US Army Corps of Engineers ®
Northwestern Division

Missouri River Basin
Water Management Division

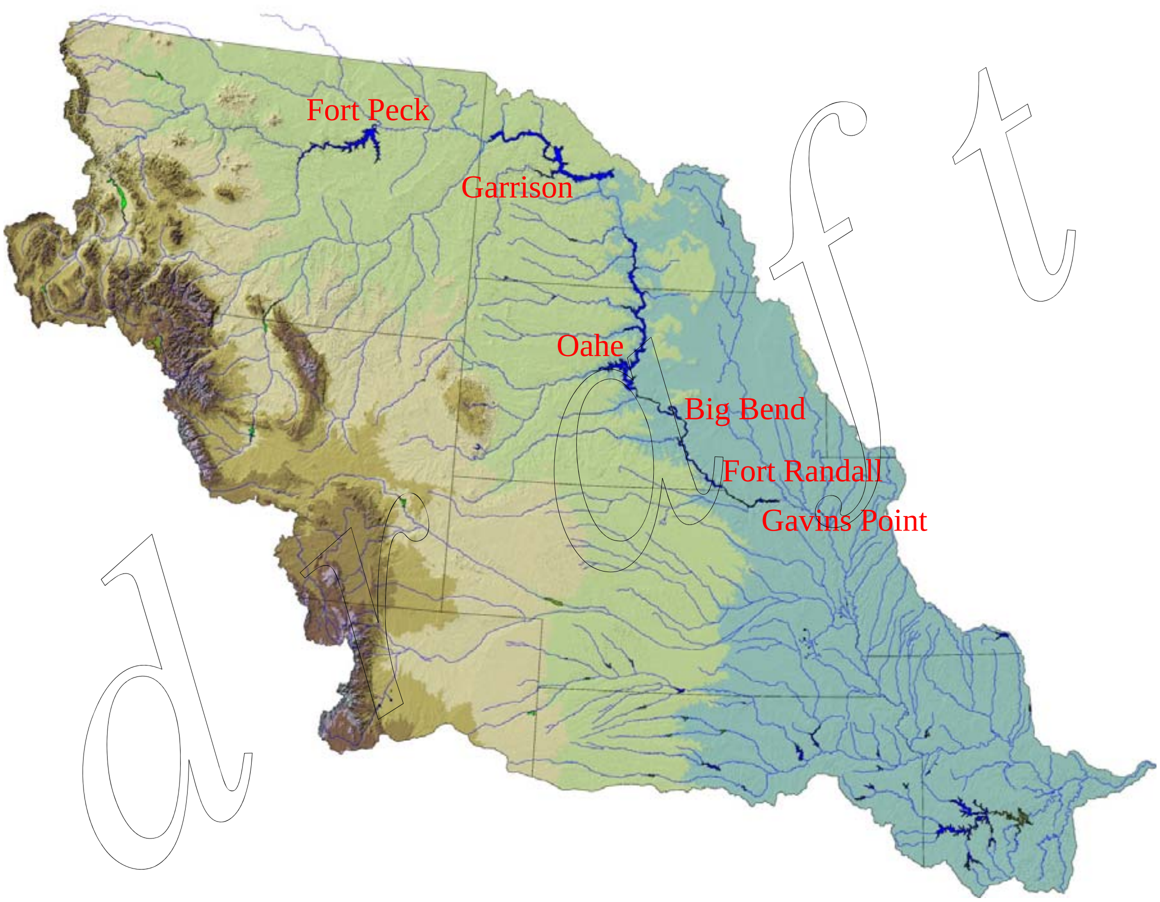
Draft

AOP

2012-2013

Missouri River Mainstem System

2012-2013 Annual Operating Plan



Annual Operating Plan Process
60 Years Serving the Missouri River Basin

September 2012

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DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, NORTHWESTERN DIVISION
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September 2012

This Draft Annual Operating Plan (AOP) presents pertinent information regarding water management in the Missouri River Mainstem Reservoir System through December 2013. The information provided in this Draft AOP is based upon water management guidelines designed to meet the reservoir regulation objectives of the 2006 Missouri River Master Water Control Manual (Master Manual). Regulation of the mainstem reservoir system is provided by my office, the Missouri River Basin Water Management Division, Northwestern Division, U. S. Army Corps of Engineers, located in Omaha, Nebraska.

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

In addition to the AOP, two separate documents are also available entitled: "System Description and Operation" and "Summary of Actual 2011 Regulation." To receive copies of those documents, you may contact the Missouri River Basin Water Management Division at 1616 Capitol Avenue, Suite 365, Omaha, Nebraska 68102-4909, phone (402) 996-3841. Both reports will also be available at the "Reports and Publications" link on our web site at: **www.nwd-mr.usace.army.mil/rcc/**

Six public meetings to discuss this Draft AOP are scheduled as follows: October 29 in Fort Peck, Montana; October 30 in Bismarck, North Dakota and Pierre, South Dakota; October 31 in Sioux City, Iowa; November 1 in St. Joseph, Missouri and Columbia, Missouri. We ask that any comments be provided by November 23, 2012. The Final AOP is scheduled for publication in December 2012.

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

Jody S. Farhat, P.E.
Chief, Missouri River Basin Water
Management Division

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MISSOURI RIVER MAINSTEM RESERVOIR SYSTEM

Annual Operating Plan
2012 - 2013

TABLES

PLATES

ABBREVIATIONS

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

DEFINITION OF TERMS

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

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

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

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

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

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

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

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

MISSOURI RIVER MAINSTEM RESERVOIR SYSTEM

Draft Annual Operating Plan
2012 – 2013

I. FOREWORD

This Draft Annual Operating Plan (AOP) presents pertinent information and plans for regulating the Missouri River Mainstem Reservoir System (System) through December 2013 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 of the System 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***.

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

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

This document provides the plan for future regulation of the System. Other documents that may be of interest include the "System Description and Regulation" report dated November 2007 or the "Summary of Actual Calendar Year 2011 Regulation," dated July 2012. Both reports are currently available at the "Reports and Publications" link on our web site at: **www.nwd-mr.usace.army.mil/rcc**, or you may contact the Missouri River Basin Water Management Division at 1616 Capitol Avenue, Suite 365, Omaha, Nebraska 68102-4909, phone (402) 996-3841 for copies. The "Summary of Actual Calendar Year 2012 Regulation" will be available at the same site in late spring or early summer of 2013.

II. BACKGROUND AND AOP PROCESS

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

Under the terms of Stipulation 18 of the March 2004 "Programmatic Agreement for the Operation and Management of the Missouri River Main Stem System for Compliance with the National Historic Preservation Act, as amended" (PA) the Corps has agreed to consult/meet with the affected Tribes and Tribal Historic Preservation Officers (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 AOPs under 36 CFR Part 800, the PA, and Executive Order 13175. The process consists of a series of informational meetings with the Tribes and/or government-to-government consultation with Tribes, as requested. A letter, dated September 5, 2012, was sent to the Tribes offering consultation on the 2012-2013 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 AOPs. In addition, the Tribes have reserved water rights to the Missouri River and its major tributaries. In no way does this AOP attempt to define, regulate or quantify water rights or any other rights that the Tribes are entitled to by law or treaty.

The 2012 spring public meetings were held at the following locations and dates: April 16 at Fort Peck, Montana and Bismarck, North Dakota; April 17 at Pierre, South Dakota; April 18 at Omaha, Nebraska; April 19 at Jefferson City, Missouri and St. Joseph, Missouri; and April 20 at Sioux City, Iowa. The attendees were given an update regarding the outlook for 2012 runoff and projected System regulation for the remainder of 2012. Six fall public meetings on the Draft 2012-2013 AOP are planned at the following locations: October 29 in Fort Peck, Montana; October 30 in Bismarck, North Dakota and Pierre, South Dakota; October 31 in Sioux City, Iowa; and November 1 in St. Joseph, Missouri and Columbia, Missouri. In the spring of 2013, 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 2012-2013 AOP.

III. MAINSTEM MASTER MANUAL AND ESA CONSULTATIONS

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

First published in 1960 and subsequently revised during the 1970s, 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), dated December 23, 2003, 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. Neither the 2004 nor the 2006 revisions to the Master Manual changed the volume of storage in the system reserved for flood risk reduction or the manner in which it is regulated. The Corps does not store water in the reservoirs specifically for the endangered species and the Master Manual storage allocations were not altered to facilitate the spring pulses. In years when water is released for endangered species, reservoir storage levels are not adjusted.

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. Simply put, the Corps must comply with environmental laws including the ESA, and the MRRP is the vehicle used to accomplish this. This AOP identifies flow modifications at Garrison, Fort Randall and Gavins Point for the benefit of the interior least tern and the piping plover while maintaining flood control and navigation as primary authorized purposes.

On November 30, 2011 the Missouri River Recovery Program Independent Science Advisory Panel (ISAP) released its Final Report on Spring Pulses and Adaptive Management. This report, commissioned by the Missouri River Recovery Implementation Committee (MRRIC), evaluated the pulses that have been implemented to date in regards to the biological outcomes the USFWS sought in the 2003 Amended BiOp. The ISAP confirmed that spring pulses as currently implemented are not accomplishing their intended outcomes and provided recommendations towards achieving a new management paradigm for the Missouri River.

Based on this report, the Corps and USFWS agree that aggressive pursuit of completing the recommendations laid out by the ISAP is the best path forward to continue ensuring we are using available scientific data to achieve the intent of the 2003 Amended BiOp and species recovery. Accordingly, while this is being pursued, the agencies believe it is prudent to forego a spring pulse during the 2013 Missouri River operating season and that this suspension is not likely to have an adverse effect on the listed species.

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. The ISAP report is also available at this website.

IV. POST-2011 FLOOD STATUS

The historic flood of 2011 was unprecedented in both magnitude and duration and severely impacted many communities, homeowners, farmers and businesses in the Missouri River basin. Following the flood, the Corps committed to working with stakeholders throughout the region to best prepare the basin for the 2012 runoff season. As part of that commitment, the Corps maintained a flexible posture through the fall and winter of 2011-2012 and with favorable weather conditions was able to evacuate some additional water from the reservoir system. Still, the system was vulnerable going into the 2012 runoff season. Initial repairs on dams and levees were completed by 1 March; however, more extensive repairs were necessary to restore the system to pre-flood conditions. Additional levee repairs are on-going and are expected to be completed by April 2013. The completion date for the mainstem dam repairs is estimated to be March 2014.

The Corps communicated more broadly and frequently in 2012 holding twice monthly conference calls from January to June with Federal, state, county and local officials, Tribes, emergency management officials, independent experts and the media to discuss conditions on the ground and the current release plans and forecasts. Recordings of the conference calls were made available to the public through the Corps' website. Outreach calls will be re-initiated in January 2013 or as-needed if basin and/or weather conditions change dramatically.

As noted in the 2011-2012 AOP, the U.S. Army Corps of Engineers, Northwestern Division, enlisted the assistance of an independent panel of experts in meteorology, hydrology, streamflow forecasting and reservoir system operations to review, analyze and assess the Corps' operation of the six mainstem dams along the Missouri River leading up to, and during the flood of 2011. The panel's report entitled "Review of the Regulation of the Missouri River Mainstem Reservoir System During the Flood of 2011," dated December 2011, is available on the Corps' website. The report included recommendations for improvement, some of which have already been implemented or can be implemented in a short time-frame; others may require detailed analysis and implementation could require a formal stakeholder process.

In particular, using data through 2011, the Corps is updating a number of technical reports used in the regulation of the reservoir system. These reports include hydrologic statistics, long-term runoff forecasting, incremental runoff below the system, runoff volumes for AOP studies, and Missouri River stage trends. As part of long-term runoff forecasting the Corps will also be conducting an analysis to examine the relationship of hydrologic factors as they relate to plains snowmelt. The Corps continues to collaborate with other Federal, state and local agencies and our field offices to improve runoff forecasts, particularly as it relates to plains snowpack. This will require a collaborative effort to improve both data collection (i.e. plains snowpack water equivalent, soil moisture and frost depth) and hydrologic modeling. A proposal for the Missouri River basin plains snow and basin condition network is being prepared by subject matter experts from various Federal and State agencies. This proposal will outline timelines, costs and agency responsibilities. The Water Management office continues to participate in a variety of regional and national climate change teams. The National Oceanic and Atmospheric Administration (NOAA) is also collaborating with the Corps and other agencies on a two-part study. The first part is a climate attribution effort focusing on the 2011 event. The second part is an assessment of the skill and reliability of predictions of seasonal climate and the ability to predict rapid transitions of cycles from wet to dry and dry to wet.

In April 2012 the Corps released a report entitled "Post 2011 Flood Event Analysis of Missouri River Mainstem Flood Control Storage". The analysis investigated whether additional flood control storage may improve flood risk reduction for storms equal to and greater than the 2011 flood event. The analysis included a limited investigation of the potential impacts to other authorized project purposes. The report showed that even if the reservoir system had an additional 4.6 MAF of flood control storage, significant flooding still could not have been prevented. The report is available on the Corps' website.

V. FUTURE RUNOFF: AUGUST 2012 - DECEMBER 2013

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 2012 to February 2013. The August 1 runoff forecast for 2012 was 21.0 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 September through February runoff forecast, respectively.

Simulations for the March 1, 2013 to February 28, 2014 time period use five statistically derived inflow scenarios based on an analysis of historic water supply. The inflow scenarios used in this Draft AOP were updated to include 5 additional years of inflow data that now extends from 1898 to 2011. The report detailing the development of these updated inflow scenarios, entitled "Runoff Volumes for Annual Operating Plan Studies," will be finalized later this fall and will be available on the Corps' website. The updated analysis incorporates the recent series of wet years including 2010, which was the fourth wettest year on record, and 2011, which was the wettest year on record. The updated analysis will also add two runoff scenarios, one each at the upper and lower end, to span 96 percent of the historic record. Using statistically derived inflow scenarios for the AOP provides a good range of simulation for dry, average, and wet conditions, and eliminates the need to forecast future precipitation months in advance, which is very difficult. In contrast, real-time regulation of the System is based on all available and relevant hydrometerological information including, but not limited to observed runoff volumes, National Weather Service short and long-range outlooks, plains and mountain snowpack data, observed base flows, soil moisture and frost depths.

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

Two additional runoff volumes which will be included in the updated "Runoff Volumes for Annual Operating Plan Studies" report are the 2 percent and 98 percent exceedance levels. Annual runoff at the 2 percent exceedance has a 1 in 50 chance of being exceeded; the 98 percent exceedance has a 1 in 50 change of the occurrence of less runoff. Although these runoff volumes were not included as scenarios in this year's AOP, additional monthly studies could be performed based on these runoff volumes as the 2013 runoff season unfolds should the runoff forecast exceed the upper decile runoff scenario or be lower than the lower decile runoff.

The Upper Decile and Upper Quartile simulations extend from the end of the Upper Basic simulation through February 2014. 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 2014.

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 2012 through February 2014. The natural water supply for calendar year (CY) 2011 totaled 61.0 MAF.

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

	Natural 1/	Post-1949 Depletions	Net 2/
September 2012 through February 2013 (Basic Runoff Scenario)			
Basic	6,500	800	7,300
Upper Basic (120%)	7,800	800	8,600
Lower Basic (80%)	5,200	400	5,600
Runoff Year March 2013 through February 2014 (Statistical Analysis of Past Records)			
Upper Decile	34,500	-2,800	31,700
Upper Quartile	30,600	-2,800	27,800
Median	24,600	-2,700	21,700
Lower Quartile	19,300	-2,700	16,600
Lower Decile	16,100	-2,600	13,500

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

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

VI. ANNUAL OPERATING PLAN FOR 2012-2013

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 2012-2013 AOP includes 13 years of regulation at Fort Peck (1940) as the sole Mainstem project, plus 59 years of System experience as Fort Randall (1953), Garrison (1955), Gavins Point (1955), Oahe (1962), and Big Bend (1964) were brought progressively into System regulation. This regulation experience includes lessons learned during two major droughts of six and eight years (1987-1992 and 2000–2007) that have occurred since the System filled in 1967. It also includes the high runoff period from 1993 – 1999 during which five of the seven years experienced runoff greater than Upper Quartile including the previous record runoff of 49.0 MAF in 1997, and the record runoff of 61.0 MAF in 2011. In addition to the long period of actual System reservoir regulation experience, many background regulation studies for the completed System are available for reference.

B. 2012-2013 AOP Simulations. Reservoir simulations for the Upper Basic, Basic, and Lower Basic runoff scenarios, which span the period of August 2012 through February 2013, are shown in the final section of this AOP as studies 1 through 3. AOP simulations for the five statistically derived runoff scenarios, which span the period of March 2013 through February 2014, are shown in the final section of this AOP as studies 4 through 8. As previously stated, the simulations use five statistically derived runoff scenarios and reflect 80 percent of the historic annual runoff volumes (between Upper Decile and Lower Decile). The simulations provide information for planning purposes on a range of future reservoir levels and release rates, and are not meant to represent a particular forecast. The simulations shown use a monthly time-step, and thus do not provide the level of detail necessary to address specific flood control regulations. Detailed routing of specific flood flows is accomplished using forecast models which incorporate real-time information including observed and forecasted precipitation, and these situations are handled individually during real-time regulation.

The AOP studies, in summary, provide the following: the full flood control capacity of the reservoir system will be available at the start of the runoff season and use of the exclusive flood control zone is not anticipated under any of the five runoff scenarios covered in the AOP; full service flow support under Upper Quartile and Upper Decile runoff scenarios and reduced flow support for Median runoff and below; a full length navigation for all runoff scenarios except for Lower Decile; minimum winter releases for Median and lower runoff, and above normal winter releases for Upper Decile and Upper Quartile runoff; a steady release-flow to target regulation during the tern and plover nesting season for Upper Quartile and below runoff and nearly steady releases for Upper Decile runoff though flood water evacuation is required; emphasis on Garrison 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, and utilization of the Kansas River projects authorized for Missouri River navigation flow support. Additional details about the studies are provided in the following paragraphs. Results of the simulations are shown in ***Plate 4*** and ***Plate 5*** for the System storage and the Fort Peck, Garrison and Oahe pool elevations.

Under all runoff scenarios modeled for the AOP, the full flood control capacity of the system is available at the start of the 2013 runoff season. In addition, due to the dry conditions in 2012 system storage will begin the runoff season below the base of the annual flood control zone. Although the March 1 and May 1 System storage is above the Gavins Point spring pulse precludes of 40.0 MAF, as discussed in Chapter III, spring pulses will not be conducted in 2013. The Corps will continue to work closely with the USFWS to ensure the AOP will meet the intent of the 2003 Amended BiOp and comply with the ESA.

The March 15 and July 1 System storage checks were used to determine the level of flow support for navigation and other downstream purposes as well as the navigation season length in 2013. 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 slightly below full service and increases to full service based on the July 1 System storage check (see ***Plate 3***). Service levels for Lower Quartile begin the season at an intermediate service level, and remain near that level following the July 1 System storage check. Service levels for Lower Decile begin the season at an intermediate service level and drop to near minimum service based on the July 1 System storage check. Application of the July 1 system storage check indicated that a full length navigation season would be provided for Median and Lower Quartile runoff conditions. The upper two runoff scenarios provide a 10-day extension to the navigation season, while Lower Decile runoff contains a 2-day shortening to the navigation season. Upper Quartile and Upper Decile simulations reach the desired 56.8 MAF System storage level on March 1, 2013. Storage is below the base of the annual flood control zone for median and lower runoff conditions.

For modeling purposes in this AOP, the Steady Release – Flow-to-Target (SR-FTT) regulation scenario for Gavins Point Dam is shown during the 2013 tern and plover nesting season for Upper Quartile and lower runoff conditions. For these simulations, the monthly average May release used in the simulations was determined by using the long-term average release (see ***Plate 3***) based on the service level for the first third of the month, 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 modeled June release was set equal to the long-term average release for July (see ***Plate 3***) based on the service level for the first half of the navigation season. The long-term average releases (see ***Plate 3***) were used for July and August to indicate flowing to target. The Upper 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 2013, 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 and flood evacuation criteria, modeled Gavins Point winter releases were 12,500 cfs during the 2012-2013 winter season and from 12,500 cfs to 20,000 cfs during the 2013-2014 winter season depending on the runoff scenario. Gavins Point releases will be increased to meet downstream water supply requirements in critical reaches, to the extent reasonably possible, if downstream incremental runoff is low.

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

Intrasystem releases are adjusted to best serve the multiple purposes of the projects with special emphasis placed on regulation for non-listed fisheries starting in early April and for T&E bird species beginning in early May and continuing through August. As part of the overall plan to rotate emphasis among the upper three reservoirs during low runoff years, Garrison is scheduled to be favored during the 2013 forage fish spawn while also attempting to maintain rising water levels at Fort Peck and Oahe. The Median, Upper Quartile, and Upper Decile simulations show that it is possible to provide steady-to-rising pool levels in each of the three large upper reservoirs during the spring forage fish spawn period. Releases in the Lower Quartile and Lower Decile simulations are adjusted to maintain steady-to-rising pool levels at Garrison. The Lower Quartile and Lower Decile simulations show the Oahe pool dropping during April and May. Fort Peck remains steady to rising in the Lower Quartile simulation, but drops in the Lower Decile simulation.

Two additional modified reservoir regulation plans, the Fort Peck "mini-test" and unbalancing the upper three reservoirs, have been discussed in previous AOPs, but have not been implemented in recent years. Following the 2000-2007 drought, the unbalancing of the three reservoirs to benefit reservoir fisheries and the endangered interior least tern and threatened piping plover was not implemented due to the large variability of reservoir levels. Additionally, experience has shown that storing water in the annual flood control zone, particularly at Oahe, as the current criteria requires in order to implement unbalancing is undesirable due to flood control impacts. The Corps will continue to work with each of the appropriate state agencies if requested in 2013 to determine a modified version of unbalancing that may be implemented in future AOPs that does not adversely impact flood control. For the purposes of this AOP, the upper three reservoirs are shown in a balanced condition for all runoff scenarios. This balancing is computed based on the percent storage 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, Montana. The Fort Peck mini-test and full test flows will be deferred until the efficacy of the Lower Yellowstone Project has been assessed. The groundbreaking for this project took place in August 2010. Additional information on the Lower Yellowstone Project 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.

Actual System regulation from January 1 through August 31, 2012 and the simulated regulating plans for each project through CY 2013 using the five runoff scenarios described on Page 4 are presented on ***Plate 6*** through ***Plate 11***, inclusive. Big Bend regulation is omitted since storage at that project is relatively constant and average monthly releases are essentially the same as those at Oahe. These plates also show, on a condensed scale, actual regulation since 1953.

Plate 12 illustrates 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 2011 through July 2012. ***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 2012 Navigation Season and Fall of 2012. The regulation of the System for the period of August though November 2012 is presented in the following paragraphs.

Fort Peck Dam. Releases will average 11,000 cfs during August and the first half of September. When irrigation ceases in mid-September they will be reduced to 8,500 cfs. This release will be held near that level through November. A spillway flow test was conducted the first week in September to help determine whether a subdrain system that relieves potential pressure beneath the spillway is functioning properly. During the four-day test, flows peaked as high as 30,000 cfs through the spillway. The Fort Peck pool will continue to slowly recede through the fall and end the month of November at 2230.1 ft msl or 5.8 feet below the August 1 elevation of 2235.9 ft msl.

Garrison Dam. Releases will be maintained at 24,500 cfs until mid-September when they will be decreased to 17,000 cfs and held steady until the end of November. The threatened least terns and endangered piping plovers were fledged by August 16 on the reach downstream of Garrison and peaking restrictions were discontinued at that time. The Garrison pool will steadily drop through the end of October before leveling off and ending the month of November at 1834.1 or 3.1 feet below the August 1 elevation of 1837.2 ft msl.

Oahe Dam. The reservoir started the month of August at elevation 1604.0 ft msl. Releases will average 38,200 cfs in August and 30,600 cfs in September in support of full service navigation. Releases will be reduced in October and November to accommodate the fall drawdown of the Fort Randall pool. The Oahe pool will end November at elevation 1597.1 feet msl.

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 will average 36,900 cfs in August and around 32,500 cfs in September to back up the releases from Gavins Point Dam. The fall pool draw down of Fort Randall will start after Labor Day in early September and will continue through the end of November. Releases will be reduced after the navigation season ends to the level required to back up Gavins Point winter releases.

Gavins Point Dam. Releases will be scheduled to support downstream full service flows in reaches with scheduled commercial navigation throughout the 2012 navigation season. A full length navigation season will be 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 will range from November 21 at Sioux City to November 30 at the mouth near St. Louis. Releases will be reduced by approximately 3,000 cfs per day beginning in mid-November working toward a target winter release of 12,000 cfs. The final 3,000 to 5,000 cfs of release reductions may be made in smaller increments to ensure water intakes along the lower river remain operational. The Gavins Point pool level will be 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 2012-2013. 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. The planned winter System release for 2012-2013 is 12,000 cfs. 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. Water supply is discussed in more detail in Chapter VII, Section B.

Fort Peck Dam. Releases are expected to average 10,000 cfs in December and 12,000 cfs in January and February to serve winter power loads and to help balance System storage. The Fort Peck pool level is expected to decline about 2.4 feet from elevation 2229.1 feet msl at the end of November to near elevation 2226.7 feet msl by March 1, 7.3 feet below the base of the annual flood control storage zone. The percent of carryover multiple purpose storage in the three large upper reservoirs should be balanced on March 1, 2013.

Garrison Dam. Releases are scheduled to be 18,500 cfs in December increasing to 23,000 cfs for January and February to serve winter power loads and to balance the upper three reservoirs. Releases will likely be reduced, most likely in December, to prevent ice induced flooding at the time of freeze-in and then gradually increased as river conditions permit. These temporary reductions in the releases may be scheduled to prevent exceedance of a 13-foot stage at the Missouri River at Bismarck streamgaging station. The Bismarck flood stage is 14.5 feet. Water Management staff will coordinate closely with state and local agencies during periods of freeze-in and ice-out to reduce flood risk and ensure communities and local residents are aware of the rapidly changing conditions and are prepared to take appropriate actions. The Garrison pool level is expected to decline about 2.7 feet from elevation 1834.1 feet msl at the end of November to near elevation 1831.4 feet msl by March 1, 6.1 feet below the base of the annual flood control storage zone.

Oahe Dam. Releases for the winter season will provide backup for the Fort Randall and Gavins Point releases plus refill the recapture space available in the Fort Randall reservoir consistent with anticipated winter power loads. Monthly average releases may vary substantially with fluctuations in power loads occasioned by weather conditions but, in general, are expected to average between 13,000 cfs and 16,000 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 is coordinated with the Western Area Power Administration. The Oahe pool level is expected to slowly increase from 1597.1 feet msl at the end of November to 1601.3 feet msl at the end of February as the storage of the upper three reservoirs are balanced. The Oahe pool will be 6.2 feet below the base of the annual flood control storage zone at the beginning 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. Releases will average about 11,000 cfs during the winter season to support Gavins Point winter releases. The Fort Randall pool level is expected to rise from its fall drawdown elevation of 1337.5 feet msl at the end of November 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 is 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 1355.0 feet msl could be reached by the end of the winter period on March 31 if spring runoff has commenced. The Fort Randall pool level above the White River delta near Chamberlain, South Dakota will remain at a higher elevation than the pool level below the delta from early October through December, due to the damming effect of this delta area.

Gavins Point 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 49.6 and 53.4 million acre-feet by March 1, 2013, 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 2013 Navigation Season. All five runoff scenarios modeled for this year's AOP follow the technical criteria presented in the current Master Manual for downstream flow support. Beginning in mid-March, Gavins Point releases will be gradually increased to provide navigation flow support at the mouth of the Missouri near St. Louis, Missouri by April 1, 2013, 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 2013 navigation season there is no commercial navigation scheduled to use the upper reaches of the navigation channel, we will consider eliminating navigation flow support in those reaches to conserve water in the System, reduce flood risk, and/or minimize incidental take of the protected species during the nesting season.

Navigation flow support for the 2013 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 2013 navigation season for Upper Decile and Upper Quartile runoffs. Median runoff starts the season at 2,200 cfs below full service. Lower Quartile and Lower Decile runoffs would result in reductions below full service of 4,600 cfs and 4,700 cfs respectively. Following the July 1 System storage check, full service would continue to be provided for Upper Decile and Upper Quartile runoffs, with near full service support for Median runoff (100 cfs below service). Service levels would be 4,200 cfs below full service for Lower Quartile and would be further reduced to 5,400 cfs (near minimum service) for Lower Decile runoff. The normal 8-month navigation season is provided for Median and Lower Quartile runoff scenarios as shown in ***Table II***, with Lower Decile runoff indicating a 2-day shortening of the navigation season. A 10-day extension to the navigation season is provided for the upper two runoff scenarios.

TABLE II
NAVIGATION SERVICE SUPPORT
FOR THE 2013 SEASON

	Runoff Scenario (MAF)	System Storage March 15 (MAF)	System Storage July 1 (MAF)	Flow Level Above or Below Full Service (cfs) Spring	Flow Level Above or Below Full Service (cfs) Summer/Fall	Season Shortening (Days)
U.D.	34.5	54.6	63.4	0	+13,000	0*
U.Q.	30.6	54.5	61.3	0	+5,000	0*
Med	24.6	52.5	56.9	-2,200	-100	0
L.Q.	19.3	50.3	52.5	-4,600	-4,200	0
L.D.	16.1	50.2	51.2	-4,700	-5,400	2

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

As previously stated, the modeled regulation for the 2013 nesting season below Gavins Point Dam is Steady Release – Flow-to-Target (SR-FTT). With the expectation of large quantities of high elevation nesting habitat being available, it's possible that the actual regulation will be Flow-to-Target. The nesting situation will be closely monitored and if nesting appears to be taking place at low elevations a SR-FTT release scenario may be implemented. If a SR-FTT release scenario is used, the initial steady release will be based on hydrologic conditions and the availability of habitat at that time. In the five years previous to 2011 the initial steady release ranged from 18,000 cfs to 27,000 cfs. Dry conditions in 2012 required the initial steady release to be set near 30,000 cfs. Model runs included in this AOP have a Gavins Point release peaking cycle of 2 days down and 1 day up during the last two-thirds of May to keep birds from nesting at low elevations. Gavins Point releases will be adjusted to meet downstream targets as tributary flows recede, but ideally the initial steady release will be sufficient to meet downstream targets until the majority of the birds have nested. The purpose of this regulation is to continue to meet the project purposes while minimizing the loss of nesting T&E species and conserving water in the upper three reservoirs, if required. Gavins Point releases for the Upper Quartile and Upper Decile runoff simulations are much above normal to evacuate flood water from the reservoirs. Releases from Garrison and Fort Randall will follow repetitive daily patterns from early May, at the beginning of the T&E species' nesting season, to the end of the nesting 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.

Gavins Point releases may be quite variable during the 2013 navigation season but are expected to range from 25,000 to 45,000 cfs under the five runoff scenarios modeled. 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, as was done in July 2012, if conditions indicate it is prudent to do so. Simulated storages and releases for the System and individual reservoirs within the System are shown on ***Plate 6*** through ***Plate 11***. Due to the abnormally dry conditions during the summer of 2012, additional storage space exists in the System to control flood inflows under all scenarios simulated for this AOP. As experienced in 2011, runoff above or below simulated levels can occur and result in releases beyond those modeled for the AOP. As previously stated, should that occur, the Corps will increase its efforts to convey that information throughout the basin so that state and local agencies, communities, and local residents can take appropriate actions.

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, Garrison is scheduled to be favored during the 2013 forage fish spawn if runoff is below median. The studies show that inflows are sufficient to maintain steady to rising pools at Garrison and Fort Peck from April through June for the Lower Quartile and Lower Decile runoff scenarios. This will be accomplished by setting releases at Fort Peck and Garrison at a level that would maintain a rising Garrison pool, but no less than the minimum required for downstream water supply requirements including irrigation. These adjustments may be restricted when the terns and plovers begin nesting in May. Oahe pool levels may fall during both lower runoff scenarios. If the current drought conditions continue, 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. State game and fish agencies are currently performing fisheries population surveys. The results of these surveys may affect which reservoir or reservoirs are favored during next year's spring runoff season.

As discussed in the previous section, the 2012-2013 AOP will not include provisions for unbalancing the Fort Peck, Garrison, and Oahe reservoirs to benefit the reservoir fishery and endangered species, but unbalancing may be considered within the carryover multiple use zone in future years.

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 elevation habitat, and thus were not expected to be impacted by the potential range of releases from Fort Peck during the summer. Releases during the 2013 nesting season will not be restricted by the repetitive daily pattern unless habitat conditions or nesting patterns warrant a change.

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. As in previous years, releases from Garrison will follow a repetitive daily pattern during the T&E nesting season to limit peak stages below the project for nesting birds. Releases are scheduled to be 1,000 cfs lower in July and early August than the June releases to enhance conditions for the fledging of chicks. High elevation nesting habitat is expected to be abundant below Garrison Dam during the 2013 nesting season.

During 2013, cold-water habitat in Garrison should be adequate for all runoff scenarios.

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 all 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 for Median and above runoff scenarios.

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 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. The need to utilize measures to minimize take may be lessened because of the large quantity of nesting habitat expected during the 2013 nesting season. Periods of zero release will be minimized to the extent reasonably possible during the nesting season given daily average releases, real-time hydrologic conditions, and System generating constraints as defined in coordination with Western Area Power Administration.

Gavins Point Dam. March and May spring pulses from Gavins Point Dam for the benefit of the endangered pallid sturgeon will not be implemented under any runoff scenarios in 2013.

It is anticipated that sufficient habitat to provide for successful nesting will be available above the planned release rates for all runoff conditions. This expectation is based on experience from the past record runoff in 1997 and from the high elevation habitat resulting from the record releases in 2011. Following the 1997 runoff, high elevation nesting habitat was readily available and used successfully by the birds. Flows from Gavins Point Dam may follow the flow-to-target (FTT) release scenario. This scenario limits releases from Gavins Point to those needed to meet downstream targets. The actual release scenario will be evaluated when birds begin nesting in early May. If nests are initiated at a lower elevation which would be inundated later in the summer, a steady release-flow to target release scenario may be instituted. A full description of these release scenarios can be found in the Master Manual. Actual releases will be based on hydrologic conditions and the availability of habitat at that time.

All reasonable measures to minimize the loss of nesting T&E bird species will be used. While not anticipated because of the large quantity of high elevation habitat available, 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.

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. However, because of the large quantity of habitat expected we do not anticipate nests being inundated. The pool will be increased to elevation 1207.5 feet msl late in August when it is determined that there are no terns or plovers nesting along the reservoir.

G. <u>Regulation Activities for Historic and Cultural Properties</u>. As acknowledged in the 2004 Programmatic Agreement (PA) for the Operation and Management of the Missouri River Main Stem System, wave action and fluctuation in the level of the reservoirs results in erosion along the banks of the reservoirs. The Corps will work with the Tribes utilizing 36 CFR Part 800 and the PA to address the exposure of historic and cultural sites. The objective of a programmatic agreement is to deal "…with the potential adverse effects of complex projects or multiple undertakings…" The PA objective was to collaboratively develop a preservation program that would avoid, minimize and/or mitigate adverse effects along the System reservoirs. All tribes, whether signatory to the PA or not, may request government-to-government consultation on the regulation of the System and the resulting effect on historic and cultural properties and other resources. As a result of the 2011 flood event, there were impacts to cultural resources. A gradual drawdown of reservoir levels was preferred to avoid or minimize further damage to cultural resource sites. To address impacts, the most effective and comprehensive strategy is a phased approach; site assessment/ Native American Graves Protection and Repatriation Act (NAGPRA) survey, increased law enforcement efforts, engineering design, rip rap repair, and new rip rap placement. Although condition assessments will be conducted for all sites affected by flooding, priority will be given to site assessments at occupation sites to determine impacts and check for any NAGPRA-related items. Increased law enforcement will be necessary to detect or prevent, and possibly prosecute individuals for, Archeological Resources Protection Act (ARPA) violations. Engineers will need to collect data and prepare designs to repair existing rip rap and protection for any sites that were newly impacted.

In 2013 reservoir levels are expected to be more normal but will vary depending on runoff conditions, and 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 VII 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 2012 could result in a Fort Peck pool elevation variation from a high of 2241 feet msl to a low of 2215 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 14 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 1845 and 1822 feet msl during 2012. Based on a review of existing information, approximately 76 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 ranging from 1616 to 1589 feet msl (see ***Plate 10*** and the studies included at the end of this report). Based on a review of existing information, approximately 222 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 2013. Short-term increases above 1421 due to local rainfall may also occur. Based on a review of existing information, approximately four 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 2012. Short-term increases above 1355 feet msl due to local rainfall may occur. The annual fall drawdown of the reservoir to elevation 1337.5 feet msl will begin prior to the close of the navigation season and will be accomplished by early December. The reservoir will then be refilled during the winter to elevation 1350 feet msl. Based on a review of existing information, approximately 28 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 2013. Short-term increases above 1207.5 feet msl may occur due to local rainfall. Based on a review of existing information, no known sites are expected to be affected during this period.

VII. SUMMARY OF RESULTS EXPECTED IN 2013

With regulation of the System in accordance with the 2012-2013 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 2012-2013 AOP Studies

Decision Points	**2012-2013 Runoff Condition**				
	Upper Decile	**Upper Quartile**	**Median**	**Lower Quartile**	**Lower Decile**
March 1 System Storage March 23-31 GP Release	53.4 MAF 26.7 kcfs	53.4 MAF 26.7 kcfs	51.7 MAF 24.5 kcfs	49.6 MAF 25.2 kcfs	49.6 MAF 25.1 kcfs
March 15 System Storage Spring Service Level	54.6 MAF full service	54.5 MAF full service	52.5 MAF 2.2 kcfs blw full service	50.3 MAF 4.6 kcfs blw full service	50.2 MAF 4.7 kcfs blw full service
May 1 System Storage May Cycling May GP Release	57.2 MAF 28.0/31.6 kcfs 28.7 kcfs	56.5 MAF 28.0/31.6 kcfs 28.7 kcfs	53.5 MAF 25.8/31.5 kcfs 26.9 kcfs	50.5 MAF 26.7/29.7 kcfs 27.3 kcfs	50.1 MAF 26.6/29.6 kcfs 27.2 kcfs
Fish Spawn Rise (Apr-Jun) FTPK Pool Elev Change GARR Pool Elev Change OAHE Pool Elev Change	 +9.4 feet +7.1 feet +9.6 feet	 +7.9 feet +7.5 feet +6.4 feet	 +5.7 feet +6.1 feet +3.3 feet	 +5.9 feet +5.0 feet -1.2 feet	 +1.4 feet +4.0 feet -2.4 feet
July 1 System Storage Sum-Fall Service Level (kcfs) Nav Season Length	63.4 MAF Full Service 10 Day extension	61.3 MAF Full Service 10 Day extension	56.9 MAF 0.1 kcfs blw Full Service 0 Days shortening	52.5 MAF 4.2 kcfs blw Full Service 0 Days shortening	51.2 MAF 5.4 kcfs blw Full Service 2 Days shortening
September 1 System Storage Winter 2012-13 GP Release	61.8 MAF 20.0 kcfs	61.0 MAF 20.0 kcfs	55.3 MAF 12.5 kcfs	50.4 MAF 12.5 kcfs	48.5 MAF 12.5 kcfs
February 28 System Storage End-Year Pool Balance Percent Pool	56.8 MAF Balanced 100%	56.8 MAF Balanced 100%	52.6 MAF Balanced 89%	46.7 MAF Balanced 73%	44.4 MAF Balanced 67%

A. Flood Control. Flood control is the only authorized project purpose that requires the availability of empty storage space rather than impounded water. Actual flood events are generally not predictable well in advance; therefore, detailed routing of specific major flood flows is accomplished when floods occur. There is a recurring pattern of high-risk flood periods during each year: a season when snowmelt, ice jams, and protracted heavy rains will almost surely occur with or without generating consequent floods; and a season when these situations are less likely and the flood threat is correspondingly low. The high-risk flood season begins about March 1 and extends through the summer. As a consequence, regulation of the System throughout the fall and winter months is predicated on the achievement of a March 1 System storage level at or below the base of the annual flood control zone. Drought conditions throughout the basin during 2012 have reduced runoff and necessitated higher releases to meet downstream targets. As a result, all runoff scenarios studied for this AOP indicate that the March 1, 2013 System storage will be below the desired 56.8 MAF base of the annual flood control zone. Therefore, additional flood control storage beyond the normal 16.3 MAF, (11.6 MAF in the annual flood control and multiple use zone and 4.7 MAF in exclusive flood control zone) will be available to store surplus runoff. The additional space available varies from 3.4 MAF in the Upper Decile runoff scenario to 7.2 MAF in Lower Decile runoff scenario.

To the extent practical, the System is regulated to prevent damaging flows in the river reaches between and below the Mainstem dams. In 2013, the full capacity of the System will be available to capture a significant volume of runoff originating from the upper basin and meter it out over an extended period of time at a rate that does not contribute to flooding in the river reaches between and below the reservoirs. Additionally, the reservoir system will have the capacity to reduce releases and hold back water during periods of high runoff below the System to reduce peak stages and discharges on the lower river. The ability to significantly reduce peak stages on the lower river diminishes as you move downstream due to the large uncontrolled drainage area and travel time from the dam.

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

Due to release limitations imposed by the formation of downstream ice cover, a major portion of the required flood control space must be evacuated prior to the winter season. Higher releases may be made on occasions when the downstream channel conditions permit. If plains and/or mountain snowpack accumulations are much above normal during the winter of 2012-2013, and studies indicate that available storage in the carryover and multiple use zone as well as the annual flood control and multiple use zone will be fully utilized, releases may be adjusted to the extent reasonably possible to evacuate water from the reservoir system early in the runoff season. High releases during the late winter and early spring periods may exacerbate localized flooding if coincident with plains snowmelt or spring rains, and may also contribute to significant ice jam flooding. Therefore, if higher than normal releases are indicated, local conditions will need to be closely monitored. In addition, all 2013 runoff that is stored in the flood control zones will be evacuated prior to the start of the 2014 runoff season.

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

Low reservoir levels during the 2000-2007 drought contributed to both intake access and water quality problems for intakes on Garrison and Oahe reservoirs, including several Tribal intakes. A return to higher reservoir elevations has eliminated concern over many of these intakes. If the drought conditions continue, 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 2013 would be at least 16 feet higher than the record lows set in the 2000-2007 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.

Winter releases are determined based on the September 1, System storage check. The winter season extends from December through February and flows are provided during this time to support the Congressionally authorized project purposes of hydropower production and downstream water supply and water quality. Per the Master Manual, if September 1 System storage is 55.0 MAF or less, the winter release from Gavins Point will be 12,000 cfs. Planned winter release rates of 12,000 cfs may be less than required for downstream water supply intakes without sufficient incremental tributary flows below the System. Should that occur, releases may need to be set higher to ensure that downstream water supply intakes are operable. 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 during periods when excessive river ice formation is forecast or if ice jams or blockages form which temporarily restrict flow. Based on past experiences, these events are expected to occur infrequently and be of short duration.

System storage was below 55.0 MAF on September 1, 2012, therefore monthly average releases of 12,500 cfs are shown on the simulations in the winter of 2012-2013. The additional 500 cfs reflects how the Corps, when conditions warrant, temporarily increases Gavins Point releases during extreme cold periods to inhibit the formation of ice jams in the lower river reach. As shown in ***Table III***, 2013-2014 winter releases of 20,000 cfs would be made for Upper Decile and Upper Quartile runoff scenarios and 12,500 cfs under Median, Lower Quartile and Lower Decile runoff scenarios.

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 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 between and below the mainstem dams to make necessary modifications to their intakes to allow efficient operation over the widest possible range of hydrologic conditions. While the current level of System storage should allow adequate access for all intakes during the coming year, intake operators that have experienced difficulty with access during the past drought years should continue to make adjustments to improve access and flexibility when drought returns to the basin.

C. 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 Lower Decile runoff conditions return. Below Fort Peck, localized dredging may once again be required in the vicinity of irrigation intakes in order to maintain access to the water if releases are low next summer. Tributary irrigation water usage is fully accounted for in the estimates of water supply.

D. Navigation. The anticipated service level and season length for all runoff conditions simulated are shown in ***Table III***. Service to navigation in 2013 will be at full service flow support from the beginning of the navigation season through the July 1 storage check for Upper Decile and Upper Quartile runoff scenarios. For the Median, Lower Quartile and Lower Decile runoff scenarios, the navigation service level will be at 2.2, 4.6 and 4.7 kcfs below full service, respectively. In addition, the Upper Decile and Upper Quartile runoff scenarios indicate a 10-day extension to the navigation season based on the July 1 storage check. The Median and Lower Quartile runoff scenarios indicate a full season while the Lower Decile runoff scenario indicates a 2-day shortening of the navigation season. Although the AOP simulations provide a comparison of typical flow support under varying runoff conditions, the actual rate of flow support for the 2013 navigation season will be based on actual System storage on March 15 and July 1, 2013.

E. Power. ***Table IV and Table V*** indicate the estimated monthly System load requirements and hydropower supply of the Eastern Division, Pick-Sloan Missouri Basin Program (P-S MBP), from August 2012 through December 2013. 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 2013 is estimated to be 8.9 million MWh, 106 percent of the 1967-2011 average.

F. Recreation, Fish and Wildlife. The regulation of the System will continue to provide recreation and fish and wildlife opportunities in the project areas and along the Missouri River as well as other benefits of a managed system. Recreation access is expected to be at slightly below normal levels in 2013. If Lower Quartile or Lower Decile runoff were to occur in 2013, 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 2013 on fish and wildlife are included in Chapter VI, Section F, entitled, "Regulation Activities for T&E Species and Fish Propagation Enhancement."

G. Historic and Cultural Properties. As mentioned in Chapter VI of this AOP, the regulation of the System during 2012 and 2013 will expose cultural sites due to erosion from the normal fluctuation of pool elevations. The Corps will work with the Tribes utilizing 36 CFR Part 800 and the PA to address the exposure of these sites. The objective of a programmatic agreement is to deal "…with the potential adverse effects of complex projects or multiple undertakings…" The PA objective was to collaboratively develop a preservation program that would avoid, minimize and/or mitigate the adverse 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.

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 July 2012" (see http://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 2012 and 2013. 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 http://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 2012-2013 AOP. Specific sites are identified in the draft Monitoring and Enforcement Plan for the monitoring team, comprised of Corps rangers and Tribal monitors, to visit and document impacts. This focused monitoring is resulting in more accurate data on the current impacts to sites along the river plus it is assisting with the identification of sites for mitigation. The most recent training for the monitoring teams was held in May 2012.

Second, mitigation or protection of sites that are being adversely impacted continues. During the reporting period for the 2011 Annual Report by the Corps on the implementation of the Programmatic Agreement 18 sites were either completed, started, or in the design phase. The annual report is available at http://www.nwo.usace.army.mil/CR/. In addition the Corps completed 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 was completed in June 2011.

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

2012	Estimated Committed Sales*	Expected C of E Capability					Expected Bureau Capability**					Expected Total System Capability				
			120%	Basic	80%			120%	Basic	80%			120%	Basic	80%	
Aug	2197		2277	2273	2269			154	154	154			2431	2427	2423	
Sep	2007		2270	2262	2254			146	146	145			2416	2408	2399	
Oct	1877		2256	2245	2231			142	141	139			2398	2386	2370	
Nov	1986		2223	2209	2191			141	140	138			2364	2349	2329	
Dec	2117		2236	2218	2199			137	138	136			2373	2356	2335	
2013																
Jan	2130		2265	2245	2223			134	135	134			2399	2380	2357	
Feb	2114		2281	2259	2233			131	134	133			2412	2393	2366	
		U.D.	U.Q.	Med	L.Q.	L.D.	U.D.	U.Q.	Med	L.Q.	L.D.	U.D.	U.Q.	Med	L.Q.	L.D.
Mar	2046	2299	2295	2270	2239	2236	134	134	133	132	132	2433	2429	2403	2371	2368
Apr	1916	2323	2313	2277	2237	2232	131	131	136	135	136	2454	2444	2413	2372	2368
May	1876	2346	2330	2286	2238	2231	138	138	146	147	149	2484	2468	2432	2385	2380
Jun	2081	2385	2369	2314	2254	2241	156	156	158	153	155	2541	2525	2472	2407	2396
Jul	2194	2390	2373	2310	2247	2227	160	160	160	153	156	2550	2533	2470	2400	2383
Aug	2197	2377	2366	2292	2227	2205	158	158	159	154	156	2535	2524	2451	2381	2361
Sep	2006	2356	2360	2282	2215	2190	150	150	150	148	150	2506	2510	2432	2363	2340
Oct	1876	2332	2333	2263	2196	2171	144	144	144	142	144	2476	2477	2407	2338	2315
Nov	1983	2288	2293	2226	2159	2135	143	143	143	141	142	2431	2436	2369	2300	2277
Dec	2115	2250	2254	2194	2124	2098	140	140	140	139	140	2390	2394	2334	2263	2238

* 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)

2012	Estimated Committed Sales*	Expected C of E Generation					Expected Bureau Generation **					Expected Total System Generation				
			120%	Basic	80%			120%	Basic	80%			120%	Basic	80%	
Aug	859		1127	1137	1146			42	42	42			1169	1179	1188	
Sep	736		891	928	929			33	33	34			924	961	963	
Oct	737		756	762	772			18	19	19			774	781	791	
Nov	803		661	668	654			28	21	18			689	689	672	
Dec	913		544	527	542			28	21	18			572	548	560	
2013																
Jan	927		624	624	612			28	21	18			652	645	630	
Feb	902		545	546	539			24	18	16			569	564	555	
		U.D.	U.Q.	Med	L.Q.	L.D.	U.D.	U.Q.	Med	L.Q.	L.D.	U.D.	U.Q.	Med	L.Q.	L.D.
Mar	812	564	562	545	575	570	28	28	21	18	18	592	590	566	593	588
Apr	767	699	716	686	681	692	66	66	38	31	28	765	782	724	712	720
May	712	878	841	816	816	803	111	111	69	42	39	989	952	885	858	842
Jun	777	1081	939	905	844	836	114	114	74	43	39	1195	1053	979	887	875
Jul	863	1282	1010	977	923	887	117	117	58	46	43	1399	1127	1035	969	930
Aug	858	1317	1058	1012	920	884	80	77	65	43	40	1397	1135	1077	963	924
Sep	735	1199	1023	877	812	774	60	56	52	32	29	1259	1079	929	844	803
Oct	735	1056	891	719	672	634	40	38	37	23	21	1096	929	756	695	655
Nov	802	1032	879	626	570	521	40	40	38	27	22	1072	919	664	597	543
Dec	912	813	761	545	522	516	41	41	39	28	23	854	802	584	550	539
CY TOT		11090	9849	8878	8486	8268	750	741	530	366	336	11840	10590	9408	8852	8604

* 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.

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 2012-2013 on cultural sites are included in the Chapter VI, section G., entitled, "Regulation Activities for Historic and Cultural Properties."

H. System Storage. If the August 1, 2012 Basic runoff forecast verifies, System storage will decline to 51.1 MAF by the close of CY 2012. This would be 17.2 MAF higher than the all-time record low storage of 33.9 MAF set on February 9, 2007 and 5.7 MAF lower than the 2011 end-of-year storage of 56.8 MAF. This end-of-year storage is 1.6 MAF less than the 1967 to 2011 average. The lowest storage during the 1988-1992 drought was 40.8 MAF in January 1991, and the record low storage was set during the 2000-2007 drought at 33.9 MAF in February 2007. The end-of-year System storages have ranged from a maximum of 60.9 MAF in 1975, to the 2006 minimum of 34.4 MAF. Forecasted System storage on December 31, 2013 is presented in ***Table VI*** for the runoff scenarios simulated.

I. Summary of Water Use by Functions. Anticipated water use in CY 2012, under the regulation plan with the Basic forecast of water supply is shown in ***Table VII***. Under the reservoir regulation simulations in this AOP, estimated water use in CY 2013 also is shown in ***Table VII.*** Actual water use data for CY 2011 are included for information and comparison.

TABLE VI
ANTICIPATED DECEMBER 31, 2013 SYSTEM STORAGE

Water Supply Condition	Total (12/31/13)	Carryover Storage Remaining 1/	Unfilled Carryover Storage 2/	Total Change CY 2013
(Volumes in 1,000 Acre-Feet)				
Upper Decile	56,900	38,900	0	4,300
Upper Quartile	57,100	38,900	0	4,600
Median	52,200	34,300	4,600	1,100
Lower Quartile	46,700	28,800	10,100	-2,900
Lower Decile	44,600	26,700	12,200	-4,800

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 2011, 2012, AND 2013 ABOVE SIOUX CITY, IOWA
in Million Acre-Feet (MAF)

				Simulations for Calendar Year 2013				
		CY 2011 Actual	CY 2012 Basic Simulation	Upper Decile	Upper Quartile	Median	Lower Quartile	Lower Decile
Upstream Depletions	(1)							
Irrigation, Tributary Reservoir Evaporation & Other Uses		2.4	2.6					
Tributary Reservoir Storage Change		0.1	0.1					
Total Upstream Depletions		2.5	2.7	2.8	2.8	2.8	2.7	2.5
System Reservoir Evaporation	(2)	3.3	2.4	1.3	1.2	1.7	1.9	1.9
Sioux City Flows								
Navigation Season								
Unregulated Flood Inflows Between Gavins Point & Sioux City	(3)	0.7	0.0					
Navigation Service Requirement	(4)	15.2	16.1	16.4	16.2	15.5	14.2	13.4
Supplementary Releases								
T&E Species	(5)	0.0	0.7	0.3	0.3	0.4	0.3	0.2
Flood Evacuation	(6)	34.2	0.0	5.7	2.1	0.0	0.0	0.0
Non-navigation Season								
Flows		3.7	3.8	3.1	3.1	3.1	3.1	3.0
Flood Evacuation Releases	(7)	1.1	0.9	0.5	0.3	0.0	0.0	0.0
System Storage Change		-0.3	-5.6	4.4	4.6	1.1	-2.9	-4.9
Total		61.0	21.0	34.5	30.6	24.6	19.3	16.1
Project Releases								
Fort Peck		13.4	6.9	7.5	6.9	6.3	6.2	6.2
Garrison		36.9	16.0	18.8	16.8	15.0	14.3	13.7
Oahe		41.8	18.5	19.7	16.9	15.7	15.6	15.3
Big Bend		40.6	17.7	19.6	16.8	15.6	15.5	15.2
Fort Randall		44.9	18.6	21.0	17.9	16.4	15.7	15.4
Gavins Point		46.8	20.1	23.1	19.8	17.8	16.9	16.4

(1) Tributary uses above the 1949 level of development including agricultural depletions and tributary storage effects.
(2) Net evaporation is shown for 2013.
(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.

VIII. TENTATIVE PROJECTION OF REGULATION THROUGH FEBRUARY 2019

(Not completed until final plan is adopted.)

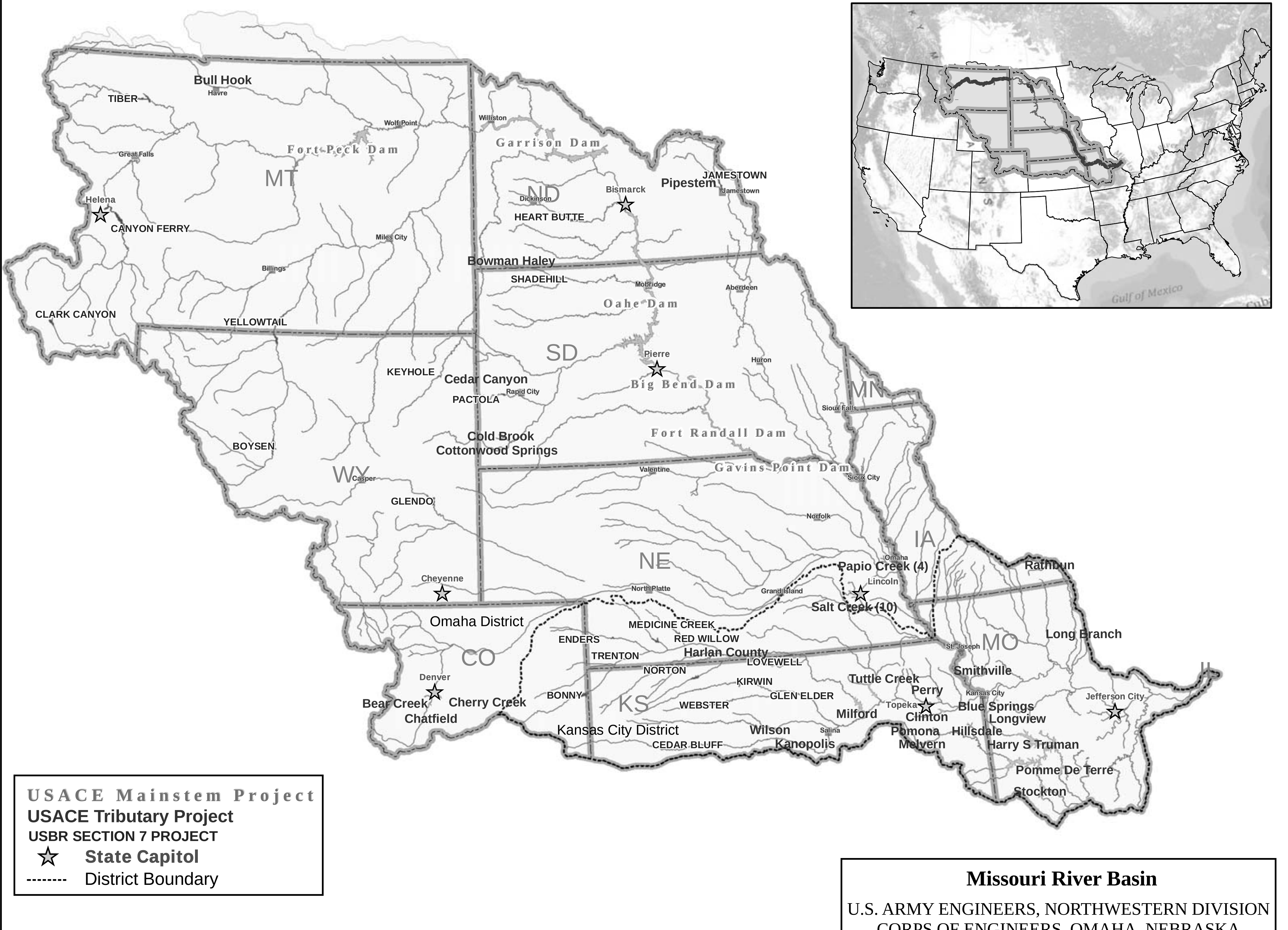


PLATE 1. Missouri River Basin Map.

Item No.	Subject	Fort Peck Dam - Fort Peck Lake	Garrison Dam - Lake Sakakawea	Oahe Dam - Lake Oahe
	Summary of Engineering Data -- Missouri River Mainstem System			
1	Location of Dam	Near Glasgow, Montana	Near Garrison, ND	Near Pierre, SD
2	River Mile - 1960 Mileage	Mile 1771.5	Mile 1389.9	Mile 1072.3
3	Total & incremental drainage areas in square miles	57,500	181,400 (2) 123,900	243,490 (1) 62,090
4	Approximate length of full reservoir (in valley miles)	134, ending near Zortman, MT	178, ending near Trenton, ND	231, ending near Bismarck, ND
5	Shoreline in miles (3)	1520 (elevation 2234)	1340 (elevation 1837.5)	2250 (elevation 1607.5)
6	Average total & incremental inflow in cfs	10,200	25,600 15,400	28,900 3,300
7	Max. discharge of record near damsite in cfs	137,000 (June 1953)	348,000 (April 1952)	440,000 (April 1952)
8	Construction started - calendar yr.	1933	1946	1948
9	In operation (4) calendar yr.	1940	1955	1962
	Dam and Embankment			
10	Top of dam, elevation in feet msl	2280.5	1875	1660
11	Length of dam in feet	21,026 (excluding spillway)	11,300 (including spillway)	9,300 (excluding spillway)
12	Damming height in feet (5)	220	180	200
13	Maximum height in feet (5)	250.5	210	245
14	Max. base width, total & w/o berms in feet	3500, 2700	3400, 2050	3500, 1500
15	Abutment formations (under dam & embankment)	Bearpaw shale and glacial fill	Fort Union clay shale	Pierre shale
16	Type of fill	Hydraulic & rolled earth fill	Rolled earth filled	Rolled earth fill & shale berms
17	Fill quantity, cubic yards	125,628,000	66,500,000	55,000,000 & 37,000,000
18	Volume of concrete, cubic yards	1,200,000	1,500,000	1,045,000
19	Date of closure	24 June 1937	15 April 1953	3 August 1958
	Spillway Data			
20	Location	Right bank - remote	Left bank - adjacent	Right bank - remote
21	Crest elevation in feet msl	2225	1825	1596.5
22	Width (including piers) in feet	820 gated	1336 gated	456 gated
23	No., size and type of gates	16 - 40' x 25' vertical lift gates	28 - 40' x 29' Tainter	8 - 50' x 23.5' Tainter
24	Design discharge capacity, cfs	275,000 at elev 2253.3	827,000 at elev 1858.5	304,000 at elev 1644.4
25	Discharge capacity at maximum operating pool in cfs	230,000	660,000	80,000
	Reservoir Data (6)			
26	Max. operating pool elev. & area	2250 msl 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
	Storage allocation & capacity			
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.
	Outlet Works Data			
38	Location	Right bank	Right Bank	Right Bank
39	Number and size of conduits	2 - 24' 8" diameter (nos. 3 & 4)	1 - 26' dia. and 2 - 22' dia.	6 - 19.75' dia. upstream, 18.25' dia. downstream
40	Length of conduits in feet (8)	No. 3 - 6,615, No. 4 - 7,240	1529	3496 to 3659
41	No., size, and type of service gates	1 - 28' dia. cylindrical gate 6 ports, 7.6' x 8.5' high (net opening) in each control shaft	1 - 18' x 24.5' Tainter gate per conduit for fine regulation	1 - 13' x 22' per conduit, vertical lift, 4 cable suspension and 2 hydraulic suspension (fine regulation)
42	Entrance invert elevation (msl)	2095	1672	1425
43	Avg. discharge capacity per conduit & total	Elev. 2250 22,500 cfs - 45,000 cfs	Elev. 1854 30,400 cfs - 98,000 cfs	Elev. 1620 18,500 cfs - 111,000 cfs
44	Present tailwater elevation (ft msl)	2032-2036 5,000 - 35,000 cfs	1670-1680 15,000- 60,000 cfs	1423-1428 20,000-55,000 cfs
	Power Facilities and Data			
45	Avg. gross head available in feet (14)	194	161	174
46	Number and size of conduits	No. 1-24'8" dia., No. 2-22'4" dia.	5 - 29' dia., 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)	1,048	2,253	2,635
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.
21 miles upstream Chamberlain, SD	Near Lake Andes, SD	Near Yankton, SD		1
Mile 987.4	Mile 880.0	Mile 811.1		2
249,330 (1) 5,840	263,480 (1) 14,150	279,480 (1) 16,000		3
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	633,000 at elev 1379.8	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
	Left Bank			38
None (7)	4 - 22' diameter	None (7)		39
	1013			40
	2 - 11' x 23' per conduit, vertical lift, cable suspension			41
1385 (11)	1229	1180 (11)		42
	Elev 1375			43
1351-1355(10) 25,000-100,000 cfs	32,000 cfs - 128,000 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
983	1,728	726	9,372 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

Remarks

(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) 1967-2011 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

Corps of Engineers, U.S. Army
Compiled by
Northwestern Division
Missouri River Region
August 2012

Plate 3
Summary of Master Manual Technical Criteria

NAVIGATION TARGET FLOWS

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

RELATION OF SYSTEM STORAGE TO NAVIGATION SERVICE LEVEL

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

RELATION OF SYSTEM STORAGE TO NAVIGATION SEASON LENGTH

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

RELATION OF SYSTEM WINTER RELEASE TO SYSTEM STORAGE

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

GAVINS POINT RELEASES NEEDED TO MEET TARGET FLOWS

1950 to 1996 Data (kcfs)

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

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

RESERVOIR UNBALANCING SCHEDULE

	Fort Peck		Garrison		Oahe	
Year	*March 1*	*Rest of Year*	*March 1*	*Rest of Year*	*March 1*	*Rest of Year*
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

	Fort Peck	Garrison	Oahe
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 **and** 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

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

TECHNICAL CRITERIA FOR SPRING PULSES
FROM GAVINS POINT DAM

Criteria Applicable to Both the March and May Spring Pulses

Flood Control Constraints	No change from current levels

Criteria Applicable to the March Spring Pulse

Drought Preclude	40.0 MAF or below measured on March 1.
Drought Proration of Pulse Magnitude*	None, 5 kcfs added to navigation releases, but no greater than 35 kcfs.
Initiation of Pulse	Extend the stepped System release increases that precede the beginning of the navigation season.
Rate of Rise before Peak	Approximately 5 kcfs for 1 day.
Duration of Peak	Two days.
Rate of Fall after Peak	Drop over 5 days to navigation target release.

Criteria Applicable to Time Period Between the Bimodal Pulses

Release	Existing Master Manual Criteria

Criteria Applicable to the May Spring Pulse

Drought Preclude	40.0 MAF or below measured on May 1.
Proration of Pulse Magnitude Based On System Storage*	Prorated from 16 kcfs based on a May 1 System Storage check; 100% at 54.5 MAF; straight line interpolation to 75% at 40.0 MAF.
Proration of Pulse Magnitude Based On Projected Runoff*	After the proration of the spring pulse magnitude for System Storage, the resultant magnitude would be further adjusted either up or down based on the May CY runoff forecast; 100% for Median; straight-line interpolation to 125% at Upper Quartile runoff; 125% for runoff above Upper Quartile; straight-line interpolation to 75% at Lower Quartile runoff; 75% for runoff below Lower Quartile.
Initiation of Pulse	Between May 1 to May 19, depending on Missouri River water temperature immediately below Gavins Point Dam. If possible, pulse will be initiated after the second daily occurrence of a 16 degree Celsius water temperature; however, the decision will be informed by the potential for 'take' of Threatened and Endangered bird species.
Rate of Rise before Peak	Approximately 6 kcfs per day.
Duration of Peak	Two days.
Rate of Fall after Peak	Approximately 30% drop over 2 days followed by a proportional reduction in releases back to the existing Master Manual criteria over an 8-day period.

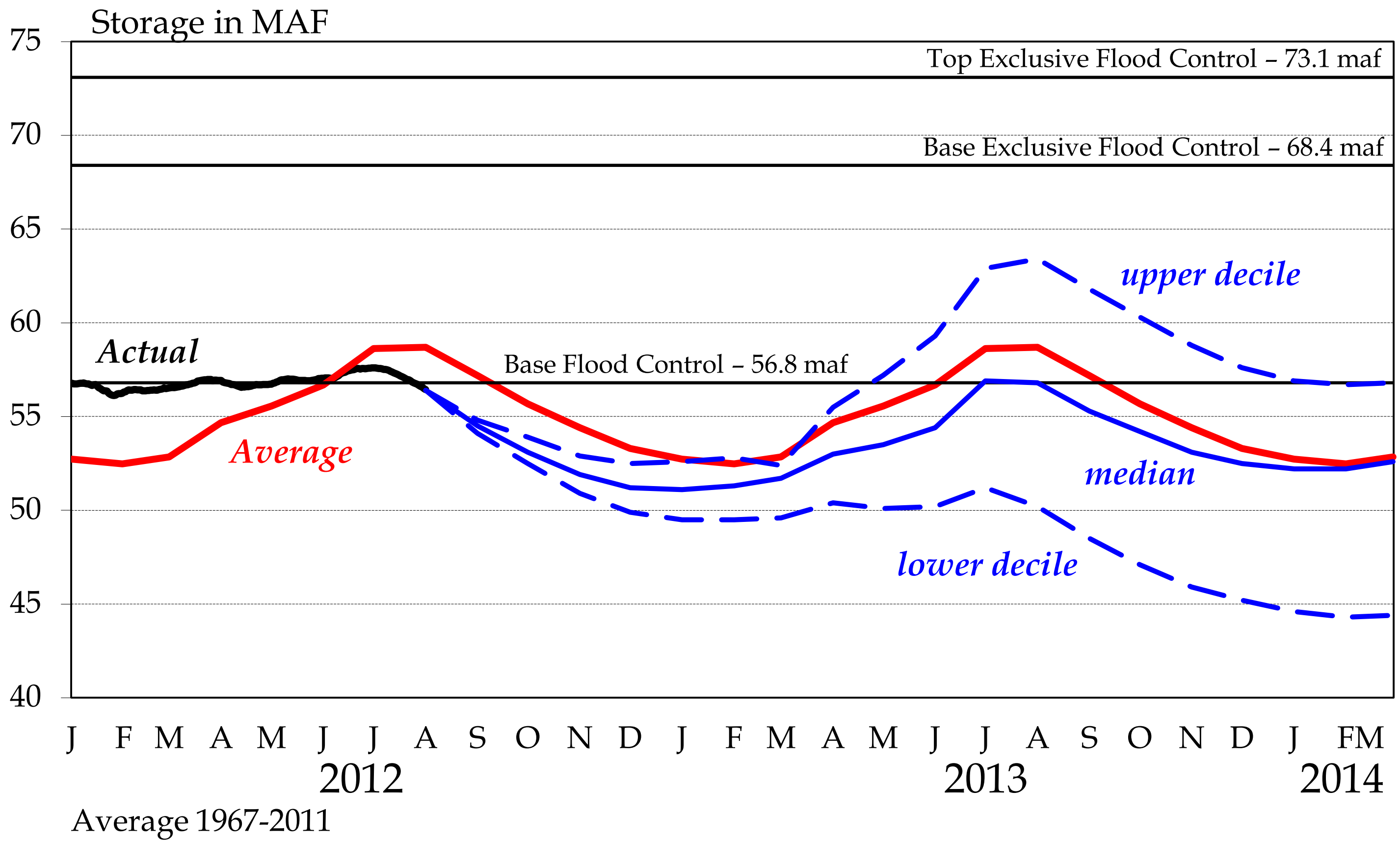
Spring Pulse Downstream Flow Limits

Omaha	41,000 cfs
Nebraska City	47,000 cfs
Kansas City	71,000 cfs

* Spring pulse magnitudes will be determined by taking the difference between pre-pulse Gavins Point releases and the peak pulse Missouri River flows measured just downstream of the mouth of the James River.

System Storage

2012-2013 Draft AOP



Fort Peck

2012-2013 Draft AOP

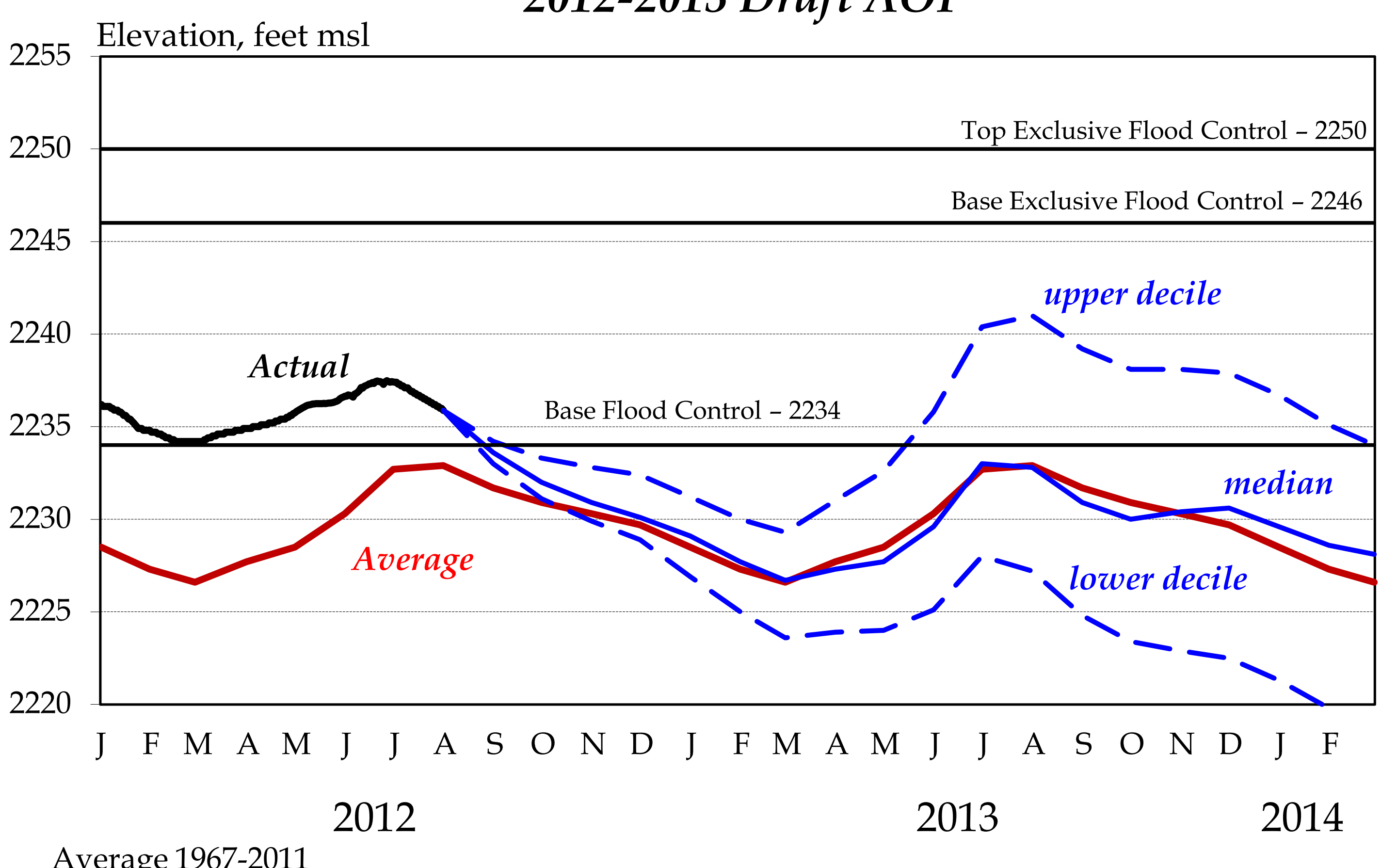
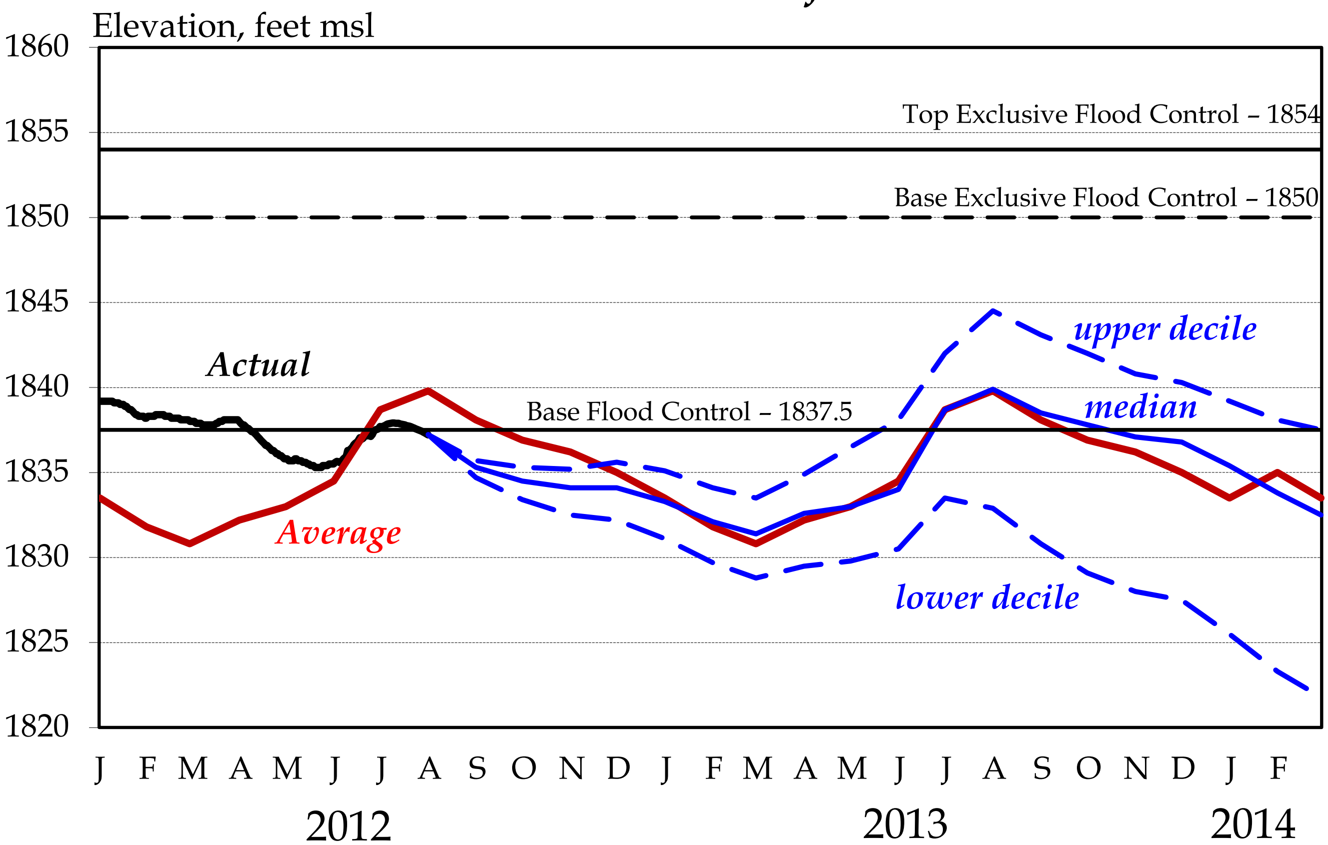


Plate 4

Garrison

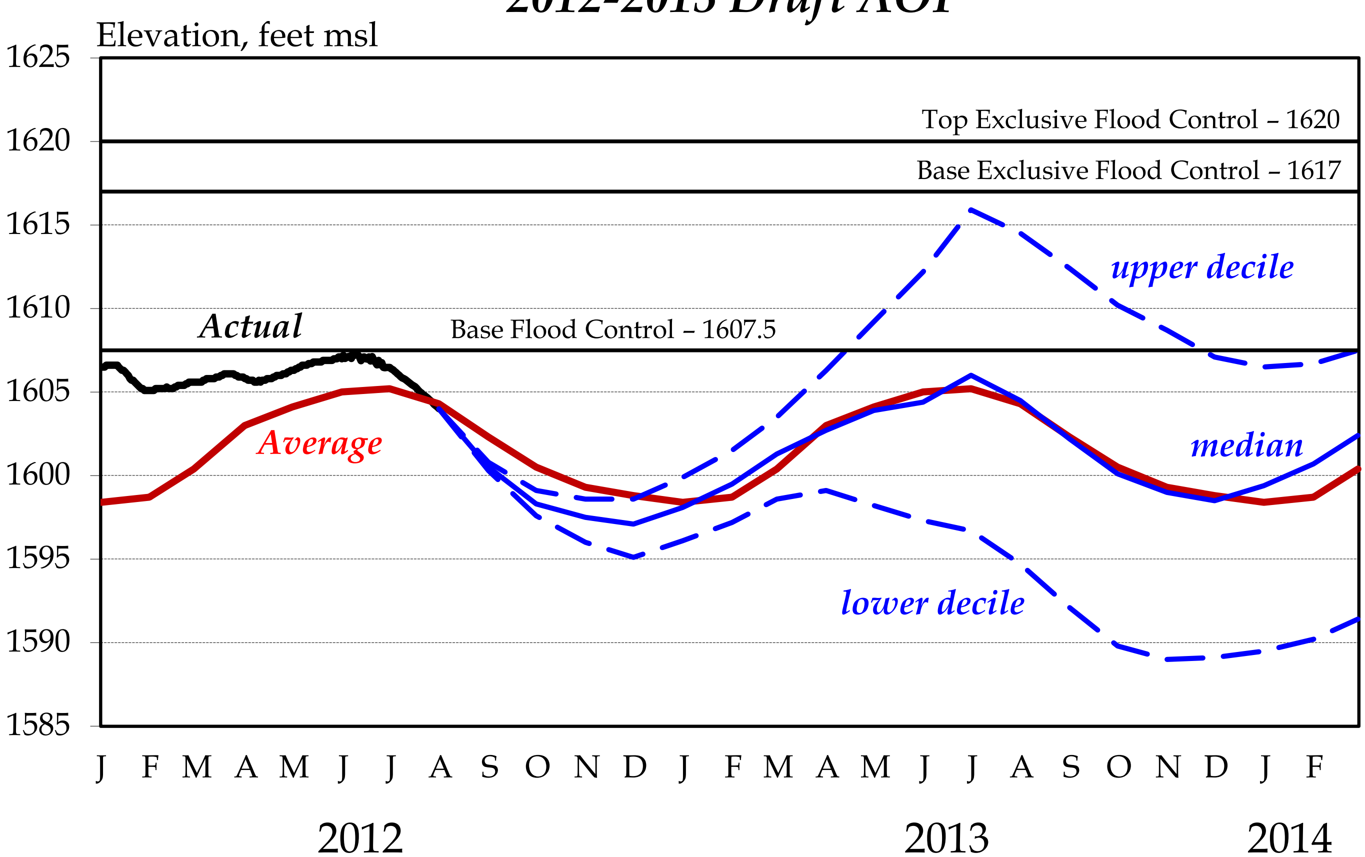
2012-2013 Draft AOP



Average 1967-2011

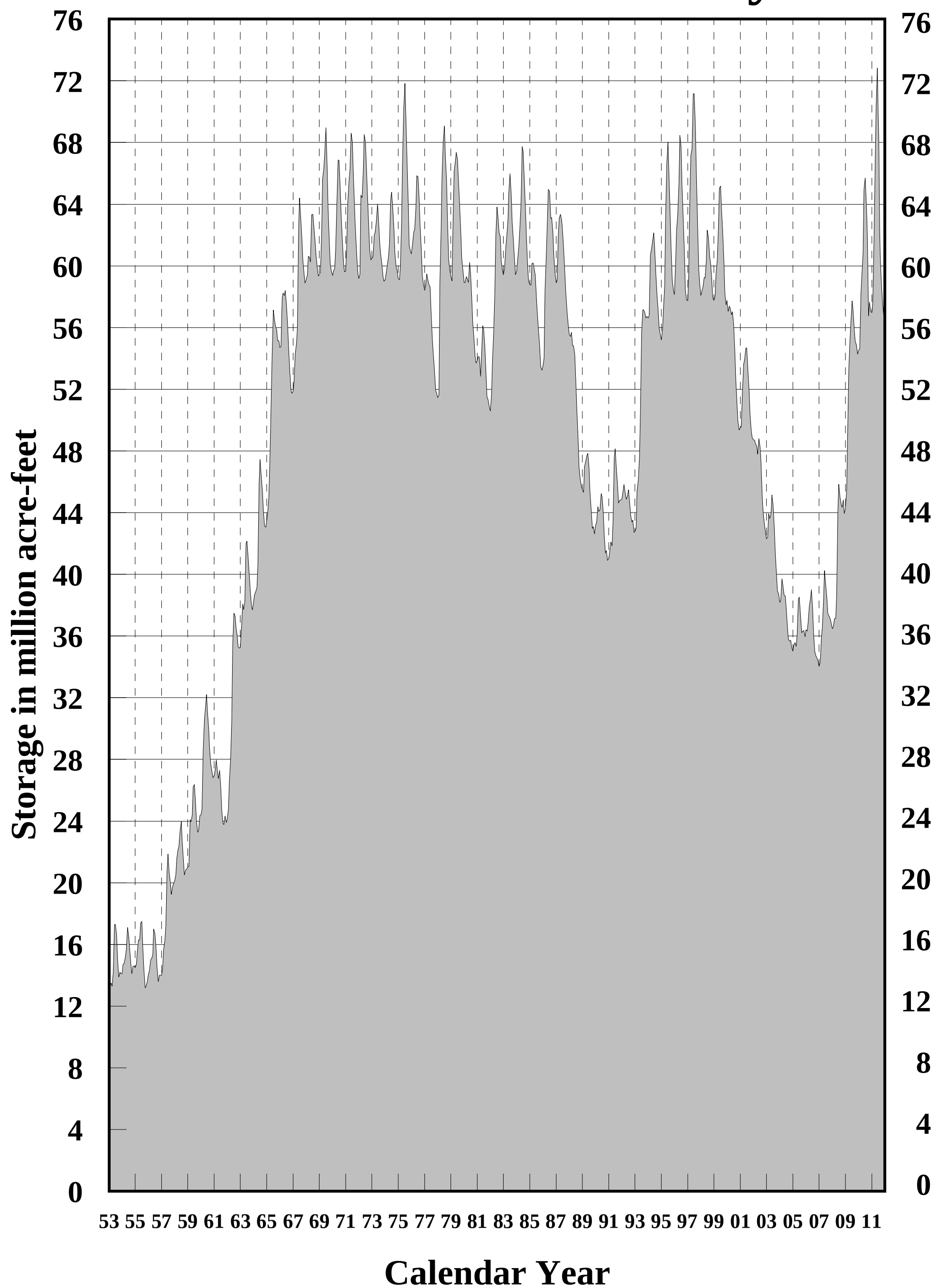
Oahe

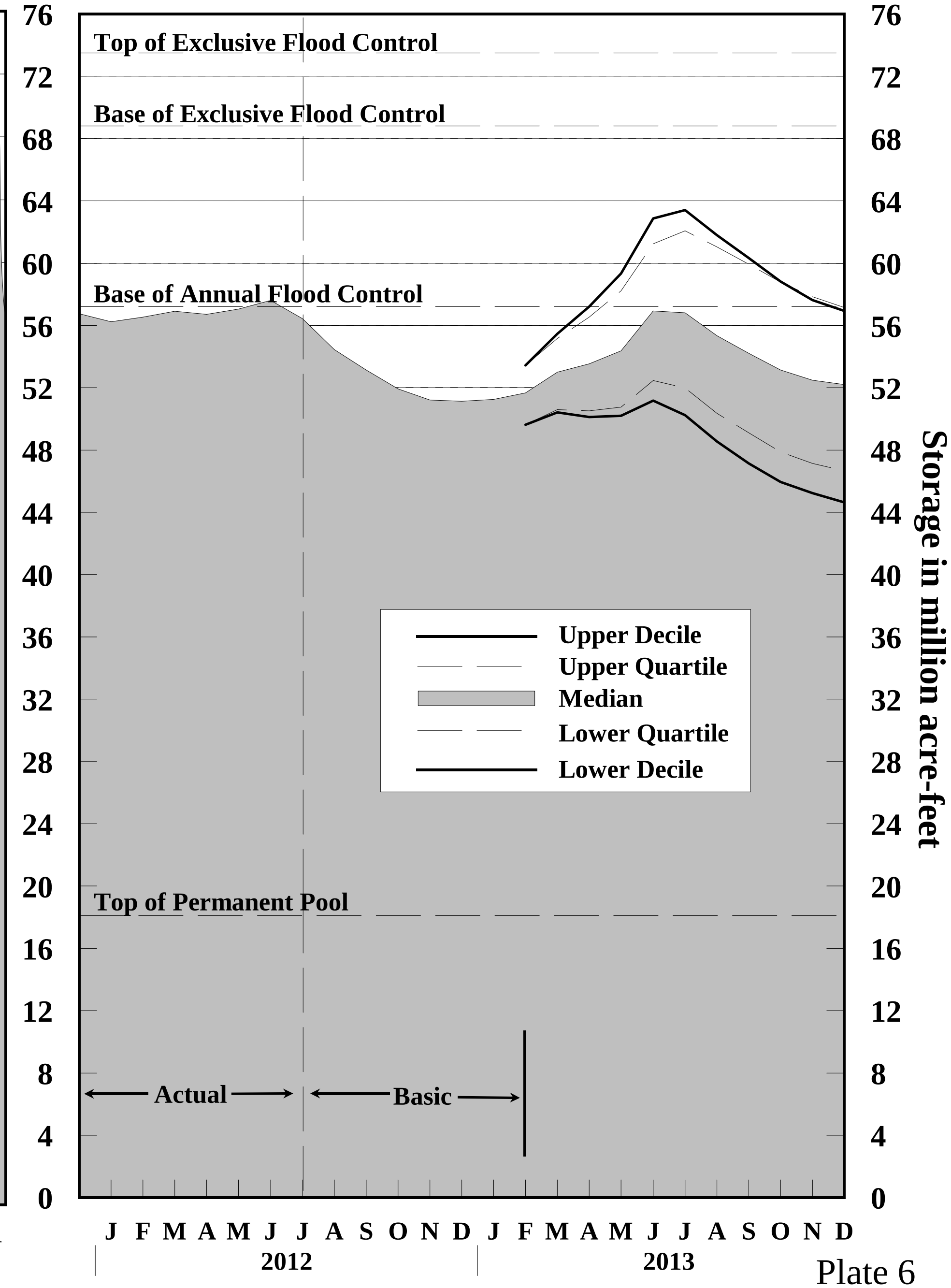
2012-2013 Draft AOP



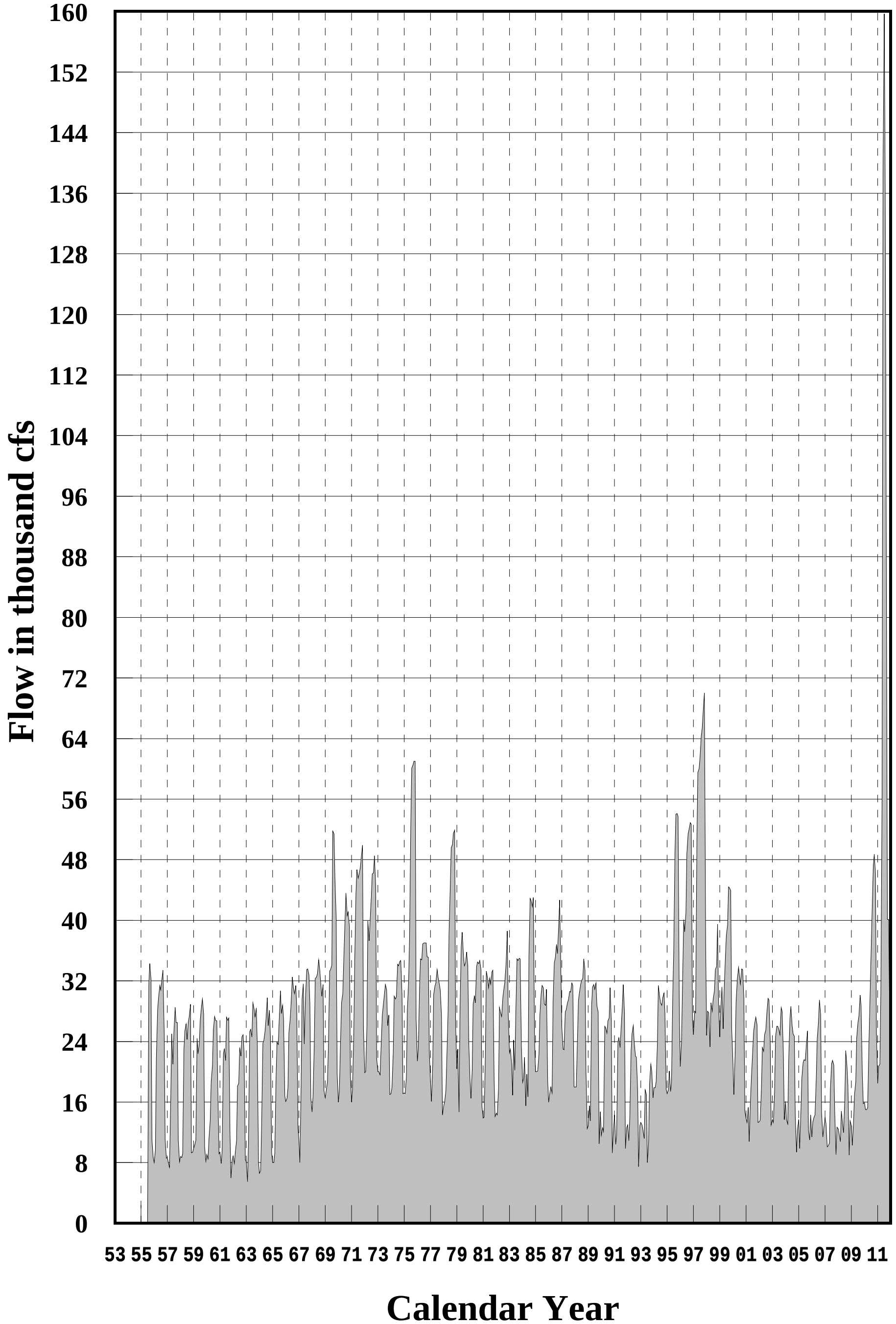
Average 1967-2011

System Storage





Gavins Point Releases



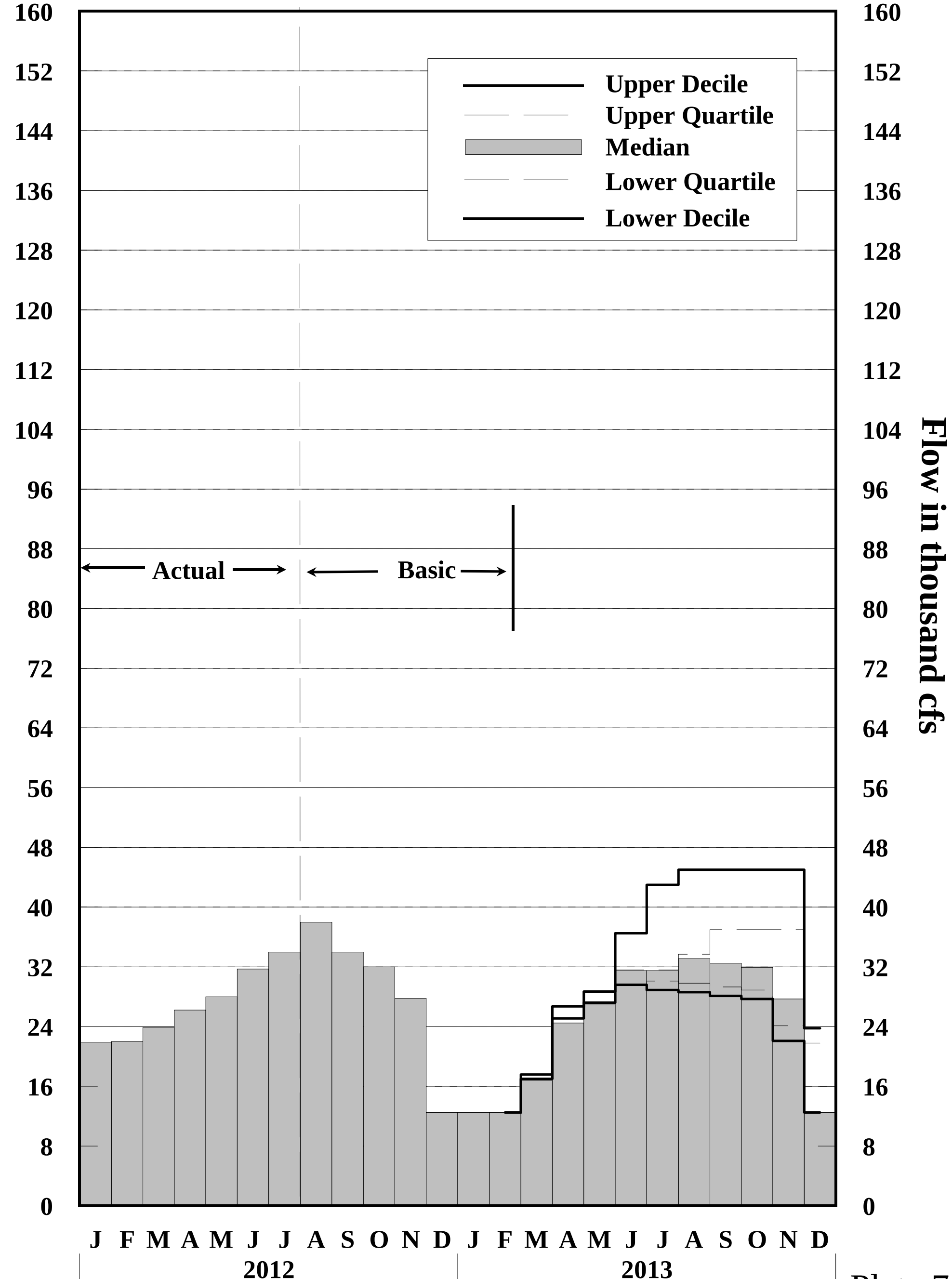


Plate 7

Fort Peck
Elevations and Releases

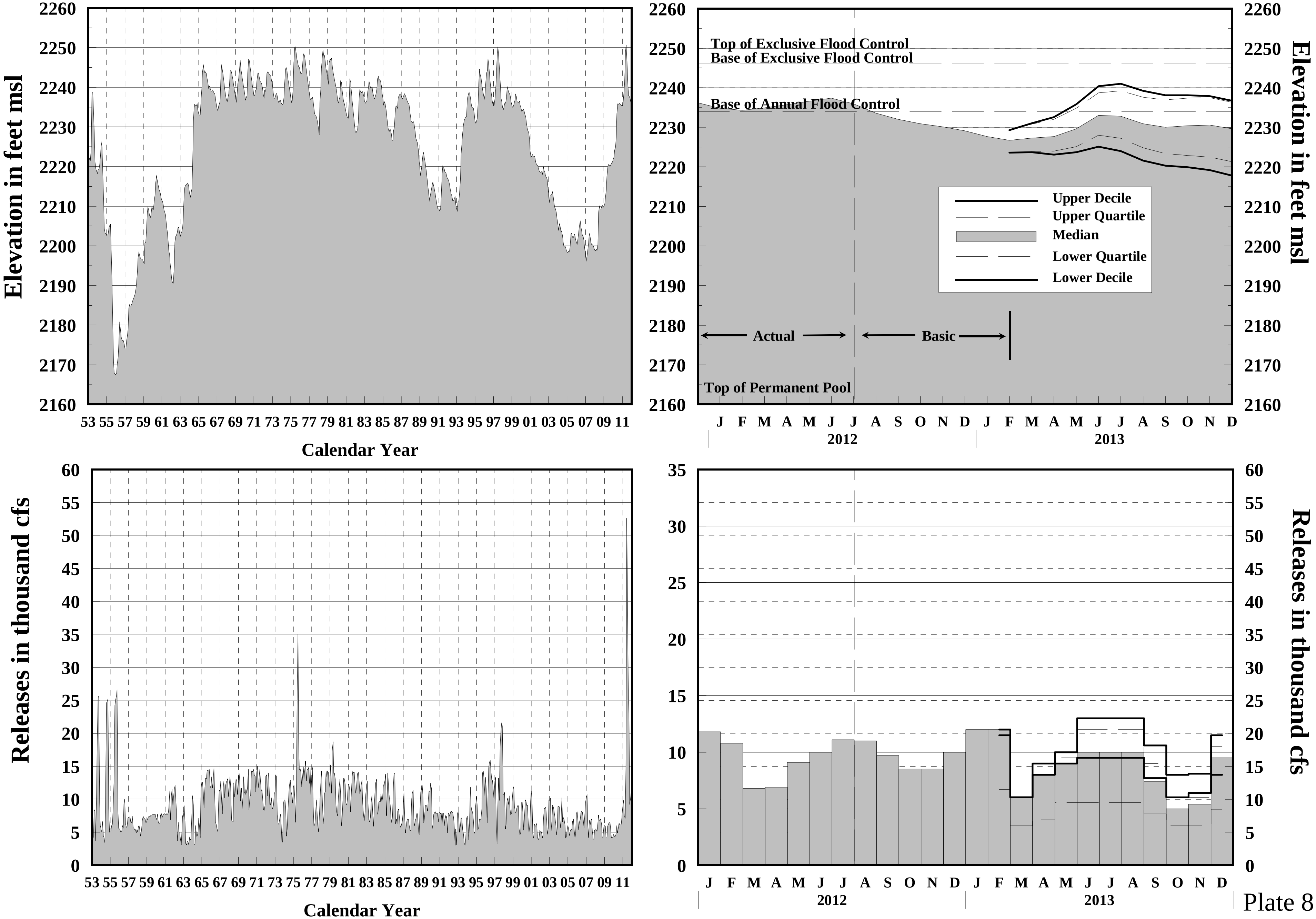


Plate 8

Garrison
Elevations and Releases

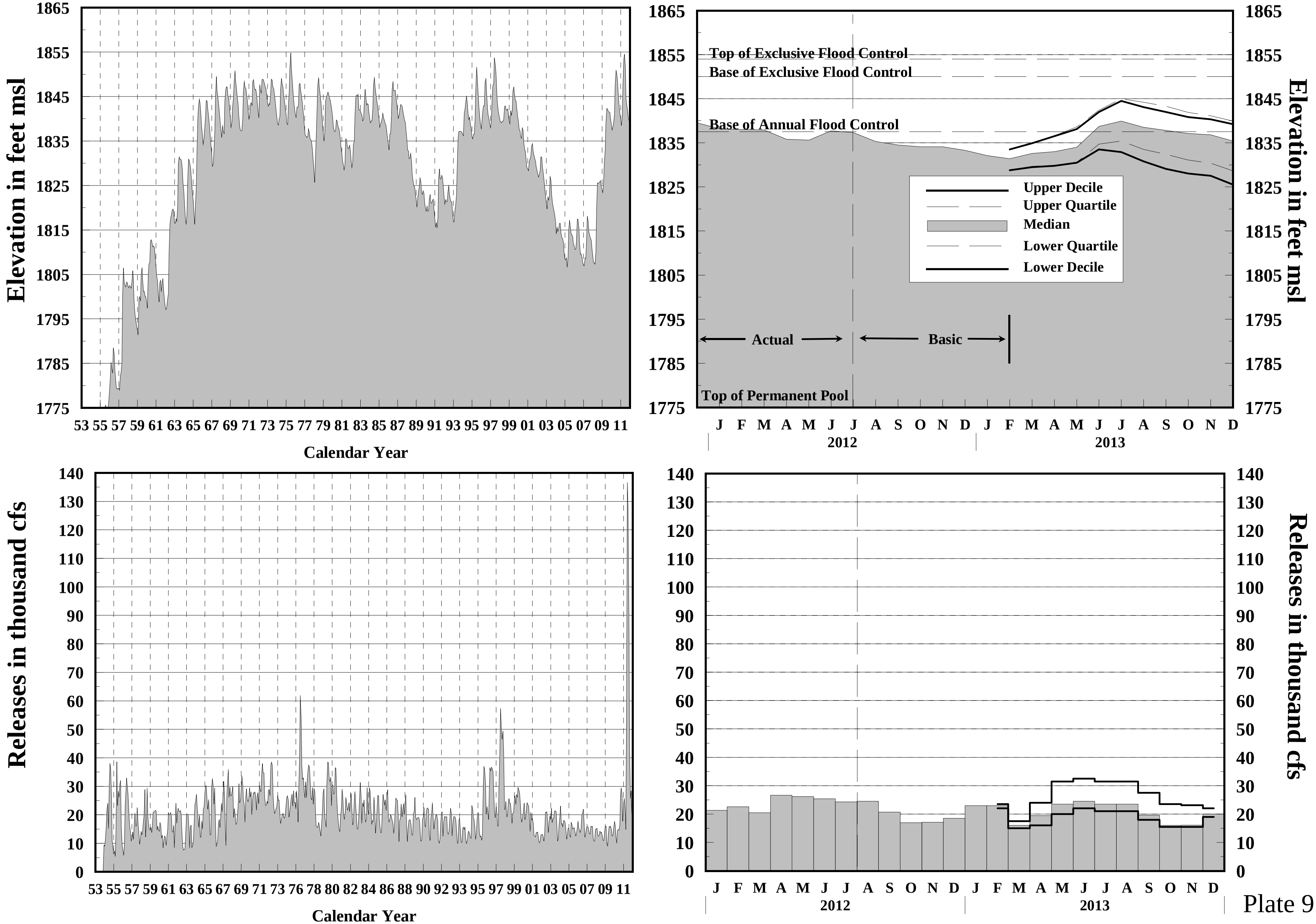


Plate 9

Oahe
Elevations and Releases

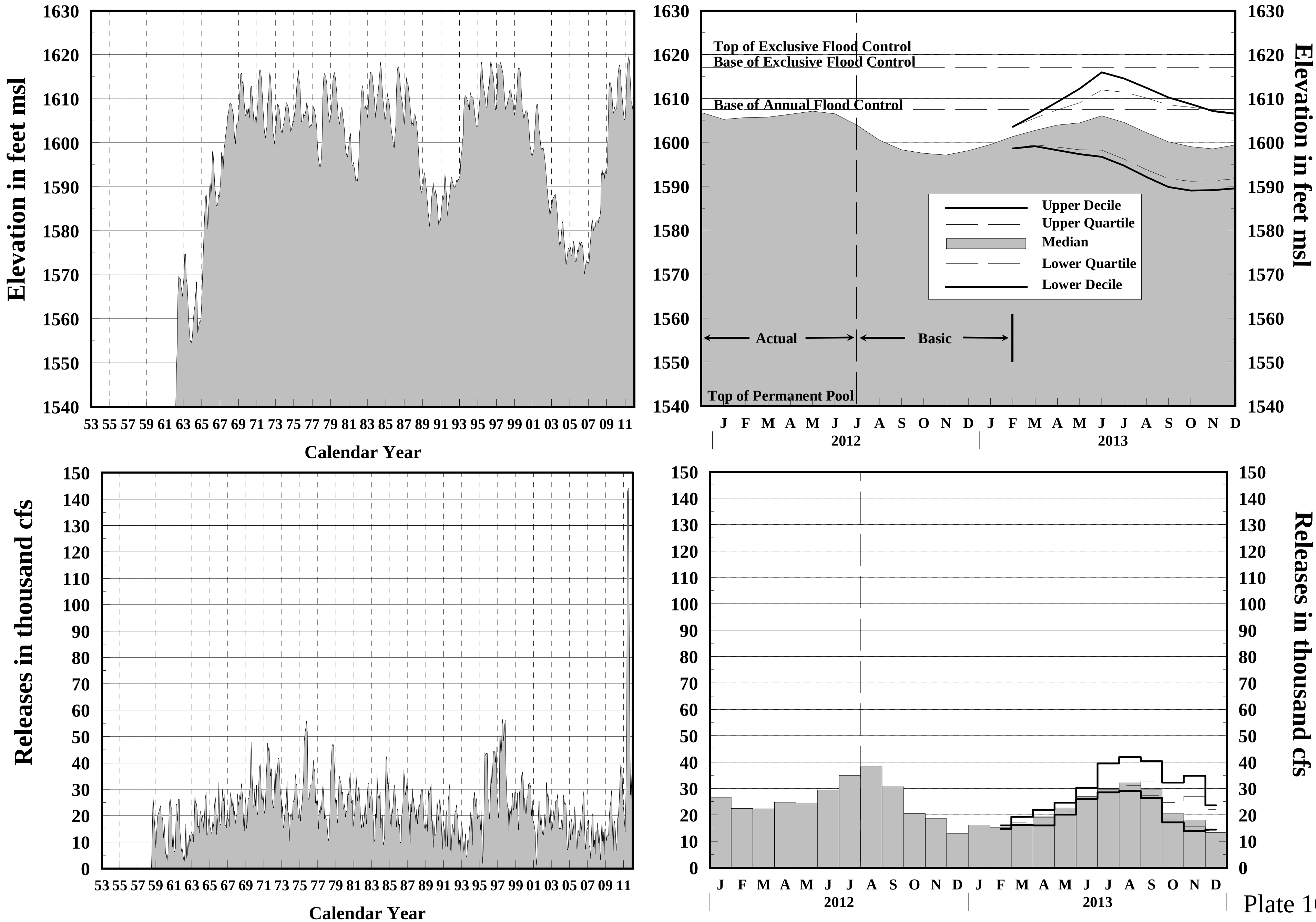
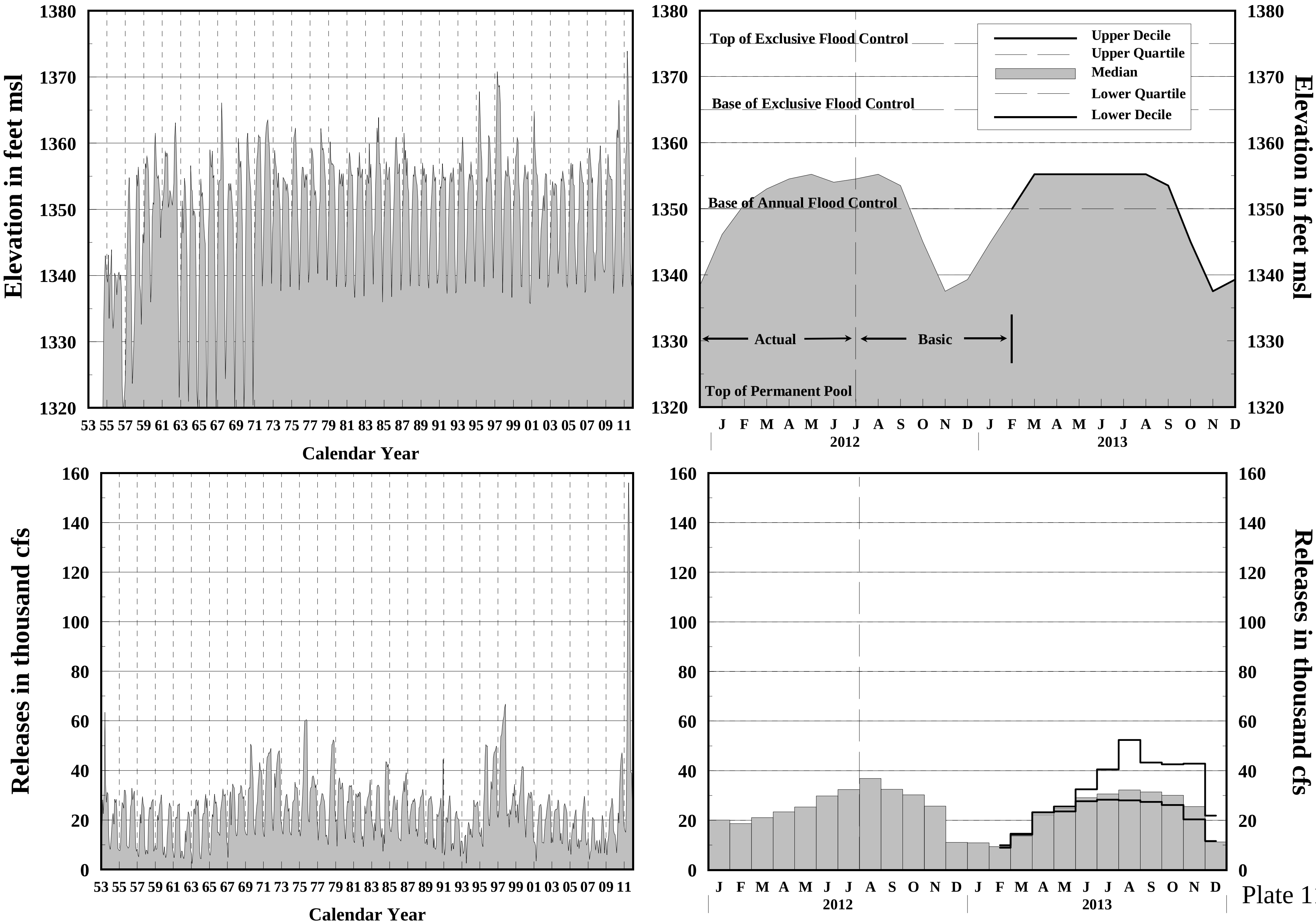


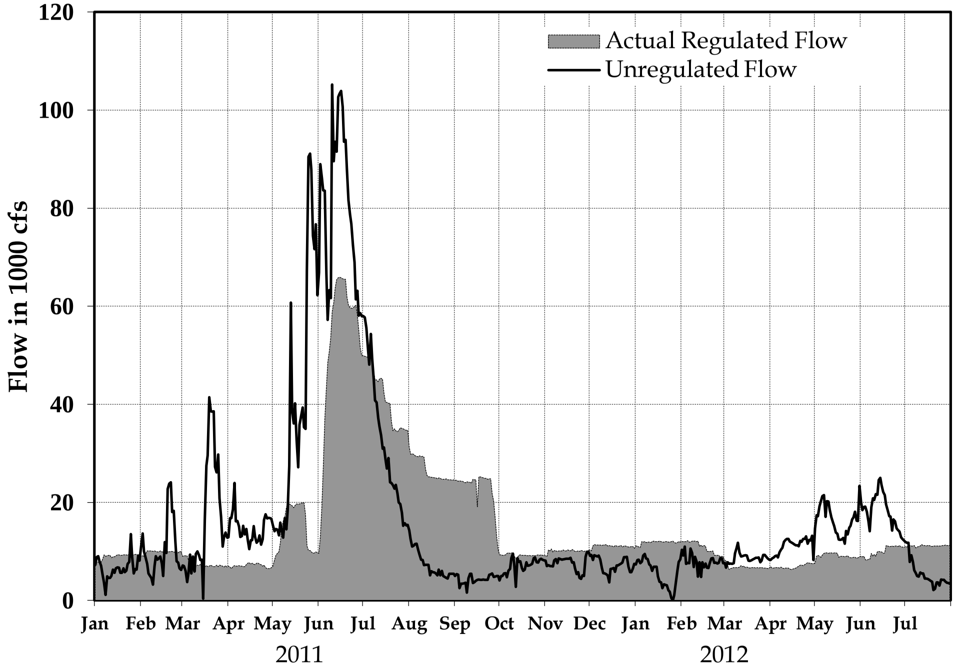
Plate 10

Fort Randall
Elevations and Releases

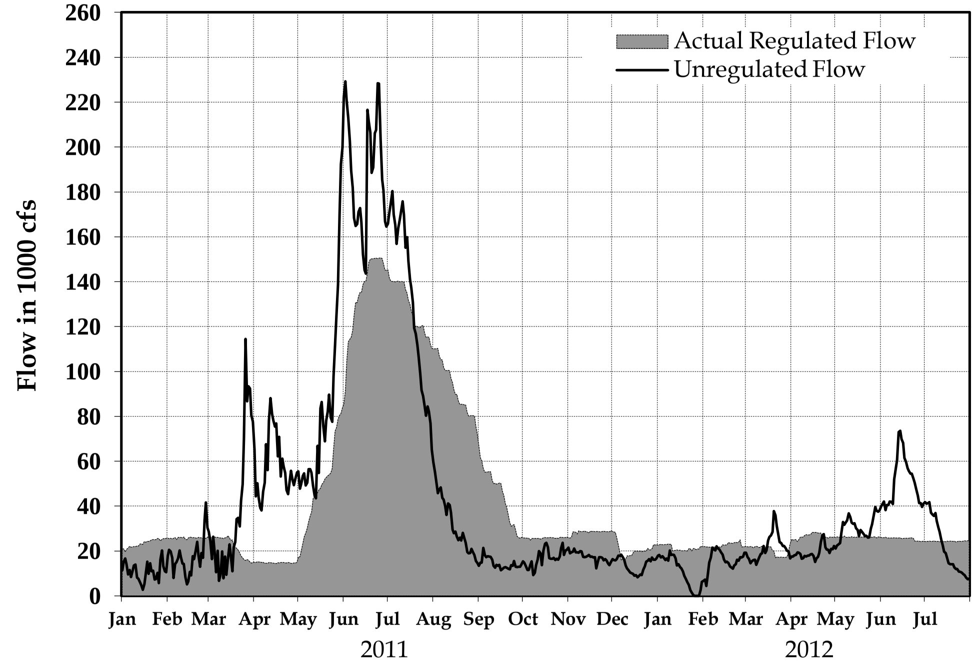


Reservoir Release and Unregulated Flow

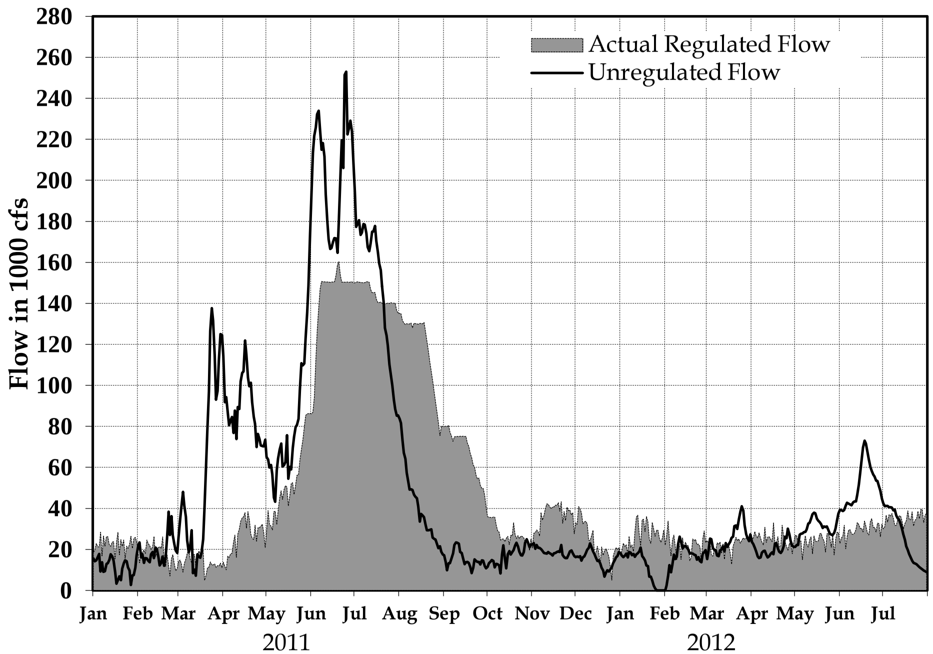
Fort Peck



Garrison



Oahe



Gavins Point

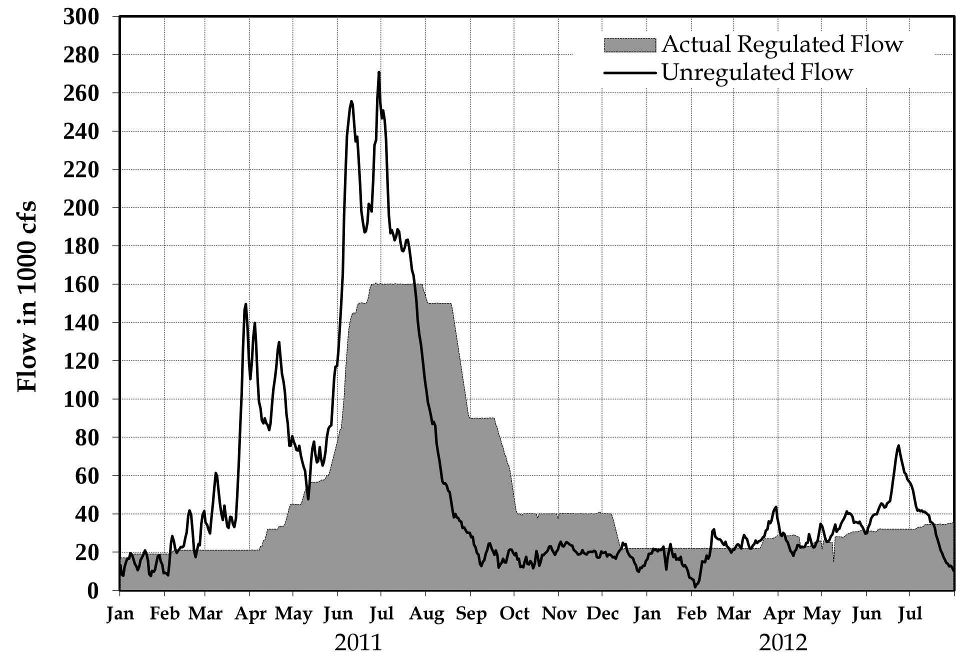
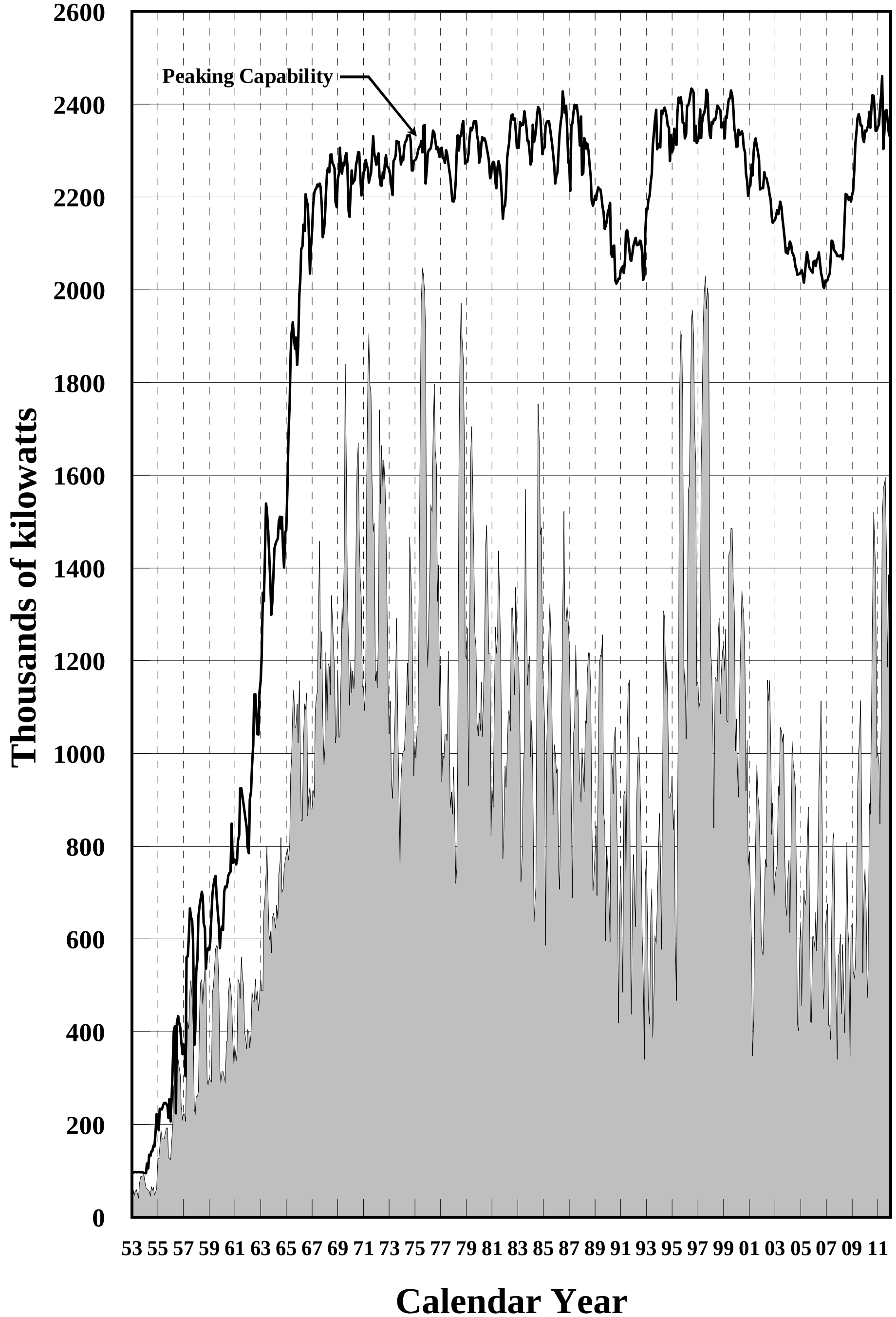


Plate 12

System Gross Capability and Average Monthly Generation



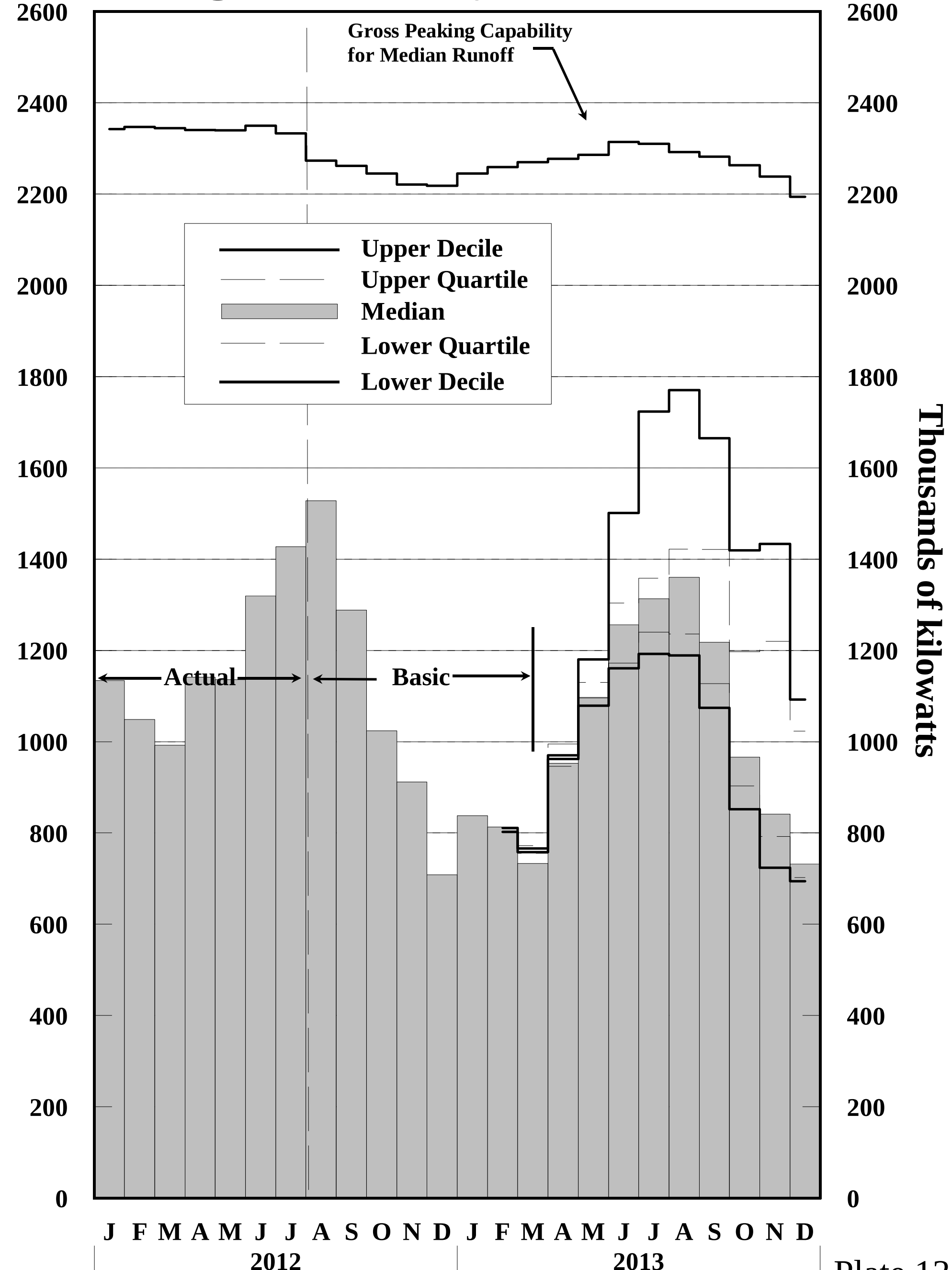
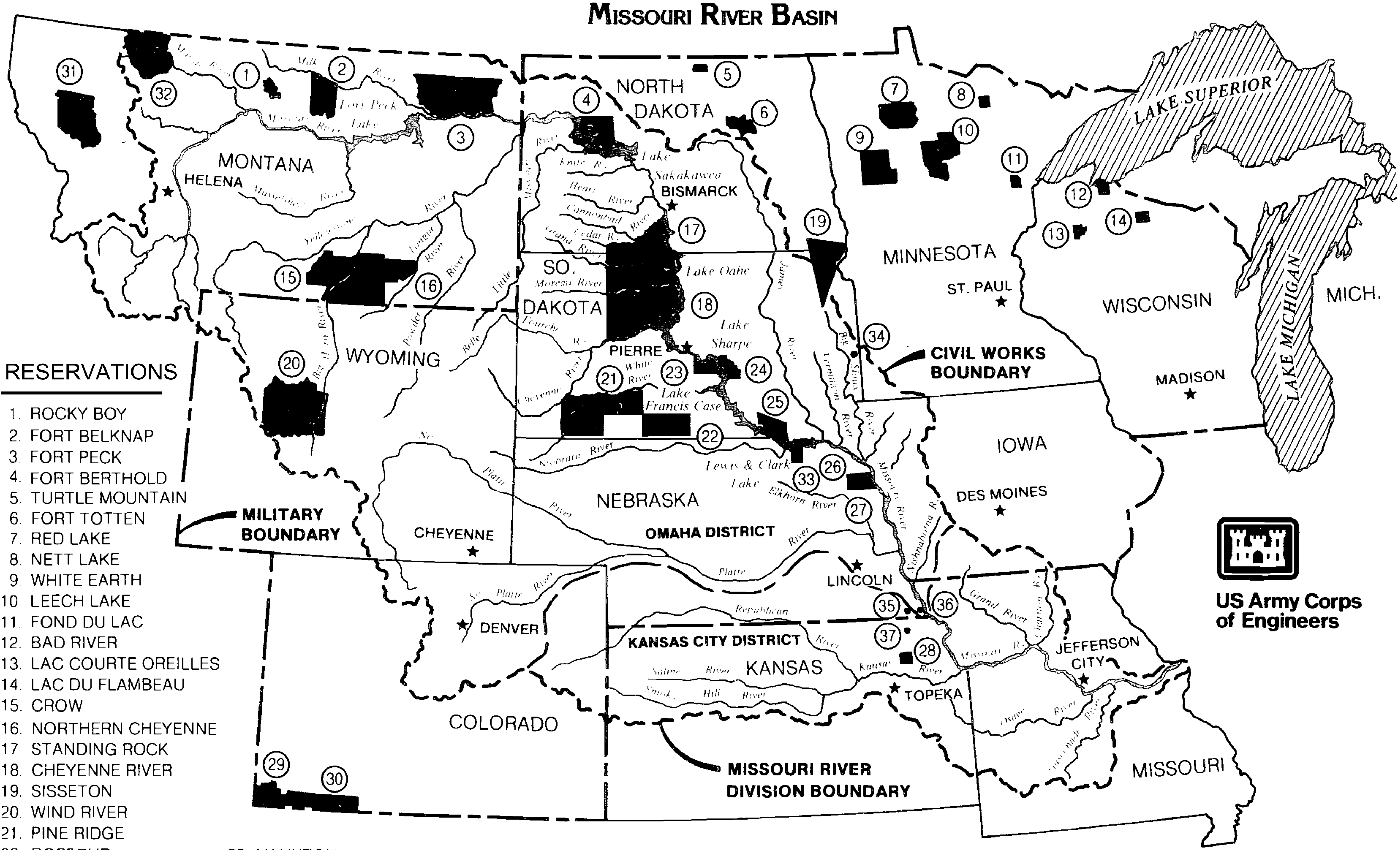


Plate 13

AMERICAN INDIAN RESERVATIONS

MISSOURI RIVER BASIN



RESERVATIONS

1. ROCKY BOY
2. FORT BELKNAP
3. FORT PECK
4. FORT BERTHOLD
5. TURTLE MOUNTAIN
6. FORT TOTTEN
7. RED LAKE
8. NETT LAKE
9. WHITE EARTH
10. LEECH LAKE
11. FOND DU LAC
12. BAD RIVER
13. LAC COURTE OREILLES
14. LAC DU FLAMBEAU
15. CROW
16. NORTHERN CHEYENNE
17. STANDING ROCK
18. CHEYENNE RIVER
19. SISSETON
20. WIND RIVER
21. PINE RIDGE
22. ROSEBUD
23. LOWER BRULE
24. CROW CREEK
25. YANKTON
26. WINNEBAGO
27. OMAHA
28. POTAWATOMI
29. UTE MOUNTAIN
30. SOUTHERN UTE
31. FLATHEAD
32. BLACKFEET
33. SANTEE
34. FLANDREAU
35. IOWA
36. SAC AND FOX
37. KICKAPOO

For illustrative purposes. No legal boundaries are implied.

Plate 14

VALUES IN 1000 AF EXCEPT AS INDICATED

31JUL12 2012 2013

	INI-SUM	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB
--FORT PECK--										
NAT INFLOW	2242	280	280	350	175	82	93	310	312	360
DEPLETION	-596	8	-69	-48	-43	-20	-23	-136	-157	-109
EVAPORATION	412	86	106	92	41	19	22	47		
MOD INFLOW	2426	186	243	306	176	82	94	399	469	469
RELEASE	4304	676	580	523	253	118	135	615	738	666
STOR CHANGE	-1878	-490	-337	-216	-76	-36	-41	-216	-269	-197
STORAGE	15191	14701	14363	14147	14071	14035	13995	13779	13510	13313
ELEV FTMSL	2235.9	2233.6	2232.0	2230.9	2230.5	2230.3	2230.1	2229.1	2227.7	2226.7
DISCH KCFS	11.1	11.0	9.7	8.5	8.5	8.5	8.5	10.0	12.0	12.0
POWER										
AVE POWER MW		148	132	115	115	115	114	134	155	154
PEAK POW MW		162	161	160	160	160	159	159	158	157
ENERGY GWH	691.4	110.1	95.2	85.5	41.3	19.2	22.0	99.7	115.0	103.3
--GARRISON--										
NAT INFLOW	2507	460	380	460	180	84	96	230	261	356
DEPLETION	-563	97	-127	-28	-125	-58	-66	-117	-88	-51
CHAN STOR	-9	1	13	13	0			-15	-20	
EVAPORATION	449	93	115	100	45	21	24	52		
REG INFLOW	6915	948	985	923	512	239	273	895	1067	1073
RELEASE	8634	1506	1233	1045	506	236	278	1138	1414	1277
STOR CHANGE	-1718	-559	-249	-122	7	3	-4	-243	-348	-204
STORAGE	18018	17459	17210	17088	17095	17098	17094	16851	16503	16300
ELEV FTMSL	1837.2	1835.3	1834.5	1834.1	1834.1	1834.1	1834.1	1833.3	1832.1	1831.4
DISCH KCFS	24.3	24.5	20.7	17.0	17.0	17.0	17.5	18.5	23.0	23.0
POWER										
AVE POWER MW		301	253	207	207	207	213	224	277	275
PEAK POW MW		460	457	456	456	456	456	453	448	446
ENERGY GWH	1268.4	224.1	182.3	154.2	74.5	34.8	40.9	167.0	205.8	184.7
--OAHE--										
NAT INFLOW	377	55	95	60	33	15	17		12	90
DEPLETION	198	119	29	-11	1	0	1	13	18	28
CHAN STOR	5	-1	16	16	0		-2	-4	-20	
EVAPORATION	423	90	109	93	42	19	22	48		
REG INFLOW	8395	1352	1207	1040	496	231	270	1072	1389	1339
RELEASE	9183	2351	1821	1264	574	302	226	796	997	852
STOR CHANGE	-788	-999	-614	-224	-79	-71	44	275	391	488
STORAGE	17766	16767	16153	15929	15850	15779	15823	16098	16490	16978
ELEV FTMSL	1604.0	1600.5	1598.3	1597.5	1597.2	1596.9	1597.1	1598.1	1599.5	1601.3
DISCH KCFS	35.0	38.2	30.6	20.5	19.3	21.8	14.3	13.0	16.2	15.3
POWER										
AVE POWER MW		477	377	252	236	265	174	159	200	191
PEAK POW MW		671	660	656	654	653	654	659	666	675
ENERGY GWH	1371.9	355.0	271.3	187.3	84.9	44.6	33.5	118.2	148.9	128.3
--BIG BEND--										
EVAPORATION	97	20	25	22	10	5	5	11		
REG INFLOW	9086	2332	1796	1242	564	297	221	785	997	852
RELEASE	9094	2340	1796	1242	564	297	221	785	997	852
STORAGE	1629	1621	1621	1621	1621	1621	1621	1621	1621	1621
ELEV FTMSL	1420.1	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0
DISCH KCFS	31.9	38.1	30.2	20.2	19.0	21.4	13.9	12.8	16.2	15.3
POWER										
AVE POWER MW		178	143	99	95	107	70	64	80	74
PEAK POW MW		509	517	538	538	538	538	538	538	529
ENERGY GWH	531.9	132.6	103.0	73.7	34.3	18.1	13.5	48.0	59.3	49.4
--FORT RANDALL--										
NAT INFLOW	153	30	30	4	3	1	1	10	25	49
DEPLETION	34	15	7	1	1	0	1	3	3	3
EVAPORATION	109	25	31	25	9	4	4	10		
REG INFLOW	9105	2330	1787	1220	556	294	218	782	1019	898
RELEASE	9467	2267	1933	1863	877	410	244	680	669	524
STOR CHANGE	-362	63	-146	-643	-321	-116	-26	103	350	374
STORAGE	3486	3549	3403	2760	2439	2323	2297	2400	2750	3124
ELEV FTMSL	1354.5	1355.2	1353.5	1345.0	1340.0	1338.0	1337.5	1339.3	1344.8	1350.0
DISCH KCFS	32.4	36.9	32.5	30.3	29.5	29.5	15.4	11.1	10.9	9.4
POWER										
AVE POWER MW		308	271	243	223	216	112	81	83	75
PEAK POW MW		356	350	319	296	287	285	293	319	339
ENERGY GWH	916.2	229.4	195.3	180.5	80.1	36.3	21.6	60.6	61.7	50.7
--GAVINS POINT--										
NAT INFLOW	755	100	110	110	55	26	29	95	100	130
DEPLETION	28	10	-5	2	5	2	3	10	1	
CHAN STOR	42	-8	8	4	2	0	26	8	0	3
EVAPORATION	34	7	9	8	3	2	2	4		
REG INFLOW	10203	2342	2048	1968	925	432	295	769	769	656
RELEASE	10211	2337	2023	1968	925	432	295	769	769	694
STOR CHANGE	-8	5	25							-38
STORAGE	350	355	380	380	380	380	380	380	380	342
ELEV FTMSL	1206.3	1206.5	1207.5	1207.5	1207.5	1207.5	1207.5	1207.5	1207.5	1206.0
DISCH KCFS	34.0	38.0	34.0	32.0	31.1	31.1	18.6	12.5	12.5	12.5
POWER										
AVE POWER MW		115	112	108	106	106	66	44	44	44
PEAK POW MW		115	117	117	117	117	117	117	117	114
ENERGY GWH	411.1	85.4	80.5	80.6	38.3	17.9	12.6	33.0	33.0	29.6
--GAVINS POINT - SIOUX CITY--										
NAT INFLOW	442	60	65	65	35	16	19	50	40	92
DEPLETION	126	37	24	11	6	3	3	13	14	15
REGULATED FLOW AT SIOUX CITY										
KAF	10527	2360	2064	2022	954	445	311	806	795	771
KCFS		38.4	34.7	32.9	32.1	32.1	19.6	13.1	12.9	13.9
--TOTAL--										
NAT INFLOW	6476	985	960	1049	480	224	256	695	750	1077
DEPLETION	-773	286	-141	-73	-154	-72	-82	-214	-209	-114
CHAN STOR	39	-8	37	33	1	0	25	-11	-40	3
EVAPORATION	1525	320	395	338	150	70	79	172		
STORAGE	56440	54451	53130	51925	51456	51237	51209	51129	51254	51676
SYSTEM POWER										
AVE POWER MW		1528	1288	1024	982	1017	750	708	838	813
PEAK POW MW		2273	2262	2245	2221	2210	2209	2218	2245	2259
ENERGY GWH	5190.7	1136.5	927.6	761.9	353.5	170.8	144.1	526.6	623.8	546.0
DAILY GWH		36.7	30.9	24.6	23.6	24.4	18.0	17.0	20.1	19.5

INI-SUM 31AUG 30SEP 31OCT 15NOV 22NOV 30NOV 31DEC 31JAN 28FEB

VALUES IN 1000 AF EXCEPT AS INDICATED

31JUL12 / 2012	INI-SUM	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN (2013)	28FEB
--FORT PECK--										
NAT INFLOW	2690	336	336	420	210	98	112	372	374	432
DEPLETION	-634	-55	-118	-80	-25	-12	-13	-113	-135	-83
EVAPORATION	285	65	81	70	17	8	9	36		
MOD INFLOW	3039	326	373	430	218	102	116	449	509	515
RELEASE	4410	676	578	523	253	118	151	707	738	666
STOR CHANGE	-1371	-350	-205	-93	-35	-16	-34	-258	-229	-151
STORAGE	15191	14841	14636	14543	14509	14493	14458	14200	13971	13820
ELEV FTMSL	2235.9	2234.2	2233.3	2232.8	2232.7	2232.6	2232.4	2231.2	2230.0	2229.3
DISCH KCFS	11.1	11.0	9.7	8.5	8.5	8.5	9.5	11.5	12.0	12.0
POWER										
AVE POWER MW		148	132	115	115	115	129	152	156	156
PEAK POW MW		162	162	161	161	161	161	160	159	159
ENERGY GWH	710.6	110.2	95.2	85.9	41.5	19.4	24.7	112.9	116.2	104.5
--GARRISON--										
NAT INFLOW	3008	552	456	552	216	101	115	276	313	427
DEPLETION	-536	93	-129	-1	-120	-56	-64	-114	-93	-53
CHAN STOR	-9	1	13	12	0		-10	-20	-5	
EVAPORATION	310	70	87	76	18	8	10	40		
REG INFLOW	7636	1066	1089	1012	570	266	310	1037	1139	1146
RELEASE	8732	1506	1219	1045	506	236	270	1199	1445	1305
STOR CHANGE	-1096	-440	-131	-34	64	30	40	-162	-306	-159
STORAGE	18018	17578	17447	17414	17478	17508	17548	17386	17080	16922
ELEV FTMSL	1837.2	1835.7	1835.3	1835.2	1835.4	1835.5	1835.6	1835.1	1834.1	1833.5
DISCH KCFS	24.3	24.5	20.5	17.0	17.0	17.0	17.0	19.5	23.5	23.5
POWER										
AVE POWER MW		302	251	209	209	209	209	239	286	285
PEAK POW MW		462	460	460	460	461	461	459	456	454
ENERGY GWH	1292.6	224.4	180.9	155.1	75.1	35.1	40.1	177.8	212.8	191.2
--OAHE--										
NAT INFLOW	452	66	114	72	39	18	21		14	108
DEPLETION	198	119	29	-11	1	0	1	13	18	28
CHAN STOR	3	-1	17	15	0			-11	-17	0
EVAPORATION	293	68	83	71	17	8	9	38		
REG INFLOW	8696	1385	1239	1072	527	246	281	1138	1424	1385
RELEASE	8846	2312	1703	1229	549	291	213	769	964	816
STOR CHANGE	-149	-927	-464	-157	-22	-45	68	368	460	570
STORAGE	17766	16839	16375	16218	16196	16151	16219	16587	17047	17617
ELEV FTMSL	1604.0	1600.8	1599.1	1598.6	1598.5	1598.3	1598.6	1599.9	1601.5	1603.5
DISCH KCFS	35.0	37.6	28.6	20.0	18.4	20.9	13.4	12.5	15.7	14.7
POWER										
AVE POWER MW		470	354	246	227	257	166	155	195	185
PEAK POW MW		672	664	661	660	660	661	668	676	687
ENERGY GWH	1329.0	349.3	254.6	183.3	81.7	43.2	31.8	115.2	145.4	124.3
--BIG BEND--										
EVAPORATION	66	15	19	16	4	2	2	9		
REG INFLOW	8780	2297	1684	1213	545	289	211	761	964	816
RELEASE	8788	2305	1684	1213	545	289	211	761	964	816
STORAGE	1629	1621	1621	1621	1621	1621	1621	1621	1621	1621
ELEV FTMSL	1420.1	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0
DISCH KCFS	31.9	37.5	28.3	19.7	18.3	20.8	13.3	12.4	15.7	14.7
POWER										
AVE POWER MW		176	134	97	92	104	67	63	77	70
PEAK POW MW		509	517	538	538	538	538	538	538	529
ENERGY GWH	514.1	130.6	96.6	72.0	33.2	17.5	12.9	46.5	57.4	47.4
--FORT RANDALL--										
NAT INFLOW	184	36	36	5	3	1	2	12	30	59
DEPLETION	34	15	7	1	1	0	1	3	3	3
EVAPORATION	75	19	24	18	4	2	2	7		
REG INFLOW	8863	2307	1690	1199	543	288	211	763	991	872
RELEASE	9225	2244	1836	1842	864	404	237	660	641	498
STOR CHANGE	-362	63	-146	-643	-321	-116	-26	103	350	374
STORAGE	3486	3549	3403	2760	2439	2323	2297	2400	2750	3124
ELEV FTMSL	1354.5	1355.2	1353.5	1345.0	1340.0	1338.0	1337.5	1339.3	1344.8	1350.0
DISCH KCFS	32.4	36.5	30.8	30.0	29.0	29.1	14.9	10.7	10.4	9.0
POWER										
AVE POWER MW		305	258	240	219	213	109	79	79	72
PEAK POW MW		356	350	319	296	287	285	293	319	339
ENERGY GWH	893.0	227.1	185.6	178.5	79.0	35.8	21.0	58.9	59.1	48.2
--GAVINS POINT--										
NAT INFLOW	902	120	120	132	66	31	35	114	128	156
DEPLETION	28	10	-5	2	5	2	3	10	1	
CHAN STOR	43	-8	11	2	2	0	26	8	1	3
EVAPORATION	23	5	6	6	1	1	1	3		
REG INFLOW	10120	2342	1965	1968	925	432	295	769	769	656
RELEASE	10128	2337	1940	1968	925	432	295	769	769	694
STOR CHANGE	-8	5	25							-38
STORAGE	350	355	380	380	380	380	380	380	380	342
ELEV FTMSL	1206.3	1206.5	1207.5	1207.5	1207.5	1207.5	1207.5	1207.5	1207.5	1206.0
DISCH KCFS	34.0	38.0	32.6	32.0	31.1	31.1	18.6	12.5	12.5	12.5
POWER										
AVE POWER MW		115	109	108	106	106	66	44	44	44
PEAK POW MW		115	117	117	117	117	117	117	117	114
ENERGY GWH	408.9	85.4	78.3	80.6	38.3	17.9	12.6	33.0	33.0	29.6
--GAVINS POINT - SIOUX CITY--										
NAT INFLOW	530	72	78	78	42	20	22	60	48	110
DEPLETION	126	37	24	11	6	3	3	13	14	15
REGULATED FLOW AT SIOUX CITY										
KAF	10532	2372	1994	2035	961	449	314	816	803	789
KCFS		38.6	33.5	33.1	32.3	32.3	19.8	13.3	13.1	14.2
--TOTAL--										
NAT INFLOW	7766	1182	1140	1259	576	269	307	834	907	1292
DEPLETION	-784	219	-192	-78	-132	-61	-70	-188	-192	-90
CHAN STOR	38	-8	41	29	1	0	17	-23	-22	3
EVAPORATION	1052	241	299	258	61	28	32	132		
STORAGE	56440	54783	53862	52935	52622	52476	52524	52575	52849	53445
SYSTEM POWER										
AVE POWER MW		1515	1238	1015	969	1005	746	732	839	811
PEAK POW MW		2277	2270	2256	2233	2224	2223	2236	2265	2281
ENERGY GWH	5148.2	1127.1	891.3	755.5	348.7	168.8	143.1	544.4	624.0	545.2
DAILY GWH		36.4	29.7	24.4	23.2	24.1	17.9	17.6	20.1	19.5
	INI-SUM	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB

VALUES IN 1000 AF EXCEPT AS INDICATED

31JUL12 2012 2013

	INI-SUM	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB
--FORT PECK--										
NAT INFLOW	1794	224	224	280	140	65	75	248	250	288
DEPLETION	-410	43	-65	-44	-32	-15	-17	-102	-105	-73
EVAPORATION	510	107	132	113	51	23	27	57		
MOD INFLOW	1694	74	157	211	121	57	65	293	355	361
RELEASE	4162	676	548	461	223	104	127	676	707	639
STOR CHANGE	-2467	-602	-390	-250	-102	-47	-62	-384	-352	-278
STORAGE	15191	14589	14198	13948	13846	13799	13737	13353	13001	12724
ELEV FTMSL	2235.9	2233.0	2231.1	2229.9	2229.4	2229.2	2228.9	2226.9	2225.0	2223.6
DISCH KCFS	11.1	11.0	9.2	7.5	7.5	7.5	8.0	11.0	11.5	11.5
POWER										
AVE POWER MW		148	125	101	101	101	107	144	148	147
PEAK POW MW		162	160	159	159	159	158	157	156	154
ENERGY GWH	664.7	110.0	89.7	75.3	36.3	16.9	20.6	107.2	110.1	98.6
--GARRISON--										
NAT INFLOW	2006	368	304	368	144	67	77	184	209	285
DEPLETION	-340	161	-89	10	-115	-53	-61	-93	-62	-38
CHAN STOR	-4	1	18	17			-5	-30	-5	
EVAPORATION	559	116	143	124	56	26	30	64		
REG INFLOW	5945	768	815	713	426	199	230	859	973	962
RELEASE	8384	1506	1199	984	476	222	254	1168	1353	1222
STOR CHANGE	-2439	-739	-383	-271	-50	-23	-24	-309	-380	-260
STORAGE	18018	17279	16896	16625	16575	16552	16528	16219	15839	15579
ELEV FTMSL	1837.2	1834.7	1833.4	1832.5	1832.3	1832.2	1832.2	1831.1	1829.7	1828.8
DISCH KCFS	24.3	24.5	20.1	16.0	16.0	16.0	16.0	19.0	22.0	22.0
POWER										
AVE POWER MW		301	245	194	193	193	193	227	261	259
PEAK POW MW		458	453	450	449	449	449	445	440	436
ENERGY GWH	1220.0	223.7	176.3	144.0	69.4	32.4	37.0	169.2	194.1	174.0
--OAHE--										
NAT INFLOW	302	44	76	48	26	12	14		10	72
DEPLETION	198	119	29	-11	1	0	1	13	18	28
CHAN STOR	9	-1	19	18				-14	-13	0
EVAPORATION	525	113	136	115	51	24	27	59		
REG INFLOW	7972	1318	1128	946	450	210	240	1083	1331	1266
RELEASE	9500	2391	1873	1369	593	311	228	824	1022	888
STOR CHANGE	-1527	-1073	-745	-423	-143	-101	12	258	309	378
STORAGE	17766	16693	15949	15525	15383	15281	15293	15552	15861	16239
ELEV FTMSL	1604.0	1600.3	1597.6	1596.0	1595.4	1595.1	1595.1	1596.1	1597.2	1598.6
DISCH KCFS	35.0	38.9	31.5	22.3	19.9	22.4	14.4	13.4	16.6	16.0
POWER										
AVE POWER MW		485	386	271	241	271	174	163	203	196
PEAK POW MW		670	656	648	645	644	644	649	654	661
ENERGY GWH	1409.7	360.6	278.2	201.6	86.8	45.5	33.3	121.0	150.7	131.9
--BIG BEND--										
EVAPORATION	121	25	31	27	12	6	7	14		
REG INFLOW	9379	2366	1842	1342	580	306	221	810	1022	888
RELEASE	9387	2374	1842	1342	580	306	221	810	1022	888
STORAGE	1629	1621	1621	1621	1621	1621	1621	1621	1621	1621
ELEV FTMSL	1420.1	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0	1420.0
DISCH KCFS	31.9	38.6	31.0	21.8	19.5	22.0	14.0	13.2	16.6	16.0
POWER										
AVE POWER MW		181	147	107	98	110	70	67	82	77
PEAK POW MW		509	517	538	538	538	538	538	538	529
ENERGY GWH	549.0	134.5	105.6	79.6	35.3	18.6	13.5	49.5	60.8	51.5
--FORT RANDALL--										
NAT INFLOW	122	24	24	3	2	1	1	8	20	39
DEPLETION	34	15	7	1	1	0	1	3	3	3
EVAPORATION	136	31	39	31	12	5	5	12		
REG INFLOW	9339	2352	1820	1314	569	301	217	803	1039	924
RELEASE	9701	2289	1966	1957	890	417	243	700	689	550
STOR CHANGE	-362	63	-146	-643	-321	-116	-26	103	350	374
STORAGE	3486	3549	3403	2760	2439	2323	2297	2400	2750	3124
ELEV FTMSL	1354.5	1355.2	1353.5	1345.0	1340.0	1338.0	1337.5	1339.3	1344.8	1350.0
DISCH KCFS	32.4	37.2	33.0	31.8	29.9	30.1	15.3	11.4	11.2	9.9
POWER										
AVE POWER MW		311	276	255	226	220	112	84	85	79
PEAK POW MW		356	350	319	296	287	285	293	319	339
ENERGY GWH	938.3	231.6	198.5	189.4	81.3	36.9	21.5	62.4	63.5	53.2
--GAVINS POINT--										
NAT INFLOW	596	80	80	88	44	21	23	76	80	104
DEPLETION	28	10	-5	2	5	2	3	10	1	
CHAN STOR	42	-9	8	2	4	0	27	7	0	2
EVAPORATION	42	8	11	10	4	2	2	5		
REG INFLOW	10269	2342	2048	2035	928	433	289	769	769	656
RELEASE	10277	2337	2023	2035	928	433	289	769	769	694
STOR CHANGE	-8	5	25							-38
STORAGE	350	355	380	380	380	380	380	380	380	342
ELEV FTMSL	1206.3	1206.5	1207.5	1207.5	1207.5	1207.5	1207.5	1207.5	1207.5	1206.0
DISCH KCFS	34.0	38.0	34.0	33.1	31.2	31.2	18.2	12.5	12.5	12.5
POWER										
AVE POWER MW		115	112	111	107	107	64	44	44	44
PEAK POW MW		115	117	117	117	117	117	117	117	114
ENERGY GWH	412.8	85.4	80.5	82.5	38.3	17.9	12.3	33.0	33.0	29.6
--GAVINS POINT - SIOUX CITY--										
NAT INFLOW	354	48	52	52	28	13	15	40	32	74
DEPLETION	126	37	24	11	6	3	3	13	14	15
REGULATED FLOW AT SIOUX CITY										
KAF	10505	2348	2051	2076	950	443	301	796	787	753
KCFS		38.2	34.5	33.8	31.9	31.9	18.9	12.9	12.8	13.6
--TOTAL--										
NAT INFLOW	5174	788	760	839	384	179	205	556	601	862
DEPLETION	-364	385	-99	-31	-134	-62	-71	-156	-131	-65
CHAN STOR	47	-9	45	38	3	0	23	-37	-18	2
EVAPORATION	1892	400	492	419	186	86	98	212		
STORAGE	56440	54086	52447	50859	50244	49955	49856	49524	49451	49628
SYSTEM POWER										
AVE POWER MW		1540	1290	1038	965	1001	720	729	823	802
PEAK POW MW		2269	2254	2231	2205	2193	2191	2199	2223	2233
ENERGY GWH	5194.4	1145.8	928.9	772.4	347.5	168.1	138.3	542.3	612.3	538.8
DAILY GWH		37.0	31.0	24.9	23.2	24.0	17.3	17.5	19.8	19.2
	INI-SUM	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB

VALUES IN 1000 AF EXCEPT AS INDICATED

	28FEB13 INI-SUM	2013 15MAR	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	2014 30NOV	31DEC	31JAN	28FEB
--FORT PECK--																	
NAT INFLOW	9450	315	147	189	785	1580	2450	1200	450	370	520	208	97	111	340	295	395
DEPLETION	491	-35	-16	-21	-20	286	677	238	-15	-106	-45	-32	-15	-17	-134	-156	-98
EVAPORATION	323							22	69	85	74	18	8	9	38		
MOD INFLOW	8636	349	163	210	805	1294	1773	940	396	391	491	222	104	118	436	451	493
RELEASE	7666	179	83	107	476	615	774	799	799	630	492	238	111	135	707	799	722
STOR CHANGE	970	171	80	102	329	679	999	141	-403	-239	-1	-16	-8	-17	-272	-348	-229
STORAGE	13820	13991	14070	14173	14502	15181	16180	16321	15918	15679	15678	15662	15655	15638	15367	15018	14789
ELEV FTMSL	2229.3	2230.1	2230.5	2231.0	2232.6	2235.8	2240.4	2241.0	2239.2	2238.1	2238.1	2238.1	2238.0	2237.9	2236.7	2235.1	2234.0
DISCH KCFS	12.0	6.0	6.0	6.0	8.0	10.0	13.0	13.0	13.0	10.6	8.0	8.0	8.0	8.5	11.5	13.0	13.0
POWER																	
AVE POWER MW		81	81	81	108	136	165	167	167	145	110	110	110	117	155	164	163
PEAK POW MW		159	160	160	161	164	167	167	166	165	165	165	165	165	164	163	162
ENERGY GWH	1220.4	29.1	13.6	17.5	78.0	101.2	118.9	124.3	124.0	104.5	82.1	39.7	18.5	22.5	115.6	121.7	109.2
--GARRISON--																	
NAT INFLOW	14000	528	246	316	1355	1840	3425	2715	835	570	645	258	120	137	270	325	415
DEPLETION	1115	18	9	11	-108	30	977	692	105	-129	6	-119	-55	-63	-112	-94	-53
CHAN STOR	-10	61			-20	-20	-30			23	25			-5	-29	-15	
EVAPORATION	367							25	79	98	84	20	9	10	43		
REG INFLOW	20174	748	321	412	1919	2405	3192	2798	1451	1254	1072	594	277	320	1017	1204	1190
RELEASE	18985	521	243	312	1428	1937	1934	1937	1937	1638	1445	699	326	349	1353	1537	1388
STOR CHANGE	1190	228	78	100	491	468	1258	861	-486	-383	-373	-105	-49	-29	-336	-334	-198
STORAGE	16922	17149	17227	17327	17818	18286	19544	20405	19919	19535	19162	19057	19008	18979	18643	18310	18111
ELEV FTMSL	1833.5	1834.3	1834.6	1834.9	1836.5	1838.1	1842.0	1844.5	1843.1	1842.0	1840.8	1840.5	1840.4	1840.3	1839.2	1838.1	1837.5
DISCH KCFS	23.5	17.5	17.5	17.5	24.0	31.5	32.5	31.5	31.5	27.5	23.5	23.5	23.5	22.0	22.0	25.0	25.0
POWER																	
AVE POWER MW		213	213	214	294	389	406	401	402	349	297	297	297	278	277	312	310
PEAK POW MW		456	457	459	465	470	487	499	498	485	480	479	479	478	474	471	468
ENERGY GWH	2878.5	76.6	35.9	46.2	211.8	289.1	292.5	298.2	299.1	251.6	221.2	106.9	49.8	53.3	205.8	232.1	208.5
--OAHE--																	
NAT INFLOW	3900	378	176	226	530	370	1300	225	110	155	100	113	53	60	-45	25	125
DEPLETION	709	24	11	15	50	73	151	182	122	30	-11	1	0	1	13	18	29
CHAN STOR	-6	25			-26	-29	-4	4		15	15		0	6		-12	
EVAPORATION	368							26	80	98	83	20	9	10	42		
REG INFLOW	21801	899	408	524	1882	2205	3079	1958	1845	1680	1488	791	369	404	1253	1532	1484
RELEASE	20582	399	257	339	951	1239	1795	2429	2577	2399	1981	946	475	650	1452	1472	1221
STOR CHANGE	1219	499	150	186	931	966	1284	-471	-733	-719	-493	-155	-105	-245	-199	60	263
STORAGE	17617	18116	18266	18452	19383	20349	21633	21162	20429	19710	19217	19062	18957	18711	18512	18572	18835
ELEV FTMSL	1603.5	1605.2	1605.7	1606.3	1609.2	1612.2	1615.9	1614.5	1612.4	1610.2	1608.7	1608.2	1607.9	1607.1	1606.5	1606.7	1607.5
DISCH KCFS	14.7	13.4	18.5	19.0	16.0	20.1	30.2	39.5	41.9	40.3	32.2	31.8	34.2	40.9	23.6	23.9	22.0
POWER																	
AVE POWER MW		171	237	243	207	265	401	527	554	528	419	411	441	525	304	307	283
PEAK POW MW		695	698	701	717	732	751	745	734	722	714	712	710	706	702	703	708
ENERGY GWH	3252.8	61.5	39.8	52.5	149.1	196.8	289.1	392.2	412.4	379.9	311.6	148.1	74.1	100.8	225.9	228.6	190.4
--BIG BEND--																	
EVAPORATION	71							5	15	19	16	4	2	2	9		
REG INFLOW	20512	399	257	339	951	1239	1795	2424	2563	2380	1965	942	473	648	1444	1472	1221
RELEASE	20512	399	257	339	951	1239	1795	2424	2563	2380	1965	942	473	648	1444	1472	1221
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	14.7	13.4	18.5	19.0	16.0	20.1	30.2	39.4	41.7	40.0	32.0	31.7	34.1	40.8	23.5	23.9	22.0
POWER																	
AVE POWER MW		64	87	89	75	94	141	184	195	189	156	158	169	202	118	117	105
PEAK POW MW		517	509	509	509	509	509	509	509	517	538	538	538	538	538	538	529
ENERGY GWH	1186.5	22.9	14.6	19.2	53.9	70.2	101.6	137.2	145.0	136.3	115.9	56.8	28.5	38.8	87.5	87.2	70.8
--FORT RANDALL--																	
NAT INFLOW	1500	148	69	89	425	220	150	90	85	80	30	20	9	11	15		60
DEPLETION	80	1	1	1	4	9	12	18	15	7	1	1	0	1	3	3	3
EVAPORATION	81							6	19	24	18	4	2	2	7		
REG INFLOW	21852	546	326	426	1372	1450	1933	2490	2614	2430	1975	957	480	655	1451	1469	1278
RELEASE	21852	254	192	426	1372	1450	1933	2490	2614	2576	2618	1278	596	681	1348	1119	904
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	9.0	8.6	13.8	23.9	23.1	23.6	32.5	40.5	42.5	43.3	42.6	43.0	42.9	42.9	21.9	18.2	16.3
POWER																	
AVE POWER MW		71	117	202	195	199	273	330	338	339	321	299	286	282	160	138	130
PEAK POW MW		351	356	356	356	356	356	356	356	350	319	296	287	285	294	319	339
ENERGY GWH	2073.1	25.6	19.6	43.6	140.3	148.2	196.6	245.6	251.8	244.0	238.9	107.8	48.1	54.1	119.2	102.6	87.0
--GAVINS POINT--																	
NAT INFLOW	2250	116	54	70	220	335	280	210	185	130	155	68	32	36	90	105	165
DEPLETION	114	0	0	0	5	19	24	39	10	-5	2	5	2	3	10	1	
CHAN STOR	-16	1	-10	-19	2	-1	-17	-15	-4	-1	1	-1	0	0	39	7	4
EVAPORATION	24							2	5	6	6	1	1	1	3		
REG INFLOW	23947	372	236	477	1589	1765	2172	2644	2780	2703	2767	1339	625	714	1463	1230	1073
RELEASE	23947	372	236	477	1589	1765	2172	2644	2767	2678	2767	1339	625	714	1463	1230	1111
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	12.5	17.0	26.7	26.7	28.7	36.5	43.0	45.0	45.0	45.0	45.0	45.0	45.0	23.8	20.0	20.0
POWER																	
AVE POWER MW		44	59	91	91	98	114	113	114	115	116	116	116	116	79	70	69
PEAK POW MW		114	114	114	114	114	114	113	114	116	116	116	116	116	78	78	76
ENERGY GWH	844.5	15.8	9.9	19.7	65.6	72.6	82.3	84.3	84.6	82.9	86.2	41.7	19.5	22.3	58.7	52.0	46.6
--GAVINS POINT - SIOUX CITY--																	
NAT INFLOW	3400	174	81	104	550	970	420	290	225	165	85	50	23	27	60	35	140
DEPLETION	270	7	3	4	23	36	31	39	37	25	11	6	3	3	13	14	15
REGULATED FLOW AT SIOUX CITY																	
KAF	27077	539	314	577	2116	2699	2561	2895	2955	2818	2841	1383	645	738	1510	1251	1236
KCFS		18.1	22.6	32.3	35.6	43.9	43.0	47.1	48.1	47.4	46.2	46.5	46.5	46.5	24.6	20.3	22.3
--TOTAL--																	
NAT INFLOW	34500	1658	773	994	3865	5315	8025	4730	1890	1470	1535	715	334	381	730	785	1300
DEPLETION	2779	15	7	9	-46	453	1872	1208	274	-178	-36	-138	-64	-73	-207	-214	-104
CHAN STOR	-31	86	-10	-19	-45	-50	-51	-12	-4	37	42	-1	0	0	11	-20	4
EVAPORATION	1235							85	266	329	282	66	30	35	142		
STORAGE	53445	54634	55076	55464	57215	59328	62869	63400	61791	60329	58819	58222	57944	57627	56923	56651	56823
SYSTEM POWER																	
AVE POWER MW		643	794	920	970	1180	1501	1723	1770	1665	1419	1392	1420	1520	1092	1108	1060
PEAK POW MW		2293	2295	2299	2323	2346	2385	2390	2377	2356	2332	2306	2295	2288	2250	2272	2282
ENERGY GWH	11455.8	231.5	133.3	198.7	698.6	878.1	1081.1	1281.8	1316.9	1199.1	1056.0	501.0	238.5	291.8	812.7	824.2	712.6
DAILY GWH		15.4	19.0	22.1	23.3	28.3	36.0	41.3	42.5	40.0	34.1	33.4	34.1	36.5	26.2	26.6	25.4
	INI-SUM	15MAR	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB

DATE OF STUDY 09/06/12 2012-2013 AOP UPPER QUARTILE RUNOFF 99001 9901 9901 PAGE 1

TIME OF STUDY 10:29:02 STUDY NO 5

VALUES IN 1000 AF EXCEPT AS INDICATED

	28FEB13		2013											2014			
	INI-SUM	15MAR	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB
--FORT PECK--																	
NAT INFLOW	8650	288	134	173	715	1445	2245	1100	410	340	480	190	89	101	310	270	360
DEPLETION	493	-35	-16	-21	-20	286	677	238	-49	-115	-74	-22	-10	-12	-107	-135	-91
EVAPORATION	319							21	67	84	73	17	8	9	38		
MOD INFLOW	7838	323	151	194	735	1159	1568	841	392	371	481	195	91	104	379	405	451
RELEASE	6869	179	83	107	476	584	714	738	738	533	369	179	83	95	646	707	639
STOR CHANGE	969	145	67	87	259	575	854	103	-346	-161	112	16	7	9	-267	-302	-188
STORAGE	13820	13964	14032	14119	14378	14953	15806	15909	15563	15402	15514	15530	15537	15546	15279	14977	14789
ELEV FTMSL	2229.3	2230.0	2230.3	2230.8	2232.0	2234.8	2238.7	2239.2	2237.6	2236.9	2237.4	2237.4	2237.5	2237.5	2236.3	2234.9	2234.0
DISCH KCFS	12.0	6.0	6.0	6.0	8.0	9.5	12.0	12.0	12.0	9.0	6.0	6.0	6.0	6.0	10.5	11.5	11.5
POWER																	
AVE POWER MW		81	81	81	108	129	161	162	162	123	83	83	83	83	143	154	153
PEAK POW MW		159	160	160	161	163	166	166	165	164	165	165	165	165	164	163	162
ENERGY GWH	1125.4	29.1	13.6	17.5	77.9	96.1	115.8	120.8	120.5	88.7	61.5	29.8	13.9	15.9	106.6	114.7	103.1
--GARRISON--																	
NAT INFLOW	12750	484	226	290	1230	1675	3130	2470	755	515	580	235	110	125	245	300	380
DEPLETION	1091	18	9	11	-108	30	992	698	98	-131	-6	-125	-58	-66	-119	-96	-56
CHAN STOR	5	61			-20	-15	-25			29	29				-44	-10	
EVAPORATION	372							25	79	99	85	20	9	11	43		
REG INFLOW	18161	705	300	386	1794	2214	2827	2485	1315	1109	898	518	242	276	922	1093	1075
RELEASE	16971	476	222	286	1279	1599	1607	1599	1599	1426	1353	655	305	349	1291	1537	1388
STOR CHANGE	1189	229	78	101	515	616	1221	886	-283	-318	-455	-137	-64	-73	-369	-444	-314
STORAGE	16922	17150	17229	17329	17844	18459	19680	20567	20283	19966	19511	19374	19311	19238	18869	18425	18111
ELEV FTMSL	1833.5	1834.3	1834.6	1834.9	1836.6	1838.6	1842.4	1845.0	1844.2	1843.3	1841.9	1841.5	1841.3	1841.1	1839.9	1838.5	1837.5
DISCH KCFS	23.5	16.0	16.0	16.0	21.5	26.0	27.0	26.0	26.0	24.0	22.0	22.0	22.0	22.0	21.0	25.0	25.0
POWER																	
AVE POWER MW		195	195	196	264	322	340	332	334	307	280	279	278	278	265	313	311
PEAK POW MW		456	457	459	465	472	493	500	499	498	484	482	482	481	477	472	468
ENERGY GWH	2584.4	70.1	32.8	42.3	190.0	239.7	245.0	247.3	248.4	220.8	208.3	100.3	46.8	53.4	197.4	232.9	208.8
--OAHE--																	
NAT INFLOW	3200	324	151	194	510	310	1045	195	95	125	65	63	29	33	-65	10	115
DEPLETION	709	24	11	15	50	73	151	182	122	30	-11	1	0	1	13	18	29
CHAN STOR	-6	31			-22	-18	-4	4		8	8		0	0	4	-16	
EVAPORATION	359							25	77	95	82	19	9	10	42		
REG INFLOW	19097	807	362	466	1717	1818	2497	1591	1495	1434	1355	697	325	372	1175	1513	1474
RELEASE	17879	424	269	353	1127	1314	1544	1760	1913	1949	1519	715	367	527	1352	1491	1257
STOR CHANGE	1218	383	94	112	590	504	953	-169	-418	-515	-164	-19	-42	-155	-176	23	218
STORAGE	17617	18000	18093	18205	18796	19300	20253	20084	19666	19151	18987	18968	18926	18771	18595	18617	18835
ELEV FTMSL	1603.5	1604.8	1605.1	1605.5	1607.4	1609.0	1611.9	1611.4	1610.1	1608.5	1608.0	1607.9	1607.8	1607.3	1606.7	1606.8	1607.5
DISCH KCFS	14.7	14.3	19.3	19.8	18.9	21.4	25.9	28.6	31.1	32.8	24.7	24.0	26.4	33.2	22.0	24.2	22.6
POWER																	
AVE POWER MW		181	247	253	243	277	340	377	407	425	320	311	342	427	283	311	292
PEAK POW MW		693	695	697	707	716	731	728	722	713	710	710	709	707	704	704	708
ENERGY GWH	2803.9	65.2	41.4	54.6	175.2	206.0	244.5	280.2	302.9	306.2	238.1	111.9	57.4	82.0	210.6	231.8	195.9
--BIG BEND--																	
EVAPORATION	71							5	15	19	16	4	2	2	9		
REG INFLOW	17808	424	269	353	1127	1314	1544	1755	1898	1930	1503	711	365	525	1343	1491	1257
RELEASE	17808	424	269	353	1127	1314	1544	1755	1898	1930	1503	711	365	525	1343	1491	1257
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	14.7	14.3	19.3	19.8	18.9	21.4	25.9	28.5	30.9	32.4	24.4	23.9	26.3	33.1	21.8	24.2	22.6
POWER																	
AVE POWER MW		68	91	93	89	100	121	134	144	154	120	120	132	165	110	119	108
PEAK POW MW		517	509	509	509	509	509	509	509	517	538	538	538	538	538	538	529
ENERGY GWH	1031.3	24.3	15.2	20.0	63.8	74.4	87.4	99.4	107.5	110.6	89.0	43.1	22.1	31.6	81.5	88.3	72.9
--FORT RANDALL--																	
NAT INFLOW	1200	131	61	78	285	180	140	80	75	70	15	15	7	8	10	-5	50
DEPLETION	80	1	1	1	4	9	12	18	15	7	1	1	0	1	3	3	3
EVAPORATION	81							6	19	24	18	4	2	2	7		
REG INFLOW	18848	553	329	431	1408	1485	1672	1811	1939	1970	1498	722	370	530	1344	1483	1304
RELEASE	18848	262	195	431	1408	1485	1672	1811	1939	2116	2142	1043	486	556	1241	1133	930
STOR CHANGE	0	291	134					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	9.0	8.8	14.0	24.1	23.7	24.1	28.1	29.5	31.5	35.6	34.8	35.0	35.0	35.0	20.2	18.4	16.7
POWER																	
AVE POWER MW		73	119	204	200	204	237	248	265	296	278	264	255	252	148	140	133
PEAK POW MW		351	356	356	356	356	356	356	356	350	319	296	287	285	294	319	339
ENERGY GWH	1848.2	26.4	19.9	44.0	143.9	151.7	170.5	184.5	197.3	213.4	207.0	95.0	42.9	48.5	109.9	103.8	89.5
--GAVINS POINT--																	
NAT INFLOW	2000	109	51	65	185	300	240	175	165	120	140	65	30	35	85	95	140
DEPLETION	114	0	0	0	5	19	24	39	10	-5	2	5	2	3	10	1	
CHAN STOR	-16	0	-10	-19	1	-1	-8	-3	-4	-8	1	0	0	0	27	3	3
EVAPORATION	24							2	5	6	6	1	1	1	3		
REG INFLOW	20693	372	236	477	1589	1765	1880	1943	2085	2227	2275	1101	514	587	1340	1230	1073
RELEASE	20693	372	236	477	1589	1765	1880	1943	2072	2202	2275	1101	514	587	1340	1230	1111
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	12.5	17.0	26.7	26.7	28.7	31.6	31.6	33.7	37.0	37.0	37.0	37.0	37.0	21.8	20.0	20.0
POWER																	
AVE POWER MW		44	59	91	91	98	105	105	110	116	117	117	117	117	74	70	69
PEAK POW MW		114	114	114	114	114	114	114	115	117	117	117	117	117	78	78	76
ENERGY GWH	827.0	15.8	9.9	19.7	65.6	72.6	75.3	77.8	81.7	83.5	86.9	42.1	19.6	22.4	55.4	52.0	46.6
--GAVINS POINT - SIOUX CITY--																	
NAT INFLOW	2800	145	68	87	450	800	340	240	180	135	70	43	20	23	50	30	120
DEPLETION	270	7	3	4	23	36	31	39	37	25	11	6	3	3	13	14	15
REGULATED FLOW AT SIOUX CITY																	
KAF	23223	510	300	560	2016	2529	2189	2144	2215	2312	2334	1137	531	607	1377	1246	1216
KCFS		17.2	21.6	31.4	33.9	41.1	36.8	34.9	36.0	38.8	38.0	38.2	38.2	38.2	22.4	20.3	21.9
--TOTAL--																	
NAT INFLOW	30600	1481	691	888	3375	4710	7140	4260	1680	1305	1350	610	285	325	635	700	1165
DEPLETION	2757	15	7	9	-46	453	1887	1214	233	-189	-77	-134	-62	-71	-187	-195	-100
CHAN STOR	-16	92	-10	-19	-41	-34	-36	1	-4	30	38	-1	0	-1	-11	-23	3
EVAPORATION	1226							83	262	327	281	66	31	35	142		
STORAGE	53445	54492	54866	55166	56530	58224	61252	62072	61037	59923	58772	58312	58098	57852	57143	56770	56822
SYSTEM POWER																	
AVE POWER MW		641	791	917	995	1130	1304	1358	1422	1421	1197	1173	1206	1322	1023	1107	1067
PEAK POW MW		2291	2291	2295	2313	2330	2369	2373	2366	2360	2333	2308	2298	2293	2254	2274	2282
ENERGY GWH	10220.0	230.9	132.9	198.1	716.4	840.6	938.5	1010.0	1058.3	1023.3	890.8	422.2	202.7	253.8	761.4	823.5	716.7
DAILY GWH		15.4	19.0	22.0	23.9	27.1	31.3	32.6	34.1	34.1	28.7	28.1	29.0	31.7	24.6	26.6	25.6

INI-SUM 15MAR 22MAR 31MAR 30APR 31MAY 30JUN 31JUL 31AUG 30SEP 31OCT 15NOV 22NOV 30NOV 31DEC 31JAN 28FEB

VALUES IN 1000 AF EXCEPT AS INDICATED

28FEB13	INI-SUM	15MAR (2013)	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV (2014)	31DEC	31JAN	28FEB
--FORT PECK--																	
NAT INFLOW	7200	227	106	136	600	1180	1810	840	320	295	430	180	84	96	300	250	345
DEPLETION	456	-7	-3	-4	36	250	528	242	14	-68	-48	-43	-20	-23	-135	-156	-108
EVAPORATION	432							27	83	103	90	41	19	22	47		
MOD INFLOW	6312	234	109	140	564	930	1282	571	223	260	388	182	85	97	388	406	453
RELEASE	6045	179	83	107	476	553	595	615	615	438	307	149	69	103	584	615	555
STOR CHANGE	267	56	26	33	88	377	687	-43	-392	-179	80	33	15	-6	-196	-209	-102
STORAGE	13313	13368	13394	13428	13516	13892	14579	14536	14144	13965	14045	14078	14094	14087	13891	13682	13580
ELEV FTMSL	2226.7	2227.0	2227.1	2227.3	2227.7	2229.6	2233.0	2232.8	2230.9	2230.0	2230.4	2230.6	2230.6	2230.6	2229.6	2228.6	2228.1
DISCH KCFS	12.0	6.0	6.0	6.0	8.0	9.0	10.0	10.0	10.0	7.4	5.0	5.0	5.0	6.5	9.5	10.0	10.0
POWER																	
AVE POWER MW		80	80	80	107	121	135	135	135	99	67	68	68	88	128	134	134
PEAK POW MW		157	157	157	158	159	161	161	160	159	160	160	160	160	159	158	158
ENERGY GWH	983.2	28.8	13.5	17.3	76.9	89.7	97.1	100.8	100.4	71.5	50.2	24.3	11.4	16.8	95.1	99.6	89.7
--GARRISON--																	
NAT INFLOW	10900	460	214	276	870	1330	3100	1890	610	470	505	198	92	105	180	270	330
DEPLETION	1111	21	10	13	45	136	811	660	123	-150	-33	-130	-60	-69	-121	-91	-54
CHAN STOR	20	61			-20	-10	-10			26	23			-15	-30	-5	
EVAPORATION	501							31	97	121	105	47	22	25	54		
REG INFLOW	15353	678	288	370	1281	1737	2874	1814	1005	963	764	429	200	238	802	971	939
RELEASE	15025	476	222	286	1160	1445	1458	1445	1445	1164	984	476	222	262	1230	1445	1305
STOR CHANGE	328	202	66	84	120	292	1416	369	-440	-201	-219	-47	-22	-24	-428	-474	-366
STORAGE	16300	16502	16567	16652	16772	17065	18481	18850	18409	18208	17989	17942	17920	17896	17467	16993	16628
ELEV FTMSL	1831.4	1832.1	1832.3	1832.6	1833.0	1834.0	1838.7	1839.9	1838.5	1837.8	1837.1	1836.9	1836.9	1836.8	1835.4	1833.8	1832.5
DISCH KCFS	23.0	16.0	16.0	16.0	19.5	23.5	24.5	23.5	23.5	19.6	16.0	16.0	16.0	16.5	20.0	23.5	23.5
POWER																	
AVE POWER MW		192	193	193	235	284	301	294	294	244	199	199	198	204	246	286	283
PEAK POW MW		448	449	450	452	455	473	477	472	469	467	466	466	466	460	454	450
ENERGY GWH	2233.0	69.1	32.4	41.7	169.3	211.3	217.0	219.1	218.9	175.7	148.1	71.5	33.3	39.3	183.2	212.8	190.4
--OAHE--																	
NAT INFLOW	2300	232	108	139	405	195	780	160	75	95	35	30	14	16	-80		95
DEPLETION	709	24	11	15	50	73	151	182	122	30	-11	1	0	1	13	18	29
CHAN STOR	-2	30			-15	-17	-4	4		17	15			-2	-15	-15	0
EVAPORATION	462							29	91	112	95	43	20	23	50		
REG INFLOW	16152	714	319	410	1501	1550	2083	1398	1307	1134	950	462	216	252	1072	1412	1371
RELEASE	15815	441	260	322	1167	1387	1609	1843	1973	1753	1253	559	295	218	817	1047	871
STOR CHANGE	337	273	59	89	334	164	474	-445	-666	-619	-303	-96	-79	34	255	365	501
STORAGE	16978	17251	17310	17398	17732	17895	18369	17924	17258	16639	16336	16240	16161	16195	16449	16814	17315
ELEV FTMSL	1601.3	1602.2	1602.4	1602.7	1603.9	1604.4	1606.0	1604.5	1602.2	1600.1	1599.0	1598.6	1598.3	1598.5	1599.4	1600.7	1602.4
DISCH KCFS	15.3	14.8	18.8	18.0	19.6	22.6	27.0	30.0	32.1	29.5	20.4	18.8	21.2	13.7	13.3	17.0	15.7
POWER																	
AVE POWER MW		186	236	227	248	286	344	381	404	366	252	231	261	169	164	211	196
PEAK POW MW		680	681	683	689	692	700	692	680	669	663	661	660	660	665	672	681
ENERGY GWH	2400.9	66.9	39.6	49.0	178.3	212.7	247.8	283.6	300.3	263.9	187.5	83.3	43.8	32.5	122.2	157.3	132.0
--BIG BEND--																	
EVAPORATION	103							6	20	25	22	10	5	5	11		
REG INFLOW	15711	441	260	322	1167	1387	1609	1837	1953	1728	1231	549	290	213	806	1047	871
RELEASE	15711	441	260	322	1167	1387	1609	1837	1953	1728	1231	549	290	213	806	1047	871
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	15.3	14.8	18.8	18.0	19.6	22.6	27.0	29.9	31.8	29.0	20.0	18.5	20.9	13.4	13.1	17.0	15.7
POWER																	
AVE POWER MW		70	88	84	92	106	127	140	149	138	98	93	105	68	66	84	75
PEAK POW MW		517	509	509	509	509	509	509	509	517	538	538	538	538	538	538	529
ENERGY GWH	907.0	25.3	14.8	18.2	66.1	78.6	91.1	104.0	110.6	99.1	73.1	33.4	17.6	13.0	49.3	62.3	50.5
--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	16415	558	315	392	1318	1518	1732	1881	1978	1720	1206	548	290	214	798	1034	913
RELEASE	16415	266	181	392	1318	1518	1732	1881	1978	1866	1849	869	406	240	696	684	539
STOR CHANGE	0	291	134					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	9.4	9.0	13.0	22.0	22.2	24.7	29.1	30.6	32.2	31.4	30.1	29.2	29.3	15.1	11.3	11.1	9.7
POWER																	
AVE POWER MW		74	110	186	187	208	245	257	270	262	241	221	214	110	83	85	78
PEAK POW MW		351	356	356	356	356	356	356	356	350	319	296	287	285	293	319	339
ENERGY GWH	1626.2	26.8	18.5	40.1	134.9	155.1	176.5	191.5	201.2	188.6	179.1	79.4	36.0	21.2	62.0	63.1	52.1
--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	-2	1	-8	-17	0	-5	-8	-3	-3	2	2	2	0	26	7	0	3
EVAPORATION	36							2	6	9	8	3	2	2	4		
REG INFLOW	17763	372	222	438	1458	1654	1874	1937	2048	1959	1961	922	430	294	769	769	656
RELEASE	17763	372	222	438	1458	1654	1874	1937	2035	1934	1961	922	430	294	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	12.5	16.0	24.5	24.5	26.9	31.5	31.5	33.1	32.5	31.9	31.0	31.0	18.5	12.5	12.5	12.5
POWER																	
AVE POWER MW		44	56	84	84	92	104	104	108	109	108	106	106	65	44	44	44
PEAK POW MW		114	114	114	114	114	114	114	115	117	117	117	117	117	78	78	76
ENERGY GWH	728.3	15.8	9.3	18.1	60.4	68.3	75.2	77.7	80.7	78.2	80.5	38.2	17.8	12.5	33.0	33.0	29.6
--GAVINS POINT - SIOUX CITY--																	
NAT INFLOW	1800	140	65	84	310	355	160	190	130	110	60	30	14	16	25	25	85
DEPLETION	270	7	3	4	23	36	31	39	37	25	11	6	3	3	13	14	15
REGULATED FLOW AT SIOUX CITY																	
KAF	19293	505	284	518	1745	1973	2003	2088	2128	2019	2010	946	442	306	781	780	764
KCFS		17.0	20.5	29.0	29.3	32.1	33.7	34.0	34.6	33.9	32.7	31.8	31.8	19.3	12.7	12.7	13.8
--TOTAL--																	
NAT INFLOW	24600	1283	598	769	2485	3360	6160	3250	1290	1095	1150	508	237	271	510	620	1015
DEPLETION	2740	46	22	28	163	523	1557	1180	321	-161	-78	-159	-74	-85	-217	-211	-115
CHAN STOR	16	92	-8	-17	-35	-31	-23	1	-3	44	41	1	0	10	-38	-20	3
EVAPORATION	1651							103	323	400	344	153	71	81	175		
STORAGE	51676	52499	52783	52990	53532	54364	56941	56821	55336	54217	53131	52699	52498	52476	52209	52240	52609
SYSTEM POWER																	
AVE POWER MW		646	762	854	953	1096	1256	1313	1360	1218	966	917	952	705	732	844	810
PEAK POW MW		2267	2267	2270	2277	2286	2314	2310	2292	2282	2263	2238	2228	2226	2194	2219	2233
ENERGY GWH	8878.5	232.6	128.1	184.5	685.9	815.7	904.6	976.7	1012.2	876.9	718.5	330.1	160.0	135.4	544.8	628.1	544.4
DAILY GWH		15.5	18.3	20.5	22.9	26.3	30.2	31.5	32.7	29.2	23.2	22.0	22.9	16.9	17.6	20.3	19.4

INI-SUM 15MAR 22MAR 31MAR 30APR 31MAY 30JUN 31JUL 31AUG 30SEP 31OCT 15NOV 22NOV 30NOV 31DEC 31JAN 28FEB

VALUES IN 1000 AF EXCEPT AS INDICATED

	28FEB13 INI-SUM	2013 15MAR	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	2014 30NOV	31DEC	31JAN	28FEB
--FORT PECK--																	
NAT INFLOW	5950	203	95	122	485	950	1470	650	280	250	340	160	75	85	260	220	305
DEPLETION	366	-2	-1	-1	46	163	348	187	48	-65	-46	-28	-13	-15	-93	-96	-65
EVAPORATION	498							31	97	120	104	47	22	25	54		
MOD INFLOW	5086	206	96	123	439	787	1122	432	135	195	282	141	66	75	299	316	370
RELEASE	5938	179	83	107	417	584	565	584	584	466	369	179	83	103	523	584	528
STOR CHANGE	-851	27	13	16	22	203	557	-152	-449	-271	-86	-37	-17	-28	-223	-268	-158
STORAGE	12724	12751	12763	12780	12802	13005	13562	13409	12961	12690	12604	12566	12549	12521	12298	12030	11872
ELEV FTMSL	2223.6	2223.7	2223.8	2223.9	2224.0	2225.1	2228.0	2227.2	2224.8	2223.4	2222.9	2222.7	2222.6	2222.5	2221.3	2219.8	2218.9
DISCH KCFS	11.5	6.0	6.0	6.0	7.0	9.5	9.5	9.5	9.5	7.8	6.0	6.0	6.0	6.5	8.5	9.5	9.5
POWER																	
AVE POWER MW		79	79	79	92	125	126	127	126	103	79	79	79	85	111	123	123
PEAK POW MW		154	154	154	154	156	158	157	155	154	153	153	153	153	152	150	149
ENERGY GWH	946.0	28.5	13.3	17.1	66.5	93.4	91.0	94.3	93.9	74.4	58.8	28.4	13.2	16.4	82.6	91.7	82.4
--GARRISON--																	
NAT INFLOW	9150	419	195	251	700	1100	2620	1580	500	390	420	165	77	88	150	220	275
DEPLETION	1142	25	12	15	49	156	650	563	166	-91	5	-115	-54	-61	-88	-57	-33
CHAN STOR	20	57			-10	-26				17	19			-5	-20	-10	
EVAPORATION	586							36	114	141	122	55	26	29	63		
REG INFLOW	13380	629	267	343	1057	1503	2535	1565	804	823	680	404	188	218	678	851	836
RELEASE	14429	476	222	286	1012	1291	1369	1353	1353	1151	1045	506	236	270	1168	1414	1277
STOR CHANGE	-1049	153	45	57	46	211	1167	212	-549	-329	-365	-102	-48	-52	-491	-563	-442
STORAGE	15579	15731	15776	15833	15879	16090	17257	17469	16921	16592	16227	16124	16077	16025	15535	14971	14529
ELEV FTMSL	1828.8	1829.3	1829.5	1829.7	1829.9	1830.6	1834.7	1835.4	1833.5	1832.4	1831.1	1830.7	1830.6	1830.4	1828.6	1826.6	1824.9
DISCH KCFS	22.0	16.0	16.0	16.0	17.0	21.0	23.0	22.0	22.0	19.4	17.0	17.0	17.0	17.0	19.0	23.0	23.0
POWER																	
AVE POWER MW		189	189	189	201	249	277	269	268	234	204	203	202	202	224	268	264
PEAK POW MW		438	439	440	440	443	458	460	453	449	445	443	443	442	436	428	422
ENERGY GWH	2078.3	67.9	31.8	40.9	145.0	185.1	199.1	199.9	199.2	168.2	151.7	73.0	34.0	38.8	166.9	199.1	177.6
--OAHE--																	
NAT INFLOW	1350	208	97	125	200	130	295	140	65	75	15	13	6	7	-90	-10	75
DEPLETION	709	24	11	15	50	73	151	182	122	30	-11	1	0	1	13	18	29
CHAN STOR	-5	26			-4	-17	-9	4		12	11	0			-9	-19	
EVAPORATION	519							33	102	125	107	48	23	26	56		
REG INFLOW	14546	686	308	396	1157	1331	1504	1282	1194	1084	975	469	219	250	1000	1368	1323
RELEASE	15622	504	290	374	1293	1506	1533	1811	1834	1624	1112	469	254	198	868	1062	891
STOR CHANGE	-1076	182	18	22	-136	-175	-29	-529	-640	-540	-137	0	-35	52	132	305	433
STORAGE	16239	16421	16439	16461	16326	16151	16122	15592	14953	14413	14275	14275	14241	14293	14425	14730	15162
ELEV FTMSL	1598.6	1599.3	1599.4	1599.4	1598.9	1598.3	1598.2	1596.2	1593.8	1591.7	1591.1	1591.1	1591.0	1591.2	1591.7	1592.9	1594.6
DISCH KCFS	16.0	16.9	20.9	20.9	21.7	24.5	25.8	29.5	29.8	27.3	18.1	15.8	18.3	12.5	14.1	17.3	16.0
POWER																	
AVE POWER MW		209	258	259	268	301	316	359	359	324	214	186	216	148	167	205	192
PEAK POW MW		665	665	665	663	660	659	649	637	627	624	624	623	624	627	633	641
ENERGY GWH	2283.0	75.2	43.3	55.8	193.0	223.9	227.3	266.7	266.7	233.5	159.2	67.1	36.2	28.3	124.5	152.9	129.3
--BIG BEND--																	
EVAPORATION	129							8	24	31	27	12	6	7	14		
REG INFLOW	15493	504	290	374	1293	1506	1533	1804	1809	1593	1085	457	248	191	854	1062	891
RELEASE	15493	504	290	374	1293	1506	1533	1804	1809	1593	1085	457	248	191	854	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 KCFS	16.0	16.9	20.9	20.9	21.7	24.5	25.8	29.3	29.4	26.8	17.6	15.3	17.9	12.1	13.9	17.3	16.0
POWER																	
AVE POWER MW		80	98	98	102	115	121	137	138	127	87	77	90	61	70	85	77
PEAK POW MW		517	509	509	509	509	509	509	509	517	538	538	538	538	538	538	529
ENERGY GWH	894.0	28.9	16.4	21.2	73.2	85.3	86.8	102.1	102.5	91.4	64.5	27.8	15.1	11.7	52.1	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	1	0	1	3	3	3
EVAPORATION	146							10	32	39	31	12	5	5	12		
REG INFLOW	15717	575	323	416	1379	1562	1646	1811	1788	1547	1033	436	239	182	808	1044	928
RELEASE	15717	284	189	416	1379	1562	1646	1811	1788	1693	1676	757	355	208	706	694	554
STOR CHANGE	0	291	134					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	9.9	9.5	13.6	23.3	23.2	25.4	27.7	29.4	29.1	28.5	27.3	25.4	25.6	13.1	11.5	11.3	10.0
POWER																	
AVE POWER MW		79	115	197	196	214	233	248	245	238	219	193	187	96	85	86	80
PEAK POW MW		351	356	356	356	356	356	356	356	350	319	296	287	285	293	319	339
ENERGY GWH	1559.2	28.5	19.3	42.6	141.0	159.5	167.9	184.5	182.2	171.4	162.7	69.3	31.5	18.4	62.9	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	1	-8	-19	0	-4	-4	-3	1	1	2	3	0	23	3	0	2
EVAPORATION	45							3	8	11	10	4	2	2	5		
REG INFLOW	16857	372	222	450	1499	1679	1767	1851	1845	1768	1777	803	375	254	769	769	656
RELEASE	16857	372	222	450	1499	1679	1767	1851	1832	1743	1777	803	375	254	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	12.5	16.0	25.2	25.2	27.3	29.7	30.1	29.8	29.3	28.9	27.0	27.0	16.0	12.5	12.5	12.5
POWER																	
AVE POWER MW		44	56	86	86	93	100	101	101	101	101	95	95	57	44	44	44
PEAK POW MW		114	114	114	114	114	114	114	115	117	117	117	117	117	78	78	76
ENERGY GWH	701.9	15.8	9.3	18.6	62.1	69.2	72.1	75.2	75.1	72.8	75.1	34.1	15.9	10.9	33.0	33.0	29.6
--GAVINS POINT - SIOUX CITY--																	
NAT INFLOW	1100	121	56	73	145	185	95	120	80	65	35	23	11	12	10	20	50
DEPLETION	270	7	3	4	23	36	31	39	37	25	11	6	3	3	13	14	15
REGULATED FLOW AT SIOUX CITY																	
KAF	17687	486	275	519	1621	1828	1831	1932	1875	1783	1801	820	383	263	766	775	729
KCFS		16.3	19.8	29.1	27.2	29.7	30.8	31.4	30.5	30.0	29.3	27.6	27.6	16.6	12.5	12.6	13.1
--TOTAL--																	
NAT INFLOW	19300	1111	518	666	1745	2570	4755	2610	1025	860	900	405	189	216	375	510	845
DEPLETION	2681	55	26	33	177	456	1216	1028	398	-99	-38	-130	-61	-69	-142	-117	-51
CHAN STOR	14	84	-8	-19	-14	-47	-13	1	1	30	32	3	0	18	-27	-29	2
EVAPORATION	1923							121	376	466	401	178	83	94	204		
STORAGE	49628	50281	50490	50587	50519	50758	52453	51983	50359	49098	47866	47406	47190	47137	46658	46482	46651
SYSTEM POWER																	
AVE POWER MW		680	795	908	946	1097	1172	1240	1236	1127	903	832	869	649	702	812	780
PEAK POW MW		2239	2237	2239	2237	2238	2254	2247	2227	2215	2196	2172	2161	2159	2124	2146	2156
ENERGY GWH	8462.3	244.8	133.5	196.2	680.8	816.4	844.2	922.9	919.5	811.6	672.0	299.7	146.0	124.5	522.1	603.9	524.2
DAILY GWH		16.3	19.1	21.8	22.7	26.3	28.1	29.8	29.7	27.1	21.7	20.0	20.9	15.6	16.8	19.5	18.7
	INI-SUM	15MAR	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB

VALUES IN 1000 AF EXCEPT AS INDICATED

28FEB13		2013												2014			
	INI-SUM	15MAR	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB
--FORT PECK--																	
NAT INFLOW	5300	189	88	113	470	830	1180	590	260	240	310	155	72	83	220	210	290
DEPLETION	371	-2	-1	-1	46	163	348	195	17	-99	-83	-21	-10	-11	-71	-60	-38
EVAPORATION	484							30	93	116	101	46	21	24	52		
MOD INFLOW	4445	191	89	115	424	667	832	365	150	223	292	130	61	70	239	270	328
RELEASE	5947	179	83	107	536	553	565	584	584	461	369	179	83	119	492	553	500
STOR CHANGE	-1502	13	6	8	-112	114	267	-219	-435	-238	-77	-48	-22	-49	-253	-283	-172
STORAGE	12724	12736	12742	12750	12638	12752	13018	12799	12365	12127	12050	12002	11979	11930	11677	11394	11222
ELEV FTMSL	2223.6	2223.6	2223.7	2223.7	2223.1	2223.7	2225.1	2224.0	2221.6	2220.3	2219.9	2219.6	2219.5	2219.2	2217.8	2216.2	2215.2
DISCH KCFS	11.5	6.0	6.0	6.0	9.0	9.0	9.5	9.5	9.5	7.7	6.0	6.0	6.0	7.5	8.0	9.0	9.0
POWER																	
AVE POWER MW		79	79	79	118	118	125	125	125	101	78	78	78	97	103	115	114
PEAK POW MW		154	154	154	154	154	156	154	152	151	150	150	150	150	148	146	145
ENERGY GWH	937.7	28.5	13.3	17.1	85.2	88.0	90.3	93.4	92.7	72.6	58.0	28.0	13.1	18.6	76.6	85.6	76.8
--GARRISON--																	
NAT INFLOW	7400	365	170	219	575	1060	2200	1080	360	160	390	148	69	79	135	135	255
DEPLETION	1083	25	12	15	64	172	584	522	148	-95	-3	-109	-51	-58	-74	-42	-26
CHAN STOR	25	57			-31		-5			18	18			-16	-5	-10	
EVAPORATION	568							35	111	137	118	53	25	28	60		
REG INFLOW	11722	576	242	311	1016	1441	2176	1107	685	596	662	382	178	212	635	720	781
RELEASE	13566	446	208	268	952	1230	1309	1291	1291	1069	953	461	215	246	1168	1291	1166
STOR CHANGE	-1845	130	34	44	64	212	867	-185	-606	-473	-291	-79	-37	-34	-533	-571	-385
STORAGE	15579	15708	15742	15786	15850	16061	16928	16744	16138	15665	15373	15294	15257	15223	14690	14119	13734
ELEV FTMSL	1828.8	1829.2	1829.4	1829.5	1829.8	1830.5	1833.5	1832.9	1830.8	1829.1	1828.0	1827.7	1827.6	1827.5	1825.5	1823.3	1821.8
DISCH KCFS	22.0	15.0	15.0	15.0	16.0	20.0	22.0	21.0	21.0	18.0	15.5	15.5	15.5	15.5	19.0	21.0	21.0
POWER																	
AVE POWER MW		177	177	178	189	237	264	254	251	213	182	181	181	181	220	239	236
PEAK POW MW		438	438	439	440	443	454	451	443	437	433	432	432	431	424	416	411
ENERGY GWH	1930.3	63.7	29.8	38.3	136.4	176.3	189.8	188.7	187.1	153.3	135.6	65.3	30.4	34.8	163.6	178.1	158.9
--OAHE--																	
NAT INFLOW	1150	196	91	118	170	115	255	125	50	65	5	8	4	4	-100	-20	65
DEPLETION	709	24	11	15	50	73	151	182	122	30	-11	1	0	1	13	18	29
CHAN STOR	4	31		0	-4	-18	-9	4		14	12				-17	-10	
EVAPORATION	507							32	99	122	105	47	22	25	55		
REG INFLOW	13504	649	288	371	1068	1254	1404	1206	1120	997	876	421	196	224	984	1244	1202
RELEASE	15395	514	294	377	1302	1515	1547	1750	1780	1573	1059	443	221	159	888	1072	901
STOR CHANGE	-1891	135	-6	-7	-234	-260	-142	-544	-660	-576	-182	-23	-25	66	95	172	301
STORAGE	16239	16373	16367	16361	16127	15866	15724	15180	14519	13943	13761	13738	13714	13779	13875	14046	14348
ELEV FTMSL	1598.6	1599.1	1599.1	1599.1	1598.2	1597.3	1596.7	1594.7	1592.1	1589.8	1589.0	1588.9	1588.8	1589.1	1589.5	1590.2	1591.4
DISCH KCFS	16.0	17.3	21.2	21.1	21.9	24.6	26.0	28.5	29.0	26.4	17.2	14.9	15.9	10.0	14.4	17.4	16.2
POWER																	
AVE POWER MW		213	261	261	269	301	316	344	345	311	201	174	186	117	169	204	191
PEAK POW MW		664	663	663	659	654	652	642	629	617	614	613	613	614	616	620	626
ENERGY GWH	2231.4	76.7	43.9	56.3	193.8	224.1	227.7	255.7	256.7	223.9	149.8	62.6	31.2	22.5	125.8	152.1	128.6
--BIG BEND--																	
EVAPORATION	129							8	24	31	27	12	6	7	14		
REG INFLOW	15266	514	294	377	1302	1515	1547	1743	1756	1542	1031	431	215	152	874	1072	901
RELEASE	15266	514	294	377	1302	1515	1547	1743	1756	1542	1031	431	215	152	874	1072	901
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	17.3	21.2	21.1	21.9	24.6	26.0	28.3	28.6	25.9	16.8	14.5	15.5	9.6	14.2	17.4	16.2
POWER																	
AVE POWER MW		82	99	99	102	115	122	133	134	123	82	73	78	49	72	86	78
PEAK POW MW		517	509	509	509	509	509	509	509	517	538	538	538	538	538	538	529
ENERGY GWH	880.7	29.5	16.7	21.4	73.8	85.8	87.6	98.7	99.4	88.4	61.3	26.3	13.1	9.3	53.4	63.8	52.3
--FORT RANDALL--																	
NAT INFLOW	350	68	32	41	85	60	115	25	15	-10	-30	-13	-6	-7	-40	-20	35
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	15389	580	325	417	1383	1566	1650	1740	1724	1486	970	405	204	140	819	1049	933
RELEASE	15389	289	191	417	1383	1566	1650	1740	1724	1632	1613	726	320	166	716	699	559
STOR CHANGE	0	291	134					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	9.9	9.7	13.8	23.4	23.2	25.5	27.7	28.3	28.0	27.4	26.2	24.4	23.0	10.5	11.6	11.4	10.1
POWER																	
AVE POWER MW		81	116	197	196	215	234	238	236	230	211	185	169	77	86	87	80
PEAK POW MW		351	356	356	356	356	356	356	356	350	319	296	287	285	293	319	339
ENERGY GWH	1527.9	29.0	19.6	42.7	141.4	159.9	168.3	177.4	175.8	165.3	156.6	66.5	28.4	14.7	63.8	64.4	54.0
--GAVINS POINT--																	
NAT INFLOW	1200	82	38	49	115	130	140	80	65	70	100	48	22	25	70	70	95
DEPLETION	114	0	0	0	5	19	24	39	10	-5	2	5	2	3	10	1	
CHAN STOR	-1	0	-8	-18	0	-4	-4	-1	0	1	2	3	3	23	-2	1	2
EVAPORATION	45							3	8	11	10	4	2	2	5		
REG INFLOW	16429	372	222	448	1493	1673	1761	1777	1772	1697	1703	768	340	209	769	769	656
RELEASE	16429	372	222	448	1493	1673	1761	1777	1759	1672	1703	768	340	209	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	12.5	16.0	25.1	25.1	27.2	29.6	28.9	28.6	28.1	27.7	25.8	24.5	13.2	12.5	12.5	12.5
POWER																	
AVE POWER MW		44	56	86	86	93	100	98	98	97	97	90	86	47	44	44	44
PEAK POW MW		114	114	114	114	114	114	114	115	117	117	117	117	117	78	78	76
ENERGY GWH	686.3	15.8	9.3	18.6	61.8	69.0	72.0	73.1	72.7	70.2	72.2	32.6	14.5	9.0	33.0	33.0	29.6
--GAVINS POINT - SIOUX CITY--																	
NAT INFLOW	700	87	41	52	90	120	65	70	40	35	25	18	8	9	5	15	20
DEPLETION	270	7	3	4	23	36	31	39	37	25	11	6	3	3	13	14	15
REGULATED FLOW AT SIOUX CITY																	
KAF	16859	452	260	497	1560	1757	1795	1808	1762	1682	1717	779	346	216	761	770	699
KCFS		15.2	18.7	27.8	26.2	28.6	30.2	29.4	28.6	28.3	27.9	26.2	24.9	13.6	12.4	12.5	12.6
--TOTAL--																	
NAT INFLOW	16100	987	461	592	1505	2315	3955	1970	790	560	800	363	169	193	290	390	760
DEPLETION	2627	54	25	33	192	472	1150	995	349	-137	-83	-117	-55	-62	-106	-66	-17
CHAN STOR	27	88	-8	-18	-35	-22	-18	3	0	33	32	3	3	8	-25	-19	2
EVAPORATION	1879							118	368	456	392	174	81	92	198		
STORAGE	49628	50196	50364	50409	50126	50191	51182	50235	48547	47139	45945	45474	45274	45230	44643	44310	44390
SYSTEM POWER																	
AVE POWER MW		675	789	900	962	1079	1161	1192	1189	1074	852	782	778	567	694	776	744
PEAK POW MW		2238	2235	2236	2232	2231	2241	2227	2205	2190	2171	2147	2137	2135	2098	2117	2125
ENERGY GWH	8194.3	243.1	132.6	194.3	692.4	803.1	835.6	886.9	884.4	773.6	633.6	281.4	130.7	108.9	516.3	577.1	500.2
DAILY GWH		16.2	18.9	21.6	23.1	25.9	27.9	28.6	28.5	25.8	20.4	18.8	18.7	13.6	16.7	18.6	17.9
	INI-SUM	15MAR	22MAR	31MAR	30APR	31MAY	30JUN	31JUL	31AUG	30SEP	31OCT	15NOV	22NOV	30NOV	31DEC	31JAN	28FEB