US Army Corps of Engineers ®
Northwestern Division

Missouri River Basin
Water Management Division

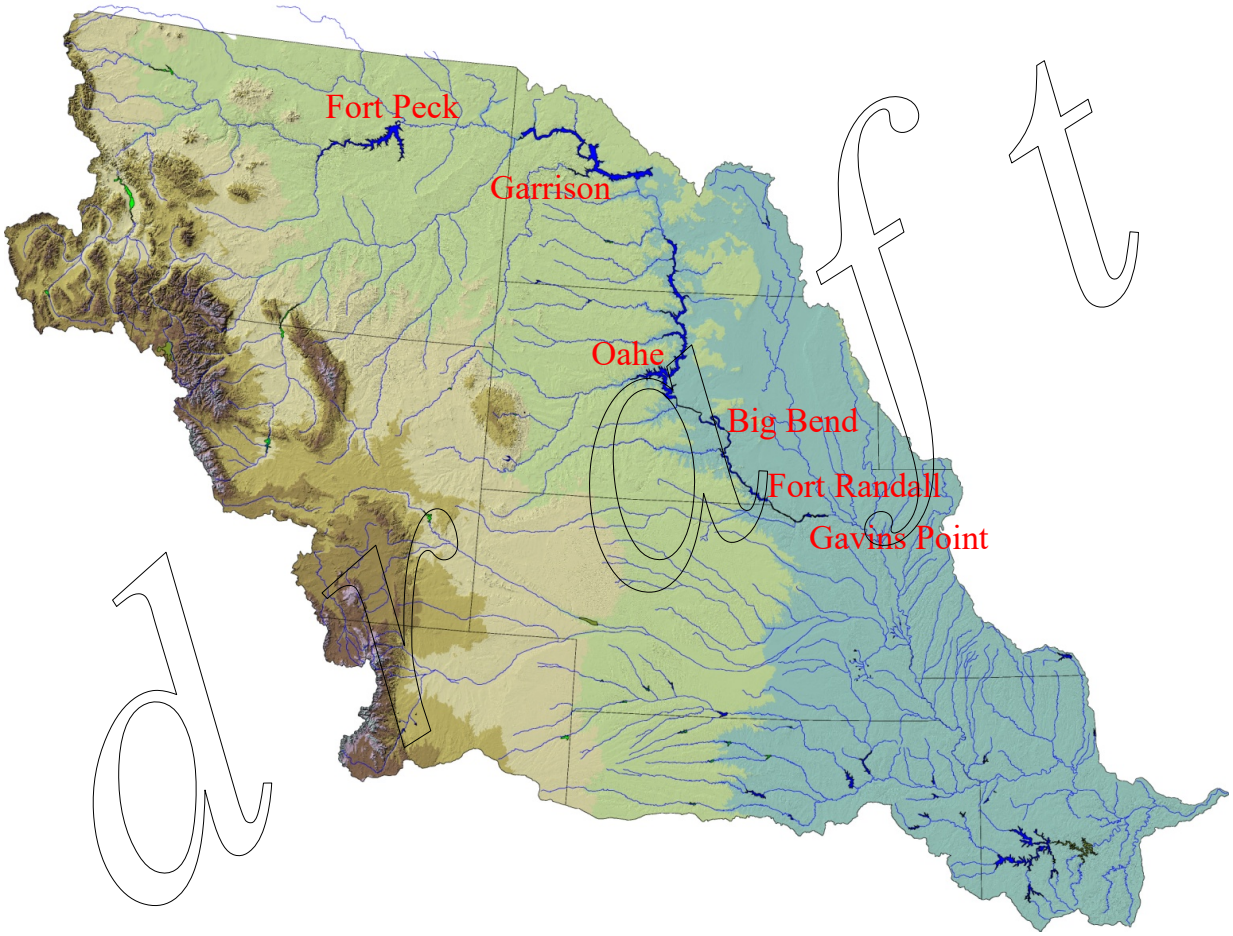
Draft

AOP

2019-2020

Missouri River Mainstem System

2019-2020 Annual Operating Plan



Annual Operating Plan Process
67 Years Serving the Missouri River Basin

September 2019

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DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, NORTHWESTERN DIVISION
PO BOX 2870
PORTLAND OR 97208-2870

September 2019

This draft Annual Operating Plan (AOP) presents pertinent information regarding water management in the Missouri River Mainstem Reservoir System through December 2020. The information provided in this draft AOP is based upon water management guidelines designed to meet the reservoir regulation objectives of the 2018 Missouri River Master Water Control Manual (Master Manual). Regulation of the mainstem reservoir system is provided by my office, the Missouri River Basin Water Management Division, Northwestern Division, U. S. Army Corps of Engineers, located in Omaha, Nebraska.

The draft AOP presents plans for the regulation of the reservoir system under widely varying water supply conditions. The AOP is not intended to be a forecast for the coming year; rather the guidelines included in the Master Manual are applied to computer simulations of System regulation assuming five statistically derived runoff scenarios based on an analysis of water supply records from 1898 to 2011. This approach provides a good range of water management simulations for dry, average, and wet conditions. The AOP provides a framework for the development of detailed monthly, weekly, and daily regulation schedules for the mainstem reservoir system's six individual projects during the upcoming year to serve its Congressionally-authorized project purposes.

In addition to the AOP, two separate documents are also available entitled: "System Description and Operation" and "Summary of Actual 2018 Regulation." To receive copies of those documents, contact the Missouri River Basin Water Management Division at 1616 Capitol Avenue, Suite 365, Omaha, Nebraska 68102-4909, phone (402) 996-3841. Both reports are available at the "Reports and Publications" link on our web site at:
www.nwd-mr.usace.army.mil/rcc/

Seven public meetings to discuss this draft AOP are scheduled: October 22 in Fort Peck, Montana and Bismarck, North Dakota; October 23 in Fort Pierre, South Dakota, and Sioux City, Iowa; October 24 in Smithville, Missouri and Nebraska City, Nebraska, and October 25 in Jefferson City, Missouri. We ask that any comments be provided by November 22, 2019. The final AOP is scheduled for publication in December 2019.

We thank you for your interest in the regulation of the mainstem reservoir system and look forward to your participation in this process.

John I. Remus II, P.E.
Chief, Missouri River Basin Water
Management Division

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MISSOURI RIVER MAINSTEM RESERVOIR SYSTEM

Draft Annual Operating Plan
2019 - 2020

TABLES

PLATES

ABBREVIATIONS

AOP	-	annual operating plan
ACHP	-	Advisory Council on Historic Preservation
AF	-	acre-feet
B	-	Billion
BiOp	-	Biological Opinion
BOR	-	Bureau of Reclamation
cfs	-	cubic feet per second
Corps	-	Corps of Engineers
CY	-	calendar year (January 1 to December 31)
elev	-	elevation
ESA	-	Endangered Species Act
ft	-	feet
FTT	-	Flow-to-Target
FY	-	fiscal year (October 1 to September 30)
GWh	-	gigawatt hour
ISAP	-	Independent Science Advisory Panel
KAF	-	1,000 acre-feet
kcfs	-	1,000 cubic feet per second
kW	-	kilowatt
kWh	-	kilowatt hour
MAF	-	million acre-feet
MRNRC	-	Missouri River Natural Resources Committee
MRBWMD	-	Missouri River Basin Water Management Division
msl	-	mean sea level
MW	-	megawatt
MWh	-	megawatt hour
NEPA	-	National Environmental Policy Act
plover	-	piping plover
PA	-	Programmatic Agreement
P-S MBP	-	Pick-Sloan Missouri Basin Program
RCC	-	Reservoir Control Center
RM	-	river mile
RPA	-	Reasonable and Prudent Alternative
SHPO	-	State Historic Preservation Officers
SR	-	Steady Release
System	-	Missouri River Mainstem System
tern	-	interior least tern
T&E	-	Threatened and Endangered
THPO	-	Tribal Historic Preservation Officers
USFWS	-	United States Fish and Wildlife Service
WY	-	water year
yr	-	year

DEFINITION OF TERMS

Acre-foot (AF, ac-ft) is the quantity of water required to cover 1 acre to a depth of 1 foot and is equivalent to 43,560 cubic feet or 325,850 gallons.

Cubic foot per second (cfs) is the rate of discharge representing a volume of 1 cubic foot passing a given point during 1 second and is equivalent to approximately 7.48 gallons per second or 448.8 gallons per minute. The volume of water represented by a flow of 1 cubic foot per second for 24 hours is equivalent to 86,400 cubic feet, approximately 1.983 acre-feet, or 646,272 gallons.

Discharge is the volume of water (or more broadly, volume of fluid plus suspended sediment) that passes a given point within a given period of time.

Drainage area of a stream at a specific location is that area, measured in a horizontal plane, enclosed by a topographic divide from which direct surface runoff from precipitation normally drains by gravity into the river above the specified point. Figures of drainage area given herein include all closed basins, or noncontributing areas, within the area unless otherwise noted.

Drainage basin is a part of the surface of the earth that is occupied by drainage system, which consists of a surface stream or body of impounded surface water together with all tributary surface streams and bodies of impounded water.

Gaging station is a particular site on a stream, canal, lake, or reservoir where systematic observations of hydrologic data are obtained.

Runoff in inches shows the depth to which the drainage area would be covered if all the runoff for a given time period were uniformly distributed on it.

Streamflow is the discharge that occurs in a natural channel. Although the term "discharge" can be applied to the flow of a canal, the word "streamflow" uniquely describes the discharge in a surface stream course. The term "streamflow" is more general than "runoff" as streamflow may be applied to discharge whether or not it is affected by diversion or regulation.

MISSOURI RIVER MAINSTEM RESERVOIR SYSTEM

Draft Annual Operating Plan
2019 – 2020

I. FOREWORD

This draft Annual Operating Plan (AOP) presents pertinent information and plans for regulating the Missouri River Mainstem Reservoir System (System) through December 2020 under widely varying water supply conditions. It provides a framework for the development of detailed monthly, weekly, and daily regulation schedules for the System's six individual projects during the coming year to serve the Congressionally authorized project purposes; to fulfill the Corps' responsibilities to Native American Tribes; and to comply with environmental laws, including the Endangered Species Act (ESA). Regulation of the System is directed by the Missouri River Basin Water Management Division (MRBWMD), Northwestern Division, U. S. Army Corps of Engineers (Corps) located in Omaha, Nebraska. A map of the Missouri River basin is shown on ***Plate 1*** and the summary of engineering data for the six individual mainstem projects and System is shown on ***Plate 2***.

It is important to note that the AOP is not intended to be a forecast for the coming year; rather it examines a range of potential runoff scenarios which span 80 percent of the historic record. There is still a 10 percent chance that runoff will be higher than shown in the AOP and a 10 percent chance that it will be lower. The studies included in the AOP provide an array of reservoir levels and releases that may be expected under the various runoff scenarios. Actual real-time regulation of the System is accomplished using the best information and tools available and is adjusted to respond to changing conditions on the ground. As the runoff season unfolds, there is a possibility that real-time regulation plans will indicate runoff volumes, reservoir levels and releases outside those anticipated in this report. Should that occur, the Corps will appreciably increase its communication and outreach efforts to convey that information to stakeholders throughout the basin so that other Federal, state and local agencies, Tribes, communities, and local residents can take appropriate actions.

This plan may require adjustments such as when substantial departures from expected runoff occur; to meet emergencies including short-term intrasystem adjustments to protect human health and safety, to maintain minimum river or reservoir levels to keep intakes operational during periods of extended drought, and to prevent loss of historic and cultural properties; or to meet the provisions of applicable laws, including the ESA. These adjustments would be made to the extent possible after evaluating impacts to all System uses, would generally be short-term in nature, and would continue only until the issue is resolved.

This document provides the plan for future regulation of the System. Other documents that may be of interest include the "System Description and Regulation" report dated November 2007 or the "Summary of Actual 2018 Regulation," dated July 2019. Both reports are currently available at the "Reports and Publications" link on our website at: **www.nwd-mr.usace.army.mil/rcc**, or you may contact the Missouri River Basin Water Management Division at 1616 Capitol Avenue, Suite 365, Omaha, Nebraska 68102-4909, phone (402) 996-3841 for copies. The "Summary of Actual 2019 Regulation" will be available at the same site in late spring or early summer of 2020.

II. BACKGROUND AND AOP PROCESS

Beginning in 1953, projected System reservoir regulation for the year ahead was developed annually as a basis for advance coordination with the various interested Federal, state, and local agencies and private citizens. Also beginning in 1953, a coordinating committee was organized to make recommendations on each upcoming year's System regulation. The Coordinating Committee on Missouri River Mainstem Reservoir Operations held meetings semiannually until 1981 and provided recommendations to the Corps. In 1982, the Committee was dissolved because it did not conform to the provisions of the Federal Advisory Committee Act. Since 1982, to continue providing a forum for public participation, one or more open public meetings are held semiannually in the spring and fall. The fall public meetings are conducted to take public input on the draft AOP, which typically is published in mid-September each year. The spring meetings are conducted to update the public on the current hydrologic conditions and projected System regulation for the remainder of the year as it relates to implementing the final AOP.

Under the terms of Stipulation 18 of the March 2004 "Programmatic Agreement for the Operation and Management of the Missouri River Main Stem System for Compliance with the National Historic Preservation Act, as amended" (PA) the Corps has agreed to consult/meet with the affected Tribes and Tribal Historic Preservation Officers (THPOs), State Historic Preservation Officers (SHPOs), the Advisory Council on Historic Preservation (ACHP) and other parties on the draft AOP. The purpose of this consultation/meeting is to determine whether operational changes are likely to cause changes to the nature, location or severity of adverse effects to historic properties or to the types of historic properties affected and whether amendments to the Corps Cultural Resources Management Plans and Five-Year Plan are warranted in order to better address such effects to historic properties. During 2006 the Corps worked with the affected Tribes to establish processes for consultation on AOPs under 36 CFR Part 800, the PA, and Executive Order 13175. The process consists of a series of informational meetings with the Tribes and/or government-to-government consultation with Tribes, as requested. A letter dated September 18, 2019 was sent to the Tribes offering consultation on the 2019-2020 AOP. Meeting times and locations of

the seven fall public meetings were also provided. Separate meetings will be scheduled for all Tribes requesting government-to-government consultation. All tribes, whether signatory to the PA or not, may request government-to-government consultation on this and all future AOPs. In addition, the Tribes have reserved water rights to the Missouri River and its major tributaries. In no way does this AOP attempt to define, regulate or quantify water rights or any other rights that the Tribes are entitled to by law or treaty.

The 2019 spring public meetings were held at the following locations and dates: April 9 at Fort Peck, Montana and Bismarck, ND; April 10 at Fort Pierre, South Dakota and Sioux City, Iowa; and April 11 at Smithville, Missouri and Nebraska City, Nebraska. The attendees were given an update regarding the outlook for 2019 runoff and projected System regulation for the remainder of 2019. Seven fall public meetings on the draft 2019-2020 AOP will be held at the following locations: October 22 in Fort Peck, Montana and Bismarck, North Dakota; October 23 in Fort Pierre, South Dakota and Sioux City, Iowa; October 24 in Smithville, Missouri and Nebraska City, Nebraska and October 25 in Jefferson City, Missouri. In the spring of 2020, public meetings will be held to discuss the basin's hydrologic conditions and the effects those conditions are expected to have on the implementation of the final 2019-2020 AOP.

III. MAINSTEM MASTER MANUAL AND ESA CONSULTATIONS

The System is comprised of six dam and reservoir projects authorized by the Rivers and Harbors Act of 1935 and the Flood Control Act of 1944. Section 9 of the 1944 Flood Control Act authorized the System to be operated for the purposes of flood control, navigation, irrigation, hydropower, water supply, water quality control, recreation and fish and wildlife. In addition, operation of the System must also comply with other applicable Federal statutory and regulatory requirements, including the ESA. The System is regulated using guidelines published in the Master Manual. The Master Manual presents the water control plan and operational objectives for the integrated regulation of the System. Annual water management plans (Annual Operating Plans) are prepared each year, based on the water control criteria contained in the Master Manual, in order to describe potential reservoir regulation of the System for the current operating year under a variety of runoff conditions.

First published in 1960 and subsequently revised during the 1970s, the Master Manual was again revised in March 2004, primarily to include more stringent drought conservation measures. In March 2006 the Master Manual was again revised to include technical criteria for a spring pulse to comply with a 2003 USFWS Amended Biological Opinion. Neither the 2004 Master Manual, nor the 2006 revisions to the Master Manual, changed the volume of storage in the System reserved for flood risk reduction or the basic principles of how that storage is regulated.

On November 30, 2011 the MRRP Independent Science Advisory Panel (ISAP) released its Final Report on Spring Pulses and Adaptive Management. This report, commissioned by the Missouri River Recovery Implementation Committee (MRRIC), evaluated the Gavins Point spring pulses that were implemented in regards to the biological outcomes the USFWS sought in the 2003 Amended BiOp. The ISAP concluded that spring pulses as implemented were not accomplishing their intended outcomes and provided recommendations towards achieving a new management paradigm for achieving compliance with the Endangered Species Act along the Missouri River.

Following the release of that report, the Corps and USFWS, in coordination with MRRIC, aggressively pursued completion of the recommendations laid out by the ISAP. At the center of this effort was the development of a Missouri River Recovery Management Plan and Environmental Impact Statement (MRRMP-EIS). The Record of Decision (ROD) for the MRRMP-EIS was signed on 20 November 2018. The MRRMP-EIS established an overarching adaptive management process for implementation of actions required to avoid jeopardizing the listed species in the Missouri River basin as a result of Corps projects. The preferred alternative selected no longer called for the spring pulse and reservoir unbalancing criteria in the 2006 Master Manual, therefore following the ROD, in 2018 the Master Manual was revised to remove these provisions.

Concurrent with the MRRMP-EIS process, the Corps conducted consultation with the USFWS, as required by Section 7 of the Endangered Species Act, resulting in a new BiOp being issued in April 2018. Current regulation of the System in accordance with the Master Manual to serve authorized project purposes is dependent on successful implementation of the 2018 BiOp. The Missouri River Recovery Program (MRRP), together with the MRBWMD, works to ensure implementation of the BiOp elements as described in the preferred alternative. Simply put, the Corps must comply with environmental laws including the ESA, and the MRRP is the vehicle used to accomplish this. This AOP identifies flow operations at Garrison, Fort Randall and Gavins Point for the benefit of the endangered interior least tern (tern) and the threatened piping plover (plover) while maintaining flood control and navigation as primary authorized purposes.

Additional information on other efforts undertaken through the MRRP to meet the requirements of the 2018 BiOp can be found on the MRRP website at: https://www.nwo.usace.army.mil/MRRP/.

IV. ONGOING COORDINATION, STUDIES AND REPORTS

As committed to following the 2011 Flood, the Corps communicated more broadly and frequently in 2019 by holding monthly conference calls from January to May with Federal, state, county and local officials, Tribes, emergency management officials, independent experts and the media to discuss conditions on the ground and the current release plans and forecasts. In addition, ad-hoc and daily calls were held in mid-March, and weekly calls were held from June to August. Monthly calls resumed in September and will be held through the fall. Recordings of the conference calls were made available to the public. Monthly outreach calls will continue in January 2020 or as needed if basin and/or weather conditions change dramatically.

The Corps continues to collaborate with other Federal, state and local agencies and our field offices to improve runoff forecasts, particularly as it relates to soil moisture and plains snowpack. This will require a collaborative effort to improve both data collection (i.e. plains snowpack water equivalent, soil moisture and frost depth) and hydrologic modeling. Refer to previous AOPs for details regarding the history of the Upper Missouri Basin Monitoring Network for Soil Moisture and Plains Snow (UMB MN). In 2018 the Corps allocated $100,000 to update the proposal with new equipment and costs, as well as to develop interagency agreements with partner federal, state and research/extension agencies regarding the purchase, installation and ongoing maintenance of equipment, retrieval, QA/QC, storage and dissemination of data, and development of soil moisture and plains snow products that could be integrated into runoff and water supply models and forecasting techniques. Those 2018 funds were primarily used to fund a study by South Dakota State University (SDSU), specifically the South Dakota Mesonet office, to establish an instrumentation test bed at the SDSU site, install and analyze equipment performance, and provide a recommendation for equipment to be purchased and installed at each UMB MN site. Funding was made available in 2019 for the purchase of some equipment. Effort is also continuing regarding other aspects of the UMB MN: 1) leveraging existing soil moisture networks to outfit them with plains snow monitoring equipment and possible upgrading of existing soil moisture and hydro-meteorological instrumentation; 2) identifying locations for new sites; 3) establishing interagency agreement with partners regarding installation and maintenance of the UMB MN; and 4) data management of the acquired data so it can accessed and utilized by partner agencies. The establishment of the UMB MN, which is expected to include up to 600 sites in the 270,000-square mile plains area of the Upper Missouri River basin, will likely take five to seven more years beyond 2019 to be fully implemented.

The Water Management office continues to participate in a variety of regional and national climate change teams. The National Oceanic and Atmospheric Administration (NOAA) also collaborated with the Corps and other agencies on a three-part study. The

first part was a climate attribution effort focusing on the 2011 event. The second part of the study was an assessment of the skill and reliability of predictions of seasonal climate and the ability to predict rapid transitions of cycles from wet to dry and dry to wet. The third part was a climate assessment of the causes for hydrologic extremes in the upper Missouri River basin which was completed by NOAA and the University of Colorado's Cooperative Institute of Research in Environmental Sciences. All three reports are available at https://www.drought.gov/drought/dews/missouri-river-basin/reports-assessments-and-outlooks.

V. FUTURE RUNOFF: AUGUST 2019 - DECEMBER 2020

Runoff into the six System reservoirs is typically low and relatively stable during the August through February period. The August 1 calendar year runoff forecast is used as input to the basic reservoir regulation simulation (Basic) in the AOP studies for the period August 2019 through February 2020. The August 1 runoff forecast for 2019 was 52.9 million acre-feet (MAF). Two other runoff scenarios based on the August 1 runoff forecast were developed for the same period. These are the Upper Basic (wetter than forecast) and Lower Basic (drier than forecast) simulations. The Upper and Lower Basic simulations are based on a percentage of the Basic runoff. The adjusted Upper and Lower Basic values for each month and reach are shown as percentages in ***Tables I*** and ***II***. The percentages shown are used for the August through February period in the AOP simulations. These percentages are also used in the regularly updated monthly reservoir simulations. The report detailing the computation of these runoff factors was posted to the Corps' website in January 2015.

TABLE I
UPPER BASIC RUNOFF PERCENTAGES

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fort Peck	120	120	135	145	135	145	145	130	120	120	120	120
Garrison	120	120	135	145	135	145	145	130	120	120	120	120
Oahe	140	140	150	155	155	145	140	135	135	135	135	135
Fort Randall	140	140	150	155	155	145	140	135	135	135	135	135
Gavins Point	140	140	150	155	155	145	140	135	135	135	135	135
Sioux City	140	140	150	155	155	145	140	135	135	135	135	135

TABLE II
LOWER BASIC RUNOFF PERCENTAGES

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fort Peck	80	75	65	65	70	65	65	70	75	80	80	80
Garrison	80	75	65	65	70	65	65	70	75	80	80	80
Oahe	75	75	55	50	50	50	55	65	75	75	75	75
Fort Randall	75	75	55	50	50	50	55	65	75	75	75	75
Gavins Point	75	75	55	50	50	50	55	65	75	75	75	75
Sioux City	75	75	55	50	50	50	55	65	75	75	75	75

Simulations for the March 1, 2020 to February 28, 2021 time period use five statistically derived runoff scenarios based on an analysis of historic water supply. The report detailing the development of these runoff scenarios, "Runoff Volumes for Annual Operating Plan Studies", was updated in August 2013 to include five additional years of runoff data that now extends from 1898 to 2011. In addition to the five runoff scenarios, the updated analysis added two runoff scenarios, one each at the upper and lower end, to span 96 percent of the historic record. Using statistically derived runoff scenarios for the AOP provides a good range of simulation for dry, average, and wet conditions, and eliminates the need to forecast future precipitation months in advance. As noted in the second NOAA study (see Chapter IV), for the lead times (one to six months) and times of year of interest (January-February-March and April-May-June) in the Missouri River basin, there is no useful skill and reliability of precipitation forecasts. Real-time regulation of the System is based on all available and relevant hydrometerological information including, but not limited to, observed runoff volumes, National Weather Service short- and long-range outlooks, plains and mountain snow water equivalent data, observed base flows, soil moisture, and soil frost depths.

The five statistically derived runoffs used in the AOP are identified as the Upper Decile, Upper Quartile, Median, Lower Quartile and Lower Decile runoff conditions. Upper Decile runoff (34.5 MAF) has a 1 in 10 chance of being exceeded, Upper Quartile runoff (30.6 MAF) has a 1 in 4 chance of being exceeded, and Median runoff (24.6 MAF) has a 1 in 2 chance of being exceeded. Lower Quartile runoff (19.3 MAF) has a 1 in 4 chance of the occurrence of less runoff, and Lower Decile runoff (16.1 MAF) has a 1 in 10 chance of the occurrence of less runoff. There is still a 20 percent chance that a runoff condition may occur that has not been simulated; i.e., a 10 percent chance runoff could be lower than Lower Decile and a 10 percent chance runoff could be greater than Upper Decile.

The two additional runoff volumes included in the updated "Runoff Volumes for Annual Operating Plan Studies" report are the 2 percent and 98 percent exceedance levels. Annual runoff at the 2 percent exceedance (40.1 MAF) has a 1 in 50 chance of being exceeded; the 98 percent exceedance (11.4 MAF) has a 1 in 50 chance of the occurrence of less runoff. Although these runoff volumes were not included as

scenarios in this year's AOP, additional monthly studies could be performed based on these runoff volumes, or any prior year's runoff volume and distribution, as the 2019 runoff season unfolds should the runoff forecast exceed the Upper Decile runoff scenario or be lower than the Lower Decile runoff.

The Upper Decile and Upper Quartile simulations extend from the end of the Upper Basic simulation through February 2021. Likewise, the Median simulation extends from the end of the Basic simulation, and the Lower Quartile and Lower Decile simulations extend from the end of the Lower Basic simulation through February 2021.

The estimated natural flow at Sioux City, the corresponding post-1949 water use effects, and the net flow available above Sioux City are shown in ***Table III,*** where water supply conditions are quantified for the period August 2019 through February 2021. The natural water supply for calendar year (CY) 2018 totaled 42.1 MAF.

TABLE III
NATURAL AND NET RUNOFF AT SIOUX CITY
(Volumes in 1,000 Acre-Feet)

	Natural 1/	Post-1949 Depletions	Net 2/
August 2019 through February 2020 (Basic Runoff Scenario)			
Basic	9,500	1,000	10,500
Upper Basic	12,100	1,000	13,100
Lower Basic	7,100	400	7,500
Runoff Year March 2020 through February 2021 (Statistical Analysis of Past Records)			
Upper Decile	34,500	-3,000	31,500
Upper Quartile	30,600	-3,000	27,600
Median	24,600	-3,000	21,600
Lower Quartile	19,300	-3,100	16,200
Lower Decile	16,100	-3,000	13,100

1/ The word "Natural" is used to designate runoff adjusted to the 1949 level of basin development, except that regulation and evaporation effects of the Fort Peck reservoir have also been eliminated during its period of regulation prior to 1949.

2/ The word "Net" represents the total runoff after deduction of the post-1949 irrigation, upstream storage, and other use effects.

VI. ANNUAL OPERATING PLAN FOR 2019-2020

A. General. The anticipated regulation described in this AOP is designed to meet the regulation objectives presented in the current Master Manual. While some aspects of System and individual project regulation are clearly defined by technical criteria in the Master Manual, for example navigation service level and season length, others such as minimum releases for irrigation and water supply in the reaches between the reservoirs are based on regulation experience and may be adjusted as needed to respond to changing conditions. Consideration has been given to all of the authorized project purposes, to historic and cultural resources and to the needs of threatened and endangered (T&E) species. The "System Description and Regulation" report provides a concise summary of the primary aspects of System regulation and should be referred to for further information. For ease of use, a summary of the frequently used technical criteria included in the Master Manual is presented on ***Plate 3.***

The plan relies on a wealth of regulation experience. Reservoir regulation experience available for preparation of the 2019-2020 AOP includes 13 years of regulation at Fort Peck (1940) as the sole Mainstem project, plus 66 years of System experience as Fort Randall (1953), Garrison (1955), Gavins Point (1955), Oahe (1962), and Big Bend (1964) were brought progressively into System regulation. This regulation experience includes lessons learned during two major droughts of six and eight years (1987-1992 and 2000–2007) that have occurred since the System filled in 1967. It also includes the high runoff period 1993–1999 during which five of the seven years experienced runoff greater than Upper Quartile including the previous record runoff of 49.0 MAF in 1997, and the record runoff of 61.0 MAF in 2011. In addition to the long period of actual System reservoir regulation experience, many background regulation studies for the completed System are available for reference.

B. 2019-2020 AOP Simulations. Reservoir simulations for the Upper Basic, Basic, and Lower Basic runoff scenarios, which span the period of August 2019 through February 2020, are shown in the final section of this AOP as studies 1 through 3. AOP simulations for the five statistically derived runoff scenarios, which span the period of March 2020 through February 2021 are shown in the final section of this AOP as studies 4 through 8. As previously stated, the simulations use five statistically derived runoff scenarios and reflect 80 percent of the historic annual runoff volumes (between Upper Decile and Lower Decile). The simulations provide information for planning purposes on a range of future reservoir levels and release rates, and are not meant to represent a particular forecast. The simulations shown use a monthly time-step, and thus do not provide the level of detail necessary to address specific flood control regulations. Detailed routing of specific flood flows is accomplished using daily and hourly time-step models which incorporate real-time information including observed precipitation, and these situations are handled individually during real-time regulation.

The AOP studies, in summary, provide the following: the full flood control capacity of the reservoir system will be available at the start of the runoff season; use of the Exclusive Flood Control Zone is not anticipated under any of the five runoff scenarios covered in the AOP; full service flow support for all runoff scenarios to start the navigation season; full service flow support for Lower Quartile and above runoff scenarios after the July 1 System storage check and reduced flow support for Lower Decile runoff; a full length navigation season for all runoff scenarios; near normal winter releases for Median runoff, minimum winter releases for Lower Quartile and Lower Decile runoff, and above normal winter releases for Upper Decile and Upper Quartile runoff; a steady release-flow to target regulation during the tern and plover nesting season for Median and below runoff and nearly steady releases for Upper Decile and Upper Quartile runoff with flood water evacuation; emphasis on Garrison for steady to rising reservoir levels during the forage fish spawn; and reservoir releases and pool levels sufficient to keep all intakes operational under all runoff scenarios. Water conservation measures may be implemented if runoff conditions indicate that it would be appropriate including cycling releases from Gavins Point during the early part of the nesting season, only supporting flow targets in reaches being used by commercial navigation, and utilization of the Kansas River projects authorized for Missouri River navigation flow support. Additional details about the studies are provided in the following paragraphs. Results of the simulations are shown in ***Plate 4*** and ***Plate 5*** for the System storage and the Fort Peck, Garrison and Oahe pool elevations.

Under all runoff scenarios modeled for the AOP, the full flood control capacity of the System is available at the start of the 2020 runoff season. All scenarios begin the runoff season at the base of the Annual Flood Control and Multiple Use Zone.

The March 15 and July 1 System storage checks were used to determine the level of flow support for navigation and other downstream purposes as well as the navigation season length in 2020. Full service navigation flows or more are provided for Lower Quartile and above runoff throughout the navigation season. Service levels for Lower Decile start the season at full service, and drop slightly following the July 1 System storage check (see ***Plate 3***). Application of the July 1 System storage check indicated that a full length navigation season would be provided for all five runoff conditions, with the upper two runoff scenarios including a 10-day extension to the navigation season. Upper Quartile and Upper Decile simulations reach the desired 56.1 MAF System storage level on March 1, 2021. Storage is below the base of the Annual Flood Control and Multiple Use Zone for Median and lower runoff conditions.

For modeling purposes in this AOP, the Steady Release – Flow-to-Target (SR-FTT) regulation scenario for Gavins Point is shown during the 2020 tern and plover nesting season for Median and lower runoff conditions. For these simulations, the monthly average May release used in the simulations was determined by using the long-term

average May release (see ***Plate 3***), based on the service level, for the first third of the month, followed by the July table values for the remainder of the month to reflect a steady release regulation at the start of the nesting season. The modeled June release was set equal to the long-term average release for July (see ***Plate 3***) based on the service level for the first half of the navigation season. The long-term average releases (see ***Plate 3***) were used for July and August to indicate flowing to target. The Upper Decile and Upper Quartile runoff simulations follow the Master Manual, with much above normal runoff requiring release increases mid-year to evacuate flood water from the reservoirs. Although these modeled Gavins Point releases represent the best estimate of required releases during 2020, actual releases will be based on hydrologic conditions and the availability of habitat at that time. To the extent reasonably possible, measures to minimize incidental take of the protected species will be utilized. These may include not meeting flow targets in reaches without commercial navigation and utilizing the Kansas River tributary reservoirs for navigation flow support when appropriate. It may also be necessary to cycle releases for flood control regulation during the T&E species' nesting season or for water conservation if drought conditions develop.

The long-term average Gavins Point releases to meet target flows were used in the AOP studies for navigation support during the spring and fall months with the exception of Upper Decile and Upper Quartile. Under these runoff scenarios, releases were based on flood water evacuation. Based on the September 1 storage checks and flood evacuation criteria, modeled Gavins Point winter releases range from 20,000 cfs to 22,000 cfs during the 2019-2020 winter season and range from 12,500 cfs to 20,000 cfs during the 2020-2021 winter season depending on the runoff scenario. Gavins Point releases will be increased to meet downstream water supply requirements in critical reaches, to the extent reasonably possible, if downstream incremental runoff is low.

The Gavins Point releases shown in this and previous AOPs are estimates based on historic averages and experience. Adjustments are made as necessary in real-time based on hydrologic conditions.

Intrasystem releases are adjusted to best serve the multiple purposes of the projects with special emphasis placed on regulation for non-listed fisheries starting in early April and for T&E bird species beginning in early May and continuing through August. As part of the overall plan to rotate emphasis among the upper three reservoirs during low runoff years, Garrison is scheduled to be favored during the 2020 forage fish spawn while also attempting to maintain rising water levels at Fort Peck and Oahe. The Median, Upper Quartile, and Upper Decile simulations show that it is possible to provide steady-to-rising pool levels in each of the three large upper reservoirs during the spring forage fish spawn period. Insufficient runoff is available in the Lower Quartile and Lower Decile simulations to keep all three reservoirs rising. In the Lower Quartile and Lower Decile simulations, the Garrison reservoir levels decline

in April but rise in May. The Oahe reservoir level declines in April and May in the Lower Quartile and Lower Decile simulations.

Intrasystem releases are also adjusted so that the upper three reservoirs are shown in a balanced condition each year on March 1, the approximate start of the runoff season. This balancing is computed based on the percent of storage in the respective Carryover Multiple Use Zones.

Actual System regulation from January 1 through July 31, 2019 and the simulated regulating plans for each project through CY 2020 using the five runoff scenarios described on Page 4 are presented on ***Plate 6*** through ***Plate 11***, inclusive. Big Bend regulation is omitted since storage at that project is relatively constant and average monthly releases are essentially the same as those at Oahe. These plates also show, on a condensed scale, actual regulation since 1953.

Plate 12 illustrates Fort Peck, Garrison, Oahe, and Gavins Point actual releases (Regulated Flow) as well as the Missouri River flows that would have resulted if the reservoirs were not in place (Unregulated Flow) during the period January 2018 through July 2019. ***Plate 13*** presents past and simulated gross average monthly power generation and gross peaking capability for the System.

C. <u>Regulation Plan for the Balance of the 2019 Navigation Season and Fall of 2019.</u> The regulation of the System for the period of August through November 2019 is presented in the following paragraphs.

<u>Fort Peck</u>. Releases will average about 15,000 cfs through mid-September and then be lowered to 13,500 cfs as irrigation ceases. Releases will be held near that level through the end of November. The Fort Peck pool will decline through the fall, ending the month of November at 2238.3 feet or 7.9 feet below the August 1 elevation of 2246.2 feet.

<u>Garrison</u>. Releases will be maintained near 46,000 cfs through mid-September, and then decreased to 36,500 cfs and held steady until near the end of November. The Garrison pool will steadily drop through the fall and end the month of November at 1840.0 feet or 11.7 feet below the August 1 elevation of 1851.7 feet.

<u>Oahe</u>. The reservoir started the month of August at the base of the Exclusive Flood Control Pool at elevation 1617.0 feet. Releases will average 56,500 cfs in August, 53,300 cfs in September, 47,900 cfs in October, and 49,100 cfs in November to evacuate the flood waters from the annual flood control pool. At the end of November, the Oahe pool is forecast to be at elevation 1608.3 feet or 8.7 feet below the August 1 elevation.

Big Bend. Releases generally parallel those from Oahe. The Big Bend pool generally fluctuates between 1420.0 feet msl and 1421.0 feet msl for weekly cycling during high power load periods.

Fort Randall. Releases will average 66,300 cfs in August, 57,800 cfs in September, 56,500 cfs in October, and 56,700 cfs in November to back up the releases from Gavins Point. The fall pool drawdown of Fort Randall will start after Labor Day in early September and will be completed near the end of November. Releases will be reduced after the navigation season ends to the level required to back up Gavins Point winter releases.

Gavins Point. Releases will be scheduled above full service flows to evacuate water from the reservoir system through early December. A full length navigation season, plus a 10-day extension, will be provided in accordance with the technical criteria for the July 1 System storage check presented in the Master Manual. In accordance with the Master Manual, during years of greater than normal water supply, the navigation season is extended as both an additional evacuation measure and to provide an increased benefit to navigation while striving to reach the base of the Annual Flood Control and Multiple Use Zone by March 1 the following season. The closing dates for the commercial navigation season ranged from December 2 at Sioux City, Iowa to December 11 at the mouth near St. Louis, Missouri. Releases will be reduced by approximately 3,000 cfs per day beginning on December 2, working toward the target winter release. The Gavins Point pool level will be raised 1.5 feet to elevation 1207.5 feet msl in the fall. The pool level will remain near that elevation during the winter months.

D. Regulation Plan for Winter 2019-2020. The regulation of the System presented in the following paragraphs is based on the previously discussed AOP simulations. Actual real-time regulation of the System is adjusted to respond to changing conditions on the ground. The latest long-term reservoir regulation forecasts, which are updated monthly, can be found on the Corps' website. The September 1 System storage check is used to determine the winter release rate from Gavins Point. A winter release of 12,000 cfs is scheduled if System storage is less than 55.0 MAF on September 1; 17,000 cfs is scheduled when System storage is above 58.0 MAF; and the release is prorated for System storages between 55.0 and 58.0 MAF. A modification to the winter release rate from Gavins Point dam may occur when the evacuation of System flood control storage cannot be accomplished by providing a full-service navigation season with a 10-day extension of the navigation season. With an excess annual water supply, the winter season Gavins Point release may be scheduled at a rate of up to 25,000 cfs to continue to evacuate the remaining excess water in System flood control storage. Based on the studies included in this AOP, the scheduled winter System release for 2019-2020 will range from 20,000 to 22,000 cfs. It is anticipated that this year's winter release will be

adequate to complete evacuation of stored flood waters and serve all downstream water intakes. Water supply is discussed in more detail in Chapter VII, Section B.

Fort Peck. Releases are expected to average 12,000 cfs in December, January and February to serve winter power loads and to help balance System storage. The Fort Peck pool level is expected to decline about 4.3 feet from December through February to near elevation 2234.0 feet by March 1. At the beginning of March, the Fort Peck pool will be at the base of its Annual Flood Control and Multiple Use Zone.

Garrison. Releases are scheduled to average 20,000 cfs in December increasing to 24,000 cfs for January and February to serve winter power loads and to help balance System storage. Releases will be held steady or lowered, most likely in December, to prevent ice-induced flooding at the time of freeze-in and then gradually increased as river conditions permit. These temporary reductions in the releases may be scheduled to prevent exceedance of a 13-foot stage at the Missouri River at Bismarck streamgaging station. The Bismarck flood stage is 14.5 feet. Water Management staff will coordinate closely with other Federal, state and local agencies during periods of freeze-in and ice-out to reduce flood risk and ensure communities and local residents are aware of the rapidly changing conditions and are prepared to take appropriate actions. The Garrison pool level will decline 2.5 feet from elevation 1840.0 feet at the end of November to near elevation 1837.5 feet by March 1, the base of its Annual Flood Control and Multiple Use Zone.

Oahe. Releases for the winter season will provide backup for the Fort Randall and Gavins Point releases as well as refill the recapture space available in the Fort Randall reservoir consistent with anticipated winter power loads. Monthly average releases may vary substantially with fluctuations in power loads occasioned by weather conditions but, in general, are expected to average between 22,400 cfs and 25,700 cfs. Daily and hourly releases will vary widely to best meet power loads. Peak hourly and minimum hourly releases, as well as daily energy generation, will be constrained to prevent urban flooding in the Pierre and Fort Pierre areas if severe ice conditions develop downstream of Oahe Dam. This potential reduction is coordinated with the Western Area Power Administration (Western). The Oahe pool level is expected to decline from 1608.3 feet at the end of November to 1606.8 feet at the end of December, hold steady through January before rising to near elevation 1607.5 feet by the end of February, the base of its Annual Flood Control and Multiple Use Zone.

Big Bend. The Big Bend pool level will be maintained in the normal 1420.0 feet to 1421.0 feet range during the winter.

Fort Randall. Releases will average about 20,200 cfs during the winter season to support Gavins Point winter releases. The Fort Randall pool level is expected to rise from its fall drawdown elevation of near 1337.5 feet near the end of November or early

December to near elevation 1350.0 feet, the seasonal base of flood control, by March 1. However, if the plains snowpack flood potential downstream of Oahe Dam is lower than normal, the Fort Randall pool level will be raised to near 1353.0 feet by March 1. It is likely that a pool level as high as 1355.0 feet could be reached by the end of March if spring runoff has commenced. The Fort Randall pool level above the White River delta near Chamberlain, South Dakota will remain at a higher elevation than the pool level below the delta from early October through December, due to the damming effect of this delta area.

Gavins Point. Gavins Point winter releases are discussed in the first paragraph of this section. The Gavins Point pool level will be near elevation 1207.5 feet until late February when it will be lowered to elevation 1206.0 feet to create additional capacity to store spring runoff.

System storage for all runoff conditions will be at the base of the annual flood control zone of 56.1 MAF by the beginning of next year's runoff season, approximately March 1, 2020.

E. Regulation During the 2020 Navigation Season. All five runoff scenarios modeled for this year's AOP follow the technical criteria presented in the current Master Manual for downstream flow support. Beginning in mid-March, Gavins Point releases will be gradually increased to provide navigation flow support at the mouth of the Missouri near St. Louis, Missouri by April 1, 2020, the normal navigation season opening date. The corresponding dates at upstream locations are Sioux City, March 23; Omaha, March 25; Nebraska City, March 26; and Kansas City, March 28. However, if during the 2020 navigation season there is no commercial navigation scheduled to use the upper reaches of the navigation channel, MRBWMD will consider not providing navigation flow support in those reaches to conserve water in the System, reduce flood risk, and/or minimize incidental take of the protected species during the nesting season.

Navigation flow support for the 2020 season will be determined by actual System storage on March 15 and July 1. Runoff scenarios modeled indicate full service flow support at the start of the 2020 navigation season for all runoff conditions. Following the July 1 System storage check, full service would be provided for Lower Quartile and above runoff scenarios. The service level would be 600 cfs below full service for Lower Decile runoff. The normal 8-month navigation season is provided for Median runoff scenarios and below as shown in ***Table IV***. A 10-day extension to the navigation season is provided for the upper two runoff scenarios.

TABLE IV
NAVIGATION SERVICE SUPPORT
FOR THE 2020 SEASON

	Runoff Scenario (MAF)	System Storage March 15 (MAF)	System Storage July 1 (MAF)	Flow Level Above or Below Full Service (cfs) Spring	Flow Level Above or Below Full Service (cfs) Summer/Fall	Season Shortening (Days)
U.D.	34.5	57.5	63.9	0	+19,000	0*
U.Q.	30.6	57.2	63.1	0	+12,000	0*
Med.	24.6	56.9	60.6	0	0	0
L.Q.	19.3	56.7	57.3	0	0	0
L.D.	16.1	56.6	56.3	0	-600	0

*Includes 10-day extension for Upper Quartile and Upper Decile.

As previously stated, the modeled regulation for the 2020 nesting season below Gavins Point is SR-FTT. When the SR-FTT release scenario is used, the initial steady release, which has ranged from 24,000 cfs to 33,000 cfs in the several years just prior to recent high runoff years, will be based on hydrologic conditions and the availability of habitat at that time. Model runs included in this AOP have a Gavins Point release which is higher during the last 20 days of May to keep birds from nesting at low elevations. Gavins Point releases will be adjusted to meet downstream targets as tributary flows recede, but ideally the initial steady release will be sufficient to meet downstream targets until the majority of the birds have nested. The purpose of this regulation is to continue to meet the project purposes while minimizing the loss of nesting T&E species. A Gavins Point peaking cycle of two days down and one day up may be used for flood control regulation or to conserve water in the upper three reservoirs, if required. Gavins Point releases for the Upper Decile and Upper Quartile runoff simulations are much above normal to evacuate flood water from the reservoirs. Releases from Garrison and Fort Randall will follow repetitive daily patterns from early May, at the beginning of the T&E species' nesting season, to the end of the nesting season in late August. In addition to the intra-day pattern, Fort Randall releases may also be cycled with two days of lower releases and one day of higher releases during the early part of the nesting season to maintain release flexibility in that reach while minimizing the potential for take. If higher daily releases are required later in the nesting season, the daily peaking pattern may be adjusted, reduced or eliminated resulting in a steady release to avoid increased stages at downstream nesting sites.

Gavins Point releases may be quite variable during the 2020 navigation season but are expected to range from 26,000 to 51,000 cfs under the five modeled runoff scenarios. Release reductions necessary to minimize downstream flooding are not reflected in the

monthly averages shown in the simulations but will be implemented as conditions warrant. Reductions in System releases to integrate the use of downstream Missouri River flow support from the designated Kansas River projects (Milford, Tuttle Creek and Perry) authorized to provide Missouri River navigation flow support have not been modeled since they are based on downstream hydrologic conditions. However, this storage will be utilized to the extent possible as a water conservation measure, or to minimize incidental take of protected species during the nesting season if conditions indicate it is prudent to do so. Simulated storages and releases for the System and individual reservoirs within the System are shown on ***Plate 6*** through ***Plate 11.*** As experienced in 2011 and 2019, runoff above or below simulated levels can occur and result in releases beyond those modeled for the AOP. As previously stated, should that occur, the Corps will increase its efforts to convey that information throughout the basin so that state, Tribal, and local agencies, communities, and local residents can take appropriate action.

F. <u>Regulation Activities for T&E Species and Fish Propagation Enhancement.</u> The ability to provide steady-to-rising pool levels in the upper three reservoirs in low runoff years is very dependent on the volume, timing, and distribution of runoff. The reservoir regulation simulations presented in this AOP for the Upper Decile, Upper Quartile, and Median runoff scenarios show that steady-to-rising pool levels would occur during the spring fish spawn period for the upper three reservoirs. As part of the overall plan to rotate emphasis among the upper three reservoirs during low runoff years, Garrison is scheduled to be favored during the 2020 forage fish spawn if runoff is below the Median runoff scenario. This will be accomplished by setting releases at Fort Peck and Garrison at a level that would attempt to maintain a rising Garrison pool, but no less than the minimum required for downstream water supply requirements, including irrigation. These adjustments may be restricted when the terns and plovers begin nesting in May. The studies show that Garrison pool levels drop in April for both the Lower Quartile and Lower Decile runoff scenarios but then rise from May through June for both runoff scenarios. The studies show that inflows are sufficient to maintain a steady to rising pool at Fort Peck from April through June for the Lower Quartile runoff scenario. Fort Peck pool levels drop in April for the Lower Decile runoff scenario then rise in May before dropping again in June. The Oahe pool falls during the April to June period for both, the Lower Quartile and Lower Decile runoff scenarios. If drought conditions develop, emphasis during the fish spawn will be rotated among the upper three reservoirs and may also be adjusted to be opportunistic in regard to runoff potential. The upper three reservoirs will be managed to benefit forage fish to the extent reasonably possible, while continuing to serve the other Congressionally authorized project purposes.

<u>Fort Peck</u>. The repetitive daily pattern of releases from Fort Peck has not been implemented since the 2004 tern and plover nesting season. This adaptive management decision was made based on data collected during previous nesting seasons. In recent

years, birds in this reach have nested on available high elevation habitat, and thus were not expected to be impacted by the potential range of releases from Fort Peck during the summer. Releases during the 2020 nesting season will not be restricted by the repetitive daily pattern unless habitat conditions or nesting patterns warrant a change.

If high tributary flows enter the Missouri River below the project during the nesting season, hourly releases will generally be lowered to no less than 3,000 cfs in order to keep traditional riverine fish-rearing areas continuously inundated, while helping to lower river stages at downstream nesting sites. In rare instances releases below 3,000 cfs may be scheduled for flood damage reduction. April releases are expected to be adequate for trout spawning below the project.

Maintaining a rising Fort Peck pool level will be dependent upon the daily inflow pattern to the reservoir. The reservoir rises in April and May for Median and above runoff scenarios, but holds steady or declines slightly in April for the Lower Quartile and Decile runoff scenarios, respectively.

Garrison. As in previous years, releases from Garrison will follow a repetitive daily pattern during the T&E nesting season to limit peak stages below the project for nesting birds. Releases are scheduled to be 1,000 cfs lower in July and early August than the June releases to enhance conditions for the fledging of chicks. High elevation nesting habitat is expected to be sufficient below Garrison Dam during the 2020 nesting season for all runoff scenarios.

During 2020, coldwater habitat in Garrison should be adequate for all runoff scenarios. Coldwater habitat will continue to be monitored during the year and adjustments will be considered if conditions warrant.

A steady-to-rising pool at Garrison during the fish spawn in April and May will be dependent upon the daily inflow pattern to the reservoir. The reservoir rises in April and May for Median and above runoff scenarios, but declines in April before holding steady or rising in May under both lower runoff scenarios.

Oahe. Releases in the spring and summer will back up those from Gavins Point. The pool level should be steady to rising in the spring during the fish spawn for Median and above runoff scenarios. Under the Lower Quartile and Lower Decile runoff scenarios, the Oahe pool would decline in the April through May period, dropping 1.6 and 3.2 feet, respectively.

Fort Randall. To the extent reasonably possible, Fort Randall will be regulated to provide for a pool elevation near 1355.0 feet during the fish spawn period, provided water can be supplied from other reservoirs for downstream uses. The pool will not be drawn down below elevation 1337.5 feet in the fall to ensure adequate supply for water

intakes. As a measure to minimize take while maintaining the flexibility to increase releases during the nesting season, hourly releases from Fort Randall will follow a repetitive daily pattern to limit peak stages below the project for nesting birds. Daily average flows may be increased every third day to preserve the capability of increasing releases later in the summer with little or no incidental take if drier downstream conditions occur. If higher daily releases are required later in the nesting season, the daily peaking pattern may be adjusted, reduced or eliminated resulting in a steady release to avoid increased stages at downstream nesting sites. Periods of zero release will be minimized to the extent reasonably possible during the nesting season given daily average releases, real-time hydrologic conditions, and System generating constraints as defined in coordination with Western.

Gavins Point. It is anticipated that a sufficient amount of habitat to provide for successful nesting will be available at elevations above the planned release rates for all runoff conditions. This expectation is based on the high elevation habitat resulting from the record releases in 2011 and the resultant habitat from flows experienced in 2018 and 2019. Releases from Gavins Point may follow the flow-to-target (FTT) release scenario or the SR-FTT scenario. The FTT scenario limits releases from Gavins Point to those needed to meet downstream targets. The actual release scenario will be evaluated when birds begin nesting in early May. If monitoring determines that nests are likely to be initiated at a lower elevation which would be inundated later in the summer, a SR-FTT release scenario may be implemented. A full description of these release scenarios can be found in the Master Manual. Actual releases will be based on hydrologic conditions and the availability of habitat at that time.

All reasonable measures to minimize the loss of nesting T&E bird species will be used. While not anticipated because of the quantity of high elevation habitat available, these measures include, but are not limited to, a relatively high initial steady release during the peak of nest initiation, the use of the three designated Kansas River basin reservoirs for Missouri River navigation flow support, moving nests to higher ground, and monitoring nest fledge dates to determine if delaying an increase a few days might allow threatened chicks to fledge. The location of navigation tows and river conditions at intakes would also be monitored to determine if an increase could be temporarily delayed without impact. Cycling releases every third day may be used to conserve water early in the nesting season if extremely dry conditions develop. In addition, cycling may be used during downstream flood control regulation.

The Gavins Point pool will be regulated near 1206.0 feet in the spring and early summer, with minor day-to-day variations due to incremental inflows between Fort Randall and Gavins Point resulting from rainfall runoff. Several factors can limit the ability to protect nests from inundation in the upper end of the Gavins Point pool. First, because there are greater numbers of T&E bird species nesting below Gavins Point, regulation to minimize incidental take usually involves restricting Gavins Point

releases, which means that the Gavins Point pool can fluctuate significantly due to increased runoff from rainfall events. Second, rainfall runoff between Fort Randall and Gavins Point can result in relatively rapid pool rises because the Gavins Point project has a smaller storage capacity than the other System reservoirs. And third, the regulation of Gavins Point for downstream flood control may necessitate immediate release reductions to reduce downstream damage. When combined, all these factors make it difficult, and sometimes impossible, to prevent inundation of nests in the upper end of the Gavins Point reservoir. However, because of the quantity of habitat expected we do not anticipate a large number of nests being inundated. The pool will be increased to elevation 1207.5 feet late in August or early September when it is determined that there are no terns or plovers nesting along the reservoir.

G. Regulation Activities for Historic and Cultural Properties. As acknowledged in the 2004 Programmatic Agreement (PA) for the Operation and Management of the Missouri River Main Stem System, wave action and fluctuation in the level of the reservoirs results in erosion along the banks of the reservoirs. The Corps will work with the Tribes utilizing 36 CFR Part 800 and the PA to address the exposure of historic and cultural sites. The objective of a programmatic agreement is to deal "…with the potential adverse effects of complex projects or multiple undertakings…" The PA objective was to collaboratively develop a preservation program that would avoid, minimize and/or mitigate adverse effects along the System reservoirs. All tribes, whether signatory to the PA or not, may request government-to-government consultation on the regulation of the System and the resulting effect on historic and cultural properties and other resources.

Pool levels at the upper three reservoirs will likely be near normal in 2020 but will vary depending on runoff conditions. Continuing exposure of cultural sites along the shoreline is still possible. Actions to avoid, minimize or mitigate adverse impacts and expected results of the actions are covered under Chapter VII of this AOP. ***Plate 14*** shows the locations of the Tribal Reservations.

Fort Peck. Depending on runoff in the Missouri River basin, System regulation during 2020 could result in a Fort Peck pool elevation variation from a high of 2243 feet msl to a low of 2222 feet msl. This is based on the Upper and Lower Decile runoff scenarios (see ***Plate 8*** and the studies included at the end of this report). Based on a review of existing information, approximately 13 known sites could be affected during this period.

Garrison. Based on the Upper and Lower Decile runoff scenarios (see ***Plate 9*** and the studies included at the end of this report), Garrison pool elevations could range between 1847 and 1827 feet msl during 2020. Based on a review of existing information, approximately 49 known sites could be affected during this period.

Oahe. At the Oahe reservoir, the System regulation under the Upper and Lower Decile runoff scenarios could result in pool elevations ranging from 1616 to 1594 feet msl (see ***Plate 10*** and the studies included at the end of this report). Based on a review of existing information, approximately 201 known sites could be affected during this period.

Big Bend. System regulation will be adjusted to maintain the Big Bend pool level in the normal 1420 to 1421 feet msl range during 2020. Short-term increases above 1421 due to local rainfall may also occur. Based on a review of existing information, no known sites will be affected during this period.

Fort Randall. As part of the normal System regulation, the Fort Randall pool elevations will vary between 1350 and 1355 feet msl during the spring and summer of 2020 (see ***Plate 11*** and the studies included at the end of this report). Short-term increases above 1355 feet msl due to local rainfall may occur. The annual fall drawdown of the reservoir to elevation 1337.5 feet msl will begin prior to the close of the navigation season and will be accomplished by early December. The reservoir will then be refilled during the winter to elevation 1350 feet msl. Based on a review of existing information, approximately 22 known sites could be affected during this period.

Gavins Point. System regulation will be adjusted to maintain the Gavins Point pool level in the normal 1206 to 1207.5 feet msl range during 2020. Short-term increases above 1207.5 feet msl may occur due to local rainfall. Based on a review of existing information, one known site could be affected during this period.

VII. SUMMARY OF RESULTS EXPECTED IN 2020

With regulation of the System in accordance with the 2019-2020 AOP outlined in the preceding pages, the following results can be expected. ***Table V*** summarizes the critical decision points throughout the year for all runoff conditions.

Table V
Summary of 2019-2020 AOP Studies

Decision Points	2020 Runoff Condition				
	Upper Decile	**Upper Quartile**	**Median**	**Lower Quartile**	**Lower Decile**
March 15 System Storage	57.4 MAF	57.2 MAF	56.9 MAF	56.7 MAF	56.6 MAF
Spring Service Level	Full service	Full service	Full service	Full service	Full service
May Releases					
May Early/Late	Not applicable	28.0/31.6 kcfs	28.0/31.6 kcfs	31.3/34.3 kcfs	31.3/34.3 kcfs
May Avg GP Release	36.0 kcfs	29.9 kcfs	29.9 kcfs	32.8 kcfs	32.8 kcfs
Fish Spawn Rise (Apr-Jun)					
FTPK Pool Elev Change	+6.9 feet	+6.2 feet	+4.4 feet	+1.9 feet	-0.7 feet
GARR Pool Elev Change	+6.2 feet	+5.4 feet	+4.3 feet	+1.9 feet	+2.2 feet
OAHE Pool Elev Change	+5.0 feet	+5.6 feet	+2.6 feet	-1.6 feet	-3.2 feet
July 1 System Storage	63.9 MAF	63.1 MAF	60.6 MAF	57.3 MAF	56.3 MAF
Sum-Fall Service Level (kcfs)	Full Service	Full Service	Full Service	Full Service	0.6 kcfs blw Full Service
Nav Season Length	10 Day extension	10 Day extension	0 Days shortening	0 Days shortening	0 Days shortening
September 1 System Storage	61.8 MAF	61.2 MAF	58.8 MAF	54.4 MAF	52.4 MAF
Winter 2020-21 GP Release	20.0 kcfs	20.0 kcfs	17.0 kcfs	12.5 kcfs	12.5 kcfs
February 29 System Storage	56.1 MAF	56.1 MAF	55.3 MAF	50.3 MAF	47.8 MAF
End-Year Pool Balance	Balanced	Balanced	Balanced	Balanced	Balanced
Percent Pool	100%	100%	99%	90%	85%

A. Flood Control. Flood control is the only authorized project purpose that requires the availability of empty storage space rather than impounded water. Actual flood events, especially those that are a result of rainfall runoff, are difficult to predict with much advance notice; therefore, detailed routing of specific major flood flows is accomplished when floods occur. There is a recurring pattern of high-risk flood periods during each year: a season when snowmelt, ice jams, and protracted heavy rains will almost surely occur with or without generating consequent floods; and a season when

these situations are less likely and the flood threat is correspondingly low. The high-risk flood season begins about March 1 and extends through the summer. As a consequence, regulation of the System throughout the fall and winter months is predicated on the achievement of a March 1 System storage level at or below the base of the Annual Flood Control and Multiple Use Zone. All runoff scenarios studied for this AOP will begin the March 1, 2020 runoff season with System storage at or below the desired 56.1 MAF base of the Annual Flood Control and Multiple Use Zone. Therefore, the entire System flood control storage of 16.3 MAF, (11.6 MAF in the Annual Flood Control and Multiple Use Zone and 4.7 MAF in the Exclusive Flood Control Zone) will be available to store runoff.

To the extent practical, the System is regulated to prevent damaging flows in the river reaches between and below the Mainstem dams. In 2020, the full capacity of the System will be available to capture a significant volume of runoff originating from the upper basin and meter it out over an extended period of time at a rate that does not contribute to flooding in the river reaches between and below the reservoirs. Additionally, the reservoir system will have the capacity to reduce releases and hold back water during periods of high runoff below the System to reduce peak stages and discharges on the lower river. The ability to significantly reduce peak stages on the lower river diminishes at locations further downstream due to the large uncontrolled drainage area and travel time from the dam.

The base of the Exclusive Flood Control Zone defines the maximum level of storage that will be accumulated for purposes other than flood control. When the Exclusive Flood Control Zone at a particular reservoir is encroached upon, the control of subsequent flood inflows becomes the dominant factor. During such periods, releases may substantially exceed the powerplant release capacity with the evacuation rate of any project dependent upon existing flood conditions, the potential for further inflows, and conditions of other reservoirs in the System. Maximum release rates at such times are based upon the Master Manual flood control criteria, the flood control status of the System, and the critical need to preserve the integrity of the dams. Detailed information regarding the adjustments of releases for flood control evacuation and downstream flood control constraints can be found in Chapter 7 of the Master Manual.

Due to release limitations imposed by the formation of downstream ice cover, a major portion of the required flood control space must be evacuated prior to the winter season. Higher releases may be made on occasions when the downstream channel conditions permit. If plains and/or mountain snowpack accumulations are much above normal during the winter of 2019-2020, and studies indicate that available storage in the Carryover Multiple Use Zone as well as the Annual Flood Control and Multiple Use Zone will be fully utilized, releases may be adjusted to the extent reasonably possible to evacuate water from the reservoir system early in the runoff season. High releases

during the late winter and early spring periods may exacerbate localized flooding if coincident with plains snowmelt or spring rains, and may also contribute to significant ice jam flooding. Therefore, if higher than normal releases are indicated, local conditions will need to be closely monitored. In addition, all 2020 runoff that is stored in the flood control zones will be evacuated prior to the start of the 2021 runoff season.

B. Water Supply and Water Quality Control. Water supply problems at intakes located in the river reaches both between and below the Mainstem dams and in the reservoirs are related primarily to intake elevations or river access rather than inadequate water supply. In emergency situations, short-term adjustments to protect human health and safety would be considered to keep intakes operational.

Low reservoir levels during the 2000-2007 drought contributed to both intake access and water quality problems for intakes on Garrison and Oahe reservoirs, including several Tribal intakes. A return to more normal reservoir elevations has eliminated concern over many of these intakes. If the drought conditions return, reservoir pool levels and releases may decline renewing the potential for intake access and water quality problems at both river and reservoir intakes. Under the Lower Decile runoff scenario, minimum reservoir levels in 2020 would be at least 22 feet higher than the record lows set in the 2000-2007 drought. Although not below the critical shut-down elevations for any intake, a return to lower reservoir levels would require extra monitoring to ensure the continued operation of the intakes.

Winter releases are determined based on the September 1 System storage check. The winter season extends from December through February and flows are provided during this time to support the Congressionally authorized project purposes of hydropower production and downstream water supply and water quality. Per the Master Manual, if September 1 System storage is 55.0 MAF or less, the winter release from Gavins Point will be 12,000 cfs. Planned winter release rates of 12,000 cfs may be less than required for downstream water supply intakes without sufficient incremental tributary flows below the System. Should that occur, releases may need to be set higher to ensure that downstream water supply intakes are operable. In 2012-2013, winter releases were set at 14,000 cfs rather than 12,000 cfs due to channel degradation and low incremental tributary flows below the System. Improved tributary flows in future winters would facilitate releases reaching the target level of 12,000 cfs. While the Master Manual indicates that the water control plan's purpose is to meet water supply requirements in river reaches downstream of the reservoirs to the extent reasonably possible, the Corps believes the minimum winter release of 12,000 cfs presented in the Master Manual represents a reasonable long-term goal for water intake operability and for owners to strive for as they make improvements to their facilities. A letter was sent to intake owners in the spring of 2013 informing them of the Master Manual criteria and encouraging them to take necessary action to ensure their intakes are able to operate at reduced release rates. Coordination with intake owners will continue prior to and

during the low release periods. In addition, it may be necessary at times to temporarily increase Gavins Point releases to provide adequate downstream flows during periods when excessive river ice formation is forecast or if ice jams or blockages form which temporarily restrict flow. Based on past experiences, these events are expected to occur infrequently and be of short duration.

Based on the studies included in this AOP, the scheduled winter System release for 2019-2020 will range from 20,000 cfs to 22,000 cfs. As shown in ***Table V***, 2020-2021 winter releases of 20,000 cfs would be made for the Upper Decile and Upper Quartile runoff scenarios, 17,000 cfs for Median, and 12,500 cfs under Lower Quartile and Lower Decile runoff scenarios. The additional 500 cfs on Lower Quartile and Lower Decile reflects how the Corps, when conditions warrant, temporarily increases Gavins Point releases during extreme cold periods to inhibit the formation of ice jams in the lower river reach.

During non-navigation open water periods in the spring and fall the Master Manual includes System releases as low as 9,000 cfs as a water conservation measure provided that enough downstream tributary flow exists to allow for continued operation of downstream water intakes. If a non-navigation year would occur in the future, summer releases (May through August) could average around 18,000 cfs from the System. However, it should be noted that System releases will be set at levels that meet the operational requirements of water intakes to the extent reasonably possible. Problems have occurred at several downstream intakes in the past, however in all cases the problems have been associated with access to the river or reservoir rather than insufficient water supply. In addition, the low summer release rate would likely result in higher water temperatures in the river, which could impact a powerplant's ability to meet their thermal discharge permits. Again, it should be noted that System releases will be set at levels that allow the downstream powerplant to meet their thermal discharge permit requirements to the extent reasonably possible. This may mean that actual System releases in the hottest part of the summer period may be set well above the 18,000 cfs level. The Corps continues to encourage intake operators between and below the mainstem dams to make necessary modifications to their intakes to allow efficient operation over the widest possible range of hydrologic conditions. While the current level of System storage should allow adequate access for all intakes during the coming year, intake operators that have experienced difficulty with access during the past drought years should continue to make adjustments to improve access and flexibility when drought returns to the basin.

C. <u>Irrigation</u>. Scheduled releases from the System reservoirs will be sufficient to meet the volumes of flow required for irrigation diversions from the Missouri River. Some access problems may be experienced, however, if Lower Quartile or Lower Decile runoff conditions return. Below Fort Peck, localized dredging may once again be required in the vicinity of irrigation intakes in order to maintain access to the water if

releases are low next summer. Intake access problems are the responsibility of the intake owner and the Corps will not guarantee access, only that the supply of water in the Missouri River is adequate to meet this project purpose. Fort Peck releases may be adjusted during the irrigation season to provide more consistent flows at downstream locations as tributary flows vary. Tributary irrigation water usage is fully accounted for in the estimates of water supply.

D. Navigation. The anticipated service level and season length for all runoff conditions simulated are shown in ***Table V***. Service to navigation in 2020 from the beginning of the navigation season through the July 1 storage check will be at full service for all runoff scenarios. After the July 1 storage check, Lower Quartile and higher runoff scenarios indicate at least full service to navigation. The July 1 storage check indicates 600 cfs below full service for the Lower Decile runoff scenario. In addition, the Upper Decile and Upper Quartile runoff scenarios indicate a 10-day extension to the navigation season based on the July 1 storage check. Median and below runoff indicates a full length navigation season. Although the AOP simulations provide a comparison of typical flow support under varying runoff conditions, the actual rate of flow support for the 2020 navigation season will be based on actual System storage on March 15 and July 1, 2020.

E. Power. ***Table VI*** and ***Table VII*** indicate the estimated monthly System load requirements and hydropower supply of the Eastern Division, Pick-Sloan Missouri Basin Program (P-S MBP), from August 2019 through December 2020. Estimates of monthly peak demands and energy include customer requirements for firm, short-term firm, summer firm, peaking, and various other types of power sales, System losses, and the effects of diversity. Also included in the estimated requirements are deliveries of power to the Western Division, P-S MBP, to help meet its firm power commitments. Under the Median runoff scenario, annual generation in 2020 is estimated to be 9.9 million MWh, 105 percent of the 1967-2018 average.

TABLE VI
PEAKING CAPABILITY AND SALES
(1,000 kW at plant)

2019	Estimated Committed Sales*	Expected C of E Capability					Expected Bureau Capability**					Expected Total System Capability				
		U.B.	Basic	L.B.			U.B.	Basic	L.B.			U.B.	Basic	L.B.		
Aug	2209	2428	2425	2422			201	199	199			2629	2624	2621		
Sep	2016	2398	2398	2404			201	199	198			2599	2597	2602		
Oct	1876	2360	2366	2376			200	199	198			2560	2565	2574		
Nov	1982	2310	2314	2329			199	198	197			2509	2512	2526		
Dec	2111	2286	2293	2309			196	195	195			2482	2488	2504		
2020																
Jan	2123	2295	2300	2309			192	192	192			2487	2492	2501		
Feb	2106	2312	2315	2316			189	190	191			2501	2505	2507		
		U.D.	U.Q.	Med	L.Q.	L.D.	U.D.	U.Q.	Med	L.Q.	L.D.	U.D.	U.Q.	Med	L.Q.	L.D.
Mar	2041	2429	2422	2413	2407	2406	188	188	189	190	190	2617	2610	2602	2597	2596
Apr	1910	2451	2441	2419	2399	2396	180	180	187	190	190	2631	2621	2606	2589	2586
May	1879	2468	2457	2424	2394	2390	182	182	191	193	193	2650	2639	2615	2587	2583
Jun	2084	2485	2479	2450	2406	2396	198	198	195	194	194	2683	2677	2645	2600	2590
Jul	2194	2479	2475	2448	2394	2372	201	201	201	190	190	2680	2676	2649	2584	2562
Aug	2222	2459	2457	2431	2369	2345	199	199	199	190	188	2658	2656	2630	2559	2533
Sep	2017	2445	2445	2422	2354	2327	200	199	199	191	189	2645	2644	2621	2545	2516
Oct	1875	2419	2422	2404	2331	2303	200	199	199	193	192	2619	2621	2603	2524	2495
Nov	1979	2378	2383	2369	2293	2265	198	198	199	193	192	2576	2581	2568	2486	2457
Dec	2107	2335	2339	2331	2257	2226	191	192	196	192	191	2526	2531	2527	2449	2417

* Estimated sales, including system reserves. Power in addition to hydro production needed for these load requirements will be obtained from other power systems by interchange or purchase.
** Total output of Canyon Ferry and 1/2 of the output of Yellowtail powerplant.

TABLE VII
ENERGY GENERATION AND SALES
(Million kWh at plant)

2019	Estimated Committed Sales*	Expected C of E Generation					Expected Bureau Generation **					Expected Total System Generation				
		U.B.	Basic	L.B.			U.B.	Basic	L.B.			U.B.	Basic	L.B.		
Aug	858	1568	1552	1523			96	87	76			1664	1639	1599		
Sep	745	1531	1470	1243			86	75	60			1617	1545	1303		
Oct	741	1543	1393	1154			83	68	57			1626	1461	1211		
Nov	808	1429	1305	1094			75	63	53			1504	1368	1147		
Dec	913	877	818	741			77	69	55			954	887	796		
2020																
Jan	929	834	795	772			76	68	49			910	863	821		
Feb	897	757	728	711			70	59	45			827	787	756		
		U.D.	U.Q.	Med	L.Q.	L.D.	U.D.	U.Q.	Med	L.Q.	L.D.	U.D.	U.Q.	Med	L.Q.	L.D.
Mar	814	647	656	653	657	669	77	77	64	48	48	724	733	717	705	717
Apr	767	769	717	758	832	837	95	95	65	43	43	864	812	823	875	880
May	718	1067	913	893	980	972	99	99	88	46	46	1166	1012	981	1026	1018
Jun	778	1263	1093	961	1008	992	97	97	96	46	46	1360	1190	1057	1054	1038
Jul	846	1469	1326	1037	1080	1043	100	100	78	56	54	1569	1426	1115	1136	1097
Aug	859	1470	1328	1074	1077	1039	97	90	75	54	52	1567	1418	1149	1131	1091
Sep	748	1350	1197	925	935	907	89	82	70	51	49	1439	1279	995	986	956
Oct	743	1241	1065	752	770	755	89	81	71	50	49	1330	1146	823	820	804
Nov	809	1217	1043	661	656	638	90	84	69	48	45	1307	1127	730	704	683
Dec	914	838	804	640	557	550	91	86	71	49	47	929	890	711	606	597
CY TOT		12922	11733	9877	10035	9885	1072	1039	873	584	573	13994	12772	10750	10619	10458

* Estimated sales including system reserves and losses. Power in addition to hydro production needed for these load requirements will be obtained from other systems by interchange or purchase.
** Total output Canyon Ferry and 1/2 output of Yellowtail powerplant.

F. Recreation, Fish and Wildlife. The regulation of the System will continue to provide recreation and fish and wildlife opportunities in the project areas and along the Missouri River as well as other benefits of a managed system. Recreation access is expected to be near normal levels in 2020. If Lower Quartile or Lower Decile runoff were to occur in 2020, boat ramps that were lowered and low water ramps that were constructed during the two recent drought periods will provide adequate reservoir access. Special regulation adjustments incorporating specific objectives for these purposes will be made to the extent reasonably possible. Overall conditions should be favorable for the many visitors who enjoy the camping, boating, fishing, hunting, swimming, picnicking, and other recreational activities associated with the System reservoirs.

The effects of the simulated System regulation during 2020 on fish and wildlife are included in Chapter VI, Section F, entitled, "Regulation Activities for T&E Species and Fish Propagation Enhancement."

G. Historic and Cultural Properties. As mentioned in Chapter VI of this AOP, the regulation of the System during 2019 and 2020 will expose cultural sites due to erosion from the normal fluctuation of pool elevations. The Corps will work with the Tribes utilizing 36 CFR Part 800 and the PA to address the exposure of these sites. The objective of a programmatic agreement is to deal "…with the potential adverse effects of complex projects or multiple undertakings…" The PA objective was to collaboratively develop a preservation program that would avoid, minimize and/or mitigate the adverse effects of the System operation. All tribes, whether signatory to the PA or not, may request government-to-government consultation on the regulation of the System and the resulting effect on historic and cultural properties and other resources.

The planned preservation program for this AOP is outlined by multiple stipulations in the PA. One of the stipulations, or program components, is the Five-Year Plan. This plan outlines how the Corps will accomplish its responsibilities under the PA and the National Historic Preservation Act. The "Cultural Resource Program Final Five Year Plan, dated February 2012" (see http://www.nwo.usace.army.mil/Missions/CivilWorks/CulturalResources.aspx) is currently being implemented. The plan includes inventory, testing and evaluation, mitigation and other specific activities that will allow the Corps to avoid, minimize and/or mitigate the adverse effects to cultural sites on Corps lands within the System. Many of the actions listed in the plan are within the elevation ranges that will occur with the implementation of the Master Manual criteria in 2019 and 2020. Two critical components of the Five-Year Plan that are applicable to this AOP are monitoring and mitigation, which will be briefly discussed in the following paragraphs.

First, a collaboratively developed plan, entitled "Final Cultural Resource Monitoring Plan, dated June 2014" (see http://www.nwo.usace.army.mil/Missions/CivilWorks/CulturalResources.aspx) is in place. This monitoring plan outlines the sites that require monitoring and specifies a frequency for monitoring. The Corps is strategically monitoring sites, including those sites within the potential operating pool elevations, to document the effects of the implementation of the 2019-2020 AOP. Specific sites are identified in the draft Monitoring and Enforcement Plan for the monitoring team, comprised of Corps rangers and Tribal monitors, to visit and document impacts. This focused monitoring is resulting in more accurate data on the current impacts to sites along the river plus it is assisting with the identification of sites for mitigation. The most recent training for the monitoring teams was held in July 2019, and the most recent Archeological Resources Protection Act training was held in April of 2018.

Second, mitigation or protection of sites that are being adversely impacted continues. During the reporting period for the 2018 Annual Report by the Corps on the implementation of the Programmatic Agreement, 8 sites were either completed, started, or in the design phase. The annual report is available at http://www.nwo.usace.army.mil/Missions/CivilWorks/CulturalResources.aspx.

Results expected from the proposed monitoring and mitigation actions include more accurate horizontal and vertical data on existing cultural sites, detailed impact data, proactive protection and preservation of sites. The effects of the simulated System regulation during 2019-2020 on cultural sites are included in the Chapter VI, section G., entitled, "Regulation Activities for Historic and Cultural Properties."

H. System Storage. If the August 1, 2019 Basic runoff forecast verifies, System storage will decline to 56.5 MAF by the end of 2019. This would be 22.6 MAF higher than the record low System storage of 33.9 MAF set on February 9, 2007 and 0.3 MAF less than the 2018 end-of-year storage. This end-of-year storage is 3.5 MAF more than the 1967-2018 average. The lowest storage during the 1988-1992 drought was 40.8 MAF in January 1991, and the record low storage was set during the 2000-2007 drought at 33.9 MAF in February 2007. The end-of-year System storages have ranged from a maximum of 60.9 MAF in 1975 to the 2006 minimum of 34.4 MAF. Forecasted System storage on December 31, 2020 is presented in ***Table VIII*** for the runoff scenarios simulated.

TABLE VIII
ANTICIPATED DECEMBER 31, 2020 SYSTEM STORAGE

Water Supply Condition	Total (12/31/20)	Carryover Storage Remaining 1/	Unfilled Carryover Storage 2/	Total Change CY 2020
	(Volumes in 1,000 Acre-Feet)			
Upper Decile	56,200	38,500	0	0
Upper Quartile	56,400	38,500	0	200
Median	55,500	37,900	600	-600
Lower Quartile	50,200	32,600	5,900	-6,800
Lower Decile	47,900	30,300	8,200	-9,100

1/ Net usable storage above 17.6 MAF System minimum pool level established for power, recreation, irrigation diversions, and other purposes.

2/ System base of Annual Flood Control and Multiple Use Zone containing 56.1 MAF.

I. Summary of Water Use by Functions. Anticipated water use in CY 2019, under the regulation plan with the Basic forecast of water supply is shown in ***Table IX***. Under the reservoir regulation simulations in this AOP, estimated water use in CY 2020 also is shown in ***Table IX.*** Actual water use data for CY 2018 are included for information and comparison.

TABLE IX
MISSOURI RIVER MAINSTEM SYSTEM
WATER USE FOR CALENDAR YEARS 2018, 2019, AND 2020 ABOVE SIOUX CITY, IOWA
in Million Acre-Feet (MAF)

		CY 2018 Actual	CY 2019 Basic Simulation	Simulations for Calendar Year 2020 Upper Decile	Upper Quartile	Median	Lower Quartile	Lower Decile
Upstream Depletions	(1)							
Irrigation, Tributary Reservoir Evaporation & Other Uses		2.9	2.0					
Tributary Reservoir Storage Change		0.1	-0.1					
Total Upstream Depletions		3.0	1.9	3.0	2.9	3.1	3.2	3.0
System Reservoir Evaporation	(2)	3.0	2.7	1.2	1.2	1.8	2.1	2.0
Sioux City Flows								
Navigation Season								
Unregulated Flood Inflows Between Gavins Point & Sioux City	(3)	0.5	2.0					
Navigation Service Requirement	(4)	15.2	15.2	16.7	16.3	15.9	16.3	15.8
Supplementary Releases								
T&E Species	(5)	0.0	0.0	0.3	0.3	0.3	0.3	0.3
Flood Evacuation	(6)	14.3	24.9	8.1	4.7	0.0	0.0	0.0
Non-navigation Season								
Flows		4.3	4.3	4.7	4.6	4.5	4.2	4.1
Flood Evacuation Releases	(7)	1.5	2.2	0.5	0.4	0.0	0.0	0.0
System Storage Change		0.3	-0.3	0.0	0.2	-1.0	-6.8	-9.1
Total		42.1	52.9	34.5	30.6	24.6	19.3	16.1
Project Releases								
Fort Peck		9.3	8.2	8.6	7.9	6.7	6.5	6.5
Garrison		24.6	21.5	20.9	19.0	16.2	15.8	15.1
Oahe		25.3	27.9	23.9	21.2	17.5	18.8	19.5
Big Bend		23.1	27.8	23.9	21.1	17.4	18.7	18.7
Fort Randall		26.2	32.3	25.2	22.2	18.9	18.9	18.9
Gavins Point		28.6	36.5	27.4	24.1	19.5	20.1	19.9

(1) Tributary uses above the 1949 level of development including agricultural depletions and tributary storage effects.
(2) Net evaporation is shown for 2020.
(3) Incremental inflows to reach which exceed those usable in support of navigation at the target level, even if Gavins Point releases were held to as low as 6,000 cfs.
(4) Estimated requirement for downstream water supply and water quality is approximately 6.0 MAF.
(5) Increased releases required for threatened and endangered species regulation.
(6) Includes flood control releases for flood control storage evacuation and releases used to extend the navigation season beyond the normal December 1 closing date at the mouth of the Missouri River.
(7) Releases for flood control storage evacuation in excess of a 17,000 cfs Gavins Point release.

VIII. TENTATIVE PROJECTION OF REGULATION THROUGH FEBRUARY 2026

(Not completed until final plan is adopted.)

USACE Mainstem Project
USACE Tributary Project
USBR SECTION 7 PROJECT
☆ **State Capitol**
-------- District Boundary

Missouri River Basin

U.S. ARMY ENGINEERS, NORTHWESTERN DIVISION
CORPS OF ENGINEERS, OMAHA, NEBRASKA
AUGUST 2011

PLATE 1. Missouri River Basin Map.

Summary of Engineering Data -- Missouri River Mainstem System

Item No.	Subject	Fort Peck Dam - Fort Peck Lake	Garrison Dam - Lake Sakakawea	Oahe Dam - Lake Oahe
1	Location of Dam	Near Glasgow, Montana	Near Garrison, ND	Near Pierre, SD
2	River Mile - 1960 Mileage	Mile 1771.5	Mile 1389.9	Mile 1072.3
3	Total & incremental drainage areas in square miles	57,500	181,400 (2) 123,900	243,490 (1) 62,090
4	Approximate length of full reservoir (in valley miles)	134, ending near Zortman, MT	178, ending near Trenton, ND	231, ending near Bismarck, ND
5	Shoreline in miles (3)	1520 (elevation 2234)	1340 (elevation 1837.5)	2250 (elevation 1607.5)
6	Average total & incremental inflow in cfs	10,200	25,600 15,400	28,900 3,300
7	Max. discharge of record near damsite in cfs	137,000 (June 1953)	348,000 (April 1952)	440,000 (April 1952)
8	Construction started - calendar yr.	1933	1946	1948
9	In operation (4) calendar yr.	1940	1955	1962
	Dam and Embankment			
10	Top of dam, elevation in feet msl	2280.5	1875	1660
11	Length of dam in feet	21,026 (excluding spillway)	11,300 (including spillway)	9,300 (excluding spillway)
12	Damming height in feet (5)	220	180	200
13	Maximum height in feet (5)	250.5	210	245
14	Max. base width, total & w/o berms in feet	3500, 2700	3400, 2050	3500, 1500
15	Abutment formations (under dam & embankment)	Bearpaw shale and glacial fill	Fort Union clay shale	Pierre shale
16	Type of fill	Hydraulic & rolled earth fill	Rolled earth filled	Rolled earth fill & shale berms
17	Fill quantity, cubic yards	125,628,000	66,500,000	55,000,000 & 37,000,000
18	Volume of concrete, cubic yards	1,200,000	1,500,000	1,045,000
19	Date of closure	24 June 1937	15 April 1953	3 August 1958
	Spillway Data			
20	Location	Right bank - remote	Left bank - adjacent	Right bank - remote
21	Crest elevation in feet msl	2225	1825	1596.5
22	Width (including piers) in feet	820 gated	1336 gated	456 gated
23	No., size and type of gates	16 - 40' x 25' vertical lift gates	28 - 40' x 29' Tainter	8 - 50' x 23.5' Tainter
24	Design discharge capacity, cfs	275,000 at elev 2253.3	827,000 at elev 1858.5	304,000 at elev 1644.4
25	Discharge capacity at maximum operating pool in cfs	230,000	660,000	80,000
	Reservoir Data (6)			
26	Max. operating pool elev. & area	2250 msl 245,000 acres	1854 msl 383,000 acres	1620 msl 386,000 acres
27	Max. normal op. pool elev. & area	2246 msl 240,000 acres	1850 msl 365,000 acres	1617 msl 362,000 acres
28	Base flood control elev & area	2234 msl 211,000 acres	1837.5 msl 308,000 acres	1607.5 msl 311,000 acres
29	Min. operating pool elev. & area	2160 msl 89,000 acres	1775 msl 125,000 acres	1540 msl 115,000 acres
	Storage allocation & capacity			
30	Exclusive flood control	2250-2246 971,000 a.f.	1854-1850 1,495,000 a.f.	1620-1617 1,107,000 a.f.
31	Flood control & multiple use	2246-2234 2,704,000 a.f.	1850-1837.5 4,211,000 a.f.	1617-1607.5 3,208,000 a.f.
32	Carryover multiple use	2234-2160 10,700,000 a.f.	1837.5-1775 12,951,000 a.f.	1607.5-1540 13,353,000 a.f.
33	Permanent	2160-2030 4,088,000 a.f.	1775-1673 4,794,000 a.f.	1540-1415 5,315,000 a.f.
34	Gross	2250-2030 18,463,000 a.f.	1854-1673 23,451,000 a.f.	1620-1415 22,983,000 a.f.
35	Reservoir filling initiated	November 1937	December 1953	August 1958
36	Initially reached min. operating pool	27 May 1942	7 August 1955	3 April 1962
37	Estimated annual sediment inflow	17,200 a.f./year 1073 yrs.	21,600 a.f./year 1,086 yrs.	14,800 a.f./year 1553 yrs.
	Outlet Works Data			
38	Location	Right bank	Right Bank	Right Bank
39	Number and size of conduits	2 - 24' 8" diameter (nos. 3 & 4)	1 - 26' dia. and 2 - 22' dia.	6 - 19.75' dia. upstream, 18.25' dia. downstream
40	Length of conduits in feet (8)	No. 3 - 6,615, No. 4 - 7,240	1529	3496 to 3659
41	No., size, and type of service gates	1 - 28' dia. cylindrical gate 6 ports, 7.6' x 8.5' high (net opening) in each control shaft	1 - 18' x 24.5' Tainter gate per conduit for fine regulation	1 - 13' x 22' per conduit, vertical lift, 4 cable suspension and 2 hydraulic suspension (fine regulation)
42	Entrance invert elevation (msl)	2095	1672	1425
43	Avg. discharge capacity per conduit & total	Elev. 2250 22,500 cfs - 45,000 cfs	Elev. 1854 30,400 cfs - 98,000 cfs	Elev. 1620 18,500 cfs - 111,000 cfs
44	Present tailwater elevation (ft msl)	2032-2036 5,000 - 35,000 cfs	1669-1677 15,000- 60,000 cfs	1422-1427 20,000-55,000 cfs
	Power Facilities and Data			
45	Avg. gross head available in feet (14)	194	161	174
46	Number and size of conduits	No. 1-24'8" dia., No. 2-22'4" dia.	5 - 29' dia., 24' penstocks	7 - 24' dia., imbedded penstocks
47	Length of conduits in feet (8)	No. 1 - 5,653, No. 2 - 6,355	1829	From 3,280 to 4,005
48	Surge tanks	PH#1: 3-40' dia., PH#2: 2-65' dia.	65' dia. - 2 per penstock	70' dia., 2 per penstock
49	No., type and speed of turbines	5 Francis, PH#1-2: 128.5 rpm, 1-164 rpm , PH#2-2: 128.6 rpm	5 Francis, 90 rpm	7 Francis, 100 rpm
50	Discharge cap. at rated head in cfs	PH#1, units 1&3 170', 2-140' 8,800 cfs, PH#2-4&5 170'-7,200 cfs	150' 41,000 cfs	185' 54,000 cfs
51	Generator nameplate rating in kW	1&3: 43,500; 2: 18,250; 4&5: 40,000	3 - 121,600, 2 - 109,250	112,290
52	Plant capacity in kW	185,250	583,300	786,030
53	Dependable capacity in kW (9)	181,000	388,000	534,000
54	Avg. annual energy, million kWh (12)	1,031	2,279	2,632
55	Initial generation, first and last unit	July 1943 - June 1961	January 1956 - October 1960	April 1962 - June 1963
56	Estimated cost September 1999 completed project (13)	$158,428,000	$305,274,000	$346,521,000

Summary of Engineering Data -- Missouri River Mainstem System

Big Bend Dam - Lake Sharpe	Fort Randall Dam - Lake Francis Case	Gavins Point Dam - Lewis & Clark Lake	Total	Item No.	Remarks
21 miles upstream Chamberlain, SD	Near Lake Andes, SD	Near Yankton, SD		1	(1) Includes 4,280 square miles of non-contributing areas.
Mile 987.4	Mile 880.0	Mile 811.1		2	
249,330 (1) 5,840	263,480 (1) 14,150	279,480 (1) 16,000		3	(2) Includes 1,350 square miles of non-contributing areas.
80, ending near Pierre, SD	107, ending at Big Bend Dam	25, ending near Niobrara, NE	755 miles	4	
200 (elevation 1420)	540 (elevation 1350)	90 (elevation 1204.5)	5,940 miles	5	(3) With pool at base of flood control.
28,900	30,000 1,100	32,000 2,000		6	
440,000 (April 1952)	447,000 (April 1952)	480,000 (April 1952)		7	(4) Storage first available for regulation of flows.
1959	1946	1952		8	(5) Damming height is height from low water to maximum operating pool. Maximum height is from average streambed to top of dam.
1964	1953	1955		9	
1440	1395	1234		10	
10,570 (including spillway)	10,700 (including spillway)	8,700 (including spillway)	71,596	11	(6) Based on latest available storage data.
78	140	45	863 feet	12	
95	165	74		13	(7) River regulation is attained by flows over low-crested spillway and through turbines.
1200, 700	4300, 1250	850, 450		14	
Pierre shale & Niobrara chalk	Niobrara chalk	Niobrara chalk & Carlile shale		15	(8) Length from upstream face of outlet or to spiral case.
Rolled earth, shale, chalk fill	Rolled earth fill & chalk berms	Rolled earth & chalk fill		16	
17,000,000	28,000,000 & 22,000,000	7,000,000	358,128,000 cu. yds	17	(9) Based on 8th year (1961) of drought drawdown (From study 8-83-1985).
540,000	961,000	308,000	5,554,000 cu. yds.	18	
24 July 1963	20 July 1952	31 July 1955		19	
Left bank - adjacent	Left bank - adjacent	Right bank - adjacent		20	(10) Affected by level of Lake Francis case. Applicable to pool at elevation 1350.
1385	1346	1180		21	
376 gated	1000 gated	664 gated		22	(11) Spillway crest.
8 - 40' x 38' Tainter	21 - 40' x 29' Tainter	14 - 40' x 30' Tainter		23	(12) 1967-2017 Average
390,000 at elev 1433.6	620,000 at elev 1379.3	584,000 at elev 1221.4		24	(13) Source: Annual Report on Civil Works Activities of the Corps of Engineers. Extract Report Fiscal Year 1999.
270,000	508,000	345,000		25	
1423 msl 62,000 acres	1375 msl 102,000 acres	1210 msl 29,000 acres	1,206,000 acres	26	(14) Based on Study 8-83-1985
1422 msl 60,000 acres	1365 msl 94,000 acres	1208 msl 25,000 acres	1,146,000 acres	27	(15) 67,275 kW on per unit basis 64,684 kW on facility basis
1420 msl 58,000 acres	1350 msl 76,000 acres	1204.5 msl 21,000 acres	984,000 acres	28	
1415 msl 51,000 acres	1320 msl 36,000 acres	1204.5 msl 21,000 acres	437,000 acres	29	
1423-1422 61,000 a.f.	1375-1365 986,000 a.f.	1210-1208 54,000 a.f.	4,674,000 a.f.	30	
1422-1420 118,000 a.f.	1365-1350 1,306,000 a.f.	1208-1204.5 79,000 a.f.	11,626,000 a.f.	31	
	1350-1320 1,532,000 a.f.		38,536,000 a.f.	32	
1420-1345 1,631,000 a.f.	1320-1240 1,469,000 a.f.	1204.5-1160 295,000 a.f.	17,592,000 a.f.	33	
1423-1345 1,810,000 a.f.	1375-1240 5,293,000 a.f.	1210-1160 428,000 a.f.	72,428,000 a.f.	34	
November 1963	January 1953	August 1955		35	
25 March 1964	24 November 1953	22 December 1955		36	
3,445 a.f./year 525 yrs.	15,800 a.f./year 334 yrs.	2,700 a.f./year 159 yrs.	75,545	37	
	Left Bank			38	
None (7)	4 - 22' diameter	None (7)		39	
	1013			40	
	2 - 11' x 23' per conduit, vertical lift, cable suspension			41	
1385 (11)	1229	1180 (11)		42	
	Elev 1375			43	
	32,000 cfs - 128,000 cfs				
1351-1355(10) 25,000-100,000 cfs	1228-1237 10,000-60,000 cfs	1153-1161 15,000-60,000 cfs		44	
70	117	48	764 feet	45	
None: direct intake	8 - 28' dia., 22' penstocks	None: direct intake		46	
	1,074		55,083	47	
None	59' dia, 2 per alternate penstock	None		48	
8 Fixed blade, 81.8 rpm	8 Francis, 85.7 rpm	3 Kaplan, 75 rpm	36 units	49	
67' 103,000 cfs	112' 44,500 cfs	48' 36,000 cfs		50	
67,275 (15)	40,000	44,100		51	
517,470	320,000	132,300	2,524,350 kw	52	
497,000	293,000	74,000	1,967,000 kw	53	Corps of Engineers, U.S. Army
982	1,720	726	9,369 million kWh	54	Compiled by
October 1964 - July 1966	March 1954 - January 1956	September 1956 - January 1957	July 1943 - July 1966	55	Northwestern Division
				56	Missouri River Region
$107,498,000	$199,066,000	$49,617,000	$1,166,404,000		August 2019

Plate 2

Plate 3
Summary of Master Manual Technical Criteria

NAVIGATION TARGET FLOWS

Location	Minimum Service (kcfs)	Full Service (kcfs)
Sioux City	25	31
Omaha	25	31
Nebraska City	31	37
Kansas City	35	41

RELATION OF SYSTEM STORAGE TO NAVIGATION SERVICE LEVEL

Date	System Storage (MAF)	Navigation Service Level
March 15	54.5 or more	35,000 cfs (full-service)
March 15	49.0 to 31	29,000 cfs (minimum-service)
March 15	31.0 or less	No navigation service
July 1	57.0 or more	35,000 cfs (full-service)
July 1	50.5 or less	29,000 cfs (minimum-service)

RELATION OF SYSTEM STORAGE TO NAVIGATION SEASON LENGTH

Date	System Storage (MAF)	Final Day of Navigation Support at Mouth of the Missouri River
July 1	51.5 or more	November 30 (8-month season)
July 1	46.8 through 41.0	October 31 (7-month season)
July 1	36.5 or less	September 30 (6-month season)

RELATION OF SYSTEM WINTER RELEASE TO SYSTEM STORAGE

September 1 System Storage (MAF)	Average Winter Release for Gavins Point
58.0 or more	17,000 cfs
55.0 or less	12,000 cfs

Plate 3 (cont'd)
Summary of Master Manual Technical Criteria

GAVINS POINT RELEASES NEEDED TO MEET TARGET FLOWS
1950 to 1996 Data (kcfs)

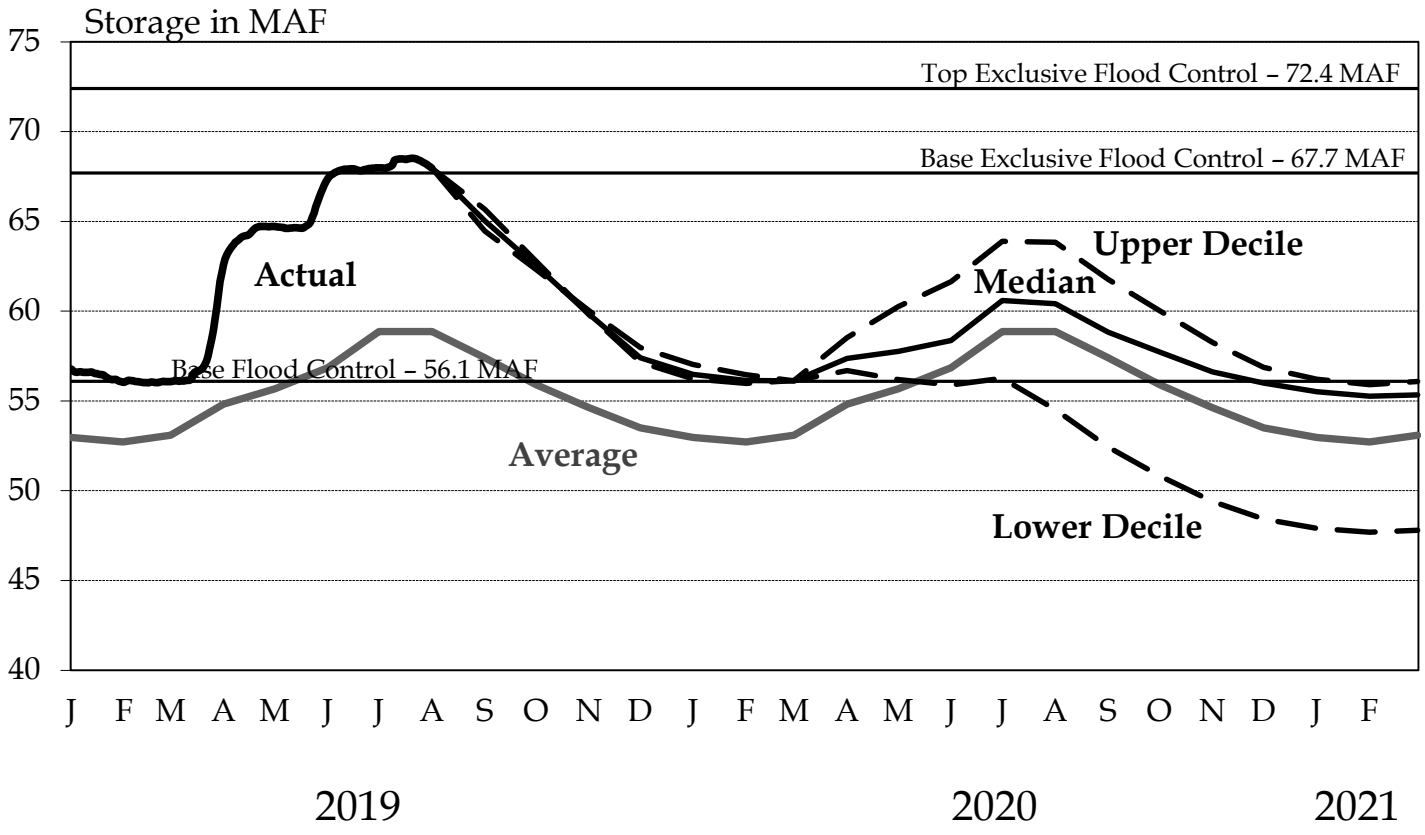
Median, Upper Quartile, Upper Decile Runoff

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Full Service	26.7	28.0	27.9	31.6	33.2	32.6	32.0	31.1
Minimum Service	20.7	22.0	21.9	25.6	27.2	26.6	26.0	25.1

Lower Quartile, Lower Decile Runoff

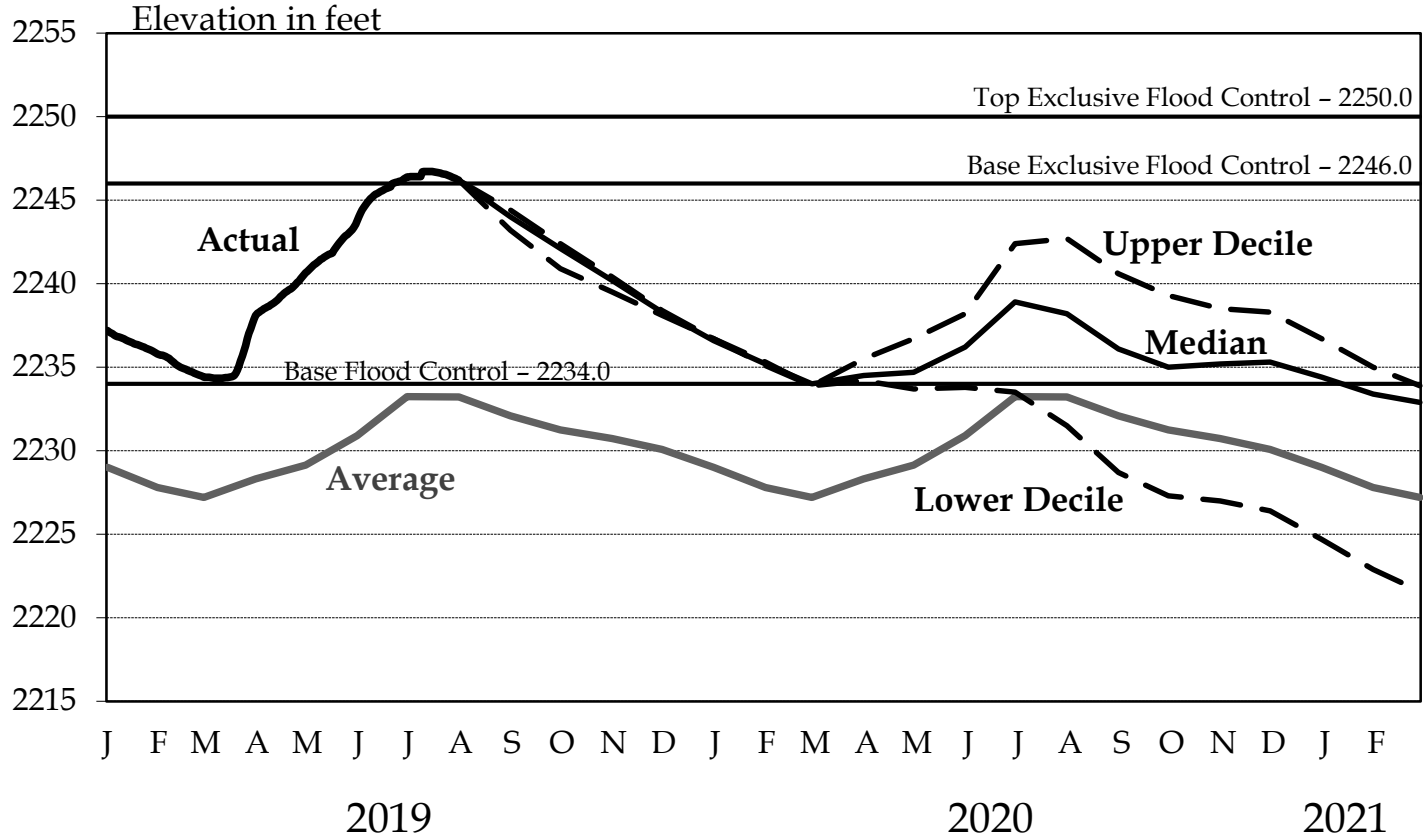
	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Full Service	29.8	31.3	31.2	34.3	34.0	33.5	33.1	31.2
Minimum Service	23.8	25.3	25.2	28.3	28.0	27.5	27.1	25.2

System Storage
2019-2020 Draft AOP



Average 1967-2018

Fort Peck
2019-2020 Draft AOP

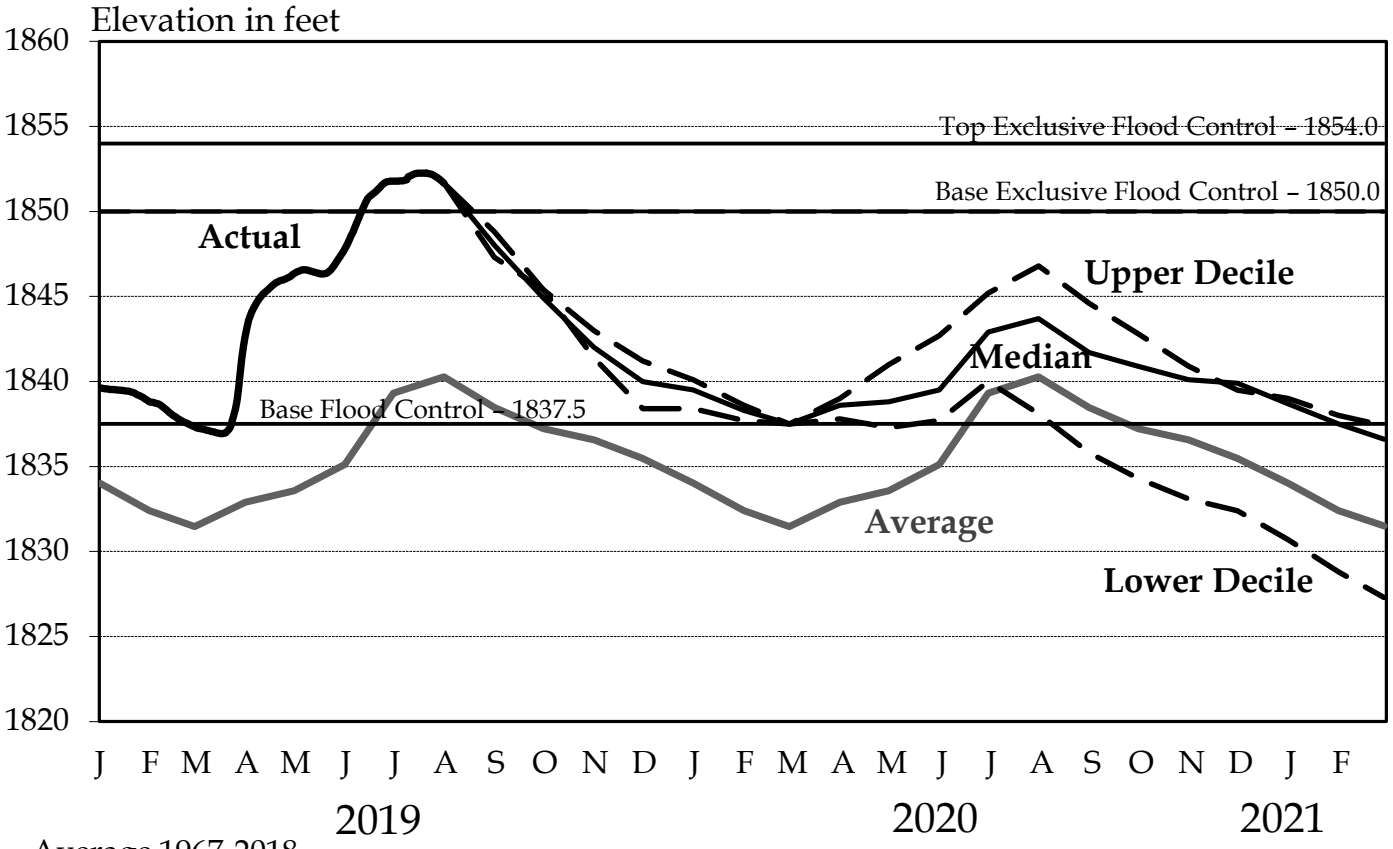


Average 1967-2018

Plate 4

Garrison

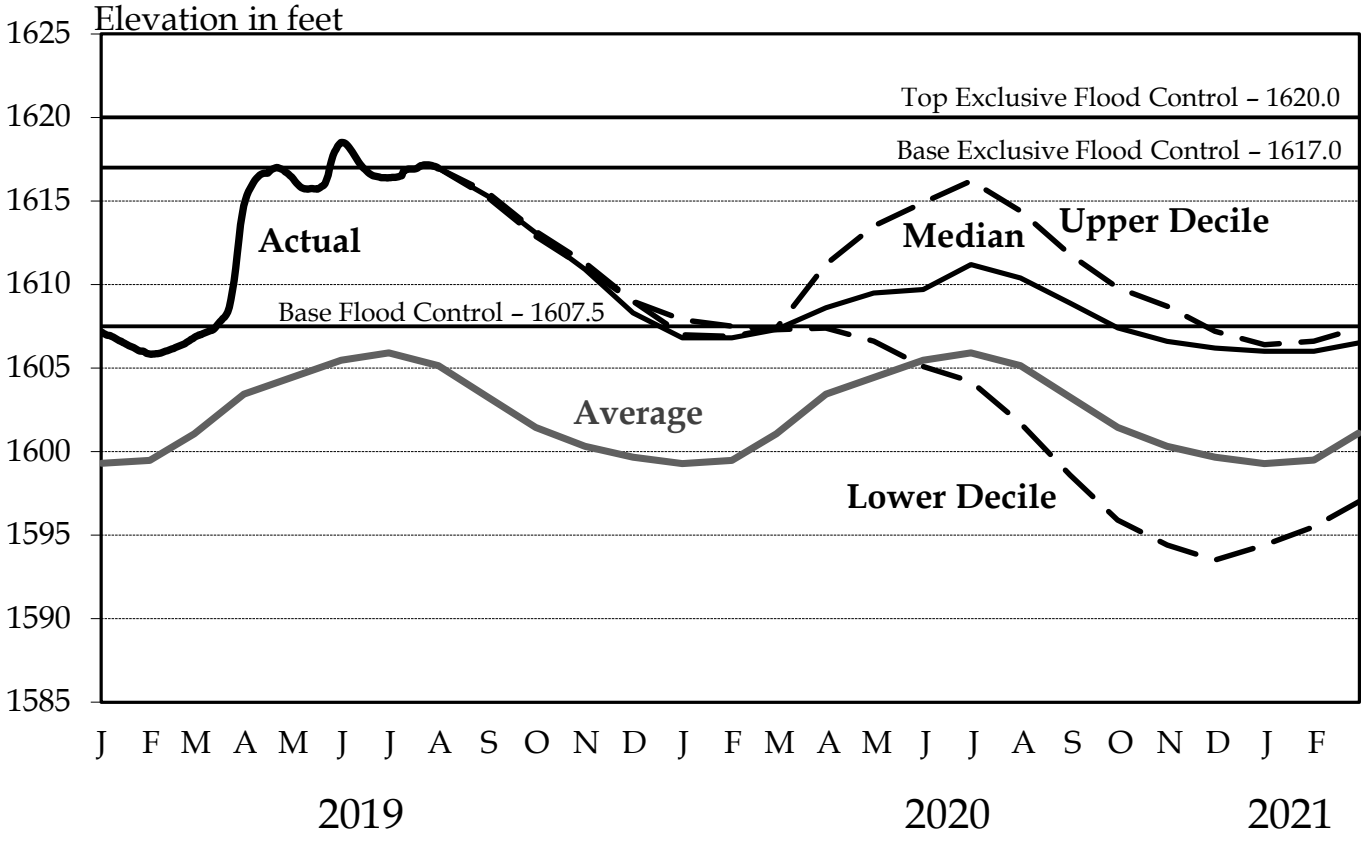
2019-2020 Draft AOP



Average 1967-2018

Oahe

2019-2020 Draft AOP



Average 1967-2018

Plate 5

System Storage

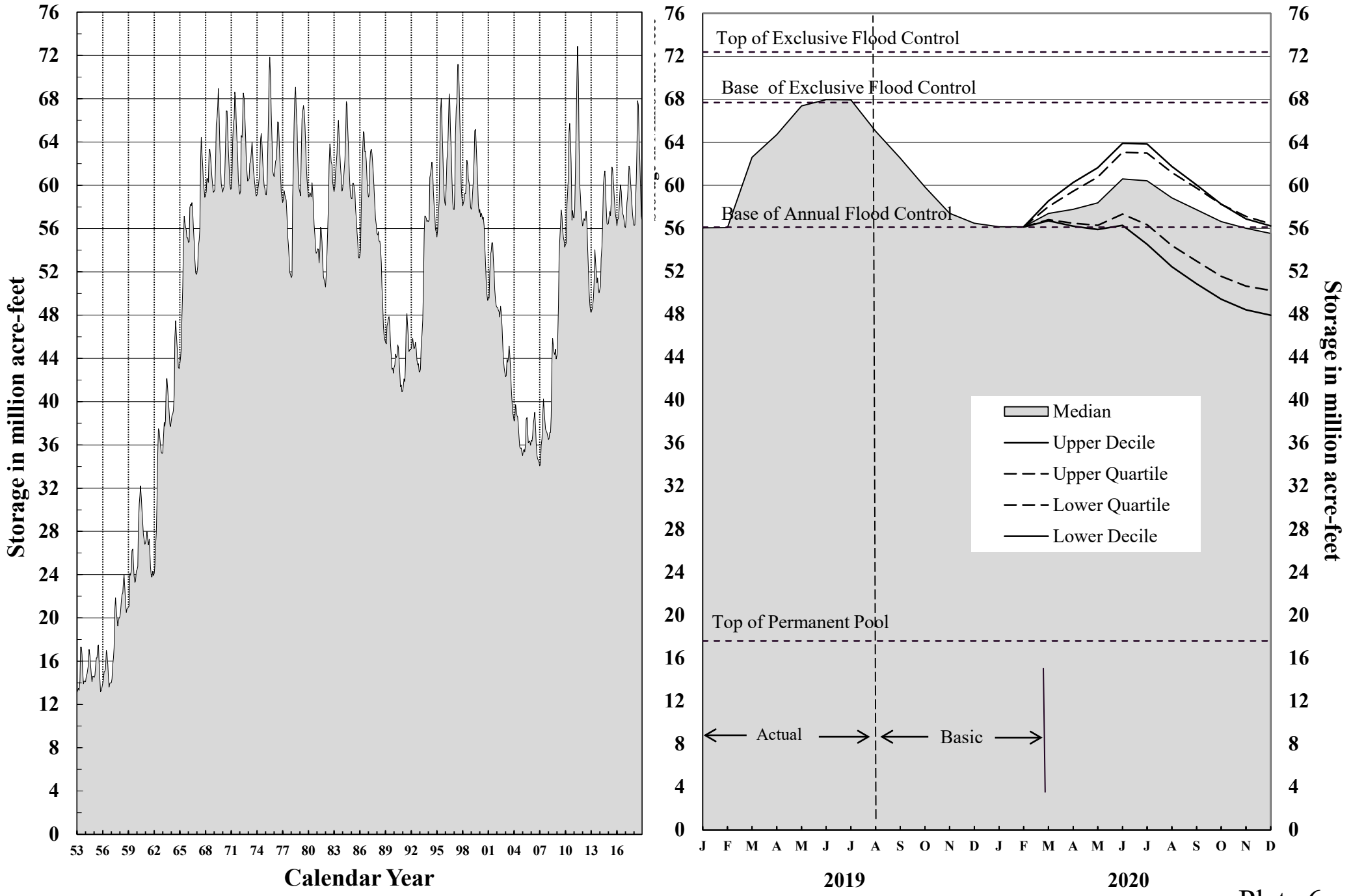


Plate 6

Gavins Point Releases

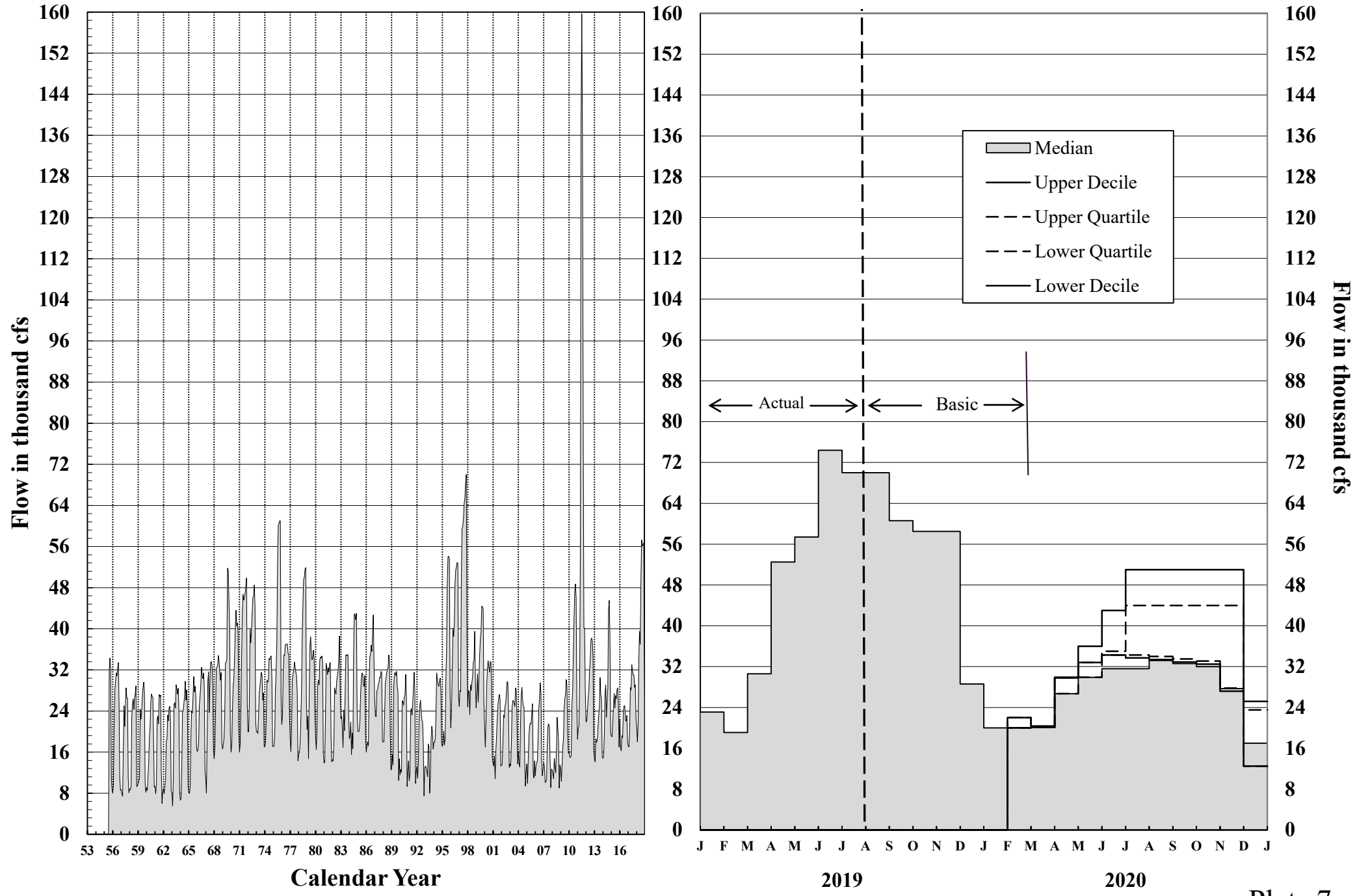
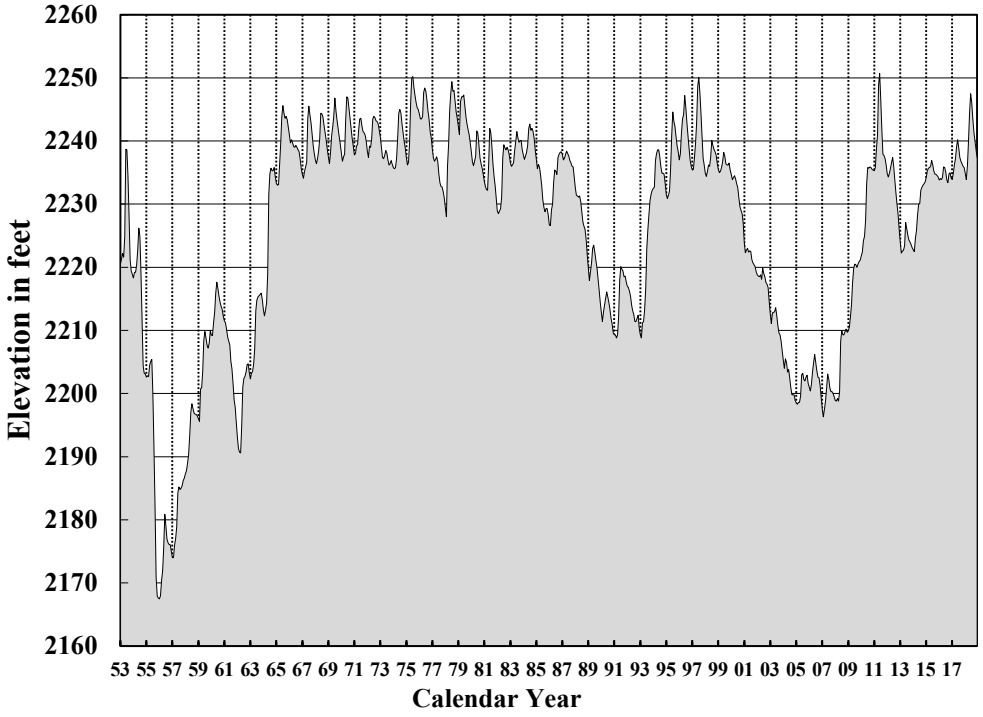
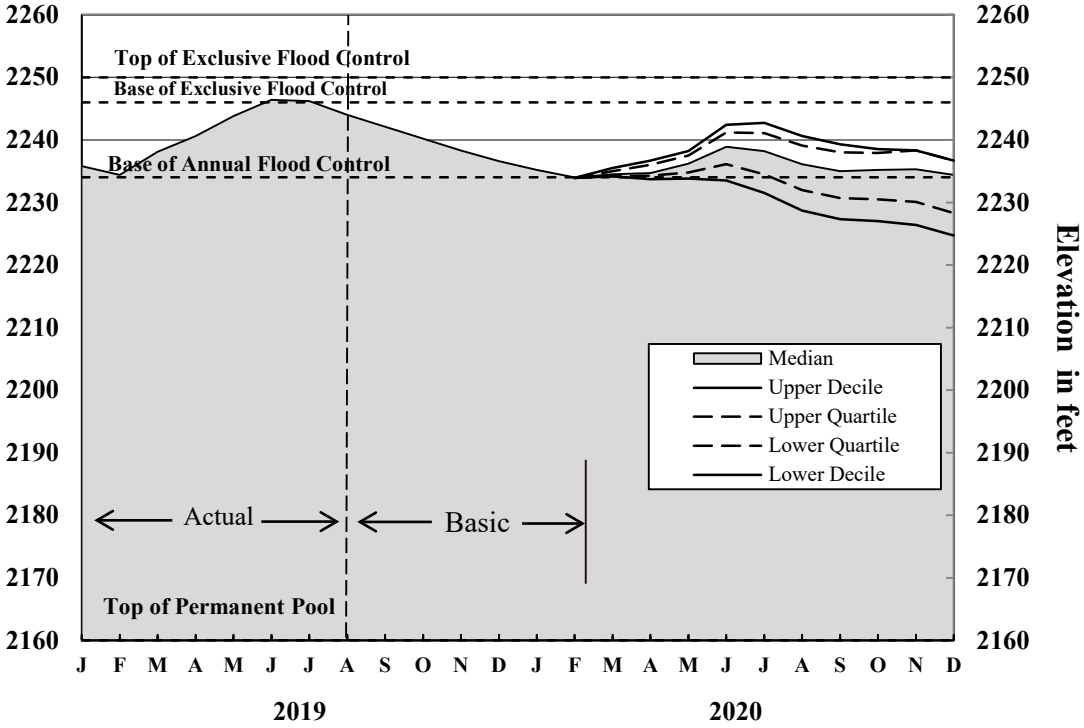
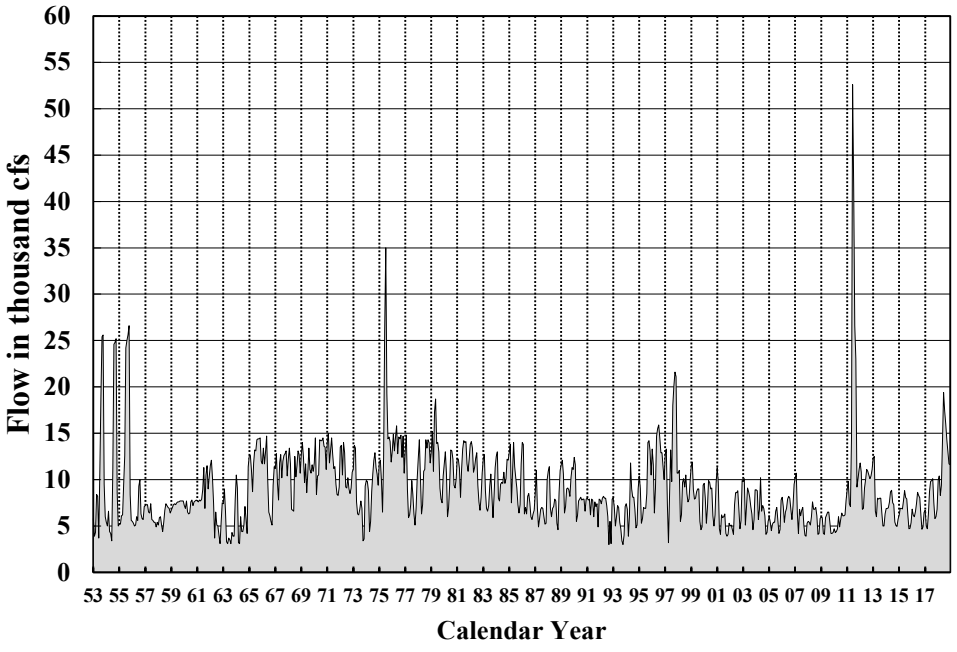


Plate 7

Fort Peck
Elevations and Releases







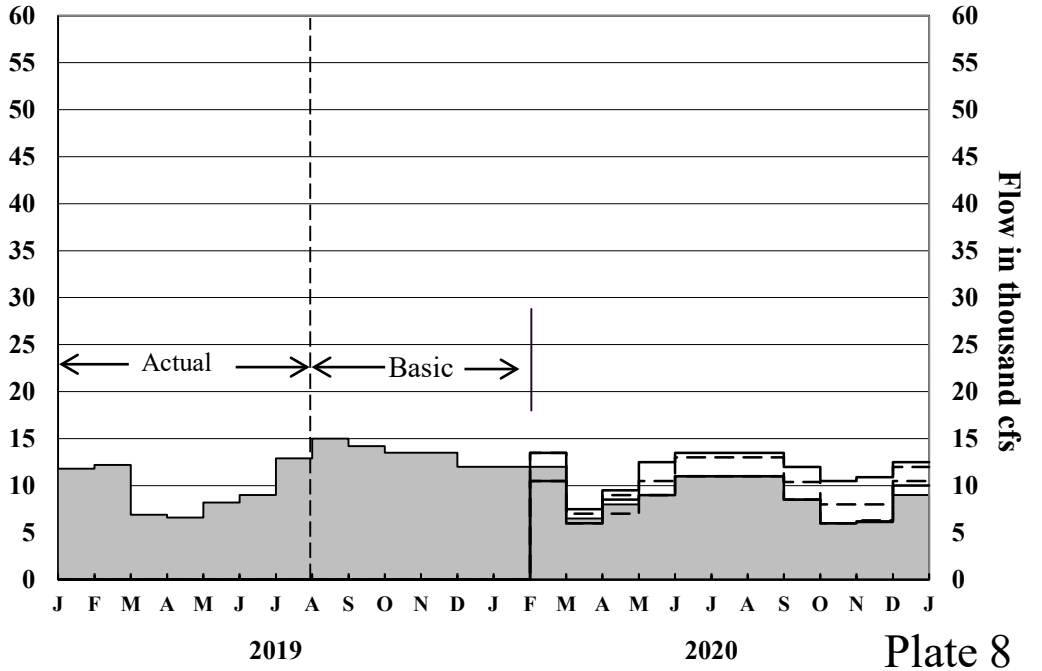
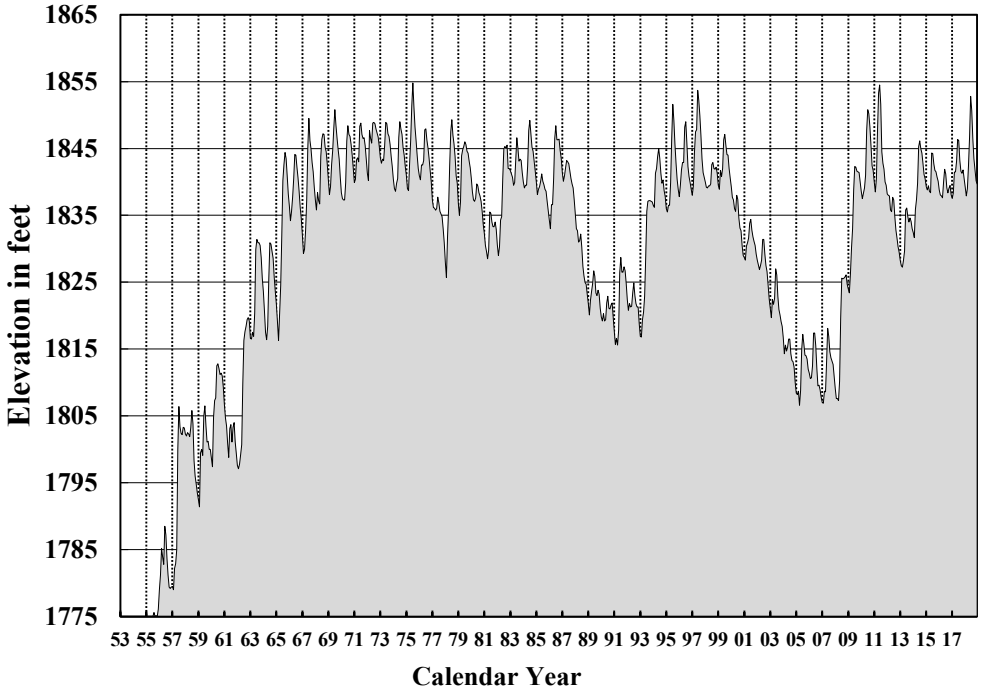
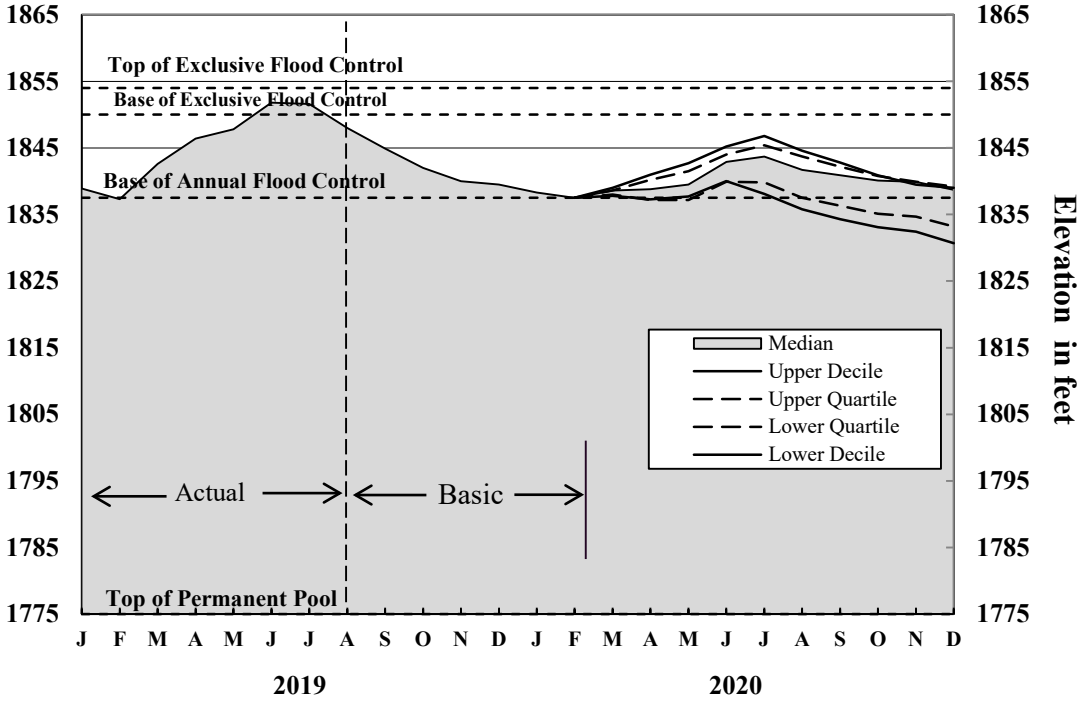
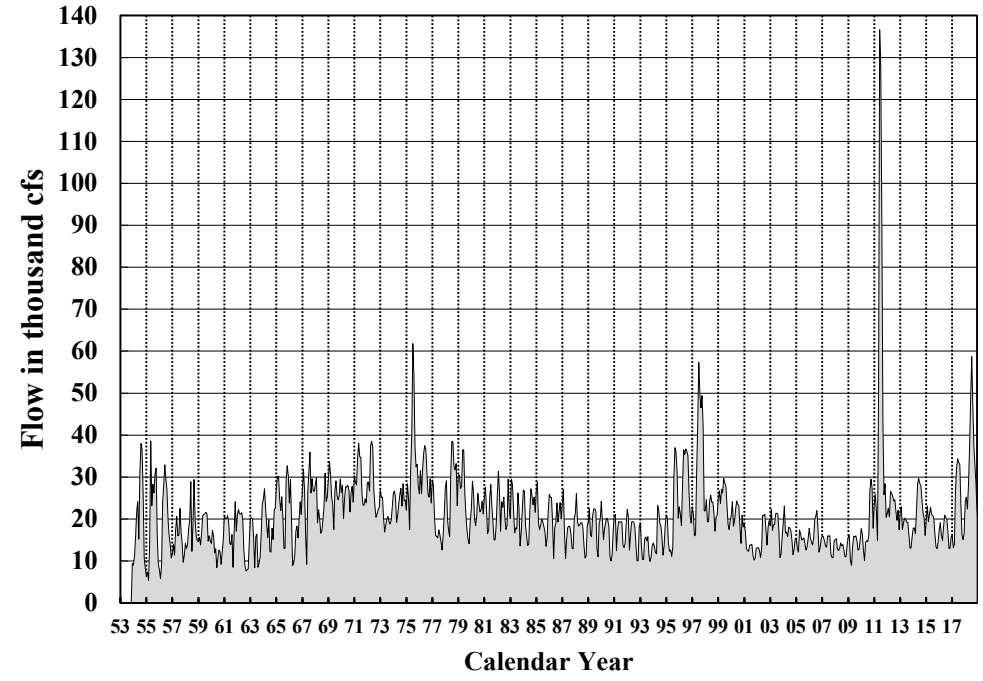


Plate 8

Garrison
Elevations and Releases







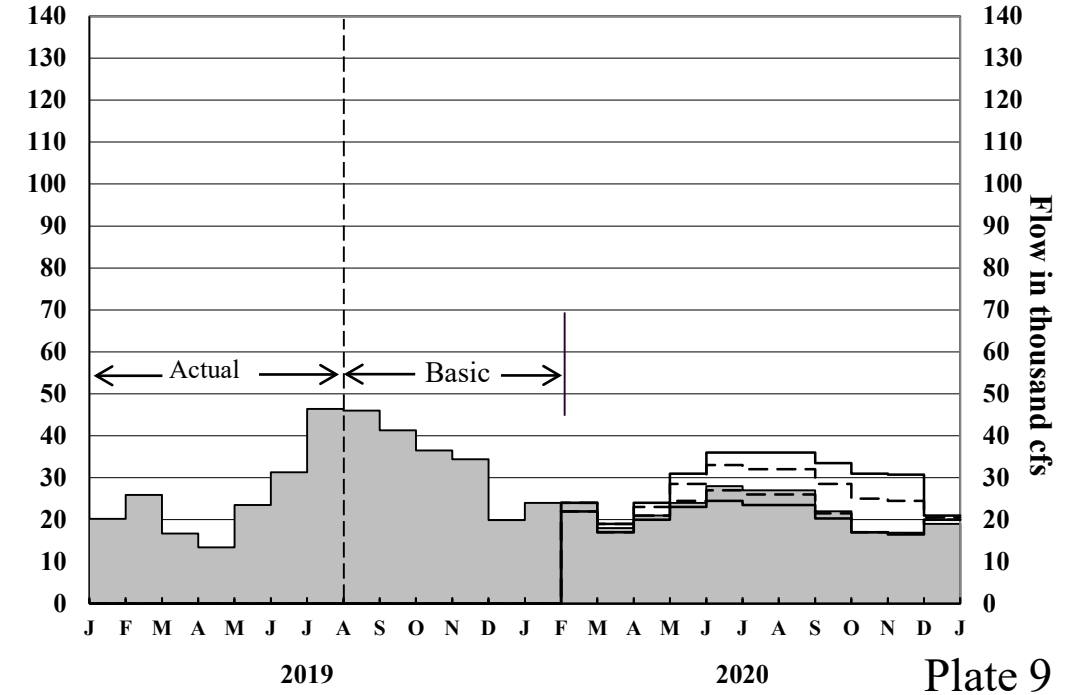
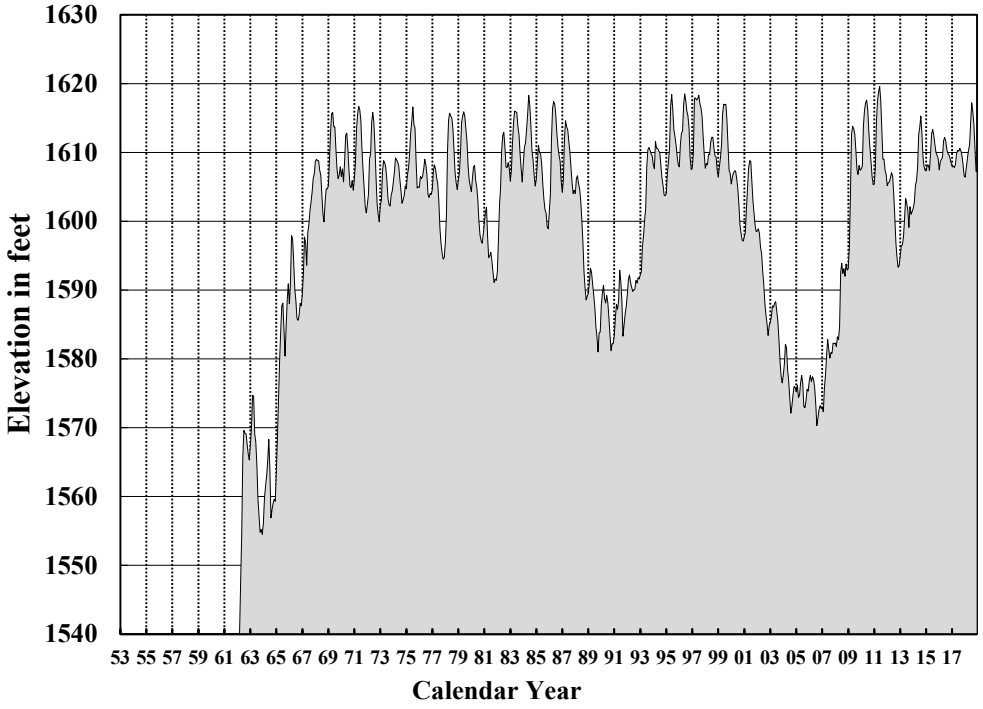
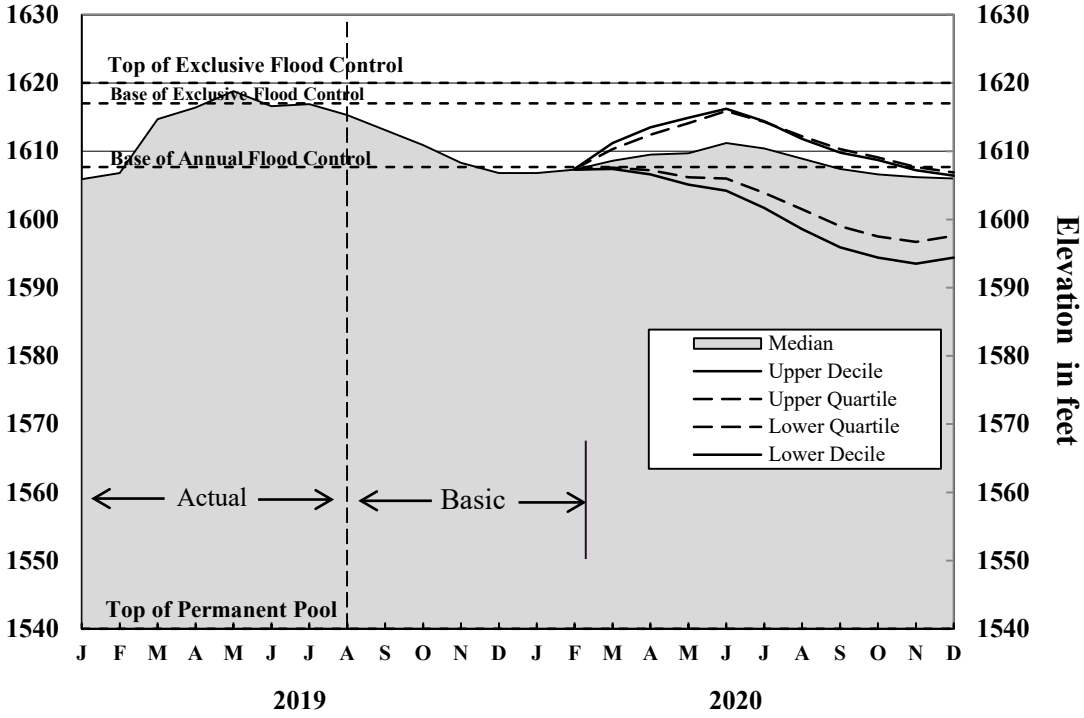


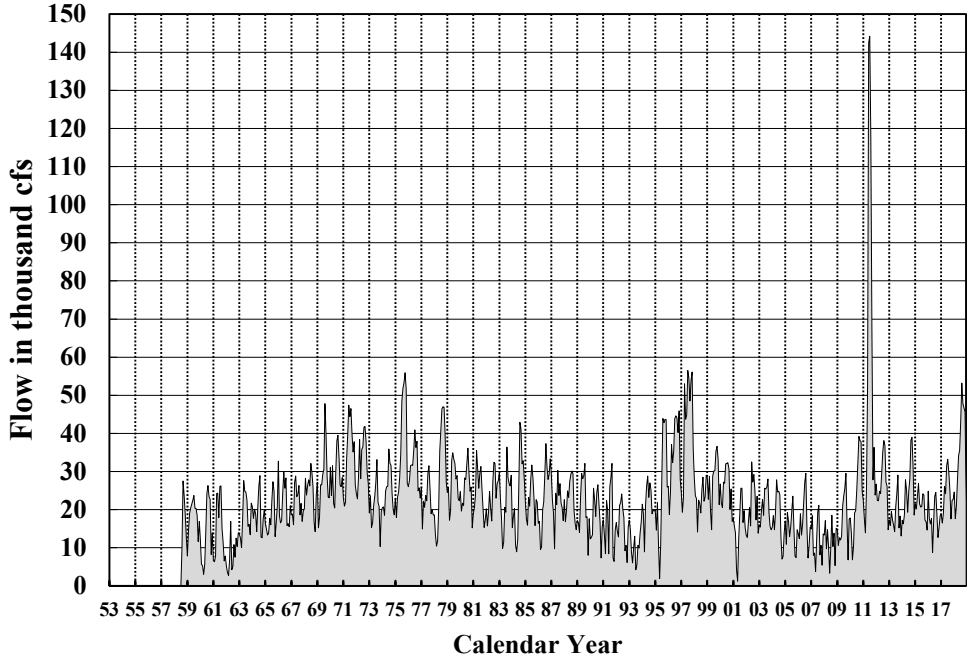
Plate 9

Oahe

Elevations and Releases







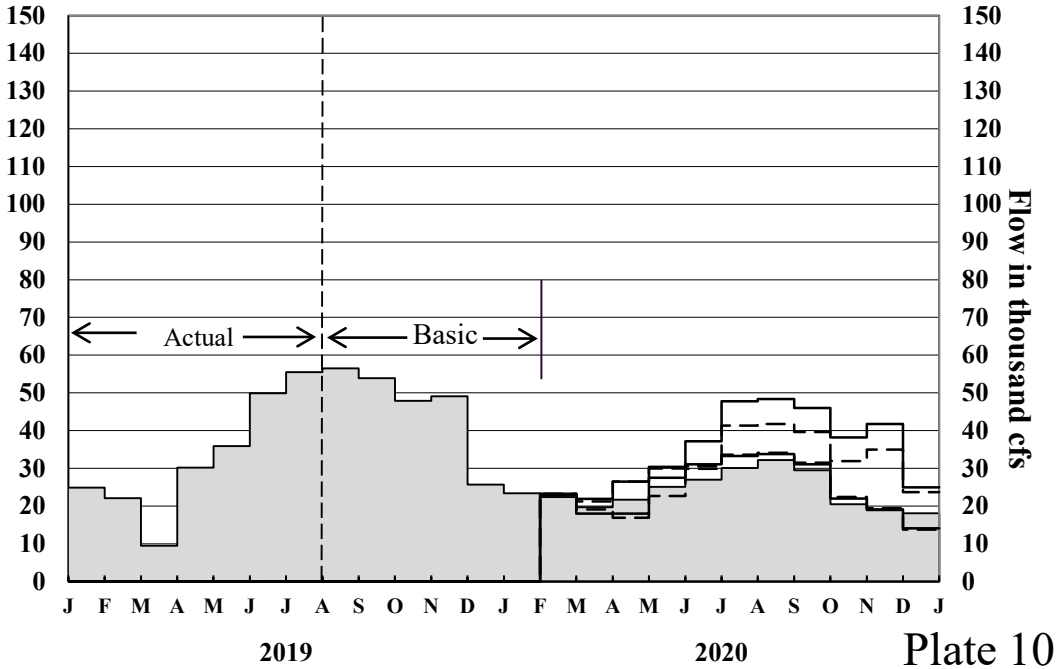
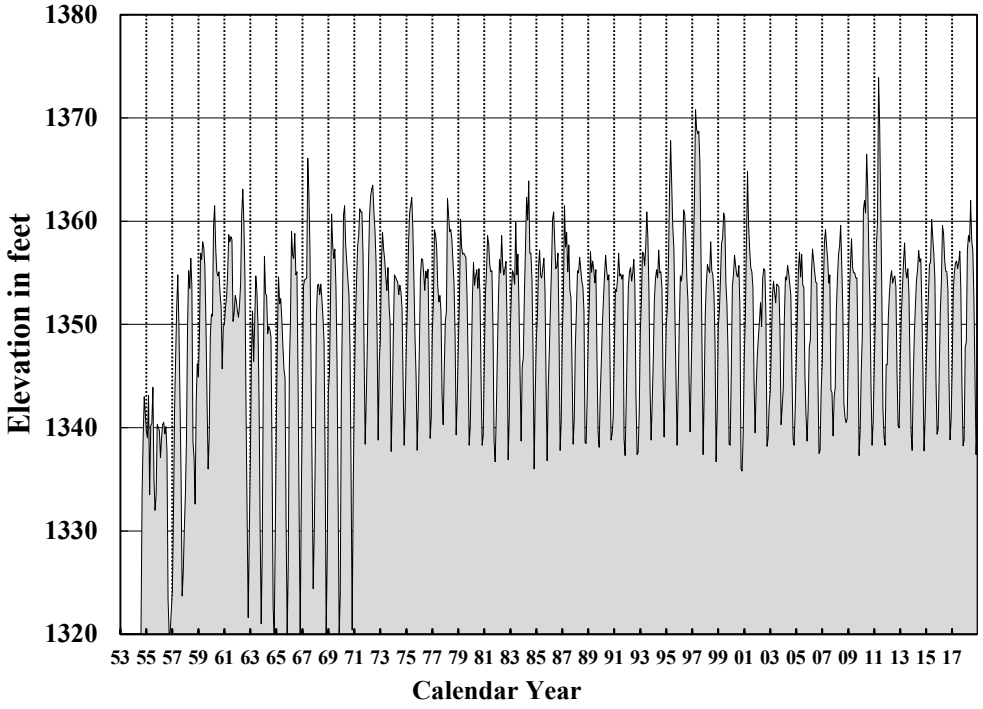
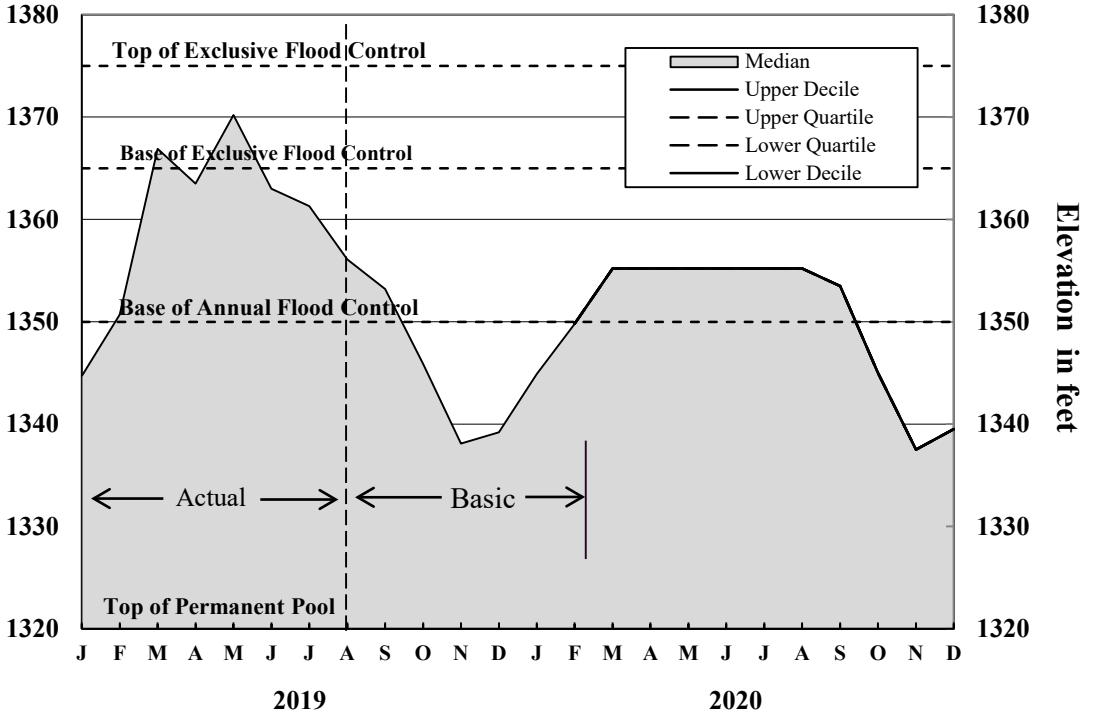
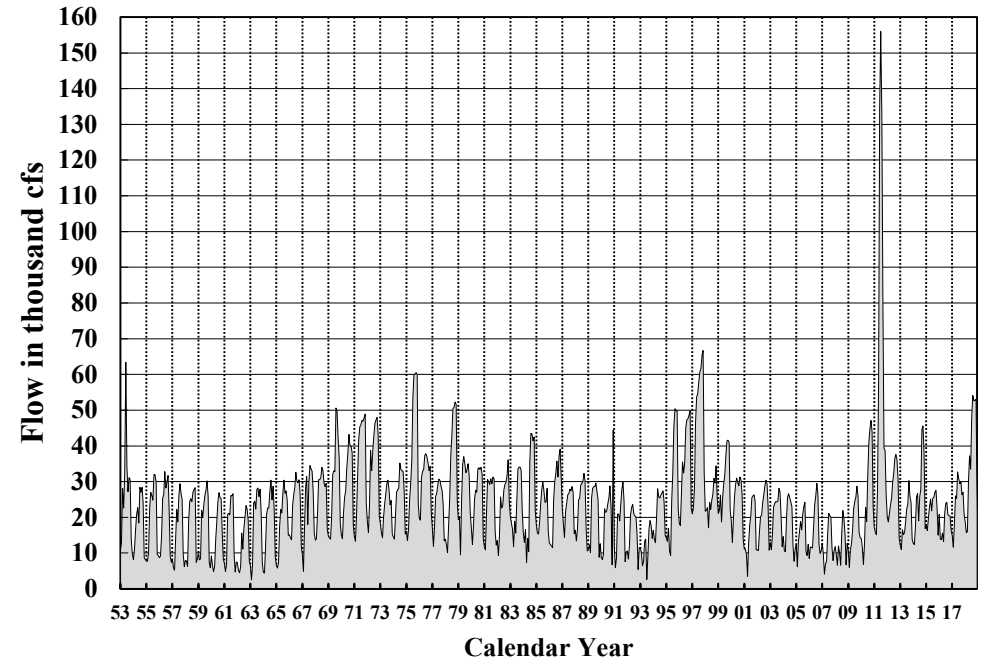


Plate 10

Fort Randall
Elevations and Releases







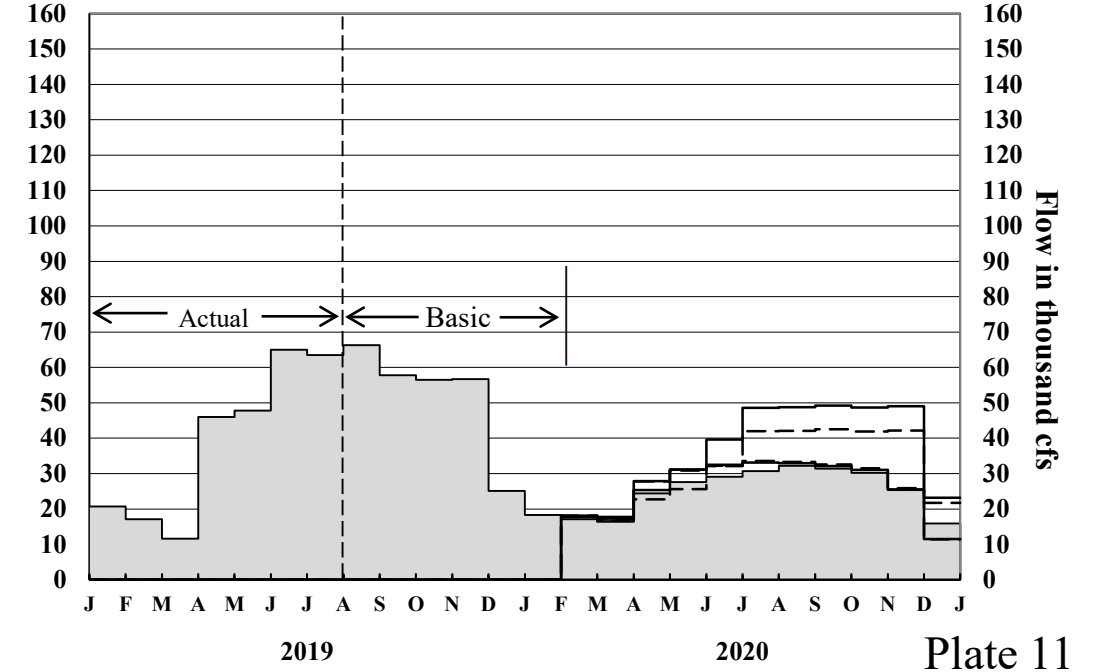
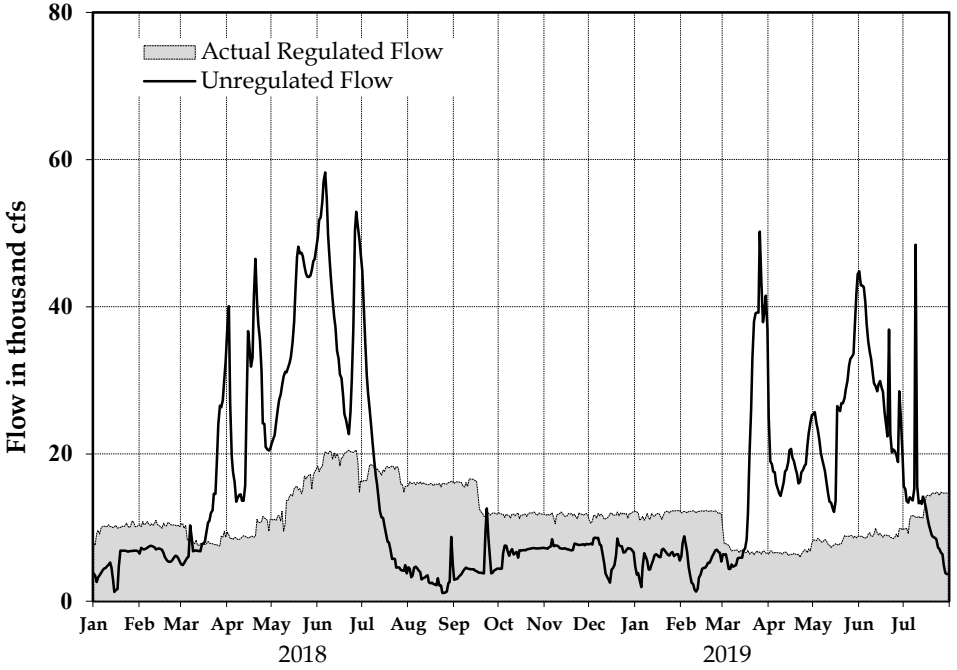


Plate 11

Reservoir Release and Unregulated Flow

Fort Peck



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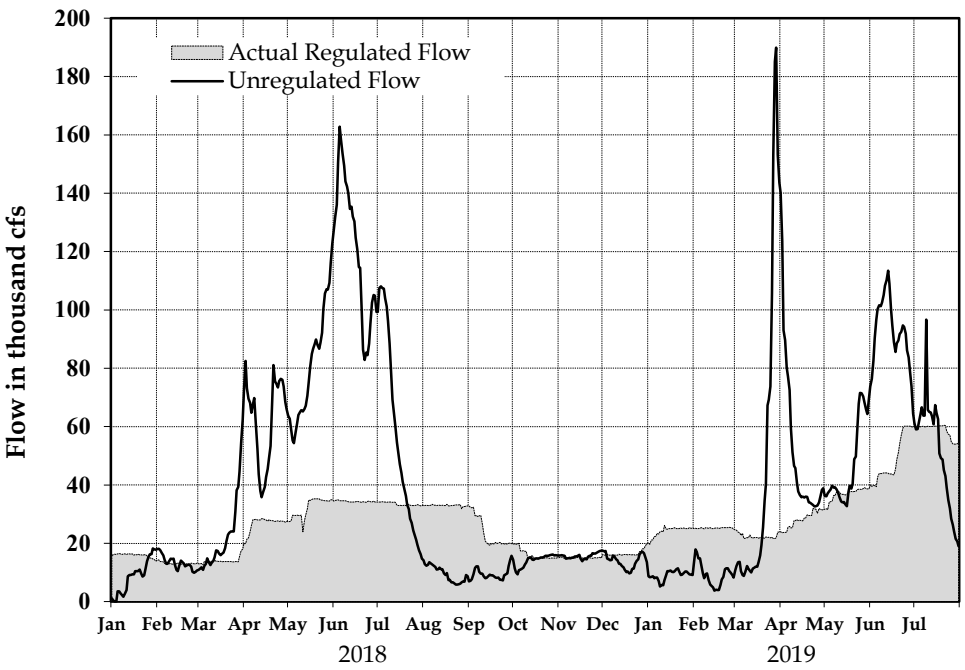

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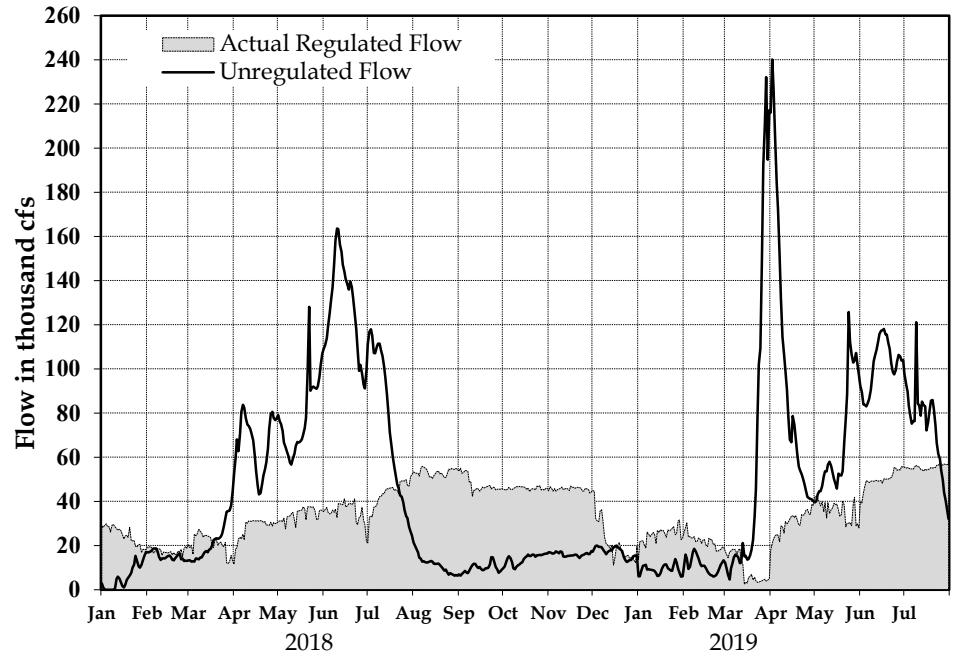

Gavins Point

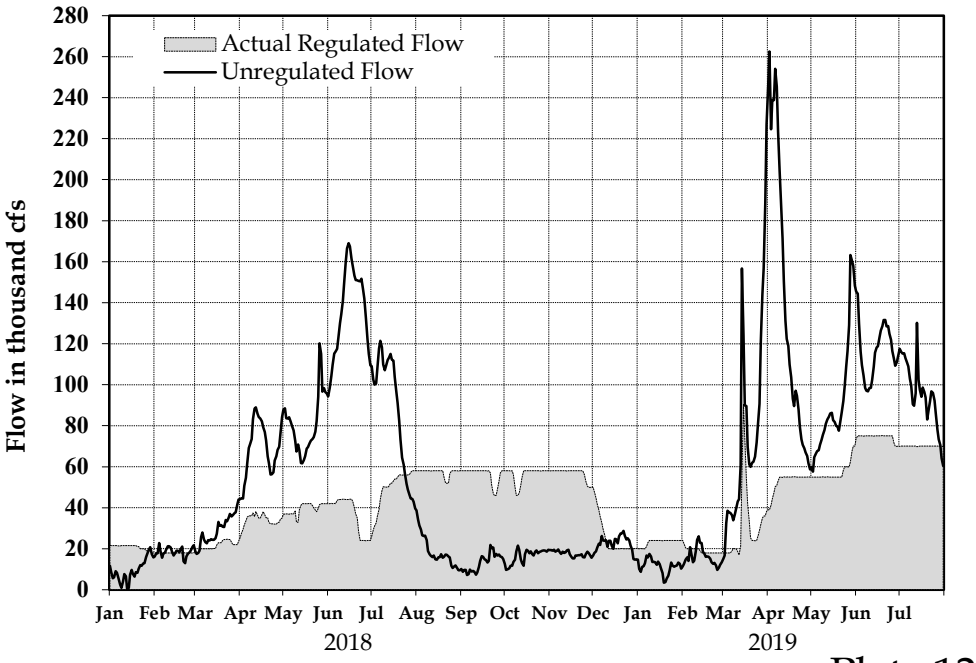

Plate 12

System Gross Capability and Average Monthly Generation

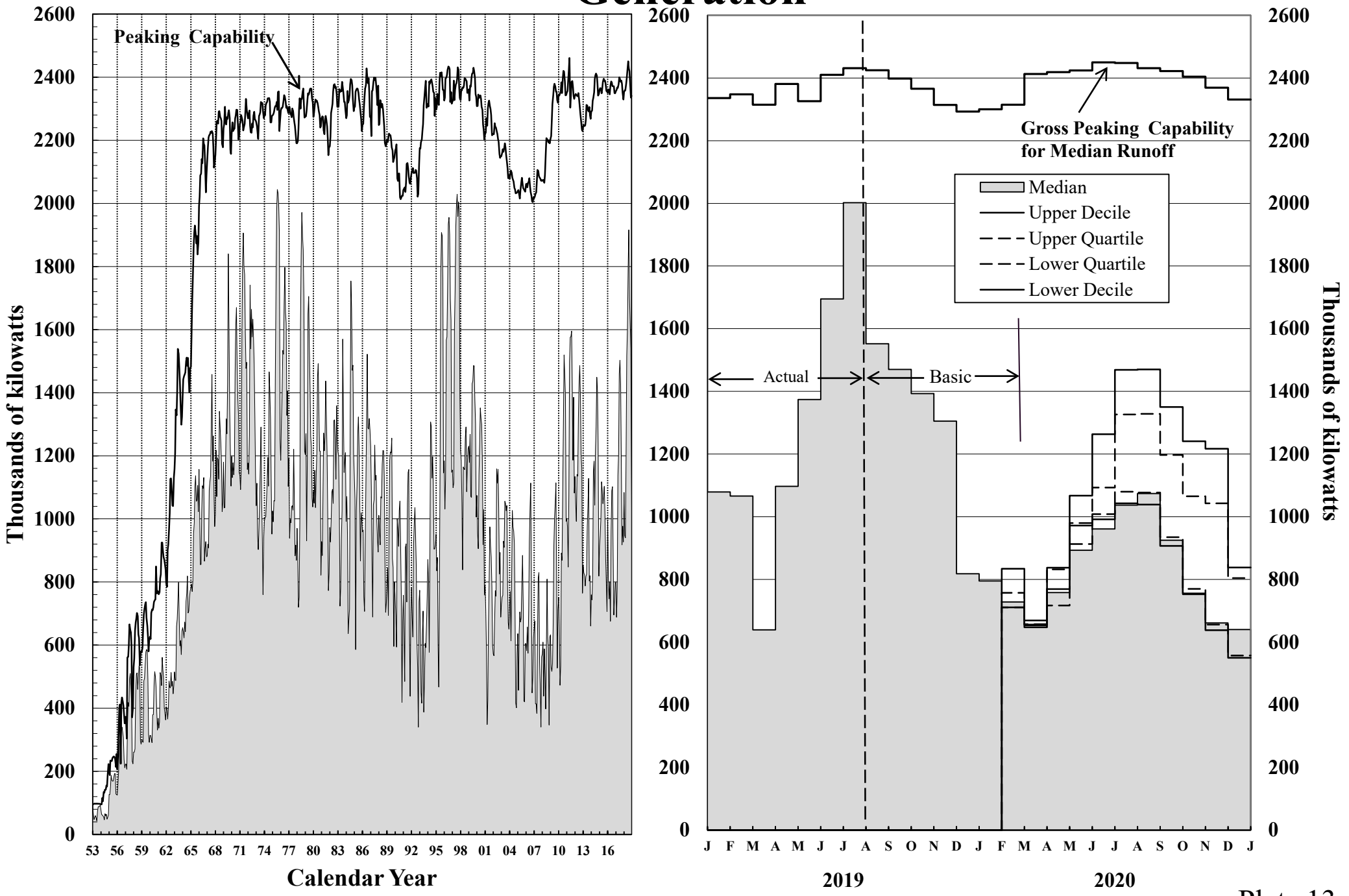

Plate 13

Tribal Lands of the Missouri River Basin

US Army Corps of Engineers ®

RESERVATIONS

1. Rocky Boy
2. Fort Belknap
3. Fort Peck
4. Fort Berthold
5. Turtle Mountain
6. Fort Totten
7. Red Lake
8. Nett Lake
9. White Earth
10. Leech Lake
11. Fond du Lac
12. Bad River
13. Lac Courte Oreilles
14. Lac du Flambeau
15. Crow
16. Northern Cheyenne
17. Standing Rock
18. Cheyenne River
19. Sisseton
20. Wind River
21. Pine RIdge
22. Rosebud
23. Lower Brule
24. Crow Creek
25. Yankton
26. Winnebago
27. Omaha
28. Potawatomi
29. Ute Mountain
30. Southern Ute
31. Flathead
32. Blackfeet
33. Santee
34. Flandreau
35. Iowa
36. Sac and Fox
37. Kickapoo

Missouri River Basin

Bureau of Indian Affairs - Tribal Lands

Department of Defense - Military installations and U.S. Army Corps of Engineers Lands and Reservoirs

Plate 14

Date of Study: 02Aug2019 **01Aug2019 / Basic Condition / 52.9 MAF / Balanced**
Values in 1000 acre-ft Except as Indicated
F-Sum: Sum of Forecasted Values. *: Previous Month's Data

	2019 *31Jul F-Sum	31Aug	30Sep	31Oct	30Nov	31Dec	2020 31Jan	29Feb
Fort Peck								
Reach Inflow	2533	440	330	380	380	327	312	364
Depletion	-715	-56	-186	-110	-59	-103	-119	-82
Reg Inflow	3248	496	516	490	439	430	430	446
Evap	428	94	111	81	78	53	7	4
Release	5570	922	848	830	803	738	738	690
Stor Change	-2753	-523	-443	-421	-442	-361	-314	-248
Storage	*17538	17015	16572	16151	15709	15348	15033	14785
Elev NGVD29	*2246.2	2244.0	2242.1	2240.2	2238.3	2236.6	2235.2	2234.0
Disch kcfs	*12.9	15.0	14.2	13.5	13.5	12.0	12.0	12.0
Ave Power MW		188	183	179	177	156	155	154
Ave Cap MW		231	228	226	224	222	220	219
Energy GWh	656.5	140.0	132.1	133.1	127.7	116.4	115.6	107.5
Garrison								
Reach Inflow	3133	830	500	533	391	253	264	362
Depletion	-680	145	-157	-55	-305	-134	-97	-77
Reg Inflow	9405	1604	1517	1418	1499	1138	1099	1130
Evap	569	109	140	132	113	76	-2	0
Release	13656	2828	2457	2244	2047	1224	1476	1380
Stor Change	-4824	-1337	-1079	-958	-661	-162	-375	-251
Storage	*22568	21232	20152	19194	18533	18371	17996	17745
Elev NGVD29	*1851.7	1848.0	1844.9	1842.0	1840.0	1839.5	1838.3	1837.5
Disch kcfs	*46.4	46.0	41.3	36.5	34.4	19.9	24.0	24.0
Ave Power MW		567	521	474	441	258	308	306
Ave Cap MW		567	562	557	552	551	545	539
Energy GWh	1589.5	421.5	375.5	352.3	317.6	191.9	229.2	213.3
Oahe								
Reach Inflow	682	300	125	71	68	5	13	100
Depletion	226	141	33	-14	1	14	20	31
Reg Inflow	14191	2989	2582	2329	2171	1202	1469	1450
Evap	579	94	144	129	111	87	9	5
Release	16854	3474	3207	2942	2924	1578	1441	1287
Stor Change	-3245	-583	-769	-742	-864	-463	19	157
Storage	*21858	21275	20506	19764	18900	18437	18456	18614
Elev NGVD29	*1617.0	1615.3	1613.1	1610.9	1608.3	1606.8	1606.8	1607.3
Disch kcfs	*55.5	56.5	53.9	47.9	49.1	25.7	23.4	22.4
Ave Power MW		721	683	601	607	318	291	279
Ave Cap MW		773	761	745	727	698	697	699
Energy GWh	2124.6	536.7	492.0	447.3	437.2	236.2	216.5	194.0
Big Bend								
Reg Inflow	16867	3474	3210	2943	2924	1588	1440	1288
Evap	76	23	21	15	10	5	1	0
Release	16791	3460	3171	2948	2903	1580	1457	1272
Storage	*1674	1664	1682	1661	1672	1675	1658	1674
Elev NGVD29	*1420.7	1420.6	1420.9	1420.5	1420.7	1420.8	1420.5	1420.7
Disch kcfs	*51.9	56.3	53.3	48.0	48.8	25.7	23.7	22.1
Ave Power MW		220	209	190	193	107	99	93
Ave Cap MW		375	378	383	382	409	410	412
Energy GWh	659.7	163.6	150.8	141.5	139.1	79.5	74.0	64.9
Fort Randall								
Reach Inflow	369	200	60	4	4	12	31	58
Depletion	35	15	7	1	2	3	3	3
Reg Inflow	17153	3642	3228	2950	2911	1604	1484	1334
Evap	114	28	34	30	15	6	1	1
Release	18020	4075	3441	3475	3373	1543	1127	986
Stor Change	-982	-461	-247	-555	-476	55	356	347
Storage	*3966	3504	3257	2702	2226	2281	2637	2984
Elev NGVD29	*1361.3	1356.1	1353.2	1345.9	1338.1	1339.2	1344.9	1349.8
Disch kcfs	*63.5	66.3	57.8	56.5	56.7	25.1	18.3	17.1
Ave Power MW		292	340	322	287	175	144	142
Ave Cap MW		354	342	327	301	286	301	319
Energy GWh	1173.2	217.5	244.7	239.6	206.8	130.4	107.2	99.0
Gavins Point								
Reach Inflow	984	250	150	130	120	100	100	134
Depletion	27	10	-5	1	10	10	1	-0
Reg Inflow	19134	4307	3633	3603	3485	1760	1230	1115
Evap	23	5	6	6	4	2	0	0
Release	19126	4304	3605	3597	3481	1758	1230	1150
Stor Change	-15	-2	22	-0	0	-1	-0	-35
Storage	*342	340	362	362	363	362	362	327
Elev NGVD29	*1206.6	1206.6	1207.5	1207.5	1207.5	1207.5	1207.5	1206.0
Disch kcfs	*70.0	70.0	60.6	58.5	58.5	28.6	20.0	20.0
Ave Power MW		98	104	107	107	86	71	71
Ave Cap MW		126	127	127	127	127	127	126
Energy GWh	345.6	73.1	75.2	79.5	77.0	63.6	52.8	49.1
Sioux City								
Reach Inflow	1775	590	400	300	200	125	55	105
Depletion	138	40	26	12	14	15	16	16
Reg Flow	20872	4854	4004	3885	3667	1954	1269	1239
Reg Flow kcfs		78.9	67.3	63.2	61.6	31.8	20.6	21.5
Total								
Reach Inflow	9476	2610	1565	1418	1163	822	775	1123
Depletion	-969	294	-281	-164	-337	-196	-176	-109
Evap	1789	354	456	393	330	228	16	11
Storage	*67946	65030	62532	59834	57402	56474	56142	56128
Ave Power MW		2087	2042	1873	1813	1100	1069	1045
Ave Cap MW		2425	2398	2366	2314	2293	2300	2315
Energy GWh	6548.9	1552.4	1470.1	1393.3	1305.3	818.1	795.2	727.6
Daily GWh		50.1	49.0	44.9	43.5	26.4	25.7	25.1

Date of Study: 02Aug2019 **01Aug2019 / Lower Basic Condition / 50.9 MAF / Balanced**
Values in 1000 acre-ft Except as Indicated
F-Sum: Sum of Forecasted Values. *: Previous Month's Data

	2019 *31Jul F-Sum	31Aug	30Sep	31Oct	30Nov	31Dec	2020 31Jan	29Feb
Fort Peck								
Reach Inflow	1948	308	248	304	304	262	250	273
Depletion	-397	2	-46	-89	-40	-77	-90	-57
Reg Inflow	2345	306	294	393	344	339	340	330
Evap	425	94	110	80	77	53	7	4
Release	4678	922	712	615	595	584	646	604
Stor Change	-2761	-713	-528	-302	-329	-298	-313	-278
Storage	*17538	16824	16296	15994	15666	15367	15054	14776
Elev NGVD29	*2246.2	2243.2	2240.9	2239.5	2238.1	2236.7	2235.3	2233.9
Disch kcfs	*12.9	15.0	12.0	10.0	10.0	9.5	10.5	10.5
Ave Power MW		188	155	132	131	124	136	135
Ave Cap MW		230	227	225	224	222	221	219
Energy GWh	652.5	139.8	111.7	98.3	94.5	92.2	101.2	94.1
Garrison								
Reach Inflow	2380	581	375	426	313	202	211	271
Depletion	-413	143	-128	-13	-258	-83	-44	-29
Reg Inflow	7506	1358	1257	1054	1166	874	893	904
Evap	573	109	140	134	115	77	-2	0
Release	11758	2828	1791	1722	1631	1168	1353	1265
Stor Change	-4829	-1583	-674	-801	-580	-371	-458	-361
Storage	*22568	20985	20311	19510	18930	18559	18100	17739
Elev NGVD29	*1851.7	1847.3	1845.4	1843.0	1841.2	1840.1	1838.6	1837.5
Disch kcfs	*46.4	46.0	30.1	28.0	27.4	19.0	22.0	22.0
Ave Power MW		566	397	367	356	248	284	282
Ave Cap MW		566	562	558	555	552	547	540
Energy GWh	1587.2	421.1	285.5	273.3	256.4	184.2	211.2	196.2
Oahe								
Reach Inflow	481	195	94	53	51	4	10	75
Depletion	226	141	33	-14	1	14	20	31
Reg Inflow	12100	2884	1915	1789	1709	1151	1342	1310
Evap	581	95	143	129	111	89	9	5
Release	14755	3416	2591	2270	2271	1399	1470	1338
Stor Change	-3239	-630	-820	-610	-673	-337	-136	-33
Storage	*21858	21228	20409	19799	19125	18788	18652	18619
Elev NGVD29	*1617.0	1615.2	1612.9	1611.0	1609.0	1607.9	1607.5	1607.3
Disch kcfs	*55.5	55.5	43.5	36.9	38.2	22.8	23.9	23.3
Ave Power MW		690	553	467	477	285	298	290
Ave Cap MW		774	760	745	731	709	704	701
Energy GWh	2127.5	513.5	398.0	347.6	343.6	212.2	222.0	201.8
Big Bend								
Reg Inflow	14769	3412	2602	2270	2271	1405	1469	1339
Evap	76	23	21	15	10	5	1	0
Release	14693	3394	2567	2276	2250	1397	1486	1323
Storage	*1674	1669	1682	1661	1672	1675	1658	1673
Elev NGVD29	*1420.7	1420.6	1420.9	1420.5	1420.7	1420.8	1420.5	1420.7
Disch kcfs	*51.9	55.2	43.1	37.0	37.8	22.7	24.2	23.0
Ave Power MW		216	173	150	153	96	101	97
Ave Cap MW		377	387	393	392	412	409	411
Energy GWh	656.8	160.6	124.4	111.6	110.2	71.2	75.4	67.3
Fort Randall								
Reach Inflow	257	130	45	3	3	9	23	44
Depletion	35	15	7	1	2	3	3	3
Reg Inflow	14941	3503	2620	2276	2258	1409	1504	1371
Evap	113	27	33	30	15	6	1	1
Release	15806	4018	2755	2800	2717	1346	1153	1017
Stor Change	-979	-543	-168	-554	-474	58	350	352
Storage	*3966	3423	3255	2701	2226	2284	2634	2986
Elev NGVD29	*1361.3	1355.2	1353.2	1345.9	1338.2	1339.2	1344.9	1349.8
Disch kcfs	*63.5	65.3	46.3	45.5	45.7	21.9	18.7	17.7
Ave Power MW		288	341	324	292	162	147	147
Ave Cap MW		350	341	327	301	286	301	319
Energy GWh	1173.8	214.3	245.7	241.2	210.3	120.7	109.6	102.0
Gavins Point								
Reach Inflow	713	163	112	97	90	75	75	100
Depletion	27	10	-5	1	10	10	1	-0
Reg Inflow	16648	4180	2928	2896	2801	1499	1230	1115
Evap	23	5	6	6	4	2	0	0
Release	16641	4181	2896	2890	2797	1498	1230	1150
Stor Change	-16	-6	27	0	0	-0	-0	-36
Storage	*342	336	362	362	362	362	362	326
Elev NGVD29	*1206.6	1206.4	1207.5	1207.5	1207.5	1207.5	1207.5	1205.9
Disch kcfs	*70.0	68.0	48.7	47.0	47.0	24.4	20.0	20.0
Ave Power MW		99	108	110	110	81	71	71
Ave Cap MW		126	127	127	127	127	127	126
Energy GWh	351.8	73.4	77.6	81.7	79.1	60.2	52.8	49.1
Sioux City								
Reach Inflow	1272	384	300	225	150	94	41	79
Depletion	138	40	26	12	14	15	16	16
Reg Flow	17885	4529	3216	3103	2933	1636	1255	1213
Reg Flow kcfs		73.7	54.0	50.5	49.3	26.6	20.4	21.1
Total								
Reach Inflow	7052	1760	1174	1109	911	646	610	842
Depletion	-384	350	-112	-100	-271	-119	-95	-36
Evap	1791	353	454	393	332	231	16	11
Storage	*67946	64466	62315	60027	57982	57035	56461	56119
Ave Power MW		2047	1726	1551	1520	995	1038	1021
Ave Cap MW		2422	2404	2376	2329	2309	2309	2316
Energy GWh	6549.6	1522.7	1242.8	1153.8	1094.1	740.6	772.1	710.5
Daily GWh		49.1	41.4	37.2	36.5	23.9	24.9	24.5

Date of Study: 02Aug2019 **01Aug2019 / Upper Basic Condition / 55.0 MAF / Balanced**
Values in 1000 acre-ft Except as Indicated
F-Sum: Sum of Forecasted Values. *: Previous Month's Data

	2019 *31Jul F-Sum	31Aug	30Sep	31Oct	30Nov	31Dec	2020 31Jan	29Feb
Fort Peck								
Reach Inflow	3084	572	396	456	456	392	374	437
Depletion	-708	-50	-172	-97	-64	-116	-120	-89
Reg Inflow	3792	622	568	553	520	509	494	526
Evap	429	94	112	81	78	53	7	4
Release	6130	954	924	922	893	830	830	777
Stor Change	-2770	-430	-467	-451	-450	-375	-343	-255
Storage	*17538	17108	16641	16190	15740	15365	15022	14768
Elev NGVD29	*2246.2	2244.4	2242.4	2240.4	2238.4	2236.7	2235.1	2233.9
Disch kcfs	*12.9	15.5	15.5	15.0	15.0	13.5	13.5	13.5
Ave Power MW		188	187	185	184	176	175	174
Ave Cap MW		231	229	227	224	222	220	219
Energy GWh	652.8	140.1	134.5	137.9	132.3	131.0	130.0	120.8
Garrison								
Reach Inflow	3843	1079	600	640	469	304	317	434
Depletion	-764	132	-162	-62	-315	-152	-116	-89
Reg Inflow	10746	1890	1694	1624	1677	1298	1262	1300
Evap	568	110	141	132	111	74	-2	0
Release	15003	2828	2737	2828	2523	1230	1476	1380
Stor Change	-4828	-1052	-1184	-1336	-957	-6	-211	-81
Storage	*22568	21516	20332	18996	18039	18033	17821	17740
Elev NGVD29	*1851.7	1848.8	1845.4	1841.4	1838.4	1838.4	1837.7	1837.5
Disch kcfs	*46.4	46.0	46.0	46.0	42.4	20.0	24.0	24.0
Ave Power MW		567	561	549	500	257	307	306
Ave Cap MW		567	563	557	548	543	540	538
Energy GWh	1587.7	421.7	404.2	408.4	360.1	191.5	228.2	212.9
Oahe								
Reach Inflow	926	405	169	96	92	7	18	140
Depletion	226	141	33	-14	1	14	20	31
Reg Inflow	15782	3094	2873	2938	2692	1222	1474	1490
Evap	581	94	144	129	112	88	9	5
Release	18414	3536	3520	3452	3344	1736	1507	1319
Stor Change	-3216	-540	-791	-643	-764	-601	-42	166
Storage	*21858	21319	20527	19884	19120	18519	18477	18642
Elev NGVD29	*1617.0	1615.5	1613.2	1611.3	1609.0	1607.0	1606.9	1607.4
Disch kcfs	*55.5	57.5	59.1	56.1	56.2	28.2	24.5	22.9
Ave Power MW		734	709	697	691	349	304	286
Ave Cap MW		773	762	746	733	701	698	699
Energy GWh	2127.9	546.1	510.4	518.3	497.7	260.0	226.5	198.7
Big Bend								
Reg Inflow	18427	3535	3518	3454	3345	1748	1507	1320
Evap	76	23	21	15	10	5	1	0
Release	18351	3525	3476	3459	3323	1740	1522	1305
Storage	*1674	1661	1682	1661	1672	1675	1659	1674
Elev NGVD29	*1420.7	1420.5	1420.9	1420.5	1420.7	1420.7	1420.5	1420.7
Disch kcfs	*51.9	57.3	58.4	56.3	55.9	28.3	24.8	22.7
Ave Power MW		223	227	220	219	117	104	96
Ave Cap MW		374	373	376	376	405	408	411
Energy GWh	656.8	166.2	163.3	163.7	157.4	87.0	77.1	66.5
Fort Randall								
Reach Inflow	503	270	81	5	5	16	43	81
Depletion	35	15	7	1	2	3	3	3
Reg Inflow	18847	3776	3547	3464	3334	1772	1562	1391
Evap	114	28	34	30	15	6	1	1
Release	19713	3985	3989	3986	3797	1709	1209	1038
Stor Change	-982	-238	-476	-551	-478	58	352	351
Storage	*3966	3728	3252	2701	2223	2281	2633	2984
Elev NGVD29	*1361.3	1358.6	1353.2	1345.9	1338.1	1339.2	1344.9	1349.8
Disch kcfs	*63.5	64.8	67.0	64.8	63.8	27.8	19.7	18.1
Ave Power MW		296	341	319	286	187	154	149
Ave Cap MW		358	344	327	301	286	301	319
Energy GWh	1173.8	220.3	245.4	237.4	205.9	139.5	114.7	104.0
Gavins Point								
Reach Inflow	1340	337	202	176	162	135	140	188
Depletion	27	10	-5	1	10	10	1	-0
Reg Inflow	21189	4307	4194	4171	3959	1973	1353	1232
Evap	23	5	6	6	4	2	0	0
Release	21180	4304	4165	4165	3957	1970	1353	1265
Stor Change	-13	-2	23	0	-2	2	-0	-33
Storage	*342	340	362	362	360	362	362	329
Elev NGVD29	*1206.6	1206.5	1207.5	1207.5	1207.4	1207.5	1207.5	1206.1
Disch kcfs	*70.0	70.0	70.0	67.7	66.5	32.0	22.0	22.0
Ave Power MW		99	102	105	105	91	78	77
Ave Cap MW		126	127	127	127	127	127	126
Energy GWh	351.8	73.6	73.3	77.8	75.5	67.9	57.9	53.8
Sioux City								
Reach Inflow	2404	797	540	405	270	169	77	147
Depletion	138	40	26	12	14	15	16	16
Reg Flow	23551	5060	4679	4566	4213	2222	1414	1396
Reg Flow kcfs		82.3	78.6	74.3	70.8	36.1	23.0	24.3
Total								
Reach Inflow	12099	3460	1988	1777	1454	1023	970	1427
Depletion	-1046	288	-272	-158	-353	-227	-196	-128
Evap	1791	355	458	394	330	227	16	11
Storage	*67946	65672	62796	59794	57154	56234	55974	56137
Ave Power MW		2108	2127	2075	1985	1178	1121	1087
Ave Cap MW		2428	2398	2360	2310	2286	2295	2312
Energy GWh	6550.7	1568.0	1531.1	1543.5	1428.9	876.8	834.2	756.7
Daily GWh		50.6	51.0	49.8	47.6	28.3	26.9	26.1

VALUES IN 1000 AF EXCEPT AS INDICATED

29FEB20		2020										2021			
	INI-SUM	15MAR	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB
--FORT PECK--																	
NAT INFLOW	9450	341	159	205	825	1400	2355	1205	440	385	480	288	134	153	350	310	420
DEPLETION	568	-42	-19	-25	-16	312	591	293	17	-110	-78	-28	-13	-15	-110	-112	-77
EVAPORATION	327							22	70	86	75	18	8	9	39		
MOD INFLOW	8555	383	179	230	841	1088	1764	890	353	409	483	298	139	159	421	422	497
RELEASE	8556	223	104	134	565	769	803	830	830	713	646	312	146	190	769	799	722
STOR CHANGE	-1	160	74	96	276	319	961	60	-477	-305	-162	-15	-7	-32	-347	-377	-225
STORAGE	14768.	14928	15002	15098	15374	15693	16654	16713	16236	15932	15769	15755	15748	15716	15369	14992	14767
ELEV FTMSL	2233.9	2234.7	2235.0	2235.5	2236.7	2238.2	2242.4	2242.7	2240.6	2239.3	2238.5	2238.5	2238.4	2238.3	2236.7	2235.0	2233.9
DISCH KCFS	13.500	7.5	7.5	7.5	9.5	12.5	13.5	13.5	13.5	12.0	10.5	10.5	10.5	12.0	12.5	13.0	13.0
POWER																	
AVE POWER MW		102	102	103	130	170	184	186	185	165	145	145	145	164	170	175	174
PEAK POW MW		188	189	189	190	191	194	194	192	191	191	191	191	191	190	189	188
ENERGY GWH	1411.9	36.8	17.2	22.1	93.6	126.4	132.4	138.1	137.6	118.8	107.8	52.1	24.3	31.6	126.4	130.0	116.8
--GARRISON--																	
NAT INFLOW	14000	530	247	318	1355	1840	3460	2715	835	570	645	248	116	132	260	315	415
DEPLETION	1192	-9	-4	-6	-189	112	1266	767	127	-169	-62	-158	-74	-84	-144	-108	-73
CHAN STOR	5	60		0	-20	-29	-10			15	14			-15	-5	-5	0
EVAPORATION	370							25	80	99	84	20	9	10	42		
REG INFLOW	20999	822	356	457	2090	2467	2988	2753	1458	1368	1283	698	326	382	1125	1217	1210
RELEASE	21017	565	264	339	1428	1906	2142	2214	2214	1994	1906	922	430	476	1291	1537	1388
STOR CHANGE	-18	257	92	118	661	561	845	539	-756	-625	-623	-224	-105	-94	-166	-320	-178
STORAGE	17740.	17997	18088	18206	18868	19429	20275	20814	20058	19433	18809	18585	18481	18386	18220	17900	17722
ELEV FTMSL	1837.5	1838.3	1838.6	1839.0	1841.0	1842.7	1845.2	1846.8	1844.6	1842.8	1840.9	1840.2	1839.8	1839.5	1839.0	1838.0	1837.4
DISCH KCFS	24.000	19.0	19.0	19.0	24.0	31.0	36.0	36.0	36.0	33.5	31.0	31.0	31.0	30.0	21.0	25.0	25.0
POWER																	
AVE POWER MW		236	237	237	301	392	460	465	464	427	392	389	387	374	263	310	309
PEAK POW MW		530	531	533	543	551	560	565	557	551	542	539	537	536	533	529	526
ENERGY GWH	3215.9	84.9	39.8	51.2	216.7	291.7	330.9	345.6	345.0	307.7	291.5	139.9	65.1	71.9	195.4	231.0	207.6
--OAHE--																	
NAT INFLOW	3900	569	265	341	510	390	710	310	125	185	145	118	55	63	15	10	90
DEPLETION	802	26	12	16	53	81	172	212	144	34	-14	1	0	0	14	20	31
CHAN STOR	0	20			-19	-26	-18			9	10			4	36	-16	
EVAPORATION	367							26	80	98	83	19	9	10	42		
REG INFLOW	23748	1128	517	665	1866	2189	2662	2285	2114	2056	1992	1020	476	532	1286	1511	1447
RELEASE	23745	487	282	338	1071	1693	2211	2937	2977	2735	2349	1155	574	757	1535	1460	1184
STOR CHANGE	3	640	235	327	795	496	451	-652	-862	-679	-358	-135	-98	-225	-248	51	264
STORAGE	18642.	19282	19517	19844	20639	21136	21587	20935	20073	19394	19036	18901	18803	18579	18330	18381	18645
ELEV FTMSL	1607.4	1609.4	1610.2	1611.2	1613.5	1614.9	1616.2	1614.4	1611.8	1609.8	1608.7	1608.2	1607.9	1607.2	1606.4	1606.6	1607.4
DISCH KCFS	22.900	16.4	20.3	18.9	18.0	27.5	37.2	47.8	48.4	46.0	38.2	38.8	41.3	47.7	25.0	23.8	21.3
POWER																	
AVE POWER MW		213	266	249	238	367	497	634	634	599	495	501	531	608	321	305	274
PEAK POW MW		718	722	727	739	747	753	744	731	720	714	712	710	706	702	703	707
ENERGY GWH	3757.1	76.6	44.6	53.7	171.6	273.1	358.0	471.8	471.8	431.3	368.3	180.3	89.3	116.7	238.6	226.8	184.4
--BIG BEND--																	
EVAPORATION	72							5	15	19	17	4	2	2	9		
REG INFLOW	23673	487	282	338	1071	1693	2211	2933	2962	2716	2333	1151	572	755	1526	1460	1184
RELEASE	23715	530	282	338	1071	1693	2211	2933	2962	2716	2333	1151	572	755	1526	1460	1184
STORAGE	1674.	1631	1631	1631	1631	1631	1631	1631	1631	1631	1632	1632	1632	1632	1632	1632	1632
ELEV FTMSL	1420.7	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0
DISCH KCFS	22.700	17.8	20.3	18.9	18.0	27.5	37.2	47.7	48.2	45.6	37.9	38.7	41.2	47.6	24.8	23.8	21.3
POWER																	
AVE POWER MW		84	95	89	84	129	174	223	225	216	184	192	204	235	124	116	102
PEAK POW MW		517	509	509	509	509	509	509	509	517	538	538	538	538	538	538	529
ENERGY GWH	1369.1	30.3	16.0	19.1	60.7	95.9	125.2	165.9	167.5	155.4	137.2	69.0	34.2	45.0	92.4	86.5	68.7
--FORT RANDALL--																	
NAT INFLOW	1500	150	70	90	440	230	155	80	70	100	40				15		60
DEPLETION	80	1	1	1	4	9	12	18	15	7	1	1	0	1	3	3	3
EVAPORATION	80							6	19	24	18	4	2	2	7		
REG INFLOW	25057	679	351	427	1507	1914	2354	2989	2998	2786	2353	1146	570	752	1534	1457	1241
RELEASE	25040	382	207	427	1507	1914	2354	2989	2998	2930	2992	1459	681	778	1424	1116	882
STOR CHANGE	17	297	144	0			0	0	0	-144	-639	-313	-111	-26	109	341	359
STORAGE	2984.	3281	3425	3425	3425	3425	3425	3425	3425	3281	2642	2329	2218	2192	2301	2642	3001
ELEV FTMSL	1349.8	1353.5	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.0	1340.0	1338.0	1337.5	1339.5	1345.0	1350.0
DISCH KCFS	18.100	12.8	14.9	23.9	25.3	31.1	39.6	48.6	48.8	49.2	48.7	49.1	49.0	49.0	23.2	18.2	15.9
POWER																	
AVE POWER MW		106	126	202	214	262	326	356	356	353	336	307	291	286	169	138	126
PEAK POW MW		350	356	356	356	356	356	356	356	350	319	296	287	284	294	320	339
ENERGY GWH	2248.4	38.2	21.2	43.6	153.9	194.8	234.8	264.8	264.8	254.2	250.1	110.7	48.9	54.8	126.0	102.5	84.9
--GAVINS POINT--																	
NAT INFLOW	2250	111	52	67	280	330	245	205	165	130	150	65	30	35	90	105	190
DEPLETION	114	0	0	0	5	19	24	39	10	-5	2	5	2	3	10	1	
CHAN STOR	2	10	-4	-17	-3	-11	-16	-17	0	-1	1	-1	0	0	48	9	4
EVAPORATION	23							1	5	6	5	1	1	1	3		
REG INFLOW	27155	504	256	477	1779	2214	2559	3136	3148	3058	3136	1517	708	809	1550	1230	1076
RELEASE	27157	506	256	477	1779	2214	2559	3136	3136	3035	3136	1517	708	809	1550	1230	1111
STOR CHANGE	-2	-2							12	23							-35
STORAGE	329.	327	327	327	327	327	327	327	339	362	362	362	362	362	362	362	327
ELEV FTMSL	1206.1	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.5	1207.5	1207.5	1207.5	1207.5	1207.5	1207.5	1206.0
DISCH KCFS	22.000	17.0	18.4	26.7	29.9	36.0	43.0	51.0	51.0	51.0	51.0	51.0	51.0	51.0	25.2	20.0	20.0
POWER																	
AVE POWER MW		59	64	91	101	114	113	112	113	115	115	115	115	115	79	70	69
PEAK POW MW		114	114	114	114	114	113	112	113	115	115	115	115	115	78	78	76
ENERGY GWH	865.8	21.3	10.7	19.7	72.5	84.8	81.6	83.1	83.7	82.5	85.8	41.5	19.4	22.1	58.6	52.0	46.6
--GAVINS POINT - SIOUX CITY--																	
NAT INFLOW	3400	189	88	113	470	890	550	290	225	165	85	50	23	27	60	35	140
DEPLETION	293	8	4	5	25	37	33	41	40	27	13	7	3	4	15	16	16
REGULATED FLOW AT SIOUX CITY																	
KAF	30264	687	340	585	2224	3067	3076	3385	3321	3173	3208	1560	728	832	1595	1249	1235
KCFS		23.1	24.5	32.8	37.4	49.9	51.7	55.0	54.0	53.3	52.2	52.4	52.4	52.4	25.9	20.3	22.2
--TOTAL--																	
NAT INFLOW	34500	1890	882	1133	3880	5080	7475	4805	1860	1535	1545	768	358	409	790	775	1315
DEPLETION	3049	-16	-7	-10	-118	570	2098	1370	353	-216	-138	-173	-81	-92	-212	-180	-100
CHAN STOR	9	89	-4	-17	-41	-66	-44	-17	0	23	25	-1	0	-11	81	-12	4
EVAPORATION	1239							86	269	331	282	66	30	34	141		
STORAGE	56137.	57446	57991	58531	60264	61641	63898	63845	61762	60032	58251	57564	57244	56867	56215	55909	56094
SYSTEM POWER																	
AVE POWER MW		800	889	970	1068	1434	1754	1975	1976	1875	1668	1649	1674	1782	1126	1114	1055
PEAK POW MW		2418	2422	2429	2451	2468	2485	2479	2459	2445	2419	2390	2378	2371	2335	2356	2365
ENERGY GWH	12868.2	288.1	149.4	209.5	769.0	1066.6	1262.7	1469.3	1470.4	1349.9	1240.8	593.6	281.3	342.1	837.5	828.8	709.0
DAILY GWH		19.2	21.3	23.3	25.6	34.4	42.1	47.4	47.4	45.0	40.0	39.6	40.2	42.8	27.0	26.7	25.3
	INI-SUM	15MAR	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB

VALUES IN 1000 AF EXCEPT AS INDICATED

29FEB20		2020										2021				
	INI-SUM	15MAR	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB
--FORT PECK--																	
NAT INFLOW	8650	310	144	186	755	1285	2155	1105	405	350	440	263	123	140	320	285	385
DEPLETION	552	-13	-6	-8	14	317	555	291	3	-125	-99	-33	-15	-18	-116	-119	-76
EVAPORATION	323							22	69	85	74	18	8	9	38		
MOD INFLOW	7775	323	151	194	741	968	1600	792	333	390	465	278	130	148	398	404	461
RELEASE	7774	208	97	125	536	646	774	799	799	622	492	238	111	127	738	769	694
STOR CHANGE	1	115	53	69	205	322	826	-7	-466	-232	-27	40	19	21	-340	-365	-233
STORAGE	14768.	14883	14936	15005	15210	15532	16359	16352	15886	15654	15627	15667	15686	15707	15367	15002	14769
ELEV FTMSL	2233.9	2234.4	2234.7	2235.0	2236.0	2237.5	2241.2	2241.1	2239.1	2238.0	2237.9	2238.1	2238.2	2238.3	2236.7	2235.0	2233.9
DISCH KCFS	13.500	7.0	7.0	7.0	9.0	10.5	13.0	13.0	13.0	10.4	8.0	8.0	8.0	8.0	12.0	12.5	12.5
POWER																	
AVE POWER MW		95	96	96	123	144	177	178	178	144	110	110	110	110	164	169	168
PEAK POW MW		188	188	189	189	190	193	193	191	191	191	191	191	191	190	189	188
ENERGY GWH	1284.6	34.3	16.0	20.6	88.6	107.1	127.5	132.7	132.1	103.7	82.0	39.7	18.5	21.2	121.9	125.7	112.9
--GARRISON--																	
NAT INFLOW	12750	482	225	289	1230	1675	3200	2475	760	520	555	215	100	115	235	295	380
DEPLETION	1176	-9	-4	-6	-133	125	1142	808	119	-156	-65	-159	-74	-85	-145	-108	-75
CHAN STOR	10	64			-20	-15	-24			25	24		0	0	-39	-5	
EVAPORATION	367							25	79	98	84	20	9	10	43		
REG INFLOW	18991	764	326	419	1879	2181	2807	2441	1361	1225	1052	592	276	316	1036	1167	1149
RELEASE	19005	565	264	339	1369	1752	1964	1968	1968	1696	1537	744	347	365	1261	1506	1361
STOR CHANGE	-14	198	62	80	510	429	844	474	-606	-471	-485	-152	-71	-49	-225	-340	-211
STORAGE	17740.	17938	18001	18081	18591	19019	19863	20337	19730	19259	18774	18622	18551	18502	18277	17937	17726
ELEV FTMSL	1837.5	1838.1	1838.3	1838.6	1840.2	1841.5	1844.0	1845.4	1843.7	1842.2	1840.8	1840.3	1840.1	1839.9	1839.2	1838.1	1837.4
DISCH KCFS	24.000	19.0	19.0	19.0	23.0	28.5	33.0	32.0	32.0	28.5	25.0	25.0	25.0	23.0	20.5	24.5	24.5
POWER																	
AVE POWER MW		236	236	237	287	359	419	411	410	363	316	314	314	289	257	305	303
PEAK POW MW		529	530	531	539	545	555	560	554	548	541	539	538	537	534	529	526
ENERGY GWH	2901.1	84.8	39.7	51.1	207.0	266.7	301.7	305.6	305.3	261.3	235.3	113.2	52.7	55.4	191.1	226.7	203.6
--OAHE--																	
NAT INFLOW	3200	457	213	274	430	310	640	250	95	150	120	95	44	51	-10		80
DEPLETION	803	27	12	16	53	81	172	212	144	34	-14	1	0	0	14	20	31
CHAN STOR	-1	20			-15	-21	-17	4		13	13			8	10	-16	0
EVAPORATION	369							26	80	98	84	20	9	10	42		
REG INFLOW	21032	1016	465	598	1730	1961	2415	1983	1838	1727	1601	819	382	413	1204	1470	1410
RELEASE	21025	519	297	357	1005	1397	1781	2539	2571	2359	1964	954	480	650	1456	1479	1219
STOR CHANGE	7	497	168	241	725	564	634	-556	-733	-632	-363	-135	-98	-237	-251	-8	191
STORAGE	18642.	19139	19307	19548	20273	20837	21471	20915	20182	19550	19187	19052	18954	18717	18466	18458	18649
ELEV FTMSL	1607.4	1609.0	1609.5	1610.3	1612.4	1614.1	1615.9	1614.3	1612.2	1610.3	1609.1	1608.7	1608.4	1607.7	1606.9	1606.8	1607.4
DISCH KCFS	22.900	17.4	21.4	20.0	16.9	22.7	29.9	41.3	41.8	39.6	31.9	32.1	34.6	40.9	23.7	24.0	21.9
POWER																	
AVE POWER MW		226	279	261	223	302	400	550	552	519	416	416	447	527	305	309	283
PEAK POW MW		716	719	722	734	742	751	743	732	723	717	714	713	709	704	704	707
ENERGY GWH	3334.1	81.5	46.8	56.5	160.4	224.7	288.2	409.6	410.9	373.4	309.3	149.7	75.1	101.1	227.0	230.0	190.1
--BIG BEND--																	
EVAPORATION	72							5	15	19	17	4	2	2	9		
REG INFLOW	20953	519	297	357	1005	1397	1781	2534	2556	2340	1947	950	478	648	1447	1479	1219
RELEASE	20996	562	297	357	1005	1397	1781	2534	2556	2340	1947	950	478	648	1447	1479	1219
STORAGE	1674.	1631	1631	1631	1631	1631	1631	1631	1631	1631	1632	1632	1632	1632	1632	1632	1632
ELEV FTMSL	1420.7	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0
DISCH KCFS	22.700	18.9	21.4	20.0	16.9	22.7	29.9	41.2	41.6	39.3	31.7	31.9	34.4	40.8	23.5	24.0	21.9
POWER																	
AVE POWER MW		89	100	94	79	106	140	193	194	186	154	159	171	202	118	118	105
PEAK POW MW		517	509	509	509	509	509	509	509	517	538	538	538	538	538	538	529
ENERGY GWH	1213.9	32.1	16.8	20.2	56.9	79.1	100.9	143.4	144.7	134.0	114.9	57.3	28.8	38.8	87.7	87.6	70.7
--FORT RANDALL--																	
NAT INFLOW	1200	123	58	74	350	185	140	75	65	75	10	-3	-1	-1	5	-5	50
DEPLETION	80	1	1	1	4	9	12	18	15	7	1	1	0	1	3	3	3
EVAPORATION	80							6	19	24	18	4	2	2	7		
REG INFLOW	22037	684	354	430	1351	1573	1909	2585	2587	2384	1938	943	475	644	1444	1471	1266
RELEASE	22020	387	210	430	1351	1573	1909	2585	2587	2528	2577	1256	586	670	1335	1130	907
STOR CHANGE	17	297	144		0			0	0	-144	-639	-313	-111	-26	109	341	359
STORAGE	2984.	3281	3425	3425	3425	3425	3425	3425	3425	3281	2642	2329	2218	2192	2301	2642	3001
ELEV FTMSL	1349.8	1353.5	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.0	1340.0	1338.0	1337.5	1339.5	1345.0	1350.0
DISCH KCFS	18.100	13.0	15.1	24.1	22.7	25.6	32.1	42.0	42.1	42.5	41.9	42.2	42.2	42.2	21.7	18.4	16.3
POWER																	
AVE POWER MW		108	127	203	192	216	270	337	337	336	319	297	284	280	159	139	130
PEAK POW MW		350	356	356	356	356	356	356	356	350	319	296	288	285	294	320	339
ENERGY GWH	2094.6	38.7	21.4	43.9	138.2	160.6	194.3	250.4	250.5	241.8	237.0	106.9	47.8	53.7	118.2	103.7	87.4
--GAVINS POINT--																	
NAT INFLOW	2000	106	50	64	240	290	210	180	145	115	135	60	28	32	85	95	165
DEPLETION	114	0	0	0	5	19	24	39	10	-5	2	5	2	3	10	1	
CHAN STOR	2	10	-4	-17	3	-6	-12	-19	0	-1	1	-1	0	0	38	6	4
EVAPORATION	23							1	5	6	5	1	1	1	3		
REG INFLOW	23884	504	256	477	1589	1839	2083	2705	2717	2641	2705	1309	611	698	1445	1230	1076
RELEASE	23886	506	256	477	1589	1839	2083	2705	2705	2618	2705	1309	611	698	1445	1230	1111
STOR CHANGE	-2	-2							12	23							-35
STORAGE	329.	327	327	327	327	327	327	327	339	362	362	362	362	362	362	362	327
ELEV FTMSL	1206.1	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.5	1207.5	1207.5	1207.5	1207.5	1207.5	1207.5	1206.0
DISCH KCFS	22.000	17.0	18.4	26.7	26.7	29.9	35.0	44.0	44.0	44.0	44.0	44.0	44.0	44.0	23.5	20.0	20.0
POWER																	
AVE POWER MW		59	64	91	91	101	112	113	114	115	116	116	116	116	78	70	69
PEAK POW MW		114	114	114	114	114	114	113	114	116	116	116	116	116	78	78	76
ENERGY GWH	851.4	21.3	10.7	19.7	65.6	74.9	80.6	84.1	84.8	82.9	86.3	41.8	19.5	22.3	58.4	52.0	46.6
--GAVINS POINT - SIOUX CITY--																	
NAT INFLOW	2800	165	77	99	390	730	435	240	180	135	70	43	20	23	50	30	115
DEPLETION	293	8	4	5	25	37	33	41	40	27	13	7	3	4	15	16	16
REGULATED FLOW AT SIOUX CITY																	
KAF	26393	663	329	571	1954	2532	2485	2904	2845	2726	2762	1345	627	717	1480	1244	1210
KCFS		22.3	23.7	32.0	32.8	41.2	41.8	47.2	46.3	45.8	44.9	45.2	45.2	45.2	24.1	20.2	21.8
--TOTAL--																	
NAT INFLOW	30600	1643	766	985	3395	4475	6780	4325	1650	1345	1330	673	314	359	685	700	1175
DEPLETION	3018	13	6	8	-32	588	1938	1409	331	-218	-162	-178	-83	-95	-219	-187	-101
CHAN STOR	12	94	-4	-17	-32	-41	-53	-15	0	37	38	-1	0	7	10	-15	4
EVAPORATION	1235							85	266	329	282	66	30	35	142		
STORAGE	56137.	57199	57626	58016	59457	60771	63075	62986	61193	59738	58224	57664	57403	57112	56405	56033	56103
SYSTEM POWER																	
AVE POWER MW		813	901	982	995	1227	1518	1782	1785	1663	1431	1412	1442	1524	1081	1110	1058
PEAK POW MW		2415	2417	2422	2441	2457	2479	2475	2457	2445	2422	2395	2383	2376	2339	2358	2365
ENERGY GWH	11679.7	292.8	151.4	212.0	716.6	913.2	1093.1	1325.8	1328.3	1197.1	1064.9	508.4	242.3	292.5	804.3	825.7	711.3
DAILY GWH		19.5	21.6	23.6	23.9	29.5	36.4	42.8	42.8	39.9	34.4	33.9	34.6	36.6	25.9	26.6	25.4

VALUES IN 1000 AF EXCEPT AS INDICATED

	29FEB20	2020												2021			
	INI-SUM	15MAR	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB
--FORT PECK--																	
NAT INFLOW	7200	227	106	136	560	1145	1830	840	365	290	385	205	96	109	295	260	350
DEPLETION	575	-15	-7	-9	42	270	577	298	43	-90	-112	-31	-14	-16	-127	-142	-92
EVAPORATION	458							28	88	109	95	43	20	23	50		
MOD INFLOW	6167	242	113	145	518	875	1253	514	234	271	402	192	90	103	372	402	442
RELEASE	6399	193	90	116	476	553	655	676	676	505	369	179	83	103	553	615	555
STOR CHANGE	-232	49	23	29	42	322	598	-163	-443	-235	33	14	6	-1	-181	-213	-113
STORAGE	14785.	14834	14857	14886	14928	15250	15848	15686	15243	15009	15041	15055	15061	15061	14880	14667	14553
ELEV FTMSL	2234.0	2234.2	2234.3	2234.5	2234.7	2236.2	2238.9	2238.2	2236.1	2235.0	2235.2	2235.3	2235.3	2235.3	2234.4	2233.4	2232.9
DISCH KCFS	12.000	6.5	6.5	6.5	8.0	9.0	11.0	11.0	11.0	8.5	6.0	6.0	6.0	6.5	9.0	10.0	10.0
POWER																	
AVE POWER MW		89	89	89	109	123	151	152	151	116	82	82	82	89	123	136	136
PEAK POW MW		188	188	188	188	189	191	191	189	189	189	189	189	189	188	188	187
ENERGY GWH	1058.6	31.9	14.9	19.2	78.5	91.5	108.8	112.8	112.3	83.6	61.0	29.5	13.8	17.1	91.4	101.2	91.2
--GARRISON--																	
NAT INFLOW	10900	479	223	287	780	1300	3120	2100	580	480	445	180	84	96	180	255	310
DEPLETION	1156	-2	-1	-1	-58	148	959	826	152	-159	-62	-159	-74	-85	-145	-107	-76
CHAN STOR	20	55	0	0	-15	-10	-20			24	24			-5	-25	-10	0
EVAPORATION	526							33	102	127	110	49	23	26	56		
REG INFLOW	15637	730	315	405	1299	1696	2796	1918	1002	1042	791	468	218	253	797	967	941
RELEASE	15921	536	250	321	1250	1476	1666	1660	1660	1311	1045	506	236	262	1168	1353	1222
STOR CHANGE	-285	194	65	84	50	220	1130	258	-658	-269	-255	-38	-18	-9	-371	-386	-280
STORAGE	17745.	17939	18004	18087	18137	18357	19487	19744	19086	18817	18562	18524	18507	18497	18127	17741	17460
ELEV FTMSL	1837.5	1838.1	1838.3	1838.6	1838.8	1839.5	1842.9	1843.7	1841.7	1840.9	1840.1	1840.0	1839.9	1839.9	1838.7	1837.5	1836.6
DISCH KCFS	24.000	18.0	18.0	18.0	21.0	24.0	28.0	27.0	27.0	22.0	17.0	17.0	17.0	16.5	19.0	22.0	22.0
POWER																	
AVE POWER MW		223	224	224	262	299	353	345	344	279	215	214	214	208	238	273	271
PEAK POW MW		529	530	531	532	535	551	554	546	542	538	538	537	537	532	526	522
ENERGY GWH	2419.3	80.4	37.6	48.5	188.4	222.7	254.2	256.4	255.6	200.7	159.7	77.1	35.9	39.9	177.0	203.1	182.2
--OAHE--																	
NAT INFLOW	2300	259	121	155	405	220	625	170	70	95	45	45	21	24	-15	-10	70
DEPLETION	801	26	12	16	53	81	172	212	144	33	-14	1	0	0	14	20	31
CHAN STOR	8	24			-12	-12	-15	4		19	20			2	-10	-12	
EVAPORATION	511							32	100	123	106	47	22	25	55		
REG INFLOW	16917	792	359	461	1590	1603	2104	1590	1486	1269	1019	503	235	262	1075	1311	1261
RELEASE	17158	531	321	358	1293	1543	1609	1849	1983	1754	1263	586	309	227	1113	1315	1103
STOR CHANGE	-241	261	38	103	297	60	494	-260	-497	-485	-245	-83	-74	35	-39	-4	157
STORAGE	18614.	18875	18913	19016	19313	19373	19868	19608	19111	18626	18381	18298	18223	18259	18220	18216	18373
ELEV FTMSL	1607.3	1608.2	1608.3	1608.6	1609.5	1609.7	1611.2	1610.4	1608.9	1607.4	1606.6	1606.3	1606.1	1606.2	1606.0	1606.0	1606.5
DISCH KCFS	22.400	17.8	23.1	20.1	21.7	25.1	27.0	30.1	32.2	29.5	20.5	19.7	22.3	14.3	18.1	21.4	19.9
POWER																	
AVE POWER MW		231	299	260	283	327	354	394	420	381	265	253	286	184	232	274	255
PEAK POW MW		711	712	714	719	720	727	723	715	707	703	701	700	701	700	700	703
ENERGY GWH	2690.5	83.2	50.3	56.2	203.7	243.4	254.8	293.1	312.2	274.3	196.9	91.1	48.0	35.3	172.8	203.8	171.4
--BIG BEND--																	
EVAPORATION	105							6	20	25	22	10	5	5	12		
REG INFLOW	17053	531	321	358	1293	1543	1609	1843	1963	1729	1241	576	305	222	1102	1315	1103
RELEASE	17096	574	321	358	1293	1543	1609	1843	1963	1729	1241	577	305	222	1101	1315	1103
STORAGE	1674.	1631	1631	1631	1631	1631	1631	1631	1631	1632	1632	1631	1631	1631	1631	1631	1631
ELEV FTMSL	1420.7	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0
DISCH KCFS	22.100	19.3	23.1	20.1	21.7	25.1	27.0	30.0	31.9	29.1	20.2	19.4	21.9	14.0	17.9	21.4	19.9
POWER																	
AVE POWER MW		91	108	94	102	117	127	140	149	138	99	97	110	70	90	105	95
PEAK POW MW		517	509	509	509	509	509	509	509	517	538	538	538	538	538	538	529
ENERGY GWH	987.5	32.8	18.2	20.3	73.2	87.4	91.1	104.4	111.1	99.1	73.7	35.1	18.5	13.5	67.0	78.0	64.0
--FORT RANDALL--																	
NAT INFLOW	900	121	56	73	160	165	135	70	60	35		-5	-2	-3		-10	45
DEPLETION	80	1	1	1	4	9	12	18	15	7	1	1	0	1	3	3	3
EVAPORATION	116							8	25	31	24	9	4	4	9		
REG INFLOW	17800	693	376	430	1449	1699	1732	1887	1982	1725	1216	562	298	215	1089	1302	1145
RELEASE	17784	396	232	430	1449	1699	1732	1887	1982	1869	1855	875	409	241	980	961	786
STOR CHANGE	16	297	144					0	0	-144	-639	-313	-111	-26	108	341	359
STORAGE	2984.	3281	3425	3425	3425	3425	3425	3425	3425	3281	2642	2329	2218	2192	2300	2641	3000
ELEV FTMSL	1349.8	1353.5	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.0	1340.0	1338.0	1337.5	1339.5	1345.0	1350.0
DISCH KCFS	17.100	13.3	16.7	24.1	24.4	27.6	29.1	30.7	32.2	31.4	30.2	29.4	29.5	15.2	15.9	15.6	14.2
POWER																	
AVE POWER MW		110	141	203	206	233	245	258	271	262	242	222	215	111	117	119	113
PEAK POW MW		350	356	356	356	356	356	356	356	350	319	296	287	285	294	320	339
ENERGY GWH	1756.5	39.6	23.7	43.9	148.1	173.3	176.5	192.1	201.7	188.9	179.7	79.9	36.2	21.3	87.2	88.4	75.9
--GAVINS POINT--																	
NAT INFLOW	1500	102	47	61	145	165	175	100	90	95	120	58	27	31	80	85	120
DEPLETION	114	0	0	0	5	19	24	39	10	-5	2	5	2	3	10	1	
CHAN STOR	4	7	-7	-14	-1	-6	-3	-3	-3	2	2	1	0	26	-1	1	3
EVAPORATION	34							2	6	8	7	3	2	2	4		
REG INFLOW	19141	506	274	477	1588	1839	1880	1943	2053	1963	1968	925	432	294	1045	1045	909
RELEASE	19141	506	274	477	1588	1839	1880	1943	2041	1940	1968	925	432	294	1045	1045	944
STOR CHANGE									12	23							-35
STORAGE	327.	327	327	327	327	327	327	327	339	362	362	362	362	362	362	362	327
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.5	1207.5	1207.5	1207.5	1207.5	1207.5	1207.5	1206.0
DISCH KCFS	20.000	17.0	19.7	26.7	26.7	29.9	31.6	31.6	33.2	32.6	32.0	31.1	31.1	18.5	17.0	17.0	17.0
POWER																	
AVE POWER MW		59	68	91	91	101	105	105	109	109	108	106	106	65	60	60	60
PEAK POW MW		114	114	114	114	114	114	114	115	117	117	117	117	117	78	78	76
ENERGY GWH	784.0	21.2	11.4	19.7	65.6	74.9	75.3	77.8	80.9	78.3	80.6	38.3	17.9	12.5	44.7	44.7	40.1
--GAVINS POINT - SIOUX CITY--																	
NAT INFLOW	1800	162	76	97	280	345	190	165	130	110	60	30	14	16	25	25	75
DEPLETION	293	8	4	5	25	37	33	41	40	27	13	7	3	4	15	16	16
REGULATED FLOW AT SIOUX CITY																	
KAF	20648	660	346	570	1843	2147	2037	2067	2131	2023	2015	948	443	306	1055	1054	1003
KCFS		22.2	24.9	31.9	31.0	34.9	34.2	33.6	34.7	34.0	32.8	31.9	31.9	19.3	17.2	17.1	18.1
--TOTAL--																	
NAT INFLOW	24600	1350	630	810	2330	3340	6075	3445	1295	1105	1055	513	239	273	565	605	970
DEPLETION	3019	17	8	10	71	564	1777	1434	404	-187	-172	-176	-82	-94	-230	-209	-118
CHAN STOR	32	86	-7	-14	-27	-28	-38	1	-3	45	47	1	0	24	-36	-21	3
EVAPORATION	1749							109	342	424	364	162	75	86	185		
STORAGE	56129.	56887	57157	57373	57761	58363	60586	60421	58836	57726	56620	56199	56002	56002	55520	55258	55346
SYSTEM POWER																	
AVE POWER MW		803	929	962	1052	1201	1335	1393	1443	1285	1010	975	1013	727	860	967	930
PEAK POW MW		2410	2410	2413	2419	2424	2450	2448	2431	2422	2404	2379	2369	2367	2331	2349	2356
ENERGY GWH	9696.4	289.2	156.1	207.7	757.5	893.2	960.9	1036.6	1073.8	925.0	751.7	351.0	170.2	139.6	640.1	719.2	624.7
DAILY GWH		19.3	22.3	23.1	25.2	28.8	32.0	33.4	34.6	30.8	24.2	23.4	24.3	17.5	20.6	23.2	22.3

VALUES IN 1000 AF EXCEPT AS INDICATED

29FEB20		2020											2021			
	INI-SUM	15MAR	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB
--FORT PECK--																	
NAT INFLOW	5950	201	94	120	460	945	1510	645	290	240	320	168	78	89	240	240	310
DEPLETION	571	0	0	0	18	272	589	284	13	-127	-116	-33	-15	-18	-106	-115	-74
EVAPORATION	544							34	106	131	113	51	24	27	58		
MOD INFLOW	4835	201	94	121	442	673	921	327	171	236	323	149	70	80	288	355	384
RELEASE	6530	179	83	107	417	553	655	676	676	506	369	179	83	114	646	676	611
STOR CHANGE	-1695	23	11	14	25	120	266	-349	-505	-270	-46	-29	-14	-34	-358	-321	-227
STORAGE	14776.	14799	14809	14823	14849	14968	15235	14885	14380	14111	14065	14035	14022	13987	13630	13308	13081
ELEV FTMSL	2233.9	2234.1	2234.1	2234.2	2234.3	2234.8	2236.1	2234.5	2232.0	2230.7	2230.5	2230.3	2230.3	2230.1	2228.3	2226.7	2225.5
DISCH KCFS	10.500	6.0	6.0	6.0	7.0	9.0	11.0	11.0	11.0	8.5	6.0	6.0	6.0	7.2	10.5	11.0	11.0
POWER																	
AVE POWER MW		82	82	82	95	123	150	150	149	115	81	81	81	97	141	146	146
PEAK POW MW		188	188	188	188	189	189	188	187	186	186	186	186	186	184	183	182
ENERGY GWH	1067.4	29.4	13.7	17.7	68.7	91.3	108.2	111.7	111.0	82.7	60.2	29.1	13.6	18.6	104.6	109.0	98.0
--GARRISON--																	
NAT INFLOW	9150	404	189	242	640	1150	2600	1700	475	395	395	160	75	85	150	210	280
DEPLETION	1270	21	10	12	39	181	777	777	158	-135	-44	-145	-67	-77	-113	-75	-49
CHAN STOR	-5	45			-10	-20	-20			25	25			-12	-33	-5	
EVAPORATION	619							39	121	149	128	58	27	31	66		
REG INFLOW	13786	606	262	337	1008	1503	2458	1560	872	911	704	425	199	234	810	956	940
RELEASE	15845	506	236	303	1250	1506	1607	1599	1599	1277	1045	506	236	254	1230	1414	1277
STOR CHANGE	-2060	101	26	34	-242	-4	851	-38	-727	-366	-341	-80	-37	-20	-420	-458	-337
STORAGE	17739.	17840	17866	17899	17657	17653	18504	18466	17739	17373	17032	16952	16915	16895	16475	16017	15679
ELEV FTMSL	1837.5	1837.8	1837.9	1838.0	1837.2	1837.2	1839.9	1839.8	1837.5	1836.3	1835.1	1834.9	1834.7	1834.7	1833.2	1831.7	1830.5
DISCH KCFS	22.000	17.0	17.0	17.0	21.0	24.5	27.0	26.0	26.0	21.5	17.0	17.0	17.0	16.0	20.0	23.0	23.0
POWER																	
AVE POWER MW		211	211	211	260	302	335	325	323	264	208	207	207	195	242	275	273
PEAK POW MW		528	528	529	525	525	538	537	526	520	515	514	513	513	506	499	493
ENERGY GWH	2352.9	75.9	35.5	45.6	187.1	224.6	241.3	242.2	240.3	190.4	155.0	74.7	34.8	37.4	180.0	204.7	183.3
--OAHE--																	
NAT INFLOW	1350	177	82	106	285	130	315	110	50	55	15	13	6	7	-35	-15	50
DEPLETION	802	26	12	16	53	81	172	212	144	34	-14	1	0	0	14	20	31
CHAN STOR	-4	20			-16	-14	-10	4		19	19			4	-18	-13	0
EVAPORATION	569							37	113	138	117	52	24	28	60		
REG INFLOW	15821	676	306	394	1466	1542	1740	1464	1392	1180	976	466	218	237	1103	1366	1296
RELEASE	17901	488	365	449	1577	1846	1820	2069	2096	1874	1379	663	259	235	849	1058	874
STOR CHANGE	-2081	188	-59	-56	-111	-304	-80	-605	-704	-695	-402	-197	-42	2	254	308	423
STORAGE	18619.	18807	18748	18692	18581	18277	18197	17592	16887	16193	15791	15594	15552	15554	15808	16116	16538
ELEV FTMSL	1607.3	1607.9	1607.8	1607.6	1607.2	1606.2	1606.0	1603.9	1601.5	1599.0	1597.5	1596.8	1596.7	1596.7	1597.6	1598.7	1600.3
DISCH KCFS	23.300	16.4	26.3	25.2	26.5	30.0	30.6	33.6	34.1	31.5	22.4	22.3	18.7	14.8	13.8	17.2	15.7
POWER																	
AVE POWER MW		212	340	325	341	385	391	427	427	390	275	272	227	181	169	212	195
PEAK POW MW		710	709	708	706	701	700	689	676	663	656	652	651	651	656	662	670
ENERGY GWH	2722.4	76.5	57.1	70.2	245.8	286.4	281.3	317.5	317.8	280.5	204.7	97.8	38.2	34.7	125.6	157.4	130.9
--BIG BEND--																	
EVAPORATION	131							8	25	31	28	12	6	7	14		
REG INFLOW	17770	488	365	449	1577	1846	1820	2061	2071	1843	1351	650	253	229	834	1058	874
RELEASE	17812	530	365	449	1577	1846	1820	2061	2071	1842	1352	650	253	229	834	1058	874
STORAGE	1673.	1631	1631	1631	1631	1631	1631	1631	1631	1632	1631	1631	1631	1631	1631	1631	1631
ELEV FTMSL	1420.7	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0
DISCH KCFS	23.000	17.8	26.3	25.2	26.5	30.0	30.6	33.5	33.7	31.0	22.0	21.9	18.2	14.4	13.6	17.2	15.7
POWER																	
AVE POWER MW		84	123	118	124	140	143	157	158	147	108	109	92	73	68	85	75
PEAK POW MW		517	509	509	509	509	509	509	509	517	538	538	538	538	538	538	529
ENERGY GWH	1026.3	30.3	20.7	25.4	89.3	104.5	103.0	116.7	117.3	105.6	80.2	39.3	15.4	14.0	51.0	62.9	50.7
--FORT RANDALL--																	
NAT INFLOW	450	77	36	46	80	65	110	35	25		-20	-8	-4	-4	-10	-20	40
DEPLETION	80	1	1	1	4	9	12	18	15	7	1	1	0	1	3	3	3
EVAPORATION	145							10	32	39	31	12	5	5	12		
REG INFLOW	18037	606	401	495	1653	1902	1918	2068	2050	1796	1300	630	244	219	810	1035	911
RELEASE	18023	311	257	495	1653	1902	1918	2068	2050	1940	1939	884	414	245	701	694	552
STOR CHANGE	15	295	144	0				0	0	-144	-639	-254	-170	-26	109	341	359
STORAGE	2986.	3281	3425	3425	3425	3425	3425	3425	3425	3281	2642	2388	2218	2192	2301	2642	3001
ELEV FTMSL	1349.8	1353.5	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.0	1341.0	1338.0	1337.5	1339.5	1345.0	1350.0
DISCH KCFS	17.700	10.5	18.5	27.7	27.8	30.9	32.2	33.6	33.3	32.6	31.5	29.7	29.8	15.4	11.4	11.3	9.9
POWER																	
AVE POWER MW		87	156	234	234	260	271	283	280	272	252	225	219	113	84	86	79
PEAK POW MW		350	356	356	356	356	356	356	356	350	319	301	287	285	294	319	339
ENERGY GWH	1787.2	31.2	26.1	50.5	168.6	193.6	195.1	210.3	208.4	196.0	187.8	81.1	36.8	21.7	62.5	64.1	53.4
--GAVINS POINT--																	
NAT INFLOW	1300	92	43	55	125	140	150	85	70	80	105	50	23	27	75	75	105
DEPLETION	114	0	0	0	5	19	24	39	10	-5	2	5	2	3	10	1	
CHAN STOR	13	14	-15	-18	0	-6	-2	-3	1	1	2	3	0	27	8	0	3
EVAPORATION	42							2	8	10	9	4	2	2	5		
REG INFLOW	19180	418	284	533	1773	2017	2041	2109	2103	2016	2035	928	433	294	769	769	659
RELEASE	19179	417	284	533	1773	2017	2041	2109	2091	1993	2035	928	433	294	769	769	694
STOR CHANGE	1	1							12	23							-35
STORAGE	326.	327	327	327	327	327	327	327	339	362	362	362	362	362	362	362	327
ELEV FTMSL	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.5	1207.5	1207.5	1207.5	1207.5	1207.5	1207.5	1206.0
DISCH KCFS	20.000	14.0	20.5	29.8	29.8	32.8	34.3	34.3	34.0	33.5	33.1	31.2	31.2	18.5	12.5	12.5	12.5
POWER																	
AVE POWER MW		49	71	100	100	107	111	111	110	111	111	107	107	65	44	44	44
PEAK POW MW		114	114	114	114	114	114	114	115	117	117	117	117	117	78	78	76
ENERGY GWH	773.9	17.6	11.9	21.7	72.3	79.8	79.6	82.2	82.1	79.8	82.5	38.3	17.9	12.5	33.0	33.0	29.6
--GAVINS POINT - SIOUX CITY--																	
NAT INFLOW	1100	121	56	73	145	185	115	100	80	65	35	23	11	12	10	20	50
DEPLETION	293	8	4	5	25	37	33	41	40	27	13	7	3	4	15	16	16
REGULATED FLOW AT SIOUX CITY																	
KAF	19986	530	337	600	1893	2165	2123	2168	2131	2031	2057	944	440	302	764	773	728
KCFS		17.8	24.3	33.6	31.8	35.2	35.7	35.3	34.7	34.1	33.5	31.7	31.7	19.0	12.4	12.6	13.1
--TOTAL--																	
NAT INFLOW	19300	1072	500	643	1735	2615	4800	2675	990	835	850	405	189	216	430	510	835
DEPLETION	3130	55	26	33	144	599	1607	1371	380	-199	-158	-164	-77	-87	-177	-150	-73
CHAN STOR	4	78	-15	-18	-26	-40	-32	1	1	45	46	3	0	19	-43	-18	3
EVAPORATION	2049							130	404	499	426	189	87	99	215		
STORAGE	56119.	56685	56806	56798	56470	56281	57319	56326	54402	52951	51523	50962	50700	50621	50207	50076	50258
SYSTEM POWER																	
AVE POWER MW		725	982	1070	1155	1318	1401	1452	1447	1298	1035	1001	933	724	748	848	812
PEAK POW MW		2407	2405	2404	2399	2394	2406	2394	2369	2354	2331	2308	2293	2290	2257	2280	2290
ENERGY GWH	9730.1	260.9	165.0	231.1	831.8	980.2	1008.4	1080.5	1076.9	934.9	770.4	360.3	156.7	138.9	556.8	631.2	546.0
DAILY GWH		17.4	23.6	25.7	27.7	31.6	33.6	34.9	34.7	31.2	24.9	24.0	22.4	17.4	18.0	20.4	19.5

VALUES IN 1000 AF EXCEPT AS INDICATED

29FEB20	2020												2021			
INI-SUM	15MAR	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB
--FORT PECK--																
NAT INFLOW 5300	194	90	116	440	850	1180	595	260	230	310	145	68	77	220	230	295
DEPLETION 606	-12	-5	-7	33	288	583	296	39	-118	-110	-32	-15	-17	-114	-120	-84
EVAPORATION 521							33	102	125	108	49	23	26	56		
MOD INFLOW 4173	205	96	123	407	562	597	266	119	223	312	128	60	68	278	350	379
RELEASE 6580	179	83	107	506	553	655	676	676	506	369	179	83	106	615	676	611
STOR CHANGE -2408	27	12	16	-99	9	-58	-410	-557	-283	-57	-51	-24	-38	-337	-326	-232
STORAGE 14776.	14803	14815	14831	14732	14741	14683	14273	13716	13433	13376	13325	13301	13263	12927	12600	12368
ELEV FTMSL 2233.9	2234.1	2234.1	2234.2	2233.7	2233.8	2233.5	2231.5	2228.7	2227.3	2227.0	2226.7	2226.6	2226.4	2224.7	2222.9	2221.6
DISCH KCFS 10.500	6.0	6.0	6.0	8.5	9.0	11.0	11.0	11.0	8.5	6.0	6.0	6.0	6.7	10.0	11.0	11.0
POWER																
AVE POWER MW	82	82	82	116	122	149	149	148	113	80	80	80	89	132	144	143
PEAK POW MW	188	188	188	188	188	188	186	185	184	183	183	183	183	182	180	179
ENERGY GWH 1066.3	29.4	13.7	17.7	83.3	91.0	107.5	110.7	109.9	81.7	59.5	28.8	13.4	17.1	98.5	107.4	96.4
--GARRISON--																
NAT INFLOW 7400	382	178	229	580	1100	2165	935	325	215	385	150	70	80	140	195	270
DEPLETION 1141	22	10	13	27	110	631	735	134	-156	-44	-123	-57	-65	-64	-26	-7
CHAN STOR -6	45			-25	-5	-20			25	25			-7	-33	-10	
EVAPORATION 603							39	118	145	125	56	26	30	64		
REG INFLOW 12231	583	251	323	1034	1538	2169	838	749	756	698	395	184	215	722	887	888
RELEASE 15152	506	236	303	1190	1414	1458	1445	1445	1206	1045	506	222	254	1230	1414	1277
STOR CHANGE -2922	77	15	20	-156	124	711	-607	-696	-450	-347	-111	-38	-39	-508	-527	-389
STORAGE 17739.	17816	17832	17851	17695	17819	18530	17923	17227	16777	16430	16319	16281	16242	15734	15207	14817
ELEV FTMSL 1837.5	1837.7	1837.8	1837.8	1837.3	1837.7	1840.0	1838.1	1835.8	1834.3	1833.1	1832.7	1832.6	1832.4	1830.7	1828.8	1827.3
DISCH KCFS 22.000	17.0	17.0	17.0	20.0	23.0	24.5	23.5	23.5	20.3	17.0	17.0	16.0	16.0	20.0	23.0	23.0
POWER																
AVE POWER MW	211	211	211	248	284	305	293	289	247	206	205	192	192	238	270	267
PEAK POW MW	527	527	528	525	527	538	529	518	511	506	504	503	503	494	486	479
ENERGY GWH 2231.4	75.9	35.5	45.6	178.3	211.4	219.6	218.0	215.2	177.8	153.0	73.7	32.3	36.9	177.3	201.1	179.7
--OAHE--																
NAT INFLOW 1150	169	79	102	200	110	305	105	40	45	5	8	4	4	-45	-20	40
DEPLETION 802	26	12	16	53	81	172	212	144	34	-14	1	0	0	14	20	31
CHAN STOR -5	20			-12	-12	-6	4		14	15		5	0	-18	-14	0
EVAPORATION 545							36	109	132	111	50	23	26	57		
REG INFLOW 14951	669	303	389	1325	1431	1585	1306	1232	1100	968	463	207	231	1095	1361	1286
RELEASE 17921	511	375	462	1576	1871	1850	2046	2080	1848	1352	591	312	230	865	1068	884
STOR CHANGE -2970	158	-73	-73	-251	-440	-265	-739	-848	-749	-384	-128	-105	1	230	292	403
STORAGE 18619.	18777	18705	18632	18381	17941	17676	16937	16089	15340	14956	14828	14723	14724	14954	15247	15649
ELEV FTMSL 1607.3	1607.9	1607.6	1607.4	1606.6	1605.1	1604.2	1601.7	1598.6	1595.9	1594.4	1593.9	1593.5	1593.5	1594.4	1595.5	1597.0
DISCH KCFS 23.300	17.2	27.0	25.9	26.5	30.4	31.1	33.3	33.8	31.1	22.0	19.9	22.5	14.5	14.1	17.4	15.9
POWER																
AVE POWER MW	222	349	334	341	388	394	417	418	378	265	238	269	174	169	210	194
PEAK POW MW	710	708	707	703	695	691	677	661	647	640	638	636	636	640	646	653
ENERGY GWH 2695.2	80.0	58.6	72.1	245.2	288.9	283.7	310.6	310.8	272.0	197.3	85.9	45.2	33.3	125.7	156.0	130.0
--BIG BEND--																
EVAPORATION 131							8	25	31	28	12	6	7	14		
REG INFLOW 17790	511	375	462	1576	1871	1850	2038	2055	1817	1324	579	306	223	850	1068	884
RELEASE 17831	553	375	462	1576	1871	1850	2038	2054	1817	1325	579	306	223	850	1068	884
STORAGE 1673.	1631	1631	1631	1631	1631	1631	1631	1631	1632	1631	1631	1631	1631	1631	1631	1631
ELEV FTMSL 1420.7	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0
DISCH KCFS 23.000	18.6	27.0	25.9	26.5	30.4	31.1	33.1	33.4	30.5	21.5	19.4	22.0	14.1	13.8	17.4	15.9
POWER																
AVE POWER MW	88	127	121	124	142	145	155	156	145	106	98	111	71	70	85	76
PEAK POW MW	517	509	509	509	509	509	509	509	517	538	538	538	538	538	538	529
ENERGY GWH 1027.5	31.6	21.3	26.2	89.3	106.0	104.7	115.4	116.3	104.1	78.6	35.2	18.6	13.6	51.9	63.5	51.3
--FORT RANDALL--																
NAT INFLOW 350	68	32	41	85	50	95	25	15	-5	-25	-10	-5	-5	-20	-25	35
DEPLETION 80	1	1	1	4	9	12	18	15	7	1	1	0	1	3	3	3
EVAPORATION 145							10	32	39	31	12	5	5	12		
REG INFLOW 17957	619	406	502	1657	1912	1933	2035	2023	1765	1268	556	296	213	816	1040	916
RELEASE 17942	324	262	502	1657	1912	1933	2035	2023	1909	1907	869	407	239	707	699	557
STOR CHANGE 15	295	144			0	0	0	0	-144	-639	-313	-111	-26	109	341	359
STORAGE 2986.	3281	3425	3425	3425	3425	3425	3425	3425	3281	2642	2329	2218	2192	2301	2642	3001
ELEV FTMSL 1349.8	1353.5	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.0	1340.0	1338.0	1337.5	1339.5	1345.0	1350.0
DISCH KCFS 17.700	10.9	18.9	28.1	27.9	31.1	32.5	33.1	32.9	32.1	31.0	29.2	29.3	15.0	11.5	11.4	10.0
POWER																
AVE POWER MW	90	159	237	235	262	273	278	277	268	248	220	215	110	85	87	80
PEAK POW MW	350	356	356	356	356	356	356	356	350	319	296	287	285	294	319	339
ENERGY GWH 1779.0	32.5	26.7	51.2	169.0	194.7	196.6	206.9	205.7	192.9	184.7	79.4	36.0	21.1	63.1	64.6	53.9
--GAVINS POINT--																
NAT INFLOW 1200	80	37	48	120	130	135	80	60	75	100	48	22	25	70	70	100
DEPLETION 114	0	0	0	5	19	24	39	10	-5	2	5	2	3	10	1	
CHAN STOR 13	13	-15	-18	1	-6	-3	-1	0	2	2	3	0	26	7	0	2
EVAPORATION 42							2	8	10	9	4	2	2	5		
REG INFLOW 19000	418	284	533	1773	2017	2041	2072	2066	1981	1998	910	425	286	769	769	659
RELEASE 18999	417	284	533	1773	2017	2041	2072	2054	1958	1998	910	425	286	769	769	694
STOR CHANGE 1	1							12	23							-35
STORAGE 326.	327	327	327	327	327	327	327	339	362	362	362	362	362	362	362	327
ELEV FTMSL 1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.0	1206.5	1207.5	1207.5	1207.5	1207.5	1207.5	1207.5	1207.5	1206.0
DISCH KCFS 20.000	14.0	20.5	29.8	29.8	32.8	34.3	33.7	33.4	32.9	32.5	30.6	30.6	18.0	12.5	12.5	12.5
POWER																
AVE POWER MW	49	71	100	100	107	111	109	109	109	110	105	105	64	44	44	44
PEAK POW MW	114	114	114	114	114	114	114	115	117	117	117	117	117	78	78	76
ENERGY GWH 769.0	17.6	11.9	21.7	72.3	79.8	79.6	81.3	81.2	78.8	81.5	37.8	17.7	12.2	33.0	33.0	29.6
--GAVINS POINT - SIOUX CITY--																
NAT INFLOW 700	87	41	52	90	120	65	70	40	30	30	18	8	9	5	15	20
DEPLETION 293	8	4	5	25	37	33	41	40	27	13	7	3	4	15	16	16
REGULATED FLOW AT SIOUX CITY																
KAF 19406	496	321	580	1838	2100	2073	2101	2054	1961	2015	921	430	291	759	768	698
KCFS	16.7	23.2	32.5	30.9	34.2	34.8	34.2	33.4	33.0	32.8	31.0	31.0	18.4	12.3	12.5	12.6
--TOTAL--																
NAT INFLOW 16100	980	457	588	1515	2360	3945	1810	740	590	805	358	167	191	370	465	760
DEPLETION 3036	45	21	27	147	544	1455	1341	382	-211	-152	-141	-66	-75	-136	-106	-41
CHAN STOR 3	78	-15	-18	-36	-23	-29	3	0	41	42	3	4	20	-45	-24	2
EVAPORATION 1987							128	393	483	412	183	84	96	208		
STORAGE 56119.	56635	56734	56697	56191	55884	56272	54516	52427	50825	49396	48793	48516	48414	47909	47689	47794
SYSTEM POWER																
AVE POWER MW	742	998	1086	1163	1306	1377	1402	1397	1260	1014	946	971	700	739	841	805
PEAK POW MW	2406	2404	2403	2396	2390	2396	2372	2345	2327	2303	2276	2265	2262	2226	2247	2255
ENERGY GWH 9568.4	267.0	167.7	234.5	837.3	971.8	991.8	1042.9	1039.2	907.4	754.7	340.7	163.2	134.3	549.5	625.7	541.0
DAILY GWH	17.8	24.0	26.1	27.9	31.3	33.1	33.6	33.5	30.2	24.3	22.7	23.3	16.8	17.7	20.2	19.3
INI-SUM	15MAR	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB