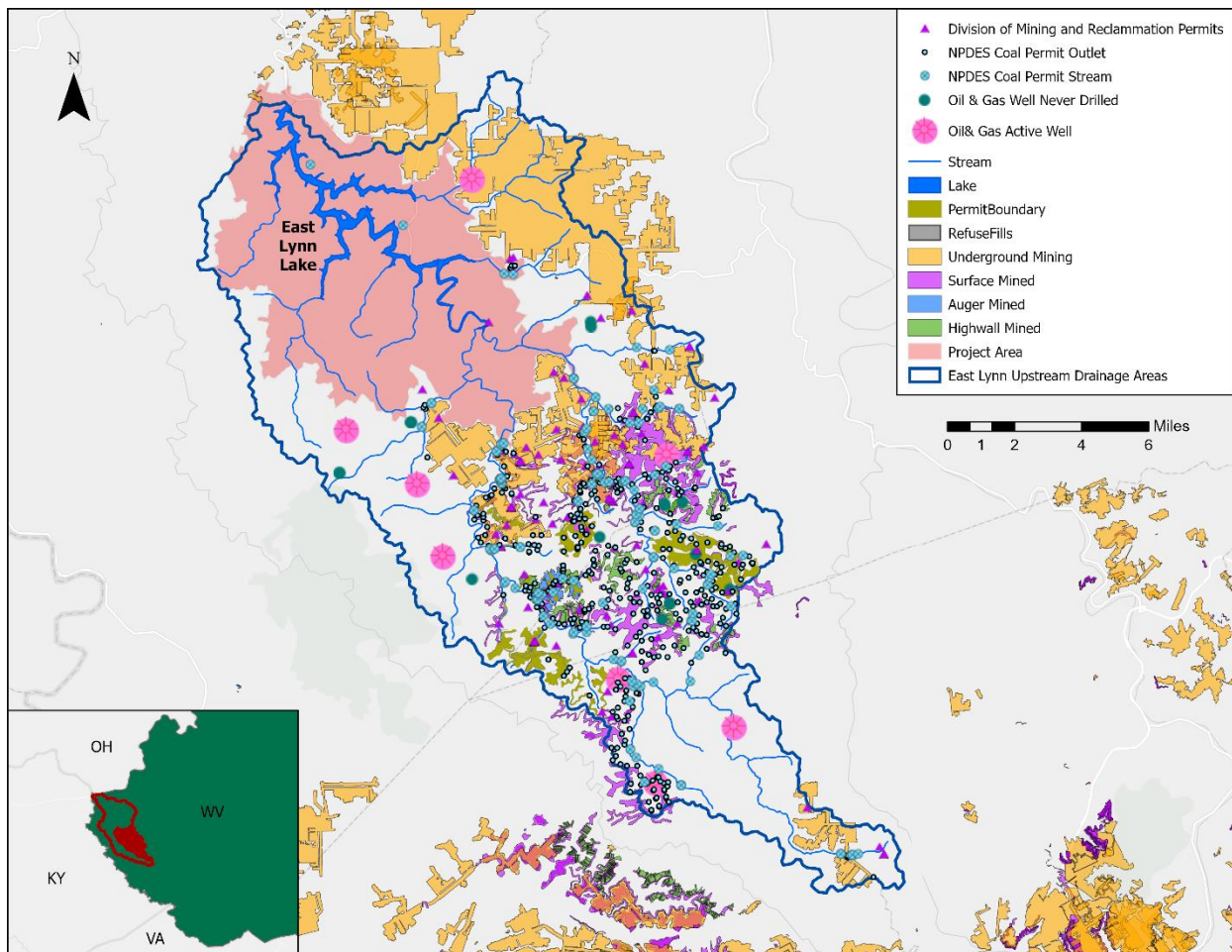
4.2.9 Minerals and Timber Resources

Mineral Resources: Coal, gas, and oil are the three minerals of commercial interest occurring within the Twelvepole Creek Basin. The major coal seam outcropping in Wayne County is referred to as the No.5 Block which underlies the southern half of the East Lynn Lake drainage area and is the same seam underlying Beech Fork Lake. Historically, coal mining was the main industry of the region. East Lynn Lake was the center of the mining industry on the Left Fork of Twelvepole Creek. By 1913, the West Virginia Geological Survey listed approximately 73 mine openings within the present boundaries of the East Lynn Lake Project (Krebs and Teers, 1913). Several abandoned drift mines, from which domestic coal was produced prior to the purchase of project lands, are within the project area, many of which are found on hillsides overlooking the lake. These openings enter horizontal tunnels excavated to exploit the coal seam.

Several active coal mining operations are immediately adjacent to East Lynn Lake project lands, including Rockspring's Camp Creek Mine and Argus Active No. 8 Mine. The surface operations extract from the No. 5 Block coal seam while the underground operations extract from the Coalburg/Winifrede and the No. 5 Block coal seams. The Coalburg/Winifrede reserves typically are low in sulfur, and high in British Thermal Units (BTU), used principally for electric generation. In the past, these two companies with adjacent mining operations applied to deep-mine approximately 13,000 acres of the 22,928-acre East Lynn WMA. In 2014, the Bureau of Land Management (BLM) held a coal lease sale in response to the two leases by application. Following the auction, Argus Energy WV, LLC was awarded a lease for 7,642 acres of East Fork Lake Project

lands to mine all reserves recoverable by underground room and pillar mining methods (BLM, 2022). However, no mining has taken place to date.

Wayne County has historically been a significant producer of natural gas. Gas and oil are known to occur within the East Fork Twelvepole Creek Watershed. The area within and surrounding East Lynn Lake was producing natural gas before the USACE acquired the lands to construct the project in the late 1960s. The Columbia Gas System and the Industrial Gas Corporation held substantial leases in the East Lynn Lake watershed and some of which are still active for gas production within the East Lynn Lake Project. Active oil, gas, or mining developments are shown in **Figure 4-13**.



Source: http://www.wvgs.wvnet.edu/GIS/CBMP/all_mining.html

Figure 4-13. Oil, gas, and mining operations in upstream drainage area of East Lynn Lake

Timber Resources: A forest inventory of project lands was conducted in 1972 to develop the Forest Management Plan component of the initial 1973 East Lynn Lake

Master Plan (USACE, 1973). The WVDNR-Wildlife under a lease agreement is responsible for timber management activities within the East Lynn Lake WMA. **Table 4-10** identifies the acreages, volumes, dates, and locations of the five most recent selective timber harvests conducted by the WVDNR within the WMA. According to the most recent 5-year management plan, WVDNR-Wildlife harvests timber from a different 300-acre tract every other year, with the primary purpose being to improve habitat conditions for wildlife (Glotfelty, 2019b).

Table 4-10. Historic timber sales for the East Lynn Lake WMA

Timber Sale Name	Date Sold	Acres	Volume (BDFT)
Alum Fork	September 17, 2012	425	1,281,521
Bluelick Branch	July 27, 2012	425	1,652,907
Rich Creek #1	April 15, 2012	150	773,693
Twelvepole Creek #1	June 14, 2012	175	971,159
Left Fork Rich Creek	January 11, 2013	307	921,000

Section 4.2.6.1 describes the current condition of the East Lynn Lake forest communities existing on project lands.

4.2.10 Aesthetics

Visual quality describes the aesthetic traits of an area based on the natural and artificial features of its environment. The compatibility of a project with existing structures and the natural environment is known as “landscape characteristics”. Landscape characteristics define whether the project blends with the existing features of the area, or contrasts with the setting and appears out of place. Visual sensitivity includes public values, goals, awareness, and concerns regarding visual quality.



View from East Lynn Lake Marina

East Lynn Lake sits in the floor of a valley flanked by steep forest covered slopes of the surrounding hills that crest upwards to 500 feet above the lake. The numerous incised small tributary watersheds draining into the lake form an abundance of coves. The surrounding extensive acreages of forested project lands are largely maintained in a natural condition and include a mix of older growth trees and understory. The vegetation offers changes in color, texture, and size that vary by topography, vegetation

type, and season. There are striking views at many locations where steep tree covered slopes meet the lake's water surface. The tributaries offer scenic views of narrow meandering streams with overhanging trees. Developed facilities are limited to high density recreation areas and do not adversely affect the overall aesthetics of the Project.

East Lynn Lake adds visual diversity to the Twelvepole Creek Sub-basin.

Although the dam, lake, and associated features are manmade, they do not

detract from the aesthetic qualities of the larger natural area of the project. The view of the lake is enhanced by the rugged scenic shoreline that is backed by steep slopes which make the lake an attractive recreation resource in the region. Surrounding the lake and the immediate shoreline, land use in the project area includes operational, recreational, and wildlife management.



View of Cove Creek from East Fork Campground

Trash is washed into the upper reaches of the lake during storm events. The primary source of the trash is Cove Creek near the East Fork Campground. The trash floating in the water and trapped by vegetation along the shoreline can be unsightly at times in Cove Creek and the lake below it.

4.2.11 Noise

Noise conditions at East Lynn Lake vary depending on recreational usage and location. Noise generation from recreation areas such as campgrounds, boat launches, day use areas is heightened during the recreation season (May – September). Some recreation activities with the potential to produce enough noise to disturb other recreationalists include waterskiing, and fishing tournaments. In these situations, boat ramps and marinas could be high emitters of noise as they are the starting point for many these activities. The mountainous topography and thick forests also play a key role in how noise travels, with the steep mountains around the lakes preventing sound from traveling around them and the thick forests helping to absorb the noise. Some locations within the project area experience relatively low noise conditions such as the wildlife management area, which are more characteristic of a natural setting and man-made noise from hunting is not as frequent and typically short in duration. Illegal activities such as unauthorized use of off-road recreational vehicles can contribute to elevated noise levels.

4.2.12 Transportation and Traffic

East Lynn Lake is located approximately 25 miles from I-64. The road system to East Lynn Lake generally consists of winding two-lane rural roads which limit the locations from which the lake can be accessed within a one or two-hour driving time.

From Huntington, WV, the largest nearby population center, the lake can be reached via State Route 152 to Wayne and then via SR 37 (i.e., East Lynn Road) which provides relatively direct access to all USACE managed areas. I-64 is the primary road providing access from the east and west from Charleston, WV and Lexington, KY, respectively. From the south, interstate highway access is not available, and access is provided by State Routes 152 and 10 which are winding two-lane rural roads.

The dam, tailwater area, and overlook entrance is directly off Route 37 at the north end of the lake. From Route 37, the marina is accessible via Marina Road. The East Fork Campground is a 9-mile drive from the dam – south on Route 37 to East Fork Road. The Lakeside Boat Launch area is located on East Fork Road between the East Fork Campground to the south and Route 37 to the north. Lick Creek Day Use Area is located along Route 37; 5.5 miles from the dam. South of the Town of Wayne, WV, traffic on Route 37 is light. In 2010, the average daily traffic count on Route 37 in the vicinity of East Lynn Lake ranged between 200 and 2,200 (WVDOT, 2020).

4.2.13 Utilities

Utility providers for East Lynn Lake are described in **Table 4-11**.

Table 4-11. East Lynn Lake utility providers

Utility	Provider
Solid Waste	Mountain State Waste, Weston, WV provides garbage services
Electricity	Appalachian Power Company provides electricity
Telephone	Frontier Telephone Company provides telephone service to the project
Water	<u>Below Dam, & Dam site</u> Wayne Water & Sewer Services, Wayne, WV <u>East Fork</u> Branchland-Midkiff PSD, Branchland, WV. <u>Lick Creek and Lakeside Areas</u> Project wells provide water
Wastewater	There are four sewage treatment plants (STP) located on the project. The STP's are located at the Dam site/Office, Lakeside, & two in East Fork Campground. The Below Dam, & Lick Creek areas have septic/leach fields.

4.2.14 Real Estate Acquisition Policies

During design of East Lynn Lake, the dam site was moved upstream 0.4 miles from the original site identified in the Survey Report; land acquisition criteria were changed; and access impacts were reevaluated. These three factors required the acquisition of more

land than originally estimated for the project. The last two factors were predominant in increasing fee purchases to 24,798 acres and easements on 24 acres.

The new acquisition criteria required fee purchase of real estate horizontally beyond the spillway crest elevation instead of beyond the seasonal pool elevation. Access evaluation studies determined which lands were left without adequate access and what the provision of access would cost. Additional land was purchased when the cost of providing access was close to, or exceeded, the cost of fee acquisition. The largest block of such properties consisted of 11,000 acres. This land was severed by the relocation of SR 37 to the eastern side of the lake. It extends to the ridge of the western divide between the dam and Milam Creek. Project land purchases included all lands required for construction, sites designated for public use, rights-of-way for relocated highways, and the above mentioned 11,000 acres severed by the relocation of SR 37.

In accordance with the acquisition plan and to minimize project degradation, all coal lands within the East Lynn Lake Project area were acquired in fee with the exception of approximately 1,296 acres which were left outstanding with no encumbrances.

Developed oil and gas activity was allowed to continue with subordination of these mineral rights to other project purposes (i.e., subject to certain restrictions for pollution and debris control and to avoid interference with the authorized project purposes).

Appendix A includes a comprehensive description of laws, regulations, and EOs that apply to real estate acquisition and real property management.

4.2.14.1 Outgrant Lands

Outgrant lands are federal lands on which a right for use of the property has been granted through a lease, easement, license, or permit. East Lynn Lake Project lands include outgrants to a concessionaire for operation of the lake's marina and to WVDNR-Wildlife for fish, wildlife' and forest management at the WMA. **Table 4-12** lists and **Figure 4-14** illustrates federal lands that are managed by USACE compared to the outgrant lands that are managed by WVDNR-Wildlife and a concessionaire.

Table 4-12. East Lynn Lake USACE managed and outgrant lands

Land Management	Acres
USACE Operations and Recreation	5,640
WVDNR WMA Outgrant	22,928
Marina Concession	10
Total Project Lands	28,578
Total Flowage Easement	24

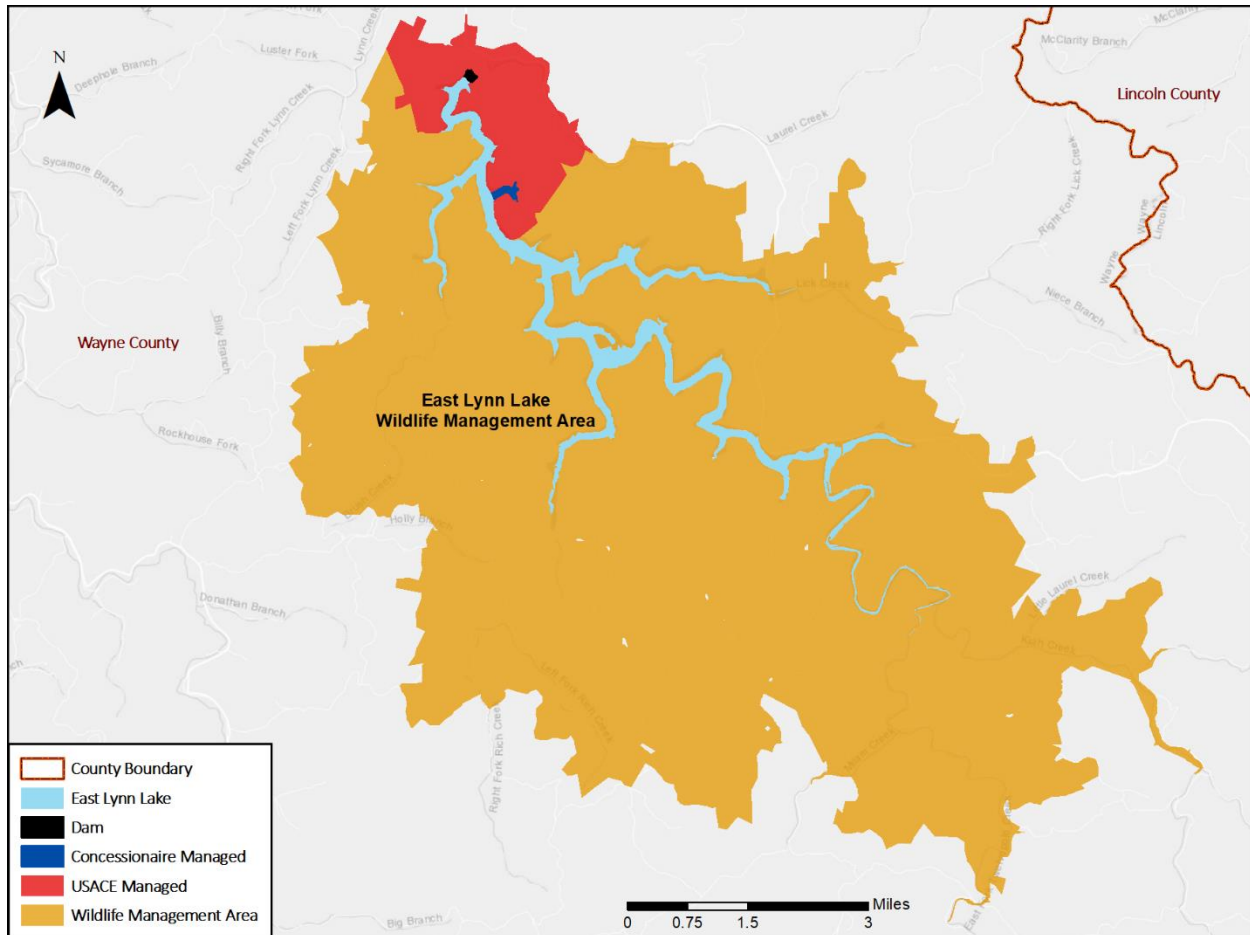


Figure 4-14. East Lynn Lake WMA and USACE managed lands

4.3 East Lynn Lake Recreation Analysis

Existing recreation opportunities at East Lynn Lake include picnicking, camping, boating, fishing, water skiing, swimming, hunting, hiking, bicycling, and sightseeing. Horseback riding and backcountry camping are not available on East Lynn Lake Project lands. Hunting is allowed in the WMA and a WV hunting license is required.

Three hiking trails have trailheads in the Tailwater Fishing Area, Dam, Overlook Area, and Lakeside Area. The Damsite Trail is a 1-mile trail (round trip) from the Tailwater Fishing Area to the Dam. The Overlook Trail connects the Overlook Area and the Lakeside Area and is 4-miles long (roundtrip). The Lakeside Trail is a 1.5-mile-long loop trail from the Lakeside Area. Another hiking trail is available at the East Fork Campground.

There are a total of four shelters at East Lynn Lake recreation areas. They can be reserved for a fee on www.recreation.gov. The shelters are available on a first come-first-serve basis unless previously reserved. All shelters have electricity and capacity up to 100 visitors.

4.3.1 Overview of Recreation Areas

The East Lynn Lake Project recreation areas are managed by the USACE, WVDNR-Wildlife, and a private lessee. Additionally, the camp store at East Fork Campground is operated by a concessionaire. The primary recreation areas and managing entities are summarized in **Table 4-13**. **Figure 4-15** identifies the locations of the East Lynn Lake recreation areas and summarizes the amenities at each. More detailed descriptions of the recreation areas and opportunities they provide are described in the following sections.

Table 4-13. Primary recreation areas and managing entities at East Lynn Lake

Primary Area	Managing Entity
Dam Site and Visitor Center	USACE
Tailwater Fishing Area	USACE
Overlook Area	USACE
Laurel Creek Fishing Area	USACE
East Fork Campground	USACE
Lick Creek Area	USACE
East Fork Boat Launch	USACE
Lakeside Area	USACE
East Lynn Lake Marina	Lessee
East Lynn Lake	USACE
East Lynn Lake WMA	WVDNR-Wildlife
East Fork Swimming Beach	USACE

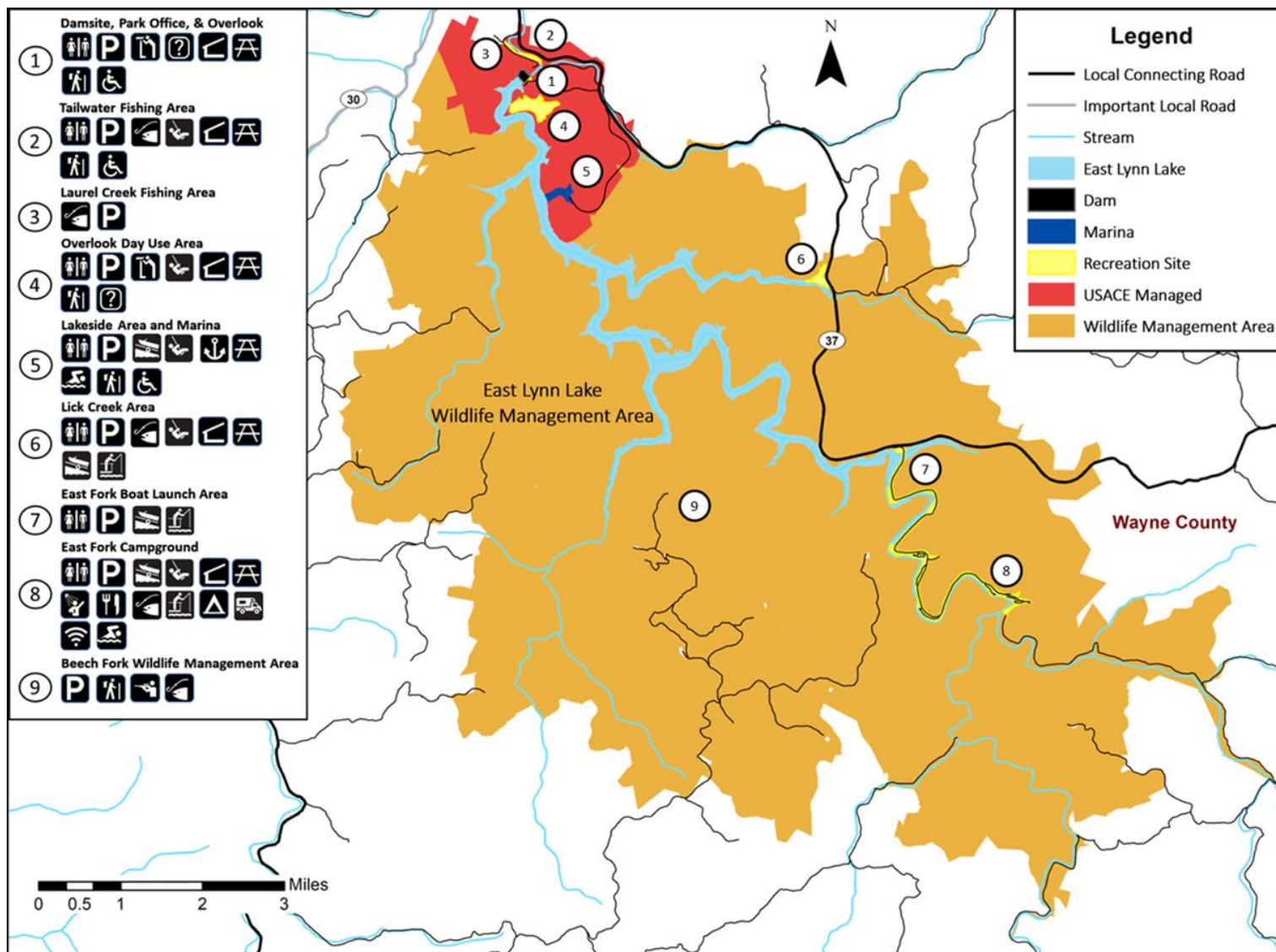


Figure 4-15. East Lynn Lake recreation areas

4.3.1.1 Dam Site, Park Office, and Overlook

The Dam Site is ten acres in size and includes the dam, intake and outlet structures, and operations office. An overlook, provided with a ten-space parking area and a paved esplanade, provides good views of the lake. A trailhead is accessible from the Visitor Center.



Dam Site, Office, and Overlook

Tailwater Fishing Area

Recreation at the Tailwater Area provides day-use recreation opportunities. The primary recreation activity is fishing. Facilities available at the Tailwater Fishing Area include picnic tables, group shelter, and playground. Additionally, a restroom facility is located adjacent to the 28-space paved parking area.



Tailwater Fishing Area

4.3.1.2 Overlook Area

This site occupies ten acres of land about 1,000 feet south of the dam site via a two-lane access road. It is located on a peninsula that juts out into the lake offering scenic lake views in three directions. It is a popular venue for large events such as weddings and family reunions. The area contains a 37-space parking area, 27 picnic tables, three shelters,



Overlook restrooms, shelter, playground, basketball court, and volleyball court

restrooms, and a playground. Also included in this area are basketball and volleyball courts and a softball field.

4.3.1.3 Laurel Creek Fishing Area

The Laurel Creek Fishing Area is located upstream of the Tailwater Fishing Area near the confluence of the East Fork and Laurel Creek. It has a small gravel parking area and provides bank fishing just below the dam.



Laurel Fishing Area look upstream toward the dam

4.3.1.4 East Fork Campground

The East Fork Campground is managed by the USACE. Visitors come to the campground for camping, boating, water skiing, fishing, swimming, hiking, hunting, and picnicking. There are 167 campsites grouped in Areas 1 through 6 located along the East Fork of Twelvepole Creek. Half of the campsites in Area 3, and all campsites in Areas 5 and 6 have 50-amp electric hookups. All campsites are provided with water. Campsites in Areas 1 through 4 can be reserved at www.recreation.gov and campsites in Areas 5 and 6 are available on a first come-first-serve basis.

Amenities at each of the six campsite areas include flush and pit toilets, showers, potable water, and playgrounds. A concessionaire operates a camp store that offers provisions, rentals, and provides Wi-Fi to campers for a fee. A dump station is located near the campground entrance. A trailhead for the East Fork Trail is located between Areas 1 and 2. The hiking trail is for campers and is a 1.5-mile-



East Fork Campground Area 6

long loop trail. There are paved single-lane boat launches at Areas 2 and 5. A fee is charged for use of the boat launches. The campground includes basketball and volleyball courts near the camp store. An amphitheater is also included in Area 2. The boat launches, restrooms, and campsites are all universally accessible.

4.3.1.5 Lick Creek Area

The area has paved parking for 46 car-trailer combinations, a two-lane paved boat launch, restrooms, playground, shelter, trailhead, fishing pier, and picnic tables. A daily fee is charged for boat launching. Lick Creek is a designated no-wake zone from its confluence with the East Fork to the Lick Creek Area.



Lick Creek – Shelter 4

4.3.1.6 East Fork Boat Launch Area

The East Fork Boat Launch Area is located on the East Fork about 0.7 miles downstream of the East Fork Campground. It has a two-lane paved boat launch directly off East Fork Road. A fee is charged for use of the boat launch. There is paved parking for 30 car-trailer combinations and 15 cars. The area has restrooms, picnic tables, and a fishing pier.



East Fork Boat Launch

4.3.1.7 Lakeside Area

This area, adjacent to the marina, has a four-lane boat launch and parking for 180 car-trailer combinations and 15 cars. A fee is charged for use of the boat launch. A separate 20-car parking area is provided for the swimming area and the adjacent picnic area which includes picnic tables and a small, covered picnic area available on a first come-first-serve basis. A trailhead is also located here. Restrooms and a playground are also provided.



Lakeside picnic area

4.3.1.8 East Lynn Lake Marina

The marina is adjacent to the Lakeside Area. It is privately operated under a lease agreement with the USACE and provides 134 boat slips, fuel, fishing equipment, bait, boat rentals, and a snack bar.



East Lynn Lake Marina

4.3.1.9 East Lynn Lake

Visitors to East Lynn Lake enjoy boating fishing, skiing, swimming, picnicking, and observing the natural environment. There is no HP restriction for powerboats. Fishing is allowed from boats and the shoreline. The USACE and WVDNR-Wildlife manage the fishery program through habitat improvements and an aquatic vegetation program which benefits all fish species. A total of 29 fish species have been identified in the lake.



East Lynn Lake and Dam

Game fish occurring in project waters are largemouth, smallmouth, and striped bass, black crappie, red-breast sunfish, walleye, channel catfish and muskellunge. Channel catfish and muskellunge are stocked in the lake annually. Rainbow, brook, and brown trout are stocked in the dam tailwater and Lick Creek Pond once each month every year from February through May. A WV fishing license is required.

4.3.1.10 East Lynn Lake WMA

WVDNR-Wildlife manages the 22,928-acre East Lynn Lake WMA for conservation of fish and wildlife and public hunting. Conservation activities undertaken by WVDNR-Wildlife include fish stocking, imposing size limits as necessary, monitoring wildlife populations (including monitoring reproductive success and size distribution within species) and administering licensing regulations for sport fishermen. Game traditionally hunted include deer, grouse, squirrel, rabbit, raccoon, turkey, bear, and waterfowl. Over 50 miles of roads in the WMA provide good access for hunters.

4.3.1.11 East Fork Swimming Beach

The East Fork Swimming Beach is located on East Fork Road near the intersection with Route 37. East Fork Road also provides access to the East Fork Boat Launch and East Fork Campground. There is a designated swimming beach on the East Fork Road just off Route 37. The beach occupies about 250 feet of shoreline and is about 75 feet from the parking area to the lake. It has a paved parking area with spaces for 30 cars.

4.3.2 East Lynn Lake Recreation Activities and Visitation

4.3.2.1 Outdoor Recreation Activities

The project provides the opportunity to enjoy a wide range of recreational activities.

Figure 4-15 shows the locations of the recreational areas. **Table 4-14** lists the major recreation activities available, their locations, and their respective facilities.

Table 4-14. East Lynn Lake recreation activities and facilities

Activity	Location	Facilities
Boating	East Fork Campground	<ul style="list-style-type: none"> Two paved boat launches Parking for cars and trailers Restrooms
	Lakeside Area	<ul style="list-style-type: none"> Parking for cars and trailers Boat launch Restrooms Courtesy loading dock
	Lick Creek Area	<ul style="list-style-type: none"> Two-lane paved boat launch Parking for cars and trailers Restrooms
	East Lynn Lake Marina	<ul style="list-style-type: none"> Fishing gear and bait Boat slips
	East Lynn Lake WMA	<ul style="list-style-type: none"> Boating throughout lake
Camping	East Fork Campground	<ul style="list-style-type: none"> 167 campsites Electric and water hookups Restrooms and showers
Fishing	Tailwater Fishing Area	<ul style="list-style-type: none"> Bank fishing Restrooms Parking Camp Store Wi-Fi
	East Fork Campground	<ul style="list-style-type: none"> Bank fishing Restrooms Parking
	Lakeside Area	<ul style="list-style-type: none"> Bank fishing Restrooms Parking
	Lick Creek Area	<ul style="list-style-type: none"> Fishing pier Bank fishing Restrooms Parking
	East Lynn Lake WMA	<ul style="list-style-type: none"> Bank fishing Boat fishing
	Dam Site	<ul style="list-style-type: none"> Lake overlook

Activity	Location	Facilities
Other activities	Tailwater Fishing Area	<ul style="list-style-type: none"> ● Picnic tables and shelter ● Hiking trailhead
	Overlook Area	<ul style="list-style-type: none"> ● Picnic tables and shelter ● Basketball and volleyball courts ● Softball field ● Lake overlook
	East Fork Campground	<ul style="list-style-type: none"> ● Playgrounds ● Basketball court ● Volleyball court ● Amphitheater ● Hiking trailheads
	Lakeside Area	<ul style="list-style-type: none"> ● Hiking trailhead
	Lick Creek Area	<ul style="list-style-type: none"> ● Picnic tables and shelter ● Playground ● Hiking trailhead
	East Lynn Lake Marina	<ul style="list-style-type: none"> ● Marina store
	East Lynn Lake WMA	<ul style="list-style-type: none"> ● Hunting

4.3.2.2 Visitation by Recreation Area

The USACE Visitation Estimation and Reporting System (VERS) utilizes strategically placed traffic meters at project sites to estimate visitation. The most recent annual visitation data (2020) and the annual average for the 2014-2020 period is shown for each recreation area in **Table 4-15** based on VERS data. Prior to 2014, a different methodology was used to estimate visitation and the resulting estimates are not comparable with post-2014 estimates. The East Fork Campground and the WMA are the most visited areas in the East Lynn Lake Project. The East Fork Campground offers camping and the widest variety of recreation opportunities in the project. The WMA is the largest recreation area.

VERS visitation data was evaluated by recreation area and yearly totals for the entire project for the period 2014 through 2020. A linear trend line of the total annual visitation to East Lynn Lake for this period shows gradually increasing visitation for this seven-year period (**Figure 4-16**). However, at individual recreation areas at the project, both increasing and decreasing trends in visitation can be seen.

Table 4-15. East Lynn Lake average annual visitation by recreation site

Site	2020		2014-2020 Average	
	Visitation	% Of Total	Visitation	% Of Total
Dam Site	15,559	7%	17,921	9%
Tailwater Fishing Area	13,175	6%	15,798	8%
Laurel Creek	10,503	4%	7,393	4%
East Fork Campground	98,097	42%	72,645	35%
Lick Creek	8,516	4%	8,193	4%
Lakeside Area	29,000	12%	25,546	12%
East Lynn Marina	3,455	1%	2,946	1%
Wildlife Mgt Area	57,087	24%	59,999	29%
Totals	235,392	100%	210,442	100%



Figure 4-16. Visitation at East Lynn Lake recreation sites (2014 – 2020)

4.3.2.3 East Fork Campground Occupancy

East Fork Campground is the only campground at East Lynn Lake. Check-in and check-out operations and the camp store are operated there by a concessionaire. Occupancy data was obtained from www.recreation.gov. Campsite occupancy has been consistently increasing since 2011 (**Figure 4-17**). The blue line represents campsite occupancy for the entire season. The peak season, Memorial Day to Labor Day, has the highest occupancy in the total season as shown in the orange line. The East Fork Campground has an average occupancy rate compared to USACE Huntington District managed campgrounds. Note that the COVID-19 pandemic has significantly increased recreation activity at East Lynn Lake as well as at other USACE recreation areas.

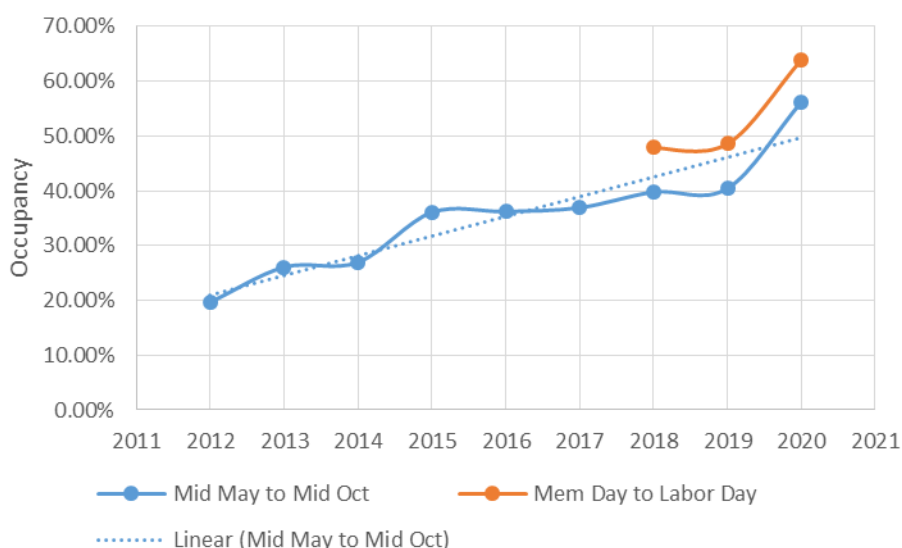


Figure 4-17. East Fork Campground annual campsite occupancy (2011-2020)

4.3.3 East Lynn Lake Zones of Influence

The zone of influence (or market area) is the area within which most visitors to a recreation site live. Identifying the zone of influence and evaluating the demographic characteristics of the area are an important part of projecting future recreational demand for the site. The primary, secondary, and tertiary zones of influence were evaluated. Definitions of the zones and descriptions of how they were determined and evaluated are provided in **Section 3.3.3**.

East Lynn Lake's primary zone of influence is entirely in WV and consists of Wayne County. The secondary zone of influence includes portions of two WV counties and two KY counties. The tertiary zone of influence consists of all, or parts of ten WV counties, three OH counties, and fifteen KY counties (**Figure 4-18**).

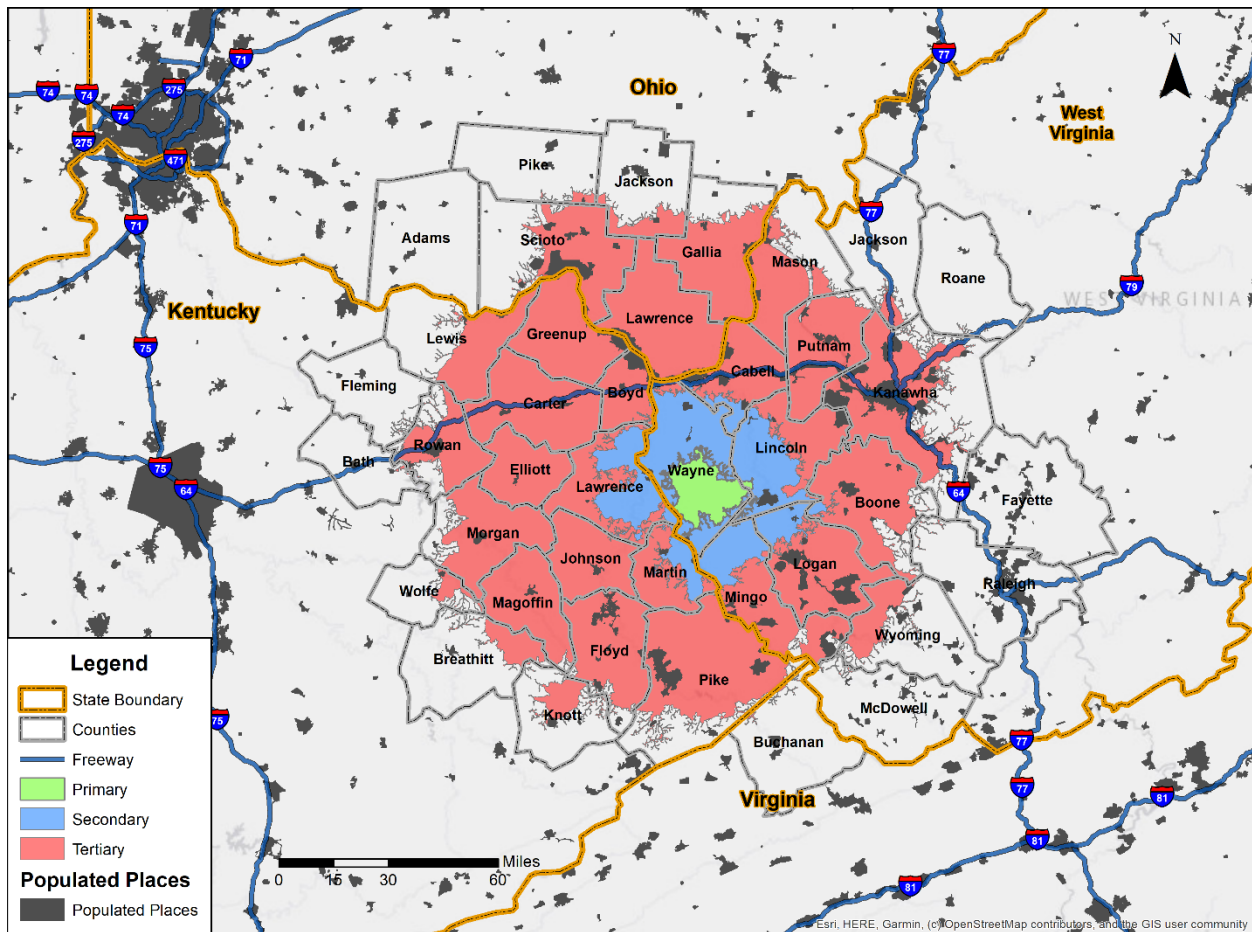


Figure 4-18. East Lynn Lake zones of influence and county population centers

4.3.4 Population

Population data was obtained by county for each zone of influence. Historical population data was obtained from the USCB (2020). County population projections were obtained from West Virginia University (Christiadi et. al., 2014) for WV, from the ODSA (2018) for OH, and from KSDC (2020) for KY.

The size of the population of the zones of influence is one factor that influences the demand for recreation opportunities. The 2019 population of East Lynn Lake's three zones of influence were:

- Primary zone of influence = 41,869
- Secondary zone of influence = 90,495
- Tertiary zone of influence = 1,063,365

Figures 4-19 through 4-21 show the historical (2010 – 2019) and projected (2020 – 2040) populations in the three respective zones of influence. In all cases, population is projected to gradually decline between 2020 and 2040.

The tertiary zone of influence includes one of the top five WV counties experiencing the greatest population declines (Boone County) since 2010 (O’Leary, 2018). The rural population in WV is declining at a faster rate than the urban population. Between 2010 and 2018, the urban population declined 1.7% compared to a 4.6% rural population decline.

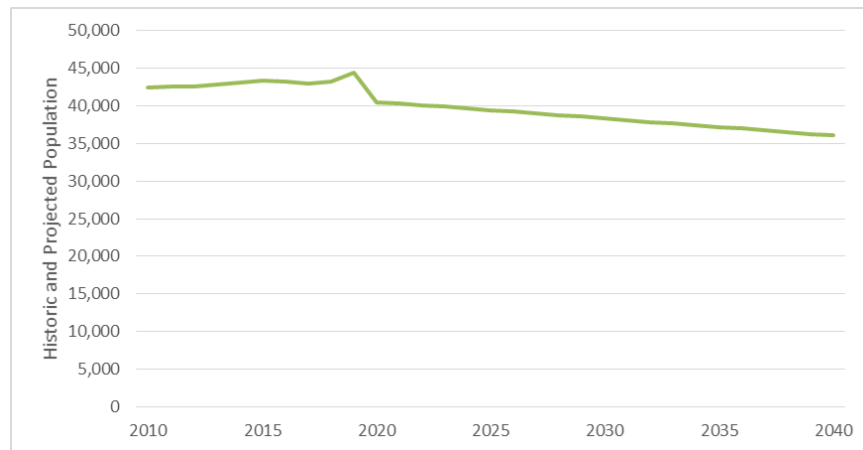


Figure 4-19. East Lynn Lake primary zone of influence historical and projected population (2010 – 2040)

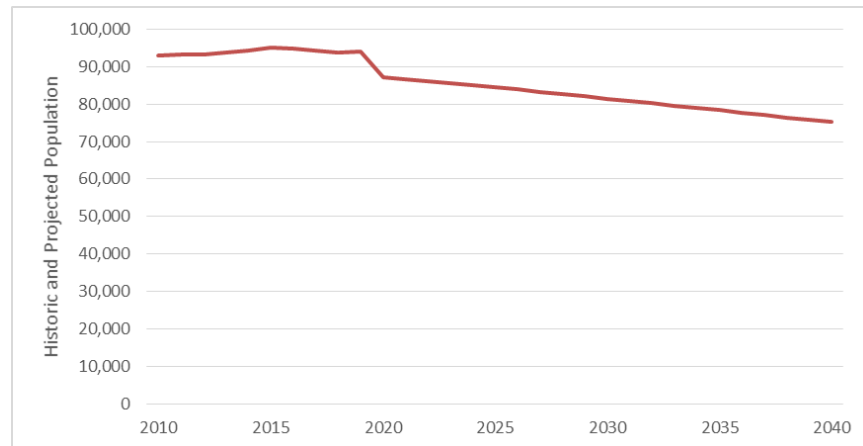


Figure 4-20. East Lynn Lake secondary zone of influence historical and projected population (2010 – 2040)

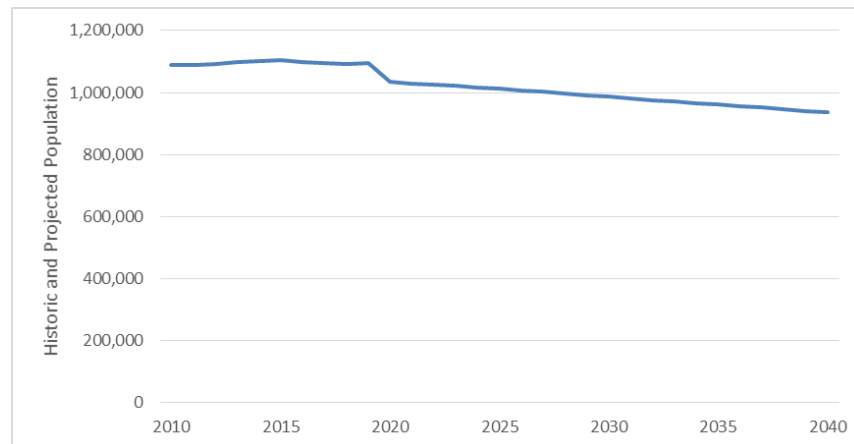


Figure 4-21. East Lynn Lake tertiary zone of influence historical and projected population (2010 – 2040)

4.3.5 Demographics

Demographic data for 2019 was obtained from the USCB (2020) for the East Lynn Lake zones of influence. For a regional and national comparison, demographic data was also obtained for each of the states in the tertiary and secondary zones of influence as well as the national averages (**Tables 4-16 and 4-17**). A review of the demographic data leads to the following observations:

- People living in the lake's zones of influence are generally older than the national average. This is consistent with the WV SCORP finding that WV has the third oldest population in the US (WVDO, 2015). However, the ages of residents of KY are similar to the national average.
- The percentage of homes that are occupied by the owners is significantly higher in the zones of influence than the national average. All but two of the 28 counties in the tertiary zone of influence were above the national average for owner-occupied housing. Notably, three WV counties had more than 80% owner-occupied housing compared to a national average of 63.8%. The statewide average for WV was also significantly higher than the national average.
- Incomes are lower and poverty rates are higher in the zones of influence compared to national averages. This is also true for the overall statewide incomes and poverty rates in WV, OH, and KY.
- The percentage of white people in the zones of influence is significantly higher than the national average. Similarly, the percentages of white people in WV and KY are also higher than the national average. Racial diversity in OH is closer to the national averages.
- There is a smaller percentage of the population within the zones of influence that graduated high school compared to the national average. State average high

school graduation rates in WV and KY are close to the national average, but OH graduation rates are above the national average.

- A significantly smaller percentage of zones of influence residents have bachelor's degrees than the national average. The same is true for WV, OH, and KY statewide percentages.
- The percentage of people under 65 years of age with disabilities in the zones of influence is almost double the national average. While the state average percentages of people with disabilities in WV, OH, and KY are lower than the zones of influence, they are still greater than the national average.

Table 4-16. East Lynn Lake zones of influence, state, and national age, housing, and income

Area	Ages				% Owner-Occupied Housing	Persons per Household	Median Household Income	% Population in Poverty
	< 5 yrs	5 yr - 17 yrs	18 yrs - 65 yrs	> 65 yrs				
Primary Zone	4.9%	15.2%	58.2%	21.7%	74.4%	2.57	\$ 36,875	20.5%
Secondary Zone	5.3%	15.8%	58.8%	20.1%	75.0%	2.60	\$ 35,956	24.6%
Tertiary Zone	5.4%	15.5%	59.3%	19.8%	71.5%	2.42	\$ 40,552	21.6%
West Virginia	5.2%	20.1%	59.4%	20.5%	72.9%	2.42	\$ 44,921	17.2%
Ohio	5.9%	22.1%	60.4%	17.5%	66.0%	2.43	\$ 54,533	13.9%
Kentucky	6.1%	22.4%	60.8%	16.8%	67.0%	2.49	\$ 48,392	16.9%
US	6.0%	22.3%	61.2%	16.5%	63.8%	2.63	\$ 60,293	11.8%

Source: USCB, 2020

Table 4-17. East Lynn Lake zones of influence, state, and national ethnicity, education, and disabilities

Area	% White	% Black	% Asian	% Mixed Race	% Hispanic	% High School Grad	% Bachelor or Higher	Disability under 65 yrs old
Primary Zone	97.6%	0.6%	0.3%	1.1%	0.7%	79.8%	15.1%	18.6%
Secondary Zone	96.9%	1.3%	0.3%	1.2%	1.2%	78.4%	11.9%	19.8%
Tertiary Zone	96.1%	1.8%	0.6%	1.3%	1.1%	81.8%	13.8%	17.4%
West Virginia	93.5%	3.6%	0.8%	1.8%	1.7%	86.5%	20.3%	14.1%
Ohio	81.7%	13.1%	2.5%	2.4%	4.0%	90.1%	22.8%	10.1%
Kentucky	87.5%	8.5%	1.6%	2.0%	3.9%	85.7%	23.6%	13.1%
US	76.3%	13.4%	5.9%	2.8%	18.5%	87.7%	31.5%	8.6%

Source: USCB, 2020

4.4 Recreation Carrying Capacity

East Lynn Lake is more remote from population centers such as Huntington, WV than Beech Fork Lake. Average annual visitation for the five-year period from 2014 to 2019 at East Lynn Lake was only 60% of the visitation at Beech Fork Lake.

Based on coordination with individuals that are knowledgeable of recreation activities and facilities at East Lynn Lake, there is no information suggesting that boating, swimming, or picnicking are near their respective carrying capacities and overcrowding and user conflict have not been observed in these areas. Therefore, no formal carrying capacity analyses were performed for these activities. It was found that camping at the East Fork Campground was the only activity at East Lynn Lake that needed further carrying capacity evaluation and is described below. At this time, and into the foreseeable future, the USACE has no plans of actively limiting uses. If future public use increases to the extent that significant use conflicts occur, a formal carrying capacity study may be warranted if it could lead to solutions not available in the absence of such a report.

4.4.1 Camping Carrying Capacity – East Fork Campground

East Fork Campground is the only campground at East Lynn Lake. There are 167 campsites grouped in six areas (Areas 1 through 6). East Fork Road provides access to East Fork Campground from Route 37. There is a designated swimming beach and a two-lane boat launch along the East Fork Road before reaching the campground entrance. Area 1 campsites are just inside the campground entrance and Areas 2 through 6 are sequentially located upstream along the shoreline of the East Fork, with Area 6 being at the extreme upstream limit of the campground.

Campground Areas 1 through 3 are the most popular and have the highest occupancies. Half of the campsites in Area 3 and all campsites in Areas 5 and 6 have 50-amp electric hookups. Some possible explanations for the popularity of Areas 1 through 3 are:

- East Fork is navigable to Areas 1, 2, and 3 but it is too shallow to navigate to areas 4 to 6.
- These areas are closest to the campground entrance, dump station, and swimming beach.
- Areas 1 through 3 can be reserved on www.recreation.gov. Campsites at Area 4 can also be reserved; but at areas 5 and 6 campsites are on a first come-first-serve basis.

Occupancy data is only available for the campground as a whole - not for the individual campsite areas. As described in **Section 4.3.2.3**, campground occupancy at East Fork Campground has been increasing since 2012 and in 2020 was over 55% for the mid-May to mid-October season. However, campground occupancy at many USACE campgrounds reached record high levels in 2020 because of the COVID-19 pandemic. This rate translates to every campsite being occupied every Friday, Saturday, and Sunday night plus one or two weeknights for every week in the season. During the peak of the season (Memorial Day to Labor Day), occupancy is about 65%.

The rising occupancy rate at East Fork Campground suggests that in the future, a carrying capacity study may be needed.

4.5 Enhancing Recreation Opportunities at East Lynn Lake

Comprehensive descriptions of recreation activities, recreation facilities, visitation, and campground occupancy were described in the preceding sections, as well as related factors that affect recreation at East Lynn Lake such as the zones of influence, demographics, carrying capacity, and the regional recreation setting. This section describes that information in a format that can be used to support development of resource objectives and the resource plan.

Factors that should be considered in the development of resource objectives include accessibility of the project, nearby competing recreation areas, demographics, recreation trends, and space limitations at East Fork Campground.

Accessibility

East Lynn Lake is more remote than Beech Fork Lake. Recreationists from large population centers such as Huntington, WV must drive past Beech Fork Lake to reach to East Lynn Lake. From the south, there are no interstate or other multi-lane highways providing access to East Lynn Lake. Visitors must utilize winding two-lane roads.

Nearby Competing Recreation Areas

In addition to Beech Fork Lake in WV, there are nine recreation areas in KY and OH within about a two-hour driving distance of East Lynn Lake, including four other USACE lakes. All these recreation areas offer similar recreation opportunities to East Lynn Lake and therefore they are in direct competition for visitation.

The East Lynn Lake Project and the nearby competing recreation facilities have been in operation for a long period of time. This fact, in combination with the stable historical annual visitation indicate that the recreation supply and demand are generally in equilibrium. However, recreation facilities at East Lynn Lake could accommodate additional visitors for boating, fishing, and picnicking.

Demographics

West Virginia has the third oldest population in the US, it has almost double the percentage of individuals with disabilities compared to the US average, and only two states have a higher percentage of physically inactive individuals. The population residing in the zone of influence has similar characteristics. The WV SCORP survey found that walking and enjoying good views were the most popular recreation facility preferences among all groups surveyed. As a result, passive recreation opportunities that do not require strenuous physical activity would remain popular.

Recreation Trends

Current trends for camping include larger recreation vehicles with greater electrical requirements, more ancillary recreation equipment, and more vehicles. Campers prefer campsites with full hookups including electric, water, and sewer. Additionally, although 50-amp electric hookups are currently the preferred standard, there is evidence that 70-amp hookups, or higher, may be desired in the future.

The COVID-19 pandemic sparked a growing national and regional trend for non-motorized watercraft use, such as kayaks, canoes, and paddleboards, which is anticipated to continue in the long-term (Paddling Magazine, 2021).

East Fork Campground

East Fork Campground remains very popular and has very high occupancy. The demand for campsites exceeds availability on many weekends during the summer. Space limitations at the East Lynn Campground prevent the addition of more campsites to meet the increasing high demand. Campsites are mostly at capacity in October when large events draw campers. Due to space limitations, enhancement of the site may be limited to improving functionality and enhancing existing facilities for user enjoyment.

Findings

The findings of the recreation analysis summarized above indicate that the following points should be considered when developing the resource objectives:

- The large size of the project area combined with relatively low visitation should be considered as opportunities for attracting additional visitors or expanding the variety of recreation opportunities.
- Recreation facilities should be universally accessible to all individuals regardless of ability.
- Opportunities for taking advantage of scenic lake and mountain views should be emphasized.
- Based on recreation trends, future demand will be for full hookups with increased electric capacity at all campsites.
- With the increasing trend in use of non-motorized watercraft, modifications to existing facilities or new facilities may be appropriate.

4.6 East Lynn Lake Resource Objectives

The resource objectives described below were developed for East Lynn Lake based on detailed evaluations of existing conditions and the issues and needs identified through agency, stakeholder, and public coordination. Resource objectives were developed in three categories: recreation, natural resources, and cultural resources.

4.6.1 Recreation Resource Objectives – East Lynn Lake

Recreation Resource Objective 1 (R1)

Issue/Need: With the exception of East Fork Campground, East Lynn Lake’s recreation facilities are generally underutilized.

Objective Statement: Highlight unique characteristics at East Lynn Lake and promote awareness of recreation opportunities to increase visitation.

Recreation Resource Objective 2 (R2)

Issue/Need: EO 11644, Use of off-road vehicles on the public lands, establishes policies to ensure the use of off-road vehicles on public lands will be controlled to protect natural resources, promote safety, and minimize conflicts among users. It also enables agencies to prohibit off-road vehicle use in areas that cause significant adverse effects on the soil, vegetation, wildlife, habitat, or cultural resources. At the East Lynn Lake project, off-road vehicles are prohibited; however, illegal use is an ongoing issue in the project area.

Objective Statement: Develop a strategy in coordination with partners for discouraging use of off-road vehicles in unauthorized areas on project lands.

Recreation Resource Objective 3 (R3)

Issue/Need: Existing recreation facilities within the East Fork Campground do not fully accommodate user demands (i.e., additional dump station), modern recreational equipment (i.e., larger campers), and new technology (i.e., Wi-Fi) which require increased facility size, connectivity, and power availability.

Objective Statement: Upgrade infrastructure within the East Fork Campground to respond to recreational trends and accommodate modern recreational equipment and high occupancy.

Recreation Resource Objective 4 (R4)

Issue/Need: The Overlook Area has two shelters. The shelters are very popular for everyday use and special events such as weddings. Shelter 2 is immediately adjacent to the parking area. Shelter 1 however, is located almost 500 feet from the parking area and is not easily accessible to transport supplies from vehicles.

Objective Statement: Improve accessibility to the Overlook Day Use Area Shelter 1.

Recreation Resource Objective 5 (R5)

Issue/Need: The Lakeside Area is a very scenic site with plenty of shade, a shelter, restrooms, and parking area. However, visitation to this day use area is relatively low.

Objective Statement: Evaluate opportunities to increase visitation and identify options for expanding recreational facilities at the Lakeside Day Use Area such as a new kayak launch or water feature.

Recreation Resource Objective 6 (R6)

Issue/Need: Garbage collection service is not provided in the rural portions of the counties surrounding East Lynn Lake. Some residents illegally dump trash in ravines and along hillsides. Trash (i.e., appliances, tires, etc.) is flushed from upstream tributaries into the lake by stormwater runoff and creates an unsightly safety hazard. Cove Creek and East Fork are primary sources of trash inflows to the lake.

Objective Statement: Evaluate cost effective options for reducing the trash in the lake.

Recreation Resource Objectives 7 (R7)

Issue/Need: There are areas at the mouths of tributaries and in the upper reaches of the lake where sedimentation has accumulated which makes boat launching and navigation difficult.

Objective Statement: Maximize boat launching opportunities and safe navigation in the upper reaches of the lake and the East Fork Boat Launch. Evaluate broad alternatives to address larger scale sedimentation problem areas, such as comprehensive sediment removal or boat launch relocation.

Recreation Resource Objective 8 (R8)

Issue/Need: Recreation facilities at East Lynn Lake need maintenance, repair, rehabilitation, and replacement. Funding requests for maintenance, repair, and replacement of aging facilities at both projects must compete with the needs of other projects on a nation-wide basis.

Objective Statement: Assess the need for rehabilitation or replacement of existing recreation facilities and prioritize needed improvements using performance-based criteria such as costs per visit, utilization, facility condition, public use patterns, etc.

Recreation Resource Objective 9 (R9)

Issue/Need: Providing broader Wi-Fi at recreation facilities and cell phone coverage throughout project areas would improve the recreation experience and provide a means of increasing public safety.

Objective Statement: Pursue opportunities to expand Wi-Fi and cell phone coverage at East Lynn Lake.

Recreation Resource Objective 10 (R10)

Issue/Need: Improvements to site functionality and upgrades or additional facilities at East Lynn Lake recreation areas may increase visitation and enhance the user experience.

Objective Statement: Evaluate opportunities to increase site functionality and upgrade or develop facilities at East Lynn Lake recreation areas that would enhance the user experience and respond to recreational trends.

4.6.2 Natural Resource Objectives – East Lynn Lake

Natural Resource Objective 1 (N1)

Issue/Need: USACE Environmental Stewardship Operations and Maintenance Guidance and Procedures as outlined in ER 1130-2-540 requires the USACE to manage natural resources on USACE administered land and water in accordance with ecosystem management principles to insure their continued availability. The need for specific resource management evaluations (i.e., special status species changes) should be identified when Master Plan updates are undertaken.

Objective Statement: Prepare Level 2 Natural Resource Inventory for East Lynn Lake as necessary.

Natural Resource Objectives 2 and 3

Issue/Need: Invasive species affect a significant percentage of project lands.

Objective Statement: Develop and implement invasive plant species control measures on USACE managed project lands, including an ongoing monitoring program to assess the extent of invasive species (plants, animals, insects, and fish) on project lands. **(N2)**

Objective Statement: Optimize partnerships for the prevention and control of exotic and invasive species to help prevent or reduce damages to the water resource project. **(N3)**

4.6.3 Cultural Resource Objectives – East Lynn Lake

Cultural Resource Objective 1 (C1)

Issue/Need: To comply with requirements of the NHPA in support of existing and ongoing project activities a comprehensive knowledge base of past and current cultural resources is a prerequisite as well as updated/current CRMP or HPMPs. Systematic

surveys of historic and prehistoric cultural resources are needed to update existing inventoried sites and to ensure undocumented resources are identified. Many of the survey methods used to identify and evaluate resources are outdated. Status of the resources also require monitoring.

Objective Statement: Further develop and update the cultural history portion of HPMP or CRMP for East Lynn Lake to include specific information on the local mining industry and potential historic resources within the project area as needed.

4.7 East Lynn Lake Land Allocation, Classification, and Easements

The land allocation and land classification information presented in this section provides for the orderly development, use, and management of Project lands and waters. Land allocation and classification categories are established for projects and are based on ER 1130-2-550, Recreation Operations and Maintenance Policies.

4.7.1 East Lynn Lake Land Allocation

There are four possible land allocation categories listed below for which USACE project lands were purchased including operations, recreation, fish and wildlife, and mitigation. These land allocation categories are described in **Section 3.7.1**. The entire East Lynn Lake Project has a land allocation of Operations. All project lands were acquired to provide safe, efficient operation of the project for its authorized purposes. The project purposes are flood control, recreation, fish and wildlife management, and maintaining minimum flows. No separable lands authorized specifically for recreation, fish and wildlife, or mitigation were acquired for the project.

4.7.2 East Lynn Lake Land Classification

Land classification designates the primary use for which project lands are managed. Land classification categories are prescribed by EP 1130-2-550 as described below.

Table 4-18 Identifies land classifications for the East Lynn Lake Project in accordance with EP 1130-2-550. **Figure 4-22** shows an overview of land classifications for the East Lynn Lake Project. **Figure 4-23** provides more detailed views of land classifications lands surrounding the dam site, the Lakeside and Marina area, the Lick Creek Area, and the East Fork Area.

Table 4-18. East Lynn Lake land classifications

Land Classification	Area	Area (acres)
Project Operations	Dam	13
	Emergency spillway	6
	Office & maintenance area	9
	Outlet channel	2
Project Operations Total =>		30
High Density Recreation	Tailwater Fishing Area	8
	Office Overlook	0.5
	Overlook Area	37
	Lakeside Area & Lakeside Marina Drive	19
	East Lynn Lake Marina	2
	Lick Creek Area	10
	East Fork Swimming Beach	5
	East Fork Road	19
	East Fork Boat Launch	4
	East Fork Campground	54
High Density Recreation Total =>		158.5
Mitigation	No applicable lands	0
Environmentally Sensitive Lands	No applicable lands	*
Multiple Resource Management		
Low Density Recreation	East Lynn Lake recreation area	1,128
	Laurel Creek Fishing Area	1
Wildlife Management General	East Lynn Lake WMA	22,537
Vegetation Management	No applicable lands	0
Inactive and/or Future Recreation	No applicable lands	0
Multiple Resource Management Total =>		23,666
Total Fee Lands = >		23,854.5
Easement Lands		
Operations Easement	No applicable lands	0
Flowage Easement		95
Conservation Easement	No applicable lands	0
Total Easement Lands =>		95

*Environmentally sensitive lands are currently being mapped.

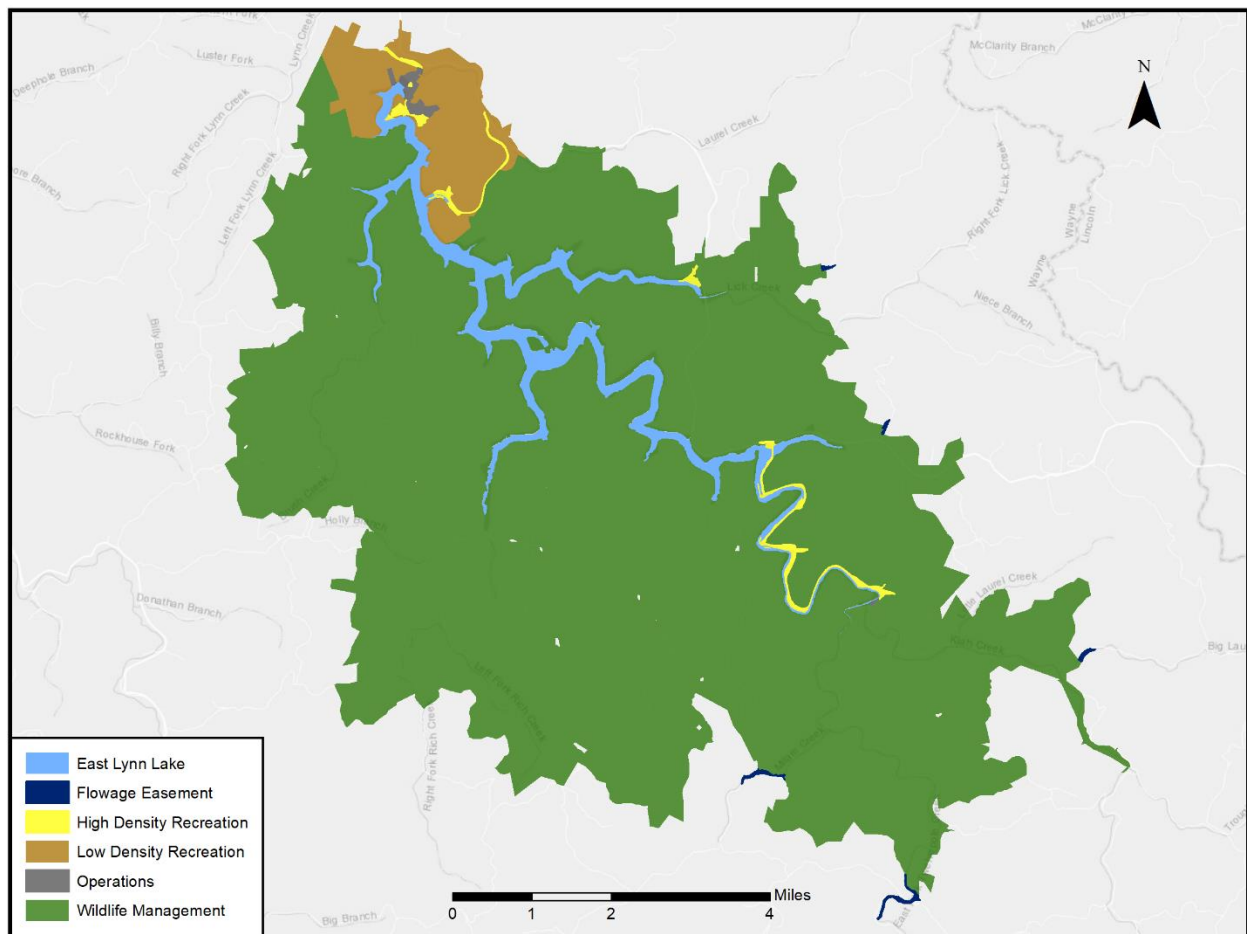


Figure 4-22. East Lynn Lake land classification overview map

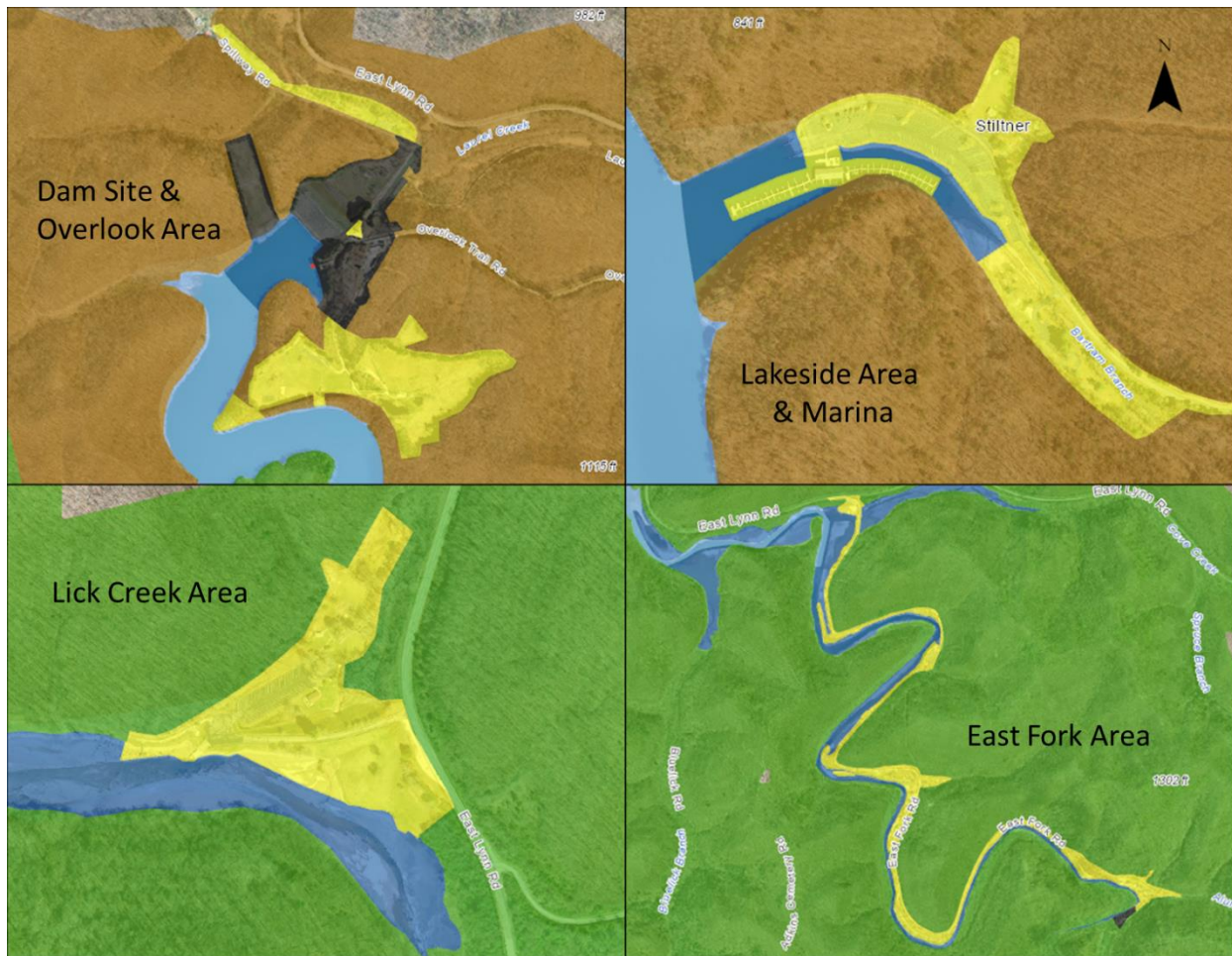


Figure 4-23. East Lynn Lake land classification inset map

4.7.2.1 Project Operations

This category includes those lands required solely for the operation of the project and includes the dam, spillway, levees, and discharge channel and maintenance area below the dam. The area surrounding the office and maintenance buildings, the dam, the intake structure, emergency spillway, and discharge channel are classified as project operations at East Lynn Lake.

4.7.2.2 High Density Recreation

The high-density recreation land classification consists of lands developed for intensive recreational activities for the visiting public. Areas in the East Lynn Lake Project that are classified as high intensity recreation are the overlook adjacent to the project office, Overlook Area, Tailwater Fishing Area, Lakeside Day Use area, East Lynn Lake Marina, Lick Creek Area, East Fork Swimming Beach, East Fork Boat Launch, and East Fork Campground. Additionally, roads that are intended exclusively for access to a high-

density recreation area are included in this classification. As a result, East Fork Road and Lakeside Marina Drive are classified as high-density recreation. These access roads are also utilized for project operations.

4.7.2.3 Mitigation

This classification is only used for lands with an allocation of Mitigation and that were acquired specifically for the purposes of offsetting losses associated with development of the project. There are no lands in the East Lynn Lake Project area that are classified as mitigation lands.

4.7.2.4 Environmentally Sensitive Areas

This land classification consists of areas where scientific, ecological, cultural, or aesthetic features have been identified. Designation of these lands is not limited to only lands that are otherwise protected by laws such as the Endangered Species Act, the National Historic Preservation Act or applicable State statutes. These areas must be considered by management to ensure they are not adversely impacted. Typically, limited or no development of public use is allowed on these lands. No agricultural or grazing uses are permitted on these lands unless necessary for a specific resource management benefit, such as prairie restoration. These areas are typically distinct parcels located within another, and perhaps larger, land classification area.

4.7.2.5 Multiple Resource Management Lands

This classification allows for the designation of a predominate use as described below, with the understanding that other compatible uses may also occur on these lands. For example, a trail through an area designated as Wildlife Management. Land classification reflects the predominant sub-classification, rather than just Multiple Resource Management.

4.7.2.5.1 Low Density Recreation

This classification includes lands with minimal development or infrastructure that support passive public recreational use. At East Lynn Lake, this classification includes the USACE managed lands that surround the Tailwater Fishing Area, the dam, the Overlook Area, and the Lakeside Day Use Area.

4.7.2.5.2 Wildlife Management

This classification consists of lands designated for stewardship of fish and wildlife resources. The East Lynn Lake WMA is classified as wildlife management. However, the water surface of East Lynn Lake within the WMA is not included in this classification.

4.7.2.5.3 *Vegetative Management*

This classification consists of lands designated for stewardship of forest, prairie, and other native vegetative cover. There are no lands at East Lynn Lake that are classified as vegetation management.

4.7.2.5.4 *Future or Inactive Recreation Areas*

Areas with site characteristics compatible with potential future recreational development or recreation areas that are closed fall under this classification. Until there is an opportunity to develop or reopen these areas, they will be managed for multiple resources. There are no lands in the East Lynn Lake Project area that are classified as future or inactive recreation areas.

4.7.2.6 *Water Surface*

Section 3.7.2.6 provides definitions of the water surface classifications and **Table 4-19 and Figure 4-24** provides acreages for the water surface classifications at East Lynn Lake.

Table 4-19. Water surface classifications at East Lynn Lake

Water Surface	
Restricted	0.5
Designated No-Wake	306
Fish & Wildlife Sanctuary	0
Open Recreation	648
Total Water Surface Area =>	954.5

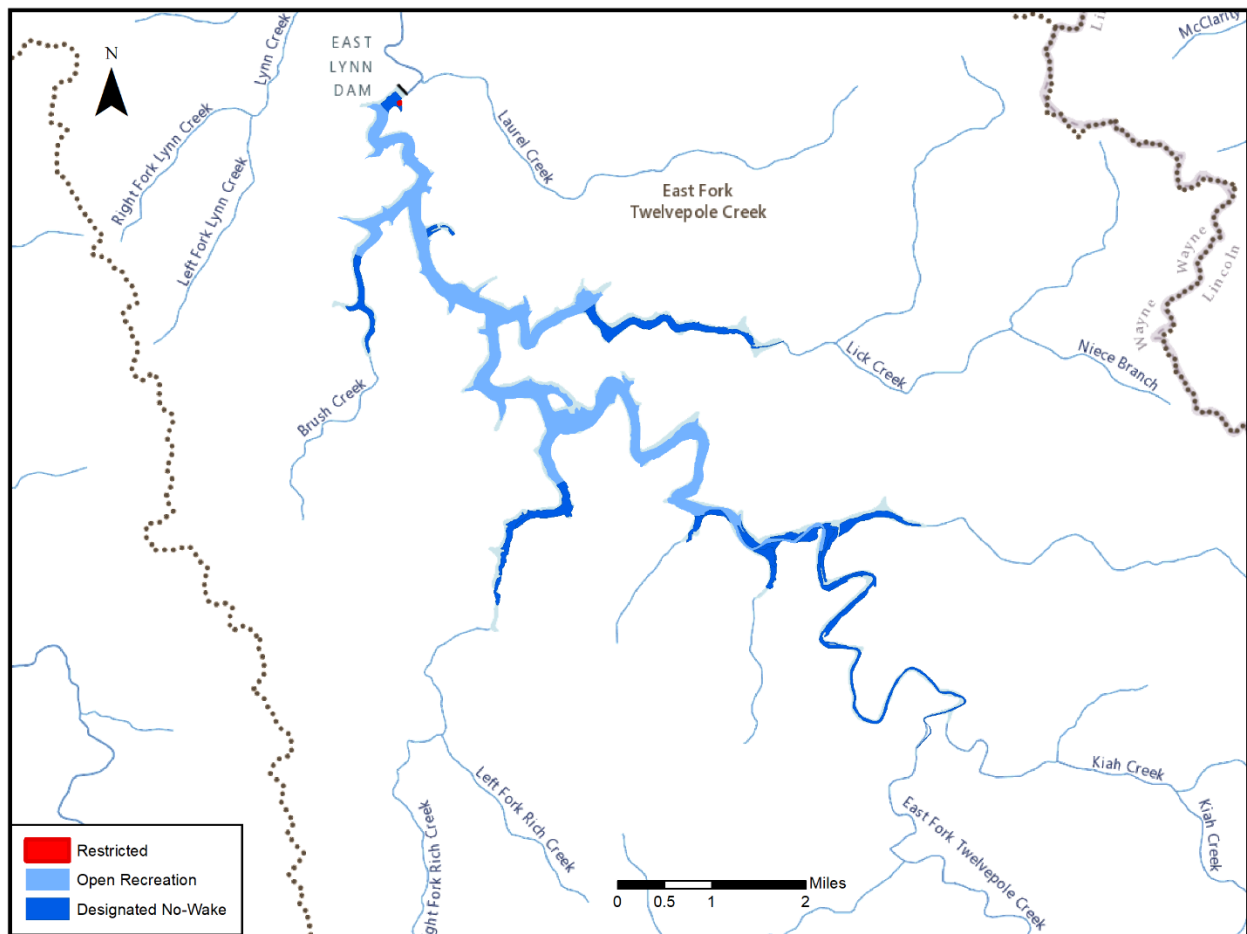


Figure 4-24. East Lynn Lake water classification map

4.7.2.6.1 *Restricted*

The restricted water surface classification consists of water areas restricted for project operations, safety, and security purposes. This includes the area immediately surrounding the intake structure.

4.7.2.6.2 *Designated No-Wake*

The designated no-wake water surface classification is utilized to protect environmentally sensitive shoreline areas, recreational water access areas from disturbance, and for public safety. The area just above the dam is a designated no-wake area. Other water surface areas in East Lynn Lake that have no-wake designations are areas with shallow water depths that require that boats travel at slow-speeds to avoid damage. No-wake areas are designated in the upstream reaches of Brushy Creek, Lick Creek, Rich Creek, Beechy Branch, Bluelick Creek, and East Fork adjacent to East Fork Campground.

4.7.2.6.3 *Fish and Wildlife Sanctuary*

The fish and wildlife sanctuary water surface classification places annual or seasonal restrictions on areas to protect fish and wildlife species during periods of migration, resting, feeding, nesting, and/or spawning. There are no water surface areas in East Lynn Lake that fall under this classification.

4.7.2.6.4 *Open Recreation*

Waters classified as open recreation are available for year-round or seasonal water-based recreational use. There are no horsepower or speed restrictions in the open recreation area of East Lynn Lake.

4.7.2.7 **Easement Lands**

These are all lands for which the USACE holds an easement interest, but not fee title. Use and management of easement lands must be in strict accordance with the terms and conditions of the easement estate acquired for the project. Easements were acquired for specific purposes and do not convey the same rights or ownership to the USACE as other lands. The easement categories are described below

4.7.2.7.1 *Operations Easement*

The USACE retains rights to these lands necessary for project operations such as access. There are no operations easements on lands in the East Lynn Lake Project area.

4.7.2.7.2 *Flowage Easement*

The USACE retains rights to these lands necessary for project operations such as access. The USACE owns 24 acres of flowage easements in areas that can be impacted by high lake levels in the headwaters of the lake and its tributaries.

4.7.2.7.3 *Conservation Easement*

The USACE retains rights to conservation easement lands for aesthetic, recreation, and environmental benefits. There are no conservation easements held by USACE at the East Lynn Lake Project area.

4.8 **East Lynn Lake Resource Plan**

The resource plan for East Lynn Lake follows the management by area framework. Within the project boundary, ten management areas have been identified and are described below. **Table 4-20** provides a summary of the resource plan recommendations and the resource objectives that they address for each management area. Additionally, **Table 4-20** includes over-arching project-level recommendations for the East Lynn Lake Project that are based on descriptions of the current conditions and management of the project described in **Section 4** and the regional resources objectives provided in **Section 2.17**.

Figure 4-25 identifies the location of the management areas at East Lynn Lake. Descriptions of the current land use conditions at each management area and the recommendations for the future use of the areas are provided in the following sections.

Table 4-20. Resource Plan recommendations by management area

Management Area	Recommendation	Resource Objective
East Lynn Lake Project	Continue to pursue partnerships with other agencies and organizations for management of existing recreation facilities and development of new recreation opportunities.	RR1, RR2, RR12
East Lynn Lake	Continue WVDNR's management of the fisheries in East Lynn Lake with the goal of maintaining healthy and stable populations of native aquatic species, including sports fish.	RN6
	Collaborate with WVDNR-Wildlife to identify any feasible alternatives for enhancing fish habitat such as evaluating anchoring methods for cut trees.	RN7
	Investigate and implement cost-effective options for reducing trash in the lake.	R6
	Evaluate broad alternatives for addressing sedimentation problem areas, including consideration of comprehensive sediment removal, boat launch relocation, etc.	R7
	USACE should continue to identify and pursue methods for informing potential visitors of the recreation opportunities that are offered at East Lynn Lake to increase overall visitation for day use and boating.	RR3, RR11, R1
Dam Site, Project Office, and Overlook	Continue use of the management area for project operations.	RR5
Dam Overlook	Continue current management of the site to provide visitors with a scenic overlook of the dam and lake.	RR1
Tailwater Fishing Area	Replace the playground with upgraded equipment to increase its utilization by local residents and visitors to East Lynn Lake.	R8
	USACE should continue to pursue opportunities to inform the public of the recreation opportunities that are available at this site to increase its utilization.	RR3, RR11, R1
Overlook Recreation Area	Evaluate alternatives for improving accessibility to Shelter 1.	R4
	Evaluate the need and feasibility of adding another shelter.	R8
	Recommend expansion of the playground to enhance the user experience and evaluate other substrates (e.g., permanent pad) besides mulch that would reduce maintenance needs.	RR1, RR6
	Evaluate measures to increase public safety when utilizing sports fields in this management area.	R9

Management Area	Recommendation	Resource Objective
Laurel Creek Fishing Area	The existing unpaved parking area should be paved with a section of pavement extending to near the East Fork to provide access for stocking trucks.	RR1, RR6, R9
	A restroom should also be added for anglers using the area.	RR1, RR6, R9
East Lynn Lake Trails and Low-density Recreation Open Lands	USACE should continue to pursue opportunities to inform the public of the recreation opportunities that are available at this site to increase its utilization.	RR3, RR11 R1
	Explore opportunities to expand the trail system for hiking and other uses.	RR5
	Monitor invasive species and implement a control program to protect the quality of the native habitat.	RN2, RN3, N2, N3
East Fork Area	To provide cost effective maintenance of boat launches, an assessment should be performed to identify options to address the accumulation of sediment.	R7, R8
	Construct a pavilion for shade and a restroom at the East Fork Swimming Beach.	R11
	Conduct outreach to better inform the visiting public of recreation opportunities provided at the swimming beach.	R1
	Conduct a comprehensive site use evaluation to provide the framework for identifying opportunities to optimize the space available.	R11
	Upgrade campsite electric hookups from 30-amps to 50-amps where needed at the East Fork Campground.	RR6, R3
	Evaluate the adequacy of existing campsite pads and make improvements where needed to better accommodate modern recreation vehicles.	RR6, R3
	Evaluate whether adding another dump station in the vicinity of Areas 4 and 5 or providing sewer hookups for those areas would be more cost effective.	RR6, R3
	Upgrade the playground at East Fork Campground.	RR6
	Add a shelter at the East Fork Campground just before the campground entrance.	RR6
	The Wi-Fi should be upgraded at the East Fork Campground to provide more reliable service.	RR6, R10
	East Fork Road should be upgraded from Route 37 to Area 6 of the East Fork Campground to meet WVDOT safety criteria.	RR6, R9
	Pursue options to add a boat launch for non-motorized watercraft at a location on East Fork Road.	RR8, RR11
Lick Creek Area	Close the shelter, playground, and restroom.	RR1, RR4, R9

Management Area	Recommendation	Resource Objective
Lakeside Area	Add a playground or water park fountain in the picnic area.	RR1
	USACE should continue to pursue opportunities to inform the public of the recreation opportunities that are available at this site to increase its utilization.	RR3, RR11 R1
	Undertake outreach efforts to better inform the public of the recreation opportunities provided at the Lakeside Area.	R1
	Prior to any disturbance to areas surrounding the Lakeside Area, investigations should be performed to evaluate risks associated with Bartram Refuse Pile.	RR5, RR12, RN3

Sections 2.17 and 4.6 designate a code for each of the regional and project specific resource objectives. The resource objective codes are provided in the last column to identify the resource objective that is addressed by each recommendation.

RR indicates a regional recreation objective; **RN** indicates a regional natural resource objective; and **RC** indicates a regional cultural resources objective. For resource objectives specific to East Lynn Lake, **R**, **N**, and **C** indicate recreation, natural resource, and cultural resource objectives, respectively.

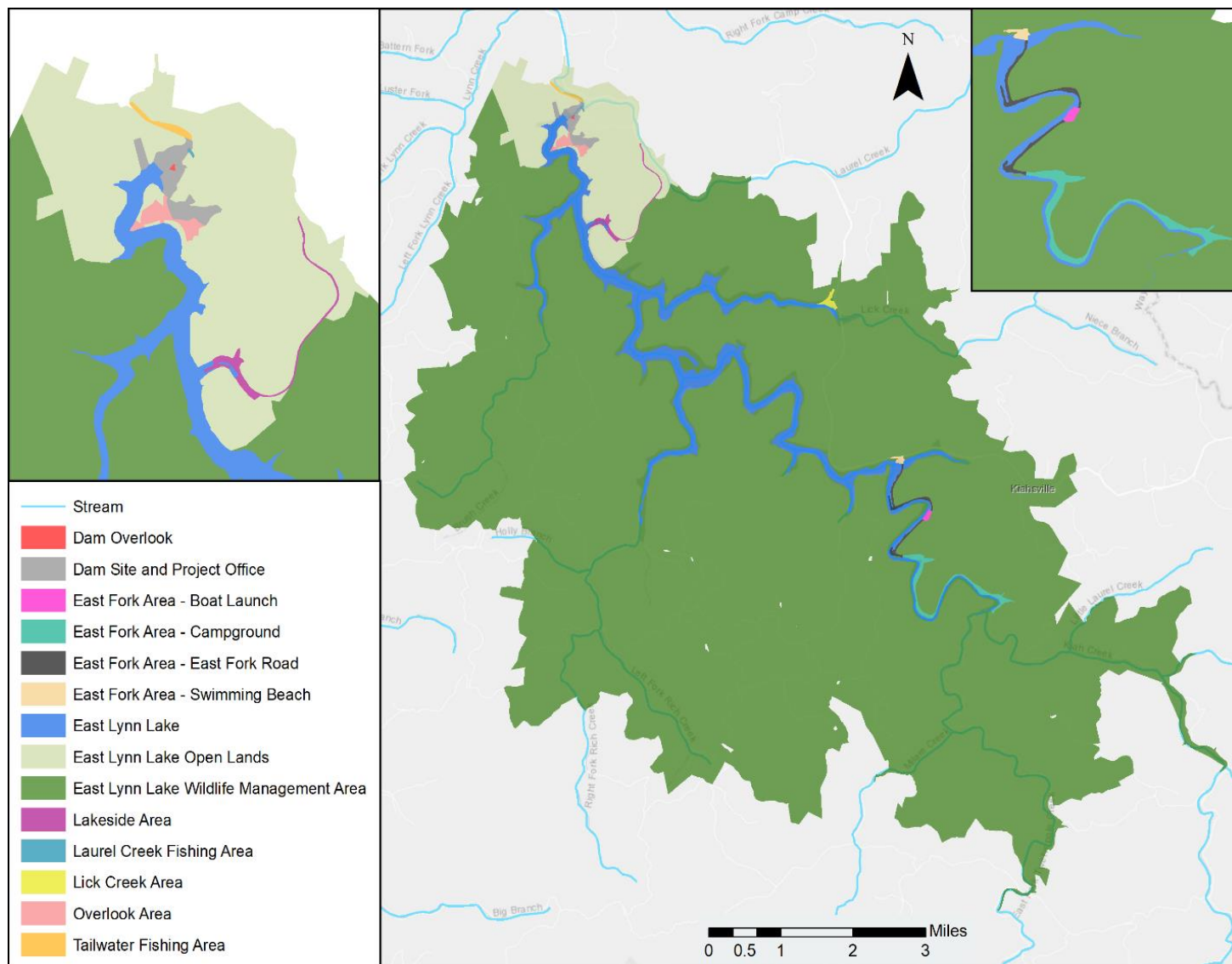


Figure 4-25. East Lynn Lake Management Areas

4.8.1 East Lynn Lake

Current Use Condition

East Lynn Lake is managed by USACE and WVDNR-Wildlife to support water-based recreation activities and preservation of a healthy aquatic habitat (**Figure 4-26**). There are no horsepower restrictions for motorboats at East Lynn Lake. Recreation activities on the lake include motorized and non-motorized boating, swimming, and fishing. Water skiing and tubing are activities that are also seen occasionally on East Lynn Lake. The most common types of motorboats that use the lake are bass boats and pontoon boats although Jon boats, houseboats, and jet skis are also present. Non-motorized watercraft such as kayaks, canoes, and paddle boards using the lake have increased in the last decade and are continuing to increase. USACE places buoys to mark no-wake zones, restricted areas, and shallow areas along the lake's shoreline.

WVDNR-Wildlife manages the lake's aquatic resources. They create fish habitat by anchoring submerged Christmas trees and native shoreline trees just below the water surface to attract fish. The locations of the submerged trees are marked with signage and are shown on maps posted by WVDNR. The trees sometimes become detached from the anchors and float in the lake, creating obstacles. WVDNR also permits fishing tournaments, which are common on the weekend throughout the recreation season. WVDNR-Wildlife's featured fish species at East Lynn Lake is muskie. Fishing success in East Lynn Lake is good. The proportional stock density (PSD) is 60 at East Lynn Lake compared to less than 50 for Beech Fork Lake. PSD is a measure of the fish size distribution in a water body and is calculated as the number of fish longer than 12 inches divided by the number of fish greater than eight inches.

Garbage collection service is either not provided or utilized in some rural portions of the counties surrounding East Lynn Lake resulting in illegal dumping of trash in ravines and along hillsides. During large storm events, trash is flushed into tributaries by stormwater runoff which carries it downstream where it collects in East Lynn Lake. Cove Creek and the East Fork are the largest sources of trash entering the lake. Trash in the lake is not only unsightly to visitors, but it also presents a safety hazard to boaters and the potential for pollution of lake waters.

Sedimentation is problematic at the mouths of tributaries and in the upstream reaches of East Lynn Lake. Boat launches must be cleared of sediment periodically to remain functional.

East Lynn Lake is a relatively large lake in an attractive natural setting and provides a variety of water-based recreation opportunities. Compared to other lakes, East Lynn Lake experiences relatively low use which may be partially the result of a lack of awareness of the opportunities the lake offers.

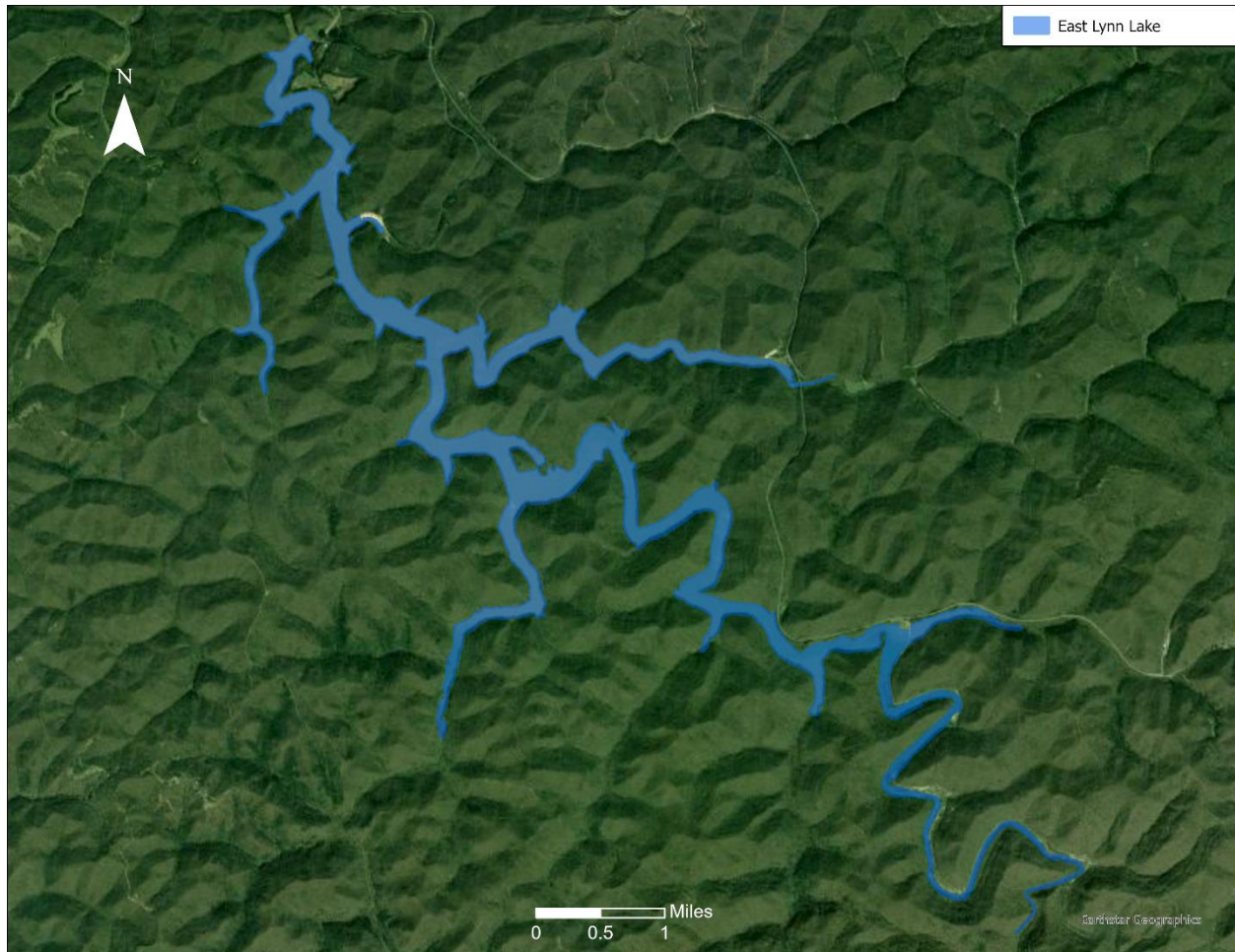


Figure 4-26. East Lynn Lake Management Area

Proposed Future Use

East Lynn Lake will continue to be managed by USACE and WVDNR-Wildlife to support water-based recreation activities and preservation of a healthy aquatic habitat. The USACE will continue cooperation with WVDNR-Wildlife to improve methods for anchoring systems for Christmas trees and other vegetation to create more permanent fish habitat in the future.

To improve boating safety, user enjoyment of the lake, and reduction of environmental contamination, measures to reduce the volume of trash in the lake will be evaluated. This evaluation will include measures such as placement of trash booms in Cove Creek and East Fork. Additionally, due to sedimentation reducing functionality of some facilities and to address boating safety in the upper reaches of East Lynn Lake, the USACE will evaluate broad alternatives to address these issues. The evaluation of comprehensive alternatives could include sediment removal or relocation of facilities.

USACE should identify and pursue methods for informing potential visitors of the recreation opportunities that are offered at East Lynn Lake to increase overall visitation. It is anticipated this outreach and better marketing of recreation opportunities at East Lynn Lake would encourage increased visitation to East Lynn Lake in the future.

4.8.2 Dam Site and Project Office

Current Use Condition

The Dam Site and Project Office (**Figure 4-27**) area consists of the dam, emergency spillway, inlet structure, office, maintenance sheds, and an old residence. The old residence was once used for offices but is currently unoccupied and used for storage. The office is located above the dam and has seven parking spaces, including one universally accessible space. The office includes space for both administrative and maintenance activities. This management area is currently used to provide administrative office space and for operations and maintenance activities.



Figure 4-27. Dam Site and Project Office

Proposed Future Use

The proposed future use of the Dam Site and Project Office is for continued management for operations and maintenance project purposes. The old residence facility provides the flexibility to be utilized for offices, meeting rooms, or storage space as management needs change in the future. Cell phone coverage is currently limited within the project. Therefore, an evaluation and implementation of improved cell coverage will increase the efficiency and effectiveness of operations and maintenance activities, reporting illegal activities, and notifying emergency services after accidents.

4.8.3 Dam Overlook

Current Use Condition

The overlook (**Figure 4-28**) is currently managed as a high-density recreation area that provides a scenic view of the lake and dam. The overlook has eight paved parking spaces, picnic tables, and a walkway with fencing around its perimeter. Visitors use this area for passive recreation such as wildlife viewing or picnicking. Additionally, visitors can access the hiking trail from this area.



Figure 4-28. Dam Overlook

Proposed Future Use

Continue the current management of the site to provide visitors with a scenic overlook of the dam and lake.

4.8.4 Overlook Area

Current Use Condition

The Overlook Area (**Figure 4-29**) is managed to provide recreation opportunities for a scenic overlook, fishing, picnicking, and sports activities. The overlook provides scenic views of the lake from one of the shelters. The area is a popular venue for large gatherings such as weddings and family reunions. Two ponds in the area provide good fishing. The playground adjacent to Shelter 1 requires routine maintenance. This area also includes basketball, volleyball courts, and a softball field used for recreation activities. The field is uneven and presents a potential tripping hazard.

Three shelters are located within this management area. Shelter 1 is approximately 500 feet from the parking area via foot path and is adjacent to a playground. A paved walkway is provided but it is a long distance for visitors to carry picnic supplies from the parking area to the shelter. Shelter 2 is close to the parking area and the restroom.



Shelter 2

Shelters 1 and 2 can be reserved on weekends or used on a first come-first-serve basis. They are not reservable on weekdays. Based on observations of project staff, both shelters are very well used. A third, smaller shelter at the scenic overlook is available on a first come-first-serve basis.



Figure 4-29. Overlook Recreation Area

Proposed Future Use

The proposed future use of the area is to continue its current management as a high-density recreation area that provides picnicking, sightseeing, and sports opportunities and seek opportunities to provide enhanced recreational amenities.

Recommendations include expansion of the existing playground to enhance the user experience and evaluate other substrates (e.g., permanent pad) in place of mulch that would reduce maintenance needs and provide safety benefits. Additionally, an evaluation of alternatives that would improve accessibility of Shelter 1 is recommended.

Project staff have observed high utilization of the existing shelters which suggests the need for another shelter within the management area. An evaluation of current occupancy rates of the existing shelters should be conducted to assess whether the addition of another shelter is warranted. The objective of the evaluation would be to provide picnicking facilities that are commensurate with the demand.

Additionally, given the unevenness of the sports field, it is recommended that measures should be evaluated to increase public safety when utilizing sports fields in this management area.

4.8.5 Tailwater Fishing Area

Current Use Condition

This area stretches approximately 0.4-mile along the south side of the East Fork of Twelvepole Creek below the dam (**Figure 4-30**). It is accessed from East Lynn Road by Spillway Road. The area is currently managed as a water-based recreation area with opportunities for fishing and picnicking. The area's playground is currently in poor condition which has likely contributed to its low utilization. The facilities at this recreation area are adequate to accommodate more visitors than are currently utilizing the area.



Figure 4-30. Tailwater Fishing Area

Proposed Future Use

The proposed future use of the Tailwater Fishing Area is to continue providing recreation opportunities for fishing and picnicking. Proposed recommendations include replacement and upgrades of playground facilities and pursuing opportunities to inform the public of recreation opportunities available in the Tailwater Fishing Area. Implementation of marketing, outreach, and upgrades to facilities would likely result in increased future visitation within this management area.

4.8.6 Laurel Creek Fishing Area

Current Use Condition

The Laurel Creek Fishing Area (**Figure 4-31**) is located below the dam on the East Fork of Twelvepole Creek near its confluence with Laurel Creek. The Laurel Creek Fishing Access Road provides access to the area. The area is currently managed as a low-density recreation area that consists of a small unpaved parking area and provides fishing opportunities at the tailwaters of the dam. Anglers fish from the shoreline along the East Fork. WVDNR-Wildlife uses this area for their seasonal tailwater trout stocking and depending on conditions, access can be difficult.

Proposed Future Use

The USACE would continue the current management of the site to provide visitors with fishing access. To improve efficiency in tailwater trout stocking efforts, it is recommended the existing unpaved parking area would be paved and include a paved ramp to provide access for stocking trucks. Additionally, development of the recommended restroom facility in this area would provide enhanced user enjoyment.



Figure 4-31. Laurel Creek Fishing Area

4.8.7 East Lynn Lake Open Lands

Current Use Condition

This USACE management area (**Figure 4-32**) consists of low density managed lands surrounding the Tailwater Area, dam site, Overlook Area, and Lakeside Area. The project lands provide opportunities for passive recreation such as fishing, hiking, and hunting. The Damsite Trail, Overlook Trail, Lakeside Trail, and East Fork Trail are located within this management area.

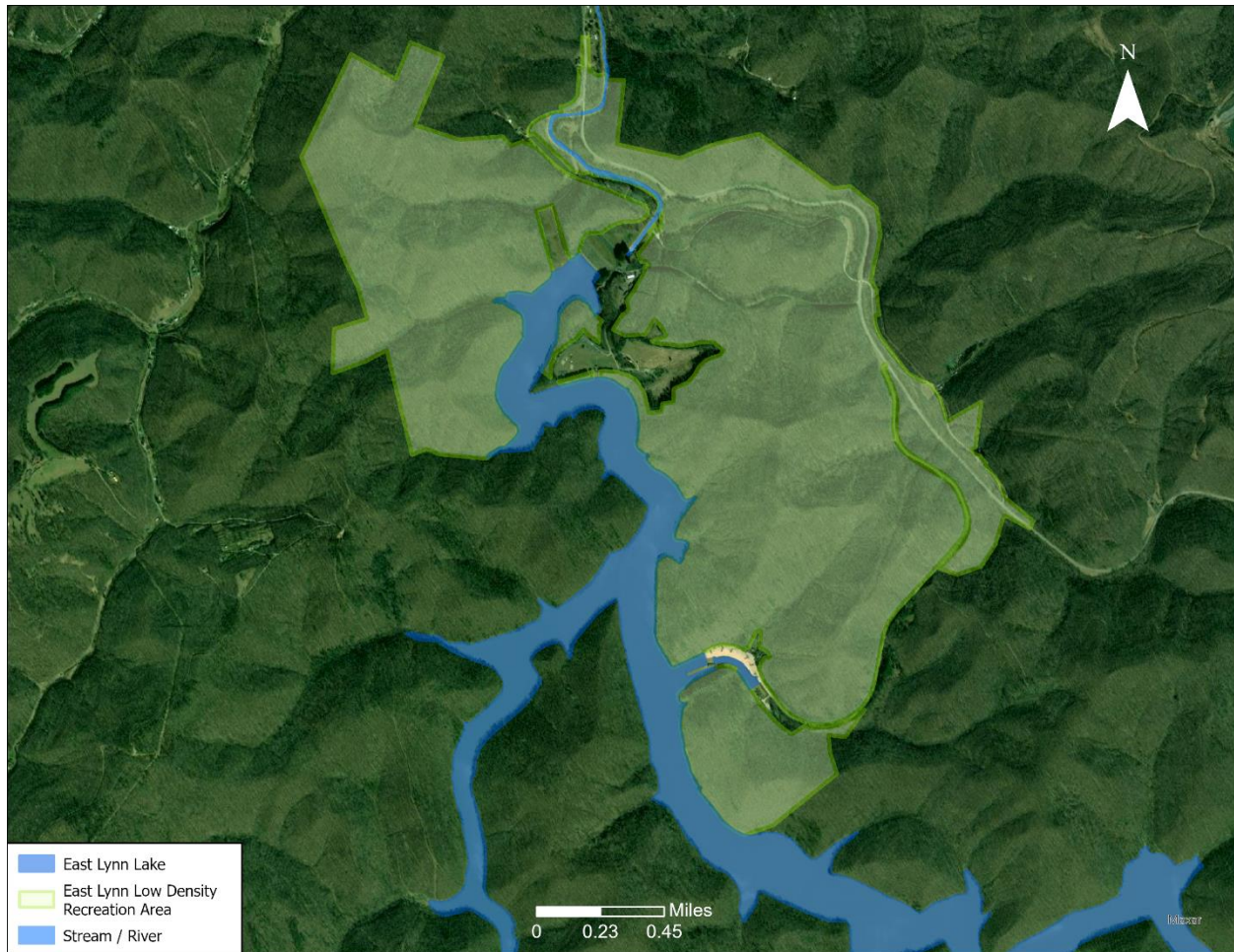


Figure 4-32. East Lynn Lake Open Lands

Proposed Future Use

The USACE would continue current management of the trails and low density recreation open lands site to provide visitors passive recreation opportunities. Within this management area, the USACE will continue to monitor invasive species and develop and implement plans for invasive species management. It is recommended that options be explored for expanding the existing trails in the area to include opportunities for multi-use and other various types of trails. If space is available, expansion of trails could enhance the user experience as this recommendation was identified through public engagement and identified as a priority in the WV SCORP.

4.8.8 East Fork Area

The East Fork Area (**Figure 4-33**) consists of a continuous narrow strip of land along the east bank of East Fork that begins at the intersection of East Fork Road and Route 37. This management area includes the Swimming Beach, Boat Launch, Campground,

and East Fork Road which connects all these areas. The East Fork portion of the lake is a designated no-wake zone throughout the entire length of the Management Area.

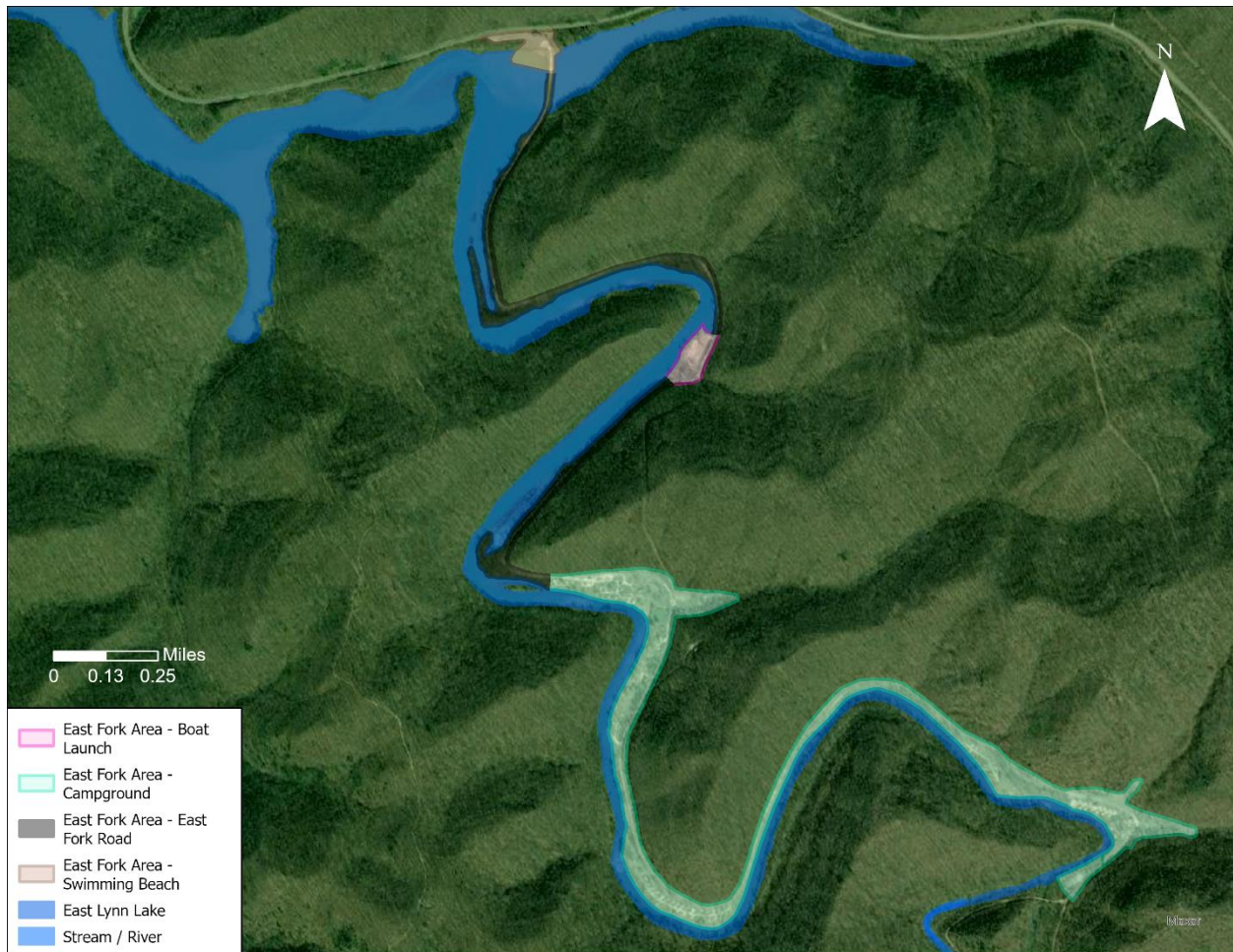


Figure 4-33. East Fork Area

4.8.8.1 East Fork Swimming Beach

Current Use Condition

The East Fork Swimming Area is located on East Fork Road near its intersection with Route 37. It is managed as a high-density recreation area that provides recreation opportunities that are limited to swimming. The beach occupies approximately 250 feet of shoreline, and a paved parking area is provided for visitors. The existing parking area is adequate, it rarely fills. Although located near the East Fork Campground, a popular recreation area, the swimming beach is currently underutilized. There are no showers or shade which likely contributes to the area's underutilization.

Proposed Future Use

The proposed future use of the East Fork Swimming Beach is to continue management of the area to support the swimming beach and to make the area more attractive to visitors. To enhance the user experience and to increase visitation, the addition of shade structures, restrooms and showers are recommended. Additionally, the USACE should identify and pursue methods for informing potential visitors of the swimming opportunities that are offered in this management area. It is anticipated this outreach, better marketing of recreation opportunities, and the addition of proposed features above would encourage increased visitation to this management area in the future.

4.8.8.2 East Fork Boat Launch

Current Use Condition

The East Fork Boat Launch is located on East Fork Road 1.1 miles south of the East Fork Swimming Beach. The area is currently managed as a high-density recreation area that provides fishing, boating, and picnicking opportunities. Currently, no shelters or playground facilities are available in this management area. The area is easily accessed from State Route 37. Visitation data is not collected specifically for the boat launch, but project staff have observed that the area is well used. Large events such as weddings have utilized the large space available in this area despite the lack of a shelter. Sediment accumulates at the boat launch and must be cleared periodically.

Proposed Future Use

It is recommended a comprehensive site use evaluation for the East Fork Boat Launch and day use area be conducted to provide the framework identifying opportunities for visitors and to optimize the space available. The evaluation would take into consideration potential upgrades such as the addition of a shelter and playground to enhance the user experience. This would be accomplished in conjunction with partially shutting down the Lick Creek Area to increase efficiency of operations and maintenance by consolidating more recreation opportunities into the better utilized recreation area and would allow an upgrade to the East Fork Boat Launch. Facilities that would be removed from the Lick Creek Area are described in **Section 4.8.9**. USACE should pursue opportunities to inform the public of all recreation opportunities that are available at this site to increase its utilization beyond the boat launch.

4.8.8.3 East Fork Campground

Current Use Condition

The East Fork Campground is managed by the USACE. The entrance to the East Fork Campground is on East Fork Road about 0.75-miles south of the East Fork Boat Launch. The area is managed to provide camping, boating, and fishing recreation

opportunities. The campground's six camping areas extend along the East Fork for approximately 2 miles from Area 1 at the entrance to Area 6.

Campsites in Areas 1 through 4 can be reserved and campsites in Areas 5 and 6 are available on a first come-first-serve basis. All campsites have water, but no sewer hookups are available. 50-amp electric hookups are provided in Areas 5 and 6 and in a portion of Area 3. The remaining campsites have 30-amp hookups. The existing facilities at many East Fork campsites do not fully accommodate modern recreational equipment. For example, the power requirements of RVs sometimes exceed the ability of the campground facilities, and the area will lose power.

The campground has one dump station near the entrance which is heavily utilized on Sundays during peak camper checkout times. The dump station is located 2 miles from the farthest campsites in Area 6. During the week, campers transport portable tanks back and forth between the dump station and their campsites, creating additional traffic on the two-lane road.

A concessionaire operates the camp store which offers supplies and rental equipment, as well as offering Wi-Fi to campers for a fee. The USACE currently does not have Wi-Fi access and intermittent interruptions in internet access can result in arriving visitors not being able to be checked in and credit card payments cannot be processed.

Two boat launches are available at the campground for use by campers. Due to the sedimentation in the upstream reaches of the East Fork it is necessary to dredge the boat launches periodically to maintain optimal access. Bank erosion in some areas is encroaching on campsites.

Proposed Future Use

The proposed future use of the East Fork Campground is to continue to providing camping to the public and explore opportunities for improvement to the current recreational facilities. An evaluation of the adequacy of existing campsites should be conducted, and improvements implemented where needed to better accommodate modern recreation vehicles. This evaluation should take into consideration measures such as including campsite pads to accommodate the size of modern recreation vehicles and upgrading all campsite electric hookups to 50-amps to provide safer and more reliable power. An evaluation should determine whether adding another dump station in the vicinity of Areas 4 and 5 or providing sewer hookups would be more cost effective. Improvements to the playground facilities and Wi-Fi upgrades to provide more reliable service. In the interest of cost-effective maintenance of boat launches, an assessment should be performed to identify long-term measures to address the accumulation of sediment, including potential relocation of boat launches.

4.8.8.4 East Fork Road

Current Use Condition

East Fork Road is approximately four miles long from its intersection with Route 37 to Area 6 in the East Fork Campground. It provides access to all three recreation sites in the East Fork Area: the swim beach, boat launch, and campground. It is a two-lane paved road that meanders along the shoreline of the East Fork. Roughly a third of all visitors to East Lynn Lake travel on East Fork Road each year. The road is in poor condition because of heavy usage, periodic inundation during high water events, and a lack of adequate maintenance. Large recreation vehicles and vehicles towing boat trailers use the road and it does not meet current WVDOT lane and shoulder width safety criteria.

The East Fork is a dedicated no-wake zone the entire length of the East Fork Area and it is a popular area for non-motorized watercraft. However, there is no launch dedicated to non-motorized watercraft launch in the East Fork Area.

Proposed Future Use

East Fork Road will continue to be managed to provide access to the recreation sites in the East Fork Area. An evaluation of overall maintenance needs and safety upgrades should be conducted for East Fork Road from Route 37 to Area 6 of the campground to provide a safe route for large vehicles. Evaluate and identify an appropriate site and pursue options to add a boat launch for non-motorized watercraft along East Fork Road.

4.8.9 Lick Creek Area

Current Use Condition

The Lick Creek Area (**Figure 4-34**) is on Lick Creek, a major tributary to the East Lynn Lake, located directly off Route 37. The Lick Creek Area is currently managed as high-density recreation that provides opportunities for boating, fishing, and picnicking. Lick Creek is a designated no-wake zone from its confluence with the East Fork to the Lick Creek Area.



Figure 4-34. Lick Creek Area

Visitation to Lick Creek is low, only about 3% of the total annual visitation to East Lynn Lake. Visitors primarily utilize the boat launch. The playground is in poor condition because it is situated in a low area that remains wet much of the time. Overall, poor drainage increases maintenance requirements for the area and discourages the area's utilization by visitors.

Proposed Future Use

The proposed future use of the area is to continue its management as a high-density recreation area but to reduce the recreation opportunities to boating and fishing. The boat launch and fishing pier will remain in operation. Considering the high maintenance requirements and low utilization of the area, it is recommended that the shelter, playground, and restroom be closed and no longer maintained. As described in **Section 4.8.8.2**, similar facilities would be placed at the East Fork Boat Launch. This will eliminate high maintenance costs at the Lick Creek Area and improve recreation opportunities at East Fork Boat Launch, a popular recreation area.

4.8.10 Lakeside Area

Current Use Condition

The Lakeside Area (**Figure 4-35**) is at the mouth of Bartram Branch, 0.8 miles south of the Overlook Area. Lakeside Marina Road provides access from Route 37. It is currently managed to provide fishing, boating, and picnicking opportunities to visitors. The area includes Lakeside Marina Drive, the marina, paved parking for 180 car-trailer combinations, a four-lane boat launch, and a day use area. The marina is operated by a commercial concessionaire. Visitation at the Lakeside Area accounts for about 12% of the total visitation to East Lynn Lake.



Figure 4-35. Lakeside Area

The day use area includes, a small shelter, picnic tables, paved parking for 20 cars, restroom, and a trailhead for the 1.5-mile-long East Fork Trail. The Bartram Refuse Pile is located across Bartram Creek from the Lakeside Area. The WVDEP coal database

indicates is an abandoned mine area with dangerous piles and embankments but does not provide any other information.

Proposed Future Use

The proposed future use of this area is to continue current use and improve its management to provide recreation opportunities. Recommendations for additional recreational opportunities include the addition of a playground or interactive water feature. However, due to the potential for contaminated material at the nearby Bartram Refuse Pile (**Section 4.2.8**), an evaluation should be performed to identify any potential safety concerns. Additional outreach should be undertaken to better inform the public of the recreation opportunities provided at the Lakeside Area.

4.8.11 East Lynn Lake Wildlife Management Area

Current Use Condition

The following goals are stated in the WVDNR East Lynn Lake WMA Management Plan (**Figure 4-36**):

1. To protect and enhance wildlife habitat to provide maximum hunting, trapping, and non-consumptive recreational opportunities which are compatible with the habitat.
2. Manage wildlife populations for hunting, trapping and non-consumptive recreational opportunities.
3. Reduce illegal use of ATVs/ORVs on the management area.
4. Continue public information efforts to facilitate management of the area.

Hunting and fishing are the primary recreation activities conducted in the East Lynn Lake WMA. The rifle deer season and spring turkey season are the most popular hunting seasons. East Lynn Lake WMA is a heavily forested area and therefore management efforts are directed toward forest game species such as the wild turkey, gray squirrel, and ruffed grouse.

There are 56 miles of unimproved roads in the WMA. These roads are maintained cooperatively between the WVDNR, USACE, WV Division of Highways (WVDOH) and several utility companies. There are about 15 miles of hunter access trails behind locked gates located on the management area. The unimproved roads provide access to illegal off-road vehicles that congregate in the WMA. Illegal use causes damage to the backcountry areas by creating ruts, destroying native vegetation, contributing to erosion, and interfering with hunting. USACE and WVDNR patrol the backcountry on a regularly basis in the summer, however budget constraints limit the ability of both agencies to prevent all illegal off-road activities in the area.

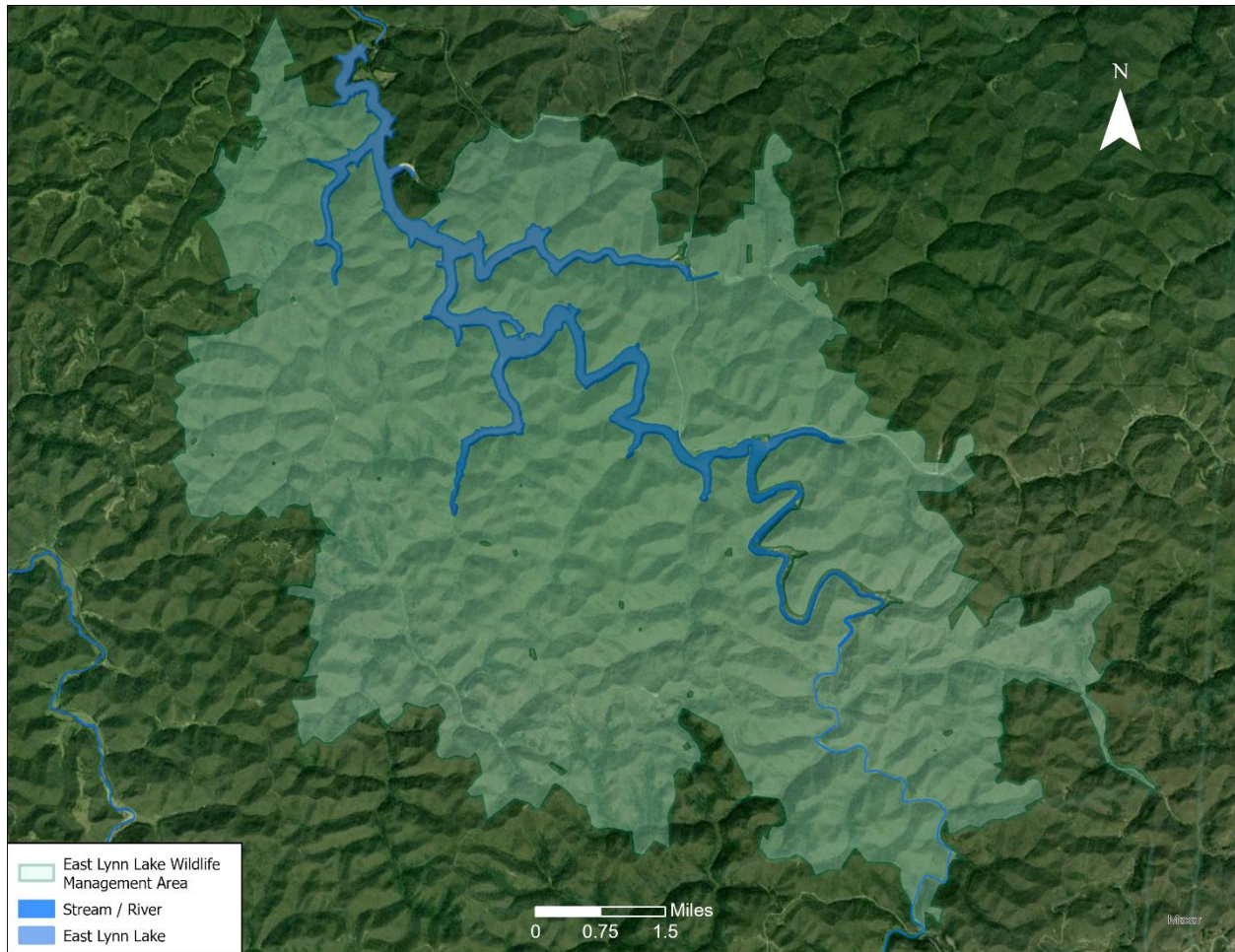


Figure 4-36. East Lynn Lake Wildlife Management Area

According to the WMA license agreement, WVDNR submits an annual timber management plan to USACE. The goal of timber management is to maintain good quality wildlife habitat. The proceeds from timber harvests are to be used for maintenance and development of the East Lynn WMA.

East Lynn Lake WMA has numerous oil and natural gas production sites on the property. The WVDNR allows 8 acres to be sharecropped by local farmers for the purpose of hay and grain production.

Proposed Future Use

The East Lynn Lake WMA will continue to be managed by the WVDNR to provide preservation of fish and wildlife habitat, hunting, and fishing. USACE and WVDNR-Wildlife will continue to collaborate and explore new methods for controlling illegal off-road vehicle access and optimize partnerships for the prevention and control of invasive species.

5. Environmental Consequences*

This section serves as part of the integrated EA that has been prepared for the Regional Master Plan. A Master Plan does not propose specific actions or projects; therefore, this integrated EA has been prepared on a programmatic basis, meaning it evaluates the types of impacts that may occur as a result of implementing the Master Plan update.

NEPA documents for Master Plans are broad in scope and do not evaluate effects from specific projects; rather, they provide a framework from which future NEPA review of specific actions may be tiered. Prior to implementation of specific future actions, supplemental NEPA analyses and documentation would be required. The USACE will review the information in this proposed Master Plan and determine the appropriate level of supplemental NEPA documentation for each individual action/measure and incorporate this integrated EA by reference.

This section also describes and compares impacts from the Proposed Action Alternative and No Action Alternative for managing, preserving, developing, or enhancing natural, cultural, and recreational human-made resources within Beech Fork Lake and East Lynn Lake federal fee boundaries.

5.1 Purpose and Need

The purpose of the integrated EA is to evaluate the impacts of the measures proposed in this Regional Master Plan Update. The Master Plan is a vital tool for the responsible stewardship of resources at Beech Fork Lake and East Lynn Lake to benefit present and future generations. Master Plans are updated periodically to maintain focus on four primary components: regional and ecosystem needs, resource capabilities and sustainability, expressed public interests compatible with authorized purposes, and environmental sustainability elements.

The Regional Master Plan provides guidance and includes direction for appropriate management, use, development, enhancement, protection, and conservation of the natural, cultural, and man-made resources at Beech Fork Lake and East Lynn Lake. The Master Plan Update also includes recommendations for accommodating increased or new demands that may affect project resources.

The Regional Master Plan seeks to update and replace the prior 1988 and 1984 Master Plans for Beech Fork Lake and East Lynn Lake respectively and provide a balanced regional plan that follows current Federal laws and regulations while sustaining natural resources and providing outdoor recreational experiences. The integrated EA is needed to assist the USACE in the decision-making process regarding implementation of measures included in the Regional Master Plan and to comply with NEPA.

5.2 Alternatives*

This section provides a description of the two alternatives considered in this integrated EA —the No Action Alternative and the Proposed Action Alternative.

5.2.1 No Action Alternative

The No Action Alternative is assessed to determine the potential impacts of not implementing the Proposed Action. The No Action Alternative is included in the alternatives analysis to allow comparison between future without and with project actions, and to determine potential environmental effects of the proposed project alternatives.

Under the No Action Alternative, measures described in the Beech Fork Lake and East Lynn Lake Regional Master Plan would not be implemented. The USACE would continue to maintain and upgrade existing facilities according to the existing Master Plans but would not implement some of the management and development actions specified in this Regional Master Plan update. The 1988 Beech Fork Lake and 1984 East Lynn Lake Master Plans and their supplements would continue to provide the only source of comprehensive management guidance. Information in these master plans is outdated and no longer adequately addresses the needs of the USACE, other management partners, users of these recreational areas, or updated policy and guidance. Management of the Beech Fork Lake and East Lynn Lake Projects would continue under the current master plan and Operations Management Plan (OMP). Future developments or resource management policies would require approval on a case-by-case basis without the benefit of evaluation in the context of an overall comprehensive plan.

5.2.2 Proposed Action

The Proposed Action assessed in this integrated EA is adoption and implementation of the updated Master Plan, including goals and objectives and resource plan recommendations described in **Sections 3 and 4**. The resource objectives listed in these sections identify the potential development needs for the overall region and for each lake. These recommendations for each recreation area are presented in the Resource Plan for each lake. These revisions are proposed to address ongoing and anticipated management issues, including recreational features, to allow the USACE Natural Resources Managers the flexibility they need to respond to changing conditions and uses over the life of the Master Plan, and to ensure that actions needed to maintain their facilities are compliant with all relevant federal regulations.

The proposed updates to management areas within Beech Fork Lake and East Lynn Lake Project Areas takes into consideration changes to the planning area's physical and biological conditions as well as public preferences for uses and access. These updates are formulated to optimize management of recreational resources and uses while

protecting sensitive natural and cultural resources; reflect current project natural resources management priorities; and allow USACE to manage project lands in compliance with pertinent laws and regulations. Following trends and guidance in policy, the management focus of the Proposed Action is towards increased stewardship of natural and cultural resources and improved management of recreational features and access.

The recommendations for Beech Fork Lake and East Lynn Lake are described in **Tables 3-24 and 4-20**. Elements of the proposed action include:

- Implement an invasive species management plan to control expansion of problem species on project lands.
- Perform comprehensive surveys for prehistoric and historic cultural resource sites and develop comprehensive geospatial databases.
- Collaborate with WVDNR and WVDHR to inform anglers of current for fish consumption advisories.
- Establish pollinator habitat where appropriate.
- Explore options for expanding the existing trails on USACE managed low density recreation lands, including multiuse trails.
- Evaluate broad alternatives for addressing sedimentation problem areas, including consideration of comprehensive sediment removal, boat launch relocation, etc.
- Explore opportunities for gateway improvements for the Beech Fork Lake Project such as adding natural areas.
- Evaluate repair strategies for Beech Fork Road to provide comprehensive rehabilitation of the road to maintain efficient and safe access for operations and maintenance vehicles and visitors.
- Enhance the visitor experience at the Beech Fork Lake Downstream Recreation Area based on future analysis and evaluation of circulation and efficient use of the area.
- Perform an evaluation of circulation patterns and a more detailed assessment of recreation use patterns of different user groups at Stowers Branch Beach at Beech Fork Lake to identify options for alleviating the feeling of overcrowding.
- Evaluate available options for reducing crime and vandalism at Stowers Branch Beach at Beech Fork Lake.
- Assess options and implement modifications to maintain visibility of the no-wake sign without mowing the surrounding wetland at Stowers Branch Beach at Beech Fork Lake.
- Modify the universal access ramp to the swimming area at Stowers Branch Beach at Beech Fork Lake so that it is visible and functional.
- Work with partners to develop more permanent fish habitat at East Lynn Lake.

- Evaluate options to address the accumulation of sediment and options for trash reduction within East Lynn Lake for functionality of boat launching, navigation, and safety.
- Evaluate the need and feasibility to replace, upgrade, or install new recreation facilities at East Lynn Lake including the upgrades to the playground in the Tailwater Fishing Area, addition of a shelter and expansion of the playground in the Overlook Recreation area, improvements to the East Fork Campground, addition of amenities to the East Fork Swimming Beach and Boat Launch, etc.
- Add a paved parking area with pavement extending to the channel for fish stocking truck access in the Laurel Creek Fishing Area at East Lynn Lake.
- Evaluate the need for installation of a non-motorized watercraft launch on East Fork Road at East Lynn Lake.

5.3 Potential Environmental Impacts

This section discusses the existing conditions by resource category and any potential environmental impacts associated with the No Action Alternative and the Proposed Action Alternative.

The environmental impacts were assessed following the 1978 Council for Environmental Quality (CEQ) Regulations since preparation of the Master Plan began prior to the 2020 Final Rule. Therefore, the USACE took context and intensity into consideration in determining potential impact significance, as defined in 40 CFR part 1508.27 (CEQ, 1978). The intensity of a potential impact is the impact's severity and includes consideration of beneficial and adverse effects, the level of controversy associated with a project's impacts on human health, whether the action establishes a precedent for future actions with significant effects, the level of uncertainty about project impacts and whether the action threatens to violate federal, state, or local laws established for the protection of the human and natural environment. The severity of an environmental impact is characterized as none/negligible, minor, moderate, significant, or beneficial. The impact may also be short-term or long-term in nature.

- None/negligible: No measurable impacts are expected to occur.
- Minor: A measurable and adverse effect on a resource. A slight impact that may not be readily obvious and is within accepted levels for permitting, continued resource sustainability, or human use. Impacts should be avoided and minimized if possible but should not result in a mitigation requirement.
- Significant: A measurable and adverse effect to a resource. A major impact that is readily obvious and is not within accepted levels for permitting, continued resource sustainability, or human use. Impacts likely result in the need for mitigation.
- Beneficial: A measurable and positive effect to a resource. May be minor to major, resulting in improved conditions, sustainability, or viability of the resource.

- Short-Term: Temporary in nature and does not result in a permanent long-term beneficial or adverse effect to a resource. For example, temporary construction-related effects (such as, an increase in dust, noise, traffic congestion) that no longer occur once construction is complete. May be minor, significant, adverse, or beneficial in nature.
- Long-Term: Permanent (or for most of the project life) beneficial or adverse effects to a resource. For example, permanent conversion of a wetland to a parking lot. May be minor, significant, adverse, or beneficial in nature.

The USACE used quantitative and qualitative analyses, as appropriate, to determine the level of potential impact from proposed alternatives. Based on the results of the analyses, this integrated EA identifies whether a particular potential impact would be adverse or beneficial, and to what extent. CEQ regulations also require that a proposed action's cumulative impact be addressed as part of a NEPA document. Cumulative impacts are discussed in **Section 5.4** below.

5.3.1 Hydrology/Floodplains

No Action: The No Action Alternative would not result in any change in management of Beach Fork Lake and East Lynn Lake project lands. The USACE would continue to manage the Beech Fork Lake and East Lynn Lake Projects utilizing the current master plans, as applicable, and updated OMPs. Future developments or resource management policies would require individual approval.

Future actions are anticipated to be similar to current management activities. Ground disturbing activities could occur as part of these individual actions. Land disturbance could occur from activities such as establishment of nonmotorized watercraft launches and maintenance of roads. Although increased stormwater would be minimal due to the small footprint of these actions, best management practices (BMPs) would be implemented to avoid or minimize impacts to surface water and ground water.

Future impacts could also occur if new facilities are constructed within the floodplain. Minimization measures would be implemented as appropriate. Any proposed new construction would be evaluated under NEPA on a case-by-case basis and must meet requirements of EO 11988, resulting in no significant impacts to the floodplain as part of the No Action.

Overall, no significant impacts to hydrology (surface, ground water, and hydrology) and floodplains are anticipated as part of the No Action Alternative. However, long term minor to moderate impacts to hydrology are likely to be influenced by future climatic changes.

Proposed Action: The Proposed Action would have similar impacts as the No Action Alternative regarding surface and ground water, and hydrology impacts. Under the

Proposed Action, an increase in impervious surface area could occur from new development such as improvements to parking area circulation, access roads, installation of nonmotorized watercraft launches, and development of new trails, that could result in concentrated and increased stormwater runoff from these areas. The conversion of pervious surface to impervious surface and vegetated to open space could increase the amount of stormwater runoff in the watershed long-term. However, the amount of land being converted is minimal compared to the size of the watershed and would be expected to only have an insignificant long-term impact to hydrology.

Many recreational activities at Beech Fork Lake and East Lynn Lake require direct access to the lake. Many of the recommended goals, objectives, and recommendations in the Master Plan would take place within the floodplain such as installation of nonmotorized watercraft launches, improvements to parking areas, etc. Due to topography constraints and the nature of water-based activities such as swimming and boating, no practicable alternative locations exist outside of the floodplain. The functionality of the floodplain would not be reduced by project activities. USACE would ensure that any proposed actions comply with EO 11988 (Floodplain Management), and guidance on implementation of EO 11988. Closure of the shelter, playground, and restroom at the Lick Creek Area would remove structures from a portion of the floodplain that is regularly inundated. Therefore, the Proposed Action Alternative would not have significant impacts to floodplains.

Implementation of any management recommendations proposed, or other ground disturbing activities initiated as the result of the Proposed Action Alternative would comply with all state and Federal regulations, as well as EO 11988, therefore no significant impacts to surface and ground water, hydrology, or floodplains are anticipated as part of the Proposed Action Alternative.

5.3.2 Sedimentation and Shoreline Erosion

No Action: The No Action Alternative would not result in any change in management of Beech Fork Lake and East Lynn Lake project lands. The USACE would continue to manage Beech Fork Lake and East Lynn Lake utilizing the current master plans, as applicable, and updated OMPs. Future developments or resource management policies would require individual approval.

The USACE and other agencies responsible for management of project lands would monitor areas that are susceptible to erosion from increased usage and people trying to access less congested areas (potentially resulting from the development of trails, trampling of vegetation on the edges of existing recreation areas, or overuse of existing trails), to minimize the potential for increased erosion.

Future actions are anticipated to be similar to current management activities. Ground disturbing activities could occur as part of these individual actions. Any new ground

disturbing activities conducted under current or future OMPs would include industry standard BMPs to minimize erosion. Due to sediment accumulation, water depth has been reduced impacting navigation and recreation in portions of both Beech Fork Lake and East Lynn Lake and dredging activities are anticipated to continue under the No Action Alternative.

The 9.9-horsepower limit at Beech Fork Lake on motorboats that limit boat speeds and wakes and the absence of long distances of open water that would result in wind-induced waves have prevented large-scale shoreline erosion at Beech Fork Lake. Although there is no horsepower limit at East Lynn Lake, large scale shoreline erosion has not been identified. However, localized areas of erosion would continue to develop at both lakes and would require minor stabilization projects. Overall, minor short-term and long-term impacts on sedimentation and shoreline erosion could result by implementation of the No Action Alternative.

Proposed Action: The Proposed Action Alternative would be similar to the No Action Alternative. Construction activities under the proposed action could include ground disturbance which could expose soils and contribute to sedimentation during stormwater runoff. However, exposed soils would be stabilized with native vegetation, crushed limestone, or asphalt. Implementation of temporary erosion and sediment control BMPs during construction of proposed actions on USACE managed areas (e.g., mulching bare areas, installing silt fences, etc.) along with permanent best management practices post construction (e.g., managing the flow of stormwater runoff from impervious areas, establishing vegetation, etc.) would occur for all proposed activities that would disturb the ground surface. In addition, any activities disturbing more than 1 acre would require the responsible agency to obtain coverage under the National Pollutant Discharge Elimination System (NPDES) by applying for a Construction Stormwater General Permit from the WVDEP and developing construction-site erosion control and stormwater management plans as necessary. No long-term impacts to sedimentation are anticipated once construction is complete.

Activities associated with the shoreline of Beech Fork Lake and East Lynn Lake are mainly limited to the installation of nonmotorized watercraft launches, improvements to Stowers Branch at Beech Fork Lake, and installation of a paved ramp for stocking trucks at in the Laurel Creek Fishing Area at East Lynn Lake. Localized areas of erosion will continue to develop and will require minor stabilization projects. Under the Proposed Action Alternative, USACE would evaluate broad alternatives with partners to address larger scale sedimentation problem areas, such as comprehensive sediment removal or boat launch relocation.

Overall, there could be short-term impacts to shoreline erosion and sedimentation. However, through implementing stabilization projects and large-scale sedimentation

solutions, it is anticipated that there would be minor to moderate long-term beneficial impacts.

5.3.3 Water Quality

No Action: The No Action Alternative would not result in any change in management of Beech Fork Lake and East Lynn Lake project lands. The USACE would continue to manage Beech Fork Lake and East Lynn Lake utilizing the current master plans, as applicable, and updated OMPs. Future development or resource management policies would require individual approval.

The USACE will continue to monitor in-lake and downstream water quality to identify potential changes or water quality degradation. In accordance with the water control plan, operational changes may be warranted to mitigate in-lake or downstream water quality concerns. WVDEP will also continue to monitor water quality for Beech Fork Lake and East Lynn Lake and tributaries to assess their listing under 303(d). Ultimately, Total Maximum Daily Loads (TMDLs) will be developed for waters listed in the Section 303(d) list. Currently, TMDLs for CNA-Biological and phosphorus are currently being developed and once implemented, would result in a long-term trend of improving water quality. However, due to widespread impairment throughout WV lakes, methylmercury of lake waters is anticipated to continue to present health risks to individuals that consume locally caught fish.

Future actions are anticipated to be similar to current management activities. Ground disturbing activities could occur as part of these individual actions. Land disturbance could occur from activities such as establishment of nonmotorized watercraft launches and maintenance of roads. Although increased stormwater would be minimal due to the small footprint of these actions, BMPs would be implemented to avoid or minimize impacts to water quality.

Overall, no significant impacts to water quality are anticipated as part of the No Action Alternative.

Proposed Action: Under the Proposed Action Alternative, the USACE will continue to monitor in-lake and downstream water quality to identify potential changes or water quality degradation. WVDEP will also continue to monitor water quality for Beech Fork Lake, East Lynn Lake, and tributaries to assess their listing under 303(d).

The Proposed Action Alternative includes recommendations for development or improvement of recreation facilities requiring potential ground disturbing activities such as installing new nonmotorized watercraft launches, improvement or expansion of parking areas, and potential trail development. The exact area, layout, equipment, and materials would need to be determined once design of the above features is complete. In general, however, construction associated with the above activities could have insignificant short-term impacts to water quality where ground disturbance is necessary.

Long-term, the paving of certain areas such as parking lots, would have an insignificant beneficial effect by minimizing substrate runoff from these areas which ultimately contributes to water quality issues such as excessive turbidity and sedimentation within the basin and the lake.

BMPs to minimize the runoff from proposed future actions would be implemented, such as directing runoff away from nearby surface waters, thus minimizing the risk of water pollution. Short-term impacts on surface water quality could occur from sedimentation as the result of proposed ground disturbing measures such as a new nonmotorized watercraft launch and development of trails. Implementing erosion and sediment control BMPs during construction would minimize potential impacts. Measures such as providing adequately sized parking areas designed to appropriately handle stormwater runoff and including stormwater runoff measures during the design of redeveloped or new facilities would minimize impacts.

Under the Clean Water Act, 401/404 water quality certification would be obtained for any in-water work required for implementation of identified measures or actions. For activities that involve the disturbance of more than 1 acre, coverage under the NPDES by applying for a Construction Stormwater General Permit would be required.

No significant impacts to water quality are anticipated under the Proposed Action Alternative. Short-term impacts to water quality could occur during implementation of construction activities. However, through implementing small scale stabilization projects, it is anticipated there would be minor long-term beneficial impacts to water quality.

5.3.4 Climate

No Action: Under the No Action Alternative, the USACE would continue to manage Beech Fork Lake and East Lynn Lake based on the existing master plans and OMP. Future developments or resource management policies would require individual approval. The No Action Alternative would not involve any activity that could significantly affect the environment regarding climate change. In the Twelvepole Creek area, rapid changes in temperature, precipitation, and stream flows due to changes in regional climate may not begin until 2040 (IWR, 2017). A gradual increase in annual mean temperatures is projected between 2011 and 2040 amounting to one-half degree per decade. Long-term, minor to moderate impacts to water quality and aquatic resources are likely to be influenced by future changes in climate.

No impacts to climate or climate change would occur from the No Action Alternative.

Proposed Action: Similar to the No Action Alternative, the Proposed Action Alternative would not involve any activity that could significantly affect the environment regarding climate change. Long-term minor to moderate impacts to water quality and possibly aquatic resources are anticipated from climate change.

Implementation of the Regional Master Plan will not have a beneficial or negative effect on climate. Only short duration, minor discharges of carbon-based pollutants would occur during construction activities that could contribute to greenhouse gases. Therefore, no significant adverse impacts to climate or climate change would occur because of the Proposed Action Alternative.

5.3.5 Topography, Geology, and Soils

No Action: The No Action Alternative would not result in any change in management of Beech Fork Lake and East Lynn Lake project lands. The USACE would continue to manage Beech Fork Lake and East Lynn Lake utilizing the current master plans, as applicable, and updated OMPs. Future development or resource management policies would require individual approval.

The USACE and other agencies responsible for management of project lands would monitor areas that are susceptible to erosion from increased usage and people trying to access less congested areas (potentially resulting from the development of trails, trampling of vegetation on the edges of existing recreation areas, or overuse of existing trails), to minimize the potential for increased erosion.

Future actions are anticipated to be similar to current management activities. Ground disturbing activities could occur as part of these individual actions. Any new ground disturbing activities conducted under current or future OMPs would include industry standard BMPs to minimize erosion.

All current and future projects that would convert open or vegetated spaces to hard surfaces (e.g., new parking areas) would comply with the Farmland Protection Act. Current and future projects would be coordinated with the NRCS to ensure that the land classified as Prime Farmland or Farmland of Statewide Importance at the Beech Fork Lake and East Lynn Lake project areas would not be impacted or would be mitigated as required.

Minor short-term and long-term impacts on topography, geology, soils, or Farmland of Statewide Importance could result from implementation of the No Action Alternative. However, no significant impacts are anticipated.

The USACE and outgrantees will continue to monitor project lands and take actions to avoid soil erosion or slope instability. No actions will be taken to significantly alter local geologic or topographic characteristics. BMPs will be implemented when appropriate to ensure that increased utilization of trails and other facilities do not result in soil erosion or adversely impact vegetation. Therefore, no impacts are anticipated on topography, geology, and soils under the No Action Alternative.

Proposed Action: Under the Proposed Action for USACE managed areas, no impacts on geology would occur. Short-term insignificant impacts to microtopography and soils

could occur due to construction of proposed future actions (e.g., parking, access roads, non-motorized launch, etc.). Construction of these proposed future actions would likely require grading of the sites to achieve flat topography (e.g., parking lot) or sloped topography (e.g., boat launch).

Areas where these future proposed actions would be located and/or are currently located in areas with less potential for erosion than steeper areas and areas more suitable for recreational use, therefore, only insignificant impacts short-term and long-term to microtopography are anticipated. Implementation of temporary erosion and sediment control BMPs during construction of recommendations (e.g., mulching bare areas, installing silt fences) along with permanent BMPs post-construction (e.g., managing the flow of stormwater runoff from impervious areas such as buildings and parking lots, establishing permanent vegetation) would occur for all proposed activities that would disturb the ground surface. To evaluate impacts more thoroughly, the USACE would consider soil suitability, slope, and potential for geologic instability during site-specific project planning.

Management recommendations that would convert open or vegetated spaces to hard surfaces (e.g., new parking areas) would comply with the Farmland Protection Act. All ground disturbing activity would undergo a separate NEPA analysis and would be coordinated with the NRCS to ensure that Prime Farmland or Farmland of Statewide Importance would not be impacted or would be mitigated as required. Minor short-term and long-term impacts to topography, geology, soils, or Farmland of Statewide Importance could result from implementation of the Proposed Action Alternative. However, no significant impacts are anticipated.

5.3.6 Mineral and Timber Resources

No Action: The No Action Alternative would not result in any change in management of Beech Fork Lake and East Lynn Lake project lands. The USACE would continue to manage the Beech Fork Lake and East Lynn Lake Projects utilizing the current master plans, as applicable, and updated OMPs. Future proposals or resource management policies would require individual approval.

All mineral rights for Beech Fork Lake were purchased by USACE prior to construction of the project, with the exception of 4,000 acres of fee lands on which the operation of a developed oil and gas field was allowed to continue with subordination of mineral rights to other project purposes (i.e., subject to certain restrictions for pollution and debris control and to avoid interference with the authorized project purposes). No coal mines or mineral extraction currently occur on Beech Fork Lake project lands.

All coal rights at East Lynn Lake except for 1,296 acres were purchased by the USACE. Developed oil and gas activity was allowed to continue with subordination of these mineral rights to other project purposes (i.e., subject to certain restrictions for pollution

and debris control and to avoid interference with the authorized project purposes). Coal mining operations occur immediately adjacent to East Lynn Lake project lands.

Argus Energy WV, LLC has a lease from BLM for 7,641 acres of project lands that is currently inactive. The lease allows mining of all reserves recoverable by underground room and pillar mining methods. If mining is initiated here, all federal and state mining regulations would be followed to avoid impacts to groundwater.

The USACE has determined that mineral extraction within the project boundary would likely result in adverse effects on resources and would be incompatible with authorized project purposes.

The Department of the Army's Policy on Land has determined that because of the "adverse environmental and safety impacts due to coal mining, civil works projects are hereby determined to be generally unavailable for coal mining" (USACE ASA Memorandum, 1995).

Implementation of the No Action Alternative could have impacts from future gas well outgrants. However, state mandated BMPs would be required, and impacts would likely be minor. Any future coal mine outgrants could have long-term, moderate to major, adverse impacts on water quality and terrestrial and aquatic species.

Under the No Action Alternative, timber management actions would continue to be periodically conducted by the WVDNR-Wildlife on the outgranted Beech Fork Lake WMA and East Lynn Lake WMA that would be coordinated in advance with the USACE and require compliance with all applicable Federal laws and regulations. Therefore, no impacts to timber resources are anticipated under the No Action Alternative.

Proposed Action: Implementation of the Proposed Action Alternative would allow the existing oil and gas wells to continue operation on subordinated fee lands at Beech Fork and East Lynn Lakes. USACE policies would continue to minimize any effects from the existing operations. As outlined in the resource objectives, management of Beech Fork Lake and East Lynn Lake Projects would exclude any new exploration of gas, oil, or mineral (coal) resources. However, WRDA 1999 outlined BLM as the leasing authority should there be renewed interest in coal extraction on East Lynn project lands that could result in subsurface leases being approved through coordination with the USACE. If mining is initiated here, all federal and state mining regulations would be followed. Therefore, there would be no impacts to mineral resources as part of the Proposed Action Alternative.

Existing USACE policies and practices controlling the harvest of timber on fee lands would remain unchanged, with the WVDNR-Wildlife continuing to coordinate with the USACE prior to conducting periodic timber harvests on the Beech Fork Lake WMA and East Lynn Lake WMA. By continuing existing policies and management practices, the Proposed Action alternative is anticipated to have no effects to timber resources.

5.3.7 Ecologic Setting

5.3.7.1 Vegetative Resources

No Action: The No Action Alternative would not result in any change in management of Beech Fork Lake and East Lynn Lake project lands. The USACE would continue to manage Beech Fork Lake and East Lynn Lake utilizing the current master plans, as applicable, and updated OMPs. Future proposals or resource management policies would require individual approval. The USACE and WVDNR will continue to monitor, manage, and protect vegetation resources on project lands under the No Action alternative using BMPs and guidance for Environmental Stewardship.

Impacts to vegetation would continue to occur from informal use areas and social trails. Unauthorized use of off-road vehicles at East Lynn Lake would continue to impact vegetative resources. The USACE and partners would continue to monitor for impacts on vegetation and implement restrictions or restoration as needed. Therefore, continuation of the No Action alternative would have no significant impacts on vegetative resources.

Proposed Action: Similar to the No Action Alternative, the Proposed Action would continue protecting vegetative resources by analyzing natural resources based on current and future conditions, resource suitability, and trends occurring on the landscape. Following goals and objectives of the Regional Master Plan would benefit natural resources by improving the health of local habitats which in turn promotes vegetative diversity.

Implementation of the Proposed Action could impact vegetative resources by improvements to recreation facilities; expansion of parking areas; road and trail improvements; etc. Closure of the shelter, playground, and restroom at East Lynn Lake's Lick Creek Area would provide a small area where native vegetation could be reestablished. Control of invasive plants would be required until native vegetation becomes established. This would be conducted in conjunction with adding facilities at the East Fork Boat Launch. Previously disturbed areas would be utilized to the extent practicable. However, some disturbance of native vegetation could be required.

Localized impacts to vegetation would also continue to occur from foot traffic in non-designated pathways and trail areas and unauthorized use of off-road vehicles. However, the USACE would work with partners at East Lynn Lake to implement measures to minimize unauthorized use of off-road vehicles which may decrease impacts to native vegetation.

Construction-related impacts, which would involve removing vegetation prior to construction, would range from clearing and leveling parking areas and the maintenance or construction of access roads. Many of the areas that would be affected by construction are adjacent to areas that have been developed, disturbed, or currently

maintained. Impacts from construction and maintenance would be short-term and minor. Implementation of construction BMPs or any necessary mitigation would minimize or avoid any adverse impacts.

Environmental stewardship and natural resource recommendations in the resource plan could result in beneficial impacts to vegetation such as developing and implementing an invasive species management plan within USACE project lands, optimizing partnerships for prevention and control of invasive species, and implementing conservation and best management practices for pollinator health, preserving existing pollinator habitat, and incorporating new pollinator habitat on project lands.

Overall, the Proposed Action Alternative could have short-term and minor impacts to vegetative resources through implementation of construction activities. However, management activities under the Proposed Action Alternative would result in long-term, beneficial impacts to vegetative resources.

5.3.7.2 Terrestrial Resources

No Action: Under the No Action Alternative, the USACE would continue to manage Beech Fork Lake and East Lynn Lake based on existing master plans and OMPs, as applicable. Future developments or resource management policies would require individual approval.

Terrestrial habitat and wildlife management would continue under the No Action Alternative. WVDNR-Wildlife would continue to have the lead role for management of terrestrial resources in the Beech Fork Lake and East Lynn Lake WMAs and WVDNR-Parks would have the lead role for Beech Fork State Park. The WVDNR and USACE would continue to monitor and manage terrestrial resources in the same manner as described in the existing master plans and under current programs and management goals. Wildlife viewing would continue to be popular on lands managed by the USACE, as well as at the WMAs, and the Beech Fork State Park, and East Lynn overlook areas. Hunting for deer and turkey would likely continue to be the most sought-after game species pursued within the WMAs.

Under the No Action alternative, the USACE would continue following bald eagle habitat management practices described in the National Bald Eagle Management Guidelines (USFWS, 2007) to minimize disturbances and comply with the Bald and Golden Eagle Protection Act. Similarly, the USACE would take appropriate actions to comply with the provisions of the Migratory Bird Protection Act to avoid impacts on any migratory bird species that either breed or overwinter within the Beech Fork Lake and East Lynn Lake project areas.

No impacts to terrestrial resources are anticipated under the No Action Alternative.

Proposed Action: Under the Proposed Action, implementation of the Regional Master Plan update would occur. This document would guide USACE's comprehensive management and development and use of project lands for recreation, conservation of natural resources, and preservation of cultural resources. Implementation of the new resource management goals and objectives and resource plan recommendations would provide improved management of natural resources within USACE managed areas of Beech Fork Lake and East Lynn Lake. WVDNR would continue current management and monitoring efforts for terrestrial resources in the WMAs and Beech Fork Lake State Park.

Terrestrial wildlife resources that support recreational activities (e.g., white-tailed deer, wild turkey, various small game species) would continue to be managed to allow hunting while maintaining population viability. The USACE along with partners would continue to protect and/or restore important native habitats such as old growth forest areas, riparian zones, unique habitats supporting special species and wetlands where they occur, or historically occurred, on project lands, resulting in long-term, beneficial effects on terrestrial resources. Proposed actions on USACE managed lands include the development and implementation of an invasive species management plan and establishment of pollinator habitat. By controlling or reducing invasive species within the project area, native terrestrial resources are anticipated to benefit long-term by either maintaining abundance/number of different native species or increasing abundance/number of different native species.

Closure of the shelter, playground, and restroom at East Lynn Lake's Lick Creek Area would provide a small area where native vegetation could be reestablished. Control of invasive plants would be required until native vegetation becomes established. This would be conducted in conjunction with adding facilities at the East Fork Boat Launch. Previously disturbed areas would be utilized for placement of the new facilities to the extent practicable. However, some disturbance of native vegetation could be required.

Under implementation of the Proposed Action, short-term minor impacts to terrestrial resources could occur during ground disturbance for activities such as paving/addition of parking lots, construction of non-motorized watercraft launches, construction of shelters and playgrounds, and expansion or development of trails. Construction of these proposed actions would require small construction equipment and operating personnel. The presence and operation of this equipment would likely deter wildlife from using these areas while construction is occurring. Environmental considerations such as timing of construction to avoid sensitive periods to some populations (i.e., nesting season), consideration of wildlife corridors, and effects on species prior to development would minimize short-term impacts. Once construction is complete, wildlife in general would be expected to utilize these areas again primarily as corridors to higher quality habitat areas. The majority of recreational facility improvements and/or expansion would likely occur in areas that have been previously disturbed.

Prior to implementation of Proposed Action recommendations, coordination under the Fish and Wildlife Coordination Act would occur in addition to evaluation under NEPA. Therefore, short-term minor impacts could occur. However, long-term beneficial impacts to terrestrial resources are anticipated to occur due to improved stewardship of natural resources.

5.3.7.3 Aquatic Resources

No Action: Under the No Action Alternative, the USACE would continue to manage Beech Fork Lake and East Lynn Lake based on the existing master plans and OMPs, as applicable. Future developments or resource management policies would require individual approval.

The aquatic community inhabiting Beech Fork Lake and East Lynn Lake would continue to be composed of species that either favor lentic habitats or can adapt to lake environments. The WVDNR-Wildlife would continue to periodically stock the lake with a variety of fish species to enhance the lake's recreational fishery. High water events would require water management operations to accommodate flood inflows. The downstream release requirements for these inflows could stress spring and early spawning of some fish species depending on seasonality. However, the long history of the lakes' and demonstrated quality fisheries has shown that fish populations are capable of rapid recoveries following affected spawning years. Therefore, no significant impacts to aquatic resources are anticipated as part of the No Action Alternative.

Proposed Action: Under the Proposed Action Alternative, implementation of the new resource management goals and objectives, recommendations, and the overall improvement of the proposed Regional Master Plan would provide improved management of natural resources within the Beech Fork Lake and East Lynn Lake project areas. Areas proposed as Environmentally Sensitive Areas in the Regional Master Plan including wetland areas would receive added protection from any future adverse impacts by limiting future development for public use.

Proposed recommendations could result in short-term minor impacts to aquatic resources during implementation, such as construction of non-motorized watercraft launches, access for fish stocking, expansion of parking areas, and Stower's Branch beach improvements. Sedimentation due to stormwater runoff during land-based construction could adversely affect aquatic life. Sedimentation from construction in areas adjacent to water bodies would be minimized by implementing erosion and sediment control measures, and any sedimentation increases would therefore be short-term, insignificant, and localized. Implementation of other BMPs such as avoiding sensitive periods for some populations (i.e., spawning season) would help minimize impacts. Implementation of proposed actions would require compliance with all Federal laws and regulations including the Fish and Wildlife Coordination Act. Therefore, no

significant impacts to aquatic resources are anticipated as part of the Proposed Action Alternative.

5.3.7.4 Threatened and Endangered Species

No Action: Under the No Action Alternative, the USACE would continue to manage Beech Fork Lake and East Lynn Lake based on the existing master plans and OMPs, as applicable. Future developments or resource management policies would require individual approval. Any activities (i.e., tree clearing) which have the potential to affect threatened and endangered species would be evaluated and coordinated with the U.S. Fish and Wildlife Service (USFWS) in accordance with the Endangered Species Act and Fish and Wildlife Coordination Act. The USACE would continue to implement avoidance and minimization measures to reduce potential adverse impacts on the federally listed Indiana bat, grey bat, and Northern Long-eared bat as appropriate, including conducting informal or formal consultation with the USFWS. Therefore, no impacts to threatened and endangered species are anticipated as part of the No Action.

Proposed Action: Under the Proposed Action, implementation of the Regional Master Plan update would occur. This document would guide the USACE's comprehensive management and development and use of project lands for recreation, conservation of natural resources, and preservation of cultural resources. The USACE would continue to coordinate with the USFWS under Section 7 of the Endangered Species Act and the Fish and Wildlife Coordination Act prior to implementation of any element of the Proposed Action that may impact federally listed species or designated critical habitat. The USACE would follow mitigation measures required by the USFWS for federally protected species. Upon conclusion of coordination with the USFWS, surveys for federally listed species would be conducted in the proposed area if potential habitat is identified.

Short-term insignificant impacts to Indiana bat, Northern Long-eared bat, and grey bat could occur during proposed construction activities on project lands. The novelty of construction noises and their relative volume levels would likely dictate the range of responses from individual bats or colonies of bats that may be roosting within the vicinity of the proposed action area. At low noise levels (or farther distances), bats initially may be disturbed but would likely habituate to the low background noise levels. At closer range and louder noise levels, bats would likely be disturbed to the point of fleeing from their day-time roosts. Depending on the extent of the construction required for the proposed action, construction in an area could continue for more than a single day, which would likely prompt bats potentially in these areas to shift their focal roosting areas further away or temporarily abandon these roosting areas while construction is occurring. Minimization measures such as timing of construction to avoid disturbing roosting bats and not allowing any potentially necessary tree removal to occur during the seasonal window would minimize short-term impacts to bat species. Additional

measures such as presence absence surveys or selective tree removal could be required.

Federally listed mussel species including the Clubshell, Fanshell, Sheepnose, Pink Mucket, and Snuffbox are known to exist in tributaries above Beech Fork Lake and in other free-flowing portions of the Twelvepole Creek Sub-basin. Listed mussel species are not known to occur in Beech Fork Lake.

The Master Plan update includes proposed actions that could have a long-term beneficial effect on threatened, endangered, and other special status species. Proposed actions on USACE managed lands include the development and implementation of an invasive species management plan and protection of existing pollinator habitat and establishment of new habitat. By controlling or reducing invasive species within the project area, special status species are anticipated to benefit long-term by either maintaining abundance/number of different species or increase in abundance/number of different species. Establishment of new pollinator habitat could have beneficial impacts to native pollinators and migrating pollinators such as the Monarch Butterfly. Classification of Environmentally Sensitive Areas would provide protection of high value habitat that may be utilized by sensitive species. Specific goals and objectives have been developed for protection of rare and imperiled species, including state listed species and species of conservation concern in addition to Federal threatened and endangered species. Development of the invasive species and pollinator habitat management plan would be coordinated under Section 7 of the ESA and the FWCA with USFWS for compliance prior to implementation.

Overall, the USACE will take actions, in compliance with Federal and State regulations to ensure that the recommendations of the Regional Master Plan will not adversely affect threatened and endangered species or any critical habitat that may have been established in or near areas potentially affected by the proposed undertakings. The Master Plan update provides a framework for management of the lake and does not include implementation of the recommendations. Any future actions would be reviewed individually and evaluated in appropriate NEPA compliance documentation. Therefore, the USACE has determined that the Proposed Action would have 'no effect' on any listed species.

5.3.7.5 Wetlands

No Action: Under the No Action Alternative, the USACE would continue to manage Beech Fork Lake and East Lynn Lake Projects based on the existing master plans and OMPs, as applicable. Future developments or resource management policies would require individual approval, but future actions are anticipated to be similar to current management activities. Ground disturbing activities could occur as part of these individual actions. New ground disturbing activities conducted under current or future OMPs would include industry standard BMPs to avoid and minimize impacts to

wetlands. Dredging activities to address sediment accumulation are anticipated to continue under the No Action Alternative which could have impacts to wetlands. All appropriate permits would be obtained prior to any in-water disturbance. Additionally, the USACE would continue to preserve wetland resources within the project area as outlined in EO 11990, Protection of Wetlands and related USACE regulations. Therefore, the No Action alternative would have no significant impacts on wetland resources at Beech Fork Lake and East Lynn Lake.

Proposed Action: Under the Proposed Action, implementation of the Regional Master Plan update would occur. This document would guide the USACE's comprehensive management and development and use of project lands for recreation, conservation of natural resources, and preservation of cultural resources.

Short-term insignificant impacts to wetlands could occur during certain construction activities on project lands. Construction activities that would require in-water work or work immediately adjacent to water include activities such as construction of non-motorized watercraft launches, access for fish stocking, expansion of parking areas, and Beech Fork Lake Stower's Branch beach improvements which could have impacts to wetlands. However, most of these proposed actions would not be where wetlands are located. Aquatic vegetation in wetlands can tangle up in boat motors and can also cause fishing lines to get tangled, therefore, proposed projects such as watercraft launches are typically not located where aquatic vegetation is well established.

Localized areas of erosion will continue to develop and would require minor stabilization projects. Proposed actions such as shoreline erosion repairs would require small construction equipment and potentially filling in of wetlands depending on the type of shoreline repair being made. All appropriate permits under the Clean Water Act would be obtained prior to implementation of any recommendation. In addition, wetland delineations could be required, if necessary, prior to implementation of any proposed project. Construction best management practices, such as re-vegetating disturbed areas and mitigating permanently lost wetland vegetation by planting in other areas or restoring equivalent habitats, would be implemented as appropriate to minimize impacts.

Resource Plan recommendations for both projects include implementation of maintenance strategies to minimize impacts to existing wetland resources. These strategies include actions such as evaluation of options at Beech Fork Lake to reduce or eliminate the need to mow the wetland area near Stowers Branch while maintaining visibility of the no-wake sign, which would provide long-term beneficial impacts to wetlands.

The Regional Master Plan update also includes the development and implementation of an invasive species management plan as well as the development and implementation of additional pollinator habitat within project lands. Invasive species management could

occur within wetland habitats to ensure native species are not overcome by non-native and invasive wetland vegetation. Short-term impacts to wetlands due to invasive species management would be insignificant as the control methods that would be used (e.g., mechanical, chemical, etc.) have been approved for use in wetland habitats. Long-term beneficial effects to wetlands would occur with the control and potential reduction of invasive species such as Japanese Knotweed through the development and implementation of the invasive species management plan. Implementation of improved pollinator habitat would not occur in delineated wetland areas; therefore, no impacts due to the proposed action are anticipated. Overall, short-term impacts to wetlands are anticipated along with long-term beneficial effects.

Implementation of any management recommendations proposed, or other ground disturbing activities initiated as the result of the Proposed Action would comply with all state and Federal Clean Water Act regulations, as well as EO 11990, therefore no significant impacts to wetlands are anticipated as part of the Proposed Action Alternative.

5.3.7.6 Invasive Species

No Action: The No Action Alternative would not result in any change in management Beech Fork Lake and East Lynn Lake project lands. Future developments or resource management policies would require individual approval. The USACE would continue to manage Beech Fork Lake and East Lynn Lake project lands utilizing the current master plans, as applicable, and updated OMPs. Invasive species management practices would continue to be employed, which primarily includes monitoring and education, and submittal of budget request packages to control invasive species but would lack a long-term, comprehensive management plan. It is anticipated that if a more aggressive invasive species program were to be implemented, it could contribute to a reduction in acreage currently covered by invasive species, as well as their potential to spread to additional project lands. Overall, no significant impact to invasive species is anticipated as part of the No Action.

Proposed Action: Under the Proposed Action, implementation of the Regional Master Plan would occur. This document would guide the USACE comprehensive management and development and use of project lands for recreation, conservation of natural resources, and preservation of cultural resources.

The Proposed Action Alternative includes measures to proactively monitor project lands to determine not only changes in the occurrence and spread of the existing invasive plant species known to be present, but also the introduction of other plant, insect, and disease species. The proposed action also includes development of a comprehensive invasive species management plan outlining actions to reduce the abundance of invasive species and inhibit further establishment and spread. The ultimate success of these efforts will require cooperative efforts with the WVDNR-Wildlife and other partners

to assure that all detected species are subjected to the similar control measures applied to project lands directly managed by the USACE.

The various recommendations to build additional nonmotorized watercraft launches as well as development of trails and clearing of areas for parking lots near bodies of water, would create temporary and minor disturbances that could promote invasive species encroachment. The impacts would be limited to construction periods and would be mitigated by incorporating best management practices such as reducing invasive species transportation on construction equipment and seeding areas with native vegetation.

Increased visitation could occur as a result of the proposed recommendations, resulting of an increase in the likelihood of introduction of invasive species at both project areas. Visitors coming from areas that are highly populated with invasive species may unintentionally introduce those species through cross contamination on clothing, vehicles, or watercraft.

Overall, implementation of the Proposed Action Alternative would result in long-term beneficial impacts on the USACE's ability to control invasive species.

5.3.8 Aesthetics

No Action: Under the No Action alternative, the existing aesthetic attributes of the Beech Fork Lake Project and East Lynn Lake Project would remain unchanged. The extensive acreage of forest lands covering the rugged hills surrounding the lake would continue to remain in their existing condition. Although, small tracts of timber would continue to be periodically harvested by the WVDNR-Wildlife on the WMAs. Timber harvesting would not occur in areas adjacent to recreational facilities and therefore would not impact the aesthetic qualities of these areas.

Project facilities and the immediate landscapes within the designated recreation areas would continue to be maintained by the USACE, WVDNR, and the lessees operating facilities at both projects. Existing management activities will continue to focus on maintaining and enhancing the visual appeal of the project's natural and recreation-oriented facilities. The USACE would monitor project areas and implement measures to avoid or minimize impacts

Under the No Action Alternative, there could be a potential for increased impacts on the aesthetics of the Beech Fork Lake and East Lynn Lake project areas. Future proposals may continue to be requested which could include ground disturbing activities. If the proposals are not concentrated in currently disturbed areas, there is a possibility that aesthetic quality could be impacted. The USACE would monitor proposals and implement measures, where possible, to avoid or minimize impacts. Therefore, there would be no significant impact on aesthetics under the No Action Alternative.

Proposed Action: Under the Proposed Action Alternative, short-term insignificant localized impacts to aesthetics would occur during construction activities associated with the proposed action on USACE managed lands. Several of the proposed actions (e.g., development of nonmotorized watercraft launches, adding playgrounds and shelters, paving parking lots, adding parking lots, access roads, improvements to Stowers Branch, etc.) would require small construction equipment which would not be aesthetically pleasing. However, once construction of these facilities is complete, there would be no long-term impact to aesthetics in the area.

Implementation of the resource plan recommendations would not impact the viewsheds around the lake. The Proposed Action Alternative could have short-term and minor impacts to aesthetic resources through implementation of construction activities. However, no significant impacts to aesthetic resources are anticipated.

5.3.9 Air Quality

No Action: The No Action Alternative would not result in any change in management of Beech Fork Lake and East Lynn Lake project lands. The USACE would continue to manage project lands utilizing the current master plans, as applicable, and updated OMPs. Any approved new construction on project lands could result in short-term impacts on air quality from dust and/or construction vehicle emissions. Appropriate BMPs will be utilized to reduce temporary construction impacts. Air quality in the project area has remained in attainment status for all NAAQS criteria.

Air quality can also be influenced by exhaust from motor vehicles, boats, and other recreational activities. Lands used for recreation or project operations have the greatest potential to produce actions that may influence air quality and may result in short-term, negligible impacts. A gradual increase in the number of passenger vehicles or boats utilizing the project could occur in the future. Developed lands within these areas have the heaviest concentrations of emissions within the project area. All management activities implemented in the No Action Alternative would comply with all state and Federal Clean Air Act (CAA) regulations. No adverse impacts to air quality are anticipated from the No Action Alternative.

Proposed Action: Implementation of the Proposed Action Alternative would be similar to the impacts described in the No Action Alternative. Short-term insignificant localized impacts to air quality would occur during construction activities associated with the proposed action on project lands. Examples of proposed actions that would potentially require construction equipment utilizing small diesel and gasoline powered engines include paving parking lots, addition of parking lots, installation of nonmotorized watercraft launches, etc. These types of projects would be small construction or maintenance projects that would result in relatively minimal emissions from temporary use of construction equipment or dust generated during construction. The USACE would continue to require compliance with emission standards and implementation of

BMPs to ensure compliance with the Clean Air Act and state air quality standards. No significant or long-term impacts to air quality would occur under the Proposed Action Alternative.

5.3.10 Noise

No Action: The No Action Alternative would continue management of existing project facilities at Beech Fork Lake and East Lynn Lake operated by the USACE and the various outgrantees. As such, there would be no changes in the overall management of the projects. The USACE would continue to manage project lands utilizing the current master plans, as applicable, and updated OMPs. Future developments or resource management policies would require individual approval.

Most actions associated with ongoing management would not result in significant impacts from noise levels. Noise levels vary throughout the year and within the project. Noise is typically concentrated within recreation areas and weekends and holidays experience additional noise. Seasonal noise from boats on the lake could have an impact on wildlife and day users but the 9.9 hp motor limitation at Beech Fork Lake and the low density of boat use at East Lynn Lake assists in retaining the low level of noise generated by boat traffic. Except for boat ramps and marinas where boating noise is concentrated, boating-related noise is not expected to be loud or of long duration and would therefore have a minor impact on wildlife and visitors. Areas within the project have limited noise sources mainly coming from traffic in surrounding areas with short-term impacts from construction actions, hunting, or unauthorized off-road vehicle usage at East Lynn Lake. The unauthorized usage occurs primarily within the East Lynn WMA which consists of good habitat for wildlife and a quiet environment. As a result of this usage in the WMA, impacts to wildlife could occur due to elevated noise and disturbance. Construction noise from future development or timber management could have moderate and temporary impacts. Given the relative absence of sensitive noise receptors, other than wildlife, in the vicinity of the management areas, these potential impacts from construction would be minimized. Equipment and machinery on construction sites would meet all local, state, and Federal noise regulations. In cases where significant noise would be generated near a sensitive receptor, a noise impact assessment would be performed and documented in a project specific NEPA environmental document.

Overall, no significant impacts to noise are anticipated from the No Action Alternative.

Proposed Action: For the Proposed Action, noise and measures to reduce potential noise impacts would be similar as described above under the No Action Alternative. The USACE will work with partners including the WVDNR to implement strategies to reduce illegal off-road vehicles which would have a beneficial impact on noise within the East Lynn WMA. Implementation of the Proposed Action would comply with local noise regulations and would implement standard measures for reducing noise impacts, such

as avoiding sensitive receptors, avoiding construction during high-use periods, and limiting the hours of noise generation. In cases where significant noise would be generated near a sensitive receptor, a noise impact assessment would be performed and documented in a project specific NEPA documentation. Therefore, no significant impacts to noise are anticipated under the Proposed Action Alternative.

5.3.11 Transportation and Traffic

No Action: State and county roads will continue to provide access to the project. Roads providing access to the project are lightly traveled except in the surrounding population centers. Traffic volumes are greater in population centers, but delays are rare. Based on projected population declines in the zone of influence, it is likely that traffic on the roads providing access to the project will gradually decline in the future.

Within the project, roads providing access to the recreation sites generally experience light traffic. Visitation at East Lynn Lake has been gradually increasing over the last five years. That trend is expected to continue in the future and traffic will experience a similar trend. However, visitation and traffic are not likely to increase to a level that could not be accommodated by the existing roads in the foreseeable future. East Fork Road, which provides access to the East Fork Boat Launch and East Fork Campground needs resurfacing, but this has not resulted in a decline in traffic. The impact of the No Action alternative on transportation and traffic will be none/negligible.

Proposed Action: Under the Proposed Action, short-term insignificant localized impacts to traffic and transportation could occur along roadways within the proposed action areas. Roadways that access the proposed action areas would likely be used as haul routes for construction equipment needed for projects such as installation of nonmotorized watercraft launches, campsite upgrades, paving parking lots, expansion of parking lots, and repaving roadways, etc. The scale of these proposed actions is anticipated to require only small amounts of light construction equipment; therefore, the area roadways would not be substantially burdened by extra vehicles on the road. No staging would occur, and no long-term closures of roadways or lanes are anticipated, however temporary closure of lanes may be required for roadway improvements. Once construction is complete, no long-term impacts to traffic and transportation are expected.

Beneficial impacts to traffic and transportation would be realized under the Proposed Action Alternative through implementation of site reconfiguration and roadway improvements at Beech Fork Lake for the Upstream, Downstream and Dam Site areas, and Stower's Branch entrance road resurfacing as well as for the East Fork areas at East Lynn Lake.

Overall, short-term impacts to traffic and transportation could occur from construction activities. However, minor to moderate long-term beneficial impacts are anticipated.

5.3.12 Cultural Resources

No Action: The No Action Alternative would not result in any change in management of Beech Fork Lake and East Lynn Lake project lands. The USACE would continue to manage project lands utilizing the current master plans, as applicable, and updated OMPs. Future proposals or resource management policies would require individual approval. The No Action Alternative would result in no changes to cultural resources. Actions associated with ongoing management of operational, recreational, and natural resources are not anticipated to significantly impact cultural resources. Recreational activities and/or construction could be implemented individually under the No Action.

Federal regulations, EOs, state and local laws and documents provide guidance regarding the management, disposition, preservation, and repatriation of cultural resources on federal properties. The most notable are the NHPA, NEPA, Native American Graves Protection and Repatriation Act (NAGPRA) [25 U.S.C. 3001 et seq.], and the ARPA. These regulations provide guidance centered on the cultural interests of the public and federally recognized Tribes on federal lands and they play an integral part of the overall Federal responsibility on USACE Civil Works water resources projects. Stewardship of cultural resources on USACE water resources projects is an important part of the overall Federal responsibility. USACE guidance for implementation of these laws is provided in ER and EP 1130-2-540.

The process for identifying sites prior to project implementation and the required consultations under Section 106 of the NHPA would be the same as under the Proposed Action. Section 106 and implementing regulations, require Federal agencies to take into account the effect of an undertaking on historic properties if that project is under the direct or indirect jurisdiction of the agency or has been licensed or assisted by that agency. Under the No Action alternative, the USACE will continue to manage project lands through current management plans, or, if new management issues arise, the USACE will address them through individual documentation and coordination with the State Historic Preservation Office and Federally Recognized Tribes on a case-by-case basis for proposed actions. There would be no potential to effect historic properties under the No Action Alternative, therefore it would be compliant with the NHPA and ARPA.

Proposed Action: Under the Proposed Action Alternative, direct implementation of ground disturbing activities would not occur. Instead, the updated Master Plan guides and recommends future proposed development and management actions. Prior to construction of recommendations in the resource plan, the USACE would evaluate the potential for those actions to affect cultural resources. Proposed actions would require coordination with the USACE archeologist and consultation would be conducted with Federally Recognized Tribes and the State Historic Preservation Office under Section 106 of the NHPA before implementing any actions that have a potential to affect the sites that are eligible or potentially eligible for the NRHP. The USACE is responsible for

complying with any relevant federal laws and regulations (NHPA, AHPA, NAGPRA, ARPA, and American Indian Religious Freedom Act the [AIRFA]) related to protection and management of cultural resources in all areas regardless of designation as well as EO's, state and local laws.

Under the Proposed Action, the performance of comprehensive surveys for prehistoric and historic cultural resources and the development of geospatial databases is recommended. This activity would allow for better management of cultural resources leading to greater emphasis on protection of sensitive cultural resources than under the No Action Alternative.

Overall, significant impacts to cultural resources are not anticipated because (1) the actions would be in compliance with federal laws and regulations protecting cultural resources and (2) the actions would not contradict or circumvent the procedures set forth in existing historic properties management plans (HPMPs or CRMPs) for each project, if applicable. Any future actions would be reviewed individually and undergo NEPA compliance and documentation. Therefore, USACE has determined that the adoption and implementation of the Master Plan would have no potential to effect historic properties.

5.3.13 Hazardous, Toxic, and Radioactive Waste

No Action: The No Action Alternative would not result in any change in management of Beech Fork Lake and East Lynn Lake project lands. The USACE would continue to manage Beech Fork Lake and East Lynn Lake project lands utilizing the current MPs, as applicable, and updated OMPs. Actions associated with ongoing management of operational, recreational, and natural resources are not anticipated to disturb hazardous, toxic, or radioactive waste.

Future actions would continue to be evaluated for HTRW to ensure compliance with the Comprehensive, Environmental Response, Compensation, and Liability Act (CERCLA), Resource Conservation and Recovery Act (RCRA), and Toxic Substances Control Act (TSCA). If individual actions propose ground disturbing activities, an Environmental Condition of Property would be prepared in accordance with ER 1165-2-132. Therefore, no short-term or long-term impacts due to the potential release of HTRW is anticipated under the No Action Alternative.

Proposed Action: The Proposed Action Alternative includes the implementation of the Regional Master Plan update Beech Fork Lake and East Lynn Lake. Proposed projects within USACE managed lands include ground disturbing activities such as paving/addition of parking lots, additional trails, and installation of boat launches. Environmental Condition of Property reports would be prepared prior to implementation of these proposed projects. Similarly, proposed projects would be in compliance with the CERCLA, RCRA, and TSCA. Prior to any ground disturbing activities in East Lynn

Lake's Lakeside Area, an evaluation of the Bartram Refuse Pile will be performed. If hazardous material is identified, appropriate actions will be implemented to ensure compliance with applicable Federal laws and regulations. Therefore, no short-term or long-term impacts due to disturbance of HTRW are anticipated due to the minor level of ground disturbance associated with the above proposed projects.

5.3.14 Socioeconomic/Environmental Justice

EO 13045, Protection of Children from Environmental Health Risks and Safety Risks, requires each Federal agency "to identify and assess environmental health risks and safety risks that may disproportionately affect children" and "ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks." This EO was prompted by the recognition that children, still undergoing physiological growth and development, are more sensitive to adverse environmental health and safety risks than adults.

EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, directs Federal agencies to achieve environmental justice to the greatest extent practicable and permitted by law, and consistent with the principles set forth in the report on the National Performance Review. Agencies are required to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations

No Action: The No Action Alternative would not result in any change in management of Beech Fork Lake and East Lynn Lake project lands. The USACE would continue to manage project lands utilizing the current master plans, as applicable, and updated OMPs. Future proposals or resource management policies would require individual approval.

Current recreational resources at Beech Fork Lake and East Lynn Lake project areas will continue to provide recreational opportunities that attract visitors from surrounding areas. Those visitors purchase goods such as groceries, fuel, and camping supplies locally, eat in local restaurants, stay in local hotels, and play golf at local golf courses. The No Action Alternative would not result in any changes and would continue to bring revenues to the local area, provide jobs for local residents, and generate local and state tax revenues.

Future additional recreational opportunities and facilities may be considered as OMPs are updated or proposals are received under the No Action Plan. Prior to implementation, opportunities would be evaluated to ensure no adverse impacts to socioeconomics/demographics would occur.

The U.S. Census data provided in **Section 3.3.5** for Beech Fork Lake and **Section 4.3.5** for East Lynn Lake reveals that approximately 20% and 21% of the population in

the primary and secondary zone of influence for both lakes are below the age of 18. The potential for impacts on the health and safety of children is greater where projects are located near residential areas. Given the project area is not located in a densely populated residential area, implementation of the No Action Alternative would comply with EO 13045 and result in no significant impacts on populations under 18 years of age.

Data presented in **Section 3.3.5** indicates that minority populations collectively make up approximately 6.7% of the populations in the primary zone of influence and 4.7% in the secondary zone of influence for Beech Fork Lake. Data presented in **Section 4.3.5** indicates that minority populations collectively make up approximately 2.4% of the populations in the primary zone of influence and 3.1% in the secondary zone of influence for East Lynn Lake. Similar populations in the entire State of West Virginia represent approximately 6.5% and 12.5% in the Commonwealth of Kentucky. Approximately 20% to 25% of all persons in the zones of influence for both projects had incomes below the poverty level, which is higher than statewide averages in West Virginia (~17.2%) and Kentucky (~16.9%).

Current and future management of the Beech Fork Lake and East Lynn Lake project lands would continue to be available to all demographics. Many recreational opportunities available to visitors are free. User fees at USACE boat launches and swimming areas are relatively inexpensive. Implementation of the No Action Alternative would comply with EO 12898 and would not result in any impacts to minority or disadvantaged communities (Environmental Justice Populations).

Proposed Action: For the Proposed Action Alternative, socioeconomics and environmental justice would be the same as described above under the No Action Alternative. Overall, the Proposed Action generally includes activities that would improve public safety such as road and shoreline erosion repair, reconfiguration of high traffic recreation areas, addition of trails, etc. These activities are not typically associated with adverse impacts to minority, low-income, or children's populations. Implementation of the Proposed Action Alternative would comply with EO 13045 and EO 12898 and would result in no disproportionate impacts to minority or disadvantaged communities or impacts to populations under 18 years of age.

As stated previously, the project area offers a variety of recreational opportunities for visitors, which is beneficial to the local economy through direct and indirect job creation and local spending by visitors. In terms of socioeconomics, there could be short-term insignificant beneficial effects due to construction activities associated with the Proposed Action. Activities as mentioned above may require the hiring of specialized labor to complete these activities. Once implemented, these recreational opportunities are anticipated to maintain visitation to the projects. Therefore, long-term minor beneficial socioeconomic impacts under the Proposed Action are anticipated.

5.3.15 Recreation

No Action: The No Action Alternative would not result in any change in management to Beech Fork Lake or East Lynn Lake. The USACE would continue to manage both projects utilizing the current master plans, as applicable, and updated OMPs. However, the current master plans for the Beech Fork Lake and East Lynn Lake, which the resource managers and staff currently operate under, would not accurately reflect the status of project facilities. Over the long-term, the ability of resource managers to implement management actions effectively and efficiently in response to growth in total recreation demand may be limited due to not having an updated comprehensive management plan.

Updated OMPs and/or new proposals may identify new improvements to recreational and support facilities that could be developed on a case-by-case basis, but these improvements would represent an individual action, and not a comprehensive plan, to fulfill the authorized purposes of the projects in the long term. Minor and temporary impacts may occur through implementation of maintenance and repair actions which could include temporary closures to existing facilities or limited accessibility to recreation areas. Therefore, no significant or long-term impacts to recreation resources are anticipated under the No Action Alternative.

Proposed Action: Recreation needs of the public would be better accommodated through implementation of a comprehensive plan over the long term through this Regional Master Plan Update for Beech Fork Lake and East Lynn Lake. The updated plan took into consideration the SCORP, identified public need through engagement with the public and stakeholders to help guide future recreation management needs at both projects. Beech Fork Lake and East Lynn Lake provide numerous recreational opportunities for visitors including boat launches, day use areas, trails, etc.

Implementation of the Proposed Action Alternative would improve recreational facilities and visitor experiences through reducing congestion, improving public safety, and site circulation in several management areas. There would be beneficial impacts on recreation, not only from modernizing and upgrading existing facilities (e.g., boat launching, campground facilities) but also from increasing the management of natural resources through resource objective recommendations.

Similar to the No Action Alternative, short-term minor impacts could be realized through construction activities which could require temporary closures of some facilities or limiting access to recreation areas. No adverse impacts to recreation are anticipated under the Proposed Action Alternative and any new recreational features would provide minor to moderate, long-term, benefits to recreation at Beech Fork Lake and East Lynn Lake.

5.3.16 Health and Safety

No Action: The No Action Alternative would not result in any change in management of Beech Fork Lake and East Lynn Lake project lands. The USACE would continue to manage Beech Fork Lake and East Lynn Lake utilizing the current master plans, as applicable, and updated OMPs. Under this alternative, health and safety measures would continue to be addressed through USACE guidance, partnerships, local law enforcement, and federal safety programs.

The project currently has designated restricted water surface areas in the vicinity of the intake for protection of the operations area and public safety. In addition, Beech Fork Lake and East Lynn Lake have designated no-wake areas to provide boating safety near boat ramps, marinas, and campgrounds and would continue to be managed for boating and swimming safety. Debris such as unanchored Christmas trees used for fish habitat, fallen trees, and trash from the surrounding tributaries would continue to pose boating safety concerns at both lakes.

Unauthorized use of off-road vehicles at East Lynn Lake, primarily within the WMA would continue ongoing safety concerns for recreationists within the East Lynn WMA. The USACE and WVDNR-Wildlife would continue to discourage use of off-road vehicles in unauthorized areas on project lands however these measures would continue without a formal strategy.

The Beech Fork Lake Project and East Lynn Lake Project would continue to deliver the USACE Water Safety Program message to all visitors, as well as continue reporting guidelines should water quality become a threat to public health. Existing regulations and safety programs would continue to be enforced to ensure public safety. Current and updated OMPs would identify factors that impact human safety, and implement actions to address, eliminate or reduce those factors. Additionally, an emphasis is placed on educating the public on water safety and on flood risk management efforts.

Minor to moderate insignificant impacts to health and safety at East Lynn Lake could continue under the No Action Alternative.

Proposed Action: Similar to the No Action Alternative, the Proposed Action would be compatible with existing Project Safety Management Plans. Reporting guidelines will continue to be implemented should water quality become a threat to public health. Existing regulations and safety programs would continue to be enforced to ensure public safety. Current and updated OMPs would identify factors that impact human safety, and implement actions to address, eliminate or reduce those factors. Both projects would continue to deliver the USACE Water Safety Program message to all visitors.

The goals and objectives identified in the Proposed Action would result in minor to moderate, long-term beneficial impacts on public health and safety. The Proposed Action includes specific objectives for safety, including:

- Work with partner agencies to inform anglers that fish consumption advisories exist and where they can be found.
- Develop an effective communication strategy that will resonate with each target audience and result in positive understanding of the importance of outdoor recreation, public safety, land use management, and the natural resource management role in the protection of project purposes.
- Identify and implement measures to reduce the occurrence of illegal activities on fee land using established programs such as Crime Prevention Through Environmental Design, Corps Watch Property Protection Program, or similar.
- Develop a strategy in coordination with partners for discouraging use of off-road vehicles in unauthorized areas on project lands.
- Identify locations for nonmotorized launch sites and implementing strategies that reduce user conflict and congestion at popular water-based recreation areas.
- Improved safe access for motorized and nonmotorized watercraft.

Implementation of the Proposed Action would result is anticipated to result in long-term minor to moderate, beneficial impacts related to health and safety.

5.4 Cumulative Impacts

The Council on Environmental Quality (CEQ) regulations define a cumulative impact as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.” (40 CFR 1508.7). Impacts can be positive or negative.

The cumulative effects analysis is based on the potential effects of the proposed project when added to impacts from other projects in the region. By Memorandum dated June 24, 2005 from the Chairman of the CEQ to the Heads of Federal Agencies entitled “Guidance on the Consideration of Past Actions in Cumulative Effects Analysis”, CEQ made clear its interpretation that “...generally, agencies can conduct an adequate cumulative effects analysis by focusing on the current aggregate effects of past actions without delving into the historical details of individual past actions...” and that the “...CEQ regulations do not require agencies to catalogue or exhaustively list and analyze all individual past actions.”

An inherent part of the cumulative effects analysis is the uncertainty surrounding actions that have not yet been fully developed. CEQ regulations provide for the inclusion of

uncertainties in the analysis and state that, "...when an agency is evaluating reasonably foreseeable significant adverse effects on the human environment...and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking" (40 CFR 1502.22).

Temporal and geographical limits for this project must be established to frame the analysis. These limits can vary by the resources that are affected. The Proposed Action Alternative would have minimal and insignificant negative impacts on the environment. The temporal limits for assessment of this impact would initiate with impoundment of the reservoirs in 1978 (Beech Fork Lake) and 1971 (East Lynn Lake) and end 25 years after completion of the Regional Master Plan update in 2047. The geographical boundaries for this discussion of cumulative impacts would be broadened to consider the effects beyond the Proposed Action Alternative. The geographic extent is considered the Twelvepole Creek Sub-basin.

5.4.1 Past and Present Actions Within the Twelvepole Creek Sub-basin

The construction of the Beech Fork Lake and East Lynn Lake Projects was authorized in the Flood Control Act of 1962. Construction of the Beech Fork Dam, spillway, and outlet works was completed by 1978. The dam is 86 feet high and 1,080 feet long. A 1,720-acre lake is formed behind the Beech Fork dam with approximately 30 miles of shoreline. Construction of the East Fork Lake Dam was completed in 1971. The dam is 113 feet high and 652 feet long. A 1,005-acre lake is formed behind East Lynn dam with approximately 44 miles of shoreline. The authorized purposes of the Beech Fork Lake and East Lynn Lake Projects are flood control and allied purposes which include water conservation for general recreation, and fish and wildlife management. Additionally, both lakes were also authorized for water quality control and enhanced recreation. Visitation to both projects has remained steady since 2014. However, visitation numbers have increased beginning in 2020 which may be related to the COVID pandemic. Other recreational trends such as increased interest in nonmotorized watercraft and larger recreational equipment have been observed in recent years.

There have been numerous gas wells and coal mines (surface and underground) within the basin, some of which remain active. Other actions in the watershed included periodic timber management and road maintenance actions.

5.4.2 Reasonably Foreseeable Actions within the Twelvepole Creek Sub-basin

Although population in the basin and surrounding area is projected to gradually decline between 2020 and 2040, it is anticipated that visitation at Beech Fork Lake and East Lynn Lake would remain stable or slowly increase. Therefore, usage of the lake's resources is expected to continue. Facilities will need continual repair and potential upgrades to meet visitor expectations. In addition, there may be conflicting demands for

recreational facilities on project lands. The Master Plan Update is one tool available to Resource Managers to ensure optimal use of facilities and stewardship of natural and cultural resources while providing recreational opportunities to the visiting public. Along with the Master Plan, project staff will continue to manage project resources in accordance with project OMPs and these documents will also continue to be evaluated and revised as necessary to provide the most effective management tools to balance resource protection and public use.

It is anticipated that extraction of minerals within the basin will continue. Shale gas resources exist within the basin which are not currently commercially available. However, there is potential for future pressure on this resource within the basin. Future management actions by the WVDNR-Wildlife would include periodic timber harvests within WMAs.

5.4.3 Analysis of Cumulative Impacts

Impacts on each resource were analyzed according to how other actions and projects within the zone of influence might be affected by the No Action and Proposed Action Alternatives. Impacts can vary in degree or magnitude from a slightly noticeable change to a total change in the environment. For this analysis, the intensity of impacts will be classified as negligible, minor, moderate, or major. These intensity thresholds were previously defined in the beginning of Chapter 5. Development is expected to continue in the vicinity of the basin and cumulative adverse impacts on resources would not be expected to be significant, when added to the impacts of activities associated with the Proposed Action or No Action Alternative. A summary of the anticipated cumulative impacts on resources is presented below.

While large scale individual actions have not been identified in the foreseeable future, changes in land use or additional pressure of mineral extraction in the future has potential for adverse impacts to water and fish and wildlife resources. Actions by other entities such as vegetation clearing, and increased development could increase stormwater runoff and sedimentation in the basin. Therefore, potentially affecting both projects. Required implementation of state and Federal regulations and BMPs would help minimize impacts. Additional considerations for hydrologic impacts could result from changes in climate. IWR climate modeling suggests that streamflows will remain within historic conditions through 2040 (IWR, 2017). After 2040, mean maximum annual streamflows are projected to begin an increasing trend. As a result, lake levels, flood control operations, and downstream flows could be altered.

The WVDEP has determined that water quality within the reservoirs is not impaired for fecal coliform bacteria and are thus suitable for contact recreation. However, concerns remain over the impaired condition of the free-flowing waters in Twelvepole Creek for CNA-Biological, fecal coliform, and iron and East Fork for CNA-Biological. Should land use practices in the basin change in the future, the potential exists for designated use

categories to be adversely affected. TMDLs within the Twelvepole Creek Sub-basin have been developed for most criteria and the TMDL for phosphorous is projected to be completed by 2028.

Further, it is expected that widespread elevated levels of mercury in WV waters will continue to cause the State to issue annual statewide fish consumption advisories. Since regional atmospheric contamination from fossil fuel power generating plants is the probable source of mercury, it is expected that concerns over that element will continue indefinitely into the future.

The significance threshold for natural resources would include a substantial reduction in ecological processes, communities, or populations that would threaten the long-term viability of a species or result in the substantial loss of a sensitive community that could not be offset or otherwise compensated. Future projects within the basin including mineral extraction and development may have adverse impacts to resources. However, these actions are not anticipated to have significant impacts with compliance with state and Federal regulations and BMPs. Therefore, it is not anticipated that the viability of any plant species or community, rare or sensitive habitats, or wildlife will be impacted. The establishment of Environmentally Sensitive Areas, as well as resource objectives that favor protection and restoration of valuable natural resources combined with improving water quality due to implementation of TMDLs will have beneficial cumulative impacts. No recommended management actions would threaten the viability of natural resources.

Presently, eight federally listed species, 18 migratory bird species of federal conservation concern, and 161 species of SGCN to the State of WV are known to use resources within the Twelvepole Creek Sub-basin. While the Proposed Action is not anticipated to adversely affect any of these species of concern, it is possible that the unrelated actions completed by other entities within the basin could impact one or more of these listed species. The adverse cumulative effects of such non-project related actions or listing of new species is anticipated to result in additional stewardship and conservation measures at the projects.

Currently, project lands are impacted by invasive species. The Proposed Action Alternative would have long-term, minor to moderate beneficial impacts by developing and implementing a comprehensive invasive species management plan that includes reducing invasive species populations within the Beech Fork Lake and East Lynn Lake project areas. However, land use changes resulting in vegetation disturbance could increase the density of invasive species within the basin or introduce new species. Due to the nature of the methods of spread of many invasive species, the consequences of the actions of entities other than the USACE would have the potential to result in continued introduction and spread of invasive species within Beech Fork Lake and East Lynn Lake project areas. In conclusion, **Sections 3 and 4** document the existing

environment at the Beech Fork and East Lynn Projects and **Section 5** documents the potential environmental effects of the Proposed Action and No Action alternatives with respect to existing conditions. The effects of the Proposed Action Alternative would be localized and minor. No reasonably foreseeable future actions that would result in cumulative adverse impacts at the project were identified. In scoping cumulative effects, no resources were identified as having the potential to be significantly impacted.

6. Status of Environmental Compliance

The Proposed Action Alternative will be in full compliance with all local, state, and Federal statutes as well as Executive Orders prior to the issuance of a Finding of No Significant Impact. Compliance is documented below in **Table 6-1**.

Figure 6-1. Environmental compliance status

Statute/Executive Order	Full	Partial	N/A
National Environmental Policy Act (PL 91-190) [considered partial until the FONSI is signed ^a		X	
Antiquities Act (PL 59-209)	X		
Flood Control Act (PL 78-534)	X		
Water Supply Act (PL 85-500)	X		
Fish and Wildlife Coordination Act (PL 85-624) ^b		X	
Forest Conservation Act (PL 86-717)	X		
Federal Water Project Recreation Act (PL 89-72)	X		
National Historic Preservation Act (PL 89-665)	X		
Federal Water Pollution Control Act (PL 92-500)	X		
Noise Control Act (PL 92-574)	X		
Endangered Species Act (PL 93-205) ^b	X		
Safe Drinking Water Act (PL 93-523)	X		
Clean Air Act (42 USC §7401 et seq.)	X		
Clean Water Act (33 USC §1251 et seq.)	X		
EO 11514 Protection and Enhancement of Environmental Quality	X		
EO 11593 Protection and Enhancement of Cultural Environment	X		
EO 11644 Use of Off-Road Vehicles on Public Lands	X		
EO 11988 Floodplain Management	X		
EO 11989 Off-Road Vehicles on Public Lands	X		
EO 11990 Protection of Wetlands	X		
EO 11991 Relating to Protection and Enhancement of Environmental Quality	X		
EO 12088 Federal Compliance with Pollution Control Standard	X		
EO 12962 Recreational Fisheries	X		
EO 12898 Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations	X		
EO 13045 Protection of Children from Environmental Health Risks & Safety	X		
EO 13751 Safeguarding the Nation from the Impacts of Invasive Species	X		
EO 13186 Responsibilities of Federal Agencies to Protect Migratory Birds	X		
EO 13327 Federal Real Property Asset Management	X		
EO 13423 Strengthening Federal Environmental, Energy, and Transportation Management	X		
EO 13514 Federal Leadership in Environmental, Energy, and Economic Performance	X		

^a Anticipated FONSI signature to occur after public review.

^b Fish and Wildlife Coordination Act compliance to be completed prior to FONSI execution.

7. Special Topics

7.1 Extraction of Mineral Resources on Project Lands

Historically, the USACE acquired limited interests in mineral resources underlying project lands when acquiring lands for reservoir projects. In the late 1960's and 1970's coal mining at the USACE reservoir Fishtrap Lake in Kentucky resulted in significant and irreparable damage to project lands. Following a detailed study by USACE and a Congressional investigation that was completed in 1973 entitled "Adverse Effect of Coal Mining on Federal Lands", the USACE made the decision to acquire additional property rights at future projects for the expressed purpose of preventing future coal mining. It was recognized and accepted that the acquisition of these additional rights would result in substantial additional acquisition costs. The Department of the Army's Policy on Land has determined that because of the "adverse environmental and safety impacts due to coal mining, civil works projects are hereby determined to be generally unavailable for coal mining" (USACE ASA Memorandum, 1995). Therefore, the USACE acquired the majority of coal estate between 1977 and 1991, lying under the East Lynn Lake project area to protect public safety and the integrity of the dam and reservoir from potential threats posed by mining.

BLM is charged with administering the locatable minerals on Federal Government owned land. As defined in the Mineral Leasing Act (30 USC 181 et seq.) and the Water Resources Development Act of 1999, the BLM receives Leases by Application for mining on all Federally owned land. As the property was purchased by USACE for Civil Works purposes, the BLM is statutorily required to seek consent for any mining on USACE land. The approval authority for permitting mining on Civil Works land is held by the Assistant Secretary of the Army for Installations, Energy and Environment (ASA((E&E))) with concurrence from the ASA for Civil Works. However, the WRDA 1999, assigned the BLM as the decision-making authority for leasing of federal coal at East Lynn Lake.

As mentioned previously in the resource objectives, Beech Fork Lake and East Lynn Lake would continue to manage and provide natural, cultural, and recreation resources consistent with established land use practices and authorized project purposes, excluding the extraction of new mineral (e.g., coal), gas or oil resources. However, WRDA 1999 outlined BLM as the leasing authority should there be renewed interest in coal extraction on East Lynn project lands that could result in subsurface leases being approved through coordination with the USACE.

7.2 Unauthorized Off-Road Vehicle Use

EO 11644, Use of off-road vehicles on public lands, establishes policies to ensure the use of off-road vehicles on public lands will be controlled to protect natural resources,

promote safety, and minimize conflicts among users. It also enables agencies to prohibit off-road vehicle use in areas that cause significant adverse effects on the soil, vegetation, wildlife, habitat, or cultural resources. At both Beech Fork Lake and East Lynn Lake projects, off-road vehicles are prohibited; however, illegal use is an ongoing issue at the East Lynn Lake Project. Adverse impacts to natural resources from unauthorized off-road recreational vehicle activities include illegal cutting of trees to create trails and significant localized erosion resulting in increased sedimentation to tributaries streams and the lake. These unauthorized activities also generate excessive elevated noise levels that disturb wildlife resources and conflict with the visiting public attempting to enjoy those resources in hiking, nature watching, and hunting pursuits.

There are approximately 43-miles of County Roads located in the East Lynn Lake WMA. ATVs are not prohibited from using these roads. However, the county roads provide access to many spur roads into the backcountry of the WMA where ATV and off-road vehicle use is prohibited. Both, the county roads, and spur roads are heavily used by off-road vehicles.

The Hatfield McCoy Trail system provides more than 1,000 miles of trails in WV for off-road vehicles and is one of the largest off-road trail systems in the world. In September 2016, a proposal was submitted to USACE to expand the Hatfield McCoy Trail system onto East Lynn Lake Project lands that are currently leased to WVDNR-Wildlife for management as a WMA. At the time the proposal was under consideration through the ROA process as it addressed the ongoing issue with unauthorized off-road usage. The proposal included approximately 43 miles of existing roads to be designated as ATV trails, creation of approximately 5 miles of new trails, and decommissioning 116 miles of existing roads. The Hatfield McCoy Authority proposed to fund a dedicated full-time WVDNR Police Officer to patrol the entire WMA as well as to employ a full-time maintenance team to make road repairs, decommission trails, repair gates, etc. Based on public response to the proposal, the Hatfield McCoy Trail Authority has suspended further action on the expansion of the trail onto East Lynn Lake Project lands at this time.

7.3 Management of Invasive Species

Data presented in **Tables 3-9 and 4-9** for the Beech Fork and East Lynn projects, respectively, show that several invasive species have become established at both projects. These species include seven plants: autumn olive, Japanese knotweed, tree-of-heaven, Russian olive, kudzu, crown vetch, and multiflora rose. In addition, the emerald ash borer insect is also reported to be present at the East Lynn project.

The invasive plants have primarily been observed within open project lands cleared of native forest vegetation to support various project purposes and along the margins of roadways and trails. Invasive plants are generally prolific seed producers and are characterized by rapid growth that provides them with the innate ability to displace

native ground cover and low shrubs by crowding them for living space and by shading them from much needed sunlight. If not actively managed, invasive plants can outcompete many native plant species, producing tracts essentially dominated by the invasives.

The absence of native plant diversity in areas heavily populated by invasive species can result in adverse effects on wildlife (i.e., ranging from insects to birds and mammals) that are dependent upon native habitat for their existence.

The larvae of the introduced emerald ash borer feed on the inner bark of all ash species of the North American genus *Fraxinus* disrupting the trees' ability to transport nutrients resulting in the death of the host trees. Once viable numbers of this insect in an infected area are present to allow successful reproduction, its progeny will rapidly spread through the surrounding forest, killing all ash trees encountered until none are present to satisfy its biological needs. This results in safety concerns due to the abundance of dead trees that could be considered dangerous trees for felling.

Two primary methods are used to control invasive plants, either singularly or in combination: (1) physical removal and destruction of plants; and (2) chemical herbicides. The application of chemical insecticides is the major method used to control invasive insects. In addition, two other methods can be employed, where and when possible, to control certain invasive insect species: (1) introduction of predator(s) from an invasive insect's native range if it can be proven the predator(s) will not result in unintended deleterious effects on the native insect community; and (2) creation of biologically engineered sterile individuals of the invasive insect species to prevent the successful reproduction of the insect to reduce its population numbers.

Of the two projects, Beech Fork's lands are experiencing the greatest level infestation by invasives. Looking forward from the 2020 data presented in **Table 3-9**, it is likely that up to approximately 400 acres of project lands support populations of at least six invasive plant species. Of these, autumn olive is the most prevalent, followed by Japanese knotweed. In 2020, these two species were reported to be present on 359 and 59 acres, respectively, at Beech Fork Lake.

In 2020, the East Lynn Lake Project was identified as affected by invasive species with up to approximately 80 acres being impacted by five plant species (**Table 4-9**). Japanese knotweed, kudzu, and multiflora rose impact the largest portion of the total acreage affected by invasive plants. In addition, 15 acres of East Lynn project lands were also reported to have been affected by the emerald ash borer insect in 2020. It is likely that the acreage impacted by invasive species at East Lynn has increased by the date of approval for this Regional Master Plan.

It is recommended that an invasive species monitoring and management plan be implemented in a timely manner as spread of established invasive species will continue

across project lands. Continued spread of invasive species would adversely diminish the aesthetic qualities of public recreation areas; limit native plant diversity over an increasing percentage of project lands; and adversely affect native habitat and wildlife species. Moreover, delays in pursuing an effective control program could result in substantially higher future costs to bring the invasive plants under control.

An emphasis should be placed on implementing an effective control plan for the emerald ash borer in a timely manner to reduce the spread of the insects to project lands where it does not presently occur.

The control program eventually adopted for both projects must include development and implementation of an adequate monitoring program that effectively surveys all project lands at some level of periodic effort. The monitoring program should also include partnerships and coordination efforts with stakeholders to assess the presence/absence of invasive species on the extensive acreages of leased land including WVDNR-Wildlife and WVDNR-Parks managed lands. In particular, the monitoring efforts should pay special attention to roadways and trails within the management areas, sites on which timber harvests have been conducted, and any areas within which the natural forest communities have been disturbed.

8. Agency and Public Coordination

The USACE is dedicated to serving the public and stakeholder interests in support of the overall comprehensive management plan for cultural, natural, and recreational resources management within Beech Fork Lake and East Lynn Lake project lands. An integral part of this planning effort is gathering public comments and engaging stakeholders. USACE policy guidance in ER and EP 1130-2-550 and ER 200-2-2 requires thorough public involvement and agency coordination. Public involvement is especially important to ensure that future management actions are both environmentally sustainable and responsive to public outdoor recreation needs in a region.

Agency and public input to the planning process was obtained in three phases: (1) an initial scoping effort was conducted to identify issues and obtain initial information to support development of resource objectives, (2) the draft resource objectives were reviewed by agencies and the public, and (3) the draft master plan and integrated EA will be released for a 30-day agency and public review.

Throughout the planning process, a website has been maintained with updated information on the Master Plan process and interim work products. It also contained an email address for submittal of public comments and provided a link to comment directly online. The public provided feedback through email communication or by using the online link. Notices for public meetings were published in local newspapers.

Appendix B contains public comments received during the scoping process, site visit summaries, and summaries of interviews conducted for each lake. The agency and public coordination efforts are described below.

8.1 Scoping

Separate stakeholder and public meetings were held virtually on 26 January 2020 for both projects. Stakeholders consist of agency representatives, concessionaires, lessees, and organization representatives. The meetings included a presentation describing the purpose and content of the Regional Master Plan, background information on the lakes, and opportunities for future input. Following the presentations, opportunities were provided for stakeholder and public comments. All comments received via email, online, or made during the stakeholder and public meetings are summarized in **Appendix B**.

A wide range of comments were provided by stakeholders and the public. The most common comments were related to interest in equestrian riding trails and camping opportunities. Comments indicated that there is a shortage of such facilities in the region and local WV residents travel to OH or KY where equestrian riding and camping facilities are available.

8.2 Public and Agency Review of Draft Resource Objectives and Resource Plans

Stakeholder and public meetings were held to obtain input on the draft resource objectives and resource plan on 5 October 2021. A presentation provided background information on the lakes, described the master plan process and schedule, provided an overview of the draft resource objectives and draft resource plan recommendations. Following the presentation, participants were provided the opportunity to provide comments and ask questions. All comments received following the meeting are also included in **Appendix B**.

Similar to the scoping meetings, the most common comments requested the creation of equestrian riding trails and camping areas. Commenters suggested the potential for equestrian organizations to partner with the USACE for development of these facilities. However, it was communicated there are limited opportunities for development of these facilities given the relatively small footprint under USACE management.

8.3 Public and Agency Review of Draft Regional Master Plan

This section will be prepared following the public and agency review of the draft Regional Master Plan and Integrated EA. It will provide responses to all public comments that are received.

9. Summary of Recommendations

This Regional Master Plan is intended to conceptually guide the future management and development of project lands and waters including all natural, cultural, and recreational resources at Beech Fork and East Lynn Lakes. The Regional Master Plan also serves as a support document for USACE Operational budget package submissions. Recommendations of the Regional Master Plan do not address the specifics of regional water quality, shoreline management, water level management, or the operation and maintenance of project operations facilities.

This Regional Master Plan contains descriptions of baseline project conditions (affected environment), resource objectives, land/water classifications, management areas, and associated recommendations. Together these elements provide a comprehensive plan for future use, management and development of recreational, natural, and cultural resources at Beech Fork and East Lynn Lakes.

Resource objectives developed for the Regional Master Plan are based on the identification and evaluation of project needs that were identified during the plan development process. Land classifications were established based on the review of previous Master Plans and in conjunction with existing uses for which the lands are currently being managed and how they should be managed in the future. In the Resource Plan, recommendations for each management area provide a conceptual framework from which strategies for implementation are to be further developed in the Operational Management Plan. Recommendations are stewardship-driven and seek to balance recreational development and use with protection and conservation of natural and cultural resources.

The resource objectives and resource plan recommendations would not be implemented directly after Master Plan approval and would be subject to future constraints on priorities, funding, and changes to policies. Prior to the implementation of any development activity and recommendations, additional analysis may be required to determine feasibility. Supplemental NEPA documents would be required for implementation of specific measures or actions within the Master Plan and Integrated EA. The USACE will review the information in this Master Plan and determine the appropriate level of NEPA documentation for each individual action/measure and incorporate this EA by reference into supplemental NEPA documentation as appropriate.

The Regional Master Plan is a flexible document. As such, recommendations are subject to modification based on changed conditions. Modifications to the Master Plan are made through supplementation or revision, dependent on the situation and magnitude of the change and require approval of the Huntington District Commander.

For areas managed by non-USACE entities (outgrantees), future land use and resource plan recommendations are subject to the requirements of the outgrant agreements. All management and/or development proposals are submitted through the outgrant process and would be compared against the approved Regional Master Plan for identification of existing or potential land use conflicts. All conflicts identified during the evaluation should be resolved prior to the granting of a lease, license, or right-of-way.

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