

US Army Corps  
of Engineers

*Final*

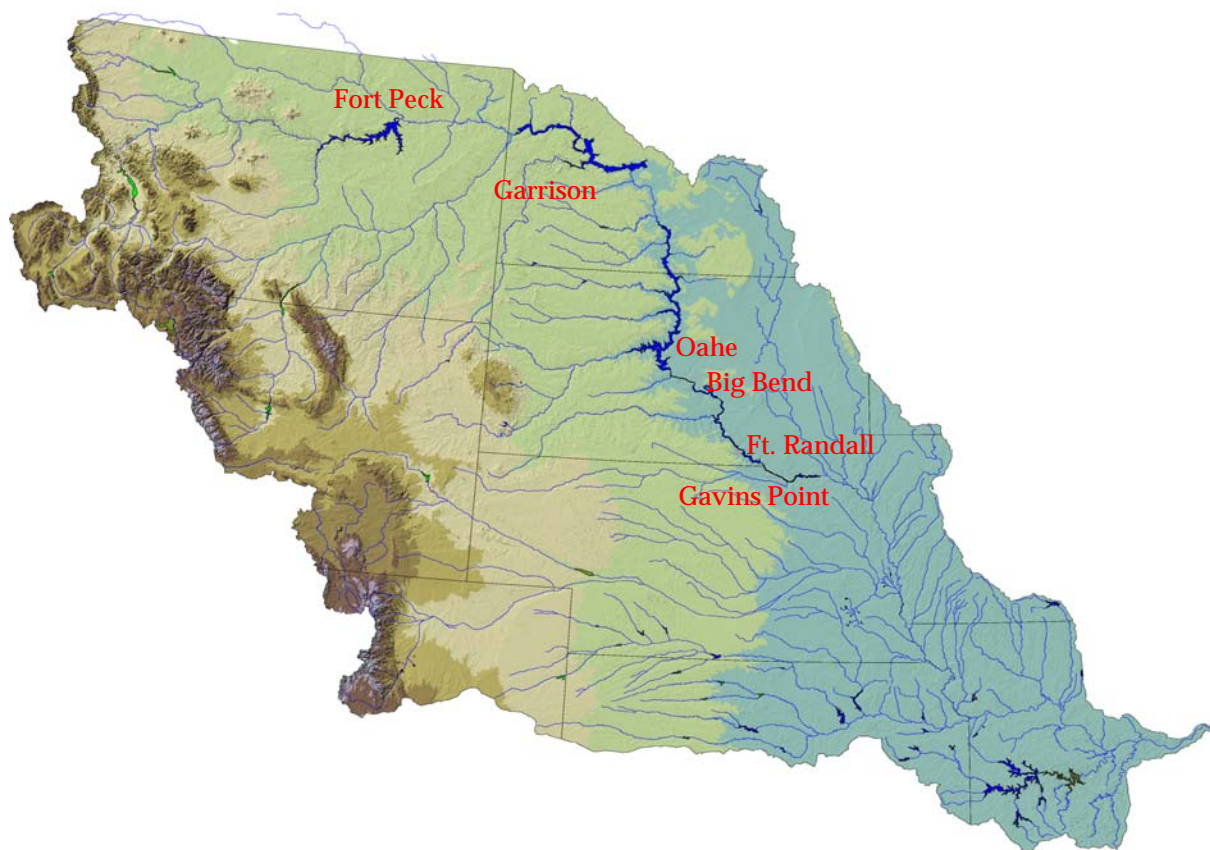
**AOP**

*2009-2010*

*Northwestern Division  
Missouri River Basin  
Water Management Division*

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*Missouri River Mainstem System  
2009-2010 Annual Operating Plan*



*Annual Operating Plan Process  
57 Years Serving the Missouri River Basin*

*December 2009*





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

DEC 15 2009

REPLY TO  
ATTENTION OF

Division Commander

Dear Stakeholders and Concerned Citizens:

This Annual Operating Plan (AOP) presents the Corps of Engineers' regulation of the Missouri River Mainstem Reservoir System (System) through December 2010. The AOP is based upon water management guidelines designed to meet the reservoir regulation objectives of the existing Missouri River Master Water Control Manual (Master Manual) updated in March 2006.

The AOP information provides a framework for the development of detailed monthly, weekly, and daily regulation schedules for the System's six individual dams during the upcoming year to serve its Congressionally-authorized project purposes. System water management is provided by my staff at the Missouri River Basin Water Management Division, Northwestern Division, U.S. Army Corps of Engineers, located in Omaha, Nebraska.

A draft of this AOP was made available to the public in September 2009. A report presenting Draft AOP meeting comments, including copies of all the comment letters received, is available upon request.

Runoff into the Missouri River basin was much above normal this year, dramatically increasing water stored in the System. As a result, the AOP shows improved service to all authorized purposes in 2010. Water conservation measures will continue to be a consideration as the System completes its recovery and to ensure service to all project purposes should drought conditions return. With the higher System storage levels, the AOP indicates the implementation of a bimodal spring pulse (March and May) from Gavins Point Dam in 2010 under all runoff scenarios, downstream flow conditions permitting. These pulses are consistent with those outlined in the 2003 Amended Biological Opinion and the 2006 Master Manual.

We realize that the benefits provided by the System are vitally important to the Nation and the people who live and work in the Basin. We believe that the continued implementation of the revised Master Manual, and more specifically this AOP, will result in an appropriate balance of benefits provided to all of the people who rely on the System. Thank you for your interest in the regulation of the System.

Sincerely,

A handwritten signature in black ink, appearing to read "John R. McMahon".

John R. McMahon  
Brigadier General, US Army  
Division Commander



# MISSOURI RIVER MAINSTEM RESERVOIR SYSTEM

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## ABBREVIATIONS

AOP	- annual operating plan
ac.ft.	- acre-feet
ACHP	- Advisory Council on Historic Preservation
AF	- acre-feet
B	- Billion
BiOp	- Biological Opinion
BOR	- Bureau of Reclamation
cfs	- cubic feet per second
COE	- 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)
GIS	- Geographic Information System
GWh	- gigawatt hour
ISP	- initial starting point
KAF	- 1,000 acre-feet
Kcfs	- 1,000 cubic feet per second
kW	- kilowatt
kWh	- kilowatt hour
M	- million
MAF	- million acre-feet
MRBA	- Missouri River Basin Association
MRNRC	- Missouri River Natural Resources Committee
msl	- mean sea level
MW	- megawatt
MWh	- megawatt hour
NEPA	- National Environmental Policy Act
plover	- piping plover
pp	- powerplant
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
tern	- interior least tern
T&E	- Threatened and Endangered
THPO	- Tribal Historic Preservation Officers

tw - tailwater  
USFWS - United States Fish and Wildlife Service  
USGS - United States Geological Survey  
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.

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# MISSOURI RIVER MAINSTEM RESERVOIR SYSTEM

## Annual Operating Plan 2009 - 2010

### I. FOREWORD

This Annual Operating Plan (AOP) presents pertinent information and plans for regulating the Missouri River Mainstem Reservoir System (System) through December 2010 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 dams 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 is directed by the Missouri River Basin Water Management Division, 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*.

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 during periods of extended drought to maintain minimum river or reservoir levels to keep intakes operational, and adjustments in reservoir releases or reservoir levels 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 Calendar Year 2008 Regulation," dated April 2009. Both reports are currently available at the "Reports and Publications" link on our web site at: [www.nwd-mr.usace.army.mil/rcc](http://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 Calendar Year 2009 Regulation" will be available at the same site in April of 2010.

## II. PURPOSE AND SCOPE

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 meeting is 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 (THPO's), State Historic Preservation Officers (SHPO's), 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 AOP's 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 August 4, 2009, was sent to the Tribes offering consultation on the 2009-2010 AOP. Meeting times and locations of the six 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 AOP's. 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/treaty.

The 2009 spring public meetings were held at the following locations and dates: April 6 at Fort Peck, Montana; April 7 at Bismarck, North Dakota and Fort Pierre, South Dakota; April 8 at Jefferson City, Missouri and Kansas City, Missouri; April 9 at

Nebraska City, Nebraska. The attendees were given an update regarding the outlook for 2009 runoff and projected System regulation for the remainder of 2009. Six fall public meetings on the Draft 2009-2010 AOP were held: October 5 in Nebraska City, Nebraska; October 6 in Kansas City and Jefferson City, Missouri; October 7 in Fort Peck, Montana and Bismarck, North Dakota; and October 8 in Pierre, South Dakota.

In the spring of 2010, 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 2009-2010 AOP.

### **III. MAINSTEM MASTER MANUAL AND ESA CONSULTATIONS**

The Missouri River Mainstem Reservoir System Master Water Control Manual (Master Manual) presents the water control plan and operational objectives for the integrated regulation of the System. First published in 1960 and subsequently revised during the 1970's, the Master Manual was revised in March 2004 to include more stringent drought conservation measures. The 2003 Amendment to the 2000 Biological Opinion (2003 Amended BiOp) presented the USFWS' opinion that the regulation of the System would jeopardize the continued existence of the endangered pallid sturgeon. The USFWS provided a Reasonable and Prudent Alternative (RPA) to avoid jeopardy to the pallid sturgeon that included a provision for the Corps to develop a plan to implement a bimodal 'spring pulse' from Gavins Point Dam. Working with the USFWS, Tribes, states and basin stakeholders, the Corps developed technical criteria for the bimodal spring pulse releases. In March 2006 the Master Manual was revised to include technical criteria for a spring pulse.

Current regulation of the System in accordance with the Master Manual to serve authorized project purposes is dependent on successful implementation of the 2003 Amended BiOp. Implementation of the RPA elements is accomplished through the Missouri River Recovery Program (MRRP) which includes the following elements: habitat construction including emergent sandbar habitat and shallow water habitat, flow modifications, propagation/hatchery support, research, monitoring and evaluation, and adaptive management. This AOP identifies flow modifications at Garrison, Fort Randall and Gavins Point for the benefit of the interior least tern and the piping plover, and the Gavins Point spring pulse for the benefit of the endangered pallid sturgeon. In addition, the ongoing construction and rehabilitation of emergent sandbar habitat construction is key to the continued operational flexibility of the System, especially in light of the return to more normal reservoirs levels and releases which has greatly reduced the amount of available emergent sandbar habitat for the terns and plovers. In the fall of 2009 and spring of 2010 100 acres of emergent sandbar habitat will be constructed in the headwaters of the Gavins Point reservoir and in the river reach below the dam. Prior to the 2011 nesting season an additional

approximately 150 acres of habitat will be made available. This habitat construction in combination with other ongoing efforts to minimize incidental take including but not limited to improving public awareness, better predation control plans, and not meeting flow targets in reaches without commercial navigation is expected to result in a greater likelihood of bird productivity. Additional information on other efforts undertaken through the Missouri River Recovery Program to meet the requirements of the 2003 Amended BiOp can be found in the Annual Report on the Biological Opinion which can be found on the "MRRP Documents" page of the Recovery Program website at: [www.moriverrecovery.org](http://www.moriverrecovery.org).

#### **IV. FUTURE RUNOFF: AUGUST 2009 - DECEMBER 2010**

Runoff into the six System reservoirs is typically low and relatively stable during the August-to-February period. The August 1 calendar year runoff forecast is used as input to the Basic reservoir regulation simulation in the AOP studies for the period August 2009 to February 2010. The August 1 runoff forecast for 2009 was 32.7 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 and Lower basic simulations, which are based on 120 percent and 80 percent of the August 1 runoff forecast, respectively.

Simulations for the March 1, 2010 to February 28, 2011 time period use five statistically derived inflow scenarios based on an analysis of historic water supply. The report that presents the details of the calculations used to develop these inflow scenarios was updated in July 2008 to include 9 additional years of inflow data that now extends from 1898 to 2006. Using statistically derived inflow scenarios provides a good range of simulation for dry, average, and wet conditions, and eliminates the need to forecast future precipitation, which is very difficult.

The five statistically derived inflows are identified as the Upper Decile, Upper Quartile, Median, Lower Quartile and Lower Decile runoff conditions. Upper Decile runoff (34.3 MAF) has a 1 in 10 chance of being exceeded, Upper Quartile (30.3 MAF) has a 1 in 4 chance of being exceeded, and Median (24.4 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 (16.2 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 Upper Decile and Upper Quartile simulations extend from the end of the Upper Basic simulation through February 2011. 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 2011.

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 I*, where water supply conditions are quantified for the period August 2009 through February 2011. The natural water supply for calendar year (CY) 2008 totaled 26.6 MAF.

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

	<u>Natural 1/</u>	<u>Post-1949 Depletions</u>	<u>Net 2/</u>
August 2009 through February 2010 (Basic Runoff Scenario)			
Basic	7,100	600	7,700
120% Basic	8,500	500	9,000
80% Basic	5,700	800	6,500
Runoff Year March 2010 through February 2011 (Statistical Analysis of Past Records)			
Upper Decile	34,300	-2,200	32,100
Upper Quartile	30,300	-2,200	28,100
Median	24,400	-2,500	21,900
Lower Quartile	19,300	-2,500	16,800
Lower Decile	16,200	-2,500	13,700

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.

## V. ANNUAL OPERATING PLAN FOR 2009-2010

**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 will 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 2009-2010 AOP includes 13 years of regulation at Fort Peck (1940) by itself, plus 56 years of System experience as Fort Randall (1953), Garrison (1955), Gavins Point (1955), Oahe (1962), and Big Bend (1964) have been 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 and the high runoff period from 1993 - 1999 during which five of the seven years experienced runoff greater than Upper Quartile including the record runoff of 49.0 MAF in 1997. 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. 2009-2010 AOP Simulations.** AOP simulations for the five runoff scenarios are shown in the final section of this AOP as studies 4 through 8. The return of System storage to near normal levels will provide a great opportunity for the System to provide improved service to all authorized purposes. In summary, the studies provide the following: full service flow support during the first part of the navigation season under the Upper Quartile and Upper Decile runoff scenarios, near full service flow support for Median runoff, and intermediate service for Lower Quartile and Lower Decile; full service flow support after the July 1 System storage check for Median runoff and above and intermediate service for Lower Quartile and Lower Decile; a full length navigation season for all runoff scenarios; low winter releases for Lower Quartile and Lower Decile runoff; higher than normal winter releases for Upper Decile and Upper Quartile runoff, and near normal winter releases for Median runoff; March and May spring pulses from Gavins Point dam; 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 Quartile and Upper Decile runoff though flood water evacuation is required; emphasis on Oahe and Fort Peck for a steady to rising reservoir level during the forage fish



spawn; and reservoir releases and pool levels sufficient to keep all intakes operational under all runoff scenarios. Water conservation measures will 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, reducing flows to minimum levels to support various authorized purposes, 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 *Plates 4 and 5* for the System storage and the Fort Peck, Garrison and Oahe pool elevations.

Under all runoff scenarios modeled for the AOP, the March 1 and May 1 System storage is above the Gavins Point spring pulse precludes of 40.0 MAF. The peak magnitude of the March pulse is 5,000 cfs over navigation flows. Based on the technical criteria, the peak magnitude of the May pulse would be 20,000 cfs under the Upper Decile and Upper Quartile runoff scenarios, 16,000 for Median runoff, 11,600 cfs for Lower Quartile runoff and 11,500 cfs for Lower Decile runoff. The actual peak magnitude of the May pulse will be determined based on the actual System storage and the May 1 runoff forecast. The Master Manual technical criteria includes safeguards to minimize the risk of flooding associated with the spring pulses. Both spring pulses may be reduced or eliminated due to the downstream flow limits, shown on Plate 3, which are well below the channel capacity of the Missouri River. These flow limits are identical to the most restrictive flood control constraints presented in the previous Master Manual and provide a very similar level of flood protection. An additional safeguard is the incorporation of observed and anticipated precipitation into the daily river forecast to provide greater assurance that flows will remain below the downstream flow limits during the duration of the spring pulses. For simulation purposes, the magnitude of the May pulse for Median and above runoff was limited to 10,000 cfs due to the downstream flow limits. Water for the spring pulses will be withdrawn from one or more of the upper three reservoirs and/or Fort Randall depending on releases required to maintain steady to rising pools during the forage fish spawn and other considerations including impacts to historical and cultural sites and the need to evacuate stored flood waters. Prior to implementing the May pulse, the Corps will coordinate with the affected Tribes and States. The Corps will also work closely with the USFWS to insure the planned implementation of the spring pulses meet the intent of the 2003 Amended BiOp.

The reach of the Missouri River downstream of the Platte River experiences a more normalized hydrograph than the reach between Gavins Point and the Platte. As a result, the USFWS has indicated that reducing the spring pulses when possible downstream of the Platte River through reductions in Corps tributary reservoir projects still meets the intent of the 2003 Amended BiOp. If the releases at these downstream Corps tributary reservoirs can be reduced without undue increased risk to other areas,

it may be possible to reduce the impacts on the lower Missouri River due to the spring pulses. This type of regulation was implemented in conjunction with the March 2008 and May 2009 spring pulses. However, this type of regulation is only feasible when releases are scheduled from certain downstream Corps' tributary reservoirs, most likely due to recently captured runoff. Because of its higher magnitude, it is unlikely that the May pulse can be completely eliminated.

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. Full service navigation flows or more are provided for Upper Quartile and Upper Decile runoff conditions throughout the navigation season. Median runoff starts the season near full service and increases to full service based on the July 1 System storage check. Service levels for Lower Quartile and Lower Decile begin the season at an intermediate service level, and drop slightly based on the July 1 System storage check. Application of the July 1 System storage check (*see Plate 3*) indicated a full length navigation season would be provided for all five runoff conditions. Upper Quartile and Upper Decile simulations reach the desired 56.8 MAF System storage level on March 1, 2011.

For modeling purposes in this AOP, the Steady Release – Flow to Target (SR-FTT) regulation scenario for Gavins Point dam is shown during the 2010 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 adding the May spring pulse hydrograph to the long-term average release (*see Plate 3*) based on the service level, followed by cycling between the May and July table values for the remainder of the month to reflect an every third day peaking cycle from Gavins Point. The June release was modeled as a steady release due to the presence of chicks along the river at that time, and was set equal to 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 Lower Quartile and Lower Decile runoff conditions reflect a decrease in service level after July 1. The Upper Quartile and Upper Decile runoff simulations follow the Master Manual, with much above normal runoff requiring release increases early in the year to evacuate floodwater from the reservoirs. Although these modeled Gavins Point releases represent our best estimate of required releases during 2010, 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.

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 Quartile and Upper Decile. Under those two runoff scenarios, releases were based on flood water evacuation. Based on the September 1 storage checks, Gavins Point winter modeled releases ranged from 14,000 to 15,000 cfs during the 2009-2010 winter season for all runoff scenarios, and from 12,500 cfs to 20,000 cfs during the 2010-2011 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, Fort Peck and Oahe are scheduled to be favored during the 2010 forage fish spawn while also attempting to maintain rising water levels in Garrison. 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. Releases in the Lower Quartile and Lower Decile simulations are adjusted to maintain steady-to-rising pool levels at Fort Peck. The Lower Quartile and Lower Decile simulations show the Oahe pool rising during April, but dropping slightly during May and June.

Two additional modified reservoir regulation plans, the Fort Peck “mini-test” and unbalancing the upper three reservoirs, have been shown in previous AOPs, but have not been implemented due to low reservoir levels. The unbalancing of the three reservoirs to benefit reservoir fisheries and the endangered interior least tern and threatened piping plover will be transitioned to in 2010, and then implemented beginning in 2011. In 2011, Fort Peck will be high (see Plate 3), Garrison low, and Oahe allowed to float (normal operation) should Median or greater runoff occur. In terms of elevations for Upper Decile and Upper Quartile, Fort Peck would be 4.2 feet high, Garrison would be 3.0 feet low, and Oahe would be balanced on March 1, 2011. In terms of elevations for Median, Fort Peck would be 1.0 foot high and Garrison would be 1.0 foot low on March 1, 2011. This unbalancing is computed based on the percent of the carryover multiple-use pool. With regard to the Fort Peck mini-test, a priority for pallid sturgeon recovery has been placed on the Lower Yellowstone Project at Intake. The Fort Peck mini-test and full test flows will be deferred until the efficacy of the Lower Yellowstone Project has been assessed.

Actual System regulation from January 1 through July 31, 2009 and the simulated regulating plans for each project through CY 2010 using the five runoff scenarios described on Page 4 are presented on *Plates 6 through 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 for Fort Peck, Garrison, Oahe, and Gavins Point the 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 2008 through July 2009. *Plate 13* presents past and simulated gross average monthly power generation and gross peaking capability for the System.

**C. Regulation Plan for the Balance of the 2009 Navigation Season and Fall of 2009.** The regulation of the System for the period of August through November 2009 is presented in the following paragraphs.

Fort Peck Dam. Releases averaged 6,500 cfs during August and the first half of September. When irrigation ceased in mid-September they were reduced to 4,000 cfs. The releases will be held near that level through December. The Fort Peck pool remained essentially steady through the period and ended November near 2221 ft msl. It will slowly climb through the winter as releases are kept low due to the upper three reservoirs not being in balance. The record low pool elevation of 2196.2 feet msl was set in March 2007. The previous record low pool elevation was 2208.7 feet msl set in April 1991.

Garrison Dam. Releases averaged 16,000 cfs during August. They continued at 16,000 until mid-September and were then reduced to 12,500 cfs when irrigation ceased. Releases ranged from 12,500 cfs to 13,000 cfs during October and November as a water conservation measure and were then raised to 15,000 cfs in December. The Garrison pool level slowly fell to 1841 feet msl by the end of November and will continue to slowly decline through the winter as higher releases for hydropower are initiated. The record low pool elevation of 1805.8 feet msl was set in May 2005. The previous record low pool elevation was 1815.0 feet msl set in May 1991.

Oahe Dam. Releases averaged 25,600 cfs in August and 29,500 cfs in September in support of full service navigation. Releases were reduced in October to initiate the fall drawdown of the Fort Randall pool. Lower releases continued in November to complete the annual fall draw of Fort Randall. Releases will be increased in December for winter power production. The Oahe pool ended November at elevation 1608.1 feet msl. The record low Oahe pool elevation of 1570.2 feet msl was set in August 2006. The previous record low pool elevation was 1580.7 feet msl set in November 1989.

Big Bend Dam. Releases will parallel those from Oahe. Big Bend will generally fluctuate between 1420.0 feet msl and 1421.0 feet msl for weekly cycling during high power load periods.

Fort Randall Dam. Releases averaged 25,600 cfs in August, 28,700 in September, and 26,000 cfs in October to back up the releases from Gavins Point Dam. The majority of the fall pool draw down of Fort Randall occurred in October and November. Releases were reduced after the navigation season ended in late-November to the level required to back up Gavins Point winter releases.

Gavins Point Dam. Releases were scheduled to support downstream full service flows in reaches with scheduled commercial navigation throughout the 2009 navigation season. A full length navigation season was provided in accordance with the technical criteria for the July 1 System storage check presented in the Master Manual. The last day of flow support for the commercial navigation season ranged from November 21 at Sioux City to November 30 at the mouth near St. Louis. Releases were reduced by 3,000 cfs per day in mid-November until they reached 15,000 cfs. The Gavins Point pool level was raised 1.5 feet to elevation 1207.5 feet msl in September. The pool level will remain near that elevation during the fall and winter months.

**D. Regulation Plan for Winter 2009-2010.** The September 1 System storage check is used to determine the winter release rate from Gavins Point dam. A winter release of 12,000 cfs is scheduled if System storage is less than 55 MAF on September 1; 17,000 cfs is scheduled when System storage is above 58 MAF; and the release is prorated for System storages between 55 and 58 MAF. Under the basic runoff scenario, Gavins Point releases were shown as 14,500 cfs during the winter of 2009-2010, well above the levels seen in the previous drought years. The actual September 1 storage set winter releases at 15,500 cfs. If mild weather conditions prevail, System releases may be set lower than 15,500 cfs, but only if downstream water supply intakes can remain operable at those levels. The planned winter release rate may be less than is required for downstream water supply intakes without sufficient incremental tributary flows below the System, and therefore, releases may need to be set at levels higher than the winter release rate at times to ensure downstream water supply intakes are operable. However, we believe 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. It may be necessary at times to increase Gavins Point releases to provide adequate downstream flows due to the forecast of excessive river ice formation or if ice jams or blockages form which temporarily restrict flows. Based on past experiences, these events are expected to occur infrequently and be of short duration. Given these infrequent temporary release increases above the winter release rate, the winter System release will likely average around 15,500 cfs. It is anticipated that this year's winter release will be adequate to

serve all downstream water intakes except for very short periods during significant river ice formation or ice jamming.

Fort Peck Dam. Releases are expected to average 4,000 cfs to help balance System storage from December through February. Average winter release rates are about 11,000 cfs. The Basic simulation shows that the Fort Peck pool level will rise slightly to near 2223.2 feet msl during the winter period, ending February about 10.8 feet below the base of the annual flood control storage zone. Carryover multiple purpose storage in the three large upper reservoirs will be out of balance on March 1, 2010 due to minimum release requirements below the dam throughout the year. Fort Peck will end February 2010 about 6.1 feet low, Garrison about 2.0 feet high, and Oahe about 2.0 feet high. The pool level is expected to rise during March to near elevation 2224.5 feet msl.

Garrison Dam. Releases will be scheduled at 16,000 cfs in December increasing to 21,000 cfs for January and February to serve winter power loads and to help balance System storage. The December release rate should be sufficient to prevent ice induced flooding at the time of freeze-in, but temporary reductions in the releases may be scheduled to prevent exceedence of a 13-foot stage at the Bismarck gage. Flood stage is 16 feet. Average winter release rates for Garrison are 20,300 cfs in December, 22,800 cfs in January and 24,000 cfs in February. The Garrison pool level is expected to decline about 5.5 feet from near elevation 1841.0 feet msl at the end of November to near elevation 1835.5 feet msl by March 1, 2.0 feet below the base of the annual flood control storage zone. The Median simulation indicates the pool level will rise to elevation 1836.7 feet msl by March 31.

Oahe Dam. Releases for the winter season will provide backup for the Fort Randall and Gavins Point releases plus fill 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 about 16,800 cfs. Daily releases will vary widely to best meet power loads. Peak 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 problems develop downstream of Oahe Dam. This potential reduction has been coordinated with the Western Area Power Administration. Under the Median simulation, the Oahe pool level is expected to remain steady at 1604.1 from the end of November through the end of December before starting to rise to elevation 1605.4 feet msl by the beginning of March, 2.1 feet below the base of the annual flood control storage zone. The pool is expected to rise to elevation 1606.2 feet msl by the end of March.

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

Fort Randall Dam. Under the Median simulation releases averaged about 12,500 cfs during the winter season. Based on the actual September system storage check, releases will average about 13,500 cfs. The Fort Randall pool level is expected to rise from its fall drawdown elevation of 1337.5 feet msl to near elevation 1350.0 feet msl, the seasonal base of flood control, by March 1. However, if the plains snowpack flood potential downstream of Oahe Dam remains quite low, the Fort Randall pool level will be raised to near 1353.0 feet msl by March 1. It is likely that a pool level as high as 1355.2 feet msl could be reached by the end of the winter period on March 31 if runoff conditions permit. The Fort Randall pool level above the White River delta near Chamberlain, South Dakota will likely 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 Dam. 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 msl until late February when it will be lowered to elevation 1206.0 feet msl to create additional capacity to store spring runoff.

System storage for all runoff conditions will range between 52.0 and 55.0 million acre-feet by March 1, 2010, the beginning of next year's runoff season. System storage at the base of the annual flood control zone is 56.8 million acre-feet.

**E. Regulation During the 2010 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 by April 1, 2010, 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 2010 navigation season there is no commercial navigation scheduled to use the upper reaches of the navigation channel, we will consider eliminating navigation flow support for targets in those reaches to conserve water in the System, provide additional flood control, and/or minimize incidental take of the protected species during the nesting season.

Navigation flow support for the 2010 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 2010 navigation season for Upper Decile and Upper Quartile runoffs and near full support for Median runoff (200 cfs below full service). Lower Quartile and Lower Decile runoffs would result in reductions below full service of 2,000 cfs and 2,100 cfs, respectively. Following the July 1 System storage check, full service would be provided for the Median runoff scenario and above. Service levels would be further reduced for Lower Quartile and Lower Decile runoffs to 2,600 cfs and 3,600 cfs

below full service, respectively. If the July 1 System storage check indicates an increase in service level, any increase may be delayed until the end of the nesting season, depending on the potential for incidental take of the protected species. The normal 8-month navigation season is provided for all runoff scenarios as shown in *Table II*.

**TABLE II  
NAVIGATION SERVICE SUPPORT  
FOR THE 2010 SEASON**

	<b>Runoff Scenario (MAF)</b>	<b>System Storage</b>		<b>Flow Level Above or Below Full Service (cfs)</b>		<b>Season Shortening (Days)</b>
		<b>March 15 (MAF)</b>	<b>July 1 (MAF)</b>			
				<u>Spring</u>	<u>Summer/Fall</u>	
U.D.*	34.3	56.1	63.3	0	0	0
U.Q.*	30.3	56.0	62.6	0	0	0
Med *	24.4	54.3	58.4	-200	0	0
L.Q.*	19.3	52.7	54.2	-2,000	-2,600	0
L.D.*	16.2	52.6	53.1	-2,100	-3,600	0

\*Includes both March and May Spring Pulses

As previously stated, the planned regulation for the 2010 nesting season below Gavins Point dam will be Steady Release – Flow to Target (SR-FTT) for median runoff or below. The initial steady release, which is estimated to be 25,000 to 32,000 cfs, 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 peaking cycle of 2 days down and 1 day up following the May pulse 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 and conserving water in the upper three reservoirs. Gavins Point releases for the Upper Quartile and Upper Decile runoff simulations are much above normal to evacuate floodwater 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 in late August. In addition to the intra-day pattern, Fort Randall releases may also be cycled with 2 days of low releases and 1 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.

As discussed previously, System storage will be above the storage precludes for both spring pulses under all runoff scenarios modeled.



Gavins Point releases may be quite variable during the 2010 navigation season but are expected to range from 12,000 to 35,000 cfs. 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 Kansas Reservoir System have not been included 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 *Plates 6 through 11*. Ample storage space exists in the System to control flood inflows under all scenarios simulated for this AOP.

**F. Regulation Activities for T&E Species and Fish Propagation Enhancement.**

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 System reservoirs. As part of the overall plan to rotate emphasis among the upper three reservoirs during low runoff years, Fort Peck and Oahe are scheduled to be favored during the 2010 forage fish spawn if runoff is below median. The studies show that inflows are sufficient to maintain steady to rising pools at Fort Peck from April through June for Lower Quartile and Lower Decile runoff scenarios, however, the Oahe pool level may fall during this period. Oahe will be supported by releases from Garrison during the forage fish spawn if local runoff is not sufficient to keep Oahe rising. These adjustments may be restricted when the terns and plovers begin nesting in May. If the drought re-emerges, 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.

As discussed in the previous section, the 2009-2010 AOP includes provisions for unbalancing the Fort Peck, Garrison, and Oahe reservoirs for the first time under the revised Master Manual to benefit the endangered species and reservoir fishery. On March 1, 2011 for the Upper Quartile and Upper Decile runoff scenarios the reservoirs will be unbalanced 4.2 feet in favor of Fort Peck and Garrison will be 3 feet lower than balanced. Under Median runoff the reservoirs will be unbalanced 1 foot in favor of Fort Peck and Garrison will be 1 foot lower than balanced. The criteria for unbalancing are based on recommendations provided by the MORAST, MRNRC and the USFWS. System storage will be below the minimum levels under which unbalancing is recommended by either the MRNRC or the USFWS under the lowest two runoff scenarios.

Fort Peck Dam. The repetitive daily pattern of releases from Fort Peck Dam 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 habitat, and thus were not expected to be impacted by the potential range of releases from Fort Peck during the summer. Releases during the 2010 nesting season will not be restricted by the repetitive daily pattern unless habitat conditions or nesting patterns warrant a change. Overall habitat should be slightly less than in 2009 as flows during the nesting season will be slightly higher.

If flood 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 should 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, but appears possible under all the runoff scenarios. The Fort Peck “mini-test” will not be run pending an evaluation of the results of the Yellowstone River Intake Diversion fish passage structure.

Garrison Dam. Daily average releases from Garrison will be much less than full powerplant capacity during the tern and plover nesting season under all runoff scenarios. 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 during the 2010 nesting season will be higher than was experienced during the drought resulting in less available habitat.

The Garrison pool was much higher in the summer of 2009 than in the past several years. Early indications are that the cold-water habitat volume in the reservoir has improved significantly this year. In 2005 plywood was attached to the lower 50 feet of the trash racks on two of the penstocks to allow water to be drawn from a higher, and therefore warmer, region of the reservoir to conserve the volume of cold-water habitat in the reservoir. In 2007 plywood was installed on one additional trash rack. In 2005-2008, releases from Garrison during the summer months were made through the hydropower units with modified intakes, to the extent reasonably possible. In addition, the manner in which the other hydropower units were operated was adjusted to run them at or near full capacity when in use, which also had the effect of drawing water off the upper, warmer, portion of the reservoir. With the higher pool elevation improving cold-water habitat volume this summer, the modified unit operation was discontinued. Additional sampling of data was conducted in September and a comparison of previous

cold-water habitat was completed. The plywood was removed from the trash racks in October 2009.

If runoff is not sufficient to keep all the pool levels rising during the fish spawn in 2010, the Corps will, to the extent reasonably possible while serving other Congressionally authorized project purposes, set releases to result in a steady to rising pool at Fort Peck and Oahe from April 20 to May 20. Adjustments to Garrison's releases, however, may be restricted when the terns and plovers begin nesting in May. A rising pool at Garrison during the fish spawn in April and May will be dependent upon the daily inflow pattern to the reservoir but appears possible for Median runoff and above runoff simulations.

Oahe Dam. Releases in the spring and summer will back up those from Gavins Point Dam. The pool level should be steady to rising in the spring during the fish spawn under median and above runoff scenarios. Under lower runoff conditions, Garrison's releases will be adjusted to the extent reasonably possible to maintain a steady to rising pool at Oahe, but depending on the timing and distribution of runoff that goal may not be possible under all conditions.

Fort Randall Dam. To the extent reasonably possible, Fort Randall will be regulated to provide for a pool elevation near 1355 feet msl 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 msl 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 during the 2009 nesting season 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. Fort Randall zero releases 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 Area Power Administration.

Gavins Point Dam. March and May spring pulses from Gavins Point Dam for the benefit of the endangered pallid sturgeon will be implemented under all runoff scenarios in 2010. The Master Manual technical criteria for the pulses are presented in Plate 3. Details of the spring pulses included in the AOP simulations are provided in Chapter V, Section B, entitled "2009-2010 AOP Simulations".

Based on 2003 through 2008 nesting season results with the SR-FTT regulation and planned habitat development activities, it is anticipated that sufficient habitat will be

available above the planned release rates for Median or below runoff to provide for successful nesting. All reasonable measures to minimize the loss of nesting T&E bird species will be used. These measures include, but are not limited to, such things as a relatively high initial steady release during the peak of nest initiation, the use of the Kansas River basin reservoirs, moving nests to higher ground when possible, 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. It is anticipated that for Upper Decile and Upper Quartile runoff scenarios a SR scenario will be implemented due to the need to evacuate flood water. A SR-FTT release scenario will be implemented for Median and below runoff scenarios. A full description of these two release scenarios can be found in the Missouri River Mainstem Master Water Control Manual.

The Gavins Point pool will be regulated near 1206.0 feet msl in the spring and early summer, with minor day-to-day variations due to inflows 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 the Gavins Point project, 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 Dam and Gavins Point Dam 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. Planned habitat creation projects in Lewis and Clark Lake will reduce the inundation risk to T&E bird species by providing higher habitat for nesting. The pool will be increased to elevation 1207.5 feet msl 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 for the Operation and Management of the Missouri River Main Stem System (PA), 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 improved significantly in 2009 and are currently 11 to 18 feet higher than one year ago, but continuing exposure of cultural sites along the shorelines is still possible. Actions to avoid, minimize or mitigate adverse impacts and expected results of the actions are covered under Chapter VI of this AOP. *Plate 14* shows the locations of the Tribal Reservations.

Fort Peck Dam. Depending on runoff in the Missouri River basin, System regulation during 2010 could result in a Fort Peck pool elevation variation from a high of 2241 feet msl to a low of 2217 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 Dam. 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 1823 feet msl during 2010. Based on a review of existing information, approximately 93 known sites could be affected during this period.

Oahe Dam. At the Oahe reservoir, the System regulation under the Upper and Lower Decile runoff scenarios could result in pool elevations between 1615 and 1590 feet msl (see *Plate 10* and the studies included at the end of this report). Based on a review of existing information, approximately 203 known sites could be affected during this period.

Big Bend Dam. System regulation will be adjusted to maintain the Big Bend pool level in the normal 1420 to 1421 feet msl range during 2010. Short-term increases above 1421 due to local rainfall may also occur. Based on a review of existing information, approximately 4 known sites could be affected during this period.

Fort Randall Dam. 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 2010. 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 refill during the winter to elevation 1350 feet msl. Based on a review of existing information, approximately 32 known sites could be affected during this period.

Gavins Point Dam. System regulation will be adjusted to maintain the Gavins Point pool level in the normal 1206 to 1207.5 feet msl range during 2010. Short-term increases above 1207.5 feet msl may occur due to local rainfall. Based on a review of existing information, no known sites could be affected during this period.

## VI. SUMMARY OF RESULTS EXPECTED IN 2010

With regulation of the System in accordance with the 2009-2010 AOP outlined in the preceding pages, the following results can be expected. Table III summarizes the critical decision points throughout the year for all runoff conditions.

**Table III**  
**Summary of 2009-2010 AOP Studies**

Decision Points	2009-2010 Runoff Condition				
	Upper Decile	Upper Quartile	Median	Lower Quartile	Lower Decile
<b>March 1 System Storage</b> March Spring Pulse? Pulse Magnitude March 23-31 GP Release	55.0 MAF Yes 5 kcfs 28.9 kcfs	55.0 MAF Yes 5 kcfs 28.9 kcfs	53.4 MAF Yes 5 kcfs 28.7 kcfs	52.0 MAF Yes 5 kcfs 30.0 kcfs	52.0 MAF Yes 5 kcfs 29.9 kcfs
<b>March 15 System Storage</b> Spring Service Level	56.1 MAF full service	56.0 MAF full service	54.3 MAF 0.2 Kcfs blw full service	52.7 MAF 2.0 Kcfs blw full service	52.6 MAF 2.1 Kcfs blw full service
<b>May 1 System Storage</b> May Spring Pulse? Pulse Magnitude* May Cycling May GP Release	58.5 MAF Yes 20.0 (10) kcfs 37.5/37.5 kcfs 37.5 kcfs	58.0 MAF Yes 20.0 (10) kcfs 28.0/31.0 kcfs 33.0 kcfs	55.2 MAF Yes 16.0 (10.0) kcfs 27.8/31.4 kcfs 30.5kcfs	52.7 MAF Yes 11.6 kcfs 29.3/32.3 kcfs 32.0 kcfs	52.4 MAF Yes 11.6 kcfs 29.2/32.2 kcfs 31.9 kcfs
<b>Fish Spawn Rise (Apr-Jun)</b> FTPK Pool Elev Change GARR Pool Elev Change OAHE Pool Elev Change	+12.6 feet +5.8 feet +5.7 feet	+10.6 feet +5.0 feet +6.0 feet	+6.5 feet +5.1 feet +2.5 feet	+5.7 feet +1.6 feet -0.9 feet	+3.0 feet +0.6 feet -1.5 feet
<b>July 1 System Storage</b> Sum-Fall Service Level (kcfs) Nav Season Shortening	63.3 MAF Full Service 0 Days	62.6 MAF Full Service 0 Days	58.4 MAF Full Service 0 Days	54.2 MAF 2.6 blw full service 0 Days	53.1 MAF 3.6 blw full Service 0 Days
<b>September 1 System Storage</b> Winter GP Release	62.1 MAF 20.0 kcfs	62.2 MAF 20.0 kcfs	56.8 MAF 15.2 kcfs	52.0 MAF 12.5 kcfs	50.3 MAF 12.5 kcfs
<b>February 28 System Storage</b> End-Year Pool Balance Percent Pool	56.8 MAF Unbalanced 100% FP+4.2/GA -3.0	56.8 MAF Unbalanced 100% FP+4.2/GA -3.0	53.5 MAF Unbalanced 91% FP+1.0/GA -1.0	48.0 MAF Balanced 76%	45.6 MAF Balanced 70%

\* Pulse magnitudes are the calculated magnitude per technical criteria and simulated magnitude due to the downstream flow limits.

**A. Flood Control.** All runoff scenarios studied will begin the March 1, 2009 runoff season below the desired 56.8 MAF base of the annual flood control and multiple

use zone. Therefore, the entire System flood control zone, plus an additional 1.8 to 4.8 MAF of the carryover multiple use zone, will be available to store surplus runoff. The System will be available to significantly reduce peak discharges and store a significant volume of water for all floods that may originate above the System.

Remaining storage in the carryover multiple use zone will be adequate to provide support for all of the other multiple purposes of the System, though at reduced service levels after July 1 if lower quartile or lower decile runoff occurs in 2010.

**B. Water Supply and Water Quality Control.** Problems at intakes located in the river reaches and Mainstem 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; however better runoff in 2008 and 2009 has eliminated concern over many of these intakes. Gains in the Oahe pool level required modification of the Standing Rock Sioux Tribe's temporary intake at Fort Yates to protect it from the rising water levels. The Bureau of Reclamation (BOR) installed the temporary intake after the primary intake failed in November 2003 leaving the community without water for several days. If the drought re-emerges, 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 2010 would be approximately 20 feet higher than the record lows set in the current drought. Although not below the critical shut-down elevations for any intake, return to lower levels would require extra monitoring to ensure the continued operation of the intakes.

Although below normal Gavins Point releases are being scheduled in the winter of 2009-2010 for all runoff scenarios and in the winter of 2010-2011 for all but the Upper Decile and Quartile runoff scenarios, all water supply and water quality requirements on the Missouri River both below Gavins Point Dam and between System reservoirs should be met for all flow conditions studied. Lower releases may result in additional water treatment costs such as intake operators experienced during the past eight year drought. It is also possible with the lower releases during winter that river ice formation or ice jams may temporarily reduce river stages to levels below which some intakes can draw water. Therefore, during severe cold spells, experience has shown that for brief periods it may be necessary to increase Gavins Point releases to help alleviate downstream water supply problems.



During non-navigation periods in the spring and fall from 2004 through 2007, System releases were scheduled as low as 9,000 cfs provided that enough downstream tributary flow existed to allow for continued operation of downstream water intakes. If a non-navigation year would occur in the future, summer releases (May thru 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 all 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 power plant'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 power plant 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 throughout the System and along the lower river reach 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 for those intake operators whom had issues or difficulty with access during the past drought years, adjustments should continue to be made during this more normal release period to improve access and flexibility when drought returns to the basin.

**C. Irrigation.** 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 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 as a significant storage imbalance exists that will require releases to be at minimums for irrigation. Tributary irrigation water usage is fully accounted for in the estimates of water supply.

**D. Navigation.** Service to navigation in 2010 will be at or near full service flow support from the beginning of the navigation season through the July 1 storage check for Median and above runoff scenarios. For lower runoff scenarios, navigation flow support will be at intermediate levels of 2,000 cfs below full service for Lower Quartile, and 2,100 cfs below full service for Lower Decile. Full service flow support will continue throughout the entire navigation season for Median and higher runoff. Lower Quartile or Lower Decile runoffs will result in reductions from full service of 2,600 and 3,600 cfs respectively after the July 1 storage check. Although the AOP simulations provide a comparison of typical flow support under varying runoff conditions, the actual rate of flow support for the 2010 navigation season will be based on actual System storage on March 15 and July 1, 2010.

All runoff simulations show no reduction in the normal 8-month navigation season length during 2010. The anticipated service level and season length for all runoff conditions simulated are shown in *Table II*.

**E. Power.** *Tables IV and V* give the estimated monthly System load requirements and hydropower supply of the Eastern Division, Pick-Sloan Missouri Basin Program (P-S MBP), from August 2009 through December 2010. 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 median runoff, annual generation in CY2010 is estimated to be 9.0 million mWh, 95 percent of normal.

**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. Improved runoff resulted in higher pool levels and better recreation access at the upper three reservoirs during 2009. Recreation access is expected to be at normal levels in 2010 with the exception of Fort Peck which still has two boat ramps that remain inaccessible due to the low reservoir level. If Lower Quartile or Lower Decile runoff were to occur in 2010,, 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 2010 on fish and wildlife are included in Chapter V, Section F, entitled, "Regulation Activities for T&E Species and Fish Propagation Enhancement."

**G. Historic and Cultural Properties.** As mentioned in Chapter V of this AOP, the regulation of the System during 2009 and 2010 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 PA 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 affects 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.

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

2009	Estimated Committee Sales*	Expected C of E Capability					Expected Bureau Capability*					Expected Total System Capability				
		120%	Basic	80%			120%	Basic	80%			120%	Basic	80%		
Aug	2395	2340	2333	2330			211	212	211			2551	2545	2541		
Sep	2367	2332	2320	2314			210	211	209			2542	2531	2523		
Oct	2367	2315	2300	2291			211	212	208			2526	2512	2499		
Nov	2274	2280	2260	2249			210	211	207			2490	2471	2456		
Dec	2274	2282	2265	2251			206	206	203			2488	2471	2454		
<b>2010</b>																
Jan	2274	2304	2286	2270			202	202	200			2506	2488	2470		
Feb	2274	2313	2293	2276			198	199	197			2511	2492	2473		
		<u>U.D.</u>	<u>U.Q.</u>	<u>Med</u>	<u>L.Q.</u>	<u>L.D.</u>	<u>U.D.</u>	<u>U.Q.</u>	<u>Med</u>	<u>L.Q.</u>	<u>L.D.</u>	<u>U.D.</u>	<u>U.Q.</u>	<u>Med</u>	<u>L.Q.</u>	<u>L.D.</u>
Mar	2274	2329	2324	2301	2278	2275	194	195	196	196	199	2523	2519	2497	2474	2474
Apr	2301	2345	2340	2307	2275	2271	193	193	194	194	193	2538	2533	2501	2469	2464
May	2367	2358	2352	2311	2271	2266	196	196	201	199	196	2554	2548	2512	2470	2462
Jun	2367	2391	2390	2338	2284	2273	213	213	213	206	200	2604	2603	2551	2490	2473
Jul	2367	2385	2391	2339	2274	2257	213	213	213	206	205	2598	2604	2552	2480	2462
Aug	2367	2375	2384	2315	2254	2234	211	211	211	204	203	2586	2595	2526	2458	2437
Sep	2367	2362	2361	2305	2240	2217	209	209	211	204	203	2571	2570	2516	2444	2420
Oct	2367	2330	2335	2286	2218	2194	209	209	212	205	204	2539	2544	2498	2423	2398
Nov	2309	2284	2288	2248	2178	2153	207	207	210	203	203	2491	2495	2458	2381	2356
Dec	2309	2245	2248	2212	2143	2115	202	202	206	200	201	2447	2450	2418	2343	2316

\* 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 V  
ENERGY GENERATION AND SALES  
(Million kWh at plant)

2009	Estimated Committee Sales*	Expected C of E Generator					Expected Bureau Generation *					Expected Total System Generator				
		120%	Basic	80%			120%	Basic	80%			120%	Basic	80%		
Aug	844	833	845	858			90	70	67			923	915	925		
Sep	727	811	815	830			84	67	63			895	882	893		
Oct	724	686	685	694			84	68	62			770	753	756		
Nov	792	603	607	615			80	78	62			683	685	677		
Dec	899	505	495	489			84	80	63			589	575	552		
<b>2010</b>																
Jan	912	591	584	563			83	79	63			674	663	626		
Feb	882	513	509	494			75	71	55			588	580	549		
		<u>U.D.</u>	<u>U.Q.</u>	<u>Med</u>	<u>L.Q.</u>	<u>L.D.</u>	<u>U.D.</u>	<u>U.Q.</u>	<u>Med</u>	<u>L.Q.</u>	<u>L.D.</u>	<u>U.D.</u>	<u>U.Q.</u>	<u>Med</u>	<u>L.Q.</u>	<u>L.D.</u>
Mar	815	589	581	548	583	571	83	82	77	60	58	672	663	625	643	629
Apr	754	733	694	746	802	811	81	81	73	47	57	814	775	819	849	868
May	697	1035	963	900	927	938	145	137	96	39	39	1180	1100	996	966	977
Jun	758	1233	971	884	889	872	147	147	108	39	39	1380	1118	992	928	911
Jul	843	1363	1077	965	959	918	158	128	82	52	46	1521	1205	1047	1011	964
Aug	846	1367	1161	1001	955	916	96	92	74	57	46	1463	1253	1075	1012	962
Sep	725	1253	1141	887	836	791	92	87	71	55	44	1345	1228	958	891	835
Oct	725	1090	986	725	673	644	92	87	71	54	48	1182	1073	796	727	692
Nov	792	1063	963	627	645	540	89	86	82	60	49	1152	1049	709	705	589
Dec	900	<u>803</u>	<u>767</u>	<u>582</u>	<u>535</u>	<u>523</u>	<u>91</u>	<u>87</u>	<u>84</u>	<u>64</u>	<u>50</u>	<u>894</u>	<u>854</u>	<u>666</u>	<u>599</u>	<u>573</u>
CY TOT		11633	10408	8958	8861	8581	1233	1173	966	645	595	12866	11581	9924	9506	9176

\* 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.

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 "Draft Five Year Plan, dated February 2005" (see <https://www.nwo.usace.army.mil/CR/>) 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 2009 and 2010. 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 "Draft Monitoring and Enforcement Plan, dated April 2005" (see <https://www.nwo.usace.army.mil/CR/>) 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 2009-2010 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. Training for the monitoring teams was held in June 2006, July 2007, March 2008, April 2008, July 2008, and again in May 2009.

Second, mitigation or protection of sites that are being adversely impacted continues. During the reporting period for the 2008 Annual Report by the Corps on the implementation of the Programmatic Agreement eight sites were either completed, started, or in the design phase. The annual report is available at <https://www.nwo.usace.army.mil/CR/>. In addition the Corps has awarded a contract to develop an erosion model that will compare modeling data against actual erosion data, collected by the monitoring team, to assist in the prioritization of sites for protection. Work on the erosion model is continuing.

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 2009-2010 on cultural sites are included in the Chapter V, section G., entitled, "Regulation Activities for Historic and Cultural Properties."

**H. System Storage.** If August 1, 2009 Basic runoff forecast verifies, System storage will decline to 53.1 MAF by the close of CY 2009. This would be 19.2 MAF higher than the all-time record low storage of 33.9 MAF set on February 9, 2007 and nearly 9.1 MAF higher than last year's storage of 44.0 MAF. This end-of-year storage is 0.6 MAF more than the 1967 to 2008 average. The record low storage during the 1988-1992 drought was 40.8 MAF in January 1991. 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, 2010 is presented in *Table VI* for the runoff scenarios simulated.

**I. Summary of Water Use by Functions.** Anticipated water use in CY 2009, under the regulation plan with the Basic forecast of water supply is shown in *Table VII*. Actual water use data for CY 2008 are included for information and comparison. Under the reservoir regulation simulations in this AOP, estimated water use in CY 2010 also is shown in *Table VII*.

**TABLE VI  
ANTICIPATED DECEMBER 31, 2010 SYSTEM STORAGE**

Water Supply Condition	Total (12/31/10)	Carryover Storage Remaining 1/	Unfilled Carryover Storage 2/	Total Change CY 2010
(Volumes in 1,000 Acre-Feet)				
Upper Decile	56,900	38,900	0	2,400
Upper Quartile	57,100	38,900	0	2,200
Median	53,400	35,500	3,400	300
Lower Quartile	48,000	30,100	8,800	-4,100
Lower Decile	45,900	28,000	10,900	-6,200

1/ Net usable storage above 17.9 MAF System minimum pool level established for power, recreation, irrigation diversions, and other purposes.

2/ System base of annual flood control zone containing 56.8 MAF.

**TABLE VII**  
**MISSOURI RIVER MAINSTEM SYSTEM**  
**WATER USE FOR CALENDAR YEARS 2008, 2009, AND 2010 ABOVE SIOUX CITY, IOWA**  
**in Million Acre-Feet (MAF)**

	CY 2008 Actual	CY 2009 Basic Simulation	Simulations for Calendar Year 2010					
			Upper Decile	Upper Quartile	Median	Lower Quartile	Lower Decile	
Upstream Depletions (1)								
Irrigation, Tributary Reservoir Evaporation & Other Uses	2.5	1.3						
Tributary Reservoir Storage Change	<u>0.6</u>	<u>0.1</u>						
Total Upstream Depletions	3.1	1.4	2.4	2.3	2.5	2.5	2.3	
System Reservoir Evaporation (2)	2.5	2.5	1.2	1.2	1.7	2.0	1.9	
Sioux City Flows								
Navigation Season								
Unregulated Flood Inflows Between Gavins Point & Sioux City (3)	0.1	0.2						
Navigation Service Requirement (4)	9.6	14.5	18.2	17.3	15.9	15.29	14.5	
Supplementary Releases								
T&E Species (5)	0.4	1.5	0.6	0.6	0.5	0.3	0.3	
Flood Evacuation (6)	0.0	0.0	5.3	2.2	0.0	0.0	0.0	
Non-navigation Season								
Flows	3.5	3.1	3.8	3.7	3.5	3.3	3.3	
Flood Evacuation Releases (7)	0.0	0.0	0.4	0.4	0.0	0.0	0.0	
System Storage Change	<u>7.4</u>	<u>9.5</u>	<u>2.4</u>	<u>2.6</u>	<u>0.3</u>	<u>-4.0</u>	<u>-6.1</u>	
Total	26.6	32.7	34.3	30.3	24.4	19.3	16.2	
Project Releases								
Fort Peck	4.3	3.7	5.0	4.9	4.5	4.6	4.6	
Garrison	9.6	10.2	14.7	16.8	14.9	15.1	13.2	
Oahe	8.5	13.2	14.7	17.2	16.6	16.8	16.7	
Big Bend	7.9	12.8	14.2	19.1	17.6	16.6	16.6	
Fort Randall	9.0	14.1	15.5	20.2	17.2	16.9	16.8	
Gavins Point	10.6	15.5	17.6	22.1	18.6	18.1	17.8	

- (1) Tributary uses above the 1949 level of development including agricultural depletions and tributary storage effects.
- (2) Net evaporation is shown for 2010.
- (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 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.

## VII. TENTATIVE PROJECTION OF REGULATION THROUGH MARCH 2016

The 5-year extensions to the AOP (March 2011 to March 2016) have been prepared to serve as a guide for the Western Area Power Administration's marketing activities and to provide data to allow basin interests to conduct long-term planning. Three runoff conditions are modeled in the extension studies: Median, Lower Quartile, and Lower Decile.

The navigation service level and season length criteria described in *Plate 3* were applied to the extensions. The March 15 and July 1 System storage checks shown in *Plate 3* were used to determine the flow support for navigation and other downstream uses and the navigation season length. A steady release - flow to target (SR-FTT) regulation with cycling in May was modeled during the T&E bird species' nesting season. The Gavins Point releases to meet navigation target flows, as shown in *Plate 3* and as computed by the March 15 and July 1 System storage checks, were used prior to and following the nesting season. The September 1 System storage check was used to determine the winter System release. Navigation service support and season length, magnitudes of March and May spring pulses, March 1 reservoir unbalancing, end of year System storage, and the winter release rate for the extensions are shown on *Table VII*. The criteria considered as each year of the extensions was modeled are listed, along with the results, in *Tables VIII through X* for the Median, Lower Quartile, and Lower Decile extension studies, respectively.

**A. Median Runoff.** Studies 9 through 13 present the results of simulating Median runoff (24.4 MAF) from March 2011 through February 2016. The March 1, 2011 System storage would be 53.5 MAF and would drop to 53.0 MAF by March 1, 2016, 3.8 MAF below the desired March 1 storage of 56.8 MAF, the base of the annual flood control and multiple use pool. The navigation service level would range from full service to 400 cfs below service for the study period of 2011 to 2015. There would be full navigation seasons for the study period of 2011 through 2015. Winter releases would range from 14,800 cfs in the winter of 2011-2012 to 14,000 cfs in winter 2015-2016. March and May spring pulses would occur each year, with the magnitude of the May pulse ranging from 13,200 cfs in 2011 to 13,400 cfs in 2015. The May pulses in the study period of 2011 to 2015 would be limited in order to meet downstream flow limits during the pulse. Fort Peck, Garrison, and Oahe pools are in the range of the elevations described in *Plate 3* that permit unbalancing.

**TABLE VIII  
NAVIGATION SERVICE SUPPORT, SPRING PULSES, UNBALANCING  
AOP EXTENSION STUDIES**

	2011	2012	2013	2014	2015
<b>MEDIAN</b>					
Spring Pulse					
March (kcfs)	5.0	5.0	5.0	5.0	5.0
May (kcfs)	13.2*	13.3*	13.3*	13.4*	13.4*
Flow Level Below Full Service					
Spring (kcfs)	Full-0.2	Full-0.3	Full-0.3	Full-0.4	Full-0.4
Summer/Fall (kcfs)	Full	Full	Full	Full	Full
Season Length	8 months	8 months	8 months	8 months	8 months
Reservoir Unbalancing (ft)					
Fort Peck	0	-4.2	+4.2	0	-4.2
Garrison	+3.0	0	-3.0	+3.0	0
Oahe	-3.0	+3.0	0	-3.0	+3.0
Dec 31 Storage (MAF)	53.2	53.1	53.1	53.0	52.8
Winter Release (kcfs)	14.8	14.5	14.5	14.2	14.0
Special Information					
<b>LOWER QUARTILE</b>					
Spring Pulse					
March (kcfs)	5.0	5.0	5.0	5.0	5.0
May (kcfs)	11.2	11.4	11.4	13.0	14.5
Flow Level Below Full Service					
Spring (kcfs)	Full-6.0	Full-6.0	Full -6.0	Full -6.0	Full -6.0
Summer/Fall (kcfs)	Full -5.7	Full -6.0	Full -6.0	Full -6.0	Full -4.4
Season Length	8 mnths-5 days	8 mnths-13 days	8 mnths-13days	8 mnths-8 days	8 mnths
Reservoir Unbalancing (ft)					
Fort Peck	0	0	0	0	0
Garrison	0	0	0	0	0
Oahe	0	0	0	0	0
Dec 31 Storage (MAF)	45.9	45.3	45.4	46.4	47.9
Winter Release (kcfs)	12.5	12.5	12.5	12.5	12.5
<b>LOWER DECILE</b>					
Spring Pulse					
March (kcfs)	5.0	5.0	0	0	0
May (kcfs)	10.3	9.6	9.0	0	0
Flow Level Below Full Service					
Spring (kcfs)	Full-6.0	Full -6.0	Full -6.0	Full -6.0	Full -6.0
Summer/Fall (kcfs)	Full -6.0	Full -6.0	Full -6.0	Full -6.0	Full -6.0
Season Length	8 mnths-25 days	8 mnths-30 days	8 mnths-30 days	8 mnths-31 days	8 mnths-37 days
Reservoir Unbalancing (ft)					
Fort Peck	0	0	0	0	0
Garrison	0	0	0	0	0
Oahe	0	0	0	0	0
Dec 31 Storage (MAF)	42.2	39.0	37.5	36.6	36.1
Winter Release (kcfs)	12.5	12.5	12.5	12.5	12.5

\*Limited by Downstream Flood-Control Limits



**Table IX**

**Median Extension Studies - Criteria Considered in the Modeling Process**

<b>Study Number</b>	<b>Units</b>	<b>Criteria</b>	<b>9</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>
			<b>2011-2012</b>	<b>2012-2013</b>	<b>2013-2014</b>	<b>2014-2015</b>	<b>2015-2016</b>
March 1 Storage	MAF	40	53.5	53.3	53.3	53.3	53.2
- March Spring Pulse?	N/A		Yes	Yes	Yes	Yes	Yes
March 15 Storage	MAF	31/49/54.5	54.3	54.2	54.2	54.1	54.1
- Service Level	N/A or kcfs	No Sea/Min/Full Thresholds	Full -0.2	Full -0.3	Full -0.3	Full -0.4	Full -0.4
- 3rd Period March GP Q	kcfs		28.7	28.6	28.6	28.5	28.5
- April Gavins Point Q	kcfs		26.5	26.4	26.4	26.3	26.3
May 1 Storage	MAF	40	55.3	55.2	55.1	55.1	55.0
- May Spring Pulse?	N/A		Yes	Yes	Yes	Yes	Yes
- Pulse Magnitude	kcfs		13.2	13.3	13.3	13.4	13.4
- Gavins Point Cycling Qs	kcfs		27.8/31.4	27.8/31.3	27.7/31.3	27.7/31.2	27.7/31.2
- May Gavins Point Q	kcfs		31.7	31.6	31.6	31.5	31.5
- June Gavins Point Q	kcfs		31.4	31.3	31.3	31.2	31.2
July 1 Storage	MAF	50.5/57	58.3	58.1	58.2	58.0	57.9
- Service Level	N/A	Min/Full Thresholds	Full	Full	Full	Full	Full
- July Gavins Point Q	kcfs		31.6	31.6	31.6	31.6	31.6
- Aug Gavins Point Q	kcfs		33.2	33.2	33.2	33.2	33.2
- Sept Gavins Point Q	kcfs		32.6	32.6	32.6	32.6	32.6
July 1 Storage	MAF	36.5/41&46.8/51.5	58.3	58.1	58.2	58.0	57.9
- Season Length Shortening	days		0	0	0	0	0
- Oct Gavins Point Q	kcfs	61/31&31/0 Thresholds	32.0	32.0	32.0	32.0	32.0
- Nov Gavins Point Q	kcfs		28.3	28.3	28.3	28.3	28.3
September 1 Storage	MAF	55/58	56.7	56.5	56.5	56.3	56.2
- Winter Gavins Point Q	kcfs	12/17 Thresholds	14.8	14.5	14.5	14.2	14.0
End-of-Year Reservoir Storage	MAF		53.3	53.3	53.3	53.2	53.0
- Percent Full	N/A		91%	91%	91%	91%	90%
Balance/Unbalance	N/A	Bal <2227/1827/1600 ft msl	+3.0 G -3.0 O	-4.2 P +3.0 O	+4.2 P -3.0 G	+3.0 G -3.0 O	-4.2 P +3.0 O
Peck Rise 3/31-5/31	N/A		Yes	Yes	Yes	Yes	Yes
Garr Rise 3/31-5/31	N/A		Yes	Yes	Yes	Yes	Yes
Oahe Rise 3/31-5/31	N/A		Yes	Yes	Yes	Yes	Yes
Favored Reservoir - Fish Spawn	N/A		GA	FP/OA	GA	FP/OA	GA

**Table X**

**Lower Quartile Extension Studies - Criteria Considered in the Modeling Process**

Study Number	Units	Criteria	14 2011-2012	15 2012-2013	16 2013-2014	17 2014-2015	18 2015-2016
March 1 Storage	MAF	40	48.0	46.0	45.5	45.7	46.7
- March Spring Pulse?	N/A		Yes	Yes	Yes	Yes	Yes
March 15 Storage	MAF	31/49/54.5	48.8	46.9	46.4	46.7	47.8
- Service Level	N/A or kcfs	No Sea/Min/Full Thresholds	Min Service	Min Service	Min Service	Min Service	Min Service
- 3rd Period March GP Q	kcfs		26.0	26.0	26.0	26.0	26.0
- April Gavins Point Q	kcfs		23.8	23.8	23.8	23.8	23.8
May 1 Storage	MAF	40	49.1	47.5	47.2	47.6	49.1
- May Spring Pulse?	N/A		Yes	Yes	Yes	Yes	Yes
- Pulse Magnitude	kcfs		11.2	11.4	11.4	13.0	14.5
- Gavins Point Cycling Qs	kcfs		25.3/28.3	25.3/28.3	25.3/28.3	25.3/28.3	25.3/28.3
- May Gavins Point Q	kcfs		28.0	28.0	28.1	28.1	28.2
- June Gavins Point Q	kcfs		28.3	28.3	28.3	28.3	28.3
July 1 Storage	MAF	50.5/57	50.8	49.5	49.4	50.3	52.2
- Service Level	N/A	Min/Full Thresholds	Full - 5.7	Min Service	Min Service	Min Service	Full - 4.4
- July Gavins Point Q	kcfs		28.6	28.3	28.3	28.3	29.9
- Aug Gavins Point Q	kcfs		28.3	28.0	28.0	28.0	29.6
- Sept Gavins Point Q	kcfs		27.8	27.5	27.5	27.5	29.1
July 1 Storage	MAF	36.5/41&46.8/51.5	50.8	49.5	49.4	50.3	52.2
- Season Length Shortening	days	61/31&31/0 Thresholds	5	13	13	8	0
- Oct Gavins Point Q	kcfs		27.4	27.1	27.1	27.1	28.7
- Nov Gavins Point Q	kcfs		19.6	15.1	15.1	17.8	23.9
September 1 Storage	MAF	55/58	49.0	47.9	47.9	48.9	50.8
- Winter Gavins Point Q	kcfs	12/17 Thresholds	12.5	12.5	12.5	12.5	12.5
End-of-Year Reservoir Storage	MAF		46.0	45.5	45.7	46.7	48.3
- Percent Full	N/A		71%	70%	70%	73%	77%
Balance/Unbalance	N/A	Bal <2227/1827/1600 ft msl	Balance	Balance	Balance	Balance	Balance
Peck Rise 3/31-5/31	N/A		No	Yes	Yes	Yes	Yes
Garr Rise 3/31-5/31	N/A		Yes	Yes	Yes	Yes	Yes
Oahe Rise 3/31-5/31	N/A		No	Yes	Yes	Yes	Yes
Favored Reservoir - Fish Spawn	N/A		GA	FP/OA	GA	FP/OA	GA

**Table XI**

**Lower Decile Extension Studies - Criteria Considered in the Modeling Process**

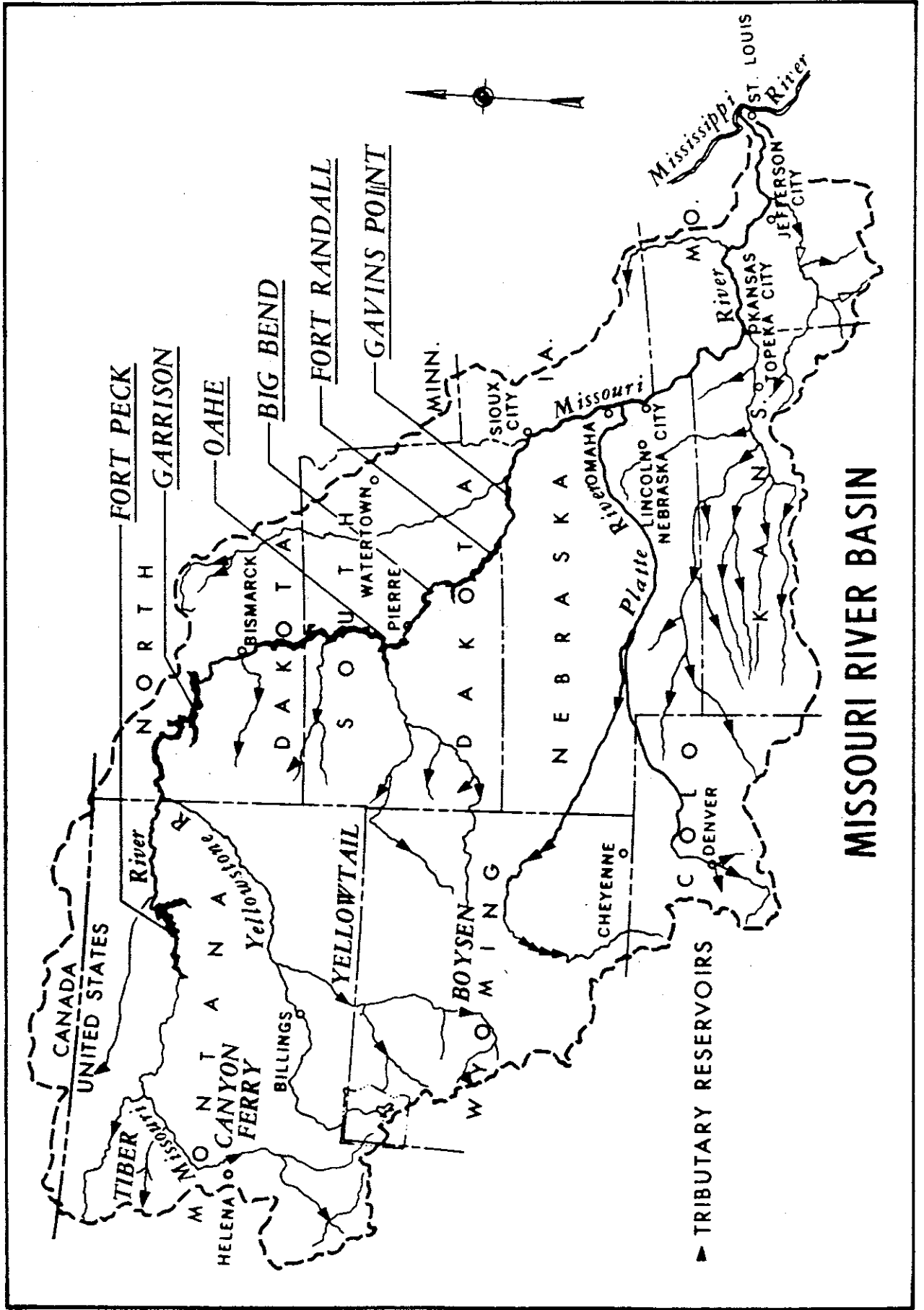
<b>Study Number</b>	<b>Units</b>	<b>Criteria</b>	<b>19</b>	<b>20</b>	<b>21</b>	<b>22</b>	<b>23</b>
			<b>2011-2012</b>	<b>2012-2013</b>	<b>2013-2014</b>	<b>2014-2015</b>	<b>2015-2016</b>
March 1 Storage	MAF	40	45.6	42.0	39.0	37.5	36.7
- March Spring Pulse?	N/A		Yes	Yes	No	No	No
March 15 Storage	MAF	31/49/54.5	46.3	42.7	39.8	38.4	37.6
- Service Level	N/A or kcfs	No Sea/Min/Full Thresholds	Min Service	Min Service	Min Service	Min Service	Min Service
- 3rd Period March GP Q	kcfs		26.0	26.0	23.8	23.8	23.8
- April Gavins Point Q	kcfs		23.8	23.8	23.8	23.8	23.8
May 1 Storage	MAF	40	46.4	42.9	40.2	39.0	38.1
- May Spring Pulse?	N/A		Yes	Yes	Yes	No	No
- Pulse Magnitude	kcfs		10.3	9.6	9.0	0.0	0.0
- Gavins Point Cycling Qs	kcfs		25.3/28.3	25.3/28.3	25.3/28.3	25.3/28.3	25.3/28.3
- May Gavins Point Q	kcfs		27.9	27.9	27.8	25.9	25.9
- June Gavins Point Q	kcfs		28.3	28.3	28.3	28.3	28.3
July 1 Storage	MAF	50.5/57	47.6	43.8	41.8	40.8	40.0
- Service Level	N/A	Min/Full Thresholds	Min Service	Min Service	Min Service	Min Service	Min Service
- July Gavins Point Q	kcfs		28.3	28.3	28.3	28.3	28.3
- Aug Gavins Point Q	kcfs		28.0	28.0	28.0	28.0	28.0
- Sept Gavins Point Q	kcfs		27.5	27.5	27.5	27.5	27.5
July 1 Storage	MAF	36.5/41&46.8/51.5	47.6	43.8	41.8	40.8	40.0
- Season Length Shortening	days	61/31&31/0 Thresholds	25	30	30	31	37
- Oct Gavins Point Q	kcfs		26.5	23.9	23.9	23.3	19.8
- Nov Gavins Point Q	kcfs		9.3	9.0	9.0	9.0	9.0
September 1 Storage	MAF	55/58	45.0	41.5	39.7	38.7	37.9
- Winter Gavins Point Q	kcfs	12/17 Thresholds	12.5	12.5	12.5	12.5	12.5
End-of-Year Reservoir Storage	MAF		42.0	39.0	37.5	36.7	36.2
- Percent Full	N/A		60%	52%	48%	46%	45%
Balance/Unbalance	N/A	Bal <2227/1827/1600 ft msl	Balance	Balance	Balance	Balance	Balance
Peck Rise 3/31-5/31	N/A		Yes	Yes	No	Yes	No
Garr Rise 3/31-5/31	N/A		Yes	No	Yes	No	Yes
Oahe Rise 3/31-5/31	N/A		No	Yes	Yes	Yes	No
Favored Reservoir - Fish Spawn	N/A		GA	FP/OA	GA	FP/OA	GA

**B. Lower Quartile Runoff.** Studies 14 through 18 show the results of Lower Quartile runoff extensions. System storage on March 1, 2011 is 48.0 MAF and rises to 48.3 MAF by March 1, 2016, with navigation service levels remaining at minimum service during the simulation period. The navigation season is shortened 5 days in 2011, 13 days in 2012 and 2013 8 days in 2014, and no shortening in 2015. A 12,500-cfs average winter release is shown for the entire study period. Spring pulses would occur every March and May from 2011 through 2015. Since the upper three reservoirs do not refill enough to meet the unbalancing criteria in *Plate 3* under Lower Quartile runoff, the carryover multiple use storage is balanced each March 1.

**C. Lower Decile Runoff.** Studies 19 through 23 show the results of Lower Decile runoff extensions. System storage is 45.6 MAF on March 1, 2011 and gradually decreasing to 36.2 MAF on March 1, 2016. All extension years have minimum navigation service levels throughout the season. The navigation season is shortened 25 days in 2011, 30 days in 2012 and 2013, 31 days in 2014, and 37 days in 2015. There are March spring pulses in 2011 and 2012, May spring pulses in 2011, 2012, and 2013, and no intrasystem unbalancing for the entire study period due to low System storage.

*Plate 14* presents System storage, Gavins Point releases, and System peaking capability for Median, Lower Quartile, and Lower Decile runoff for the period 2011 through February 2016. Peak power, or peaking capability, is the amount of power available when all powerplants are operating at maximum.

*Plate 15* presents reservoir pool elevations for Fort Peck, Garrison, Oahe, and Fort Randall for Median, Lower Quartile, and Lower Decile runoff for the period 2011 through February 2016.



# MISSOURI RIVER BASIN

**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
<b>Dam and Embankment</b>				
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
<b>Spillway Data</b>				
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
<b>Reservoir Data (6)</b>				
26	Max. operating pool elev. & area	2250 msl 241,000 acres	1854 msl 380,000 acres	1620 msl 374,000 acres
27	Max. normal op. pool elev. & area	2246 msl 234,000 acres	1850 msl 364,000 acres	1617 msl 360,000 acres
28	Base flood control elev & area	2234 msl 210,000 acres	1837.5 msl 307,000 acres	1607.5 msl 312,000 acres
29	Min. operating pool elev. & area	2160 msl 89,000 acres	1775 msl 128,000 acres	1540 msl 117,000 acres
<b>Storage allocation &amp; capacity</b>				
30	Exclusive flood control	2250-2246 971,000 a.f.	1854-1850 1,489,000 a.f.	1620-1617 1,102,000 a.f.
31	Flood control & multiple use	2246-2234 2,704,000 a.f.	1850-1837.5 4,222,000 a.f.	1617-1607.5 3,201,000 a.f.
32	Carryover multiple use	2234-2160 10,700,000 a.f.	1837.5-1775 13,130,000 a.f.	1607.5-1540 13,461,000 a.f.
33	Permanent	2160-2030 4,088,000 a.f.	1775-1673 4,980,000 a.f.	1540-1415 5,373,000 a.f.
34	Gross	2250-2030 18,463,000 a.f.	1854-1673 23,821,000 a.f.	1620-1415 23,137,000 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	17,700 a.f. 1030 yrs.	25,900 a.f. 920 yrs.	19,800 a.f. 1170 yrs.
<b>Outlet Works Data</b>				
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	1670-1680 15,000- 60,000 cfs	1423-1428 20,000-55,000 cfs
<b>Power Facilities and Data</b>				
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., 25' 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)	1,063	2,268	2,640
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. (2) Includes 1,350 square miles of non-contributing areas. (3) With pool at base of flood control. (4) Storage first available for regulation of flows. (5) Damming height is height from low water to maximum operating pool. Maximum height is from average streambed to top of dam. (6) Based on latest available storage data. (7) River regulation is attained by flows over low-crested spillway and through turbines. (8) Length from upstream face of outlet or to spiral case. (9) Based on 8th year (1961) of drought drawdown (From study 8-83-1985). (10) Affected by level of Lake Francis case. Applicable to pool at elevation 1350. (11) Spillway crest. (12) 1967-2008 Average (13) Source: Annual Report on Civil Works Activities of the Corps of Engineers. Extract Report Fiscal Year 1999. (14) Based on Study 8-83-1985
Mile 887.4		Mile 880.0		Mile 811.1			2	
249,330 (1)	5,840	263,480 (1)	14,150	279,480 (1)	16,000		3	
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	
28,900		30,000	1,100	32,000	2,000		6	
440,000 (April 1952)		447,000 (April 1952)		480,000 (April 1952)			7	
1959		1946		1952			8	
1964		1953		1955			9	
1440		1395		1234			10	
10,570 (including spillway)		10,700 (including spillway)		8,700 (including spillway)		71,596	11	
78		140		45		863 feet	12	
95		165		74			13	
1200, 700		4300, 1250		850, 450			14	
Pierre shale & Niobrara chalk		Niobrara chalk		Niobrara chalk & Carlile shale			15	
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	
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	
1385		1346		1180			21	
376 gated		1000 gated		664 gated			22	
8 - 40' x 38' Tainter		21 - 40' x 29' Tainter		14 - 40' x 30' Tainter			23	
390,000 at elev 1433.6		620,000 at elev 1379.3		584,000 at elev 1221.4			24	
270,000		508,000		345,000			25	
1423 msl	61,000 acres	1375 msl	102,000 acres	1210 msl	30,000 acres	1,188,000 acres	26	
1422 msl	60,000 acres	1365 msl	95,000 acres	1208 msl	27,000 acres	1,140,000 acres	27	
1420 msl	57,000 acres	1350 msl	77,000 acres	1204.5 msl	23,000 acres	986,000 acres	28	
1415 msl	51,000 acres	1320 msl	38,000 acres	1204.5 msl	23,000 acres	446,000 acres	29	
1423-1422	60,000 a.f.	1375-1365	985,000 a.f.	1210-1208	57,000 a.f.	4,664,000 a.f.	30	
1422-1420	117,000 a.f.	1365-1350	1,309,000 a.f.	1208-1204.5	86,000 a.f.	11,639,000 a.f.	31	
		1350-1320	1,607,000 a.f.			38,898,000 a.f.	32	
1420-1345	1,621,000 a.f.	1320-1240	1,517,000 a.f.	1204.5-1160	307,000 a.f.	17,886,000 a.f.	33	
1423-1345	1,798,000 a.f.	1375-1240	5,418,000 a.f.	1210-1160	450,000 a.f.	73,087,000 a.f.	34	
November 1963		January 1953		August 1955			35	
25 March 1964		24 November 1953		22 December 1955			36	
5,300 a.f.	430 yrs.	18,400 a.f.	250 yrs.	2,600 a.f.	180 yrs.	89,700 a.f.	37	
None (7)		Left Bank		None (7)			38	
		4 - 22' diameter					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	1228-1239	5,000-60,000 cfs	1155-1163	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	
3 - 67,276, 5 - 58,500		40,000		44,100			51	
494,320		320,000		132,300		2,501,200 kw	52	
497,000		293,000		74,000		1,967,000 kw	53	
976		1,736		728		9,412 million kWh	54	
October 1964 - July 1966		March 1954 - January 1956		September 1956 - January 1957		July 1943 - July 1966	55	
	\$107,498,000		\$199,066,000		\$49,617,000		\$1,166,404,000	56

**Plate 3**  
**Summary of Master Manual Technical Criteria**

**NAVIGATION TARGET FLOWS**

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

**RELATION OF SYSTEM STORAGE TO NAVIGATION SERVICE LEVEL**

<u>Date</u>	<u>System Storage (MAF)</u>	<u>Navigation Service Level</u>
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**

<u>Date</u>	<u>System Storage (MAF)</u>	<u>Final Day of Navigation Support at Mouth of the Missouri River</u>
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)

**GAVINS POINT RELEASES NEEDED TO MEET TARGET FLOWS**

		<u>1950 to 1996 Data (kcfs)</u>							
		<u>Median, Upper Quartile, Upper Decile Runoff</u>							
		<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>
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
		<u>Lower Quartile, Lower Decile Runoff</u>							
		<u>Apr</u>	<u>May</u>	<u>Jun</u>	<u>Jul</u>	<u>Aug</u>	<u>Sep</u>	<u>Oct</u>	<u>Nov</u>
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

**RESERVOIR UNBALANCING SCHEDULE**

<u>Year</u>	<u>Fort Peck</u>		<u>Garrison</u>		<u>Oahe</u>	
	<u>March 1</u>	<u>Rest of Year</u>	<u>March 1</u>	<u>Rest of Year</u>	<u>March 1</u>	<u>Rest of Year</u>
1	High	Float	Low	Hold Peak	Raise & hold during spawn	Float
2	Raise & hold during spawn	Float	High	Float	Low	Hold peak
3	Low	Hold peak	Raise & hold during spawn	Float	High	Float

**Notes:** **Float year:** Normal regulation, then unbalance 1 foot during low pool years or 3 feet when System storage is near 57.0 MAF on March 1.

**Low year:** Begin low, then hold peak the remainder of the year.

**High year:** Begin high, raise and hold pool during spawn, then float.

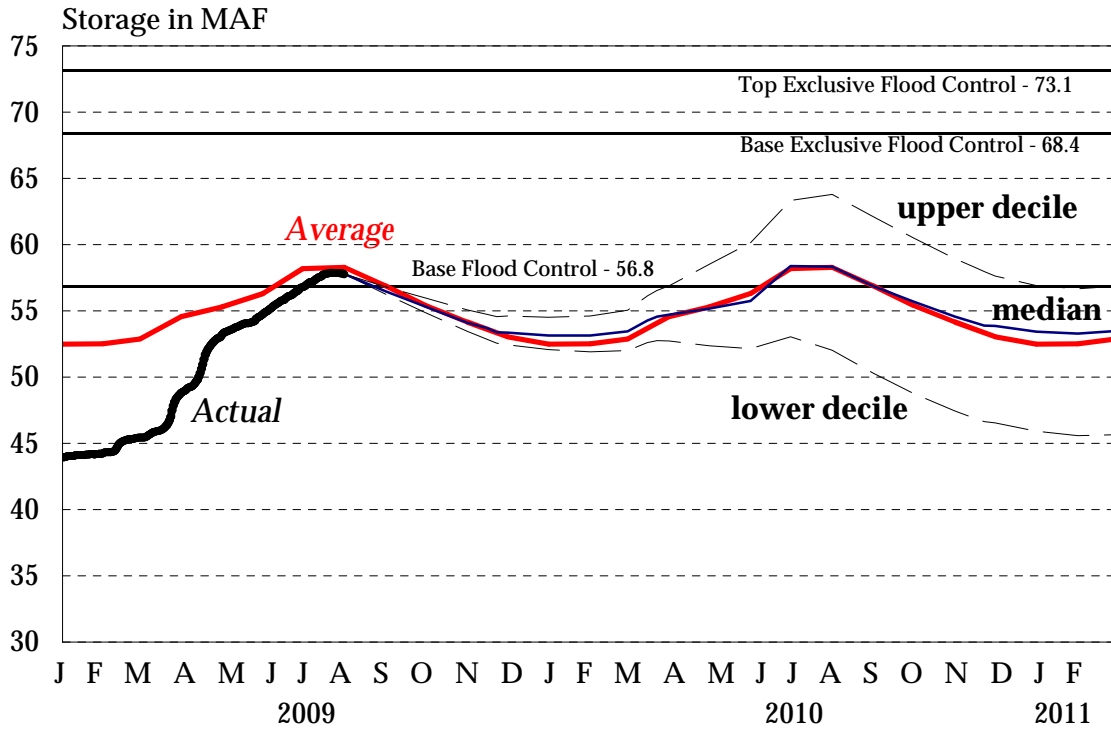
**MRNRC RECOMMENDED RESERVOIR ELEVATION GUIDELINES FOR UNBALANCING**

	<u>Fort Peck</u>	<u>Garrison</u>	<u>Oahe</u>
Implement unbalancing if March 1 pool is above this level.	2234 feet msl	1837.5 feet msl	1607.5 feet msl
Implement unbalancing if March 1 pool level is in this range <b>and</b> the pool is expected to raise more than 3 feet after March 1.	2227-2234 feet msl	1827-1837.5 feet msl	1600-1607.5 feet msl
Scheduling Criteria	Avoid pool level decline during spawn period which ranges from April 15 - May 30	Schedule after spawn period of April 20 - May 20	Schedule after spawn period of April 8 - May 15



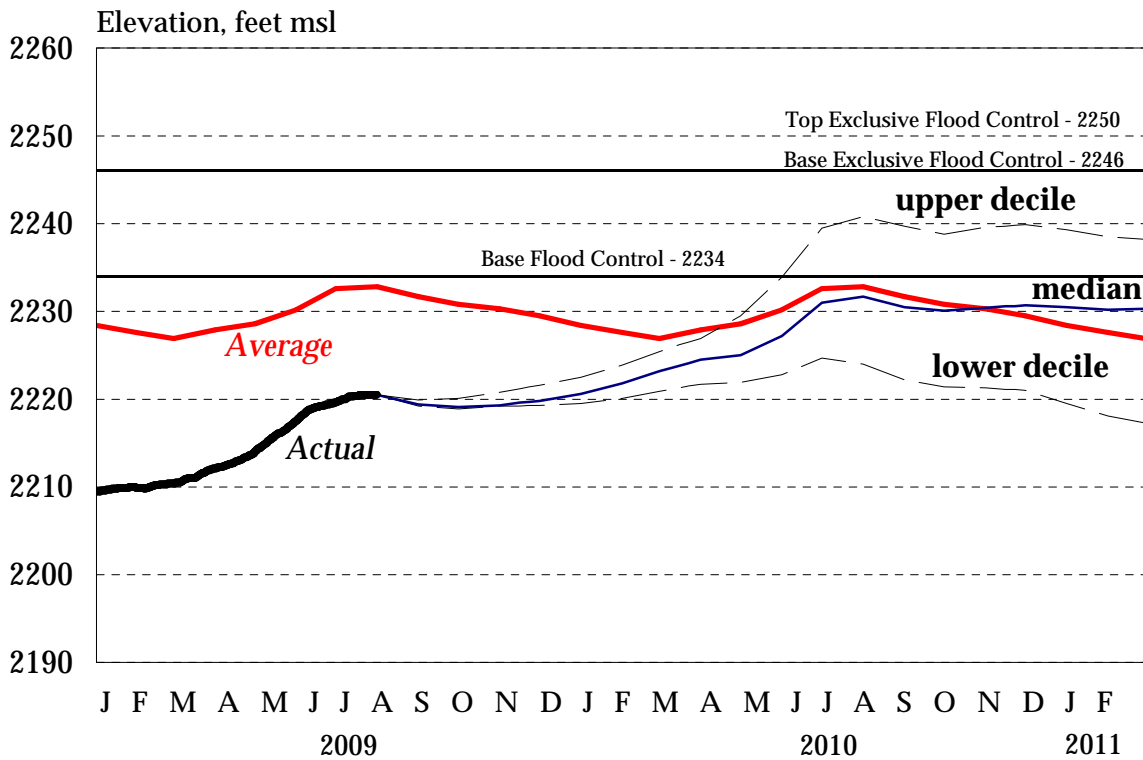


# System Storage 2009-2010 AOP



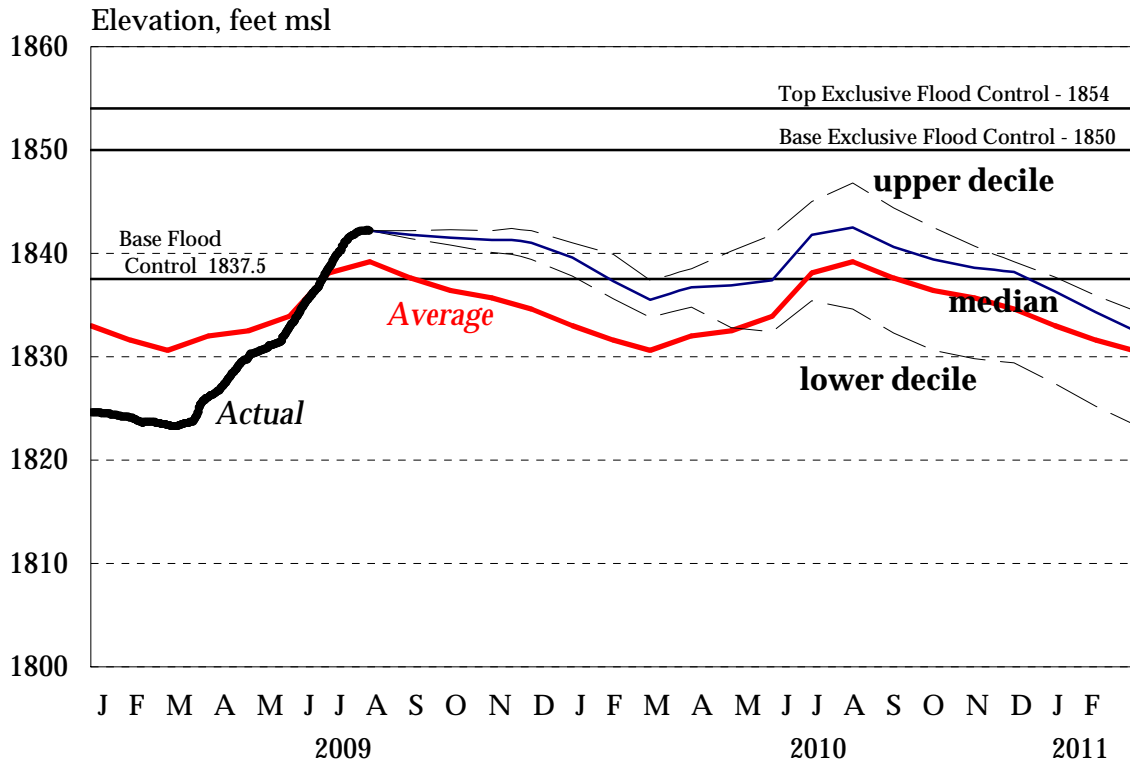
Average: 1967-2008

# Fort Peck 2009-2010 AOP



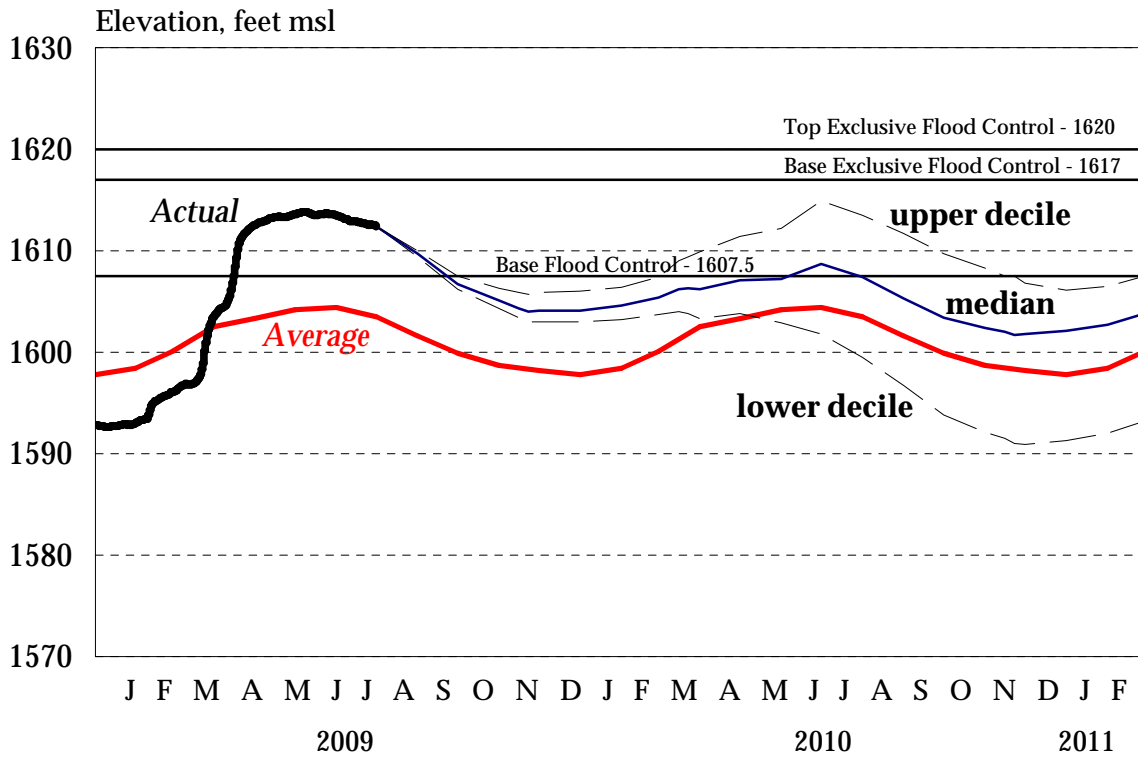
Average: 1967-2008

# Garrison 2009-2010 AOP



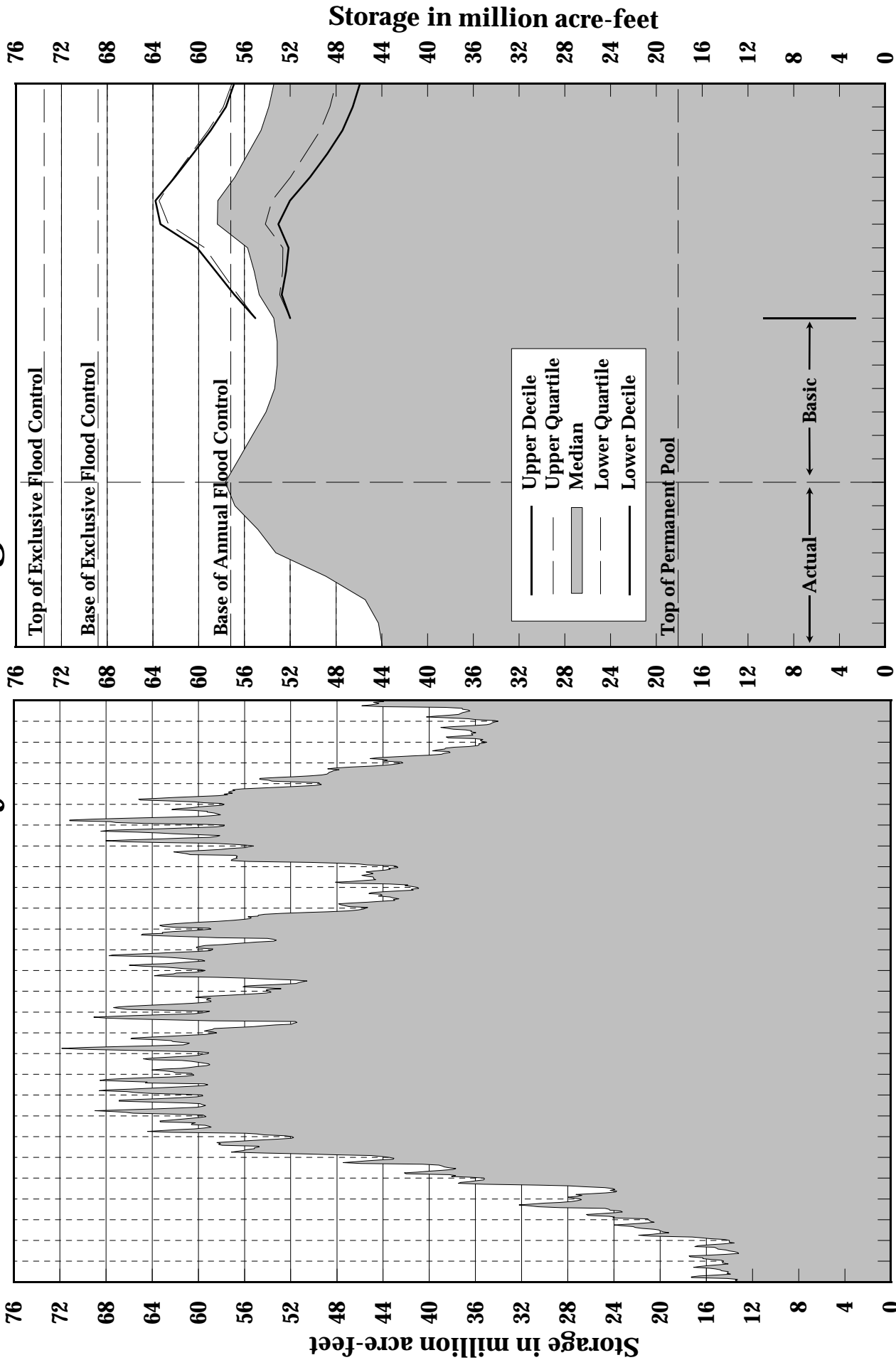
Average: 1967-2008

# Oahe 2009-2010 AOP



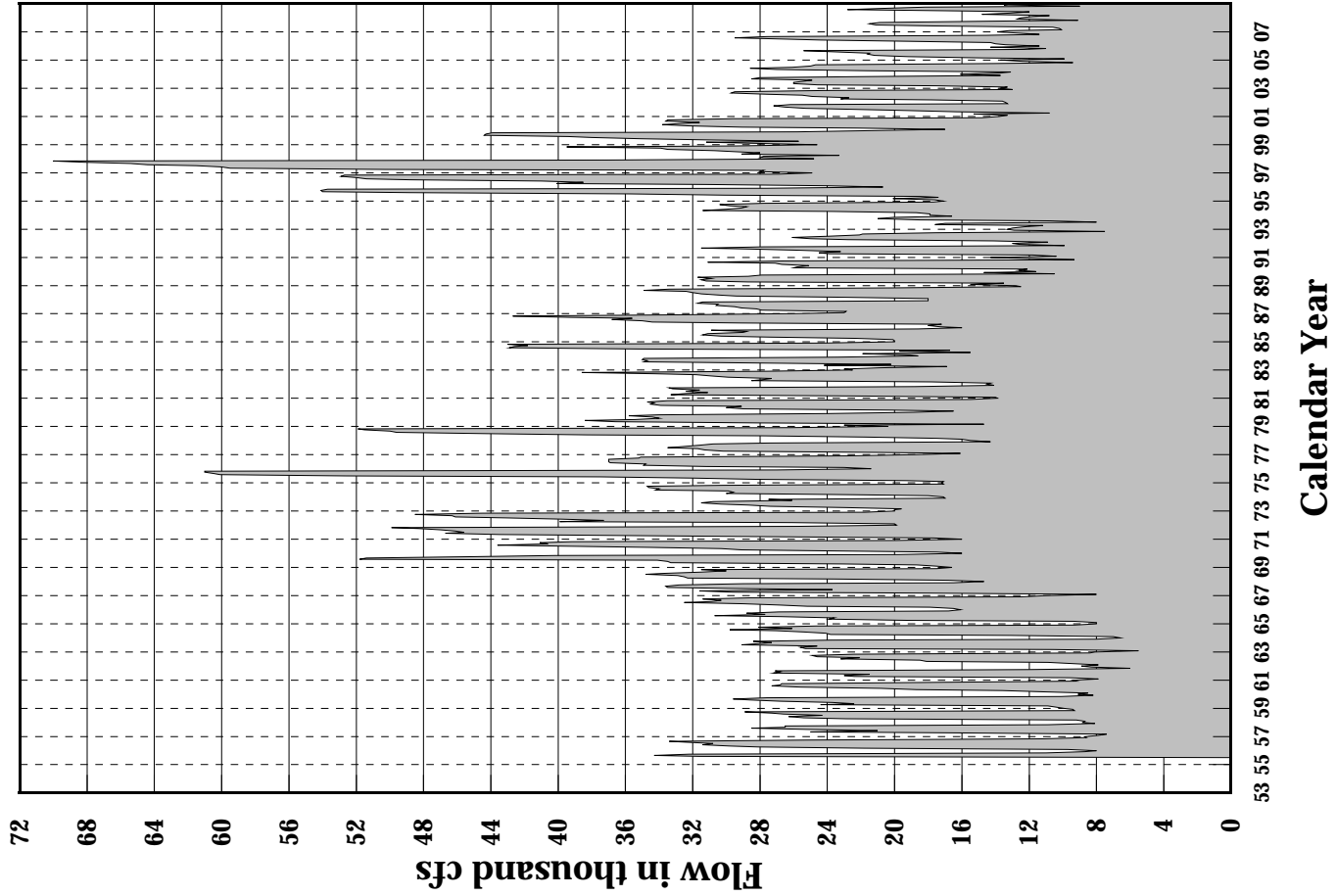
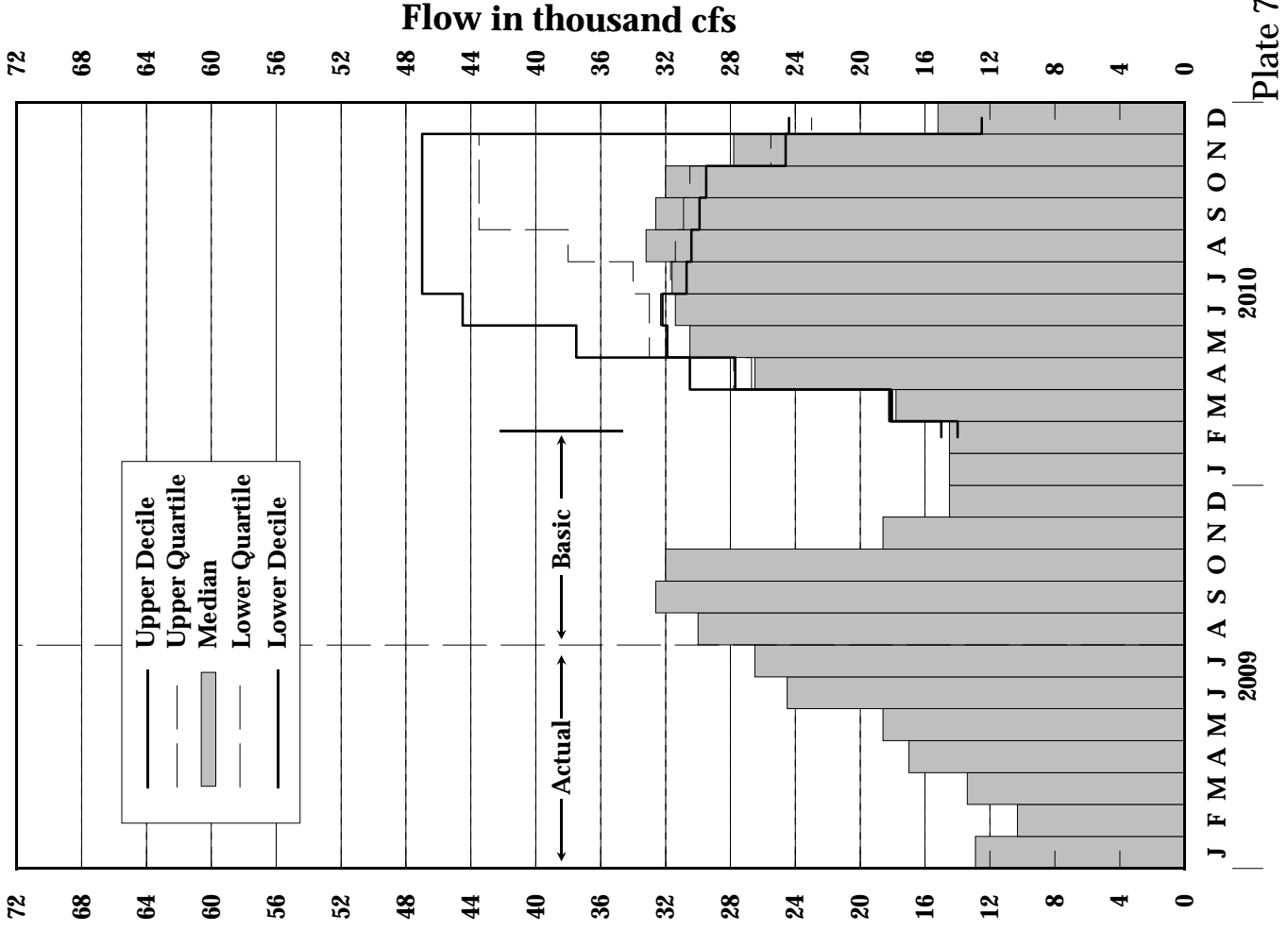
Average: 1967-2008

# System Storage

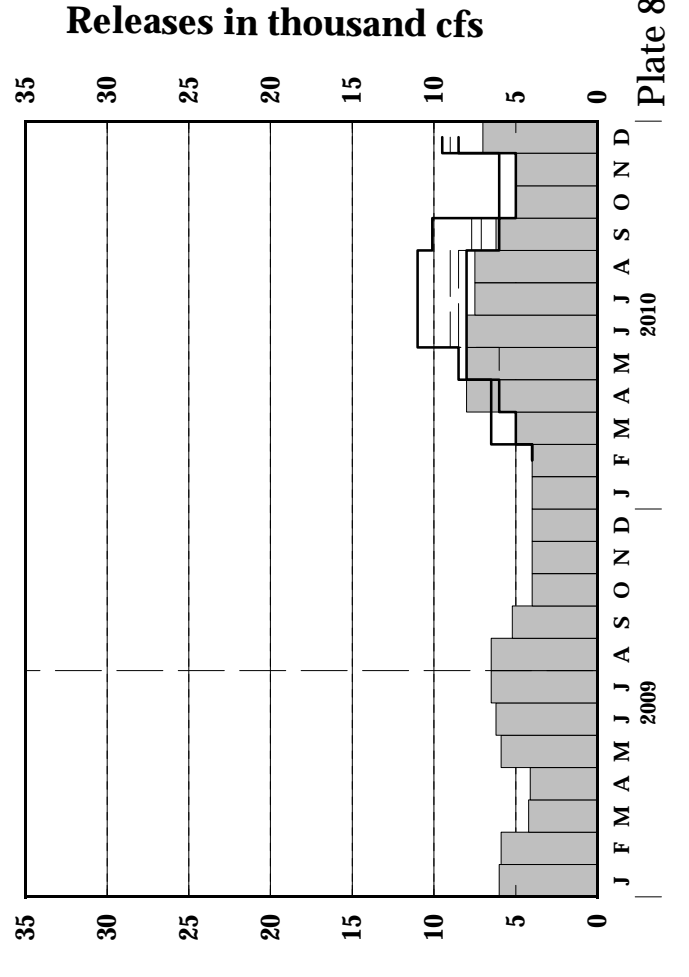
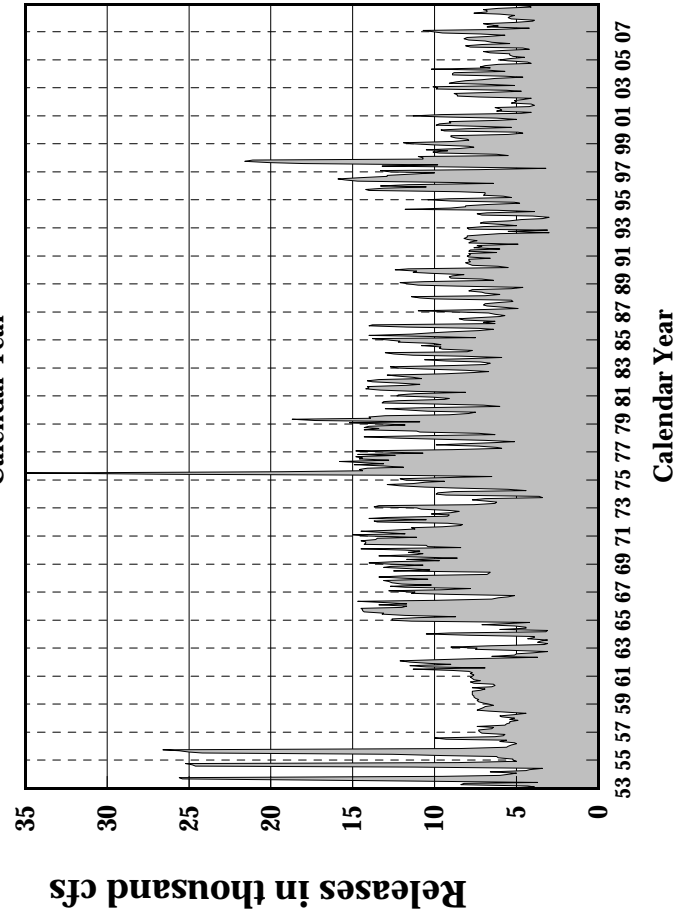
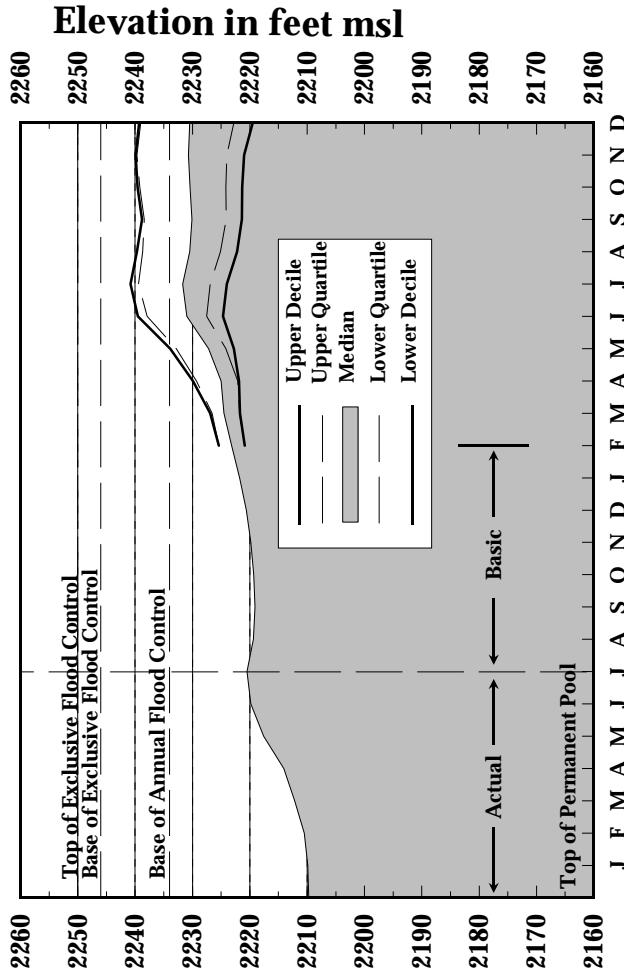
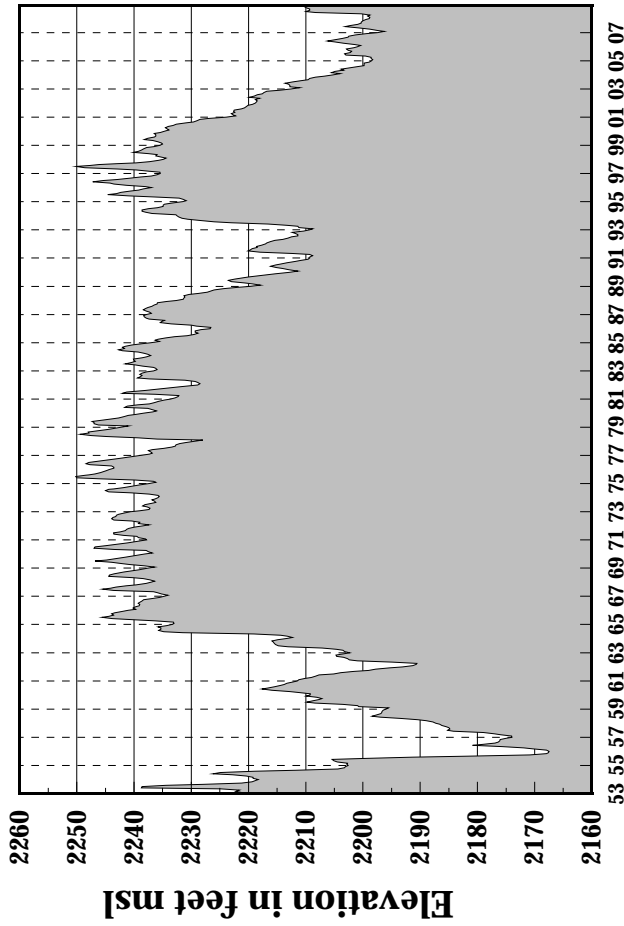


53 55 57 59 61 63 65 67 69 71 73 75 77 79 81 83 85 87 89 91 93 95 97 99 01 03 05 07

# Gavins Point Releases

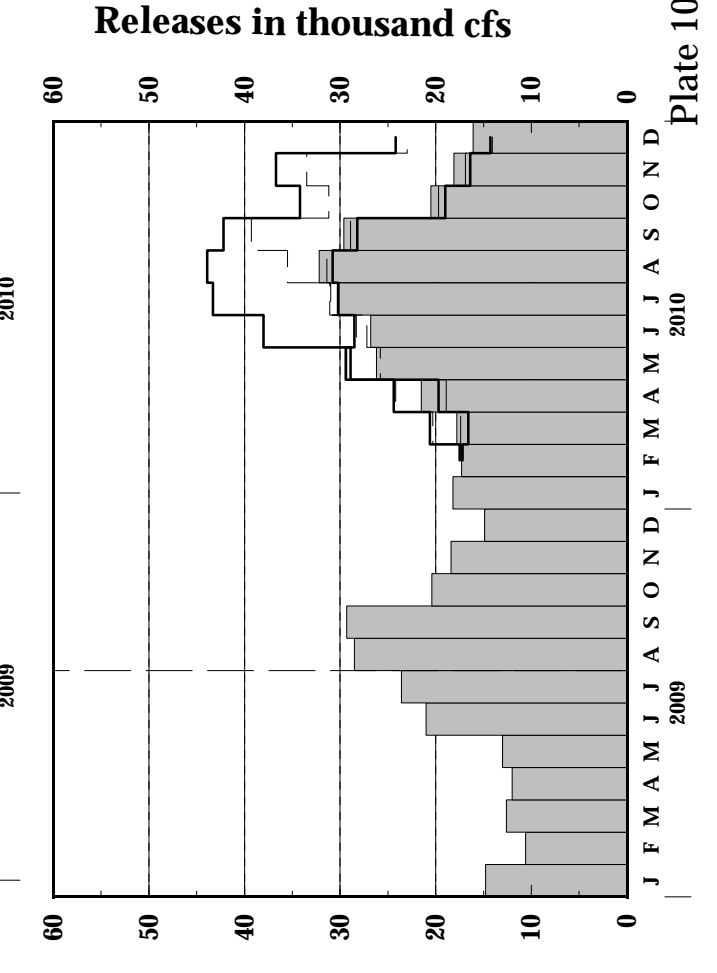
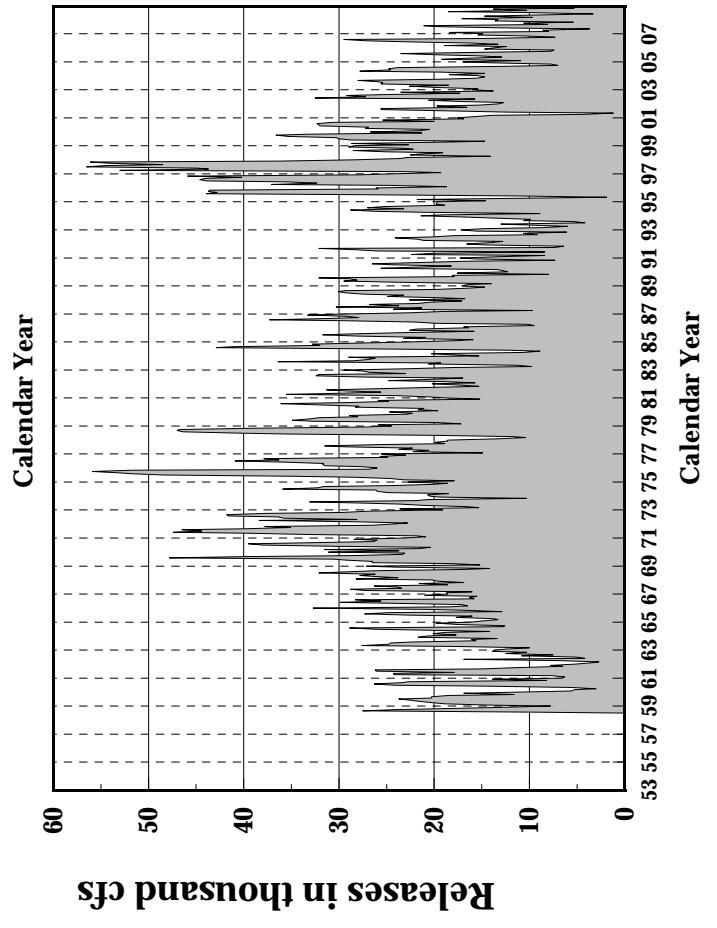
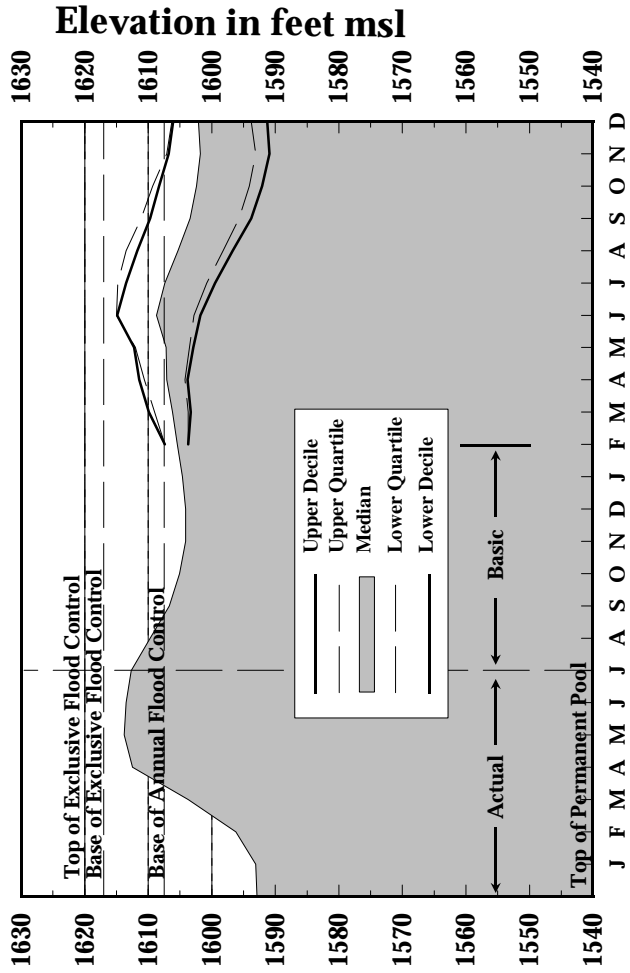
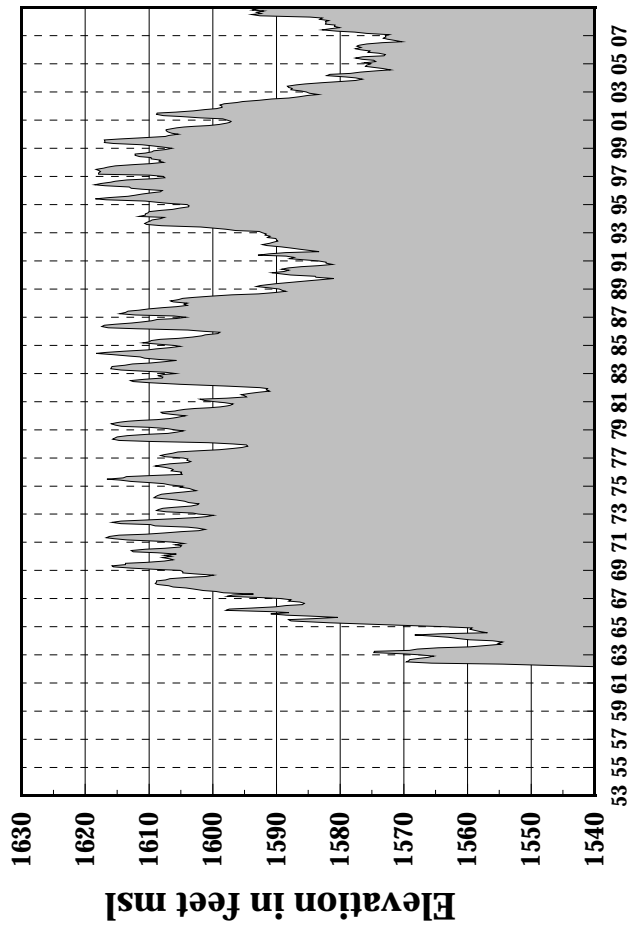


# Fort Peck Elevations and Releases



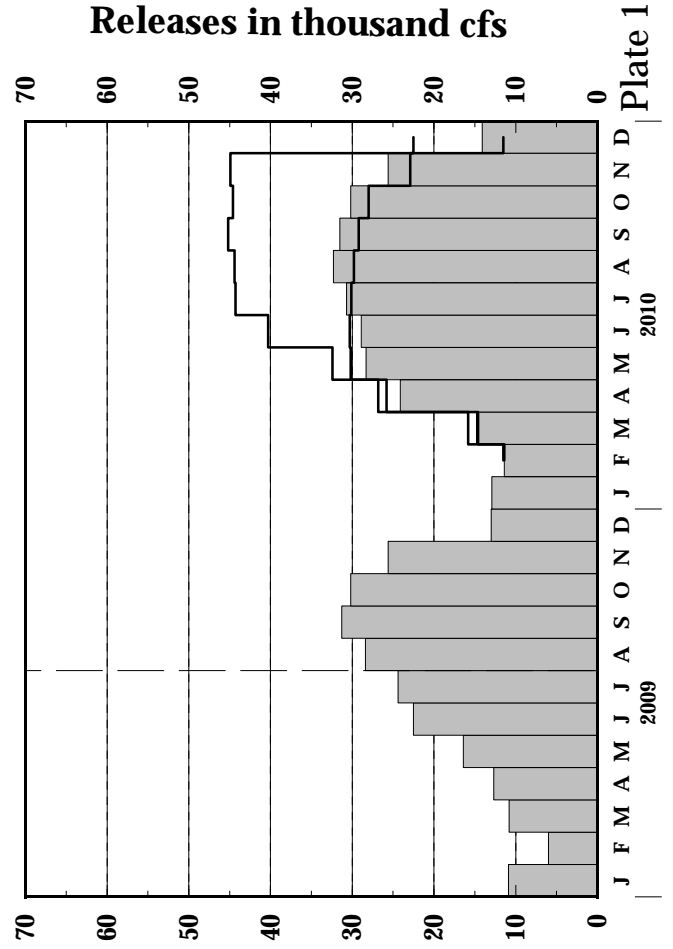
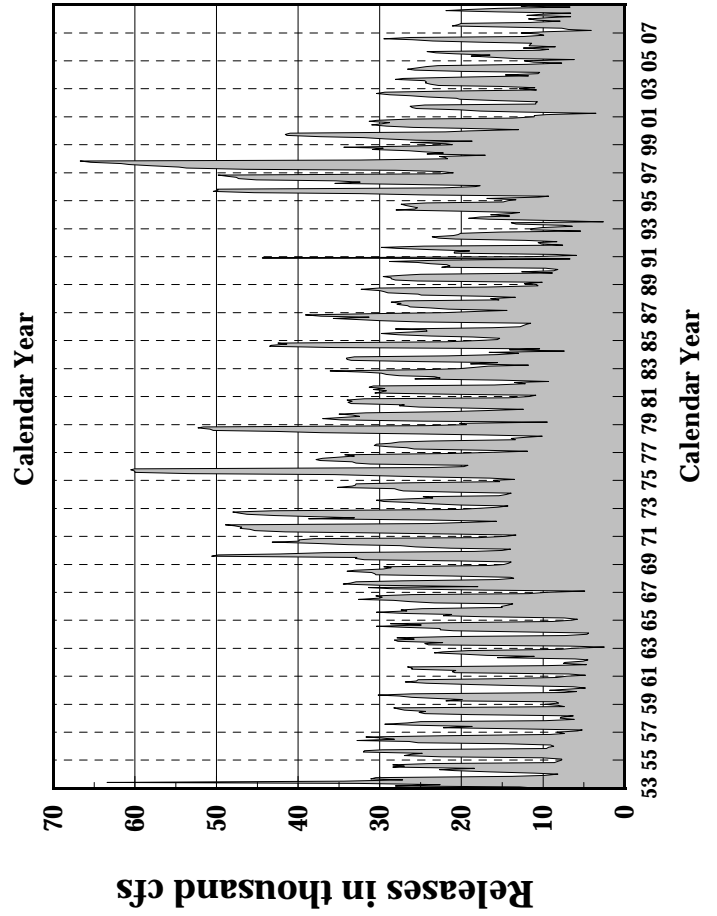
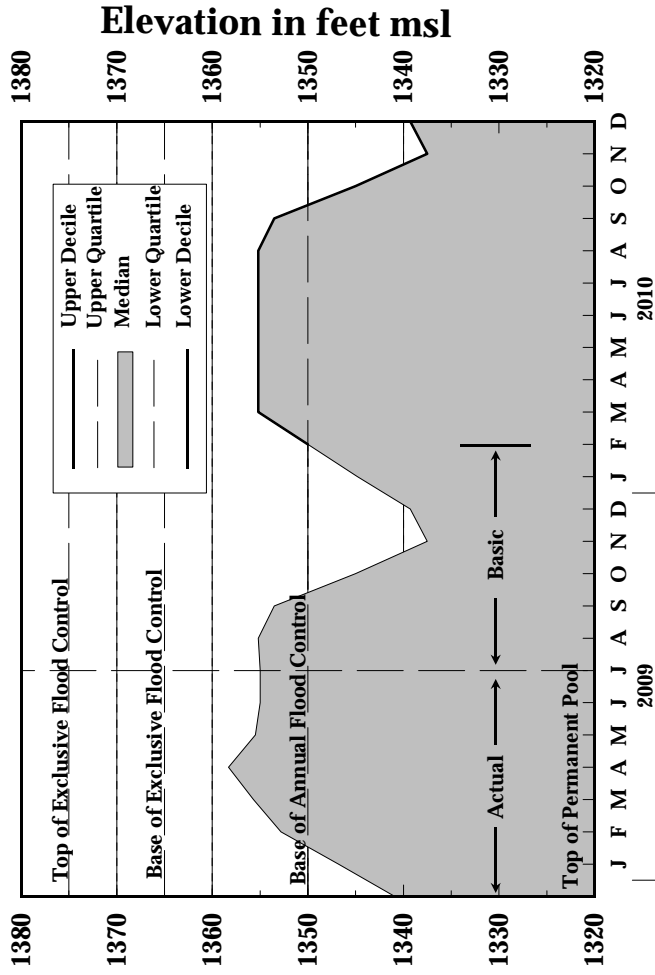
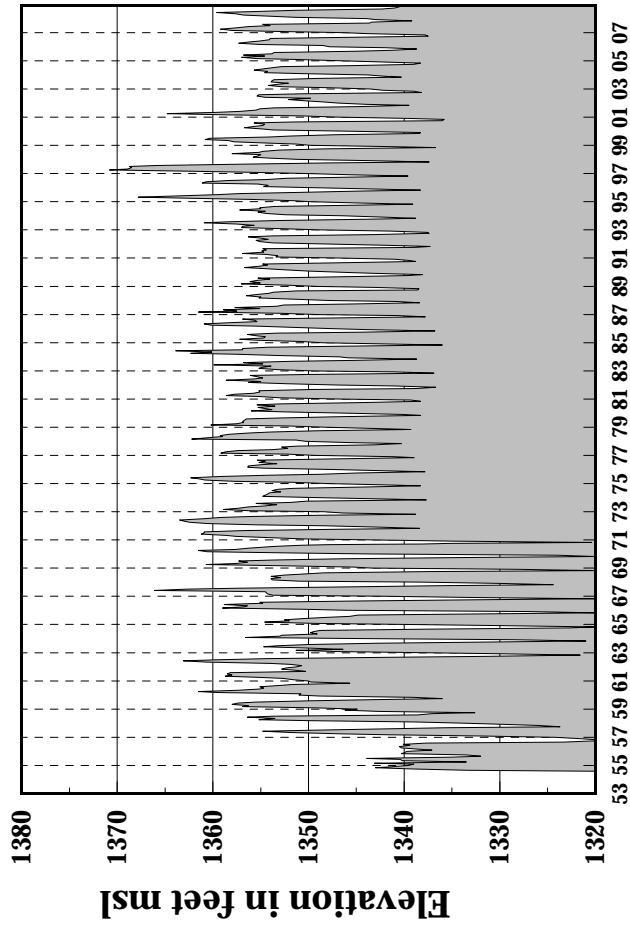


# Oahe Elevations and Releases



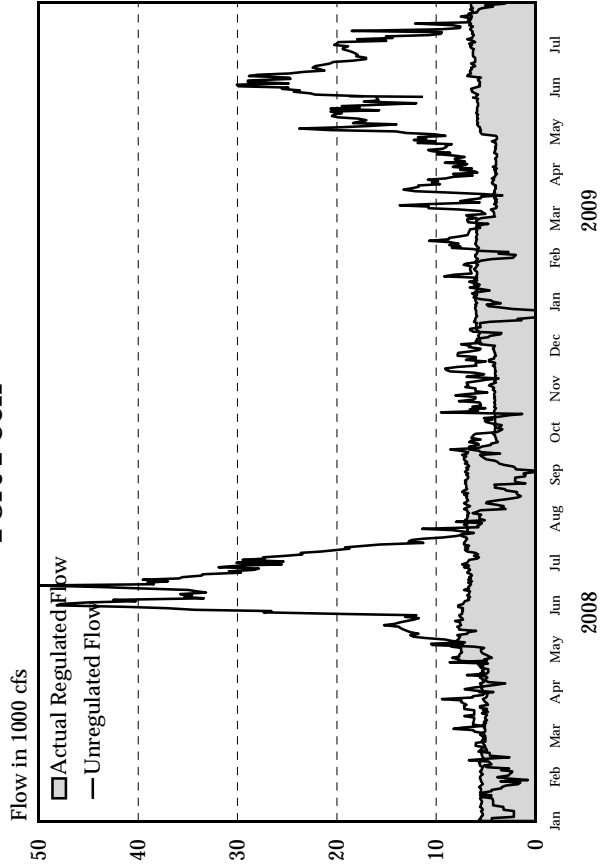


# Fort Randall Elevations and Releases

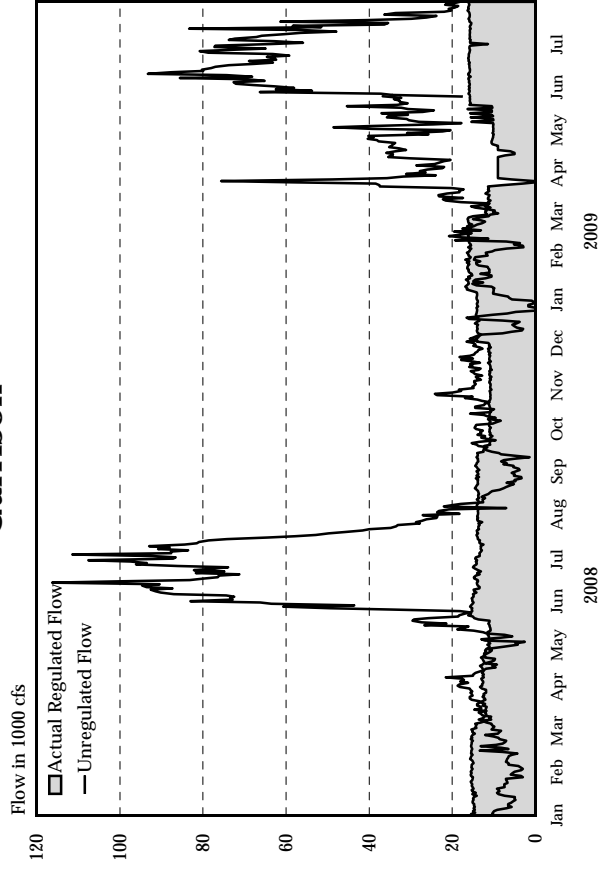


# Reservoir Release and Unregulated Flow

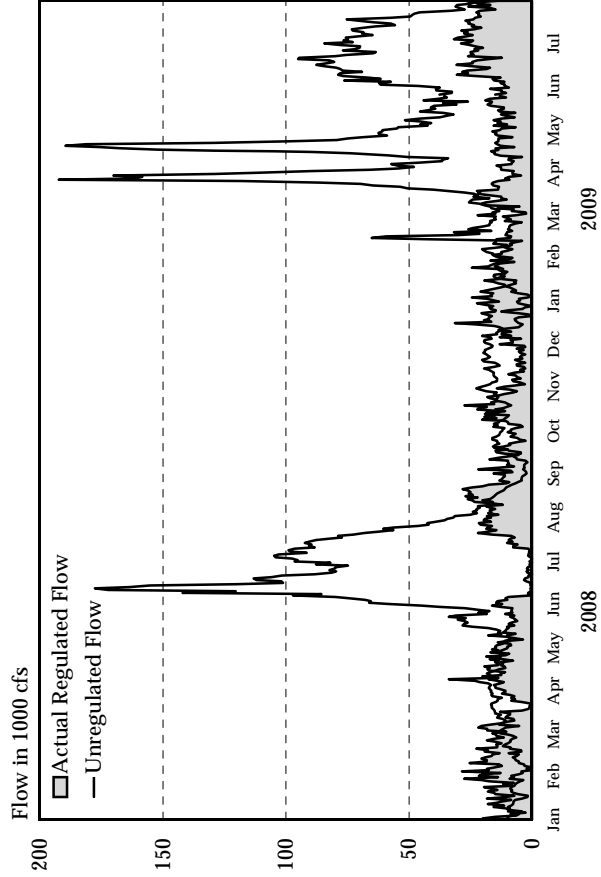
## Fort Peck



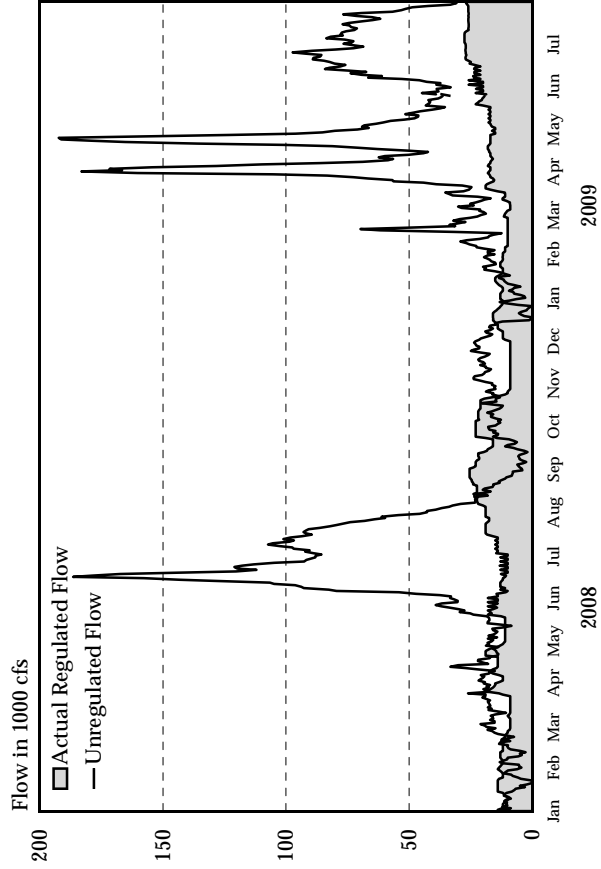
## Garrison



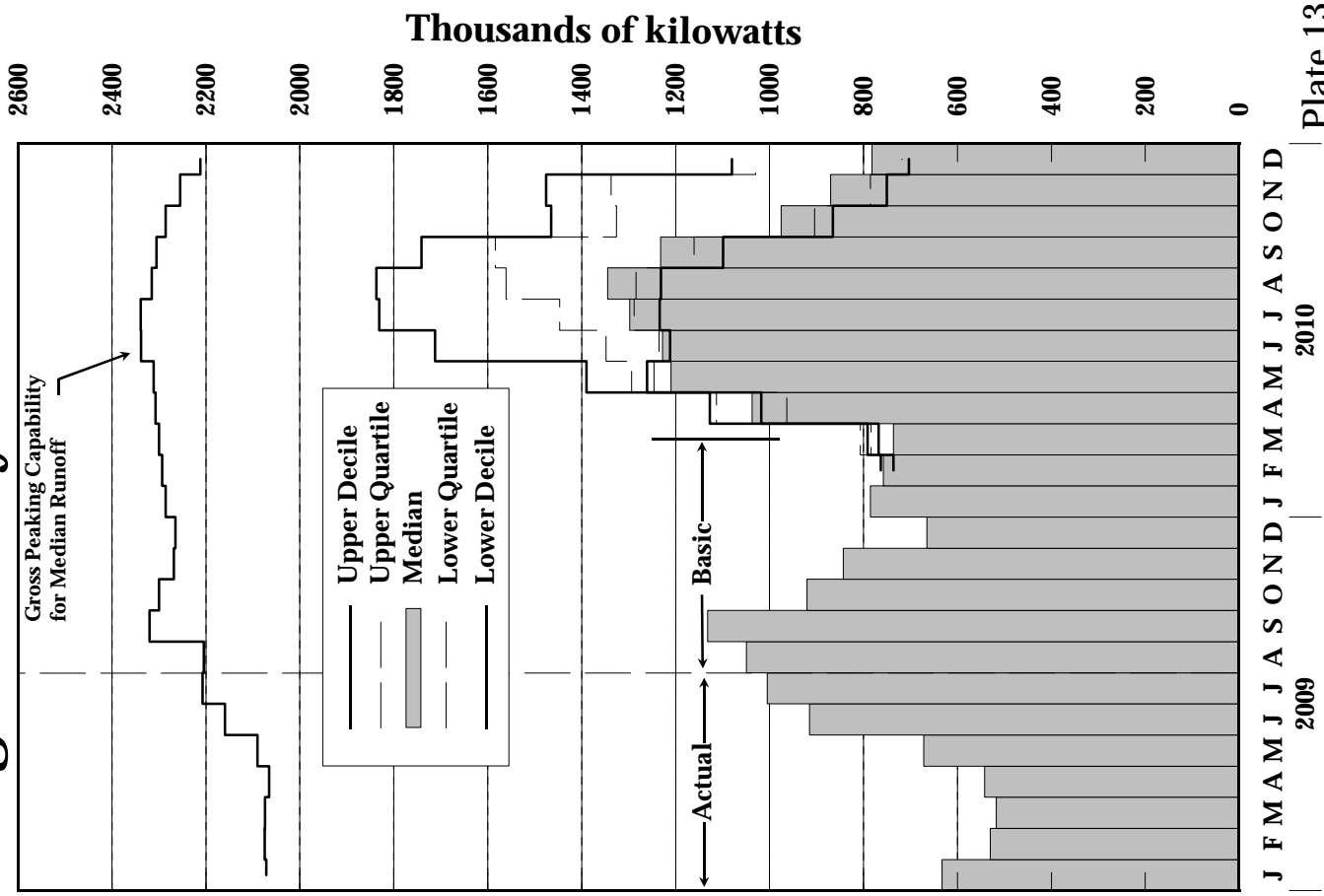
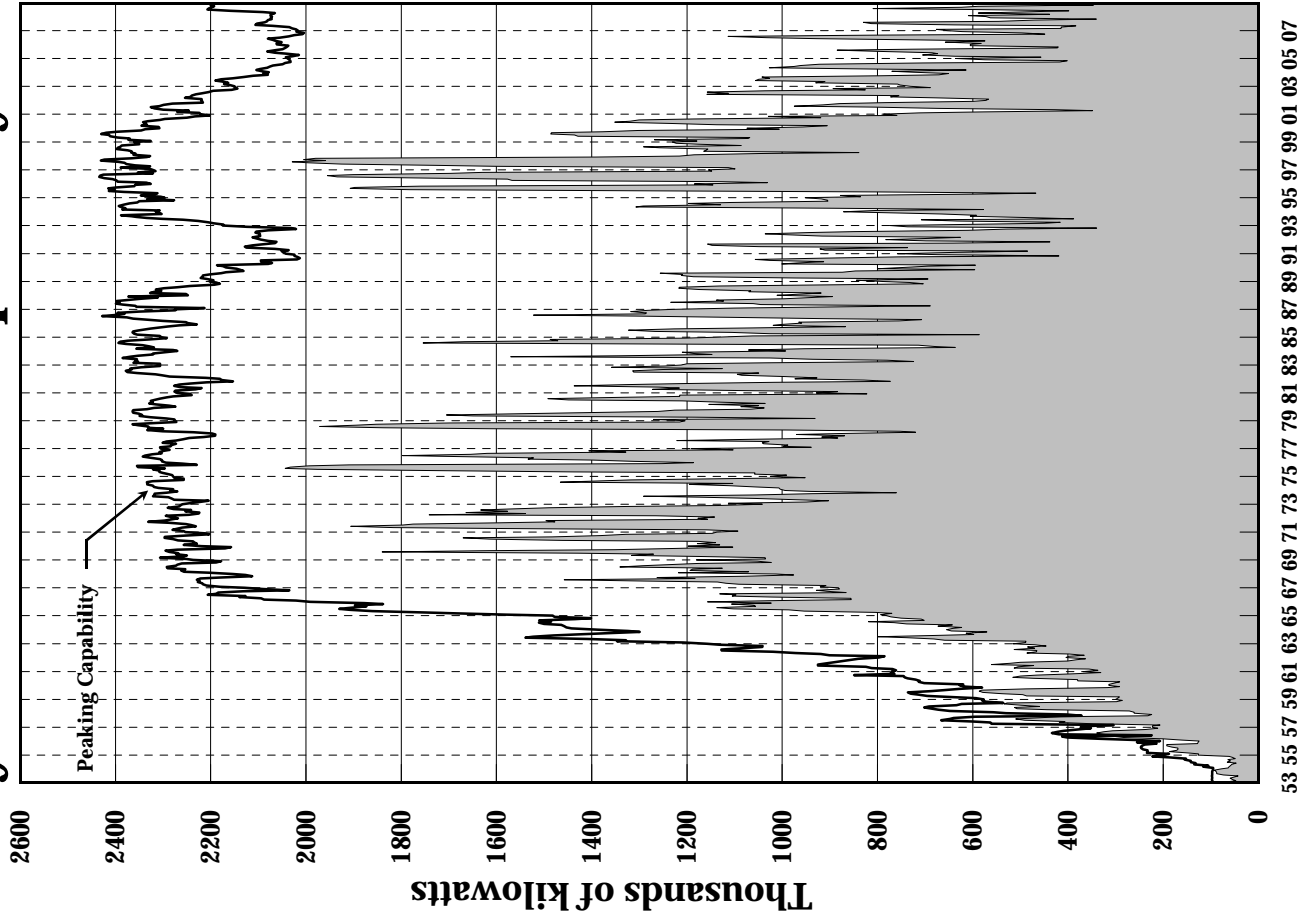
## Oahe



## Gavins Point

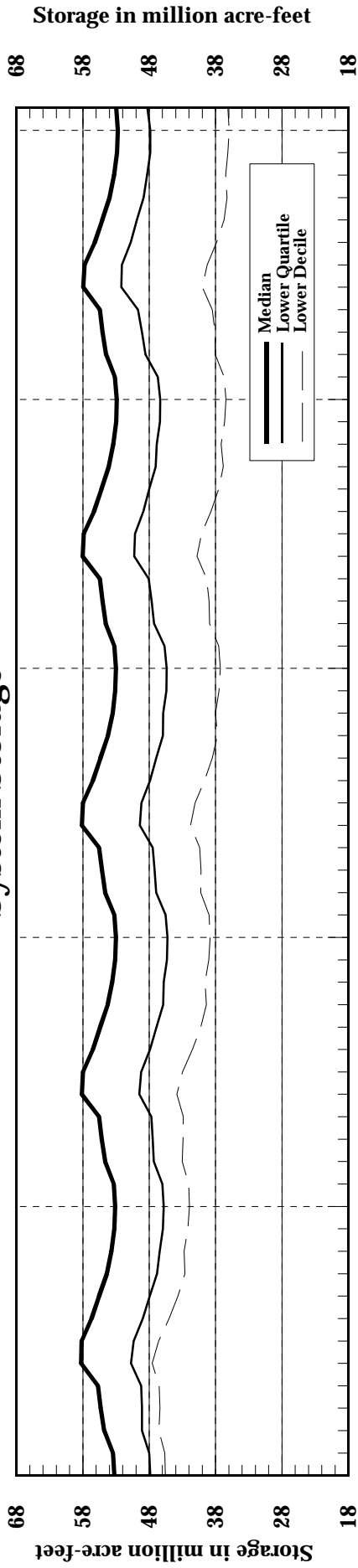


# System Gross Capability and Average Monthly Generation

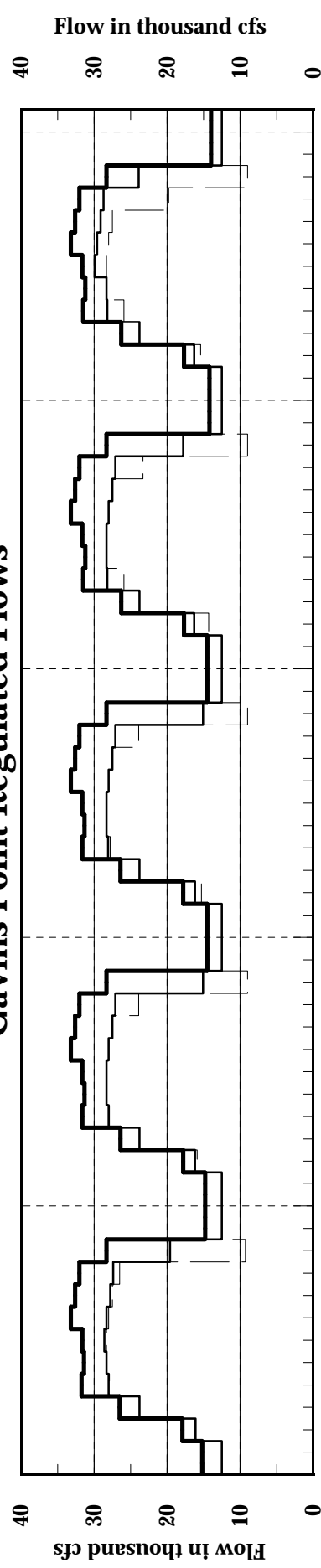


Calendar Year

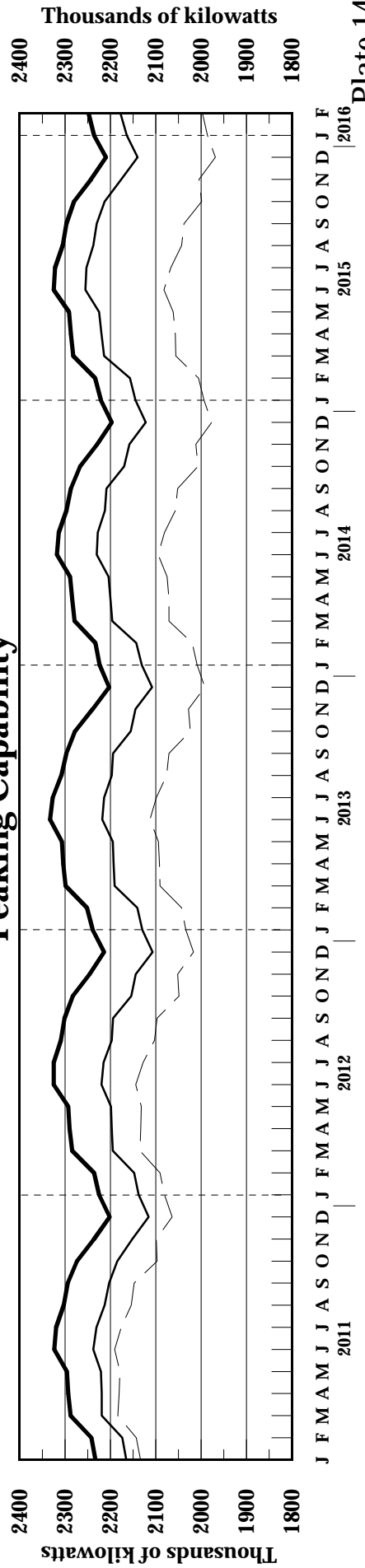
# Tentative Five Year Extensions of 2009-2010 AOP System Storage



## Gavins Point Regulated Flows



## Peaking Capability







TIME OF STUDY 07:46:58

FULL SERV, SHTN NAV SEAS 0 DAYS  
VALUES IN 1000 AF EXCEPT AS INDICATED

STUDY NO 1

	31JUL09	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB	2010
	INI-SUM										
--FORT PECK--											
NAT INFLOW	2212	300	290	330	165	77	88	290	312	360	
DEPLETION	-552	24	-63	-34	-38	-18	-20	-128	-158	-118	
EVAPORATION	360	73	92	80	36	17	19	42			
MOD INFLOW	2404	203	261	284	166	77	89	376	470	478	
RELEASE	1907	400	309	246	119	56	63	246	246	222	
STOR CHANGE	497	-197	-48	38	47	22	25	130	224	256	
STORAGE	12153	11956	11909	11946	11994	12016	12041	12170	12394	12650	
ELEV FTMSL	2220.5	2219.4	2219.1	2219.3	2219.6	2219.7	2219.8	2220.6	2221.8	2223.2	
DISCH KCFS	6.5	6.5	5.2	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
POWER											
AVE POWER MW		84	67	52	52	52	52	52	52	53	
PEAK POW MW		150	149	150	150	150	150	151	152	154	
ENERGY GWH	300.0	62.7	48.4	38.6	18.7	8.7	10.0	38.7	38.9	35.3	
--GARRISON--											
NAT INFLOW	2887	650	452	523	199	93	106	247	261	356	
DEPLETION	-459	108	-124	-24	-105	-49	-56	-97	-72	-41	
CHAN STOR	24		13	12							
EVAPORATION	500	102	128	112	50	23	27	57			
REG INFLOW	4777	840	770	693	372	174	199	533	579	619	
RELEASE	6881	984	839	769	372	222	254	984	1291	1166	
STOR CHANGE	-2104	-144	-70	-76	0	-48	-55	-451	-712	-547	
STORAGE	19610	19466	19396	19320	19321	19272	19217	18766	18053	17506	
ELEV FTMSL	1842.2	1841.8	1841.5	1841.3	1841.3	1841.2	1841.0	1839.6	1837.3	1835.5	
DISCH KCFS	15.8	16.0	14.1	12.5	12.5	16.0	16.0	16.0	21.0	21.0	
POWER											
AVE POWER MW		204	179	159	159	203	203	202	262	259	
PEAK POW MW		483	483	482	482	481	480	476	467	461	
ENERGY GWH	1048.6	151.5	129.2	118.3	57.2	34.1	38.9	150.5	195.1	174.0	
--OAHE--											
NAT INFLOW	426	80	111	66	34	16	18		12	90	
DEPLETION	196	106	26	-8	2	1	1	15	20	33	
CHAN STOR	-22	-1	7	6			-14		-21		
EVAPORATION	476	103	124	104	46	21	24	53			
REG INFLOW	6613	855	808	745	357	201	246	916	1263	1223	
RELEASE	8840	1752	1742	1254	569	300	224	916	1120	963	
STOR CHANGE	-2227	-897	-934	-510	-212	-99	22	0	142	261	
STORAGE	20427	19530	18596	18086	17874	17775	17797	17797	17939	18200	
ELEV FTMSL	1612.4	1609.7	1606.7	1605.1	1604.3	1604.0	1604.1	1604.1	1604.6	1605.4	
DISCH KCFS	23.6	28.5	29.3	20.4	19.1	21.6	14.1	14.9	18.2	17.3	
POWER											
AVE POWER MW		374	378	261	244	274	179	189	232	221	
PEAK POW MW		720	704	695	691	689	690	690	692	697	
ENERGY GWH	1374.8	278.0	272.5	194.4	87.7	46.0	34.4	140.9	172.3	148.6	
--BIG BEND--											
EVAPORATION	97	20	25	22	10	5	5	11			
REG INFLOW	8743	1732	1717	1233	560	295	219	905	1120	963	
RELEASE	8762	1751	1717	1233	560	295	219	905	1120	963	
STORAGE	1640	1621	1621	1621	1621	1621	1621	1621	1621	1621	
ELEV FTMSL	1420.3	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	
DISCH KCFS	21.7	28.5	28.9	20.0	18.8	21.3	13.8	14.7	18.2	17.3	
POWER											
AVE POWER MW		134	137	98	95	107	70	74	90	83	
PEAK POW MW		509	517	538	538	538	538	538	538	529	
ENERGY GWH	514.0	99.3	98.5	73.2	34.0	17.9	13.4	55.2	66.6	55.9	
--FORT RANDALL--											
NAT INFLOW	190	55	38	5	3	1	2	12	25	49	
DEPLETION	34	15	7	1	1	0	1	3	3	3	
EVAPORATION	109	25	31	25	9	4	4	10			
REG INFLOW	8810	1766	1717	1212	552	292	216	904	1142	1009	
RELEASE	9215	1745	1863	1855	873	408	242	801	792	635	
STOR CHANGE	-405	21	-146	-643	-321	-116	-26	103	350	374	
STORAGE	3528	3549	3403	2760	2438	2322	2296	2399	2749	3123	
ELEV FTMSL	1354.9	1355.2	1353.5	1345.0	1340.0	1338.0	1337.5	1339.3	1344.8	1350.0	
DISCH KCFS	24.4	28.4	31.3	30.2	29.4	29.4	15.3	13.0	12.9	11.4	
POWER											
AVE POWER MW		239	262	242	222	215	111	96	98	91	
PEAK POW MW		356	350	319	296	287	285	293	319	339	
ENERGY GWH	888.6	177.7	188.3	179.7	79.8	36.1	21.4	71.4	72.9	61.3	
--GAVINS POINT--											
NAT INFLOW	794	115	111	120	59	28	31	100	100	130	
DEPLETION	28	10	-5	2	5	2	3	10	1		
CHAN STOR	24	-7	-6	2	2	0	26	4	0	3	
EVAPORATION	34	7	9	8	3	2	2	4			
REG INFLOW	9971	1836	1965	1968	925	432	295	892	892	767	
RELEASE	9993	1845	1940	1968	925	432	295	892	892	805	
STOR CHANGE	-22	-9	25							-38	
STORAGE	364	355	380	380	380	380	380	380	380	342	
ELEV FTMSL	1206.9	1206.5	1207.5	1207.5	1207.5	1207.5	1207.5	1207.5	1207.5	1206.0	
DISCH KCFS	26.5	30.0	32.6	32.0	31.1	31.1	18.6	14.5	14.5	14.5	
POWER											
AVE POWER MW		102	109	108	106	106	66	51	51	51	
PEAK POW MW		115	117	117	117	117	117	117	117	114	
ENERGY GWH	414.5	76.0	78.3	80.6	38.3	17.9	12.6	38.3	38.3	34.3	
--GAVINS POINT - SIOUX CITY--											
NAT INFLOW	607	170	99	78	38	18	20	52	40	92	
DEPLETION	122	36	23	10	6	3	3	13	14	14	
REGULATED FLOW AT SIOUX CITY											
KAF	10478	1979	2016	2036	957	447	312	931	918	883	
KCFS		32.2	33.9	33.1	32.2	32.2	19.7	15.1	14.9	15.9	
--TOTAL--											
NAT INFLOW	7116	1370	1101	1122	498	232	265	701	750	1077	
DEPLETION	-631	299	-136	-53	-128	-60	-68	-184	-192	-109	
CHAN STOR	26	-8	15	20	1	-14	27	4	-20	3	
EVAPORATION	1576	329	408	350	156	72	82	178			
STORAGE	57722	56477	55305	54114	53628	53386	53352	53133	53137	53442	
SYSTEM POWER											
AVE POWER MW		1136	1132	920	877	957	681	665	785	758	
PEAK POW MW		2333	2320	2300	2274	2263	2260	2265	2286	2293	
ENERGY GWH	4540.7	845.4	815.2	684.7	315.6	160.8	130.7	494.9	584.0	509.4	
DAILY GWH		27.3	27.2	22.1	21.0	23.0	16.3	16.0	18.8	18.2	
	INI-SUM	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB	

	31JUL09	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB
	INI-SUM		2009							2010
--FORT PECK--										
NAT INFLOW	2654	360	348	396	198	92	106	348	374	432
DEPLETION	-420	9	-76	-36	-7	-3	-3	-103	-122	-79
EVAPORATION	247	55	69	61	15	7	8	32		
MOD INFLOW	2827	296	355	371	190	89	101	419	496	511
RELEASE	1906	400	308	246	119	56	63	246	246	222
STOR CHANGE	921	-104	46	125	71	33	38	173	250	289
STORAGE	12153	12049	12096	12221	12292	12325	12363	12535	12785	13074
ELEV FTMSL	2220.5	2219.9	2220.1	2220.8	2221.2	2221.4	2221.6	2222.5	2223.9	2225.4
DISCH KCFS	6.5	6.5	5.2	4.0	4.0	4.0	4.0	4.0	4.0	4.0
POWER										
AVE POWER MW		84	67	52	52	52	52	52	53	53
PEAK POW MW		150	150	151	152	152	152	153	154	156
ENERGY GWH	301.7	62.8	48.4	38.8	18.8	8.8	10.1	39.1	39.3	35.7
--GARRISON--										
NAT INFLOW	3464	780	542	628	239	112	127	296	313	427
DEPLETION	-489	112	-131	-28	-108	-50	-57	-103	-84	-40
CHAN STOR	24		13	11						
EVAPORATION	344	77	97	85	20	9	11	44		
REG INFLOW	5539	991	897	828	445	208	237	601	643	689
RELEASE	7063	984	884	830	402	229	262	1015	1291	1166
STOR CHANGE	-1524	7	12	-2	44	-21	-24	-414	-648	-477
STORAGE	19610	19617	19629	19628	19671	19650	19625	19212	18563	18086
ELEV FTMSL	1842.2	1842.2	1842.3	1842.2	1842.4	1842.3	1842.2	1841.0	1839.0	1837.4
DISCH KCFS	15.8	16.0	14.9	13.5	13.5	16.5	16.5	16.5	21.0	21.0
POWER										
AVE POWER MW		204	190	172	172	210	210	210	265	262
PEAK POW MW		489	489	489	491	490	489	480	473	468
ENERGY GWH	1082.8	151.7	136.5	128.2	62.1	35.3	40.4	155.9	196.8	175.9
--OAHE--										
NAT INFLOW	510	96	133	79	40	19	21		14	108
DEPLETION	196	106	26	-8	2	1	1	15	20	33
CHAN STOR	-21	-1	4	5			-12		-18	
EVAPORATION	330	78	94	80	19	9	10	41		
REG INFLOW	7025	896	902	843	421	226	272	958	1267	1241
RELEASE	8657	1704	1696	1216	543	288	210	920	1126	954
STOR CHANGE	-1632	-808	-794	-373	-122	-62	62	39	141	287
STORAGE	20427	19619	18824	18451	18329	18267	18328	18367	18508	18795
ELEV FTMSL	1612.4	1610.0	1607.5	1606.3	1605.9	1605.7	1605.9	1606.0	1606.4	1607.4
DISCH KCFS	23.6	27.7	28.5	19.8	18.3	20.7	13.3	15.0	18.3	17.2
POWER										
AVE POWER MW		364	370	255	234	265	170	192	235	221
PEAK POW MW		721	708	701	699	698	699	700	702	707
ENERGY GWH	1354.4	270.7	266.0	189.5	84.3	44.6	32.7	142.8	174.9	148.8
--BIG BEND--										
EVAPORATION	66	15	19	16	4	2	2	9		
REG INFLOW	8591	1689	1677	1200	539	286	208	911	1126	954
RELEASE	8610	1708	1677	1200	539	286	208	911	1126	954
STORAGE	1640	1621	1621	1621	1621	1621	1621	1621	1621	1621
ELEV FTMSL	1420.3	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0
DISCH KCFS	21.7	27.8	28.2	19.5	18.1	20.6	13.1	14.8	18.3	17.2
POWER										
AVE POWER MW		130	134	96	91	103	66	75	90	82
PEAK POW MW		509	517	538	538	538	538	538	538	529
ENERGY GWH	505.2	96.9	96.2	71.2	32.8	17.4	12.7	55.6	66.9	55.4
--FORT RANDALL--										
NAT INFLOW	228	66	46	6	4	2	2	14	30	59
DEPLETION	34	15	7	1	1	0	1	3	3	3
EVAPORATION	75	19	24	18	4	2	2	7		
REG INFLOW	8729	1740	1693	1186	538	286	209	915	1153	1010
RELEASE	9134	1719	1839	1829	859	402	235	812	803	636
STOR CHANGE	-405	21	-146	-643	-321	-116	-26	102	350	374
STORAGE	3528	3549	3403	2760	2438	2322	2296	2399	2749	3123
ELEV FTMSL	1354.9	1355.2	1353.5	1345.0	1340.0	1338.0	1337.5	1339.3	1344.8	1350.0
DISCH KCFS	24.4	28.0	30.9	29.8	28.9	28.9	14.8	13.2	13.1	11.5
POWER										
AVE POWER MW		235	258	238	218	212	108	97	99	91
PEAK POW MW		356	350	319	296	287	285	293	319	339
ENERGY GWH	880.8	175.2	185.9	177.3	78.5	35.6	20.7	72.3	73.9	61.4
--GAVINS POINT--										
NAT INFLOW	953	138	133	144	71	33	38	120	120	156
DEPLETION	28	10	-5	2	5	2	3	10	1	
CHAN STOR	24	-7	-6	2	2	0	26	3	0	3
EVAPORATION	23	5	6	6	1	1	1	3		
REG INFLOW	10060	1836	1965	1968	925	432	295	922	922	795
RELEASE	10082	1845	1940	1968	925	432	295	922	922	833
STOR CHANGE	-22	-9	25							-38
STORAGE	364	355	380	380	380	380	380	380	380	342
ELEV FTMSL	1206.9	1206.5	1207.5	1207.5	1207.5	1207.5	1207.5	1207.5	1207.5	1206.0
DISCH KCFS	26.5	30.0	32.6	32.0	31.1	31.1	18.6	15.0	15.0	15.0
POWER										
AVE POWER MW		102	109	108	106	106	66	53	53	53
PEAK POW MW		115	117	117	117	117	117	117	117	114
ENERGY GWH	418.3	76.0	78.3	80.6	38.3	17.9	12.6	39.6	39.6	35.5
--GAVINS POINT - SIOUX CITY--										
NAT INFLOW	728	204	119	94	46	21	24	62	48	110
DEPLETION	122	36	23	10	6	3	3	13	14	14
REGULATED FLOW AT SIOUX CITY										
KAF	10688	2013	2036	2052	965	450	316	971	956	929
KCFS		32.7	34.2	33.4	32.4	32.4	19.9	15.8	15.6	16.7
--TOTAL--										
NAT INFLOW	8537	1644	1321	1347	597	279	318	840	899	1292
DEPLETION	-529	288	-156	-59	-100	-47	-53	-165	-168	-69
CHAN STOR	27	-7	12	19	1	-12	27	3	-18	3
EVAPORATION	1085	248	309	267	63	29	33	136		
STORAGE	57722	56810	55953	55060	54731	54565	54614	54514	54607	55042
SYSTEM POWER										
AVE POWER MW		1120	1127	921	874	950	673	679	795	763
PEAK POW MW		2340	2332	2315	2293	2282	2280	2282	2304	2313
ENERGY GWH	4543.1	833.3	811.4	685.6	314.7	159.5	129.1	505.3	591.4	512.7
DAILY GWH		26.9	27.0	22.1	21.0	22.8	16.1	16.3	19.1	18.3
	INI-SUM	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB



TIME OF STUDY 09:33:15      FULL SERV, SHTN NAV SEAS 0 DAYS      STUDY NO 3

	31JUL09	2009										
	INI-SUM	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB	2010	
--FORT PECK--												
NAT INFLOW	1770	240	232	264	132	62	70	232	250	288		
DEPLETION	-661	-31	-137	-124	-43	-20	-23	-112	-99	-73		
EVAPORATION	449	91	114	100	45	21	24	53				
MOD INFLOW	1982	180	255	288	129	60	69	291	349	361		
RELEASE	1905	400	307	246	119	56	63	246	246	222		
STOR CHANGE	77	-220	-52	42	10	5	5	45	103	139		
STORAGE	12153	11933	11881	11923	11933	11938	11943	11988	12091	12230		
ELEV FTMSL	2220.5	2219.2	2218.9	2219.2	2219.2	2219.3	2219.3	2219.5	2220.1	2220.9		
DISCH KCFS	6.5	6.5	5.2	4.0	4.0	4.0	4.0	4.0	4.0	4.0		
POWER												
AVE POWER MW		84	67	52	52	52	52	52	52	52		
PEAK POW MW		150	149	149	150	150	150	150	150	151		
ENERGY GWH	299.0	62.7	48.1	38.5	18.7	8.7	10.0	38.6	38.7	35.0		
--GARRISON--												
NAT INFLOW	2310	520	362	418	159	74	85	198	209	285		
DEPLETION	-513	75	-141	-17	-105	-49	-56	-96	-72	-52		
CHAN STOR	24		13	11								
EVAPORATION	620	128	160	138	62	29	33	70				
REG INFLOW	4132	717	663	554	321	150	171	470	527	559		
RELEASE	6733	984	867	769	372	222	254	984	1199	1083		
STOR CHANGE	-2602	-267	-204	-215	-51	-72	-83	-514	-672	-524		
STORAGE	19610	19343	19139	18924	18873	18801	18718	18204	17532	17008		
ELEV FTMSL	1842.2	1841.4	1840.8	1840.1	1839.9	1839.7	1839.4	1837.8	1835.6	1833.8		
DISCH KCFS	15.8	16.0	14.6	12.5	12.5	16.0	16.0	16.0	19.5	19.5		
POWER												
AVE POWER MW		203	185	158	158	202	202	201	241	238		
PEAK POW MW		482	480	477	477	476	475	469	461	455		
ENERGY GWH	1020.0	151.4	133.0	117.7	56.9	33.9	38.7	149.2	179.3	159.9		
--OAHE--												
NAT INFLOW	342	64	89	53	27	13	14		10	72		
DEPLETION	196	106	26	-8	2	1	1	15	20	33		
CHAN STOR	-16	-1	6	8			-15		-15			
EVAPORATION	593	129	155	130	58	27	30	66				
REG INFLOW	6270	812	781	708	339	193	237	903	1174	1122		
RELEASE	9008	1799	1788	1293	588	308	233	912	1115	971		
STOR CHANGE	-2738	-987	-1007	-585	-248	-116	3	-9	60	151		
STORAGE	20427	19440	18433	17848	17600	17485	17488	17479	17538	17689		
ELEV FTMSL	1612.4	1609.4	1606.2	1604.3	1603.4	1603.0	1603.0	1603.0	1603.2	1603.7		
DISCH KCFS	23.6	29.3	30.1	21.0	19.7	22.2	14.7	14.8	18.1	17.5		
POWER												
AVE POWER MW		384	388	268	250	280	186	187	229	221		
PEAK POW MW		718	701	691	686	684	684	684	685	688		
ENERGY GWH	1395.1	285.3	279.0	199.6	90.1	47.1	35.7	139.5	170.2	148.6		
--BIG BEND--												
EVAPORATION	121	25	31	27	12	6	7	14				
REG INFLOW	8887	1775	1757	1266	575	303	227	898	1115	971		
RELEASE	8906	1794	1757	1266	575	303	227	898	1115	971		
STORAGE	1640	1621	1621	1621	1621	1621	1621	1621	1621	1621		
ELEV FTMSL	1420.3	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0		
DISCH KCFS	21.7	29.2	29.5	20.6	19.3	21.8	14.3	14.6	18.1	17.5		
POWER												
AVE POWER MW		137	140	101	97	109	72	74	89	84		
PEAK POW MW		509	517	538	538	538	538	538	538	529		
ENERGY GWH	522.3	101.8	100.8	75.1	35.0	18.4	13.8	54.8	66.3	56.4		
--FORT RANDALL--												
NAT INFLOW	152	44	30	4	3	1	1	10	20	39		
DEPLETION	34	15	7	1	1	0	1	3	3	3		
EVAPORATION	136	32	39	31	12	5	5	12				
REG INFLOW	8888	1791	1741	1238	565	298	223	893	1132	1007		
RELEASE	9293	1770	1887	1881	886	414	249	791	782	633		
STOR CHANGE	-405	21	-146	-643	-321	-116	-26	103	350	374		
STORAGE	3528	3549	3403	2760	2438	2322	2296	2399	2749	3123		
ELEV FTMSL	1354.9	1355.2	1353.5	1345.0	1340.0	1338.0	1337.5	1339.3	1344.8	1350.0		
DISCH KCFS	24.4	28.8	31.7	30.6	29.8	29.8	15.7	12.9	12.7	11.4		
POWER												
AVE POWER MW		242	265	245	225	218	114	95	97	91		
PEAK POW MW		356	350	319	296	287	285	293	319	339		
ENERGY GWH	896.2	180.3	190.7	182.2	80.9	36.7	22.0	70.4	72.0	61.2		
--GAVINS POINT--												
NAT INFLOW	635	92	89	96	47	22	25	80	80	104		
DEPLETION	28	10	-5	2	5	2	3	10	1			
CHAN STOR	24	-8	-6	2	1	0	26	5	0	2		
EVAPORATION	42	8	11	10	4	2	2	5				
REG INFLOW	9882	1836	1965	1968	925	432	295	861	861	740		
RELEASE	9904	1845	1940	1968	925	432	295	861	861	778		
STOR CHANGE	-22	-9	25							-38		
STORAGE	364	355	380	380	380	380	380	380	380	342		
ELEV FTMSL	1206.9	1206.5	1207.5	1207.5	1207.5	1207.5	1207.5	1207.5	1207.5	1206.0		
DISCH KCFS	26.5	30.0	32.6	32.0	31.1	31.1	18.6	14.0	14.0	14.0		
POWER												
AVE POWER MW		102	109	108	106	106	66	50	50	49		
PEAK POW MW		115	117	117	117	117	117	117	117	114		
ENERGY GWH	410.8	76.0	78.3	80.6	38.3	17.9	12.6	37.0	37.0	33.1		
--GAVINS POINT - SIOUX CITY--												
NAT INFLOW	486	136	79	62	31	14	16	42	32	74		
DEPLETION	122	36	23	10	6	3	3	13	14	14		
REGULATED FLOW AT SIOUX CITY												
KAF	10268	1945	1996	2020	950	443	308	890	879	838		
KCFS		31.6	33.5	32.8	31.9	31.9	19.4	14.5	14.3	15.1		
--TOTAL--												
NAT INFLOW	5695	1096	881	897	398	186	212	562	601	862		
DEPLETION	-794	211	-227	-136	-134	-62	-71	-167	-133	-75		
CHAN STOR	33	-9	13	22	1	-15	27	5	-14	2		
EVAPORATION	1962	412	510	436	193	89	102	220				
STORAGE	57722	56241	54857	53456	52846	52546	52447	52071	51912	52014		
SYSTEM POWER												
AVE POWER MW		1152	1153	932	888	968	692	658	757	736		
PEAK POW MW		2330	2314	2291	2264	2252	2249	2251	2270	2276		
ENERGY GWH	4543.4	857.5	829.9	693.7	319.8	162.6	132.8	489.4	563.4	494.3		
DAILY GWH		27.7	27.7	22.4	21.3	23.2	16.6	15.8	18.2	17.7		
INI-SUM		31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB		





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	VALUES IN 1000 AF EXCEPT AS INDICATED												STUDY NO				6
	28FEB10	15MAR	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	
--FORT PECK--																	
NAT INFLOW	7200	230	107	138	600	1180	1810	840	315	295	430	180	84	96	300	250	345
DEPLETION	434	-39	-18	-23	30	274	562	228	7	-88	-38	-39	-18	-21	-129	-151	-104
EVAPORATION	431							26	82	103	90	41	19	22	47		
MOD INFLOW	6335	269	125	161	570	906	1248	586	226	280	378	178	83	95	382	401	449
RELEASE	4954	149	69	89	476	492	476	461	368	307	149	69	79	79	430	461	417
STOR CHANGE	1380	120	56	72	94	414	772	125	-236	-88	70	29	13	15	-49	-60	32
STORAGE	12650	12770	12826	12898	12992	13406	14178	14302	14067	13979	14049	14078	14092	14107	14058	13998	14030
ELEV FTMSL	2223.2	2223.8	2224.1	2224.5	2225.0	2227.2	2231.0	2231.7	2230.5	2230.1	2230.4	2230.6	2230.6	2230.7	2230.5	2230.2	2230.3
DISCH KCFS	4.0	5.0	5.0	5.0	8.0	8.0	8.0	7.5	7.5	6.2	5.0	5.0	5.0	5.0	7.0	7.5	7.5
POWER																	
AVE POWER MW		66	66	66	106	106	107	101	101	83	67	68	68	68	94	101	101
PEAK POW MW		154	155	155	155	157	160	161	160	159	160	160	160	160	160	159	160
ENERGY GWH	805.0	23.8	11.1	14.3	76.2	79.1	77.3	75.5	75.4	60.0	50.2	24.3	11.3	13.0	70.3	75.2	67.9
--GARRISON--																	
NAT INFLOW	10800	460	214	276	870	1325	3095	1860	595	460	495	195	91	104	180	260	320
DEPLETION	961	7	3	4	16	152	742	583	102	-140	-21	-118	-55	-63	-114	-87	-51
CHAN STOR	-35	-10			-30			5	13	12				0	-20	-5	
EVAPORATION	516							32	101	125	107	48	22	26	55		
REG INFLOW	14242	592	281	361	1300	1665	2829	1711	853	856	728	413	193	220	650	803	788
RELEASE	15103	417	194	250	1250	1506	1428	1476	1476	1249	984	476	222	254	1230	1414	1277
STOR CHANGE	-861	175	86	111	51	158	1401	235	-623	-393	-256	-63	-29	-33	-580	-611	-490
STORAGE	17506	17681	17768	17879	17929	18088	19489	19724	19101	18708	18452	18389	18360	18326	17746	17135	16645
ELEV FTMSL	1835.5	1836.1	1836.4	1836.7	1836.9	1837.4	1841.8	1842.5	1840.6	1839.4	1838.6	1838.4	1838.3	1838.2	1836.3	1834.3	1832.6
DISCH KCFS	21.0	14.0	14.0	14.0	21.0	24.5	24.0	24.0	24.0	21.0	16.0	16.0	16.0	16.0	20.0	23.0	23.0
POWER																	
AVE POWER MW		173	173	173	260	303	301	305	304	265	201	200	200	200	248	281	278
PEAK POW MW		463	464	465	466	468	485	492	479	475	472	471	471	471	464	456	450
ENERGY GWH	2275.0	62.2	29.1	37.5	186.9	225.4	216.9	226.6	225.9	190.4	149.5	72.1	33.6	38.4	184.5	209.2	186.8
--OAHE--																	
NAT INFLOW	2300	232	108	139	405	195	780	160	75	95	35	30	14	16	-80		95
DEPLETION	666	24	11	14	49	70	142	169	112	27	-10	1	0	1	12	17	27
CHAN STOR	-8	28			-28	-14	2		12	21					-17	-13	
EVAPORATION	483							31	95	116	100	45	21	24	52		
REG INFLOW	16245	654	292	375	1577	1618	2068	1436	1344	1213	950	460	215	246	1069	1385	1345
RELEASE	16728	407	284	402	1281	1612	1595	1850	1979	1759	1259	562	296	220	988	1213	1021
STOR CHANGE	-483	246	8	-27	296	6	473	-414	-635	-546	-310	-101	-81	26	81	171	325
STORAGE	18200	18446	18454	18427	18723	18729	19202	18788	18153	17607	17297	17196	17114	17140	17221	17393	17717
ELEV FTMSL	1605.4	1606.2	1606.3	1606.2	1607.1	1607.2	1608.7	1607.4	1605.3	1603.4	1602.4	1602.0	1601.7	1601.8	1602.1	1602.7	1603.8
DISCH KCFS	17.3	13.7	20.4	22.5	21.5	26.2	26.8	30.1	32.2	29.6	20.5	18.9	21.3	13.8	16.1	19.7	18.4
POWER																	
AVE POWER MW		176	262	289	277	337	346	388	411	374	258	237	267	174	202	248	232
PEAK POW MW		701	701	701	706	706	714	707	696	686	681	679	677	678	679	683	688
ENERGY GWH	2580.0	63.2	44.1	62.4	199.3	250.9	249.4	289.0	306.1	269.4	192.0	85.4	44.9	33.4	150.1	184.5	156.0
--BIG BEND--																	
EVAPORATION	103						6	20	25	22	10	5	5	11			
REG INFLOW	16625	407	284	402	1281	1612	1595	1844	1959	1734	1238	552	292	215	977	1213	1021
RELEASE	16625	407	284	402	1281	1612	1595	1844	1959	1734	1238	552	292	215	977	1213	1021
STORAGE	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621
ELEV FTMSL	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	1420.0
DISCH KCFS	17.3	13.7	20.4	22.5	21.5	26.2	26.8	30.0	31.9	29.1	20.1	18.6	21.0	13.5	15.9	19.7	18.4
POWER																	
AVE POWER MW		65	96	106	101	123	126	140	149	138	99	93	105	68	80	97	88
PEAK POW MW		517	509	509	509	509	509	509	509	517	538	538	538	538	538	538	529
ENERGY GWH	959.9	23.4	16.1	22.8	72.6	91.3	90.4	104.4	110.9	99.4	73.5	33.6	17.7	13.1	59.6	72.1	59.2
--FORT RANDALL--																	
NAT INFLOW	900	119	55	71	155	140	135	70	65	30		10	5	5	5	-10	45
DEPLETION	80	1	1	1	4	9	12	18	15	7	1	1	0	1	3	3	3
EVAPORATION	117							8	25	31	25	9	4	4	10		
REG INFLOW	17328	524	339	473	1432	1743	1718	1888	1984	1726	1212	551	292	216	969	1200	1063
RELEASE	17327	232	205	473	1432	1743	1718	1888	1984	1872	1855	872	408	242	867	850	689
STOR CHANGE	1	292	134					0	0	-146	-643	-321	-116	-26	103	350	374
STORAGE	3123	3415	3549	3549	3549	3549	3549	3549	3403	2760	2439	2323	2297	2399	2749	3123	
ELEV FTMSL	1350.0	1353.6	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.0	1340.0	1338.0	1337.5	1339.3	1344.8	1350.0
DISCH KCFS	11.4	7.8	14.7	26.5	24.1	28.3	28.9	30.7	32.3	31.5	30.2	29.3	29.4	15.2	14.1	13.8	12.4
POWER																	
AVE POWER MW		65	124	223	203	239	243	258	271	263	242	221	215	111	104	105	99
PEAK POW MW		351	356	356	356	356	356	356	356	350	319	296	287	285	293	319	339
ENERGY GWH	1713.5	23.3	20.9	48.2	146.4	177.7	175.2	192.2	201.8	189.2	179.7	79.7	36.1	21.3	77.1	78.2	66.5
--GAVINS POINT--																	
NAT INFLOW	1500	104	49	62	145	160	175	100	90	95	120	60	28	32	80	85	115
DEPLETION	114	0	0	0	5	19	24	39	10	-5	2	5	2	3	10	1	
CHAN STOR	-3	7	-13	-23	5	-8	-1	-3	-3	2	2	2	0	26	2	0	3
EVAPORATION	36							2	6	9	8	3	2	2	4		
REG INFLOW	18675	344	240	513	1577	1875	1868	1943	2054	1965	1968	925	432	295	935	935	806
RELEASE	18675	344	240	513	1577	1875	1868	1943	2041	1940	1968	925	432	295	935	935	844
STOR CHANGE								13	25								-38
STORAGE	342	342	342	342	342	342	342	342	355	380	380	380	380	380	380	380	342
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	14.5	11.5	17.3	28.													

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STUDY NO

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	VALUES IN 1000 AF EXCEPT AS INDICATED												STUDY NO				
	28FEB10 INI-SUM	15MAR	2010 22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	2011 30NOV	31DEC	31JAN	28FEB
--FORT PECK--																	
NAT INFLOW	6000	203	95	122	485	955	1480	665	285	255	340	165	77	88	260	220	305
DEPLETION	344	-27	-12	-16	74	192	354	223	1	-97	-74	-17	-8	-9	-95	-102	-43
EVAPORATION	501							31	97	120	105	47	22	25	54		
MOD INFLOW	5155	230	107	138	411	763	1126	411	187	232	309	135	63	72	301	322	348
RELEASE	5127	149	69	89	357	369	506	523	523	420	307	149	69	79	523	523	472
STOR CHANGE	28	81	38	49	54	394	620	-112	-335	-188	2	-14	-7	-7	-222	-201	-124
STORAGE	12230	12311	12349	12398	12452	12846	13466	13355	13019	12831	12833	12819	12812	12805	12583	12382	12258
ELEV FTMSL	2220.9	2221.3	2221.5	2221.8	2222.1	2224.2	2227.5	2226.9	2225.1	2224.1	2224.2	2224.1	2224.0	2224.0	2222.8	2221.7	2221.0
DISCH KCF5	4.0	5.0	5.0	5.0	6.0	6.0	8.5	8.5	8.5	7.1	5.0	5.0	5.0	5.0	8.5	8.5	8.5
POWER																	
AVE POWER MW		65	65	65	79	79	113	113	113	93	66	66	66	66	112	111	111
PEAK POW MW		152	152	152	152	155	157	157	156	155	155	155	154	154	153	152	151
ENERGY GWH	818.2	23.5	11.0	14.1	56.6	58.8	81.3	84.4	84.0	67.3	49.2	23.8	11.1	12.7	83.2	82.8	74.5
--GARRISON--																	
NAT INFLOW	9200	423	198	254	705	1110	2635	1585	505	390	420	165	77	88	150	220	275
DEPLETION	1035	5	2	3	7	144	670	565	116	-108	19	-106	-49	-56	-86	-57	-34
CHAN STOR	-46	-10			-10		-25	0		14	21			0	-35		0
EVAPORATION	597							37	116	144	124	56	26	30	64		
REG INFLOW	12650	557	265	340	1045	1335	2445	1506	796	789	605	363	170	194	659	800	781
RELEASE	14652	417	194	250	1488	1537	1339	1383	1383	1104	861	417	194	222	1230	1383	1250
STOR CHANGE	-2002	141	70	90	-443	-202	1107	122	-588	-315	-256	-53	-25	-28	-571	-584	-469
STORAGE	17008	17149	17219	17310	16867	16665	17772	17894	17306	16991	16735	16682	16657	16629	16058	15474	15006
ELEV FTMSL	1833.8	1834.3	1834.5	1834.8	1833.3	1832.6	1836.4	1836.8	1834.8	1833.8	1832.9	1832.7	1832.6	1832.5	1830.5	1828.4	1826.7
DISCH KCF5	19.5	14.0	14.0	14.0	25.0	25.0	22.5	22.5	22.5	18.6	14.0	14.0	14.0	14.0	20.0	22.5	22.5
POWER																	
AVE POWER MW		171	171	171	303	301	274	277	276	226	170	169	169	169	239	265	262
PEAK POW MW		456	457	458	453	450	464	466	458	454	451	450	450	450	442	435	428
ENERGY GWH	2140.4	61.5	28.8	37.0	218.2	223.9	197.2	206.4	205.4	162.7	126.4	61.0	28.4	32.5	177.9	197.2	175.9
--OAHE--																	
NAT INFLOW	1300	203	95	122	180	130	275	140	65	75	15	13	6	7	-90	-10	75
DEPLETION	666	24	11	14	49	70	142	169	112	27	-10	1	0	1	12	17	27
CHAN STOR	-14	23			-45		10			17	20			0	-28	-11	
EVAPORATION	545							35	108	132	112	50	23	26	58		
REG INFLOW	14728	619	278	358	1573	1597	1482	1319	1228	1037	794	378	177	202	1043	1345	1298
RELEASE	16765	454	330	464	1443	1799	1683	1908	1932	1719	1211	516	276	211	866	1062	891
STOR CHANGE	-2038	165	-52	-106	130	-202	-201	-589	-704	-682	-416	-138	-99	-9	176	283	407
STORAGE	17689	17854	17802	17696	17827	17625	17424	16835	16131	15449	15032	14894	14795	14786	14962	15245	15652
ELEV FTMSL	1603.7	1604.3	1604.1	1603.7	1604.2	1603.5	1602.8	1600.8	1598.2	1595.7	1594.1	1593.6	1593.2	1593.1	1593.8	1594.9	1596.5
DISCH KCF5	17.5	15.3	23.8	26.0	24.2	29.3	28.3	31.0	31.4	28.9	19.7	17.4	19.9	13.3	14.1	17.3	16.0
POWER																	
AVE POWER MW		194	301	328	307	369	356	387	387	351	237	208	237	159	169	208	194
PEAK POW MW		691	690	688	690	687	683	672	659	647	639	636	634	634	638	643	651
ENERGY GWH	2505.1	69.8	50.6	71.0	220.9	274.9	256.2	288.0	288.0	252.9	176.6	74.9	39.9	30.5	125.6	154.7	130.7
--BIG BEND--																	
EVAPORATION	129							8	24	31	27	12	6	7	14		
REG INFLOW	16637	454	330	464	1443	1799	1683	1900	1908	1688	1184	504	270	204	852	1062	891
RELEASE	16637	454	330	464	1443	1799	1683	1900	1908	1688	1184	504	270	204	852	1062	891
STORAGE	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621
ELEV FTMSL	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	1420.0
DISCH KCF5	17.5	15.3	23.8	26.0	24.2	29.3	28.3	30.9	31.0	28.4	19.2	16.9	19.5	12.9	13.9	17.3	16.0
POWER																	
AVE POWER MW		72	111	122	113	137	132	145	145	134	94	85	98	65	70	85	77
PEAK POW MW		517	509	509	509	509	509	509	509	517	538	538	538	538	538	538	529
ENERGY GWH	959.2	26.0	18.7	26.3	81.7	101.9	95.3	107.6	108.0	96.8	70.3	30.7	16.4	12.5	52.0	63.2	51.7
--FORT RANDALL--																	
NAT INFLOW	450	73	34	44	90	65	125	35	25		-20	-8	-4	-4	-30	-15	40
DEPLETION	80	1	1	1	4	9	12	18	15		7	1	0	1	3	3	3
EVAPORATION	146							10	32	39	31	12	5	5	12		
REG INFLOW	16860	525	363	506	1529	1855	1796	1907	1886	1642	1132	483	261	195	807	1044	928
RELEASE	16859	233	229	506	1529	1855	1796	1907	1886	1775	804	377	221	704	694	554	
STOR CHANGE	1	292	134					0	0	-146	-643	-321	-116	-26	103	350	374
STORAGE	3123	3415	3549	3549	3549	3549	3549	3549	3549	3403	2760	2439	2323	2297	2400	2750	3124
ELEV FTMSL	1350.0	1353.6	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.0	1340.0	1338.0	1337.5	1339.3	1344.8	1350.0
DISCH KCF5	11.4	7.8	16.5	28.4	25.7	30.2	30.2	31.0	30.7	30.1	28.9	27.0	27.2	13.9	11.5	11.3	10.0
POWER																	
AVE POWER MW		65	139	239	217	254	254	261	258	251	231	204	199	102	84	86	80
PEAK POW MW		351	356	356	356	356	356	356	356	350	319	296	287	285	293	319	339
ENERGY GWH	1672.5	23.4	23.4	51.6	156.1	189.0	182.9	194.2	192.1	180.9	172.1	73.6	33.4	19.5	62.8	64.0	53.6
--GAVINS POINT--																	
NAT INFLOW	1300	87	41	52	125	140	150	85	75	80	110	53	25	28	75	75	100
DEPLETION	114	0	0	0	5	19	24	39	10	-5	2	5	2	3	10	1	
CHAN STOR	1	7	-17	-23	5	-9	0	-2	1	1	2	3	0	25	5	0	2
EVAPORATION	45							3	8	11	10	4	2	2	5		
REG INFLOW	18002	327	253	536	1654	1968	1922	1949	1944	1864	1875	851	397	268	769	769	656
RELEASE	18002	327	253	536	1654	1968	1922	1949	1931	1839	1875	851	397	268	769	769	694
STOR CHANGE								13	25								-38
STORAGE	342	342	342	342	342	342	342	342	355	380	380	380	380	380	380	380	342
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 KCF5	14.0	11.0	18.2	30.0													



		VALUES IN 1000 AF EXCEPT AS INDICATED															
28FEB11		2011														2012	
INI-SUM		15MAR	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	29FEB
--FORT PECK--																	
NAT INFLOW	7200	230	107	138	600	1180	1810	840	315	295	430	180	84	96	300	250	345
DEPLETION	448	-27	-13	-16	-15	286	595	234	5	-98	-38	-42	-19	-22	-132	-145	-105
EVAPORATION	446							27	86	107	93	42	20	22	48		
MOD INFLOW	6306	257	120	154	615	894	1215	579	224	286	375	179	84	96	384	395	450
RELEASE	6575	164	76	98	446	646	625	646	646	517	369	179	83	95	676	676	633
STOR CHANGE	-268	93	44	56	169	248	590	-67	-422	-231	6	1	0	1	-293	-281	-183
STORAGE	14030	14124	14167	14223	14392	14640	15231	15163	14742	14511	14517	14518	14518	14519	14226	13945	13762
ELEV FTMSL	2230.3	2230.8	2231.0	2231.3	2232.1	2233.3	2236.1	2235.8	2233.8	2232.7	2232.7	2232.7	2232.7	2232.7	2231.3	2229.9	2229.0
DISCH KCF5	7.5	5.5	5.5	5.5	7.5	10.5	10.5	10.5	10.5	8.7	6.0	6.0	6.0	6.0	11.0	11.0	11.0
POWER																	
AVE POWER MW		74	74	74	102	141	142	143	142	118	82	82	82	82	146	146	145
PEAK POW MW		160	160	160	161	162	164	164	162	161	161	161	161	161	160	159	159
ENERGY GWH	1070.2	26.7	12.5	16.1	73.1	105.0	102.3	106.2	105.8	85.1	60.7	29.4	13.7	15.7	108.9	108.3	100.9
--GARRISON--																	
NAT INFLOW	10800	460	214	276	870	1325	3095	1860	595	460	495	195	91	104	180	260	320
DEPLETION	1068	0	0	0	11	166	804	621	99	-125	-6	-119	-55	-63	-114	-90	-62
CHAN STOR	-35	20	0	0	-20	-30				18	26				-49		
EVAPORATION	521							32	101	125	109	49	23	26	56		
REG INFLOW	15750	643	291	374	1285	1775	2916	1853	1041	994	787	443	207	236	865	1026	1015
RELEASE	14629	417	194	250	952	1660	1398	1445	1445	1146	892	431	201	230	1230	1414	1323
STOR CHANGE	1122	227	96	124	333	114	1517	408	-404	-151	-104	11	5	6	-365	-388	-308
STORAGE	16645	16872	16968	17092	17425	17540	19057	19465	19061	18910	18805	18817	18822	18828	18463	18075	17767
ELEV FTMSL	1832.6	1833.3	1833.7	1834.1	1835.2	1835.6	1840.5	1841.8	1840.5	1840.0	1839.7	1839.8	1839.8	1839.8	1838.6	1837.4	1836.4
DISCH KCF5	23.0	14.0	14.0	14.0	16.0	27.0	23.5	23.5	23.5	19.3	14.5	14.5	14.5	14.5	20.0	23.0	23.0
POWER																	
AVE POWER MW		170	170	171	196	330	292	297	297	243	183	183	183	183	251	286	284
PEAK POW MW		453	454	456	460	461	479	484	479	477	476	476	476	477	472	468	464
ENERGY GWH	2206.1	61.0	28.6	36.8	140.9	245.4	210.5	221.1	221.1	175.2	136.3	65.9	30.8	35.2	186.7	212.9	197.7
--OAHE--																	
NAT INFLOW	2300	232	108	139	405	195	780	160	75	95	35	30	14	16	-80		95
DEPLETION	681	24	11	14	49	71	145	173	116	28	-10	1	0	1	12	18	28
CHAN STOR	-1	37			-8	-45	14			18	20				-24	-13	
EVAPORATION	462						30	91	112	96	43	20	22	49			
REG INFLOW	15784	662	292	375	1300	1739	2048	1402	1313	1119	861	418	195	223	1065	1383	1390
RELEASE	16792	406	284	402	1281	1688	1593	1850	1979	1759	1259	562	296	258	958	1189	1028
STOR CHANGE	-1007	256	8	-27	19	51	455	447	-666	-640	-398	-144	-101	-35	107	194	362
STORAGE	17717	17973	17981	17954	17973	18024	18479	18031	17365	16725	16327	16183	16082	16047	16154	16348	16710
ELEV FTMSL	1603.8	1604.7	1604.7	1604.6	1604.7	1604.8	1606.4	1604.9	1602.6	1600.4	1598.9	1598.4	1598.1	1597.9	1598.3	1599.0	1600.3
DISCH KCF5	18.4	13.7	20.4	22.5	21.5	27.4	26.8	30.1	32.2	29.6	20.5	18.9	21.3	16.2	15.6	19.3	17.9
POWER																	
AVE POWER MW		174	260	287	274	349	342	383	406	368	253	233	262	199	192	238	221
PEAK POW MW		693	693	693	693	694	702	694	682	670	663	660	658	658	660	663	670
ENERGY GWH	2551.0	62.6	43.7	61.9	197.1	259.3	245.9	285.2	301.8	265.2	188.6	83.7	44.0	38.3	142.5	177.1	154.1
--BIG BEND--																	
EVAPORATION	103						6	20	25	22	10	5	5	11			
REG INFLOW	16689	406	284	402	1281	1688	1593	1844	1959	1734	1238	552	292	252	947	1189	1028
RELEASE	16689	406	284	402	1281	1688	1593	1844	1959	1734	1238	552	292	252	947	1189	1028
STORAGE	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621
ELEV FTMSL	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	1420.0
DISCH KCF5	18.4	13.7	20.4	22.5	21.5	27.4	26.8	30.0	31.9	29.1	20.1	18.6	21.0	15.9	15.4	19.3	17.9
POWER																	
AVE POWER MW		65	96	106	101	128	125	140	149	138	99	93	105	80	78	95	86
PEAK POW MW		517	509	509	509	509	509	509	509	517	538	538	538	538	538	538	529
ENERGY GWH	963.5	23.3	16.1	22.8	72.6	95.6	90.2	104.4	110.9	99.4	73.5	33.6	17.7	15.4	57.7	70.6	59.7
--FORT RANDALL--																	
NAT INFLOW	900	119	55	71	155	140	135	70	65	30		10	5	5	5	-10	45
DEPLETION	80	1	1	1	4	9	12	18	15	7	1	1	0	1	3	3	3
EVAPORATION	117						8	25	31	25	9	4	4	10			
REG INFLOW	17392	524	339	473	1432	1819	1716	1888	1984	1726	1212	551	292	253	939	1176	1070
RELEASE	17392	232	205	473	1432	1819	1716	1888	1984	1872	1855	872	408	279	837	826	696
STOR CHANGE	0	292	134	0	0	0	0	0	-146	-643	-321	-116	-26	103	350	374	
STORAGE	3123	3415	3549	3549	3549	3549	3549	3549	3549	3403	2760	2439	2323	2297	2399	2749	3123
ELEV FTMSL	1350.0	1353.6	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.0	1340.0	1338.0	1337.5	1339.3	1344.8	1350.0
DISCH KCF5	12.4	7.8	14.7	26.5	24.1	29.6	28.8	30.7	32.3	31.5	30.2	29.3	29.4	17.6	13.6	13.4	12.1
POWER																	
AVE POWER MW		65	124	223	203	249	243	258	271	263	242	221	215	128	100	102	97
PEAK POW MW		351	356	356	356	356	356	356	356	350	319	296	287	285	293	319	339
ENERGY GWH	1720.1	23.3	20.9	48.2	146.4	185.3	174.9	192.2	201.8	189.2	179.7	79.7	36.1	24.6	74.5	76.0	67.2
--GAVINS POINT--																	
NAT INFLOW	1500	104	49	62	145	160	175	100	90	95	120	60	28	32	80	85	115
DEPLETION	114	0	0	0	5	19	24	39	10	-5	2	5	2	3	10	1	
CHAN STOR	-1	9	-13	-23	5	-11	1	-4	-3	2	2	2	0	22	7	0	2
EVAPORATION	36						2	6	9	8	3	2	2	4			
REG INFLOW	18741	345	240	513	1577	1949	1868	1943	2054	1965	1968	925	432	329	910	910	813
RELEASE	18741	345	240	513	1577	1949	1868	1943	2041	1940	1968	925	432	329	910	910	851
STOR CHANGE									13	25							-38
STORAGE	342	342	342	342	342	342	342	342	355	380	380	380	380	380	380	380	342
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 KCF5	15.2																









TIME OF STUDY 07:49:13

VALUES IN 1000 AF EXCEPT AS INDICATED

STUDY NO 13

	28FEB15	15MAR	2015 22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	2016 30NOV	31DEC	31JAN	29FEB
--FORT PECK--																	
NAT INFLOW	7200	230	107	138	600	1180	1810	840	315	295	430	180	84	96	300	250	345
DEPLETION	497	-25	-12	-15	15	306	564	263	22	-99	-46	-44	-21	-23	-135	-147	-106
EVAPORATION	430							27	83	103	89	40	19	22	46		
MOD INFLOW	6273	255	119	153	585	874	1246	550	210	291	387	184	86	98	389	397	451
RELEASE	7118	179	83	107	357	676	714	738	738	544	369	179	83	95	769	769	719
STOR CHANGE	-845	77	36	46	228	198	532	-188	-528	-253	18	5	2	3	-380	-372	-268
STORAGE	13717	13793	13829	13875	14103	14300	14832	14645	14116	13863	13881	13886	13888	13891	13511	13140	12872
ELEV FTMSL	2228.7	2229.1	2229.3	2229.5	2230.7	2231.6	2234.2	2233.3	2230.7	2229.5	2229.6	2229.6	2229.6	2229.6	2227.7	2225.8	2224.4
DISCH KCFS	13.0	6.0	6.0	6.0	6.0	11.0	12.0	12.0	12.0	9.1	6.0	6.0	6.0	6.0	12.5	12.5	12.5
POWER																	
AVE POWER MW		81	81	81	81	146	158	159	157	123	81	81	81	81	158	157	156
PEAK POW MW		159	159	159	160	160	162	162	160	159	159	159	159	159	158	156	155
ENERGY GWH	1125.0	29.0	13.6	17.4	58.2	108.6	113.7	118.0	117.0	88.6	60.1	29.1	13.6	15.5	117.8	116.7	108.2
--GARRISON--																	
NAT INFLOW	10800	460	214	276	870	1325	3095	1860	595	460	495	195	91	104	180	260	320
DEPLETION	1251	1	1	1	14	153	836	681	121	-136	-25	-115	-53	-61	-83	-55	-29
CHAN STOR	5	70				-49	-10			28	31				-65		
EVAPORATION	511							32	101	124	106	48	22	25	54		
REG INFLOW	16161	707	297	382	1213	1799	2963	1885	1111	1044	814	440	206	235	913	1084	1068
RELEASE	17201	476	222	286	1071	1629	1785	1845	1845	1417	1107	536	250	286	1353	1599	1496
STOR CHANGE	-1040	231	75	96	142	169	1178	40	-733	-373	-293	-95	-44	-51	-440	-515	-428
STORAGE	17708	17938	18013	18110	18252	18421	19599	19639	18906	18533	18240	18145	18100	18050	17610	17095	16668
ELEV FTMSL	1836.2	1836.9	1837.2	1837.5	1838.0	1838.5	1842.2	1842.3	1840.0	1838.9	1837.9	1837.6	1837.5	1837.3	1835.9	1834.1	1832.6
DISCH KCFS	23.0	16.0	16.0	16.0	18.0	26.5	30.0	30.0	30.0	23.8	18.0	18.0	18.0	18.0	22.0	26.0	26.0
POWER																	
AVE POWER MW		198	199	199	224	330	377	380	379	299	225	224	224	224	271	317	314
PEAK POW MW		466	467	468	470	472	489	488	477	473	470	469	468	467	462	456	450
ENERGY GWH	2589.9	71.3	33.4	43.0	161.4	245.2	271.6	282.5	282.0	215.0	167.4	80.7	37.6	42.9	201.9	235.7	218.3
--OAHE--																	
NAT INFLOW	2300	232	108	139	405	195	780	160	75	95	35	30	14	16	-80		95
DEPLETION	736	25	12	15	51	76	157	191	128	31	-12	1	0	1	13	19	29
CHAN STOR	-13	30			-8	-36	-15			26	24				-17	-17	
EVAPORATION	474							29	92	114	99	44	21	24	52		
REG INFLOW	18278	714	319	410	1417	1713	2393	1784	1700	1392	1079	520	243	277	1191	1563	1562
RELEASE	16601	406	282	399	1269	1675	1581	1850	1979	1759	1259	562	296	254	908	1140	982
STOR CHANGE	1677	307	37	11	148	37	812	-66	-279	-367	-180	-42	-53	23	283	423	580
STORAGE	16653	16960	16997	17009	17156	17194	18006	17940	17661	17295	17115	17073	17020	17043	17326	17750	18330
ELEV FTMSL	1600.1	1601.2	1601.3	1601.4	1601.9	1602.0	1604.8	1604.6	1603.6	1602.4	1601.7	1601.6	1601.4	1601.5	1602.5	1603.9	1605.9
DISCH KCFS	17.4	13.7	20.3	22.3	21.3	27.2	26.6	30.1	32.2	29.6	20.5	18.9	21.3	16.0	14.8	18.5	17.1
POWER																	
AVE POWER MW		170	253	279	267	341	335	382	406	371	257	236	267	200	185	234	218
PEAK POW MW		675	675	675	678	679	694	692	687	681	677	677	676	676	681	689	699
ENERGY GWH	2527.6	61.3	42.6	60.2	192.1	253.5	241.2	283.9	302.4	267.4	191.1	85.1	44.8	38.5	138.0	174.1	151.5
--BIG BEND--																	
EVAPORATION	103							6	20	25	22	10	5	5	11		
REG INFLOW	16498	406	282	399	1269	1675	1581	1844	1959	1734	1238	552	292	249	897	1140	982
RELEASE	16498	406	282	399	1269	1675	1581	1844	1959	1734	1238	552	292	249	897	1140	982
STORAGE	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621
ELEV FTMSL	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	1420.0
DISCH KCFS	17.4	13.7	20.3	22.3	21.3	27.2	26.6	30.0	31.9	29.1	20.1	18.6	21.0	15.7	14.6	18.5	17.1
POWER																	
AVE POWER MW		65	95	105	100	128	124	140	149	138	99	93	105	79	74	91	82
PEAK POW MW		517	509	509	509	509	509	509	509	517	538	538	538	538	538	538	529
ENERGY GWH	952.3	23.3	16.0	22.6	71.9	94.9	89.5	104.4	110.9	99.4	73.5	33.6	17.7	15.2	54.7	67.7	57.0
--FORT RANDALL--																	
NAT INFLOW	900	119	55	71	155	140	135	70	65	30		10	5	5	5	-10	45
DEPLETION	80	1	1	1	4	9	12	18	15	7	1	1	0	1	3	3	3
EVAPORATION	117							8	25	31	25	9	4	4	10		
REG INFLOW	17201	523	336	469	1420	1806	1704	1888	1984	1726	1212	551	292	250	889	1127	1024
RELEASE	17201	232	202	469	1420	1806	1704	1888	1984	1872	1855	872	408	276	786	777	650
STOR CHANGE	0	291	134				0	0	0	-146	-643	-321	-116	-26	103	350	374
STORAGE	3124	3415	3549	3549	3549	3549	3549	3549	3549	3403	2760	2439	2323	2297	2400	2750	3124
ELEV FTMSL	1350.0	1353.6	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.0	1340.0	1338.0	1337.5	1339.3	1344.8	1350.0
DISCH KCFS	11.4	7.8	14.6	26.3	23.9	29.4	28.6	30.7	32.3	31.5	30.2	29.3	29.4	17.4	12.8	12.6	11.3
POWER																	
AVE POWER MW		65	123	222	202	247	241	258	271	263	242	221	215	127	94	96	90
PEAK POW MW		351	356	356	356	356	356	356	356	350	319	296	287	285	293	319	339
ENERGY GWH	1702.2	23.3	20.7	47.9	145.2	184.1	173.7	192.2	201.8	189.2	179.7	79.7	36.1	24.3	70.0	71.5	62.8
--GAVINS POINT--																	
NAT INFLOW	1500	104	49	62	145	160	175	100	90	95	120	60	28	32	80	85	115
DEPLETION	114	0	0	0	5	19	24	39	10	-5	2	5	2	3	10	1	
CHAN STOR	-1	7	-13	-22	5	-11	1	-4	-3	2	2	2	0	22	8	0	2
EVAPORATION	36							2	6	9	8	3	2	2	4		
REG INFLOW	18550	344	238	509	1565	1937	1857	1943	2054	1965	1968	925	432	325	861	861	767
RELEASE	18550	344	238	509	1565	1937	1857	1943	2041	1940	1968	925	432	325	861	861	805
STOR CHANGE								13	25								-38
STORAGE	342	342	342	342	342	342	342	342	355	380	380	380	380	380	380	380	342
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	14.2	11.5															

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STUDY NO 14

	28FEB11	15MAR	2011	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	2012	31DEC	31JAN	29FEB
	INI-SUM		22MAR											30NOV			
--FORT PECK--																	
NAT INFLOW	6100	207	96	124	493	971	1505	676	290	259	346	168	78	89	264	224	310
DEPLETION	649	-1	0	-1	78	317	588	232	-5	-112	-52	-34	-16	-18	-111	-124	-92
EVAPORATION	484							30	93	116	101	46	21	24	53		
MOD INFLOW	4967	208	97	125	415	654	917	414	202	255	297	156	73	83	322	348	402
RELEASE	5532	149	69	89	536	584	506	523	523	415	307	149	69	79	523	523	489
STOR CHANGE	-566	59	27	35	-121	70	411	-108	-321	-160	-11	7	3	4	-200	-175	-87
STORAGE	12258	12317	12345	12380	12259	12329	12740	12632	12312	12152	12141	12148	12151	12155	11954	11780	11693
ELEV FTMSL	2221.0	2221.4	2221.5	2221.7	2221.0	2221.4	2223.7	2223.1	2221.3	2220.4	2220.4	2220.4	2220.4	2220.5	2219.4	2218.4	2217.9
DISCH KCF5	8.5	5.0	5.0	5.0	9.0	9.5	8.5	8.5	8.5	7.0	5.0	5.0	5.0	5.0	8.5	8.5	8.5
POWER																	
AVE POWER MW		65	65	65	117	124	111	112	111	91	65	65	65	65	110	110	109
PEAK POW MW		152	152	152	151	152	154	153	152	151	151	151	151	151	150	149	148
ENERGY GWH	871.3	23.5	11.0	14.1	84.4	92.0	80.2	83.2	82.7	65.4	48.4	23.4	10.9	12.5	81.9	81.5	76.0
--GARRISON--																	
NAT INFLOW	9338	430	200	258	716	1127	2674	1609	513	396	426	168	78	89	152	223	279
DEPLETION	1086	12	5	7	24	126	778	616	111	-123	-3	-116	-54	-62	-104	-77	-55
CHAN STOR	0	36			-41	-5	10	0		16	20			0	-36		0
EVAPORATION	575						35	111	138	120	54	25	29	62			
REG INFLOW	13210	603	264	340	1186	1580	2412	1480	814	811	637	378	176	201	681	823	823
RELEASE	13906	387	180	232	1101	1476	1339	1383	1065	799	387	180	206	1168	1353	1265	
STOR CHANGE	-697	217	84	108	85	104	1073	97	-570	-254	-163	-9	-4	-5	-488	-530	-443
STORAGE	15006	15223	15307	15415	15500	15605	16678	16775	16205	15951	15788	15779	15775	15770	15282	14752	14310
ELEV FTMSL	1826.7	1827.5	1827.8	1828.2	1828.5	1828.9	1832.7	1833.0	1831.0	1830.1	1829.5	1829.5	1829.5	1829.5	1827.7	1825.7	1824.1
DISCH KCF5	22.0	13.0	13.0	13.0	18.5	24.0	22.5	22.5	22.5	17.9	13.0	13.0	13.0	13.0	19.0	22.0	22.0
POWER																	
AVE POWER MW		152	152	153	217	281	267	271	270	213	154	154	154	154	223	255	251
PEAK POW MW		431	433	434	435	437	451	452	444	441	439	439	439	439	432	425	419
ENERGY GWH	1982.5	54.6	25.6	33.0	156.1	209.1	192.5	201.6	200.5	153.3	114.9	55.5	25.9	29.6	165.9	189.4	175.0
--OAHE--																	
NAT INFLOW	1369	214	100	128	190	137	290	147	68	79	16	13	6	7	-95	-10	79
DEPLETION	681	24	11	14	49	71	145	173	116	28	-10	1	0	1	12	18	28
CHAN STOR	0	40			-24	-24	7			21	23				-28	-14	
EVAPORATION	517						33	101	124	107	48	22	26	56			
REG INFLOW	14077	617	269	346	1217	1517	1491	1325	1234	1013	741	351	164	187	977	1311	1316
RELEASE	14792	438	277	387	1197	1547	1435	1716	1739	1534	1019	424	104	117	882	1062	912
STOR CHANGE	-715	179	-8	-41	20	-30	55	-391	-504	-521	-278	-73	60	70	95	249	405
STORAGE	15652	15831	15823	15782	15802	15772	15828	15436	14932	14411	14133	14060	14119	14189	14284	14533	14938
ELEV FTMSL	1596.5	1597.1	1597.1	1596.9	1597.0	1596.9	1597.1	1595.6	1593.7	1591.6	1590.5	1590.2	1590.5	1590.8	1591.1	1592.1	1593.7
DISCH KCF5	16.0	14.7	20.0	21.7	20.1	25.2	24.1	27.9	28.3	25.8	16.6	14.3	7.5	7.4	14.4	17.3	15.9
POWER																	
AVE POWER MW		180	244	264	245	306	294	338	339	306	196	168	89	87	170	205	189
PEAK POW MW		654	654	653	653	653	654	647	637	627	621	620	621	622	624	629	637
ENERGY GWH	2151.4	64.7	41.0	57.1	176.6	227.8	211.4	251.7	252.6	220.5	145.7	60.5	14.9	16.8	126.2	152.3	131.7
--BIG BEND--																	
EVAPORATION	129						8	24	31	27	12	6	7	14			
REG INFLOW	14663	438	277	387	1197	1547	1435	1709	1714	1503	992	412	99	111	868	1062	912
RELEASE	14663	438	277	387	1197	1547	1435	1709	1714	1503	992	412	99	111	868	1062	912
STORAGE	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621
ELEV FTMSL	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	1420.0
DISCH KCF5	16.0	14.7	20.0	21.7	20.1	25.2	24.1	27.8	27.9	25.3	16.1	13.8	7.1	7.0	14.1	17.3	15.9
POWER																	
AVE POWER MW		70	94	102	94	118	113	130	130	120	79	70	36	35	71	85	76
PEAK POW MW		517	509	509	509	509	509	509	509	517	538	538	538	538	538	538	529
ENERGY GWH	845.7	25.1	15.7	21.9	67.8	87.6	81.3	96.8	97.1	86.2	59.0	25.2	6.1	6.8	53.0	63.2	52.9
--FORT RANDALL--																	
NAT INFLOW	480	77	36	46	96	69	133	37	27		-21	-8	-4	-4	-32	-16	43
DEPLETION	80	1	1	1	4	9	12	18	15	7	1	1	0	1	3	3	3
EVAPORATION	146						10	32	39	31	12	5	5	12			
REG INFLOW	14916	514	313	433	1289	1607	1556	1718	1694	1457	939	391	89	100	820	1043	952
RELEASE	14916	223	179	433	1289	1607	1556	1718	1695	1603	1582	712	231	100	718	693	578
STOR CHANGE	0	291	134				0	0	-146	-643	-321	-142	0	103	350	374	
STORAGE	3124	3415	3549	3549	3549	3549	3549	3549	3549	3403	2760	2439	2297	2297	2400	2750	3124
ELEV FTMSL	1350.0	1353.6	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.0	1340.0	1337.5	1337.5	1339.3	1344.8	1350.0
DISCH KCF5	10.0	7.5	12.9	24.3	21.7	26.1	26.1	27.9	27.6	26.9	25.7	23.9	16.7	6.3	11.7	11.3	10.0
POWER																	
AVE POWER MW		62	109	205	183	221	221	235	232	226	207	181	123	46	86	86	80
PEAK POW MW		351	356	356	356	356	356	356	356	350	319	296	285	285	293	319	339
ENERGY GWH	1482.4	22.5	18.3	44.2	131.9	164.1	158.8	175.2	172.8	162.4	153.7	65.2	20.6	8.9	64.0	63.9	55.9
--GAVINS POINT--																	
NAT INFLOW	1318	89	41	53	127	142	152	86	76	81	112	53	25	28	76	76	101
DEPLETION	114	0	0	0	5	19	24	39	10	-5	2	5	2	3	10	1	
CHAN STOR	-1	5	-10	-22	5	-9	0	-3	1	1	2	3	13	19	-10	1	2
EVAPORATION	45						3	8	11	10	4	2	2	5			
REG INFLOW	16074	317	210	465	1416	1722	1684	1759	1753	1679	1685	759	265	143	769	769	681
RELEASE	16074	317	210	465	1416	1722	1684	1759	1740	1654	1685	759	265	143	769	769	719
STOR CHANGE							13	25	380	380	380	380	380	380	380	380	342
STORAGE	342	342	342	342	342	342	342	342	355	380	380	380	380	380	380	380	342
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 KCF5	12.5																

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STUDY NO 15

	VALUES IN 1000 AF EXCEPT AS INDICATED																	
	28FEB12	2012															2013	
	INI-SUM	15MAR	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB	
--FORT PECK--																		
NAT INFLOW	6345	215	100	129	513	1010	1565	703	301	270	360	175	81	93	275	233	322	
DEPLETION	477	-21	-10	-13	22	289	564	234	-1	-113	-53	-39	-18	-21	-120	-133	-90	
EVAPORATION	481							29	92	115	101	46	21	24	53			
MOD INFLOW	5387	236	110	142	491	721	1001	440	210	268	312	168	78	90	342	366	412	
RELEASE	5528	149	69	89	387	553	536	553	553	426	307	149	69	79	553	553	500	
STOR CHANGE	-141	87	41	52	104	168	465	-114	-344	-158	5	19	9	10	-211	-187	-88	
STORAGE	11693	11780	11821	11873	11977	12145	12610	12497	12153	11995	11999	12019	12028	12038	11827	11639	11552	
ELEV FTMSL	2217.9	2218.4	2218.6	2218.9	2219.5	2220.4	2223.0	2222.3	2220.5	2219.6	2219.6	2219.7	2219.8	2219.8	2218.6	2217.6	2217.1	
DISCH KCF5	8.5	5.0	5.0	5.0	6.5	9.0	9.0	9.0	9.0	7.2	5.0	5.0	5.0	5.0	9.0	9.0	9.0	
POWER																		
AVE POWER MW		64	65	65	84	117	117	118	117	93	65	65	65	65	116	116	115	
PEAK POW MW		149	149	149	150	151	153	153	151	150	150	150	150	150	149	148	147	
ENERGY GWH	866.5	23.2	10.8	14.0	60.5	86.7	84.6	87.8	87.3	66.9	48.3	23.4	10.9	12.5	86.4	86.0	77.4	
--GARRISON--																		
NAT INFLOW	9674	445	208	267	741	1167	2771	1667	531	410	442	174	81	93	158	231	289	
DEPLETION	1021	6	3	3	18	168	741	615	112	-130	-13	-123	-57	-66	-113	-86	-57	
CHAN STOR	-5	37			-16	-26				19	22			0	-41			
EVAPORATION	566							35	109	136	118	53	25	28	61			
REG INFLOW	13610	625	274	353	1094	1526	2566	1571	863	849	667	392	183	209	722	870	846	
RELEASE	13781	387	180	232	1071	1506	1309	1353	1353	1073	799	387	180	206	1168	1353	1222	
STOR CHANGE	-171	238	94	121	23	20	1256	218	-490	-225	-133	5	2	3	-446	-482	-376	
STORAGE	14310	14548	14642	14762	14786	14805	16062	16280	15790	15566	15433	15438	15440	15443	14997	14515	14139	
ELEV FTMSL	1824.1	1825.0	1825.3	1825.8	1825.9	1825.9	1830.5	1831.3	1829.5	1828.7	1828.3	1828.3	1828.3	1828.3	1826.6	1824.8	1823.4	
DISCH KCF5	22.0	13.0	13.0	13.0	18.0	24.5	22.0	22.0	22.0	18.0	13.0	13.0	13.0	13.0	19.0	22.0	22.0	
POWER																		
AVE POWER MW		149	150	150	208	282	257	262	261	213	153	153	153	153	221	253	250	
PEAK POW MW		422	423	425	425	426	443	445	439	436	434	434	434	434	428	422	416	
ENERGY GWH	1942.1	53.7	25.2	32.4	149.4	209.5	185.1	194.7	194.1	153.1	113.9	55.0	25.7	29.3	164.7	188.2	168.1	
--OAHE--																		
NAT INFLOW	1547	242	113	145	214	155	327	167	77	89	18	15	7	8	-107	-12	89	
DEPLETION	696	24	11	15	50	72	148	178	119	29	-11	1	0	1	13	18	28	
CHAN STOR	0	41			-23	-29	11			18	24				-28	-14	0	
EVAPORATION	510							32	99	122	106	48	22	25	55			
REG INFLOW	14122	646	282	363	1212	1560	1499	1310	1212	1029	746	353	165	188	964	1309	1283	
RELEASE	14297	426	270	378	1177	1530	1408	1687	1713	1233	960	461	93	140	883	1063	876	
STOR CHANGE	-175	220	12	-15	35	30	91	-377	-501	-203	-214	-108	72	49	82	246	407	
STORAGE	14938	15158	15170	15154	15190	15219	15311	14933	14432	14229	14016	13908	13980	14028	14110	14355	14763	
ELEV FTMSL	1593.7	1594.6	1594.6	1594.6	1594.7	1594.8	1595.2	1593.7	1591.7	1590.9	1590.1	1589.6	1589.9	1590.1	1590.4	1591.4	1593.0	
DISCH KCF5	15.9	14.3	19.5	21.2	19.8	24.9	23.7	27.4	27.9	20.7	15.6	15.5	6.7	8.8	14.4	17.3	15.8	
POWER																		
AVE POWER MW		172	234	255	238	299	285	329	331	245	184	182	79	104	169	204	188	
PEAK POW MW		641	641	641	642	642	644	637	627	623	619	617	618	619	621	626	634	
ENERGY GWH	2061.9	61.9	39.4	55.0	171.4	222.6	205.2	244.8	246.2	176.2	136.8	65.5	13.3	19.9	125.8	151.8	126.1	
--BIG BEND--																		
EVAPORATION	129							8	24	31	27	12	6	7	14			
REG INFLOW	14168	426	270	378	1177	1530	1408	1680	1689	1202	933	449	87	133	869	1063	876	
RELEASE	14168	426	270	378	1177	1530	1408	1680	1689	1202	933	449	87	133	869	1063	876	
STORAGE	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	
ELEV FTMSL	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	1420.0	
DISCH KCF5	15.9	14.3	19.5	21.2	19.8	24.9	23.7	27.3	27.5	20.2	15.2	15.1	6.3	8.4	14.1	17.3	15.8	
POWER																		
AVE POWER MW		68	91	99	93	116	111	128	129	97	76	76	32	43	71	85	76	
PEAK POW MW		517	509	509	509	509	509	509	509	529	538	538	538	538	538	538	529	
ENERGY GWH	819.6	24.4	15.3	21.4	66.7	86.7	79.8	95.1	95.6	69.7	56.9	27.4	5.4	8.2	53.0	63.2	50.8	
--FORT RANDALL--																		
NAT INFLOW	560	91	42	54	112	81	155	44	31		-25	-10	-4	-5	-37	-19	50	
DEPLETION	80	1	1	1	4	9	12	18	15	7		1	0	1	3	3	3	
EVAPORATION	140							10	32	38	28	11	5	5	12			
REG INFLOW	14506	515	312	431	1285	1602	1551	1696	1673	1157	877	428	79	122	816	1041	923	
RELEASE	14506	223	178	431	1285	1602	1551	1696	1673	1582	1561	571	79	122	713	691	549	
STOR CHANGE	0	291	134				0	0	0	-425	-684	-143	0	0	103	350	374	
STORAGE	3124	3415	3549	3549	3549	3549	3549	3549	3549	3124	2440	2297	2297	2296	2399	2749	3123	
ELEV FTMSL	1350.0	1353.6	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1350.0	1340.0	1337.5	1337.5	1337.5	1339.3	1344.8	1350.0	
DISCH KCF5	10.0	7.5	12.8	24.2	21.6	26.1	26.1	27.6	27.2	26.6	25.4	19.2	5.7	7.7	11.6	11.2	9.9	
POWER																		
AVE POWER MW		62	108	204	183	220	220	232	229	219	196	141	42	56	85	86	79	
PEAK POW MW		351	356	356	356	356	356	356	356	339	296	285	285	285	293	319	339	
ENERGY GWH	1435.0	22.5	18.2	44.1	131.5	163.6	158.3	173.0	170.7	158.0	146.2	50.7	7.0	10.8	63.6	63.7	53.1	
--GAVINS POINT--																		
NAT INFLOW	1361	91	42	55	131	147	157	89	79	84	115	55	26	29	78	78	105	
DEPLETION	114	0	0	0	5	19	24	39	10	-5	2	5	2	3	10	1		
CHAN STOR	-1	5	-10	-22	5	-9	0	-3	1	1	2	11	25	-4	-7	1	3	
EVAPORATION	45							3	8	11	10	4	2	2	5			
REG INFLOW	15708	319	210	465	1416	1722	1684	1740	1735	1661	1666	628	125	143	769	769	656	
RELEASE	15708	319	210	465	1416	1722	1684	1740	1722	1636	1666	628	125	143	769	769	694	
STOR CHANGE	0	291	134				0	0	13	25							-38	
STORAGE	342	342	342	342	342	342	342	342	355	380	380	380	380	380	380	380	342	
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 KCF5	12.5	10.7	15.2	26.0														

TIME OF STUDY 08:00:51

VALUES IN 1000 AF EXCEPT AS INDICATED

STUDY NO 16

	2013			2014													
	INI-SUM	15MAR	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB
--FORT PECK--																	
NAT INFLOW	6537	222	103	133	528	1041	1613	724	310	278	370	180	84	96	283	240	332
DEPLETION	477	-26	-12	-15	21	289	568	241	4	-113	-55	-40	-19	-21	-121	-134	-90
EVAPORATION	483						29	92	116	101	46	21	24	53			
MOD INFLOW	5577	247	115	148	507	752	1045	454	214	275	324	174	81	93	351	374	422
RELEASE	5538	149	69	89	357	523	536	553	553	407	307	149	69	79	584	584	528
STOR CHANGE	39	99	46	59	150	229	509	-100	-340	-132	16	25	12	14	-233	-210	-106
STORAGE	11552	11650	11696	11755	11905	12134	12644	12544	12204	12072	12088	12114	12126	12139	11906	11696	11591
ELEV FTMSL	2217.1	2217.6	2217.9	2218.2	2219.1	2220.4	2223.1	2222.6	2220.7	2220.0	2220.1	2220.2	2220.3	2220.4	2219.1	2217.9	2217.3
DISCH KCFS	9.0	5.0	5.0	5.0	6.0	8.5	9.0	9.0	9.0	6.8	5.0	5.0	5.0	5.0	9.5	9.5	9.5
POWER																	
AVE POWER MW		64	64	64	77	110	117	118	117	89	65	65	65	65	123	122	122
PEAK POW MW		148	148	148	149	151	154	153	151	150	150	151	151	151	149	148	147
ENERGY GWH	868.6	23.1	10.8	13.9	55.8	81.8	84.6	87.8	87.4	64.0	48.4	23.4	10.9	12.5	91.4	90.9	81.8
--GARRISON--																	
NAT INFLOW	9933	457	213	274	761	1198	2845	1711	545	421	454	178	83	95	162	238	297
DEPLETION	1075	2	1	1	11	187	771	647	117	-133	-17	-127	-59	-67	-115	-87	-58
CHAN STOR	-5	42			-10	-26		-5		22	19			0	-47		
EVAPORATION	563							35	109	135	117	53	25	28	61		
REG INFLOW	13828	646	282	362	1097	1508	2604	1583	873	848	680	400	187	213	754	909	883
RELEASE	13779	387	180	232	1041	1476	1339	1383	1383	1102	799	387	180	206	1107	1353	1222
STOR CHANGE	49	259	101	130	55	32	1265	199	-511	-254	-119	14	6	7	-353	-444	-339
STORAGE	14139	14398	14499	14629	14684	14716	15981	16181	15670	15416	15297	15310	15316	15324	14971	14527	14188
ELEV FTMSL	1823.4	1824.4	1824.8	1825.3	1825.5	1825.6	1830.2	1830.9	1829.1	1828.2	1827.8	1827.8	1827.8	1827.9	1826.6	1824.9	1823.6
DISCH KCFS	22.0	13.0	13.0	13.0	17.5	24.0	22.5	22.5	22.5	18.5	13.0	13.0	13.0	13.0	18.0	22.0	22.0
POWER																	
AVE POWER MW		148	149	150	201	275	262	267	266	218	153	152	152	152	209	253	250
PEAK POW MW		420	421	423	424	425	442	444	437	434	432	433	433	433	428	422	417
ENERGY GWH	1938.1	53.4	25.1	32.3	144.9	204.8	188.9	198.7	197.9	156.6	113.5	54.8	25.6	29.3	155.8	188.1	168.2
--OAHE--																	
NAT INFLOW	1698	265	124	159	235	170	359	183	85	98	20	17	8	9	-118	-13	98
DEPLETION	709	24	11	15	50	73	151	182	122	30	-11	1	0	1	13	18	29
CHAN STOR	0	41			-20	-30	7			18	26				-24	-19	0
EVAPORATION	512							32	99	123	107	48	22	26	56		
REG INFLOW	14256	669	293	377	1206	1543	1554	1353	1248	1066	750	354	165	189	897	1303	1291
RELEASE	14206	415	264	370	1161	1524	1385	1680	1707	1231	960	460	93	139	886	1063	868
STOR CHANGE	50	254	28	6	45	20	169	-328	-459	-165	-210	-106	72	50	11	240	423
STORAGE	14763	15017	15045	15052	15096	15116	15285	14957	14498	14333	14123	14017	14089	14139	14150	14390	14813
ELEV FTMSL	1593.0	1594.0	1594.1	1594.2	1594.3	1594.4	1595.5	1593.8	1592.0	1591.3	1590.5	1590.1	1590.3	1590.5	1590.6	1591.6	1593.2
DISCH KCFS	15.8	13.9	19.0	20.7	19.5	24.8	23.3	27.3	27.8	20.7	15.6	15.5	6.7	8.8	14.4	17.3	15.6
POWER																	
AVE POWER MW		167	229	249	234	297	280	328	330	245	184	182	79	104	170	204	186
PEAK POW MW		639	639	639	640	640	644	637	628	625	621	619	620	621	622	626	635
ENERGY GWH	2048.9	60.2	38.4	53.8	168.8	221.2	201.6	243.8	245.6	176.2	137.1	65.6	13.3	19.9	126.4	151.9	125.0
--BIG BEND--																	
EVAPORATION	129							8	24	31	27	12	6	7	14		
REG INFLOW	14077	415	264	370	1161	1524	1385	1673	1683	1200	933	448	87	133	872	1063	868
RELEASE	14077	415	264	370	1161	1524	1385	1673	1683	1200	933	448	87	133	872	1063	868
STORAGE	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621
ELEV FTMSL	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	1420.0
DISCH KCFS	15.8	13.9	19.0	20.7	19.5	24.8	23.3	27.2	27.4	20.2	15.2	15.1	6.3	8.4	14.2	17.3	15.6
POWER																	
AVE POWER MW		66	89	97	91	116	109	127	128	97	76	76	32	42	72	85	75
PEAK POW MW		517	509	509	509	509	509	509	509	529	538	538	538	538	538	538	529
ENERGY GWH	814.5	23.8	15.0	21.0	65.8	86.3	78.4	94.7	95.3	69.6	56.9	27.3	5.4	8.1	53.2	63.2	50.4
--FORT RANDALL--																	
NAT INFLOW	627	101	47	61	125	91	174	49	35		-28	-11	-5	-6	-42	-21	56
DEPLETION	80	1	1	1	4	9	12	18	15	7	1	1	0	1	3	3	3
EVAPORATION	140							10	32	38	28	11	5	5	12		
REG INFLOW	14482	515	311	430	1282	1606	1547	1694	1671	1155	874	426	78	121	814	1039	921
RELEASE	14482	223	177	430	1282	1606	1547	1694	1671	1580	1558	569	78	121	711	689	547
STOR CHANGE	0	292	134				0	0	-425	-684	-143	0	0	103	350	374	
STORAGE	3123	3415	3549	3549	3549	3549	3549	3549	3549	3124	2440	2297	2297	2296	2400	2750	3124
ELEV FTMSL	1350.0	1353.6	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1350.0	1340.0	1337.5	1337.5	1337.5	1339.3	1344.8	1350.0
DISCH KCFS	9.9	7.5	12.7	24.1	21.5	26.1	26.0	27.5	27.2	26.6	25.3	19.1	5.6	7.6	11.6	11.2	9.8
POWER																	
AVE POWER MW		62	108	203	182	220	219	232	229	219	196	141	41	56	85	85	79
PEAK POW MW		351	356	356	356	356	356	356	356	339	296	285	285	285	293	319	339
ENERGY GWH	1432.6	22.5	18.1	43.9	131.2	163.9	157.9	172.8	170.5	157.8	145.9	50.6	6.9	10.8	63.4	63.5	52.9
--GAVINS POINT--																	
NAT INFLOW	1394	93	44	56	134	150	161	91	81	86	118	57	26	30	80	80	107
DEPLETION	114	0	0	0	5	19	24	39	10	-5	2	5	2	3	10	1	
CHAN STOR	-1	5	-10	-22	5	-9	0	-3	1	1	2	11	25	-4	-7	1	3
EVAPORATION	45							3	8	11	10	4	2	2	5		
REG INFLOW	15716	322	211	464	1416	1728	1684	1740	1735	1661	1666	628	125	143	769	769	656
RELEASE	15716	322	211	464	1416	1728	1684	1740	1722	1636	1666	628	125	143	769	769	694
STOR CHANGE								13	25								-38
STORAGE	342	342	342	342	342	342	342	342	355	380	380	380	380	380	380	380	342
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	12.5	10.8	15.2	26.0	23.8</												

TIME OF STUDY 08:00:52

VALUES IN 1000 AF EXCEPT AS INDICATED

STUDY NO

17

	2014				2015												
	29FEB14	15MAR	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB
--FORT PECK--																	
NAT INFLOW	6841	232	108	139	553	1089	1687	758	325	291	388	188	88	100	296	251	348
DEPLETION	486	-26	-12	-16	21	290	572	248	8	-114	-57	-41	-19	-22	-122	-134	-91
EVAPORATION	487						30	93	116	102	46	22	25	53			
MOD INFLOW	5868	258	120	155	532	799	1115	480	224	289	343	182	85	97	365	385	439
RELEASE	5567	149	69	89	357	492	565	584	584	376	307	149	69	79	584	584	528
STOR CHANGE	301	109	51	65	175	307	550	-104	-360	-87	36	34	16	18	-219	-199	-89
STORAGE	11591	11700	11751	11816	11991	12298	12848	12744	12384	12296	12332	12366	12381	12399	12180	11981	11892
ELEV FTMSL	2217.3	2217.9	2218.2	2218.6	2219.6	2221.3	2224.2	2223.7	2221.7	2221.2	2221.4	2221.6	2221.7	2221.8	2220.6	2219.5	2219.0
DISCH KCFS	9.5	5.0	5.0	5.0	6.0	8.0	9.5	9.5	9.5	6.3	5.0	5.0	5.0	5.0	9.5	9.5	9.5
POWER																	
AVE POWER MW		64	64	65	78	104	125	125	124	83	65	65	65	65	124	123	123
PEAK POW MW		148	148	149	150	152	155	154	152	152	152	152	152	152	151	150	149
ENERGY GWH	877.5	23.1	10.8	13.9	55.9	77.3	89.6	93.1	92.6	59.4	48.6	23.5	11.0	12.6	92.0	91.5	82.4
--GARRISON--																	
NAT INFLOW	10335	476	222	285	792	1247	2960	1780	567	438	472	186	87	99	169	247	309
DEPLETION	1093	3	1	2	11	187	782	663	123	-136	-22	-130	-61	-69	-116	-87	-58
CHAN STOR	0	47			-10	-21	-16			33	13			0	-46		
EVAPORATION	572						35	110	137	119	54	25	29	62			
REG INFLOW	14237	669	290	373	1128	1531	2728	1666	918	845	695	410	191	219	761	918	895
RELEASE	13870	446	194	250	1012	1476	1339	1383	1383	1056	799	387	187	214	1168	1353	1222
STOR CHANGE	367	223	96	123	116	55	1389	283	-465	-211	-104	24	4	5	-407	-435	-327
STORAGE	14188	14410	14506	14629	14745	14800	16189	16472	16006	15796	15692	15716	15720	15724	15317	14882	14555
ELEV FTMSL	1823.6	1824.4	1824.8	1825.3	1825.7	1825.9	1831.0	1832.0	1830.3	1829.6	1829.2	1829.3	1829.3	1829.3	1827.8	1826.2	1825.0
DISCH KCFS	22.0	15.0	14.0	14.0	17.0	24.0	22.5	22.5	22.5	17.7	13.0	13.0	13.5	13.5	19.0	22.0	22.0
POWER																	
AVE POWER MW		171	161	161	196	276	263	269	268	210	154	154	160	160	223	255	253
PEAK POW MW		420	422	423	425	426	444	448	442	439	438	438	438	438	433	427	422
ENERGY GWH	1962.5	61.6	27.0	34.8	140.9	205.2	189.6	199.8	199.4	151.4	114.5	55.4	26.8	30.7	165.9	189.8	169.8
--OAHE--																	
NAT INFLOW	1957	306	143	183	271	195	414	211	98	113	23	19	9	10	-135	-15	113
DEPLETION	724	25	12	15	51	75	154	187	125	30	-12	1	0	1	13	19	29
CHAN STOR	0	32	5		-14	-31	7			22	22		-2		-26	-14	0
EVAPORATION	522						33	101	126	109	49	23	26	57			
REG INFLOW	14581	760	330	419	1218	1564	1606	1375	1255	1035	747	355	171	198	938	1305	1306
RELEASE	14204	396	254	357	1132	1501	1346	1668	1699	1228	961	584	137	132	892	1064	854
STOR CHANGE	376	364	76	62	86	64	260	-294	-444	-193	-213	-229	34	65	46	241	452
STORAGE	14813	15176	15252	15314	15400	15463	15723	15430	14986	14793	14579	14351	14384	14450	14496	14737	15189
ELEV FTMSL	1593.2	1594.6	1594.9	1595.2	1595.5	1595.8	1596.7	1595.6	1593.9	1593.2	1593.3	1591.4	1591.5	1591.8	1592.0	1592.9	1594.7
DISCH KCFS	15.6	13.3	18.3	20.0	19.0	24.4	22.6	27.1	27.6	20.6	15.6	19.6	19.6	8.3	14.5	17.3	15.4
POWER																	
AVE POWER MW		160	221	241	230	295	274	329	332	247	186	233	117	99	172	206	185
PEAK POW MW		642	643	644	646	647	652	646	638	634	630	626	626	628	628	633	642
ENERGY GWH	2065.1	57.6	37.1	52.1	165.6	219.4	197.6	244.5	247.0	177.7	138.7	83.8	19.7	19.0	128.2	153.3	124.0
--BIG BEND--																	
EVAPORATION	129						8	24	31	27	12	6	7	14			
REG INFLOW	14075	396	254	357	1132	1501	1346	1661	1675	1197	934	572	131	126	878	1064	854
RELEASE	14075	396	254	357	1132	1501	1346	1661	1675	1197	934	572	131	126	878	1064	854
STORAGE	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621
ELEV FTMSL	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	1420.0
DISCH KCFS	15.6	13.3	18.3	20.0	19.0	24.4	22.6	27.0	27.2	20.1	15.2	19.2	9.4	7.9	14.3	17.3	15.4
POWER																	
AVE POWER MW		63	86	94	89	114	106	126	127	96	77	97	48	40	72	85	74
PEAK POW MW		517	509	509	509	509	509	509	509	529	538	538	538	538	538	538	529
ENERGY GWH	814.9	22.7	14.4	20.2	64.1	85.0	76.2	94.1	94.8	69.4	56.9	34.8	8.0	7.7	53.6	63.3	49.6
--FORT RANDALL--																	
NAT INFLOW	744	120	56	72	149	108	207	58	41		-33	-13	-6	-7	-50	-25	66
DEPLETION	80	1	1	1	4	9	12	18	15	7	1	1	0	1	3	3	3
EVAPORATION	140						10	32	38	28	11	5	5	12			
REG INFLOW	14597	515	310	428	1277	1600	1541	1691	1669	1152	869	548	121	113	812	1036	917
RELEASE	14597	223	176	428	1277	1600	1541	1691	1669	1577	1554	691	121	114	709	686	543
STOR CHANGE	0	291	134	0			0	0	-425	-684	-143	0	0	103	350	374	
STORAGE	3124	3415	3549	3549	3549	3549	3549	3549	3549	3124	2440	2297	2297	2297	2400	2750	3124
ELEV FTMSL	1350.0	1353.6	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1350.0	1340.0	1337.5	1337.5	1337.5	1339.3	1344.8	1350.0
DISCH KCFS	9.8	7.5	12.7	24.0	21.5	26.0	25.9	27.5	27.1	26.5	25.3	23.2	8.7	7.2	11.5	11.2	9.8
POWER																	
AVE POWER MW		62	107	202	182	220	218	232	229	219	196	170	64	53	85	85	78
PEAK POW MW		351	356	356	356	356	356	356	356	339	296	285	285	285	293	319	339
ENERGY GWH	1442.4	22.5	18.0	43.7	130.7	163.3	157.3	172.5	170.3	157.5	145.5	61.3	10.7	10.1	63.2	63.2	52.5
--GAVINS POINT--																	
NAT INFLOW	1444	97	45	58	139	156	167	94	83	89	122	59	27	31	83	83	111
DEPLETION	114	0	0	0	5	19	24	39	10	-5	2	5	2	3	10	1	
CHAN STOR	-1	4	-10	-22	5	-9	0	-3	1	2	4	27	3	-8	1	3	
EVAPORATION	45						3	8	11	10	4	2	2	5			
REG INFLOW	15882	325	211	464	1416	1728	1684	1740	1735	1661	1666	744	171	143	769	769	656
RELEASE	15882	325	211	464	1416	1728	1684	1740	1722	1636	1666	744	171	143	769	769	694
STOR CHANGE							13	25									-38
STORAGE	342	342	342	342	342	342	342	342	355	380	380	380	380	380	380	380	342
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	12.5	10.9	15														

TIME OF STUDY 08:00:52

VALUES IN 1000 AF EXCEPT AS INDICATED

STUDY NO 18

	2015				2016												
	INI-SUM	15MAR	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	29FEB
--FORT PECK--																	
NAT INFLOW	7200	244	114	146	582	1146	1776	798	342	306	408	198	92	106	312	264	366
DEPLETION	496	-26	-12	-16	22	291	576	256	12	-114	-59	-40	-19	-21	-121	-133	-100
EVAPORATION	499							31	96	120	104	47	22	25	54		
MOD INFLOW	6205	270	126	162	560	855	1200	511	234	300	363	191	89	102	379	397	466
RELEASE	5757	149	69	89	357	492	565	584	487	338	164	76	87	584	584	546	
STOR CHANGE	447	121	57	73	203	363	635	-73	-350	-187	25	27	13	14	-206	-187	-80
STORAGE	11892	12013	12070	12143	12346	12709	13343	13270	12920	12734	12758	12786	12798	12813	12607	12420	12339
ELEV FTMSL	2219.0	2219.7	2220.0	2220.4	2221.5	2223.5	2226.8	2226.5	2224.6	2223.6	2223.8	2223.9	2224.0	2224.0	2222.9	2221.9	2221.5
DISCH KCFS	9.5	5.0	5.0	5.0	6.0	8.0	9.5	9.5	9.5	8.2	5.5	5.5	5.5	5.5	9.5	9.5	9.5
POWER																	
AVE POWER MW		65	65	65	78	105	126	126	126	108	73	73	73	73	125	124	124
PEAK POW MW		150	150	151	152	154	157	157	155	154	154	154	154	154	153	152	152
ENERGY GWH	916.8	23.3	10.9	14.0	56.3	78.0	90.6	94.1	93.7	77.8	54.0	26.2	12.2	14.0	92.9	92.5	86.3
--GARRISON--																	
NAT INFLOW	10800	497	232	298	828	1303	3093	1861	593	458	493	194	90	103	176	258	323
DEPLETION	1099	3	1	2	12	187	792	679	128	-139	-27	-117	-54	-62	-130	-100	-76
CHAN STOR	0	47			-10	-21	-15			13	27		0	0	-41		
EVAPORATION	583							36	112	140	122	55	26	29	64		
REG INFLOW	14876	690	300	386	1163	1587	2851	1731	937	958	764	419	195	223	786	942	945
RELEASE	14327	446	194	250	1012	1353	1458	1506	1506	1093	799	402	187	214	1168	1414	1323
STOR CHANGE	548	244	106	136	151	234	1393	224	-569	-136	-36	17	8	9	-382	-472	-378
STORAGE	14555	14799	14904	15040	15191	15426	16818	17043	16473	16338	16302	16319	16327	16335	15953	15481	15103
ELEV FTMSL	1825.0	1825.9	1826.3	1826.8	1827.4	1828.2	1833.2	1833.9	1832.0	1831.5	1831.4	1831.4	1831.4	1831.5	1830.1	1828.4	1827.0
DISCH KCFS	22.0	15.0	14.0	14.0	17.0	22.0	24.5	24.5	24.5	18.4	13.0	13.5	13.5	13.5	19.0	23.0	23.0
POWER																	
AVE POWER MW		173	162	163	198	256	291	296	295	220	156	162	162	162	226	271	268
PEAK POW MW		426	427	429	431	434	452	455	448	446	446	446	446	446	441	435	430
ENERGY GWH	2054.1	62.2	27.2	35.1	142.4	190.8	209.3	220.3	219.4	158.5	116.1	58.3	27.2	31.1	168.3	201.3	186.4
--OAHE--																	
NAT INFLOW	2300	360	168	216	318	230	486	248	115	133	27	22	10	12	-159	-18	133
DEPLETION	736	25	12	15	51	76	157	191	128	31	-12	1	0	1	13	19	29
CHAN STOR	-5	32	4		-13	-22	-11			27	24	-2			-25	-18	
EVAPORATION	540							34	106	131	112	50	23	27	58		
REG INFLOW	15347	813	355	451	1265	1485	1776	1529	1387	1092	751	370	174	199	913	1359	1427
RELEASE	14784	368	241	339	1096	1479	1297	1754	1786	1600	1103	462	225	223	886	1065	861
STOR CHANGE	562	445	114	111	169	6	479	-225	-398	-509	-352	-92	-51	-24	27	294	566
STORAGE	15189	15634	15748	15860	16029	16035	16514	16289	15891	15383	15030	14938	14888	14864	14891	15185	15752
ELEV FTMSL	1594.7	1596.4	1596.8	1597.2	1597.9	1597.9	1599.6	1598.8	1597.4	1595.4	1594.1	1593.7	1593.5	1593.4	1593.5	1594.7	1596.8
DISCH KCFS	15.4	12.4	17.3	19.0	18.4	24.1	21.8	28.5	29.0	26.9	17.9	15.5	16.2	14.0	14.4	17.3	15.0
POWER																	
AVE POWER MW		150	211	232	225	294	268	351	355	326	216	187	194	168	173	208	182
PEAK POW MW		650	652	654	657	658	666	662	655	645	639	637	636	636	636	642	652
ENERGY GWH	2176.9	54.0	35.5	50.1	162.4	219.0	193.1	261.3	264.2	234.8	160.9	67.2	32.6	32.3	128.5	154.9	126.3
--BIG BEND--																	
EVAPORATION	129							8	24	31	27	12	6	7	14		
REG INFLOW	14655	368	241	339	1096	1479	1297	1746	1761	1569	1076	450	219	216	872	1065	861
RELEASE	14655	368	241	339	1096	1479	1297	1746	1761	1569	1076	450	219	216	872	1065	861
STORAGE	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621
ELEV FTMSL	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	1420.0
DISCH KCFS	15.4	12.4	17.3	19.0	18.4	24.1	21.8	28.4	28.6	26.4	17.5	15.1	15.8	13.6	14.2	17.3	15.0
POWER																	
AVE POWER MW		59	81	89	86	113	102	133	134	125	86	76	79	69	72	85	72
PEAK POW MW		517	509	509	509	509	509	509	509	517	538	538	538	538	538	538	529
ENERGY GWH	846.4	21.1	13.6	19.2	62.1	83.8	73.4	98.9	99.7	90.0	63.9	27.5	13.3	13.2	53.2	63.4	50.0
--FORT RANDALL--																	
NAT INFLOW	900	145	68	87	180	130	250	70	50		-40	-15	-7	-8	-60	-30	80
DEPLETION	80	1	1	1	4	9	12	18	15	7	1	1	0	1	3	3	3
EVAPORATION	146							10	32	39	31	12	5	5	12		
REG INFLOW	15329	512	308	426	1272	1600	1535	1788	1764	1523	1004	422	206	202	797	1032	938
RELEASE	15328	220	174	426	1272	1600	1535	1788	1764	1669	1647	743	348	202	694	682	564
STOR CHANGE	0	291	134					0	0	-146	-643	-321	-142	0	103	350	374
STORAGE	3124	3415	3549	3549	3549	3549	3549	3549	3549	3403	2760	2439	2297	2297	2400	2750	3124
ELEV FTMSL	1350.0	1353.6	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1353.5	1345.0	1340.0	1337.5	1337.5	1339.3	1344.8	1350.0
DISCH KCFS	9.8	7.4	12.5	23.8	21.4	26.0	25.8	29.1	28.7	28.0	26.8	25.0	25.1	12.7	11.3	11.1	9.8
POWER																	
AVE POWER MW		62	106	201	181	220	218	245	242	235	215	189	184	93	83	85	78
PEAK POW MW		351	356	356	356	356	356	356	356	350	319	296	285	285	293	319	339
ENERGY GWH	1520.8	22.2	17.8	43.5	130.2	163.3	156.7	182.3	179.9	169.0	159.9	68.1	30.9	17.9	61.9	62.9	54.5
--GAVINS POINT--																	
NAT INFLOW	1500	101	47	60	144	162	173	98	86	92	127	61	28	32	87	87	115
DEPLETION	114	0	0	0	5	19	24	39	10	-5	2	5	2	3	10	1	
CHAN STOR	-1	5	-10	-22	5	-9	0	-6	1	2	3	0	0	23	3	0	2
EVAPORATION	45							3	8	11	10	4	2	2	5		
REG INFLOW	16669	326	211	464	1416	1734	1684	1839	1833	1757	1765	797	372	252	769	769	681
RELEASE	16669	326	211	464	1416	1734	1684	1839	1820	1732	1765	797	372	252	769	769	719
STOR CHANGE								13	25								-38
STORAGE	342	342	342	342	342	342	342	342	355	380	380	380	380	380	380	380	342
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	12.5	11.0</															



TIME OF STUDY 08:01:06

VALUES IN 1000 AF EXCEPT AS INDICATED

STUDY NO 19

	28FEB11	15MAR	2011 22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	2012 30NOV	31DEC	31JAN	29FEB
--FORT PECK--																	
NAT INFLOW	5527	198	93	119	481	865	1223	624	276	251	328	161	75	86	235	215	297
DEPLETION	411	-1	-1	-1	58	197	362	243	19	-91	-71	-16	-7	-9	-98	-111	-62
EVAPORATION	465						29	90	112	97	44	20	23	50			
MOD INFLOW	4651	200	93	120	423	668	861	352	167	230	302	133	62	71	283	326	359
RELEASE	5683	149	69	89	387	553	536	553	553	443	369	179	83	95	553	553	518
STOR CHANGE	-1032	51	24	31	36	115	325	-201	-386	-212	-67	-45	-21	-24	-270	-227	-159
STORAGE	11581	11632	11656	11686	11723	11837	12163	11961	11575	11363	11296	11251	11229	11205	10935	10708	10549
ELEV FTMSL	2217.3	2217.5	2217.7	2217.9	2218.1	2218.7	2220.5	2219.4	2217.2	2216.0	2215.6	2215.4	2215.2	2215.1	2213.5	2212.2	2211.2
DISCH KCFS	8.5	5.0	5.0	5.0	6.5	9.0	9.0	9.0	9.0	7.4	6.0	6.0	6.0	6.0	9.0	9.0	9.0
POWER																	
AVE POWER MW	64	64	64	84	116	116	117	117	116	95	76	76	76	76	114	113	112
PEAK POW MW	148	148	148	148	149	151	150	147	146	146	145	145	145	145	143	142	140
ENERGY GWH	877.2	23.1	10.8	13.9	60.2	86.1	83.8	86.7	86.1	68.4	56.9	27.5	12.8	14.6	84.5	83.9	78.0
--GARRISON--																	
NAT INFLOW	7739	382	178	229	601	1103	2306	1129	377	167	408	155	72	82	141	141	267
DEPLETION	1200	23	11	14	43	109	764	635	130	-117	4	-110	-51	-59	-90	-62	-43
CHAN STOR	-5	37			-16	-26				16	15				-32		
EVAPORATION	536							34	104	128	111	50	23	27	58		
REG INFLOW	11681	545	237	305	929	1521	2078	1014	696	615	677	393	183	209	695	756	828
RELEASE	12947	357	167	214	893	1168	1309	1353	1353	1076	738	357	167	190	1107	1291	1208
STOR CHANGE	-1266	188	71	91	36	353	768	-339	-657	-461	-61	36	17	19	-412	-535	-380
STORAGE	14174	14362	14433	14523	14560	14913	15681	15342	14685	14224	14163	14199	14216	14235	13823	13288	12908
ELEV FTMSL	1823.5	1824.3	1824.5	1824.9	1825.0	1826.3	1829.2	1827.9	1825.5	1823.7	1823.5	1823.6	1823.7	1823.8	1822.2	1820.1	1818.5
DISCH KCFS	21.0	12.0	12.0	12.0	15.0	19.0	22.0	22.0	22.0	18.1	12.0	12.0	12.0	12.0	18.0	21.0	21.0
POWER																	
AVE POWER MW	137	138	138	172	219	256	258	255	207	137	137	137	137	137	204	234	231
PEAK POW MW	420	421	422	422	427	438	433	424	418	417	417	418	418	418	412	404	399
ENERGY GWH	1790.4	49.4	23.1	29.8	124.0	162.7	184.6	191.7	189.4	148.9	101.8	49.3	23.0	26.3	151.5	174.2	160.9
--OAHE--																	
NAT INFLOW	1181	201	94	121	175	118	262	128	51	67	5	8	4	4	-103	-20	67
DEPLETION	681	24	11	14	49	71	145	173	116	28	-10	1	0	1	12	18	28
CHAN STOR	-1	41			-14	-19	-14			19	30				-30	-15	
EVAPORATION	480							30	93	115	100	45	21	24	52		
REG INFLOW	12967	576	249	321	1005	1197	1412	1278	1195	1019	683	319	149	170	910	1238	1247
RELEASE	14265	457	283	394	1213	1556	1456	1712	1741	1033	1044	222	125	141	945	1022	922
STOR CHANGE	-1299	119	-34	-73	-208	-359	-44	-434	-546	-15	-361	97	24	29	-34	217	325
STORAGE	14799	14918	14885	14811	14603	14244	14200	13765	13219	13204	12843	12940	12964	12993	12958	13175	13500
ELEV FTMSL	1593.2	1593.7	1593.5	1593.2	1592.4	1591.0	1590.8	1589.0	1586.7	1586.7	1585.1	1585.5	1585.6	1585.8	1585.6	1586.5	1587.9
DISCH KCFS	16.2	15.3	20.4	22.1	20.4	25.3	24.5	27.8	28.3	17.4	17.0	7.5	9.0	8.9	15.4	16.6	16.0
POWER																	
AVE POWER MW	184	244	264	243	299	288	325	327	200	195	86	103	102	102	176	191	185
PEAK POW MW	637	636	635	631	623	623	614	602	602	593	596	596	596	597	596	601	608
ENERGY GWH	2013.0	66.2	41.0	56.9	174.9	222.5	207.4	242.2	243.4	144.0	144.8	30.8	17.3	19.6	131.0	142.0	128.9
--BIG BEND--																	
EVAPORATION	129							8	24	31	27	12	6	7	14		
REG INFLOW	14137	457	283	394	1213	1556	1456	1704	1717	1002	1017	210	119	135	930	1022	922
RELEASE	14137	457	283	394	1213	1556	1456	1704	1717	1002	1017	210	119	135	930	1022	922
STORAGE	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621
ELEV FTMSL	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	1420.0
DISCH KCFS	16.2	15.3	20.4	22.1	20.4	25.3	24.5	27.7	27.9	16.8	16.5	7.1	8.6	8.5	15.1	16.6	16.0
POWER																	
AVE POWER MW	73	95	103	95	118	115	130	131	82	83	36	43	43	43	76	82	77
PEAK POW MW	517	509	509	509	509	509	509	509	538	538	538	538	538	538	538	538	529
ENERGY GWH	818.2	26.2	16.0	22.3	68.7	88.1	82.5	96.5	97.2	59.1	61.9	12.9	7.3	8.3	56.7	60.8	53.5
--FORT RANDALL--																	
NAT INFLOW	368	71	33	43	90	63	121	26	16	-11	-32	-13	-6	-7	-42	-21	37
DEPLETION	80	1	1	1	4	9	12	18	15	7	1	1	0	1	3	3	3
EVAPORATION	137							10	32	37	26	10	5	5	12		
REG INFLOW	14288	526	316	436	1299	1610	1565	1702	1686	948	958	187	108	122	873	998	956
RELEASE	14289	235	182	436	1299	1610	1565	1702	1686	1595	1536	214	108	122	720	698	582
STOR CHANGE	0	291	134					0	0	-647	-578	-27	0	0	153	300	374
STORAGE	3124	3415	3549	3549	3549	3549	3549	3549	3549	2902	2324	2297	2297	2297	2450	2750	3124
ELEV FTMSL	1350.0	1353.6	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1347.0	1338.0	1337.5	1337.5	1337.5	1340.2	1344.8	1350.0
DISCH KCFS	10.1	7.9	13.1	24.4	21.8	26.2	26.3	27.7	27.4	26.8	25.0	7.2	7.8	7.7	11.7	11.4	10.1
POWER																	
AVE POWER MW	66	111	206	185	221	222	233	231	218	189	53	57	56	56	87	87	81
PEAK POW MW	351	356	356	356	356	356	356	356	328	287	285	285	285	285	297	319	339
ENERGY GWH	1412.2	23.6	18.6	44.5	133.0	164.3	159.8	173.6	172.0	157.3	140.7	19.0	9.6	10.8	64.4	64.6	56.3
--GAVINS POINT--																	
NAT INFLOW	1223	84	39	50	117	133	143	82	66	71	102	49	23	26	71	71	97
DEPLETION	114	0	0	0	5	19	24	39	10	-5	2	5	2	3	10	1	
CHAN STOR	-1	4	-10	-22	5	-8	0	-3	0	1	3	33	-1	0	-7	1	2
EVAPORATION	45							3	8	11	10	4	2	2	5		
REG INFLOW	15352	323	211	464	1416	1716	1684	1740	1735	1661	1629	286	125	143	769	769	681
RELEASE	15352	323	211	464	1416	1716	1684	1740	1722	1636	1629	286	125	143	769	769	719
STOR CHANGE								13	25								-38
STORAGE	342	342	342	342	342	342	342	342	355	380	380	380	380	380	380	380	342
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	12.5	10.9	15.2	26.0	23.8	27.9	28.3	28.3	28.0	27.5	26.5	9.6	9.0	9.0	12.5	12.5	12.5
POWER																	
AVE POWER MW	38	53	89	82	95	96	96	96	96	93	34	32	32	32	44	44	44
PEAK POW MW	114	114	114	114	114	114	114	114	115	117	117	117	117	117	78	78	76
ENERGY GWH	642.0	13.7	8.9	19.2	58.7	70.7	69.3	71.6	71.3	68.8	69.1	12.3	5.4	6.2	33.0	33.0	30.7
--GAVINS POINT - SIOUX CITY--																	
NAT INFLOW	762	95	44	57	98	131	71	76	44	38	27	19	9	10	5	16	22
DEPLETION	266	7	3	4	22	36	31	39	36	24	11	6	3	3	13	14	14
REGULATED FLOW AT SIOUX CITY																	
KAF	15848	411	252	517	1492	1811	1724	1777	1730	1650	16						

TIME OF STUDY 08:01:06

VALUES IN 1000 AF EXCEPT AS INDICATED

STUDY NO 20

	28FEB12		2012												2013			
	INI-SUM	15MAR	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB	
--FORT PECK--																		
NAT INFLOW	5589	200	93	120	486	875	1237	631	280	254	331	163	76	87	238	217	300	
DEPLETION	629	-2	-1	-1	87	331	533	215	-12	-126	-66	-27	-12	-14	-94	-107	-74	
EVAPORATION	435						27	84	104	91	41	19	22	47				
MOD INFLOW	4525	203	95	122	399	544	704	389	208	276	306	148	69	79	285	324	374	
RELEASE	5402	149	69	89	387	523	506	523	523	423	307	149	69	79	553	553	500	
STOR CHANGE	-877	54	25	32	12	21	198	-134	-134	-147	-1	0	0	-269	-229	-126		
STORAGE	10549	10603	10628	10661	10673	10694	10892	10759	10444	10298	10296	10296	10296	10296	10027	9798	9672	
ELEV FTMSL	2211.2	2211.5	2211.7	2211.9	2212.0	2212.1	2213.3	2212.5	2210.6	2209.7	2209.7	2209.7	2209.7	2209.7	2208.0	2206.6	2205.8	
DISCH KCFS	9.0	5.0	5.0	5.0	6.5	8.5	8.5	8.5	8.5	7.1	5.0	5.0	5.0	5.0	9.0	9.0	9.0	
POWER																		
AVE POWER MW		62	62	63	81	106	106	107	106	88	62	62	62	62	111	110	109	
PEAK POW MW		141	141	141	141	141	143	142	140	139	139	139	139	139	137	135	134	
ENERGY GWH	809.4	22.5	10.5	13.5	58.5	78.9	76.6	79.2	78.7	63.3	46.0	22.3	10.4	11.9	82.2	81.6	73.3	
--GARRISON--																		
NAT INFLOW	7910	391	182	234	615	1128	2357	1154	385	171	417	158	74	84	144	144	273	
DEPLETION	1014	11	5	7	25	171	735	591	111	-144	-25	-121	-56	-64	-105	-76	-51	
CHAN STOR	0	43			-16	-21	0	0		15	23			0	-43			
EVAPORATION	507						31	98	122	106	48	22	25	55				
REG INFLOW	11792	571	246	317	961	1458	2128	1054	699	631	666	379	177	202	705	773	824	
RELEASE	12868	387	180	232	1131	1568	1160	1199	1199	912	738	357	167	190	1107	1230	1111	
STOR CHANGE	-1076	184	66	85	-170	-110	967	-145	-500	-281	-71	22	10	12	-402	-456	-287	
STORAGE	12908	13092	13158	13243	13073	12964	13931	13786	13286	13005	12933	12955	12966	12977	12575	12119	11832	
ELEV FTMSL	1818.5	1819.3	1819.5	1819.9	1819.2	1818.7	1822.6	1822.0	1820.0	1818.9	1818.6	1818.7	1818.7	1818.8	1817.1	1815.2	1814.0	
DISCH KCFS	21.0	13.0	13.0	13.0	19.0	25.5	19.5	19.5	19.5	15.3	12.0	12.0	12.0	12.0	18.0	20.0	20.0	
POWER																		
AVE POWER MW		143	144	144	210	279	217	219	217	170	132	132	132	132	197	215	213	
PEAK POW MW		401	402	404	401	399	414	411	404	400	399	399	399	400	394	387	382	
ENERGY GWH	1712.7	51.6	24.2	31.2	151.0	207.8	156.2	163.2	161.8	122.1	98.5	47.6	22.2	25.4	146.3	160.3	143.2	
--OAHE--																		
NAT INFLOW	1196	204	95	122	177	119	265	130	52	68	5	8	4	4	-104	-21	68	
DEPLETION	696	24	11	15	50	72	148	178	119	29	-11	1	0	1	13	18	28	
CHAN STOR	5	39			-29	-31	29			21	17			-31	-10			
EVAPORATION	452						29	88	108	93	42	20	23	49				
REG INFLOW	12921	605	264	340	1229	1584	1306	1122	1044	864	678	322	150	172	910	1181	1151	
RELEASE	14024	452	260	395	1210	1553	1452	1711	1740	1032	879	209	126	141	945	1022	896	
STOR CHANGE	-1103	153	4	55	19	31	-146	-589	-696	-168	-201	113	24	30	-35	159	255	
STORAGE	13500	13653	13657	13602	13620	13651	13505	12916	12220	12052	11851	11964	11988	12018	11983	12142	12397	
ELEV FTMSL	1587.9	1588.6	1588.6	1588.3	1588.4	1588.5	1587.9	1585.4	1582.3	1581.6	1580.6	1581.2	1581.3	1581.4	1581.3	1582.0	1583.1	
DISCH KCFS	16.0	15.2	18.7	22.1	20.3	25.3	24.4	27.8	28.3	17.3	14.3	7.0	9.1	8.9	15.4	16.6	16.1	
POWER																		
AVE POWER MW		177	218	257	236	293	283	319	319	194	159	79	102	100	172	186	181	
PEAK POW MW		611	612	610	611	611	608	595	579	575	570	573	573	574	573	577	583	
ENERGY GWH	1933.7	63.6	36.7	55.5	170.1	218.1	203.7	237.6	237.6	139.9	118.6	28.3	17.1	19.2	127.6	138.3	121.9	
--BIG BEND--																		
EVAPORATION	129						8	24	31	27	12	6	7	14				
REG INFLOW	13895	452	260	395	1210	1553	1452	1703	1716	1001	852	197	120	135	930	1022	896	
RELEASE	13895	452	260	395	1210	1553	1452	1703	1716	1001	852	197	120	135	930	1022	896	
STORAGE	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	
ELEV FTMSL	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	1420.0	
DISCH KCFS	16.0	15.2	18.7	22.1	20.3	25.3	24.4	27.7	27.9	16.8	13.9	6.6	8.7	8.5	15.1	16.6	16.1	
POWER																		
AVE POWER MW		72	88	104	95	118	114	130	131	82	70	34	44	43	76	82	77	
PEAK POW MW		517	509	509	509	509	509	509	509	538	538	538	538	538	538	538	529	
ENERGY GWH	803.8	25.9	14.7	22.4	68.5	88.0	82.3	96.5	97.2	59.1	52.0	12.1	7.4	8.3	56.7	60.8	52.0	
--FORT RANDALL--																		
NAT INFLOW	378	73	34	44	92	65	124	27	16	-11	-32	-14	-6	-7	-43	-22	38	
DEPLETION	80	1	1	1	4	9	12	18	15	7	1	1	0	1	3	3	3	
EVAPORATION	137						10	32	37	26	10	5	5	12				
REG INFLOW	14056	524	294	438	1298	1609	1564	1702	1685	947	792	173	109	122	872	997	931	
RELEASE	14055	232	160	438	1298	1609	1564	1702	1685	1594	1370	200	109	122	719	697	557	
STOR CHANGE	0	291	134				0	0	-647	-578	-27	0	0	153	300	374		
STORAGE	3124	3415	3549	3549	3549	3549	3549	3549	3549	2902	2324	2297	2297	2297	2450	2750	3124	
ELEV FTMSL	1350.0	1353.6	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1347.0	1338.0	1337.5	1337.5	1337.5	1340.2	1344.8	1350.0	
DISCH KCFS	10.1	7.8	11.5	24.5	21.8	26.2	26.3	27.7	27.4	26.8	22.3	6.7	7.8	7.7	11.7	11.3	10.0	
POWER																		
AVE POWER MW		65	97	207	185	221	222	233	231	218	169	49	57	56	86	87	80	
PEAK POW MW		351	356	356	356	356	356	356	356	328	287	285	285	285	297	319	339	
ENERGY GWH	1390.7	23.3	16.4	44.8	132.8	164.2	159.7	173.6	171.9	157.2	125.7	17.8	9.6	10.8	64.4	64.5	53.8	
--GAVINS POINT--																		
NAT INFLOW	1233	85	40	51	118	134	144	82	67	72	103	49	23	26	72	72	97	
DEPLETION	114	0	0	0	5	19	24	39	10	-5	2	5	2	3	10	1		
CHAN STOR	-1	4	-7	-25	5	-8	0	-3	1	1	8	29	-2	0	-7	1	2	
EVAPORATION	45						3	8	11	10	4	2	2	5				
REG INFLOW	15129	322	192	464	1416	1716	1684	1740	1735	1661	1470	268	125	143	769	769	656	
RELEASE	15129	322	192	464	1416	1716	1684	1740	1722	1636	1470	268	125	143	769	769	694	
STOR CHANGE							13	25									-38	
STORAGE	342	342	342	342	342	342	342	342	355	380	380	380	380	380	380	380	342	
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	12.5	10.8	13.9	26.0	23.8	27.9	28.3</											

TIME OF STUDY 08:01:06

	VALUES IN 1000 AF EXCEPT AS INDICATED																	STUDY NO		21
	28FEB13	15MAR	2013	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	2014	31DEC	31JAN	28FEB			
	INI-SUM		22MAR											30NOV						
--FORT PECK--																				
NAT INFLOW	5895	212	99	127	513	922	1305	666	295	267	349	172	80	92	251	229	317			
DEPLETION	476	-17	-8	-10	62	283	479	222	-8	-127	-68	-27	-13	-14	-95	-108	-74			
EVAPORATION	416							26	80	99	87	39	18	21	45					
MOD INFLOW	5003	229	107	137	451	639	826	418	223	295	330	160	74	85	301	337	391			
RELEASE	5417	119	56	71	536	553	536	553	378	277	134	62	71	523	523	472				
STOR CHANGE	-414	110	51	66	-85	86	290	-135	-530	-83	53	26	12	14	-222	-186	-81			
STORAGE	9672	9782	9833	9899	9814	9900	10190	10055	9725	9642	9695	9721	9733	9747	9524	9339	9258			
ELEV FTMSL	2205.8	2206.5	2206.8	2207.2	2206.7	2207.2	2209.0	2208.2	2206.1	2205.6	2205.9	2206.1	2206.1	2206.2	2204.8	2203.6	2203.1			
DISCH KCFS	9.0	4.0	4.0	4.0	9.0	9.0	9.0	9.0	9.0	6.3	4.5	4.5	4.5	4.5	8.5	8.5	8.5			
POWER																				
AVE POWER MW		49	49	49	109	109	110	110	110	77	55	55	55	55	103	102	102			
PEAK POW MW		135	135	136	135	136	138	137	135	134	134	135	135	135	133	132	131			
ENERGY GWH	795.4	17.5	8.2	10.6	78.8	81.4	79.3	82.1	81.5	55.4	40.6	19.7	9.2	10.5	76.4	75.9	68.2			
--GARRISON--																				
NAT INFLOW	8842	437	204	262	687	1261	2635	1290	430	191	466	177	82	94	161	161	305			
DEPLETION	1045	4	2	3	13	196	787	613	117	-147	-30	-128	-60	-68	-114	-85	-59			
CHAN STOR	6	55			-54					29	20				-43		0			
EVAPORATION	495							31	96	119	103	47	22	25	53					
REG INFLOW	12724	606	257	331	1155	1618	2384	1200	770	625	690	391	183	209	701	769	836			
RELEASE	13230	417	167	214	1101	1537	1309	1291	1291	1004	738	357	167	190	1107	1230	1111			
STOR CHANGE	-506	189	91	116	54	81	1074	-92	-521	-379	-48	34	16	18	-406	-461	-275			
STORAGE	11832	12021	12112	12228	12282	12364	13438	13347	12826	12447	12399	12433	12449	12468	12062	11600	11326			
ELEV FTMSL	1814.0	1814.8	1815.2	1815.7	1815.9	1816.3	1820.6	1820.3	1818.2	1816.6	1816.4	1816.6	1816.6	1816.7	1815.0	1813.0	1811.8			
DISCH KCFS	20.0	14.0	12.0	12.0	18.5	25.0	22.0	21.0	21.0	16.9	12.0	12.0	12.0	12.0	18.0	20.0	20.0			
POWER																				
AVE POWER MW		150	129	129	199	268	241	233	231	184	130	130	130	130	194	212	210			
PEAK POW MW		385	386	388	389	390	407	405	397	392	391	391	392	392	386	378	374			
ENERGY GWH	1731.0	53.9	21.7	27.9	143.3	199.7	173.2	173.4	171.9	132.3	97.0	46.9	21.9	25.0	144.1	157.8	140.9			
--OAHE--																				
NAT INFLOW	1272	217	101	130	188	127	282	138	55	72	6	9	4	5	-111	-22	72			
DEPLETION	709	24	11	15	50	73	151	182	122	30	-11	1	0	1	13	18	29			
CHAN STOR	0	30	10		-33	-33	15	5		21	25				-31	-10				
EVAPORATION	433							84	103	90	40	19	22	22	47					
REG INFLOW	13361	639	266	330	1206	1559	1455	1225	1140	964	691	324	151	173	904	1179	1154			
RELEASE	13879	441	255	343	1197	1532	1429	1704	1736	1030	880	209	126	141	948	1022	886			
STOR CHANGE	-518	198	12	-13	10	26	26	-479	-596	-66	-189	115	25	32	-43	157	268			
STORAGE	12397	12595	12607	12593	12603	12629	12655	12175	11579	11513	11324	11440	11465	11497	11453	11611	11879			
ELEV FTMSL	1583.1	1584.0	1584.1	1584.0	1584.1	1584.2	1584.3	1582.1	1579.4	1579.0	1578.1	1578.7	1578.8	1579.0	1578.8	1579.5	1580.8			
DISCH KCFS	16.1	14.8	18.4	19.2	20.1	24.9	24.0	27.7	28.2	17.3	14.3	7.0	9.1	8.9	15.4	16.6	15.9			
POWER																				
AVE POWER MW		168	208	218	228	282	272	312	313	191	157	77	100	98	170	183	177			
PEAK POW MW		588	588	588	588	588	589	578	563	562	557	560	560	561	560	564	571			
ENERGY GWH	1875.3	60.5	35.0	47.0	164.0	209.8	195.9	231.8	232.6	137.3	116.9	27.8	16.8	18.8	126.1	136.2	118.8			
--BIG BEND--																				
EVAPORATION	129							8	24	31	27	12	6	7	14					
REG INFLOW	13750	441	255	343	1197	1532	1429	1696	1712	999	852	196	120	135	933	1022	886			
RELEASE	13750	441	255	343	1197	1532	1429	1696	1712	999	852	196	120	135	933	1022	886			
STORAGE	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621			
ELEV FTMSL	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	1420.0			
DISCH KCFS	16.1	14.8	18.4	19.2	20.1	24.9	24.0	27.6	27.8	16.8	13.9	6.6	8.6	8.5	15.2	16.6	15.9			
POWER																				
AVE POWER MW		70	86	90	94	117	112	129	130	82	70	34	44	43	76	82	77			
PEAK POW MW		517	509	509	509	509	509	509	509	538	538	538	538	538	538	538	529			
ENERGY GWH	795.6	25.3	14.4	19.4	67.8	86.8	81.0	96.1	96.9	58.9	52.1	12.1	7.4	8.3	56.9	60.8	51.4			
--FORT RANDALL--																				
NAT INFLOW	430	83	39	50	105	74	141	31	18	-12	-37	-16	-7	-8	-49	-25	43			
DEPLETION	80	1	1	1	4	9	12	18	15	7	1	1	0	1	3	3	3			
EVAPORATION	137							10	32	37	26	10	5	5	12					
REG INFLOW	13963	523	293	392	1298	1597	1558	1699	1683	944	788	170	107	120	869	994	926			
RELEASE	13963	232	159	392	1298	1597	1558	1699	1683	1591	1366	197	108	120	716	694	552			
STOR CHANGE	0	291	134				0	0	0	-647	-578	-27	0	0	153	300	374			
STORAGE	3124	3415	3549	3549	3549	3549	3549	3549	3549	2902	2324	2297	2296	2296	2449	2749	3123			
ELEV FTMSL	1350.0	1353.6	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1347.0	1338.0	1337.5	1337.5	1337.5	1340.2	1344.8	1350.0			
DISCH KCFS	10.0	7.8	11.5	22.0	21.8	26.0	26.2	27.6	27.4	26.7	22.2	6.6	7.7	7.6	11.6	11.3	9.9			
POWER																				
AVE POWER MW		65	97	186	184	219	221	233	231	218	168	49	57	56	86	86	79			
PEAK POW MW		351	356	356	356	356	356	356	356	328	287	285	285	285	297	319	339			
ENERGY GWH	1381.6	23.3	16.3	40.1	132.8	163.1	159.1	173.3	171.7	156.9	125.4	17.6	9.5	10.7	64.1	64.2	53.4			
--GAVINS POINT--																				
NAT INFLOW	1284	88	41	53	123	139	150	85	69	75	107	51	24	27	75	75	102			
DEPLETION	114	0	0	0	5	19	24	39	10	-5	2	5	2	3	10	1				
CHAN STOR	-1	4	-7	-20	0	-8	0	-3	1	1	8	29	-2	0	-8	1	3			
EVAPORATION	45							3	8	11	10	4	2	2	5					
REG INFLOW	15088	325	193	425	1416	1709	1684	1740	1735	1661	1470	268	125	143	769	769	656			
RELEASE	15088	325	193	425	1416	1709	1684	1740	1722	1636	1470	268	125	143	769	769	694			
STOR CHANGE									13	25							-38			
STORAGE	342	342	342	342	342	342	342	342	355	380	380	380	380	380	380	380	342			
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	12.5	10.9	13.9	23.8	23.8	27.8														

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VALUES IN 1000 AF EXCEPT AS INDICATED

STUDY NO 22

	2009				2010				2011				2012				2013				2014																
	28FEB14	15MAR	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB	28FEB14	15MAR	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB			
--FORT PECK--																																					
NAT INFLOW	5983	214	100	129	521	936	1324	676	299	271	355	175	81	93	255	233	321	5983	214	100	129	521	936	1324	676	299	271	355	175	81	93	255	233	321			
DEPLETION	487	-17	-8	-10	61	283	483	229	-3	-126	-70	-28	-13	-15	-97	-108	-74	487	-17	-8	-10	61	283	483	229	-3	-126	-70	-28	-13	-15	-97	-108	-74			
EVAPORATION	415							26	80	99	87	39	18	21	45			415							26	80	99	87	39	18	21	45					
MOD INFLOW	5081	232	108	139	460	653	841	421	222	298	338	163	76	87	307	341	395	5081	232	108	139	460	653	841	421	222	298	338	163	76	87	307	341	395			
RELEASE	5318	119	56	71	357	369	536	553	553	403	307	149	69	79	584	584	528	5318	119	56	71	357	369	536	553	553	403	307	149	69	79	584	584	528			
STOR CHANGE	-237	113	53	68	103	284	305	-132	-331	-105	31	14	7	7	-277	-243	-133	-237	113	53	68	103	284	305	-132	-331	-105	31	14	7	7	-277	-243	-133			
STORAGE	9258	9371	9423	9491	9594	9878	10183	10051	9720	9615	9645	9659	9666	9673	9396	9153	9020	9258	9371	9423	9491	9594	9878	10183	10051	9720	9615	9645	9659	9666	9673	9396	9153	9020			
ELEV FTMSL	2203.1	2203.8	2204.1	2204.6	2205.2	2207.1	2209.0	2208.1	2206.1	2205.4	2205.6	2205.7	2205.7	2205.8	2204.0	2202.4	2201.5	2203.1	2203.8	2204.1	2204.6	2205.2	2207.1	2209.0	2208.1	2206.1	2205.4	2205.6	2205.7	2205.7	2205.8	2204.0	2202.4	2201.5			
DISCH KCFS	8.5	4.0	4.0	4.0	6.0	6.0	9.0	9.0	9.0	6.8	5.0	5.0	5.0	5.0	9.5	9.5	9.5	8.5	4.0	4.0	4.0	6.0	6.0	9.0	9.0	9.0	6.8	5.0	5.0	5.0	5.0	9.5	9.5	9.5			
POWER																																					
AVE POWER MW		48	48	48	72	73	110	110	110	82	61	61	61	61	114	113	112		48	48	48	72	73	110	110	110	82	61	61	61	61	114	113	112			
PEAK POW MW		132	132	133	134	136	138	137	135	134	134	134	134	134	132	130	129		132	132	133	134	136	138	137	135	134	134	134	134	132	130	129				
ENERGY GWH	777.1	17.3	8.1	10.4	52.1	54.2	79.2	82.1	81.5	59.1	45.1	21.8	10.2	11.6	84.9	84.0	75.3	777.1	17.3	8.1	10.4	52.1	54.2	79.2	82.1	81.5	59.1	45.1	21.8	10.2	11.6	84.9	84.0	75.3			
--GARRISON--																																					
NAT INFLOW	9140	452	211	271	710	1303	2723	1334	444	198	482	182	85	97	167	167	315	9140	452	211	271	710	1303	2723	1334	444	198	482	182	85	97	167	167	315			
DEPLETION	1083	1	1	1	6	204	804	637	122	-150	-34	-130	-60	-69	-112	-82	-56	1083	1	1	1	6	204	804	637	122	-150	-34	-130	-60	-69	-112	-82	-56			
CHAN STOR	-11	50			-22		-33			24	19			0	-49			-11	50			-22		-33			24	19			0	-49					
EVAPORATION	483							30	94	116	100	45	21	24	52			483							30	94	116	100	45	21	24	52					
REG INFLOW	12882	619	265	341	1039	1468	2422	1220	782	659	743	415	194	221	762	833	899	12882	619	265	341	1039	1468	2422	1220	782	659	743	415	194	221	762	833	899			
RELEASE	13176	387	167	214	1131	1476	1250	1291	1291	1010	769	372	174	198	1107	1230	1111	13176	387	167	214	1131	1476	1250	1291	1291	1010	769	372	174	198	1107	1230	1111			
STOR CHANGE	-294	232	99	127	-91	-8	1172	-71	-509	-351	-26	43	20	23	-345	-397	-212	-294	232	99	127	-91	-8	1172	-71	-509	-351	-26	43	20	23	-345	-397	-212			
STORAGE	11326	11558	11657	11784	11692	11685	12857	12786	12276	11925	11899	11942	11962	11985	11640	11243	11031	11326	11558	11657	11784	11692	11685	12857	12786	12276	11925	11899	11942	11962	11985	11640	11243	11031			
ELEV FTMSL	1811.8	1812.8	1813.3	1813.8	1813.4	1813.4	1818.3	1818.3	1818.0	1815.9	1814.4	1814.3	1814.5	1814.6	1814.7	1811.4	1810.5	1811.8	1812.8	1813.3	1813.8	1813.4	1813.4	1818.3	1818.3	1818.0	1815.9	1814.4	1814.3	1814.5	1814.6	1814.7	1811.4	1810.5			
DISCH KCFS	20.0	13.0	12.0	12.0	19.0	24.0	21.0	21.0	21.0	17.0	12.5	12.5	12.5	12.5	18.0	20.0	20.0	20.0	13.0	12.0	12.0	19.0	24.0	21.0	21.0	21.0	17.0	12.5	12.5	12.5	12.5	18.0	20.0	20.0			
POWER																																					
AVE POWER MW		137	127	128	201	253	226	229	227	182	134	134	134	134	191	210	207		137	127	128	201	253	226	229	227	182	134	134	134	134	191	210	207			
PEAK POW MW		378	379	381	380	380	398	397	389	384	383	384	384	385	379	373	369		378	379	381	380	380	398	397	389	384	383	384	384	385	379	373	369			
ENERGY GWH	1697.6	49.3	21.4	27.6	144.8	188.1	162.4	170.6	169.2	131.0	99.4	48.1	22.5	25.7	142.2	155.9	139.3	1697.6	49.3	21.4	27.6	144.8	188.1	162.4	170.6	169.2	131.0	99.4	48.1	22.5	25.7	142.2	155.9	139.3			
--OAHE--																																					
NAT INFLOW	1295	221	103	132	192	130	287	141	56	73	6	9	4	5	-113	-23	73	1295	221	103	132	192	130	287	141	56	73	6	9	4	5	-113	-23	73			
DEPLETION	724	25	12	15	51	75	154	187	125	30	-12	1	0	1	13	19	29	724	25	12	15	51	75	154	187	125	30	-12	1	0	1	13	19	29			
CHAN STOR	1	36	5		-36	-25	15			21	24			-29	-11			1	36	5		-36	-25	15			21	24			-29	-11					
EVAPORATION	421							27	81	100	87	39	19	21	46			421							27	81	100	87	39	19	21	46					
REG INFLOW	13327	619	263	332	1236	1505	1398	1219	1141	974	723	340	159	181	906	1177	1155	13327	619	263	332	1236	1505	1398	1219	1141	974	723	340	159	181	906	1177	1155			
RELEASE	13629	379	244	342	1193	1408	1426	1702	1734	1030	842	210	126	141	949	1022	883	13629	379	244	342	1193	1408	1426	1702	1734	1030	842	210	126	141	949	1022	883			
STOR CHANGE	-302	240	20	-10	43	97	-28	-484	-593	-56	-118	130	33	40	-43	155	272	-302	240	20	-10	43	97	-28	-484	-593	-56	-118	130	33	40	-43	155	272			
STORAGE	11879	12119	12138	12128	12171	12269	12240	11757	11163	11107	10989	11119	11152	11192	11149	11304	11576	11879	12119	12138	12128	12171	12269	12240	11757	11163	11107	10989	11119	11152	11192	11149	11304	11576			
ELEV FTMSL	1580.8	1581.9	1582.0	1581.9	1582.1	1582.6	1582.4	1580.2	1577.4	1577.1	1576.5	1577.2	1577.3	1577.5	1577.3	1578.0	1579.4	1580.8	1581.9	1582.0	1581.9	1582.1	1582.6	1582.4	1580.2	1577.4	1577.1	1576.5	1577.2	1577.3	1577.5	1577.3	1578.0	1579.4			
DISCH KCFS	15.9	12.7	17.5	19.2	20.0	22.9	24.0	27.7	28.2	17.3	13.7	7.1	9.1	8.9	15.4	16.6	15.9	15.9	12.7	17.5	19.2	20.0	22.9	24.0	27.7	28.2	17.3	13.7	7.1	9.1	8.9	15.4	16.6	15.9			
POWER																																					
AVE POWER MW		142	196	214	224	256	269	308	309	188	149	77	99	97	168	181	175		142	196	214	224	256	269	308	309	188	149	77	99	97	168	181	175			
PEAK POW MW		576	577	577	578	580	579	568	553	551	548	552	552	553	552	556	563		576	577	577	578	580	579	568	553	551	548	552	552	553	552	556	563			
ENERGY GWH	1821.5	51.2	33.0	46.3	161.5	190.8	193.4	228.9	229.6	135.6	110.7	27.7	16.6	18.7	125.1	135.0	117.3	1821.5	51.2	33.0	46.3	161.5	190.8	193.4	228.9	229.6	135.6	110.7	27.7	16.6	18.7	125.1	135.0	117.3			
--BIG BEND--																																					
EVAPORATION	129							8	24	31	27	12	6	7	14			129							8	24	31	27	12	6	7	14					
REG INFLOW	13501	379	244	342	1193	1408	1426	1694	1710	999	815	198	120	135	934	1022	883	13501	379																		

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VALUES IN 1000 AF EXCEPT AS INDICATED

STUDY NO 23

	28FEB15		2015												2016			
	INI-SUM	15MAR	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	29FEB	
--FORT PECK--																		
NAT INFLOW	6017	216	101	129	524	942	1331	680	301	273	356	176	82	94	256	234	323	
DEPLETION	494	-17	-8	-10	61	284	488	237	1	-127	-72	-28	-13	-15	-97	-107	-83	
EVAPORATION	377						25	78	97	85	24	11	13	44				
MOD INFLOW	5146	233	109	140	463	658	843	418	222	303	343	179	83	95	309	341	406	
RELEASE	5301	119	56	71	476	492	506	523	397	307	149	69	79	523	523	489		
STOR CHANGE	-155	114	53	68	-13	166	337	-105	-300	-94	36	30	14	16	-214	-182	-83	
STORAGE	9020	9135	9188	9256	9243	9409	9747	9642	9342	9248	9284	9314	9328	9344	9130	8948	8865	
ELEV FTMSL	2201.5	2202.2	2202.6	2203.0	2203.0	2204.1	2206.2	2205.6	2203.6	2203.0	2203.2	2203.4	2203.5	2203.6	2202.2	2201.0	2200.4	
DISCH KCFS	9.5	4.0	4.0	4.0	8.0	8.0	8.5	8.5	8.5	6.7	5.0	5.0	5.0	5.0	8.5	8.5	8.5	
POWER																		
AVE POWER MW		48	48	48	95	96	102	103	102	80	60	60	60	60	101	101	100	
PEAK POW MW		130	131	131	131	132	135	134	132	131	132	132	132	132	130	129	128	
ENERGY GWH	766.9	17.1	8.0	10.3	68.7	71.2	73.8	76.5	76.0	57.4	44.5	21.6	10.1	11.5	75.4	74.9	69.7	
--GARRISON--																		
NAT INFLOW	9260	457	213	274	720	1320	2759	1351	451	200	488	185	86	98	169	169	319	
DEPLETION	1217	3	2	2	10	203	813	677	128	-152	-39	-122	-57	-65	-90	-58	-39	
CHAN STOR	12	61			-44		-5	0	20	18				0	-38		0	
EVAPORATION	449							30	93	116	100	29	13	15	52			
REG INFLOW	12906	634	267	344	1142	1609	2446	1167	752	653	752	426	199	227	691	750	847	
RELEASE	13096	387	167	214	1071	1414	1309	1291	1291	1012	738	357	167	190	1107	1230	1150	
STOR CHANGE	-189	247	101	129	71	195	1137	-125	-539	-359	15	69	32	37	-416	-480	-303	
STORAGE	11031	11279	11379	11509	11580	11774	12911	12787	12248	11889	11903	11972	12005	12041	11626	11146	10842	
ELEV FTMSL	1810.5	1811.6	1812.0	1812.6	1812.9	1813.8	1818.5	1818.0	1815.8	1814.3	1814.3	1814.6	1814.8	1814.9	1813.1	1811.0	1809.6	
DISCH KCFS	20.0	13.0	12.0	12.0	18.0	23.0	22.0	21.0	21.0	17.0	12.0	12.0	12.0	12.0	18.0	20.0	20.0	
POWER																		
AVE POWER MW		136	126	126	189	242	237	230	227	182	128	128	129	129	191	209	206	
PEAK POW MW		373	375	377	378	381	399	397	389	383	383	384	385	385	379	371	366	
ENERGY GWH	1685.0	48.8	21.2	27.3	136.4	180.3	170.4	170.7	169.1	131.1	95.4	46.2	21.6	24.7	142.3	155.6	143.6	
--OAHE--																		
NAT INFLOW	1305	222	104	133	193	130	289	142	57	74	6	9	4	5	-113	-23	74	
DEPLETION	736	25	12	15	51	76	157	191	128	31	-12	1	0	1	13	19	29	
CHAN STOR	1	36	5		-31	-26	5	2	22	27				-32	-11			
EVAPORATION	382						5	79	97	85	25	12	13	45				
REG INFLOW	13284	621	264	333	1182	1442	1446	1221	1141	979	698	340	159	181	903	1177	1195	
RELEASE	13477	437	252	340	1190	1406	1423	1700	1733	1030	622	207	121	136	950	1022	908	
STOR CHANGE	-193	183	12	-7	-8	37	23	-479	-592	-51	76	133	38	45	155	288		
STORAGE	11576	11760	11771	11764	11756	11793	11816	11337	10746	10695	10771	10903	10941	10987	10940	11095	11383	
ELEV FTMSL	1579.4	1580.2	1580.3	1580.2	1580.2	1580.4	1580.5	1578.2	1575.3	1575.0	1575.4	1576.1	1576.3	1576.5	1576.3	1577.0	1578.4	
DISCH KCFS	15.9	14.7	18.2	19.0	20.0	22.9	23.9	27.6	28.2	17.3	10.1	7.0	8.7	8.6	15.4	16.6	15.8	
POWER																		
AVE POWER MW		163	201	211	221	253	265	304	304	186	109	75	94	93	167	180	172	
PEAK POW MW		568	568	568	568	569	569	557	542	540	542	546	547	548	547	551	558	
ENERGY GWH	1782.9	58.6	33.8	45.5	159.4	188.2	190.6	225.8	226.5	133.9	81.1	27.2	15.8	17.9	124.5	134.1	120.0	
--BIG BEND--																		
EVAPORATION	120						8	24	31	27	8	4	4	14				
REG INFLOW	13357	437	252	340	1190	1406	1423	1692	1709	999	595	200	117	132	936	1022	908	
RELEASE	13357	437	252	340	1190	1406	1423	1692	1709	999	595	200	117	132	936	1022	908	
STORAGE	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	1621	
ELEV FTMSL	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	1420.0	
DISCH KCFS	15.9	14.7	18.2	19.0	20.0	22.9	23.9	27.5	27.8	16.8	9.7	6.7	8.4	8.3	15.2	16.6	15.8	
POWER																		
AVE POWER MW		70	85	89	94	107	112	129	130	82	49	34	43	42	77	82	76	
PEAK POW MW		517	509	509	509	509	509	509	509	538	538	538	538	538	538	538	529	
ENERGY GWH	772.3	25.1	14.3	19.2	67.4	79.6	80.6	95.8	96.8	58.9	36.4	12.3	7.2	8.1	57.0	60.8	52.7	
--FORT RANDALL--																		
NAT INFLOW	453	88	41	53	110	78	149	33	19	-13	-39	-16	-7	-9	-52	-26	45	
DEPLETION	80	1	1	1	4	9	12	18	15	7	1	1	0	1	3	3	3	
EVAPORATION	129						10	32	37	26	6	3	3	3				
REG INFLOW	13599	524	293	391	1296	1475	1560	1697	1681	943	527	176	106	119	868	993	950	
RELEASE	13599	232	159	391	1296	1475	1560	1697	1681	1590	1105	203	106	119	715	693	576	
STOR CHANGE	0	292	134				0	0	-647	-578	-27	0	0	153	300	374		
STORAGE	3123	3415	3549	3549	3549	3549	3549	3549	3549	2902	2324	2297	2297	2297	2450	2750	3124	
ELEV FTMSL	1350.0	1353.6	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1355.2	1347.0	1338.0	1337.5	1337.5	1337.5	1340.2	1344.8	1350.0	
DISCH KCFS	9.9	7.8	11.4	21.9	21.8	24.0	26.2	27.6	27.3	26.7	18.0	6.8	7.6	7.5	11.6	11.3	10.0	
POWER																		
AVE POWER MW		65	97	185	184	203	221	233	231	218	137	50	56	55	86	86	80	
PEAK POW MW		351	356	356	356	356	356	356	356	328	287	285	285	285	297	319	339	
ENERGY GWH	1347.4	23.3	16.2	40.0	132.6	150.7	159.3	173.1	171.5	156.8	101.7	18.1	9.4	10.6	64.0	64.1	55.7	
--GAVINS POINT--																		
NAT INFLOW	1303	90	42	54	125	141	152	87	71	76	108	52	24	27	76	76	103	
DEPLETION	114	0	0	0	5	19	24	39	10	-5	2	5	2	3	10	1		
CHAN STOR	-1	4	-7	-20	0	-4	-4	-3	0	1	16	21	-1	0	-8	1	2	
EVAPORATION	41						3	8	11	10	3	1	1	5				
REG INFLOW	14745	326	194	425	1416	1593	1684	1740	1735	1661	1217	268	125	143	769	769	681	
RELEASE	14745	326	194	425	1416	1593	1684	1740	1722	1636	1217	268	125	143	769	769	719	
STOR CHANGE							13	25									-38	
STORAGE	342	342	342	342	342	342	342	342	355	380	380	380	380	380	380	380	342	
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	12.5	11.0	13.9	23.8	23.8	25.9	28.3	28.3	28.0	2								