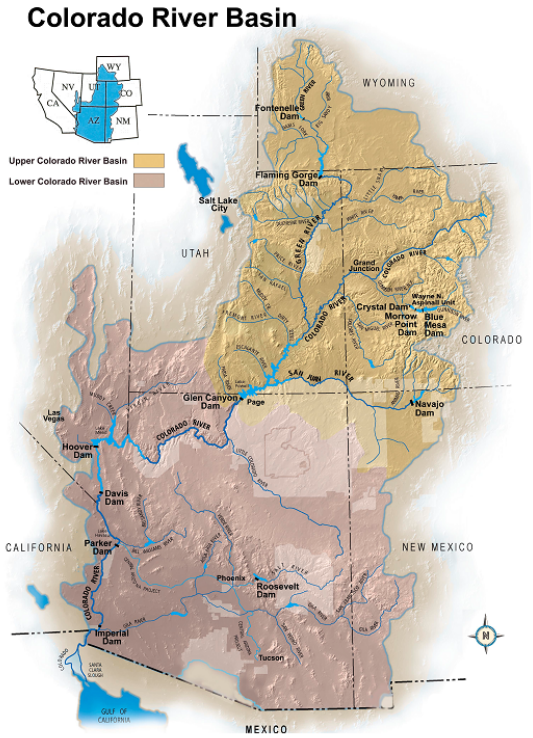
RECLAMATION

Managing Water in the West

DRAFT Annual Operating Plan for Colorado River Reservoirs 2011

[Teal highlighting (xx) indicates values or verbiage that may need to be modified in response to actual conditions that occur after the date of this draft.]



U.S. Department of the Interior
Bureau of Reclamation

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INTRODUCTION

Background

Each year's Annual Operating Plan (AOP) for Colorado River Reservoirs reports on both the past operations of the Colorado River reservoirs for the completed year as well as projected operations and releases from these reservoirs for the current (i.e., upcoming) year. Accordingly, this 2011 AOP reports on 2010 operations as well as projected operations for 2011. In recent years, additional operational rules, guidelines, and decisions have been put into place for Colorado River reservoirs including the 1996 Glen Canyon Dam Record of Decision[1] (ROD), the 1997 Operating Criteria for Glen Canyon Dam,[2] the 1999 Off-stream Storage of Colorado River Water Rule (43 CFR Part 414),[3] the 2001 Interim Surplus Guidelines[4] addressing operation of Hoover Dam, the 2006 Flaming Gorge Dam ROD,[5] the 2006 Navajo Dam ROD[6] to implement recommended flows for endangered fish, the 2007 Interim Guidelines for the operations of Lake Powell and Lake Mead,[7] and numerous environmental assessments addressing experimental releases from Glen Canyon Dam. Each AOP incorporates these rules, guidelines, and decisions and implements the criteria contained in the applicable decision document or documents. Thus, the AOP makes projections and reports on how the Bureau of Reclamation (Reclamation) will implement these decisions in response to changing water supply conditions as they unfold during the upcoming year, when conditions become known.

The Secretary of the Interior (Secretary) recognized in the 2007 Interim Guidelines that the AOP serves to integrate numerous federal policies affecting reservoir operations: *"The AOP is used to memorialize operational decisions that are made pursuant to individual federal actions (e.g., ISG* [the 2001 Interim Surplus Guidelines], *1996 Glen Canyon Dam ROD, this* [2007 Interim Guidelines] *ROD). Thus, the AOP serves as a single, integrated reference document required by section 602(b) of the CRBPA of 1968* [Colorado River Basin Project Act of September 30, 1968 (Public Law 90-537)] *regarding past and anticipated operations."*

[1] ROD for the Operation of Glen Canyon Dam, October 9, 1996.
[2] Operating Criteria for Glen Canyon Dam (62 *Federal Register* 9447, March 3, 1997).
[3] Off-stream Storage of Colorado River Water; Development and Release of Intentionally Created Unused Apportionment in the Lower Division States: Final Rule (43 CFR Part 414; 64 *Federal Register* 59006, November 1, 1999).
[4] ROD for the Colorado River Interim Surplus Guidelines, January 16, 2001 (67 *Federal Register* 7772, January 25, 2001).
[5] ROD for the Operation of Flaming Gorge Dam, February 16, 2006.
[6] ROD for Navajo Reservoir Operation, Navajo Unit – San Juan River, New Mexico, Colorado, Utah, July 31, 2006.
[7] ROD for Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead (73 *Federal Register* 19873, April 11, 2008). The ROD adopting the Interim Guidelines was signed by the Secretary on December 13, 2007.

Authority

This 2011 AOP was developed in accordance with the processes set forth in: Section 602 of the CRBPA; the Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs Pursuant to the Colorado River Basin Project Act of September 30, 1968 (P. L. 90-537) (Operating Criteria), as amended, promulgated by the Secretary; and Section 1804(c)(3) of the Grand Canyon Protection Act of 1992 (Public Law 102-575).

Section 602(b) of the CRBPA requires the Secretary to prepare and *"transmit to the Congress and to the Governors of the Colorado River Basin States a report describing the actual operation under the adopted criteria* [i.e., the Operating Criteria] *for the preceding compact water year and the projected operation for the current year."*

This AOP has been developed consistent with: the Operating Criteria; applicable Federal laws; the Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande, the Treaty Between the United States of America and Mexico, signed February 3, 1944 (1944 United States-Mexico Water Treaty); interstate compacts; court decrees; the Colorado River Water Delivery Agreement[8]; the Interim Guidelines; and other documents relating to the use of the waters of the Colorado River, which are commonly and collectively known as the "Law of the River."

The 2011 AOP was prepared by Reclamation on behalf of the Secretary, working with other Interior agencies and the Western Area Power Administration (Western). Reclamation consulted with: the seven Colorado River Basin States Governors' representatives; the Upper Colorado River Commission; Native American tribes; other appropriate Federal agencies; representatives of the academic and scientific communities, environmental organizations, and the recreation industry; water delivery contractors; contractors for the purchase of Federal power; others interested in Colorado River operations; and the general public, through the Colorado River Management Work Group (CRMWG).

Article I(2) of the Operating Criteria allows for revision of the projected plan of operation to reflect the current hydrologic conditions with notification to the Congress and the Governors of the Colorado River Basin States of any changes by June of each year. The process for revision of the AOP is further described in Section 7.C of the Interim Guidelines. Any revision to the final AOP may occur only through the AOP consultation process as required by applicable Federal law.

Purpose

The purpose of the AOP is to illustrate the potential range of reservoir operations that might be expected in the upcoming water year, and to determine or address: (1) the quantity of water considered necessary to be in storage in the Upper Basin reservoirs as of September 30, 2011, pursuant to Section 602(a) of the CRBPA; (2) water available for delivery pursuant to the 1944 United States-Mexico Water Treaty and Minutes No. 242 and 314 of the International Boundary and Water Commission, United States and Mexico (IBWC); (3)

[8] Colorado River Water Delivery Agreement: Federal Quantification Settlement Agreement for Purposes of Section 5(B) of Interim Surplus Guidelines, October 10, 2003 (69 *Federal Register* 12202, March 15, 2004).

whether the reasonable consumptive use requirements of mainstream users in the Lower Division States will be met under a "Normal," "Surplus," or "Shortage" Condition as outlined in Article III of the Operating Criteria and as implemented by the Interim Guidelines; and (4) whether water apportioned to, but unused by one or more Lower Division States, exists and can be used to satisfy beneficial consumptive use requests of mainstream users in other Lower Division States as provided in the Consolidated Decree of the Supreme Court of the United States in *Arizona v. California*, 547 U.S. 150 (2006) (Consolidated Decree).

Consistent with the above determinations and in accordance with other applicable provisions of the "Law of the River," the AOP was developed with "appropriate consideration of the uses of the reservoirs for all purposes, including flood control, river regulation, beneficial consumptive uses, power production, water quality control, recreation, enhancement of fish and wildlife, and other environmental factors" (Operating Criteria, Article I(2)). Congress has charged the Secretary with stewardship and responsibility for a wide range of natural, cultural, recreational, and tribal resources within the Colorado River Basin. The Secretary has the authority to operate and maintain Reclamation facilities within the Colorado River Basin addressed in this AOP to help manage these resources and accomplish their protection and enhancement in a manner fully consistent with applicable provisions of federal law including the Law of the River, and other project-specific operational limitations.

Since the hydrologic conditions of the Colorado River Basin can never be completely known in advance, the AOP presents projected operations resulting from three different hydrologic scenarios: the minimum probable, most probable, and maximum probable reservoir inflow conditions. Projected river operations are modified during the water year as runoff forecasts are adjusted to reflect existing snowpack, basin storage, flow conditions, and as changes occur in projected water deliveries.

Summary

Upper Basin Delivery. Taking into account (1) the existing water storage conditions in the basin, (2) the August 24-Month Study projection of the most probable near-term water supply conditions in the basin, and (3) Section 6.B. of the Interim Guidelines, the Upper Elevation Balancing Tier governs the operation of Lake Powell for water year 2011; however, ~~. Based on~~ the September 2010 24-Month Study[9] of the most probable inflow scenario~~,~~ projects an ~~April~~ adjustment would be made in April to ~~to the annual release is projected~~operations being governed by the Equalization Tier. Given this adjustment, the annual release from Glen Canyon Dam is currently projected to be 11.3 maf (13,900 mcm) for water year 2011. Given the hydrologic variability of the Colorado River System, the water year release from Lake Powell in 2011 could be in the range of 8.23 maf (10,200 mcm) to 15.0 maf (18,500 mcm) or greater.

For further information about the variability of projected inflow into Lake Powell, projected Lake Powell elevations, and projected monthly releases, ~~please~~ see the 2011 Water Supply

[9] The 24-Month Study refers to the operational study that reflects the current Annual Operating Plan that is updated each month by Reclamation to project future reservoir contents and releases.

Assumptions section and the Lake Powell section under the Summary of Reservoir Operations in 2010 and Projected 2011 Reservoir Operations, Tables 3 through 6, 8, and 9, and figures depicting projected elevation and storage at Lake Powell in the Appendix.

Lower Basin Delivery. Taking into account (1) the existing water storage conditions in the basin, (2) the most probable near-term water supply conditions in the basin, and (3) Section 2.B.5 of the Interim Guidelines, the Intentionally Created Surplus (ICS) Surplus Condition ~~is the criterion governing~~ governs the operation of Lake Mead for calendar year 2011 in accordance with Article III(3)(b) of the Operating Criteria and Article II(B)(2) of the Consolidated Decree.

No unused apportionment for calendar year 2011 is anticipated. If any unused apportionment becomes available after adoption of this AOP, Reclamation, on behalf of the Secretary, ~~shall~~ may allocate any such available unused apportionment for calendar year 2011. Any such allocation shall be made in accordance with Article II(B)(6) of the Consolidated Decree and the Lower Colorado Region Policy for Apportioned but Unused Water[10] (Unused Water Policy).

Colorado River water may be stored off-stream pursuant to individual Storage and Interstate Release Agreements (SIRAs) and 43 CFR Part 414 within the Lower Division States. The Secretary shall make Intentionally Created Unused Apportionment (ICUA) available to contractors in Arizona, California, or Nevada pursuant to individual SIRAs and 43 CFR Part 414.

The Inadvertent Overrun and Payback Policy (IOPP), which became effective January 1, 2004, will be in effect during calendar year 2011.[11]

The Interim Guidelines adopted the ICS mechanism that among other things encourages the efficient use and management of Colorado River water in the Lower Basin. ICS may be created and delivered in 2011 pursuant to the Interim Guidelines and appropriate delivery and forbearance agreements.

1944 United States-Mexico Water Treaty Delivery. A volume of 1.500 maf (1,850 mcm) of water will be available to be scheduled for delivery to Mexico during calendar year 2011 in accordance with Article 15 of the 1944 United States-Mexico Water Treaty and Minutes No. 242 and 314 of the IBWC.

[10] Lower Colorado Region Policy for Apportioned but Unused Water, February 11, 2010.
[11] Record of Decision for Implementation Agreement, Inadvertent Overrun and Payback Policy, and Related Federal Actions, Final Environmental Impact Statement, October 10, 2003; 69 *Federal Register* 12202, March 15, 2004).

2010 HYDROLOGY SUMMARY AND RESERVOIR STATUS

Below average stream flows were observed throughout much of the Colorado River Basin during water year 2010. Unregulated[12] inflow to Lake Powell in water year 2010 was 8.76 maf (10,800 mcm), or 73 percent of the 30-year average[13] which is 12.04 maf (14,850 mcm). Unregulated inflow to Flaming Gorge, Blue Mesa, and Navajo Reservoirs was 60, 74, and 77 percent of average, respectively.

Precipitation in the Upper Colorado River Basin was initially well below average in October and November 2009 but was at or above average during the winter months of December through February. During the spring months of March and April, precipitation was again below average and on April 15, 2010, the overall water year cumulative precipitation was 84 percent of average basin wide. On September 12, 2010, the cumulative precipitation for water year 2010 was 90 percent of average. Precipitation is an accumulated value representing both snow and rainfall measured at various mountain sites. Well below average precipitation conditions during the beginning of water year 2010 negatively impacted the unregulated inflow into Lake Powell. During the period from October through April the unregulated inflow to Lake Powell was in the range from 65 to 96 percent of average.

Snowpack conditions trended well below average in the Green River Basin during the winter months of water year 2010. On April 1, 2010, the snow water equivalent was only 59 percent of average. For the headwaters of the Colorado River in the Upper Colorado River Basin, the snowpack was somewhat better and on April 1, 2010, the snow water equivalent was 76 percent of average. Further south in the Gunnison River Basin, the April 1, 2010, snow water equivalent was 98 percent of average. In the San Juan River Basin conditions were also near average and the snow water equivalent on April 1, 2010, was 95 percent of average.

During the 2010 spring runoff season, inflows to Lake Powell began to increase in April as temperatures increased across the basin. By early June, inflows increased to more than 50,000 cubic feet per second (cfs) (1,420 cubic meters per second [cms]). During the spring runoff period Lake Powell storage increased by 1.90 maf (2,340 mcm). The April through July unregulated inflow volume for Lake Powell was 5.80 maf (7,150 mcm) which was only 73 percent of average based on the historic period from 1971 through 2000.

Inflow to Lake Powell has been below average in nine of the past eleven water years (2000-2010). Although slightly above average inflows occurred in 2005 and 2008, drought conditions in the Colorado River Basin persist. Provisional calculations of the natural flow for the Colorado River at Lees Ferry, Arizona, show that the average natural flow since water year 2000 (2000-2010 inclusively) is 12.0 maf (14,800 mcm). This is the lowest eleven-year average in over 100 years of record keeping on the Colorado River.

[12] Unregulated inflow adjusts for the effects of operations at upstream reservoirs. It is computed by adding the change in storage and the evaporation losses from upstream reservoirs to the observed inflow. Unregulated inflow is used because it provides an inflow time series that is not biased by upstream reservoir operations.
[13] Inflow statistics throughout this document will be compared to the 30-year average, 1971-2000, unless otherwise noted.

Lower Basin tributary inflows above Lake Mead were below to slightly above average for water year 2010. Tributary inflow from the Little Colorado River for water year 2010 totaled 0.196 maf (243 mcm), or 109 percent of the long-term average.[14] Tributary inflow from the Virgin River for water year 2010 totaled 0.135 maf (167 mcm), or 78 percent of the long-term average.

~~There was above average snowfall in the Gila, Salt, and Verde River watersheds during water year 2010 due to Pacific storms bringing above average precipitation into the southwestern region of the United States. Precipitation for water year 2010 in the Gila River Basin was 110 percent of average.~~

There was above average precipitation in the Gila, Salt, and Verde River watersheds during the winter months in 2010 due to Pacific storms in the southwestern region of the United States. Tributary inflows in the Lower Colorado River Basin below Hoover Dam were above average during January, February, and March 2010 due to ~~winter storm events~~this precipitation. The increased tributary inflows~~precipitation from these storms~~, along with flood control releases ~~within the~~from Salt River Project (SRP) dams~~into Painted Rock Dam~~, triggered increased releases from U.S. Army Corps of Engineers (USACE) dams in Arizona. From March through May 2010, ~~R~~releases from Alamo and Painted Rock Dams were coordinated with Reclamation for inclusion in scheduling releases from Hoover, Davis, and Parker Dams. Of these coordinated releases from Painted Rock and Alamo Dams, approximately 0.130 maf (160 mcm) reached the mainstream of the Colorado River. As a result of these coordinated releases, approximately 0.046 maf (57 mcm) reached the mainstream from the Bill Williams River from Alamo Dam and approximately 0.084 maf (104 mcm) reached the mainstream from the Gila River from Painted Rock Dam. Because of these ~~tributary flows~~coordinated releases, it is estimated that up to 0.110 maf (136 mcm) were conserved in Lake Mead during this time period ~~in calendar year 2010~~.

~~Lower Basin tributary inflows into the mainstream were below to near average for water year 2010. Tributary inflow from the Little Colorado River for water year 2010 totaled 0.196 maf (243 mcm), or 109 percent of the long-term average. Tributary inflow from the Virgin River for water year 2010 totaled 0.135 maf (167 mcm), or 78 percent of the long-term average. Due to increased releases from Alamo and Painted Rock Dams,~~ Total tributary inflow for water year 2010 from the Bill Williams ~~River~~and Gila Rivers, which include the coordinated releases from March through May as well as base flows throughout the remainder of the water year, were ~~totaled~~ 0.082 maf (110 mcm), or 81 percent of the long-term average and~~total inflow from the Gila River into the mainstem was~~ 0.093 maf (110 mcm).~~.~~[15] respectively.

The Colorado River total system storage experienced a net loss in water year 2010 in the amount of 0.955 maf (1,180 mcm). Reservoir storage in Lake Powell decreased during

[14] The basis for the long-term average of tributary inflows in the Lower Basin is natural flow data from 1906 to ~~2006~~2007. Additional information regarding natural flows may be found at http://www.usbr.gov/lc/region/g4000/NaturalFlow/current.html.

[15] Tributary inflow from the Gila River to the mainstream is very sporadic. These flows occur very seldom and when they do they are typically of high magnitude.

water year 2010 by 0.081 maf (100 mcm). Reservoir storage in Lake Mead declined during water year 2010 by 0.801 maf (988 mcm). At the beginning of water year 2010 (October 1, 2009), Colorado River total system storage was 58 percent of capacity. As of September 30, 2010, total system storage was 56 percent of capacity.

Tables 1 and 2 list the October 1, 2010, reservoir vacant space, live storage, water elevation, percent of capacity, change in storage, and change in water elevation during water year 2010.

Table 1. Reservoir Conditions on October 1, 2010 (English Units)

Reservoir	Vacant Space	Live Storage	Water Elevation	Percent of Capacity	Change in Storage*	Change in Elevation*
	(maf)	(maf)	(ft)	(%)	(maf)	(ft)
Fontenelle	0.054	0.291	6,498.9	84	0.015	2.1
Flaming Gorge	0.585	3.16	6,025.1	84	-0.228	-6.0
Blue Mesa	0.203	0.626	7,495.6	75	-0.025	-3.1
Navajo	0.277	1.42	6,065.4	84	0.104	8.1
Lake Powell	8.94	15.4	3,634.7	63	-0.081	-0.7
Lake Mead	15.7	10.1	1,084.3	39	-0.801	-9.4
Lake Mohave	0.246	1.56	638.0	86	0.063	2.4
Lake Havasu	0.059	0.561	447.0	91	-0.003	-0.2
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Totals	26.1	33.1		56	-0.955	

* From October 1, 2009, to September 30, 2010.

Table 2. Reservoir Conditions on October 1, 2010 (Metric Units)

Reservoir	Vacant Space	Live Storage	Water Elevation	Percent of Capacity	Change in Storage*	Change in Elevation*
	(mcm)	(mcm)	(m)	(%)	(mcm)	(m)
Fontenelle	66.8	359	1,980.9	84	18.9	0.6
Flaming Gorge	722	3,900	1,836.5	84	-281	-1.8
Blue Mesa	251	772	2,284.7	75	-30.8	-0.9
Navajo	341	1,750	1,848.7	84	129	2.5
Lake Powell	11,000	19,000	1,107.8	63	-99	-0.2
Lake Mead	19,400	12,500	330.5	39	-989	-2.9
Lake Mohave	303	1,930	194.5	86	77.6	0.7
Lake Havasu	72.7	692	136.2	91	-3.73	0
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Totals	32,200	40,900		56	-1,180	

* From October 1, 2009, to September 30, 2010.

2011 WATER SUPPLY ASSUMPTIONS

For 2011 operations, three reservoir unregulated inflow scenarios were developed and analyzed: minimum probable, most probable, and maximum probable.

There is considerable uncertainty associated with streamflow forecasts and projections of reservoir operations made a year in advance. The National Weather Service's Colorado Basin River Forecast Center (CBRFC) forecasts the inflow for the minimum probable (90 percent exceedance), most probable (50 percent exceedance), and maximum probable (10 percent exceedance) inflow scenarios ~~in~~ for 2011 using an Ensemble Streamflow Prediction model. Based upon the October CBRFC forecast, the range of unregulated inflows is projected to be as follows:

- The forecasted minimum probable unregulated inflow to Lake Powell in water year 2011 is 4.85 maf (5,980 mcm), or 40 percent of average.
- The forecasted most probable unregulated inflow to Lake Powell in water year 2011 is 10.7 maf (13,200 mcm), or 89 percent of average.
- The forecasted maximum probable unregulated inflow to Lake Powell in water year 2011 is 17.1 maf (21,100 mcm), or 142 percent of average.

Projected unregulated inflow volumes into Lake Powell for specific time periods for these three forecasted inflow scenarios are shown in Tables 3 and 4.

Inflows to the mainstream from Lake Powell to Lake Mead, Lake Mead to Lake Mohave, Lake Mohave to Lake Havasu, and below Lake Havasu are ~~forecasted~~projected using historic data over the five-year period of January 2005 through December 2009, inclusive. These five years of historic data are representative of the most recent hydrologic conditions in the Lower Basin. The most probable ~~forecasted~~ side inflows into each reach are the arithmetic mean of the five-year record. The maximum probable and minimum probable ~~forecasts~~ projections for each reach are the 10 percent and 90 percent exceedance values, respectively, of the five-year record. For the reach from Lake Powell to Lake Mead, the minimum probable inflow during water year 2011 is 0.503 maf (620 mcm), the most probable inflow is 0.946 maf (1,170 mcm), and the maximum probable inflow is 1.583 maf (1,950 mcm).

The ~~forecasted~~ projected monthly volumes of inflow were input into ~~Reclamation's monthly reservoir simulation model (~~the 24-Month Study~~)~~ and used to project potential reservoir operations for 2011. Starting with October 1, 2010, reservoir storage conditions, the projected monthly releases for each reservoir were adjusted until release and storage levels best accomplished project purposes and applicable operational objectives.

Graphs of the ~~forecasted 2011 inflows, and~~ projected 2011 inflows, releases, elevations, and storages for each hydrologic scenario are presented in the Appendix.

Table 3. Projected ~~Forecasted~~ Unregulated Inflow into Lake Powell for Water Year 2011
(English Units)[16]

Time Period	Minimum probable (maf)	Most Probable (maf)	Maximum probable (maf)
10/10–12/10	0.98	1.34	1.92
1/11 – 3/11	1.03	1.30	1.73
4/11– 7/11	2.47	7.10	11.8
8/11 – 9/11	0.37	0.98	1.63
10/11 – 12/11	1.14	1.45	1.72
WY 2011	4.85	10.7	17.1
CY 2011	5.01	10.8	16.9

Table 4. Projected ~~Forecasted~~ Unregulated Inflow into Lake Powell for Water Year 2011
(Metric Units)

Time Period	Minimum probable (mcm)	Most Probable (mcm)	Maximum probable (mcm)
10/10 –12/10	1,210	1,650	2,370
1/11–3/11	1,270	1,600	2,130
4/11 –7/11	3,050	8,760	14,560
8/11 –9/11	456	1,210	2,010
10/11 –12/11	1,410	1,790	2,120
WY 2011	5,980	13,200	21,100
CY 2011	6,180	13,400	20,800

[16] All values in Tables 3 and 4 are ~~forecasted~~ projected inflows based upon the October CBRFC forecast with the exception of the values for 10/11-12/11. The values for this period are the average unregulated inflow from 1976-2005. The calendar year totals in Tables 3 and 4 also reflect the average values for the 10/11-12/11 time period.

SUMMARY OF RESERVOIR OPERATIONS IN 2010 AND PROJECTED 2011 RESERVOIR OPERATIONS

The operation of the Colorado River reservoirs has affected some aquatic and riparian resources. Controlled releases from dams have modified temperature, sediment load, and flow patterns, resulting in increased productivity of some riparian and non-native aquatic resources and the development of economically significant sport fisheries. However, these same releases have detrimental effects on endangered and other native species. Operating strategies designed to protect and enhance aquatic and riparian resources have been established after appropriate National Environmental Policy Act (NEPA) compliance at several locations in the Colorado River Basin.

In the Upper Basin, public stakeholder work groups have been established at Fontenelle Dam, Flaming Gorge Dam, the Aspinall Unit, and Navajo Dam. These work groups provide a public forum for dissemination of information regarding ongoing and projected reservoir operations throughout the year and allow stakeholders the opportunity to provide information and feedback with respect to ongoing reservoir operations. Additionally, the Glen Canyon Dam Adaptive Management Work Group (AMWG)[17] was established in 1997 as a chartered committee under the Federal Advisory Committee Act of 1972 (Public Law 92-463).

Modifications to projected operations are routinely made based on changes in forecasted conditions or other relevant factors. Consistent with the Upper Colorado River Endangered Fish Recovery Program (Upper Colorado Recovery Program),[18] the San Juan River Basin Recovery Implementation Program (San Juan Recovery Program),[19] Section 7 consultations under the Endangered Species Act (ESA), and other downstream concerns, modifications to projected monthly operations may be based on other factors in addition to changes in streamflow forecasts. Decisions on spring peak releases and downstream habitat target flows may be made midway through the runoff season. Reclamation will conduct meetings with the U.S. Fish and Wildlife Service (Service), other Federal agencies, representatives of the Basin States, and with public stakeholder work groups to facilitate the discussions necessary to finalize site-specific projected operations.

The following paragraphs discuss the range of probable projected 2011 operations of each of the reservoirs with respect to applicable provisions of compacts, the Consolidated Decree, statutes, regulations, contracts, and instream flow needs for maintaining or improving aquatic and riparian resources where appropriate. Projected monthly release volumes ~~releases~~ from each of the reservoirs are specified in the Appendix. As actual inflow volumes are better known these monthly release projections will be adjusted.

[17] Additional information on the AMWG can be found at www.usbr.gov/uc/rm/amp.
[18] Additional information on the Upper Colorado Recovery Program can be found at http://coloradoriverrecovery.fws.gov.
[19] Additional information on the San Juan Recovery Program can be found at www.fws.gov/southwest/sjrip.

Fontenelle Reservoir

Hydrologic conditions in water year 2010 in the Upper Green River Basin were significantly drier than average. The April through July inflow to Fontenelle Reservoir during water year 2010 was 0.488 maf (602 mcm), which was 57 percent of average. Snowpack conditions in the Upper Green River Basin were significantly below average with the peak snow water equivalent reaching 65 percent of average. The basin was classified as being in severe drought. Inflows to Fontenelle Reservoir have been below average for the past nine out of ten years.

Fontenelle Reservoir did not fill in water year 2010. The reservoir elevation peaked at 6,504.5 feet (1,982.6 meters) on August 6, 2010, 1.5 feet (0.5 meters) below the spillway crest. Releases were increased during the spring ~~to~~and peaked for 3 days at approximately 3,050 cfs (86.3 cms) ~~for 3 days~~ beginning on July 3, 2010, to maintain safe operating levels in Fontenelle Reservoir. These releases were made through the powerplant and bypass tubes at Fontenelle Dam. Releases were reduced to 1,100 cfs (31.1 cms) after the ~~spring~~ inflow subsided. Inflow peaked at 8,300 cfs (235 cms) on June 12, 2010.

The ~~forecasted~~most probable April through July inflow scenario for~~to~~ Fontenelle Reservoir during water year 2011 is 0.745 maf (919 mcm), or 87 percent of average. This volume far exceeds the 0.345 maf (426 mcm) storage capacity of Fontenelle Reservoir. For this reason, the ~~forecasted~~most probable and ~~forecasted~~maximum probable inflow ~~forecasts~~scenarios would require releases during the spring that exceed the capacity of the powerplant to avoid uncontrolled spills from the reservoir. It is very likely that Fontenelle Reservoir will fill during water year 2011. In order to minimize high spring releases and to maximize downstream water resources and power production, the reservoir will most likely be drawn down to about elevation 6,468 feet (1,971 meters) by early April 2011, which is five feet (1.5 meters) above the minimum operating level for power generation, and corresponds to a volume of 0.111 maf (137 mcm) of live storage.

Flaming Gorge Reservoir

Inflow to Flaming Gorge Reservoir during water year 2010 was below average. Unregulated inflow in water year 2010 was 1.04 maf (1,280 mcm), which is 60 percent of average. On October 1, 2009, the beginning of water year 2010, the reservoir elevation was 6,031.1 feet (1,838.3 meters). The reservoir elevation showed an overall decrease during water year 2010 with an ending water year (September 30, 2010) elevation of 6,025.1 feet (1,836.5 meters) corresponding to a volume of 3.17 maf (3,880 mcm). Flaming Gorge Reservoir reached a maximum elevation of 6,027.7 feet (1,837.3 meters), with 3.26 maf (4,020 mcm) in storage, on July 15, 2010. The end of water year reservoir elevation was 14.9 feet (4.54 meters) below the full pool elevation of 6,040.0 feet (1,841.0 meters) which corresponds to an available storage space of 0.582 maf (718 mcm).

Reclamation operated Flaming Gorge Dam in compliance with the Flaming Gorge ROD in 2010. The hydrologic conditions during the spring of 2010 met the moderately dry designation under the ROD. Reclamation convened the Flaming Gorge Technical Working

Group (FGTWG) comprised of the Service, Western, and Reclamation personnel. The FGTWG proposed Reclamation manage releases to the Green River to~~in an~~ attempt to meet the Upper Colorado Endangered Species Recovery Implementation Program (Recovery Program) research request to maintain flows at or above 15,000 cfs (425 cms) for at least five consecutive days in Reach 2 during the Yampa River peak flows, if hydrology permitted. Moderately dry conditions prevailed in the Green and Yampa River Basins, but May precipitation and temperatures resulted in increased snow accumulation and delayed runoff. Runoff conditions in 2010 and Flaming Gorge operations achieved the Recovery Program research request with 10 days above 15,000 cfs (425 cms). The moderately dry ROD requirement of 8,300 cfs (235 cms) for at least seven days in Reach 2 was also met. The average ROD requirement of one day at or above 18,600 cfs (526.4 cms) was achieved on May 31, 2010, with a one-day peak of 19,300 cfs (546.2 cms).

Releases from Flaming Gorge Reservoir were increased to powerplant capacity of 4,600 cfs (130.2 cms) on May 26, 2010, in anticipation of peak flows on the Yampa River. Releases were maintained at powerplant capacity until June 5, 2010. Green River flows at Jensen remained above 8,300 cfs (235 cms) from May 19, 2010, to June 9, 2010 (21 days). Flows at Jensen reached 19,300 cfs (546.2 cms) on May 31, 2010, for a single day as a result of releases from Flaming Gorge Dam and flows on the Yampa River. Releases from Flaming Gorge Reservoir were reduced by 350 cfs (9.9 cms) per day beginning on June 5, 2010. The use of the bypass tubes was not required to meet these flow objectives.

As of August 2010, the hydrologic classification as defined by the Flaming Gorge ROD was moderately dry. Reclamation received a request for base flow releases from both the Service and Western. The Service requested base flows at the higher end of the average range during the summer period (July through September). Western requested ~~that~~ base flow levels drop to the lowest possible base flows during the summer season and increase during the winter period (October through February). Reclamation convened the FGTWG to consult on a flow proposal for the Green River during the base flow period (August through February of the following year). The FGTWG proposed to Reclamation that flows in the Green River, during the base flow period, should fall within the moderately dry range, as described in the Flaming Gorge Final Environmental Impact Statement for the Action Alternative. In response to ~~scientific and biological evidence~~information provided by the Service and Western, Reclamation operated Flaming Gorge Dam to provide base flows in the Green River during the summer of 2010 that maximized the 40 percent daily average release flexibility outlined in the ROD and requested by the Service. It is anticipated that 2010-2011 winter releases from Flaming Gorge Dam will follow a daily double peak pattern (peaking during the morning and evening hours) for hydropower purposes during the months of November through March if hydrology permits flows above an 800 cfs (22.6 cms) daily average.

During water year 2011, Flaming Gorge Dam will continue to be operated in accordance with the Flaming Gorge ROD. High spring releases are scheduled to occur in 2011, timed with the Yampa River's spring runoff peak flow, followed by lower summer and autumn base flows. Under the ~~forecasted~~ most probable inflow scenario, base flow releases are projected to be 1,600 cfs (45.3 cms) through September 30 and then decrease to approximately 1,000 cfs (28.3 cms) beginning in October 2010, and will likely continue at that rate until spring runoff begins in May 2011. A spring peak release is projected to occur

sometime in May 2011, and will be timed to coincide with the peak flows of the Yampa River.

The Recovery Program, in coordination with Reclamation, the Service, and Western, will continue conducting studies associated with floodplain inundation. Such studies may result in alternatives for meeting flow and temperature recommendations at lower peak flow levels where feasible.[20]

Blue Mesa, Morrow Point, and Crystal Reservoirs (Aspinall Unit)

Below average snowpack conditions prevailed in the Gunnison Basin during water year 2010. Snow measurement sites in the basin reported mostly below average snow water equivalent levels throughout the winter and into the spring of 2010. The April through July unregulated inflow into Blue Mesa Reservoir in 2010 was 0.494 maf (609 mcm), which was 69 percent of average. Water year 2010 unregulated inflow into Blue Mesa Reservoir was 0.737 maf (909 mcm), which was 74 percent of average. Blue Mesa Reservoir did not fill in 2010. The reservoir reached a peak elevation of 7,508.9 feet (2,288.7 meters) on June 27, 2010, 10.8 feet (3.29 meters) below full pool. Storage in Blue Mesa Reservoir decreased during water year 2010 by 0.025 maf (30.5 mcm). Storage in Blue Mesa Reservoir on September 30, 2010, was 0.626 maf (772 mcm), or 75 percent of capacity.

Releases from Aspinall Unit reservoirs in 2010 were about average providing flows of approximately 550 cfs (15.6 cms) from early October 2009 to early December and then approximately 800 cfs (22.6 cms) through mid February in the Gunnison River through the Black Canyon (below the Gunnison Tunnel). On February 18, 2010, releases were reduced to 600 cfs (17.0 cms) in response to decreases in forecasted inflow.

Beginning May 11, 2010, releases from Crystal Reservoir were increased on a daily basis until reaching 5,100 cfs (144 cms) resulting in 4,200 cfs (119 cms) in the Black Canyon below the diversion tunnel on May 18, 2010. Releases were then ramped down on a daily basis starting the morning of May 19, 2010, and leveled off at 1,300 cfs (36.8 cms) from Crystal Dam resulting in 650 cfs (18.4 cms) in the Black Canyon below the diversion tunnel and Gunnison Gorge on June 4, 2010. Flows stabilized for the summer season during mid-July at about 1,200 cfs (34 cms) through the Black Canyon and Gunnison Gorge.

A recent consideration in developing Aspinall operations is the Black Canyon Water Right decree.[21] The decree states that the Secretary's exercise of the water right is subject to the Secretary's discretion and obligations as defined by applicable law and the terms and conditions set forth in the decree.

For water year 2011, the Aspinall Unit will be operated to conserve storage while ~~meeting~~ making releases for downstream delivery requirements, consistent with authorized project

[20] Flow and Temperature Recommendations for Endangered Fishes in the Green River Downstream of Flaming Gorge Dam, September 2000.

[21] Decree Quantifying the Federal Reserved Water Right for Black Canyon of the Gunnison National Park (State of Colorado District Court, Water Division Four, Case Number 01CW05), signed on January 8, 2009.

purposes. ~~Minimum r~~Releases include the delivery requirements of the Uncompahgre Valley Project and other senior water rights downstream, including the Black Canyon Water Right. In 2011, under the ~~forecasted~~ most probable inflow ~~conditions~~scenario, a one-day spring peak flow release is projected to occur during the period of May 1 through June 30 with shoulder flows[22] on either side between May 1 and July 25. The amounts of the peak and shoulder flows will be determined based on the May 1st, April through July unregulated inflow forecast for Blue Mesa Reservoir. ~~f~~Flows through the Black Canyon of the Gunnison National Park will be above the 300 cfs (8.5 cms) minimum release target during ~~the~~ other times pursuant to the Black Canyon Water Right decree~~non-peak months~~. ~~A one-day spring peak flow release is projected to occur in 2011 and the amount will be determined based on the May 1st, April through July unregulated inflow forecast for Blue Mesa Reservoir.~~ As part of the operational process, Reclamation will continue to coordinate operations through tri-annual Aspinall Operations meetings.

Under the minimum probable inflow ~~forecast~~scenario, Blue Mesa Reservoir is not projected to fill in 2011. Under the most probable and maximum probable inflow ~~forecasts~~scenarios, Blue Mesa Reservoir is projected to fill in 2011.

Navajo Reservoir

Inflow to Navajo Reservoir in water year 2010 was below the 30-year average. Water year 2010 unregulated inflow was 0.857 maf (1,057 mcm), or 77 percent of average. The April through July unregulated inflow into Navajo Reservoir in water year 2010 was 0.654 maf (807 mcm), or 83 percent of average. Unregulated inflow to Navajo Reservoir was below average for all water years from 2000 through 2009, except for 2005 which was 136 percent of average and 2008 which was 120 percent of average.

Navajo Reservoir reached a peak water surface elevation of 6,075.5 feet (1,851.8 meters) on June 15, 2010, 9.5 feet (2.9 meters) below full pool. The water surface elevation at Navajo Reservoir on September 30, 2010, was 6,065.0 feet (1,848.6 meters), with reservoir storage at 83 percent of capacity.

A final report which outlines flow recommendations for the San Juan River (San Juan Flow Recommendations) below Navajo Dam was completed by the San Juan Recovery Program in May 1999 after a seven-year research period.[23] The purpose of the report was to provide flow recommendations for the San Juan River that promote the recovery of the endangered Colorado River pikeminnow and razorback sucker, maintain important habitat for these two species as well as the other native species, and provide information for the evaluation of continued water development in the basin.

In 2006, Reclamation completed a NEPA process on the implementation of operations at Navajo Dam that meet the San Juan Flow Recommendations, or a reasonable alternative to

[22] Shoulder flows are described in the Black Canyon Water Right decree. See the reference to the decree in footnote number 21.

[23] Flow Recommendations for the San Juan River, May 1999.

them. The ROD for the Navajo Reservoir Operations Final EIS was signed by the Regional Director of Reclamation's Upper Colorado Region on July 31, 2006.

Navajo Reservoir was operated in compliance with the ROD in 2010 including the San Juan Flow Recommendations which did not require a spring peak release from the reservoir for the year.

In 2009, a four-year agreement was developed among major users to limit their water use to the rates and volumes indicated in the agreement.[24] The 2009-2012 agreement was similar to agreements that were developed in 2003, 2004, 2005, 2006, and 2007-2008. Ten major water users (the Jicarilla Apache and Navajo Nations, Hammond Conservancy District, Public Service Company of New Mexico, City of Farmington, Arizona Public Service Company, BHP-Billiton, Bloomfield Irrigation District, Farmers Mutual Ditch, and Jewett Valley Ditch) endorsed the flow recommendations. The recommendations included limitations on diversions for 2009-2012, criteria for determining a shortage, and shortage-sharing requirements in the event of a water supply shortfall, including sharing of shortages between the water users and the flow demands for endangered fish habitat. In addition to the ten major water users, the New Mexico Interstate Stream Commission, the Bureau of Indian Affairs, the Service, and the San Juan Recovery Program all provided input to the recommendations. The recommendations were acknowledged by Reclamation and the New Mexico State Engineer for reservoir operation and river administration purposes.

During water year 2011, Navajo Reservoir will be operated in accordance with the Navajo Reservoir Operations ROD. Navajo Reservoir storage levels are expected to be near average in 2011 under the most probable inflow scenario. Releases from the reservoir will likely remain at a 500 cfs (14.2 cms) base release through the winter. Under the most probable inflow ~~condition~~ scenario in 2011, a 21-day spring peak release of 5,000 cfs (142 cms), as described in the San Juan Flow Recommendations, is likely to occur.

Lake Powell

Reservoir storage in Lake Powell showed little change during water year 2010. On October 1, 2009, the beginning of water year 2010, reservoir storage in Lake Powell was 64 percent of capacity at elevation 3,635.4 feet (1,108.1 meters), with 15.46 maf (19,070 mcm) in storage. On September 30, 2010, the reservoir storage in Lake Powell was 15.38 maf (18,970 mcm) at 63 percent of full capacity indicating a net loss over water year 2010 of 0.08 maf (100 mcm). The unregulated inflow to Lake Powell during water year 2010 was well below average at 73 percent of average. Lake Powell ended the water year on September 30, 2010, at elevation 3,634.7 feet (1,107.8 meters).

The August 2009 24-Month Study, using the most probable inflow scenario, was run to project the January 1, 2010, Lake Powell elevation. The projected January 1, 2010, elevation, and guidance under Section 6.B of the Interim Guidelines, determined the Upper Elevation Balancing Tier to be the applicable operational tier for water year 2010. This

[24] Recommendations for San Juan River Operations and Administration for 2009-2012, January 29, 2009.

resulted in a volume of 8.23 maf (10.150 mcm) being initially scheduled for release from Glen Canyon Dam for water year 2010.

Using an 8.23 maf (10.150 mcm) release volume, the August 2009 24-Month Study also projected that the end of water year 2010 elevation would be above 3,642 feet (1,110 meters), the Equalization Level for water year 2010. Thus, the August 2009 24-Month Study projected that, in April, the Equalization Tier would govern operations for the remainder of the water year. In April 2010, however, the 24-Month Study, with a release of 8.23 maf (10,150 mcm), projected that the end of water year 2010 elevation of Lake Powell would be 3,631.88 feet (1,107 meters). Consistent with Section 6.B.3 of the Interim Guidelines, this condition did not trigger the Equalization Tier (Section 6.A) to govern the operation of Glen Canyon Dam for the remainder of water year 2010. For this reason, the annual release volume during water year 2010 from Glen Canyon Dam was maintained at 8.23 maf (10,150 mcm).

The April through July unregulated inflow to Lake Powell in water year 2010 was 5.80 maf (7,150 mcm) which was 73 percent of average. Lake Powell reached peak elevation for water year 2010 of 3,638.8 feet (1,109.1 meters) on June 30, 2010, which was 61.2 feet (18.7 meters) below full pool.

In addition to a spring high flow test conducted in March 2008, a five-year period of steady flows in September and October of each year is being implemented during the period from 2008 through 2012 with flows in accordance with the 1997 Glen Canyon Dam Operating Criteria (Table 7) occurring during the other months of the year (November through August). A Final Biological Opinion on the Operation of Glen Canyon Dam was issued on February 27, 2008, and a final Environmental Assessment (EA) and Finding of No Significant Impact (FONSI) were issued on February 29, 2008.

In September and October of 2010, a test of steady flows (steady daily releases), as described in the EA, was conducted consistent with Reclamation's February 29, 2008, FONSI. Steady flows of 8,000 cfs (226.4 cms) were made during the two-month period in 2010. In 2011, a test of steady flows will be repeated during September and October.

The January 1, 2011, reservoir elevation of Lake Powell is projected under the most probable inflow scenario to be 3,628.7 feet (1,106.0 meters) based on the August 2010 24-Month Study. Given this projection, the annual release volume from Lake Powell during water year 2011 will be consistent with the Upper Elevation Balancing Tier (Section 6.B of the Interim Guidelines). ~~While o~~Operations under the Upper Elevation Balancing Tier call for an annual release of 8.23 maf (10,150 mcm), consistent with Section 6.B.1~~,~~. Based on the April 24-Month Study, under the Upper Elevation Balancing Tier, Lake Powell's annual release may increase to not more than 9.0 maf (11,100 mcm), consistent with Section 6.B.4. Lake Powell operations may also shift, based on the April 24-Month Study, to being governed by the Equalization Tier consistent with Section 6.B.3. ~~t~~The August 24-Month Study projects an April adjustment is likely to occur under the three inflow scenarios. The April adjustment may result in either balancing, with an annual release of up to 9.0 maf (11,100 mcm), or equalization, with a range of an annual releases from 11.3 maf (13,900 mcm) to ~~of~~ 15.0 maf (18,500 mcm) or greater, pursuant to Section 6.B.4 or Section 6.B.3, respectively.

If the April 2011 24-Month Study, with a water year release volume of 8.23 maf (10,200 mcm), projects the September 30, 2011, Lake Powell elevation to be greater than 3,643 feet (1,110.4 meters), operations will be adjusted to be governed by the Equalization Tier consistent with Section 6.B.3. If this condition occurs, and an adjustment is made, the water year release volume will likely be greater than 8.23 maf (10,150 mcm) and will be determined based on the Equalization Tier as described in ~~section~~ Section 6.A of the Interim Guidelines.

If the April 2011 24-Month Study projects the September 30, 2011, Lake Mead elevation to be below 1,075 feet (327.7 meters) and the September 30, 2011, Lake Powell elevation to be at or above elevation 3,575 feet (1,089.7 meters), the Secretary shall balance the contents of Lake Mead and Lake Powell, but shall release not more than 9.0 maf (11,101 mcm) and not less than 8.23 maf (10,150 mcm) from Lake Powell in water year 2011 consistent with Section 6.B.4 of the Interim Guidelines.

Under the minimum probable inflow ~~forecast~~scenario, the August 2010 24-Month Study, with a water year release volume of 8.23 maf (10,200 mcm) in water year 2011, projects that the end of water year elevations of Lake Powell and Lake Mead will be 3,608.1 feet (1,099.8 meters) and 1,062.5 feet (323.9 meters), respectively. Based on this projected condition, the August 2010 24-Month Study ~~with a~~ minimum probable inflow ~~forecast~~ scenario would project balancing to occur during water year 2011, consistent with Section 6.B.4 of the Interim Guidelines. Under this scenario the ~~The~~ water year release volume is projected to be 9.0 maf (11,100 mcm). The August 2010 24-Month Study under the minimum probable inflow scenario projects that the end of water year 2011 elevation and storage in Lake Powell to be 3,600.9 feet (1,097.6 meters) and 11.8 maf (14,600 mcm), respectively.

Under the most probable inflow ~~forecast~~scenario, the September 2010 24-Month Study, with a water year release of 8.23 maf (10,200 mcm), projects that the end of water year elevation of Lake Powell would be 3,647.3 feet (1,111.7 meters) which is above the Equalization Level for water year 2011 of 3,643 feet (1,110.4 meters). Consistent with Section 6.B.3, an April adjustment is projected to occur and the water year release from Glen Canyon Dam is projected to be 11.3 maf (13,900 mcm) under the Equalization Tier guidelines. The end of water year 2011 (September 30, 2011) elevation and reservoir storage are projected to be 3,623.0 feet (1,104.3 meters) and 14.1 maf (17,400 mcm), respectively.

Under the maximum probable inflow scenario, the August 2010 24-Month Study, with a water year release volume of 8.23 maf (10,150 mcm) in water year 2011, projects the end of water year elevation to be above the Equalization Level for 2011 and an April adjustment, consistent with section 6.B.3 of the Interim Guidelines, to being governed by the Equalization Tier ~~consistent with section 6.B.3 of the Interim Guidelines~~. The water year release volume under the maximum probable inflow scenario to achieve Equalization would be 15.0 maf (18,500 mcm). In accordance with the CRBPA of 1968, the Operating Criteria, and Section 6 of the Interim Guidelines, Reclamation will attempt to achieve equalization as nearly as practicable by the end of the water year; however, in this scenario, the full Equalization volume may not be able to be released through the powerplant by September 30, 2011. Under the current maintenance schedule, the available capacity of Glen Canyon powerplant would result in a water year release of ~~This annual release volume is limited~~

approximately 14.2 maf (17,500 mcm). ~~by the estimated capacity of Glen Canyon Powerplant during the months of April through September of 2011. This volume does not fully achieve the Equalization objective that controls during water year 2011 by September 30, 2011.Powerplant capacity release levels would be maintained beyond the end of water year 2011 until the storage levels in Lake Powell and Lake Mead are projected to be equal. Under the maximum probable inflow scenario, this is projected to occur on or before December 1, 2011.~~ The August 2010 24-Month Study under the maximum probable inflow scenario was conducted with these two annual release volumes. The studies project~~s~~ that the end of water year 2011 elevation and storage in Lake Powell ~~would be~~ range from 3,643.0 feet (1,110.4 meters) to 3,648.7 feet (1,112.1 meters) and 16.4 maf (20,200 mcm) to 17.1 maf (21,100 mcm), respectively.

For the three inflow ~~forecast~~scenarios analyzed in the August 2010 24-Month Study, implementation of the Interim Guidelines resulted in water year 2011 release volumes from Lake Powell that exceeded 8.23 maf (1,150 mcm). ~~Other inflow forecasts, within the range from the minimum probable to the maximum probable, would result in water year release volumes as low as 8.23 maf (1,150 mcm).~~

See Tables 5 and 6 for water year 2011 range of projected Lake Powell end-of-month elevations. These projections are based on the August/September 2010 24-Month Study under the minimum probable, most probable, and maximum probable inflow ~~forecast~~scenarios. The fourth and fifth columns in Tables 5 and 6 below depict the projected Lake Powell elevations for the maximum probable inflow scenario. Projected elevations in the fourth column are based on releases to achieve Equalization within water year 2011. Projected elevations in the fifth column are based on releases made within the available Glen Canyon powerplant capacity under the current maintenance schedule for the powerplant.

Table 5. Range of Projected End of Month Lake Powell Elevations Under Water Year 2011 Inflow Scenarios (English Units)

Month	Minimum Probable Inflow Scenario Projected Elevation (feet)	Most Probable Inflow Scenario Projected Elevation (feet)	Maximum Probable Inflow Scenario Projected Elevation (feet)	Maximum Probable Inflow Scenario Projected Elevation (Within Powerplant Capacity) (feet)
October 2010	3634.21	3634.68	3637.30	3637.30
November 2010	3629.85	3630.92	3635.13	3635.13
December 2010	3624.91	3626.63	3632.26	3632.26
January 2011	3619.64	3622.18	3629.09	3629.09
February 2011	3615.18	3617.50	3622.12	3625.79
March 2011	3612.72	3613.91	3618.28	3624.63
April 2011	3610.43	3610.69	3618.33	3625.91
May 2011	3610.83	3618.58	3630.66	3638.87
June 2011	3611.24	3629.75	3648.44	3656.00
July 2011	3606.83	3628.47	3652.10	3658.75
August 2011	3601.99	3624.54	3647.59	3653.16
September 2011	3600.88	3623.00	3643.00	3648.68

Table 6. Range of Projected End of Month Lake Powell Elevations Under Water Year 2011 Inflow Scenarios (Metric Units)

Month	Minimum Probable Inflow Scenario Projected Elevation (meters)	Most Probable Inflow Scenario Projected Elevation (meters)	Maximum Probable Inflow Scenario Projected Elevation (meters)	Maximum Probable Inflow Scenario Projected Elevation (Within Powerplant Capacity) (meters)
October 2010	1,107.71	1,107.85	1,108.65	1,108.65
November 2010	1,106.38	1,106.70	1,107.99	1,107.99
December 2010	1,104.87	1,105.40	1,107.11	1,107.11
January 2011	1,103.27	1,104.04	1,106.15	1,106.15
February 2011	1,101.91	1,102.61	1,104.02	1,105.14
March 2011	1,101.16	1,101.52	1,102.85	1,104.79
April 2011	1,100.46	1,100.54	1,102.87	1,105.18
May 2011	1,100.58	1,102.94	1,106.62	1,109.13
June 2011	1,100.70	1,106.35	1,112.05	1,114.35
July 2011	1,099.36	1,105.96	1,113.16	1,115.19
August 2011	1,097.89	1,104.76	1,111.79	1,113.48
September 2011	1,097.55	1,104.29	1,110.39	1,112.12

In 2011, scheduled maintenance activities at Glen Canyon Dam powerplant will require that one or more of the eight generating units periodically be offline. Coordination between Reclamation offices in Salt Lake City, Utah, and Page, Arizona, will take place in the scheduling of maintenance activities to minimize impacts to operations throughout the water year including experimental releases.

Because of less than full storage conditions in Lake Powell resulting from drought in the Colorado River Basin, releases from Glen Canyon Dam for dam safety purposes are highly unlikely in 2011. If implemented, releases greater than powerplant capacity would be made consistent with the 1956 Colorado River Storage Project Act, the CRBPA, and to the extent practicable, the recommendations made pursuant to the Grand Canyon Protection Act of 1992. Reservoir releases in excess of powerplant capacity required for dam safety purposes during high reservoir conditions may be used to accomplish the objectives of the beach/habitat-building flow according to the terms contained in the 1996 Glen Canyon Dam ROD and as published in the 1997 Glen Canyon Dam Operating Criteria.

Daily and hourly releases in 2011 will be made according to the parameters of the 1996 Glen Canyon Dam ROD for the Glen Canyon Dam Final Environmental Impact Statement (GCDFEIS) and the 1997 Glen Canyon Dam Operating Criteria, as shown in Table 7. These parameters set the maximum and minimum flows and ramp rates within which the releases must be made. Exceptions to these parameters may be made during power system emergencies, during experimental releases, or for purposes of humanitarian search and rescue.

Table 7. Glen Canyon Dam Release Restrictions
(1997 Glen Canyon Dam Operating Criteria)

Parameter	Flow / Rate (cfs)	Flow / Rate (cms)	Conditions
Maximum Flow[25]	25,000	708	
Minimum Flow	5,000	142	7:00 p.m. to 7:00 a.m.
	8,000	227	7:00 a.m. to 7:00 p.m.
Ramp Rates			
Ascending	4,000	113	per hour
Descending	1,500	43	per hour
Daily Fluctuations[26]	5,000 / 8,000	142 / 227	per day~~hour~~

Releases from Lake Powell in water year 2011 will continue to reflect consideration of the uses and purposes identified in the authorizing legislation for Glen Canyon Dam. Releases will reflect criteria based on the findings, conclusions, and recommendations made in the 1996 Glen Canyon Dam ROD for the GCDFEIS pursuant to the Grand Canyon Protection Act of 1992 and other Secretarial decisions.

Monthly releases for 2011 will be consistent with the GCDFEIS/ROD and the 2008 EA/FONSI for Experimental Releases for Glen Canyon Dam, Arizona, 2008-2012. The range of projected monthly release volumes based on the August/September 2010 24-Month

[25] May be exceeded during beach/habitat-building flows, habitat maintenance flows, or when necessary to manage above average hydrologic conditions.
[26] Daily fluctuations limit is 5,000 cfs (142 cms) for months with release volumes less than 0.600 maf (740 mcm); 6,000 cfs (170 cms) for monthly release volumes of 0.600 to 0.800 maf (740 to 990 mcm); and 8,000 cfs (227 cms) for monthly release volumes over 0.800 maf (990 mcm).

Study under the minimum probable, most probable, and maximum probable inflow scenarios, for water year 2011, are displayed in Tables 8 and 9. The fourth and fifth columns in Tables 8 and 9 below depict the projected releases from Lake Powell for the maximum probable inflow scenario. The fourth column includes projected releases to achieve Equalization within water year 2011. The fifth column included projected releases within the available Glen Canyon powerplant capacity under the current maintenance schedule for the powerplant.

Table 8. Range of Projected Monthly Releases from Lake Powell Under Water Year 2011 Inflow Scenarios (English Units)[27]

Month	Minimum Probable Inflow Scenario Projected Monthly Release Volume (maf)	Most Probable Inflow Scenario Projected Monthly Release Volume (maf)	Maximum Probable Inflow Scenario Projected Monthly Release Volume (maf)	Maximum Probable Inflow Scenario Projected Monthly Release Volume (Within Powerplant Capacity) (maf)
October 2010	0.492	0.492	0.492	0.492
November 2010	0.907	0.907	0.907	0.907
December 2010	0.950	0.950	0.950	0.950
January 2011	0.950	0.950	0.950	0.950
February 2011	0.820	0.938	1.382	0.953
March 2011	0.634	0.935	1.398	1.094
April 2011	0.654	1.040	1.418	1.271
May 2011	0.679	1.020	1.443	1.300
June 2011	0.800	1.075	1.577	1.566
July 2011	0.825	1.200	1.600	1.705
August 2011	0.813	1.063	1.539	1.705
September 2011	0.476	0.714	1.334	1.334
Water Year 2011	9.000	11.284	14.990	14.227

[27] Modifications to projected monthly releases from Lake Powell would be made based on changes in forecasted conditions or other relevant factors. These inflow scenarios are based upon the October CBRFC forecast.

Table 9. Range of Projected Monthly Releases from Lake Powell Under Water Year 2011 Inflow Scenarios (Metric Units)

Month	Minimum Probable Inflow Scenario Projected Monthly Release Volume (mcm)	Most Probable Inflow Scenario Projected Monthly Release Volume (mcm)	Maximum Probable Inflow Scenario Projected Monthly Release Volume (mcm)	Maximum Probable Inflow Scenario Projected Monthly Release Volume (Within Powerplant Capacity) (mcm)
October 2010	607	607	607	607
November 2010	1,119	1,119	1,119	1,119
December 2010	1,172	1,172	1,172	1,172
January 2011	1,172	1,172	1,172	1,172
February 2011	1,011	1,157	1,705	1,176
March 2011	782	1,153	1,724	1,349
April 2011	807	1,283	1,749	1,568
May 2011	838	1,258	1,780	1,604
June 2011	987	1,326	1,945	1,932
July 2011	1,018	1,480	1,974	2,103
August 2011	1,003	1,311	1,989	2,103
September 2011	587	881	1,645	1,645
Water Year 2011	11,103	13,919	18,490	17,550

The ten-year total flow of the Colorado River at Lee Ferry[28] for water years 2001 through 2010 is 84.7 maf (105,000 mcm). This total is computed as the sum of the flow of the Colorado River at Lees Ferry, Arizona, and the Paria River at Lees Ferry, Arizona, surface water discharge stations which are operated and maintained by the United States Geological Survey.

On December 10, 2009, Secretary of the Interior Ken Salazar announced that the Department of the Interior would initiate development of a High-Flow Experimental Protocol (Protocol) for releases from Glen Canyon Dam as part of the ongoing implementation of the Glen Canyon Dam Adaptive Management Program (AMP). High-flow experimental releases have been undertaken in the past and will be further analyzed and implemented pursuant to the direction of the Secretary to assess the ability of such releases to protect, mitigate adverse impacts to, and improve the values for which Grand Canyon National Park and Glen Canyon National Recreation Area were established. As part of the AMP, the Department's effort to develop the Protocol is a component of its ongoing responsibility to comply with the requirements and obligations established by the Grand Canyon Protection Act of 1992 (Pub. L. 102-575) (GCPA). Further information on the Protocol may be found at 74 Fed. Reg. 69361 (Dec. 31, 2009).

The High-Flow Experimental Protocol is currently the subject of an ongoing analysis, including analysis pursuant to NEPA. The Department anticipates that the Protocol is likely to be completed during Water Year 2011. Pending completion of the ongoing NEPA process, if a high-flow release is undertaken in Water Year 2011, projected operations of Glen Canyon Dam will be modified consistent with the final experimental protocol.

[28] A point in the mainstream of the Colorado River one mile below the mouth of the Paria River.

Implementation of an experimental high-flow release will modify the projected releases for Water Year 2011 displayed in Tables 8 and 9.

Lake Mead

For calendar year 2010, the ICS Surplus Condition was the criterion governing the operation of Lake Mead in accordance with Article III(3)(b) of the Operating Criteria, Article II(B)(2) of the Consolidated Decree, and Section 2.B.5 of the Interim Guidelines. A volume of 1.500 maf (1,850 mcm) of water was scheduled for delivery to Mexico in accordance with Article 15 of the 1944 United States-Mexico Treaty and Minutes No. 242 and 314 of the IBWC.

Lake Mead began water year 2010 on October 1, 2009, at elevation 1,093.68 feet (333.4 meters), with 10.93 maf (13,480 mcm) in storage, which is 42 percent of the conservation capacity[29] of 25.88 maf (31,920 mcm). Lake Mead's elevation increased to an elevation of 1,103.21 feet (336.3 meters) by the end of February 2010. After February 2010, Lake Mead's elevation steadily declined. The September 30, 2010, end of water year elevation at Lake Mead was 1,084.29 feet (330.5 meters), with 10.13 maf (12,500 mcm) in storage (39 percent of capacity).

The total release from Lake Mead through Hoover Dam during water year 2010 was 9.208 maf (11,360 mcm). The total release from Lake Mead through Hoover Dam during calendar year 2010 is projected to be 9.291 maf (11,460 mcm). Consumptive use from Lake Mead during calendar year 2010 resulting from diversions for Nevada above Hoover Dam is projected to be 0.234 maf (289 mcm).

The total inflow into Lake Mead is a combination of water released from Glen Canyon Dam plus inflows in the reach between Glen Canyon and Hoover Dams. In water year 2010, inflow into Lake Mead was 9.149 maf (11,290 mcm). For water year 2011, under the most probable assumptions, total inflow into Lake Mead is anticipated to be 12.230 maf (15,090 mcm).

Under the most probable inflow ~~conditions~~ scenario during water year 2011, the elevation of Lake Mead is projected to increase from its minimum elevation of 1,082.89 feet (330.1 meters), with 10.02 maf (12,360 mcm) in storage, at the end of October 2010,~~. Lake Mead is projected to be at~~ to its maximum elevation of 1,101.97 feet (335.9 meters), with 11.67 maf (14,390 mcm) in storage, at the end of September 2011.

Based on the August 2010 24-Month Study, Lake Mead's elevation on January 1, 2011, is projected to be 1,086.38 feet (331.1 meters). In accordance with Section 2.B.5 of the Interim Guidelines, the ICS Surplus Condition will govern the releases from Lake Mead in

[29] Conservation capacity is the amount of space available for water storage between Lake Mead's water surface elevations 895 feet (272.8 meters) and 1,219.6 feet (371.7 meters), the start of the exclusive flood control space as defined in the Field Working Agreement Between Department of the Interior, Bureau of Reclamation and Department of the Army, Corps of Engineers for Flood Control of Hoover Dam and Lake Mead, Colorado River, Nevada-Arizona, February 8, 1984.

calendar year 2011. Releases from Lake Mead through Hoover Dam for water year and calendar year 2011 are anticipated to be approximately the same as 2010 releases.

The projected Lake Mead end-of-month elevations based on the August/September 2010 24-Month Study under the minimum probable, most probable, and maximum probable inflow scenarios are shown in Tables 10 and 11 for water year 2011. The fourth and fifth columns in Tables 10 and 11 below depict the projected Lake Mead elevations for the maximum probable inflow scenario. Projected elevations in the fourth column are based on Glen Canyon Dam releases to achieve Equalization within water year 2011. Projected elevations in the fifth column are based on Glen Canyon Dam releases made within the available Glen Canyon powerplant capacity under the current maintenance schedule for the powerplant.

Table 10. Range of Projected End of Month Lake Mead Elevations Under Water Year 2011 Inflow Scenarios (English Units)

Month	Minimum Probable Inflow Scenario Projected Elevation (feet)	Most Probable Inflow Scenario Projected Elevation (feet)	Maximum Probable Inflow Scenario Projected Elevation (feet)	Maximum Probable Inflow Scenario Projected Elevation (Glen Canyon Release within Powerplant Capacity) (feet)
October 2010	1082.25	1082.89	1083.00	1083.00
November 2010	1084.03	1084.98	1085.11	1085.11
December 2010	1086.89	1088.17	1088.44	1088.44
January 2011	1089.81	1091.80	1093.91	1093.91
February 2011	1091.55	1095.56	1103.56	1099.09
March 2011	1087.37	1095.13	1108.58	1101.06
April 2011	1081.56	1094.46	1112.12	1103.21
May 2011	1077.41	1094.73	1117.28	1107.14
June 2011	1076.08	1096.32	1123.95	1113.99
July 2011	1074.72	1099.07	1130.24	1121.62
August 2011	1074.40	1101.74	1136.95	1130.13
September 2011	1071.65	1101.97	1142.57	1135.92

Table 11. Range of Projected End of Month Lake Mead Elevations Under Water Year 2011 Inflow Scenarios (Metric Units)

Month	Minimum Probable Inflow Scenario Projected Elevation (meters)	Most Probable Inflow Scenario Projected Elevation (meters)	Maximum Probable Inflow Scenario Projected Elevation (meters)	Maximum Probable Inflow Scenario Projected Elevation (Glen Canyon Release within Powerplant Capacity) (meters)
October 2010	329.87	330.06	330.10	330.10
November 2010	330.41	330.70	330.74	330.74
December 2010	331.28	331.67	331.76	331.76
January 2011	332.17	332.78	333.42	333.42
February 2011	332.70	333.93	336.37	335.00
March 2011	331.43	333.80	337.90	335.60
April 2011	329.66	333.59	338.97	336.26
May 2011	328.39	333.67	340.55	337.46
June 2011	327.99	334.16	342.58	339.54
July 2011	327.57	335.00	344.50	341.87
August 2011	327.48	335.81	346.54	344.46
September 2011	326.64	335.88	348.26	346.23

Lakes Mohave and Havasu

At the beginning of water year 2010, Lake Mohave was at an elevation of 635.60 feet (193.7 meters), with an active storage of 1.501 maf (1,851 mcm). The water level of Lake Mohave was regulated between elevation 634.34 feet (193.3 meters) and 644.34 feet (196.4 meters) throughout the water year, ending at an elevation of 638.00 feet (194.5 meters) with 1.564 maf (1,929 mcm) in storage. The total release from Lake Mohave through Davis Dam for water year 2010 was 8.779 maf (10,830 mcm) for downstream water use requirements. The calendar year 2010 total release is projected to be 8.954 maf (11,040 mcm).

For water year and calendar year 2011, Davis Dam is projected to release approximately the same amount of water as in 2010. The water level in Lake Mohave will be regulated between an elevation of approximately 633 feet (193 meters) and 645 feet (197 meters).

Lake Havasu started water year 2010 at an elevation of 447.16 feet (136.3 meters) with 0.564 maf (696 mcm) in storage. The water level of Lake Havasu was regulated between elevation 446.29 feet (136.0 meters) and 448.89 feet (136.8 meters), throughout the water year, ending at an elevation of 447.00 feet (136.2 meters), with 0.561 maf (692 mcm) in storage. During water year 2010, 6.256 maf (7,717 mcm) were released from Parker Dam. The calendar year 2010 total release is projected to be 6.259 maf (7,720 mcm). Diversions from Lake Havasu during calendar year 2010 by the Central Arizona Project (CAP) and the Metropolitan Water District of Southern California (MWD) are projected to be 1.681 maf (2,073 mcm) and 1.098 maf (1,354 mcm), respectively.

For water year 2011, Parker Dam is expected to release approximately the same amount of water as in water year 2010. Diversions from Lake Havasu in calendar year 2011 by CAP and MWD are projected to be 1.536 maf (1,895 mcm) and 0.984 maf (1,210 mcm), respectively.

Lakes Mohave and Havasu are scheduled to be drawn down in the late summer and fall months to provide storage space for local storm runoff and will be filled in the winter to meet higher summer water needs. This drawdown also corresponds with normal maintenance at both Davis and Parker powerplants scheduled for September through March.

At Davis Dam, a major turbine overhaul of Unit No. 5 began on October 19, 2009, and the unit was returned to service on February 8, 2010. This overhaul included removal and maintenance of the fixed wheel gate and hydraulic cylinder, as well as testing the generator windings. No major overhauls are scheduled in 2011.

At Parker Dam, a major turbine overhaul of Unit No. 4 began on August 31, 2009, and the unit was returned to service on May 5, 2010. No major overhauls are scheduled in 2011.

Bill Williams River

During water year 2010, abnormally dry conditions initially transitioned into~~eased and~~ normal conditions ~~returned~~ in far western Arizona, including the Bill Williams River watershed. By late water year 2010, however, abnormally dry conditions returned to far western Arizona. Tributary inflows into Alamo Lake were below average during water year 2010, with most inflows occurring during the winter months. Tributary inflows from the Bill Williams River released from Alamo Dam totaled 0.082 maf (100 mcm) for water year 2010, approximately 81 percent of the long-term average.

Runoff and precipitation events during January, February, and March 2010 contributed to tributary inflows that increased Alamo Lake's storage by 0.077 maf (95.0 mcm) by mid-March 2010. Alamo Lake elevation was 1,116.8 feet (340.4 meters) on October 1, 2009, and increased to a peak elevation of 1,136.8 feet (346.5 meters) on March 15, 2010. On January 22, 2010, Alamo Lake exceeded elevation 1,125 feet (342.9 meters). In coordination with Reclamation and the Service, the USACE released additional water to lower the elevation of Alamo Lake to about elevation 1,125 feet (342.9 meters). The timing of these releases was coordinated with Reclamation for inclusion in scheduling releases from Hoover, Davis, and Parker Dams. An experimental pulse release of approximately 3,000 cfs (84.9 cms) to disperse seed from native riparian vegetation began on March 7, 2010, and continued until March 9, 2010, before returning to seasonal riparian releases for 8 days. Additional higher releases from Alamo Dam began on March 15, 2010, and continued for 30 days until April 14, 2010, with a peak outflow of about 2,100 cfs (59.4 cms) on March 20, 2010. Due to these operations, 0.059 maf (73 mcm) was released from Alamo Dam from February 1, 2010, through April 15, 2010. Of this volume, it is estimated that approximately 0.046 maf (57 mcm) reached Lake Havasu.

For the remainder of water year 2010, the USACE coordinated releases from Alamo Dam with the Service and the Bill Williams River Corridor Steering Committee (BWRCSC) to maintain riparian habitat established in water year 2005 and 2006. Data collection associated with Alamo Dam releases supports ongoing studies conducted by the BWRCSC. The BWRCSC is chaired by the Service and is comprised of other stakeholders, including, but not limited to, Reclamation, the USACE, the Bureau of Land Management, and other governmental and non-governmental organizations.

Senator Wash and Laguna Reservoirs

Senator Wash Reservoir is an off-stream regulating storage facility below Parker Dam (approximately 142 river miles downstream) and has a storage capacity of 0.014 maf (17.27 mcm) at full pool elevation of 251.0 feet (76.5 meters). The reservoir is used to store excess flows from the river caused by water user cutbacks, side wash inflows due to rain, and other factors. Stored waters are utilized to meet the water demands in the Lower Division States and the delivery obligation to Mexico.

Since 1992, elevation restrictions have been placed on Senator Wash Reservoir due to potential piping and liquefaction of foundation and embankment materials at West Squaw Lake Dike and Senator Wash Dam. Currently, Senator Wash Reservoir is restricted to an elevation of 240.0 feet (73.2 meters) with 0.009 maf (11.10 mcm) of storage, a loss of about 0.005 maf (6.167 mcm) of storage from its original capacity. Senator Wash Reservoir elevation must not exceed an elevation of 238.0 feet (72.5 meters) for more than 10 consecutive days. This reservoir restriction is expected to continue in 2011.

Laguna Reservoir is a regulating storage facility located approximately five river miles downstream of Imperial Dam and is primarily used to capture sluicing flows from Imperial Dam. The storage capability of Laguna Reservoir has diminished from about 1,500 acre-feet (1.850 mcm) to approximately 400 acre-feet (0.493 mcm) due to sediment accumulation and vegetation growth. Sediment accumulation in the reservoir has occurred primarily due to flood releases that occurred in 1983 and 1984, and flood control or space building releases that occurred between 1985 and 1988 and from 1997 through 1999.

Imperial Dam

Imperial Dam is the last diversion dam on the Colorado River for United States water users. From the head works at Imperial Dam, water is diverted into the All-American Canal for use in the United States and Mexico on the California side of the dam, and into the Gila Gravity Main Canal on the Arizona side of the dam. These diversions supply all the irrigation districts in the Yuma area, in Wellton-Mohawk, in the Imperial and Coachella Valleys, and through Siphon Drop and Pilot Knob, to the Northerly International Boundary (NIB) for diversion at Morelos Dam to the Mexicali Valley in Mexico. The diversions also supply much of the domestic water needs in the Yuma area. Flows arriving at Imperial Dam for calendar year 2010 are projected to be 5.390 maf (6,648 mcm). The flows arriving at Imperial Dam for calendar year 2011 are projected to be 5.450 maf (6.722 mcm).

Gila River Flows

There was above average snowfall in the Gila, Salt, and Verde River watersheds during much of the winter, with precipitation at 244 percent of average on February 1, 2010. Cumulative precipitation for water year 2010 in the Gila River Basin was 110 percent of average. Precipitation from Pacific storm events, along with flood control releases from SRP reservoirs, resulted in inflows into Painted Rock Dam on the Gila River. The USACE coordinated with Reclamation to release water from Painted Rock Dam. Water released from Painted Rock Dam resulted in approximately 0.084 maf (100 mcm) reaching the confluence of the Colorado River mainstream from March through May 2010. This water was used in part to meet delivery requirements to Mexico pursuant to the 1944 United States-Mexico Water Treaty. The total tributary inflow for water year 2010 from the Gila River that reached the mainstream was 0.093 maf (110 mcm).

Additional Regulatory Storage (~~Drop 2 Storage~~Warren H. Brock Reservoir)

In 2005, Reclamation completed a study that evaluated the needs and developed options for additional water storage facilities on the mainstream of the Colorado River below Parker Dam.[30] The study, developed in cooperation with the Imperial Irrigation District (IID), the Coachella Valley Water District (CVWD), the San Diego County Water Authority (SDCWA), and MWD, recommended the construction of a small reservoir near the All-American Canal in Imperial County, California, as the best option.[31]

The purpose of the 0.008 maf (9.9 mcm) ~~Drop 2 Storage~~Warren H. Brock Reservoir, previously named the Drop 2 Storage Reservoir, is to ~~capture~~ reduce nonstorable flows and to enhance beneficial use of Colorado River water within the United States. The reservoir will make up for the loss of water storage at Senator Wash due to operational restrictions and provide additional regulatory storage, allowing for more efficient management of water below Parker Dam.

Funding for the construction of the ~~Drop 2 Storage~~Warren H. Brock Reservoir ~~has been~~was provided by the Southern Nevada Water Authority (SNWA), MWD, and the Central Arizona Water Conservation District (CAWCD) and these entities received ICS credits in 2008 in proportion to their contributions.

Construction of the reservoir, which began in 2008, ~~is scheduled to be~~was completed in the summer of 2010 with commissioning in September. Operational testing will begin in fall of 2010 and continue until approximately the spring of 2011. Reclamation is currently working with IID to develop an operations plan and an operations and maintenance agreement.

[30] Preliminary Study of Lower Colorado River Water Storage Alternatives, February 21, 2005.
[31] Congress, in Subtitle J, Section 396 of Public Law 109-432, 120 Stat. 3047, dated December 20, 2006, directed the Secretary to provide for the construction of a regulated water storage facility near the All-American Canal. This facility is known as the Drop 2 Storage Reservoir.

Yuma Desalting Plant

The Yuma Desalting Plant (YDP) was authorized in 1974 under the Colorado River Basin Salinity Control Act (Public Law 93-320) which authorized the federal government to construct the YDP to desalt the drainage flows from the Wellton-Mohawk Division of the Gila Project. This would allow the treated water to be delivered to Mexico as part of its 1.5 maf (1,850 mcm) 1944 United States-Mexico Water Treaty allotment. The United States has met salinity requirements established in IBWC Minute No. 242 primarily through use of a canal to bypass Wellton-Mohawk drain water to the Ciénega de Santa Clara (Ciénega), a wetland of open water, vegetation, and mudflats within a Biosphere Reserve in Mexico. In calendar year 2010, the amount of water discharged from the Wellton-Mohawk Division through the bypass canal is anticipated to be 0.105 maf (130 mcm), measured at the Southerly International Boundary (SIB), at an approximate concentration of total dissolved solids of 2,600 parts per million (ppm).

Reclamation commenced Pilot Run operation of the Yuma Desalting Plant (YDP) on May 3, 2010, and plans to operate the plant for 365 days within an 18-month period at one-third capacity. A total of approximately 0.029 maf (36 mcm) of plant product water blended with drainage flows is anticipated to be discharged into the Colorado River as a result of the Pilot Run. MWD, SNWA, and CAWCD will receive an amount of water in proportion to their capital contributions to the Pilot Run in accordance with the ICS provisions in the Interim Guidelines (Section 3.A.3).

MWD, SNWA, and CAWCD jointly requested that Reclamation conduct the Pilot Run and associated research activities to consider long term, sustained operation as a tool to conserve water supplies on the lower Colorado River. Such consideration requires:

(a) Collecting performance and cost data;
(b) Identifying any remaining equipment improvements that are needed; ~~and~~
(c) Testing changes that have already been made to the plant~~.~~;
(d) Performing research utilizing new technology; and
(e) Exploring the potential of using renewable energy to meet future plant power needs.

Because plant operation reduces the volume of the flow from the bypass drain ~~and increases the salinity of the flow~~ to the Ciénega, Reclamation ~~has completed consultations~~consulted with Mexico through the IBWC. As a result of those consultations, the two countries have reached an agreement of joint cooperative actions in connection with the changes associated with reduction in flows in IBWC Minute No. 316.[32] Pursuant to this agreement, during the Pilot Run project, 0.030 maf (37 mcm) will be conveyed to the Ciénega to offset the flow reduction from the bypass drain for plant operation. One third of those flows will originate

[32] ~~Joint Report of the Principal Engineers Concerning U.S.-Mexico Joint Cooperative Actions Related to the Yuma Desalting Plant (YDP) Pilot Run and the Santa Clara Wetland, July 17, 2009.~~Minute No. 316, Utilization of the Wellton-Mohawk Bypass Drain and Necessary Infrastructure in the United States for the Conveyance of Water by Mexico and Non-Governmental Organizations of Both Countries to the Santa Clara Wetland During the Yuma Desalting Plant Pilot Run dated April 16, 2010.

from non-storable flows in the United States. One third will originate from a fallowing program in Mexico organized by a binational coalition of environmental groups, and the remaining one third will originate from Mexican supplies. The latter two thirds will be accounted for from Mexico's 1.5 maf Treaty allotment. As of September 8, 2010, ~~T~~the United States has delivered 0.010 maf (12 mcm)~~, pending verification from the IBWC,~~ to satisfy the requirements of this agreement. As of September 2010, the United States has delivered an additional 0.003 maf (3.6 mcm) for Mexico, pending verification from the IBWC.

Off-stream Storage Agreements

Colorado River water may be stored off-stream pursuant to individual SIRAs and 43 CFR Part 414 within the Lower Division States. The Secretary shall make ICUA available to contractors in Arizona, California, or Nevada pursuant to individual SIRAs and 43 CFR Part 414. In calendar year 2010, 0.008 maf (9.9 mcm) of ICUA water stored in Arizona is anticipated to be recovered for use in California by MWD.[33] SNWA may propose to make unused Nevada basic apportionment available for storage by MWD and CAP in calendar years 2010 and 2011.[34,35]

Intentionally Created Surplus

The Interim Guidelines included the adoption of the ICS mechanism that, among other things, encourages the efficient use and management of Colorado River water in the Lower Basin. ICS may be created through several types of activities that include improvements in system efficiency, extraordinary conservation, tributary conservation, and the importation of non-Colorado River System water into the Colorado River mainstream. Several implementing agreements[36] were executed concurrent with the issuance of the ROD for the Interim Guidelines. ICS credits may be created and delivered in 2011 pursuant to the Interim Guidelines and the implementing agreements.

Extraordinary Conservation ICS. IID anticipates creating up to 0.025 maf (30.8 mcm) of Extraordinary Conservation ICS credits each year in 2010 and 2011. MWD anticipates creating up to 0.133 maf (164 mcm) and 0.200 maf (247 mcm) of Extraordinary

[33] Amendatory Agreement to Agreement between the Central Arizona Water Conservation District and the Metropolitan Water District of Southern California for a Demonstration Project on Underground Storage of Colorado River Water, December 1, 1994.

[34] Storage and Interstate Release Agreement among The United States of America, acting through the Secretary of the Interior; The Metropolitan Water District of Southern California; the Southern Nevada Water Authority; and the Colorado River Commission of Nevada, October 21, 2004.

[35] Storage and Interstate Release Agreement among The United States of America, acting through the Secretary of the Interior; The Arizona Water Banking Authority; the Southern Nevada Water Authority; and the Colorado River Commission of Nevada, December 18, 2002.

[36] Delivery Agreement between the United States and IID; Delivery Agreement between the United States and MWD; Delivery Agreement between the United States, SNWA and the CRCN; Lower Colorado River Basin Intentionally Created Surplus Forbearance Agreement among the Arizona Department of Water Resources, SNWA, CRCN, the Palo Verde Irrigation District (PVID), IID, CVWD, MWD, and the City of Needles; and the California Agreement for the Creation and Delivery of Extraordinary Conservation Intentionally Created Surplus among the PVID, IID, CVWD, MWD, and the City of Needles.

Conservation ICS credits in 2010 and 2011, respectively. If unplanned circumstances arise, MWD may request delivery of Extraordinary Conservation ICS credits in 2010 and 2011.

System Efficiency ICS. Reclamation, the Colorado River Commission of Nevada (CRCN), and SNWA signed a funding agreement for the construction of the Drop 2 Storage Reservoir on December 13, 2007. In exchange for project funding of $172 million, the agreement provides for SNWA to receive 0.600 maf (740.1 mcm) of ICS credits at an annual maximum delivery rate of 0.040 maf (49.34 mcm) from 2011 until the year 2036. MWD and CAWCD became parties to the funding agreement in May 2008. In exchange for a contribution of one-sixth of the project funding amount, MWD and CAWCD each received 0.100 maf (123.3 mcm) of SNWA's ICS credits with a corresponding reduction in SNWA's ICS credits to 0.400 maf (493.4 mcm).

In calendar years 2010 and 2011, MWD may request delivery of up to 0.034 maf (41.9 mcm) of System Efficiency ICS credits created from the Drop 2 Storage Reservoir project. As the YDP Pilot Run is conducted, CAWCD, MWD, and SNWA receive System Efficiency ICS credits in exchange for funding. It is anticipated that up to 0.029 maf (35.8 mcm) of System Efficiency ICS credits from the YDP Pilot Run will be created in 2010 and 2011. The System Efficiency ICS credits created in 2010 will remain in Lake Mead in 2010. MWD and SNWA may request delivery of their System Efficiency ICS credits in 2011. System Efficiency ICS credits created for CAWCD will remain in Lake Mead through at least 2015.

Tributary Conservation ICS. SNWA anticipates creating up to 0.037 maf (45.6 mcm) of Tributary Conservation ICS credits each year in 2010 and 2011.

Imported ICS. SNWA anticipates creating up to 0.005 maf (6.2 mcm) and up to 0.007 maf (8.6 mcm) of Imported ICS credits in 2010 and 2011, respectively.

System Conservation of Colorado River Water Demonstration Program

In 2006, Reclamation implemented the System Conservation of Colorado River Water Demonstration Program (SC Demonstration Program) in the Lower Division States which allows entitlement holders to participate in voluntary conservation to conserve a portion of their approved annual consumptive use of Colorado River water in exchange for appropriate compensation provided by Reclamation. Reclamation extended the SC Demonstration Program through December 31, 2010.[37] The System Conservation Water (SC Water) is retained in Lake Mead to assist in providing an interim, supplemental source of water to replace the drainage water from the Wellton-Mohawk Irrigation and Drainage District (WMIDD) that is bypassed to the Ciénega and the reject stream from operation of the YDP. In calendar year 2010, approximately 0.0037 maf (4.56 mcm) of SC Water is anticipated to be created by Yuma Mesa Irrigation and Drainage District (YMIDD) and retained in Lake

[37]Extension of Policy Establishing a Demonstration Program for System Conservation of Colorado River Water, September 16, 2008.

Mead.[38] Reclamation may further extend the program and enter into agreements with entitlement holders to create SC Water in 2011.

Delivery of Water to Mexico

Delivery to Mexico pursuant to the 1944 United States-Mexico Water Treaty is anticipated to be 1.500 maf (1,850 mcm) in calendar year 2010. Excess flows arriving at the NIB are anticipated to be 0.115 maf (142 mcm) in calendar year 2010. Excess flows result from a combination of factors, including heavy rain from winter storms, water ordered but not delivered to United States users downstream of Parker Dam, inflows into the Colorado River below Parker Dam, and spills from irrigation facilities below Imperial Dam~~, and damages sustained by IID and Mexican conveyance systems due to the earthquake that occurred on April 4, 2010~~.

Of the scheduled delivery to Mexico in calendar year 2010, approximately 1.360 maf (1,680 mcm) is projected to be delivered at NIB and approximately 0.140 maf (173 mcm) is projected to be delivered at SIB. Although the Mexican Section of the IBWC initially requested the delivery of water ~~U~~under IBWC Minute No. 314[39] and the Emergency Delivery Agreement,[40] ~~approximately 0.001 maf (1.2 mcm)~~ these deliveries were later cancelled. Therefore, no water will be diverted from Lake Havasu and delivered ~~through MWD, SDCWA, and the Otay Water District's respective distribution system facilities~~ to Tijuana, Baja California in 2010~~ at the request of the Mexican Section of the IBWC~~.

Of the total delivery at SIB projected in calendar year 2010, approximately 0.094 maf (116 mcm) is projected to be delivered from the Yuma Project Main Drain and approximately 0.046 maf (56.7 mcm) is expected to be delivered by the Protective and Regulatory Pumping Unit (Minute 242 wells).

Pursuant to the 1944 United States-Mexico Water Treaty, a volume of 1.500 maf (1,850 mcm) will be available to be scheduled for delivery to Mexico in calendar year 2011, of which 0.140 maf (173 mcm) is projected to be delivered at SIB. Under IBWC Minute No. 314, and the Emergency Delivery Agreement, approximately 0.006 maf (7.4 mcm) may be delivered for Tijuana through MWD, SDCWA, and the Otay Water District's respective distribution system facilities in California. The remainder of the 1.500 maf (1,850 mcm) will be delivered at NIB.

Drainage flows to the Colorado River from the Yuma Mesa Conduit (YMC) and South Gila Drain Pump Outlet Channels are projected to be 0.051 maf (62.9 mcm) and 0.047 maf (58.0 mcm), respectively, for calendar year 2010. This water is available for delivery at NIB in

[38] Agreement between the United States Bureau of Reclamation and the Yuma Mesa Irrigation and Drainage District to Implement a Demonstration Program for System Conservation of Colorado River Water, October 7, 2008.

[39] Minute No. 314, Extension of the Temporary Emergency Delivery of Colorado River Water for use in Tijuana, Baja California dated November 26, 2008.

[40] Amendment No. 1 to Agreement for Temporary Emergency Delivery of a Portion of the Mexican Treaty Waters of the Colorado River to the International Boundary in the Vicinity of Tijuana, Baja California, Mexico, and for the Operation of Facilities in the United States, dated November 26, 2008.

satisfaction of the 1944 United States-Mexico Water Treaty. Reclamation, under permit from the Arizona Department of Water Resources (ADWR), may pump up to 0.025 maf (30.8 mcm) of groundwater annually for water delivery to Mexico to replace water bypassed to the Ciénega through the bypass canal. By October 1 of each year, Reclamation has the option to apply to ADWR to pump water under this permit for the following calendar year. Reclamation did not apply to pump groundwater under this permit in 2010. In 2011, up to 0.020 maf (24.7 mcm) of groundwater may be pumped under this permit.[41]

As stated in Minute No. 242, the maximum allowable salinity differential is 145 ppm by the United States' measurement or count and 151 ppm by the Mexican count. The salinity differential for calendar year 2010 is projected to be 141 ppm by the United States' count.

Mexico has identified four critical months, October through January, regarding improving the quality of water delivered at SIB. As a matter of comity, the United States has agreed to reduce the salinity of water delivered at SIB during this period. To accomplish the reduction in salinity, the United States constructed a diversion channel to bypass up to 0.008 maf (9.87 mcm) of Yuma Valley drainage water during the four critical months identified by Mexico. This water will be replaced by better quality water from the Minute No. 242 well field to reduce the salinity at SIB. Reclamation anticipates bypassing approximately 0.001 maf (1.2 mcm) in calendar year 2010 to the diversion channel for salinity control and up to 0.008 maf (9.87 mcm) in calendar year 2011.

[41] ADWR Transport Permit Number 30-001 entitled Permit to Transport Groundwater Withdrawn from the Yuma Groundwater Basin, March 1, 2007.

2011 DETERMINATIONS

The AOP provides projections regarding reservoir storage and release conditions during the upcoming year, based upon Congressionally mandated and authorized storage, release, and delivery criteria and determinations. After meeting these criteria and determinations, specific reservoir releases may be modified within these requirements as forecasted inflows change in response to climatic variability and to provide additional benefits coincident to the projects' multiple purposes.

Upper Basin Reservoirs

Section 602(a) of the CRBPA provides for the storage of Colorado River water in Upper Basin reservoirs and the release of water from Lake Powell that the Secretary finds reasonably necessary to assure deliveries to comply with Articles III(c), III(d), and III(e) of the 1922 Colorado River Compact without impairment to the annual consumptive use in the Upper Basin. The Operating Criteria provide that the annual plan of operation shall include a determination of the quantity of water considered necessary to be in Upper Basin storage at the end of the water year after taking into consideration all relevant factors including historic streamflows, the most critical period of record, the probabilities of water supply, and estimated future depletions. Water not required to be so stored will be released from Lake Powell:

- to the extent it can be reasonably applied in the States of the Lower Division to the uses specified in Article III(e) of the 1922 Colorado River Compact, but these releases will not be made when the active storage in Lake Powell is less than the active storage in Lake Mead;

- to maintain, as nearly as practicable, active storage in Lake Mead equal to the active storage in Lake Powell; and

- to avoid anticipated spills from Lake Powell.

Taking into consideration all relevant factors required by Section 602(a)(3) of the CRBPA and the Operating Criteria, it is determined that the active storage in Upper Basin reservoirs ~~forecasted~~ projected for September 30, 2011, under the ~~forecasted~~ most probable inflow scenario would exceed the storage required under Section 602(a) of the CRBPA.

Taking into account (1) the existing water storage conditions in the basin, (2) the August 24-Month Study projection of the most probable near-term water supply conditions in the basin, and (3) Section 6.B. the Interim Guidelines, the Upper Elevation Balancing Tier governs the operation of Lake Powell for water year 2011; however, the September 2010 24-Month Study of the most probable inflow scenario projects an adjustment would be made in April to operations being governed by the Equalization Tier. ~~Based on the September 2010 24-Month Study of the most probable inflow, an April adjustment to the annual release is projected.~~ Given this adjustment, the annual release from Glen Canyon Dam is currently

projected to be 11.3 maf (13,900 mcm) for water year 2011. Given the hydrologic variability of the Colorado River System, the water year release from Lake Powell in 2011 could be in the range of 8.23 maf (10,200 mcm) to 15.0 maf (18,500 mcm) or greater.

Lower Basin Reservoirs

Pursuant to Article III of the Operating Criteria and consistent with the Consolidated Decree, water shall be released or pumped from Lake Mead to meet the following requirements:

(a) 1944 United States-Mexico Water Treaty obligations;
(b) Reasonable beneficial consumptive use requirements of mainstream users in the Lower Division States;
(c) Net river losses;
(d) Net reservoir losses;
(e) Regulatory wastes; and
(f) Flood control.

The Operating Criteria provide that after the commencement of delivery of mainstream water by means of the CAP, the Secretary will determine the extent to which the reasonable beneficial consumptive use requirements of mainstream users are met in the Lower Division States. Reasonable beneficial consumptive use requirements are met depending on whether a Normal, Surplus, or Shortage Condition has been determined. The Normal Condition is defined as annual pumping and release from Lake Mead sufficient to satisfy 7.500 maf (9,251 mcm) of consumptive use in accordance with Article III(3)(a) of the Operating Criteria and Article II(B)(1) of the Consolidated Decree. The Surplus Condition is defined as annual pumping and release from Lake Mead sufficient to satisfy in excess of 7.500 maf (9,251 mcm) of consumptive use in accordance with Article III(3)(b) of the Operating Criteria and Article II(B)(2) of the Consolidated Decree. An ICS Surplus Condition is defined as a year in which Lake Mead's elevation is projected to be above elevation 1,075 feet (327.7 meters) on January 1, a Flood Control Surplus has not been determined, and delivery of ICS has been requested. The Secretary may determine an ICS Surplus Condition in lieu of a Normal Condition or in addition to other operating conditions that are based solely on the elevation of Lake Mead. The Shortage Condition is defined as annual pumping and release from Lake Mead insufficient to satisfy 7.500 maf (9,251 mcm) of consumptive use in accordance with Article III(3)(c) of the Operating Criteria and Article II(B)(3) of the Consolidated Decree.

The Interim Guidelines are being utilized in calendar year 2011 and serve to implement the narrative provisions of Article III(3)(a), Article III(3)(b), and Article III(3)(c) of the Operating Criteria and Article II(B)(1), Article II(B)(2), and Article II(B)(3) of the Consolidated Decree for the period through 2026. The Interim Guidelines will be used annually by the Secretary to determine the quantity of water available for use within the Lower Division States.

Consistent with the Interim Guidelines, the August 2010 24-Month Study was used to forecast the system storage as of January 1, 2011. Based on a projected January 1, 2011, Lake Mead elevation of 1,086.38 feet (331.1 meters) and consistent with Section 2.B.5 of the Interim Guidelines, the ICS Surplus Condition will govern releases for use in the states of Arizona, Nevada, and California during calendar year 2011 in accordance with Article III(3)(b) of the Operating Criteria and Article II(B)(2) of the Consolidated Decree.

Article II(B)(6) of the Consolidated Decree allows the Secretary to allocate water that is apportioned to one Lower Division State but is for any reason unused in that state to another Lower Division State. This determination is made for one year only, and no rights to recurrent use of the water accrue to the state that receives the allocated water. No unused apportionment for calendar year 2011 is anticipated. If any unused apportionment becomes available after adoption of this AOP, Reclamation, on behalf of the Secretary, shall allocate any such available unused apportionment for calendar year 2011 in accordance with Article II(B)(6) of the Consolidated Decree and the Unused Water Policy.

Water may be stored off-stream pursuant to individual SIRAs and 43 CFR Part 414 within the Lower Division States. The Secretary shall make ICUA available to contractors in Arizona, California, or Nevada pursuant to individual SIRAs and 43 CFR Part 414. SNWA may propose to make unused Nevada basic apportionment available for storage by MWD and CAP in calendar year 2011.

The IOPP, which became effective January 1, 2004, will be in effect during calendar year 2011.

The Colorado River Water Delivery Agreement requires payback of California overruns occurring in 2001 and 2002 as noted in Exhibit C of that document. Each district with a payback obligation under Exhibit C may at its own discretion elect to accelerate paybacks. All Exhibit C overruns were paid back by the end of 2009, two years ahead of schedule. In calendar year 2011, paybacks occurring in California result from IOPP overruns only. In calendar year 2011, California paybacks are projected to total 0.005 maf (6.2 mcm). In calendar year 2011, Arizona paybacks are projected to total 0.012 maf (14.8 mcm).

The Interim Guidelines included the adoption of the ICS mechanism that among other things encourages the efficient use and management of Colorado River water in the Lower Basin. The ICS Surplus Condition will govern Lower Basin operations in calendar year 2011 and ICS credits will be created and delivered pursuant to the Interim Guidelines and appropriate delivery and forbearance agreements.

Given the limitation of available supply and the low inflow amounts within the Colorado River Basin due to the eleven-year drought, the Secretary, through Reclamation, will continue to review Lower Basin operations to assure that all deliveries and diversions of mainstream water are in strict accordance with the Consolidated Decree, applicable statutes, contracts, rules, and agreements.

As provided in Section 7.C of the Interim Guidelines, the Secretary may undertake a mid-year review to consider revisions of the current AOP. For Lake Mead, the Secretary shall

revise the determination in any mid-year review for the current year only to allow for additional deliveries from Lake Mead pursuant to Section 7.C of the Interim Guidelines.

1944 United States-Mexico Water Treaty

Under the most probable, minimum probable, and maximum probable inflow scenarios, water in excess of that required to supply uses in the United States will not be available. Vacant storage space in mainstream reservoirs is substantially greater than that required by flood control regulations. Therefore, a volume of 1.500 maf (1,850 mcm) of water will be available to be scheduled for delivery to Mexico during calendar year 2011 in accordance with Article 15 of the 1944 United States-Mexico Water Treaty and Minutes No. 242 and 314 of the IBWC.

Calendar year schedules of the monthly deliveries of Colorado River water are formulated by the Mexican Section of the IBWC and presented to the United States Section before the beginning of each calendar year. Pursuant to the 1944 United States-Mexico Water Treaty, the monthly quantity prescribed by those schedules may be increased or decreased by not more than 20 percent of the monthly quantity, upon 30 days notice in advance to the United States Section. Any change in a monthly quantity is offset in another month so that the total delivery for the calendar year is unchanged.

DISCLAIMER

Nothing in this AOP is intended to interpret the provisions of the Colorado River Compact (45 Stat. 1057); the Upper Colorado River Basin Compact (63 Stat. 31); the Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande, Treaty Between the United States of America and Mexico (Treaty Series 994, 59 Stat. 1219); the United States/Mexico agreement in Minute No. 242 of August 30, 1973, (Treaty Series 7708; 24 UST 1968); the Consolidated Decree entered by the Supreme Court of the United States in *Arizona v. California* (547 U.S 150 (2006)); the Boulder Canyon Project Act (45 Stat. 1057); the Boulder Canyon Project Adjustment Act (54 Stat. 774; 43 U.S.C. 618a); the Colorado River Storage Project Act (70 Stat. 105; 43 U.S.C. 620); the Colorado River Basin Project Act (82 Stat. 885; 43 U.S.C. 1501); the Colorado River Basin Salinity Control Act (88 Stat. 266; 43 U.S.C. 1951); the Hoover Power Plant Act of 1984 (98 Stat. 1333); the Colorado River Floodway Protection Act (100 Stat. 1129; 43 U.S.C. 1600); or the Grand Canyon Protection Act of 1992 (Title XVIII of Public Law 102-575, 106 Stat. 4669).

APPENDIX

This Appendix includes a list of acronyms used within the AOP and plots showing the projections of monthly inflows, monthly releases, and end-of-month elevations and storages for Colorado River reservoirs (October 2010 through December 2011). Plots of historic end of month storages for Colorado River reservoirs are also included.

Values in these plots are projections based on modeling reservoir operations under three possible inflow scenarios. The minimum probable inflow scenario reflects a hydrologic condition which statistically would be exceeded 90 percent of the time. The most probable inflow scenario reflects a hydrologic condition which statistically would be exceeded 50 percent of the time (the median). The maximum probable inflow scenario reflects a hydrologic condition which statistically would be exceeded 10 percent of the time. The projected levels reflected in these graphs are based on projected operation of the reservoirs with appropriate consideration of the uses of the reservoirs in accordance with Article I(2) of the Operating Criteria.

Given the hydrologic variability of the Colorado River system, the actual reservoir inflows, releases, and storages may lie outside the ranges indicated in these graphs.

Acronyms and Abbreviations

ADWR	Arizona Department of Water Resources
~~af~~	~~acre-feet~~
AMP	Glen Canyon Dam Adaptive Management Program
AMWG	Glen Canyon Dam Adaptive Management Work Group
AOP	Annual Operating Plan
~~BIA~~	~~Bureau of Indian Affairs~~
~~BLM~~	~~Bureau of Land Management~~
BWRCSC	Bill Williams River Corridor Steering Committee
CAP	Central Arizona Project
CAWCD	Central Arizona Water Conservation District
CBRFC	National Weather Service's Colorado Basin River Forecast Center
cfs	cubic feet per second
cms	cubic meters per second
CRBPA	Colorado River Basin Project Act of 1968
CRCN	Colorado River Commission of Nevada
CRMWG	Colorado River Management Work Group
~~CRSPA~~	~~Colorado River Storage Project Act of 1956~~
~~CRWDA~~	~~Colorado River Water Delivery Agreement~~
CVWD	Coachella Valley Water District
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	Endangered Species Act
~~ESP~~	~~Ensemble Streamflow Prediction~~
FGTWG	Flaming Gorge Technical Work Group
FONSI	Finding of No Significant Impact
ft	feet
GCDFEIS	Glen Canyon Dam Final Environmental Impact Statement of 1996
GCPA	Grand Canyon Protection Act of 1992
IBWC	International Boundary and Water Commission, United States and Mexico
ICS	Intentionally Created Surplus
ICUA	Intentionally Created Unused Apportionment
IID	Imperial Irrigation District
IOPP	Inadvertent Overrun and Payback Policy
~~LCR MSCP~~	~~Lower Colorado River Multi-Species Conservation Program~~
m	meters
maf	million acre-feet
mcm	million cubic meters
~~MOA~~	~~Memorandum of Agreement~~
MWD	The Metropolitan Water District of Southern California
NEPA	National Environmental Policy Act of 1969, as amended
~~NGO~~	~~non-governmental organization~~
NIB	Northerly International Boundary
P.L.	Public Law
ppm	parts per million
Reclamation	United States Bureau of Reclamation

ROD	Record of Decision
SDCWA	San Diego County Water Authority
Secretary	Secretary of the United States Department of the Interior
Service	United States Fish and Wildlife Service
SIB	Southerly International Boundary
SIRA	Storage and Interstate Release Agreement
SNWA	Southern Nevada Water Authority
SRP	Salt River Project
USACE	United States Army Corps of Engineers
Western	Western Area Power Administration
WMIDD	Wellton-Mohawk Irrigation and Drainage District
YDP	Yuma Desalting Plant
YMIDD	Yuma Mesa Irrigation and Drainage District