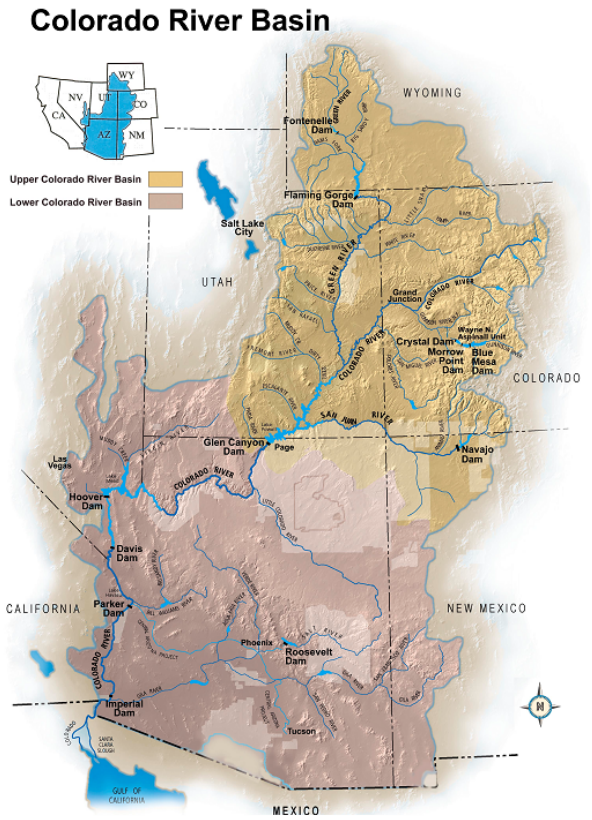
RECLAMATION

Managing Water in the West

DRAFT Annual Operating Plan for Colorado River Reservoirs 2010



U.S. Department of the Interior
Bureau of Reclamation

2010 DRAFT AOP – September 18, 2009

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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 ~~water~~ year ~~(from October 1 through September 30)~~ as well as projected operations and releases from these reservoirs for the current (i.e., upcoming) year. Accordingly, this 2010 AOP reports on 2009 operations as well as projected operations for 2010. In recent years, additional operational rules 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 2001 Interim Surplus Guidelines[3] addressing operation of Hoover Dam, the 2006 Flaming Gorge Dam ROD,[4] the 2006 Navajo Dam ROD[5] to implement recommended flows for endangered fish, the 2007 Interim Guidelines for the operations of Lake Powell and Lake Mead,[6] the 2009 Colorado Water Court decree quantifying the Federal Reserved water right for Black Canyon of the Gunnison National Park (Black Canyon Water Right),[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] ROD for the Colorado River Interim Surplus Guidelines, January 16, 2001 (67 *Federal Register* 7772, January 25, 2001).
[4] ROD for the Operation of Flaming Gorge Dam, February 16, 2006.
[5] ROD for Navajo Reservoir Operation, Navajo Unit – San Juan River, New Mexico, Colorado, Utah, July 31, 2006.
[6] 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.
[7] Decree Quantifying the Federal Reserved Water Right for ~~the~~ Black Canyon of the Gunnison National Park (State of Colorado District Court, Water~~River~~ Division ~~No. 4~~Four, Case ~~No.~~Number 01_CW_05), signed on January 8, 2009.

Authority

This 2010 AOP was developed in accordance with 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 (GCPA) (Public Law 102-575).

Section 602(b) of the CRBPA requires the Secretary to prepare and "transmit to Congress and 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 [from October 1 through September 30] 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; 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 2010 AOP was prepared by Reclamation in consultation with: the seven Colorado River Basin States Governors' representatives; the Upper Colorado River Commission; Native American tribes; 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 ~~of~~ 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 AOP may occur only through the AOP consultation process as required by applicable Federal law.

Purpose

The purposes of the AOP are to determine or address: (1) the projected operation of the Colorado River reservoirs to satisfy project purposes under varying hydrologic and climatic conditions; (2) the quantity of water considered necessary to be in storage in the Upper Basin reservoirs as of September 30, 2010, pursuant to Section 602(a) of the CRBPA; (3) 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); (4) 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 (5) 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)).

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 maximum probable, most probable, and minimum probable reservoir inflow conditions. River operations under the plan are modified during the year as runoff predictions are adjusted to reflect existing snowpack, basin storage, and flow conditions.

Summary

Upper Basin Delivery. Annual releases from Lake Powell during water year 2010 shall be made consistent with Section 6.B (Upper Elevation Balancing Tier) of the Interim Guidelines. Consistent with Section 6.B.1, the water year release from Lake Powell in 2010 shall be 8.23 million acre-feet (maf) (10,150 million cubic meters [mcm]) unless provisions in Section 6.B.3 occur. Consistent with Section 6.B.3 of the Interim Guidelines, if the April 2010 24-Month Study[8] projects the September 30, 2010, Lake Powell elevation to be greater than elevation 3,642.0 feet (1,110.1 meters), Section 6.A (Equalization Tier) of the Interim Guidelines will govern the release of water from Lake Powell for the remainder of water year 2010 (through September 2010).

Based on the August 2009 24-Month Study under the most probable inflow scenario, it is anticipated that the April 2010 24-Month Study will result in the Equalization Tier governing operations of Lake Powell for the remainder of the water year. ~~r~~Releases from Lake Powell could range from:

- 8.23 maf (10,150 mcm) under the forecasted minimum probable inflow scenario to
- 10.49 maf (12,940 mcm) under the forecasted most probable inflow scenario to
- 13.44 maf (16,580 mcm) under the forecasted maximum probable inflow scenario.

For further information about the variability of projected inflow into Lake Powell, projected Lake Powell elevations, and projected monthly releases, please see Tables 3 through 6, 8, and 9 in this AOP.

[8] The 24-Month Study is a two-year operational projection for Colorado River system reservoirs that is updated and revised by Reclamation on a monthly basis based on hydrological and operational information. The study can be found at http://www.usbr.gov/lc/riverops.html or http://www.usbr.gov/uc/water/crsp/studies/index.html.

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 the operation of Lake Mead for calendar year 2010 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 2010 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 2010 in accordance with Article II(B)(6) of the Consolidated Decree.

Colorado River water may be stored off-stream pursuant to individual Storage and Interstate Release Agreements (SIRAs) and 43 CFR Part 414[9] 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. In calendar year 2009, 0.030 maf (37.0 mcm) of ICUA water stored in Arizona is anticipated to be recovered for use in California by the Metropolitan Water District of Southern California (MWD).[10] In calendar year 2010, 0.006 maf (7.4 mcm) of ICUA water stored in Arizona is anticipated to be recovered for use in California by MWD. The Southern Nevada Water Authority (SNWA) may propose to make unused Nevada basic apportionment available for storage by MWD in calendar years 2009 and 2010.[11]

The Inadvertent Overrun and Payback Policy (IOPP), which became effective January 1, 2004, will be in effect during calendar year 2010.[12]

The Colorado River Water Delivery Agreement[13] 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. In calendar year 2009, paybacks occurring in California result from Exhibit C obligations and IOPP overruns. Based on 2009 payback plans, it is anticipated that all Exhibit C obligations will be paid back by the end of 2009, two years ahead of schedule. In calendar year 2010, paybacks occurring in California result from IOPP overruns only. During calendar year 2009, California paybacks are projected to total 0.006 maf (7.4 mcm). In calendar year 2010, California paybacks are projected to total 0.001 maf (1.23 mcm).

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[9] 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).

[10] 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.

[11] 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.

[12] 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).

[13] 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).

During calendar year 2009, Arizona paybacks are projected to total 0.0003 maf (0.370 mcm). In calendar year 2010, Arizona paybacks are projected to total 0.0003 maf (0.370 mcm).

During calendar year 2009, Nevada paybacks are projected to total 0.005 maf (6.2 mcm).

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 2010 pursuant to the Interim Guidelines and appropriate delivery and forbearance agreements.

In 2006, Reclamation implemented an ICS Demonstration Program in the Lower Basin. The ICS Demonstration Program allowed entitlement holders to undertake extraordinary conservation activities in 2006 and 2007 to reduce their approved annual consumptive use of Colorado River water and account for that conserved water in Lake Mead. The ICS credits created and accounted for under the ICS Demonstration Program are available for delivery pursuant to the Interim Guidelines and appropriate delivery and forbearance agreements. In calendar year 2006, MWD created 0.050 maf (61.67 mcm) of ICS credits.[14] In calendar year 2009, MWD is anticipated to recover up to 0.028 maf (34.54 mcm) of ICS credits created under the ICS Demonstration Program. If MWD has not recovered all of its Demonstration Program ICS credits during calendar year 2009, MWD may request delivery of those credits in a subsequent year. In calendar year 2006, the Imperial Irrigation District (IID) planned to create 0.001 maf (1.233 mcm) of ICS credits under the program.[15] Pursuant to the IID ICS agreement, the conserved water was applied to reduce its 2006 IOPP overrun.

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.[16] 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 de Santa Clara (Ciénega) and the reject stream from operation of the Yuma Desalting Plant (YDP). In calendar year 2009, approximately 0.0035 maf (4.32 mcm) of SC Water is projected to be created by Yuma Mesa Irrigation and Drainage District (YMIDD) and retained in Lake Mead.[17] Reclamation may enter into agreements with entitlement holders to create SC Water in 2010.

[14] Agreement between the United States Bureau of Reclamation and MWD to Implement a Demonstration Program to Create Intentionally Created Surplus Water, May 18, 2006.
[15] Agreement between IID and the United States Bureau of Reclamation to Implement a Demonstration Program to Create Intentionally Created Surplus Water, June 26, 2006.
[16] Extension of Policy Establishing a Demonstration Program for System Conservation of Colorado River Water, September 16, 2008.
[17] 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.

In December 2007, Reclamation signed a funding agreement for the construction of the Drop 2 Storage Reservoir. In exchange for project funding, SNWA received 0.400 maf (493 mcm) and MWD and the Central Arizona Water Conservation District (CAWCD) each received 0.100 maf (123 mcm) of System Efficiency ICS credits. In calendar year 2009, MWD has requested delivery of 0.034 maf (41.9 mcm) of its System Efficiency ICS credits and is anticipated to take delivery of 0.032 maf (39.5 mcm) of these credits in 2010.

In early 2009, MWD, SNWA, and CAWCD requested that Reclamation conduct a pilot run operation of the YDP (Pilot Run). If the YDP Pilot Run is approved, CAWCD, MWD, and SNWA would receive System Efficiency ICS credits in exchange for funding. ~~and~~ MWD ~~is~~ anticipate~~sd to~~ take~~inge~~ delivery of its System Efficiency ICS credits created from the YDP Pilot Run in 2010.

SNWA anticipates creating 0.030 maf (37.0 mcm) and taking delivery of 0.024 maf (29.6 mcm) of Tributary Conservation ICS credits in 2009. In 2010, SNWA anticipates creating 0.042 maf (51.8 mcm) (0.037 maf [45.6 mcm] of Tributary Conservation ICS and 0.005 maf [6.2 mcm] of Imported ICS) and taking delivery of 0.040 maf (49.3 mcm) of ~~Tributary Conservation~~ ICS credits in 2010.

IID anticipates creating up to 0.025 maf (30.8 mcm) of Extraordinary Conservation ICS credits each year in 2009 and in 2010.

MWD may create Extraordinary Conservation ICS credits in 2009 and 2010 if water supply availability permits.

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 2010 in accordance with Article 15 of the 1944 United States-Mexico Water Treaty and Minutes No. 242 and 314 of the IBWC.

2009 HYDROLOGY SUMMARY AND RESERVOIR STATUS

Below average streamflows were observed throughout much of the Colorado River Basin during water year 2009. Unregulated[18] inflow to Lake Powell in water year 2009 was 11.045 maf (13,624 mcm), or 92 percent of the 30-year average[19] which is 12.04 maf (14,851 mcm). Unregulated inflow to Flaming Gorge, Blue Mesa, and Navajo Reservoirs was 93, 104, and 83 percent of average, respectively.

Basin-wide precipitation during water year 2009 was initially well below average during October and November 2008. In December, however, precipitation rebounded and was well above average bringing the cumulative water year-to-date precipitation on December 31, 2008, to 107 percent of average. The December conditions, however, did not continue and precipitation in January, February and early March wasexperienced slightly below average. conditions. Cumulative water year precipitation conditions on March 1, 2009, were was 102 percent of average. Average precipitation in March and April continued to experience average precipitation and by May 4, 2009, cumulative water year precipitation remained at 103 percent of average. Precipitation in June was well above average and on June 30, 2009, the cumulative precipitation for water year 2009 was 105 percent of average. Precipitation accounts for cumulative values of both snowmelt and rainfall captured at various mountain sites rather than actual streamflow values in rivers. The well below average precipitation conditions during the beginning of water year 2009 negatively impacted observed unregulated inflow into Lake Powell with observed volumes from October through April between 70 to 80 percent of average.

Snowpack conditions trended slightly below average in the Upper Green River and San Juan River Basins during water year 2009, and slightly above average in the Upper Colorado River and Gunnison River Basins. On April 1, 2009, snowpack in the Upper Green River and San Juan River Basins measured 91 and 85 percent of average, respectively, while the Upper Colorado River and Gunnison River Basins measured 108 and 104, percent of average, respectively.

Inflows to Lake Powell during April were below forecasted levels while in May inflows were well above forecasted levels. By late May, inflows increased to more than 60,000 cubic feet per second (cfs) (1,698 cubic meters per second [cms]) with Lake Powell elevations increasing by about 0.5 foot (0.15 meter) per day. The observed unregulated inflow volume to Lake Powell during the April through July period was 7.810 maf (9,633 mcm), or 98 percent of average.

Inflow to Lake Powell has been below average in eight out of the past ten years. Although slightly above average inflows occurred in 2005 and 2008, drought conditions in the Colorado River Basin persist. Provisional calculations of natural flow for the Colorado River at Lees Ferry, Arizona, show that the average natural flow since calendar year 2000

[18] 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.
[19] Inflow statistics throughout this document will be compared to the 30-year average, 1971-2000, unless otherwise noted.

(2000-2009, inclusive) is 11.933 maf (14,719 mcm), the lowest ten-year average in over 100 years of record keeping on the Colorado River.

Drought conditions persisted during water year 2009 in parts of the Lower Basin and southwestern United States. Abnormally dry conditions persisted in southern California, southern Nevada, and far western Arizona and extended into central and eastern Arizona.[20]

There was above average snowfall in the Gila, Salt, and Verde River watersheds during much of the winter, with cumulative water year precipitation at 132 percent of average on December 29, 2008. Despite a wet winter, drier spring conditions developed and precipitation for water year 2009 in the Gila River Basin was 82 percent of average. During water year 2009, the Salt River Project released water from its system in excess of diversion requirements at Granite Reef Diversion Dam; however, none of this water reached Painted Rock Dam and no tributary inflow from the Gila River reached the mainstream of the Colorado River.[21]

Lower Basin tributary inflows into the mainstream were well below average for water year 2009. Tributary inflow from the Little Colorado for water year 2009 totaled 0.088 maf (109 mcm), or 49 percent of the long-term average.[22] Tributary inflow from the Bill Williams River totaled 0.035 maf (43 mcm) for water year 2009, or 35 percent of the long-term average. Tributary inflow from the Virgin River for water year 2009 also experienced below average conditions, totaling 0.113 maf (139 mcm), or 66 percent of the long-term average.

The Colorado River total system storage experienced a net gain in water year 2009 in the amount of 0.827 maf (1,020 mcm). Reservoir storage in Lake Powell ~~experienced an~~ increased during water year 2009, increasing by 1.427 maf (1,760 mcm). Reservoir storage in Lake Mead declined during water year 2009 by 1.048 maf (1,293 mcm). At the beginning of water year 2009 (October 1, 2008), Colorado River total system storage was 57 percent of capacity. As of September 30, 2009, total system storage was 59 percent of capacity.

[20] From the U.S. Drought Monitor website: http://drought.unl.edu/dm/monitor.html, June 16, 2009.
[21] 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.
[22] The basis for the long-term average of tributary inflows in the Lower Basin is natural flow data from 1906 to 2006. Additional information regarding natural flows may be found at http://www.usbr.gov/lc/region/g4000/NaturalFlow/current.html.

Tables 1 and 2 list the October 1, 2009, reservoir vacant space, live storage, water elevation, percent of capacity, change in storage, and change in water elevation during water year 2009.

Table 1. Reservoir Conditions on October 1, 2009 (English Units)

Reservoir	Vacant Space (maf)	Live Storage (maf)	Water Elevation (ft)	Percent of Capacity (%)	Change in Storage* (maf)	Change in Elevation* (ft)
Fontenelle	0.031	0.314	6,502.0	91	0.060	8.2
Flaming Gorge	0.361	3.389	6,031.0	90	0.365	9.8
Blue Mesa	0.147	0.682	7,502.5	82	0.032	3.9
Navajo	0.312	1.383	6,062.7	82	0.065	5.0
Lake Powell	8.384	15.936	3,639.4	66	1.427	12.5
Lake Mead	14.915	10.965	1,094.1	42	-1.048	-11.7
Lake Mohave	0.272	1.538	637.0	85	-0.048	-1.8
Lake Havasu	0.063	0.557	446.8	90	-0.026	-1.4
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Totals	24.49	34.763		58.7	0.827	

* From October 1, 2008, to September 30, 2009.

Table 2. Reservoir Conditions on October 1, 2009 (Metric Units)

Reservoir	Vacant Space (mcm)	Live Storage (mcm)	Water Elevation (m)	Percent of Capacity (%)	Change in Storage* (mcm)	Change in Elevation* (m)
Fontenelle	38	387	1,981.8	81	74	2.5
Flaming Gorge	445	4,181	1,8383	90	450	3.0
Blue Mesa	181	842	2,286.8	82	40	1.2
Navajo	385	1,705	1,847.9	82	80	1.5
Lake Powell	10,342	19,656	1,109.3	66	1,760	3.8
Lake Mead	18,398	13,525	333.5	42	-1,293	-3.6
Lake Mohave	336	1,897	194.2	85	-59	-0.5
Lake Havasu	77	687	136.2	90	-33	-0.4
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Totals	30,202	42,880		58.7	1020	

* From October 1, 2008, to September 30, 2009.

2010 WATER SUPPLY ASSUMPTIONS

For 2010 operations, three reservoir unregulated inflow scenarios were developed and analyzed: maximum probable, most probable, and minimum 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 maximum probable (10 percent exceedance), most probable (50 percent exceedance), and minimum probable (90 percent exceedance) inflow scenarios in 2010 using an Ensemble Streamflow Prediction (ESP) model. CBRFC's ESP model accounts for antecedent streamflows as well as current soil moisture levels with a continuous soil moisture accounting model known as the Sacramento Soil Moisture Accounting Model. Based upon the October CBRFC forecast, the range of unregulated inflows is projected to be as follows:

- The forecasted most probable unregulated inflow for Lake Powell in water year 2010 is 11.0 maf (13,570 mcm), or 91 percent of average.
- The forecasted minimum probable unregulated inflow to Lake Powell in water year 2010 is 5.0 maf (6,170 mcm), or 42 percent of average.
- The forecasted maximum probable unregulated inflow is 18.0 maf (22,200 mcm), or 149 percent of average.

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 using historic data over the five-year period of January 2004 through December 2008, 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 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 most probable inflow during water year 2010 is 0.990 maf (1,221 mcm), the minimum probable inflow is 0.512 maf (632 mcm), and the maximum probable inflow is 1.660 maf (2,048 mcm).

The forecasted monthly volumes of inflow were input into Reclamation's monthly reservoir simulation model (the 24-Month Study) and used to plan reservoir operations for 2010. Starting with October 1, 2009, 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 projected 2010 inflows, releases, elevations, and storages for each hydrologic scenario are presented in the Appendix.

Table 3. Forecasted Unregulated Inflow into Lake Powell for Water Year 2010 (English Units)[23]

Time Period	Minimum probable (maf)	Most Probable (maf)	Maximum probable (maf)
10/09–12/09	1.01	1.40	2.02
1/10 – 3/10	1.06	1.40	1.82
4/10– 7/10	2.55	7.25	12.44
8/10 – 9/10	0.38	0.95	1.72
10/10 – 12/10	1.45	1.45	1.45
WY 2010	5.00	11.00	18.00
CY 2010	5.44	11.05	17.43

Table 4. Forecasted Unregulated Inflow into Lake Powell for Water Year 2010 (Metric Units)

Time Period	Minimum probable (mcm)	Most Probable (mcm)	Maximum probable (mcm)
10/09 –12/09	1,250	1,730	2,490
1/10–3/10	1,310	1,730	2,240
4/10 –7/10	3,150	8,940	15,340
8/10 –9/10	470	1,170	2,120
10/10 –12/10	1,790	1,790	1,790
WY 2010	6,170	13,570	22,200
CY 2010	6,710	13,630	22,500

[23] All values in Tables 3 and 4 are forecasted inflows with the exception of the values for 10/10-12/10. 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 10/10-12/10 time period.

SUMMARY OF RESERVOIR OPERATIONS IN 2009 AND PROJECTED 2010 RESERVOIR OPERATIONS

The operation of the Colorado River reservoirs has had effects on 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. The Glen Canyon Dam Adaptive Management Work Group (AMWG)[24] was established in 1997 as a chartered committee under the Federal Advisory Committee Act of 1972 (Public Law 92-463).

Modifications to planned operations may be 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),[25] the San Juan River Basin Recovery Implementation Program (San Juan Recovery Program),[26] Section 7 consultations under the Endangered Species Act (ESA), and other downstream concerns, modifications to monthly operation plans 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 operations plans.

In 1995, Reclamation and the Service formed a partnership with other Federal, State, local public agencies and private organizations to develop the Lower Colorado River Multi-Species Conservation Program (LCR MSCP). This program includes both non-Federal and Federal parties and addresses ESA compliance requirements under Sections 7 and 10 of the ESA. In April 2005, the Secretary signed the ROD to begin implementation of the LCR MSCP.[27] Reclamation, in consultation and partnership with a Steering Committee made up of representatives from 56 participating entities, is the primary implementing agency. The LCR MSCP is currently meeting the goals outlined in the habitat conservation plan.

[24] Additional information on the AMWG can be found at www.usbr.gov/uc/rm/amp.
[25] Additional information on the Upper Colorado Recovery Program can be found at http://coloradoriverrecovery.fws.gov.
[26] Additional information on the San Juan Recovery Program can be found at www.fws.gov/southwest/sjrip.
[27] Additional information on the LCR MSCP can be found at http://www.lcrmscp.gov.

The following paragraphs discuss the 2009 and most probable projected 2010 operation 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.

Fontenelle Reservoir

Hydrologic conditions in water year 2009 in the Upper Green River Basin were slightly above average when compared to the historic record for the reservoir. The April through July inflow to Fontenelle Reservoir during water year 2009 was 0.967 maf (1,192 mcm), which was 113 percent of average. Snowpack conditions in the Upper Green River Basin were below average and the basin was classified as continuing to be in drought. Prior to 2009, inflow to Fontenelle Reservoir had been below average for nine consecutive years.

Fontenelle Reservoir filled in 2009 and bypass releases were necessary in order to safely route the spring runoff. Inflow peaked at 9,664 cfs (273 cms) on June 5, 2009. Releases from Fontenelle Reservoir increased from a baseflow of 950 cfs (26.9 cms) to powerplant capacity (approximately 1,700 cfs [48 cms]) during the spring runoff period. Bypass releases were sustained for a total of 55 days in June, July, and August, including ramping days. The resulting peak releases of 8,080 cfs (229 cms) occurred on June 16, 2009; 6,590 cfs (186.5 cms) of this was bypass water. The peak elevation of Fontenelle Reservoir during water year 2009 was 6,505.7 feet (1,982.9 meters) which occurred on July 27, 2009. This elevation is 0.3 feet (0.1 meters) below the spillway crest elevation.

The forecasted most probable April through July inflow to Fontenelle Reservoir during water year 2010 is 0.778 maf (960 mcm), or 91 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 scenarios 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 2010. 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 2010, 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 2009 was below average. Unregulated inflow in water year 2009 was 1.600 maf (1,974 mcm), which is 93 percent of average. On October 1, 2008, the beginning of water year 2009, the reservoir elevation was 6,021.3 feet (1835.3 meters). The reservoir elevation showed an overall increase during water year 2009 with an ending water year (September 30, 2009) reservoir elevation of 6,031.04 feet (1,838.26 meters) corresponding to a volume of 3.388 maf (4,179 mcm). Flaming Gorge Reservoir reached a maximum elevation 6,033.7 feet (1,839.1 meters) or

3.494 maf (4,309 mcm) on July 17, 2009~~, which is considered a full reservoir~~. Precipitation in the Green River Basin above Flaming Gorge was 245 percent of average during the month of June 2009. The reservoir elevation increased 13.3 feet (4.05 meters) from June 1 to the maximum reservoir elevation on July 17, 2009. The end of water year reservoir elevation was 8.96 feet (2.73 meters) below the full pool elevation of 6,040.0 feet (1,841.0 meters) which corresponds to an available storage space of 0.349 maf (431 mcm).

Reclamation operated Flaming Gorge Dam in compliance with the Flaming Gorge ROD in 2009. The hydrologic conditions during the spring of 2009 were designated as average. Reclamation convened the Flaming Gorge Technical Working Group (FGTWG) comprised of the Service, Western Area Power Administration (Western), and Reclamation personnel. The FGTWG proposed Reclamation manage releases to the Green River to maintain flows at or above 15,000 cfs (425 cms) for at least five consecutive days during the Yampa River peak flows, and to create an instantaneous peak flow of 18,600 cfs (526.4 cms) as measured below the confluence with the Yampa River.

Releases from Flaming Gorge Reservoir were increased to powerplant capacity of 4,300 cfs (121.7 cms) on May 12, 2009, in anticipation of peak flows on the Yampa River. Releases were maintained at powerplant capacity until May 21, 2009. Green River flows at Jensen remained above 15,000 cfs (425 cms) from May 17, 2009, to May 29, 2009 (13 days). Flows at Jensen reached 18,600 cfs (526.4 cms) on May 22, 2009 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 500 cfs (14 cms) per day beginning on May 22, 2009. Both FGTWG proposed spring objectives were achieved by May 23, 2009. The use of the bypass tubes was not required to meet these flow objectives.

As of August 2009, the hydrologic classification as defined by the Flaming Gorge ROD was average. 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~~d~~ during the winter period (October through February). Reclamation convened the FGTWG to develop 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 average range, as described in the Flaming Gorge Final Environmental Impact Statement for the Action Alternative. Because of the higher than anticipated precipitation in June 2009, Reclamation was able to meet the Service's request for higher summer flows and Western's request for higher base flow releases during the winter period. It is anticipated that 2009-2010 winter releases from Flaming Gorge Dam will follow a double peak pattern for hydropower ~~power~~ purposes during the months of November through March.

During water year 2010, Flaming Gorge Dam will continue to be operated in accordance with the Flaming Gorge ROD. High spring releases are scheduled to occur in 2010, 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, releases of approximately 1,775 cfs (50.2 cms) will begin on October 1, 2009, and will likely continue until the beginning of the 2010 high spring peak release sometime in May 2010.

The Upper Colorado Recovery Program, in coordination with Reclamation, the Service, and Western, is 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.[28]

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

Average snowpack conditions prevailed in the Gunnison Basin during water year 2009. Snow measurement sites in the basin reported mostly average moisture throughout the winter and into the spring of 2009. The April through July unregulated runoff into Blue Mesa Reservoir in 2009 was 0.772 maf (952 mcm), which was 107 percent of average. Water year 2009 unregulated inflow into Blue Mesa Reservoir was 1.041 maf (1,284 mcm), which was 104 percent of average. Blue Mesa Reservoir effectively filled in 2009 reaching a peak elevation of 7,519.02 feet (2,291.8 meters) on June 30, 2009, 0.38 feet (0.12 meters) ~~from~~ below full pool. Storage in Blue Mesa Reservoir increased during water year 2009 by 0.032 maf (40 mcm). Storage in Blue Mesa Reservoir on September 30, 2009, was 0.682 maf (841 mcm), or 82 percent of capacity.

Releases from Aspinall Unit reservoirs in 2009 were approximately average. Releases from the Aspinall Unit provided for a flow of 650 to 850 cfs (18.4 to 24.1 cms) from October 1, 2008, to February 11, 2009, in the Gunnison River through the Black Canyon (below the Gunnison Tunnel). On March 18, 2009, releases were decreased to 750 cfs (21.2 cms) in response to decreases in forecasted inflow. A week later on March 24, 2009, releases were again reduced by 200 cfs (5.66 cms) for the same reason.

Beginning May 7, 2009, releases from Crystal Reservoir were increased on a daily basis until reaching 7,500 cfs (212 cms) resulting in 6,700 cfs (189.6 cms) in the Black Canyon below the diversion tunnel on May 13, 2009. Releases were then ramped down on a daily basis starting the morning of May 15, 2009 and leveled off at 2,900 cfs (82.1 cms) from Crystal Dam resulting in 1,900 cfs (53.8 cms) in the Black Canyon below the diversion tunnel and Gunnison Gorge on May 23, 2009.

On August 16, 1995, Memorandum of Agreement (MOA) No. 95-07-40-R1760 was signed by Reclamation, the Service, and the Colorado Water Conservation Board. The purpose of the MOA was to provide water to the Redlands Fish Ladder, assure at least 300 cfs (8.5 cms) of flow in the 2-mile reach of the Gunnison River between the Redlands Fish Ladder and the confluence of the Gunnison and Colorado Rivers (2-mile reach), and to benefit Colorado River Basin endangered fish. This MOA was extended for an additional five years on June 30, 2000. A key provision of the MOA required that the parties adopt a plan to share water shortages in dry years, when total storage at Blue Mesa Reservoir is projected to drop below 0.40 maf (493 mcm) by the end of calendar year 2008. However, the MOA was not renewed in 2005. Reclamation will continue to coordinate with the Aspinall Working Group as part of the operational planning process. ~~To the extent possible, Reclamation will~~

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

~~continue to meet the intent of the MOA to the degree that it falls within the scope of normal operations and will also continue to coordinate with the Aspinall Working Group as part of the operational planning process.~~

The Black Canyon Water Right decree establishes a minimum base flow throughout the year with a ~~one~~ one-day peak flow and shoulder flows. 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. The ~~Black Canyon Water Right~~ decree states that, to minimize downstream flooding, the United States shall continue to operate the Aspinall Unit to give the highest priority to flood control, subject to maintaining structural safety and integrity, and that the decree shall not be exercised to supersede flood control operations.

For water year 2010, the Aspinall Unit will be operated to conserve storage while meeting downstream delivery requirements, consistent with authorized project purposes. Under normal conditions, the minimum release objectives of the Aspinall Unit are to meet the delivery requirements of the Uncompahgre Valley Project, and other senior water rights downstream, to the extent possible to maintain a year round minimum flow of at least 300 cfs (8.5 cms) in the Gunnison River through the Black Canyon, and to the extent possible maintain a minimum flow of 300 cfs (8.5 cms) in the 2-mile reach below the Redlands Diversion Dam during the months of July through October. In dry years, the 300 cfs (8.5 cms) flow through the canyon and the 2-mile reach may be reduced. In 2010, under the forecasted most probable inflow conditions, flows through the Black Canyon of the Gunnison National Park will be above the 300 cfs (8.5 cms) minimum release objective during the summer months. Consideration shall be given to the trout fishery in the Black Canyon and Gunnison Gorge and recreational interests consistent with project purposes. Releases during 2010 will be planned to minimize fluctuations in the daily and monthly flows in the Gunnison River below the Gunnison Tunnel diversion.

Under the forecasted minimum probable inflow scenario, Blue Mesa Reservoir would not fill in 2010. Under the most probable and maximum probable inflow scenarios, Blue Mesa Reservoir would likely fill in 2010.

Navajo Reservoir

Inflow to Navajo Reservoir in water year 2009 was below the 30-year average. Water year 2009 unregulated inflow was 0.925 maf (1,141 mcm), or 83 percent of average. The April through July unregulated inflow into Navajo Reservoir in water year 2009 was 0.663 maf (818 mcm), or 84 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 6,073.01 feet (1,851.05 meters) on May 28, 2009, 12 feet (3.7 meters) ~~from~~ below full pool. The water surface elevation at Navajo Reservoir on September 30, 2009, was 6,062.70 feet (1,847.9 meters), with reservoir storage at 81 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.[29] 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 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.

The San Juan Flow Recommendations called for a 7-day spring peak release of 5,000 cfs (142 cms) from Navajo Reservoir in 2009. The spring peak release began on May 26, 2009, with a release of 2,000 cfs (56.6 cms) ramping up to a release rate of 5,000 cfs (142 cms) reached on June 2, 2009, and maintained through June 7, 2009. The rampdown began on June 8, 2009, and the base summer release rate of 500 cfs (14.2 cms) was implemented on June 13, 2009.

In 2007, a two-year agreement was developed among major users to limit their water use to the rates/volumes indicated in the agreement.[30] The 2007-2008 agreement was similar to the agreements that were developed in 2003, 2004, 2005, and 2006. 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 recommendations. The recommendations included limitations on diversions for 2007-2008, 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. A new multi-year agreement, similar to past years, is expected to be developed for 2009.

During water year 2010, Navajo Reservoir will be operated in accordance with the Navajo Reservoir Operations ROD. Navajo Reservoir storage levels are expected to be near average in 2010 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 in 2010, a 21-day spring peak release of 5,000 cfs (142 cms), as described in the San Juan Flow Recommendations, is likely to occur.

[29] Flow Recommendations for the San Juan River, May 1999.
[30] Recommendations for San Juan River Operations and Administration for 2007 and 2008, December 15, 2006.

Lake Powell

Reservoir storage in Lake Powell increased significantly in water year 2009. On October 1, 2008, the beginning of water year 2009, reservoir storage in Lake Powell was 60 percent of capacity at elevation 3,626.9 feet (1,105.5 meters), or 14.51 maf (17,898 mcm) in storage. Inflows to Lake Powell during water year 2009 were below average (92 percent of average); however, Lake Powell storage increased by 1.43 maf (1,760 mcm) and ended the water year (September 30, 2009) at 66 percent of capacity at elevation 3,639.4 feet (1,109.3 meters), or 15.94 maf (19,662 mcm) in storage.

Based on the August 2008 24-Month Study projection of the January 1, 2009, reservoir elevation at Lake Powell and in accordance with Section 6.B (Upper Elevation Balancing Tier) of the Interim Guidelines, the annual release volume from Glen Canyon Dam in 2009 was initially scheduled to be 8.23 maf (10,150 mcm). Although the projected operations in August 2008 and in subsequent months projected ~~showed~~ that equalization was likely to occur, the April 24-Month Study for 2009 projected the September 30, 2009, Lake Powell elevation to be 3,637.13 feet (1,108.60 meters), which was below the Equalization Level for water year 2009 (3,639.0 feet [1,109.2 meters]). Consistent with Section 6.B.3 of the Interim Guidelines, this condition did not trigger Section 6.A (Equalization Tier) of the Interim Guidelines to govern the operation of Glen Canyon Dam for the remainder of water year 2009. For this reason, the annual release volume during water year 2009 from Glen Canyon Dam was maintained at 8.23 maf (10,150 mcm).

April through July unregulated inflow to Lake Powell in water year 2009 was 7.810 maf (9,633 mcm), or 98 percent of average. Lake Powell reached a seasonal peak elevation of 3,642.3 feet (1,110.2 meters), 57.7 feet (17.6 meters) ~~from~~ below full pool, on July 13, 2009. On September 30, 2009, the water surface elevation of Lake Powell was 3,639.4 feet (1,109.3 meters), 60.6 feet (18.5 meters) ~~from~~ 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 2009, a test of steady flows (steady daily releases), as described in the EA, was conducted consistent with Reclamation's February 29, 2008, decision. Steady flows of 10,000 cfs (283 cms) were made during this two-month period in 2009. In 2010, steady flows will be repeated during September and October.

The January 1, 2010, reservoir elevation at Lake Powell is projected to be 3,634.76 feet (1,107.87 meters) based on the August 2009 24-Month Study. Given this projection, annual releases from Lake Powell during water year 2010 will be consistent with the Upper Elevation Balancing Tier (Section 6.B of the Interim Guidelines). Consistent with Section

6.B.1 of the Interim Guidelines, ~~T~~the water year release from Lake Powell in 2010 will be 8.23 maf (10,150 mcm) unless provisions in Section 6.B.3 ~~occur~~apply.

Under Section 6.B.3, if the April 2010 24-Month Study projects the September 30, 2010, Lake Powell elevation to be greater than elevation 3,642.0 feet (1,110.1 meters), the Equalization Tier (Section 6.A of the Interim Guidelines) will govern the release of water from Lake Powell for the remainder of water year 2010 (through September 2010). The August 2009 24-Month Study with a projected water year release volume of 8.23 maf (10,150 mcm) projects the September 30, 2010, reservoir elevation to be 3,656.44 feet (1,114.48 meters). It is currently likely that an April adjustment ~~would~~ will occur and the Equalization Tier ~~would~~ will govern releases for the remainder of water year 2010.

Under the forecasted minimum probable inflow scenario, the Upper Elevation Balancing Tier would govern throughout water year 2010 and the annual release volume from Lake Powell would be 8.23 maf (10,150 mcm). The projected September 30, 2010, elevation and reservoir storage would be 3,617.7 feet (1,102.7 meters) and 13.52 maf (16,680 mcm), respectively. Under the forecasted most probable and forecasted maximum probable inflow scenarios, the Upper Elevation Balancing Tier would govern through April 2010. In April 2010, however, the projected September 30, 2010, elevation of Lake Powell under the forecasted most probable and forecasted maximum probable inflow scenarios would trigger the Equalization Tier to govern the annual release volume for the remainder of water year 2010. Under the forecasted most probable inflow scenario, the projected annual release volume would be 10.492 maf (12,942 mcm). The projected September 30, 2010, elevation and reservoir storage would be 3,639.6 feet (1,109.4 meters) and 15.95 maf (19,670 mcm), respectively. Under the forecasted maximum probable inflow scenario, the projected annual release volume would be 13.435 maf (16,572 mcm). The projected September 30, 2010, elevation and reservoir storage would be 3,666.1 feet (1,117.4 meters) and 19.31 maf (23,820 mcm), respectively.

~~The distribution of release volumes throughout water year 2010 will be consistent with the 1996 Glen Canyon Dam ROD and subsequent environmental compliance documents.~~

See Tables 5 and 6 for water year 2010 projected Lake Powell end-of-month elevations.

Table 5. Projected End of Month Lake Powell Elevations Under Water Year 2010 Inflow Scenarios (English Units)

Month	Most Probable Inflow Scenario Projected Elevation (feet)	Minimum Probable Inflow Scenario Projected Elevation (feet)	Maximum Probable Inflow Scenario Projected Elevation (feet)
October 2009	3,638.75	3,637.53	3,640.91
November 2009	3,637.14	3,635.47	3,641.23
December 2009	3,634.76	3,632.17	3,640.18
January 2010	3,631.10	3,627.48	3,637.66
February 2010	3,628.17	3,624.49	3,634.62
March 2010	3,625.83	3,622.57	3,634.72
April 2010	3,624.40	3,621.70	3,637.24
May 2010	3,632.89	3,623.25	3,650.93
June 2010	3,643.77	3,626.60	3,668.10
July 2010	3,643.65	3,622.94	3,673.30
August 2010	3,640.21	3,618.59	3,669.95
September 2010	3,639.58	3,617.66	3,666.11

Table 6. Projected End of Month Lake Powell Elevations Under Water Year 2010 Inflow Scenarios (Metric Units)

Month	Most Probable Inflow Scenario Projected Elevation (meters)	Minimum Probable Inflow Scenario Projected Elevation (meters)	Maximum Probable Inflow Scenario Projected Elevation (meters)
October 2009	1,109.09	1,108.72	1,109.75
November 2009	1,108.60	1,108.09	1,109.85
December 2009	1,107.87	1,107.09	1,109.53
January 2010	1,106.76	1,105.66	1,108.76
February 2010	1,105.87	1,104.74	1,107.83
March 2010	1,105.15	1,104.16	1,107.86
April 2010	1,104.72	1,103.89	1,108.63
May 2010	1,107.31	1,104.37	1,112.80
June 2010	1,110.62	1,105.39	1,118.04
July 2010	1,110.59	1,104.27	1,119.62
August 2010	1,109.54	1,102.95	1,118.60
September 2010	1,109.34	1,102.66	1,117.43

In 2010, 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 2010. 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 1992 GCPA. 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 2010 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. 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	(cfs)	(cms)	Conditions
Maximum Flow[31]	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[32]	5,000 / 8,000	142 / 227	

Releases from Lake Powell in water year 2010 will continue to reflect consideration of the uses and purposes identified in the authorizing legislation for Glen Canyon Dam. Powerplant 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 GCPA of 1992 and appropriate NEPA documentation regarding experimental flows.

Consistent with the GCDFEIS, ~~and~~ the 1996 Glen Canyon Dam ROD, and the 2008 EA/FONSI for Experimental Releases for Glen Canyon Dam, Arizona, 2008-2012, projected monthly releases under the most probable, minimum probable, and maximum probable inflow scenario~~,~~ for water year 2010~~,~~ are displayed in Table 8 and Table 9.

[31] May be exceeded during beach/habitat-building flows, habitat maintenance flows, or when necessary to manage above average hydrologic conditions.

[32] 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).

Table 8. Projected Monthly Releases from Lake Powell Under Water Year 2010 Inflow Scenarios (English Units)[33]

Month	Most Probable Inflow Scenario Projected Monthly Release Volume (maf)	Minimum Probable Inflow Scenario Projected Monthly Release Volume (maf)	Maximum Probable Inflow Scenario Projected Monthly Release Volume (maf)
October 2009	0.615	0.615	0.615
November 2009	0.690	0.690	0.690
December 2009	0.855	0.855	0.855
January 2010	0.955	0.955	0.955
February 2010	0.800	0.700	1.000
March 2010	0.900	0.600	1.000
April 2010	1.000	0.540	1.100
May 2010	1.000	0.600	1.200
June 2010	1.032	0.600	1.480
July 2010	1.050	0.800	1.530
August 2010	1.000	0.800	1.530
September 2010	0.595	0.475	1.480
Water Year 2010 Total	10.492	8.230	13.435

Table 9. Projected Monthly Releases from Lake Powell Under Water Year 2010 Inflow Scenarios (Metric Units)

Month	Most Probable Inflow Scenario Projected Monthly Release Volume (mcm)	Minimum Probable Inflow Scenario Projected Monthly Release Volume (mcm)	Maximum Probable Inflow Scenario Projected Monthly Release Volume (mcm)
October 2009	759	759	759
November 2009	851	851	851
December 2009	1,055	1,055	1,055
January 2010	1,178	1,178	1,178
February 2010	987	863	1,233
March 2010	1,110	740	1,233
April 2010	1,233	666	1,357
May 2010	1,233	740	1,480
June 2010	1,273	740	1,826
July 2010	1,295	987	1,887
August 2010	1,233	987	1,887
September 2010	734	586	1,826
Water Year 2010 Total	12,941	10,152	16,572

The ten-year total flow of the Colorado River at Lee Ferry[34] for water years 2000 through 2009 is 85.6 maf (105,600 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

[33] Modifications to projected monthly releases from Lake Powell would be made based on changes in forecasted conditions or other relevant factors.

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

water discharge stations which are operated and maintained by the United States Geological Survey.

Lake Mead

For calendar year 2009, 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 2009 on October 1, 2008, at elevation 1,105.76 feet (337.0 meters), with 12.01 maf (14,814 mcm) in storage, which is 46 percent of the conservation capacity[35] of 25.88 maf (31,923 mcm). Lake Mead's elevation increased to an elevation of 1,111.78 feet (338.9 meters) by the end of January 2009. After January 2009, Lake Mead's elevation steadily declined. The September 30, 2009, end of water year elevation at Lake Mead was 1,094.05 feet (333.5 meters), with 10.97 maf (13,531 mcm) in storage (42 percent of capacity).

The total release from Lake Mead through Hoover Dam during water year 2009 was 9.225 maf (11,379 mcm). The total release from Lake Mead through Hoover Dam during calendar year 2009 is projected to be 9.316 maf (11,491 mcm). Consumptive use from Lake Mead during calendar year 2009 resulting from diversions for Nevada above Hoover Dam is projected to be 0.318 maf (392 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 2009, inflow into Lake Mead was 8.959 maf (11,051 mcm). For water year 2010, under the most probable assumptions, total inflow into Lake Mead is anticipated to be 11.482 maf (14,163 mcm).

Under the most probable inflow conditions during water year 2010, the elevation of Lake Mead is projected to increase from its minimum elevation of 1,095.02 feet (333.8 meters), with 11.050 maf (13,630 mcm) in storage, at the end of October 2009. Lake Mead is projected to be at its maximum elevation of 1,105.96 feet (337.1 meters), with 12.031 maf (14,840 mcm) in storage, at the end of August 2010.

Based on the August 2009 24-Month Study, Lake Mead's elevation on January 1, 2010, is projected to be 1,098.47 feet (334.8 meters). In accordance with Section 2.B.5 of the Interim Guidelines, the ICS Surplus Condition will govern the releases from Lake Mead in

[35] 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 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 2010. Releases from Lake Mead through Hoover Dam for water year and calendar year 2010 are anticipated to be approximately the same as 2009 releases.

The projected Lake Mead end-of-month elevations are shown in Tables 10 and 11 for water year 2010.

Table 10. Projected End of Month Lake Mead Elevations Under Water Year 2010 Inflow Scenarios (English Units)

Month	Most Probable Inflow Scenario Projected Elevation (feet)	Minimum Probable Inflow Scenario Projected Elevation (feet)	Maximum Probable Inflow Scenario Projected Elevation (feet)
October 2009	1,095.02	1,094.64	1,095.47
November 2009	1,095.93	1,095.23	1,096.79
December 2009	1,098.47	1,097.51	1,099.61
January 2010	1,102.24	1,100.35	1,104.97
February 2010	1,104.44	1,100.75	1,110.37
March 2010	1,103.74	1,096.31	1,111.34
April 2010	1,102.41	1,089.48	1,111.70
May 2010	1,102.24	1,084.37	1,114.25
June 2010	1,102.97	1,080.05	1,119.54
July 2010	1,104.09	1,078.32	1,125.25
August 2010	1,105.96	1,077.95	1,132.00
September 2010	1,105.00	1,075.42	1,139.18

Table 11. Projected End of Month Lake Mead Elevations Under Water Year 2010 Inflow Scenarios (Metric Units)

Month	Most Probable Inflow Scenario Projected Elevation (meters)	Minimum Probable Inflow Scenario Projected Elevation (meters)	Maximum Probable Inflow Scenario Projected Elevation (meters)
October 2009	333.76	333.65	333.90
November 2009	334.04	333.83	334.30
December 2009	334.81	334.52	335.16
January 2010	335.96	335.39	336.79
February 2010	336.63	335.51	338.44
March 2010	336.42	334.16	338.74
April 2010	336.01	332.07	338.85
May 2010	335.96	330.52	339.62
June 2010	336.19	329.20	341.24
July 2010	336.53	328.67	342.98
August 2010	337.10	328.56	345.03
September 2010	336.80	327.79	347.22

Lakes Mohave and Havasu

At the beginning of water year 2009, Lake Mohave was at an elevation of 638.80 feet (194.7 meters), with an active storage of 1.585 maf (1,955 mcm). The water level of Lake Mohave was regulated between elevation 633.37 feet (193.1 meters) and 644.36 feet (196.4 meters)

throughout the water year, ending at an elevation of 637.0 feet (194.2 meters) with 1.538 maf (1,897 mcm) in storage. The total release from Lake Mohave through Davis Dam for water year 2009 was 8.992 maf (11,091 mcm) for downstream water use requirements. The calendar year 2009 total release is projected to be 9.061 maf (11,177 mcm).

For water year and calendar year 2010, Davis Dam is projected to release approximately the same amount of water as in 2009. 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 2009 at an elevation of 448.19 feet (136.6 meters) with 0.584 maf (720 mcm) in storage. The water level of Lake Havasu was regulated between elevation 446.08 feet (136.0 meters) and 448.75 feet (136.8 meters), throughout the water year, ending at an elevation of 446.8 feet (136.2 meters), with 0.557 maf (687 mcm) in storage. During water year 2009, 6.392 maf (7,884 mcm) were released from Parker Dam. The calendar year 2009 total release is projected to be 6.425 maf (7,925 mcm). Diversions from Lake Havasu during calendar year 2009 by the Central Arizona Project (CAP) and MWD are projected to be 1.563 maf (1,928 mcm) and 1.043 maf (1,287 mcm), respectively.

For water year 2010, Parker Dam is expected to release approximately the same amount of water as in water year 2009. Diversions from Lake Havasu in calendar year 2010 by CAP and MWD are projected to be 1.533 maf (1,891 mcm) and 0.797 maf (983 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 which is scheduled for September through March.

At Davis Dam, a major overhaul of Unit No. 1 began on October 6, 2008, and the unit was returned to service on February 26, 2009. This overhaul included removal and maintenance of the fixed wheel gate and hydraulic cylinder, as well as testing the generator windings. Rehabilitation of the fixed wheel gate of Unit 5 will begin on October 19, 2009, with an anticipated return to service on March 4, 2010.

At Parker Dam, a major turbine overhaul of Unit 2 began on September 2, 2008, and the unit was returned to service on March 31, 2009. A major turbine overhaul of Unit 4 began on August 31, 2009, with an anticipated return to service in March 2010.

Bill Williams River

Abnormally dry conditions persisted for water year 2009 in far western Arizona, including the Bill Williams River watershed. Tributary monthly inflows into ~~Lake~~ Alamo Lake were below average during water year 2009. Tributary inflow from the Bill Williams River into the mainstream of the Colorado River totaled 0.035 maf (43.2 mcm) for water year 2009, approximately 35 percent of the long-term average.

Runoff and precipitation events during December 2008 and February 2009 contributed to tributary inflows that increased ~~Lake Alamo's~~Alamo Lake's storage by 0.027 maf (33 mcm) by late February 2009. Alamo Lake elevation was 1,118.23 feet (340.8 meters) on October 1, 2008, and increased to a peak elevation of 1,125.58 feet (343.1 meters) on February 25, 2009. On February 20, 2009, Alamo Lake exceeded elevation 1,125 feet (342.9 meters). In coordination with Reclamation and the Service, the United States Army Corps of Engineers (USACE) released additional water to maintain elevation 1,125 feet (342.9 meters) or below. Additional releases from Alamo Dam began on February 20, 2009, and continued for 18 days until March 10, 2009, with a peak outflow of about 460 cfs (13 cms) from February 24 to March 2. Typical releases from Alamo Dam are 40 cfs (1.1 cms) during this time period. Due to these operations, an additional 0.007 maf (8.6 mcm) was released from Alamo Dam. Of this additional volume, it is estimated that approximately 0.003 maf (3.7 mcm) reached Lake Havasu.

For the remainder of water year 2009, 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 2010.

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 2009 are projected to be 5.669 maf (6,993 mcm). The flows arriving at Imperial Dam for calendar year 2010 are projected to be approximately the same as calendar year 2009.

Gila River Flows

There was above average snowfall in the Gila, Salt, and Verde River watersheds during much of the winter, with precipitation at 132 percent of average on December 29, 2008. Despite a wet winter, drier spring conditions developed and precipitation for water year 2009 in the Gila River Basin was 82 percent of average. During water year 2009, the Salt River Project released water from its system in excess of diversion requirements at Granite Reef Diversion Dam; however, none of this water reached Painted Rock Dam and no tributary inflow from the Gila River reached the mainstream of the Colorado River.

Additional Regulatory Storage (Drop 2 Storage 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.[36] The study, developed in cooperation with 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.[37]

The purpose of the 0.008 maf (9.9 mcm) Drop 2 Storage Reservoir is to capture 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

[36] Preliminary Study of Lower Colorado River Water Storage Alternatives, February 21, 2005.
[37] 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.

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 Reservoir is being provided by SNWA, MWD, and CAWCD and these entities received ICS credits in ~~2007~~ 2008 in proportion to the amount contributed.

Construction of the reservoir, which began in 2008, continued in 2009 and is scheduled to be completed in the spring of 2010. Reclamation is currently working with IID to develop an operations plan and an operations and maintenance agreement.

Yuma Desalting Plant

In 1974, the Colorado River Basin Salinity Control Act (Public Law 93-320) 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. ~~To date, t~~The United States has met salinity requirements established in IBWC Minute 242 primarily through use of a canal to bypass Wellton-Mohawk drain water to the Ciénega, a wetland of open water, vegetation, and mudflats within a Biosphere Reserve in Mexico. In calendar year 2009, the amount of water discharged through the bypass canal is anticipated to be 0.110 maf (135.7 mcm), measured at the Southerly International Boundary (SIB), at an approximate concentration of total dissolved solids of 2,430 parts per million (ppm).

Due to the ongoing drought in the Southwest, there is concern about continuing to discharge water through the bypass canal, as such water is not credited toward the United States' obligation to deliver water to Mexico pursuant to the 1944 United States-Mexico Water Treaty.

Reclamation completed a demonstration run of the YDP in 2007, operating the plant at 10 percent capacity for three months. This run validated that, after 15 years of inactivity, the plant was still operational. By the conclusion of the three-month run, 0.0043 maf (5.30 mcm) had been delivered to the Colorado River and included in water deliveries to Mexico, preserving an equivalent volume in Colorado River system storage. The plant produced 0.0026 maf (3.21 mcm) of product water which was blended with 0.0017 maf (2.10 mcm) of untreated bypass flow water prior to discharge into the Colorado River.

MWD, SNWA, and CAWCD have jointly requested that Reclamation conduct a Pilot Run of the YDP to consider long term, sustained operation as a tool to ~~extend~~ conserve water supplies on the lower Colorado River~~ during an unprecedented drought.~~ 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.

Reclamation has developed a plan for a proposed Pilot Run, in which the plant would operate for 365 days within an 18-month period at one-third capacity. ~~The Pilot Run would add a~~Approximately 0.029 maf (35.77 mcm) of water is anticipated to be discharged into Colorado River system storage as a result of the Pilot Run. ~~The entities~~ MWD, SNWA, and CAWCD would 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).

Because plant operation reduces the volume of the flow to the Ciénega and increases the salinity of that flow, Reclamation has completed consultations 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 reduction in flows.[38]

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[39] were executed concurrent with the issuance of the ROD for the Interim Guidelines. ICS credits may be created and delivered in 2010 pursuant to the Interim Guidelines and the implementing agreements.

Demonstration Program. In 2006, Reclamation implemented an ICS Demonstration Program in the Lower Basin. This program allowed Colorado River water entitlement holders to undertake extraordinary conservation activities in 2006 and 2007 to reduce their approved annual consumptive use of Colorado River water and account for that conserved water in Lake Mead.

Reclamation entered into an agreement with MWD for the creation of ICS credits in calendar year 2006 and 2007. In calendar year 2006, MWD created 0.050 maf (61.67 mcm) of ICS credits. In calendar year 2009, MWD is anticipated to recover up to 0.028 maf (34.5 mcm) of ICS credits created under the ICS Demonstration Program. If MWD has not recovered all of its Demonstration Program ICS credits during calendar year 2009, MWD may request delivery of those credits in a subsequent year.

[38] 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.

[39] 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.

In calendar year 2006, IID planned to create 0.001 maf (1.2 mcm) of ICS credits under the program. Pursuant to the IID ICS agreement, the conserved water was applied to reduce its 2006 IOPP overrun.

Extraordinary Conservation ICS. ~~In calendar year 2009 and 2010,~~ IID anticipates creating up to 0.025 maf (30.84 mcm) of Extraordinary Conservation ICS credits each year in 2009 and 2010. MWD may create Extraordinary Conservation ICS credits in 2009 and 2010 if water supply availability permits.

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 the event that project costs exceed $172 million but are less than $206 million, SNWA would receive an additional ICS credit of 1 acre-foot for each $600 of additional funding provided.

In calendar year 2009, MWD has requested delivery of 0.034 maf (41.9 mcm) of System Efficiency ICS credits created from the Drop 2 Storage Reservoir project. In calendar year 2010, MWD is anticipated to take delivery of 0.032 maf (39.5 mcm) of System Efficiency ICS credits created from the Drop 2 Storage Reservoir project.

If the YDP Pilot Run is approved, CAWCD, MWD, and SNWA would receive System Efficiency ICS credits in exchange for funding and MWD is anticipated to take delivery of its System Efficiency ICS credits created from the YDP Pilot Run in 2010 and 2011.

Tributary Conservation ICS. SNWA anticipates creating 0.030 maf (37.0 mcm) and taking delivery of 0.024 maf (29.6 mcm) of Tributary Conservation ICS credits in 2009. SNWA anticipates creating 0.037 maf (45.6 mcm) and taking delivery of 0.035 maf (43.2 mcm) in 2010.

Imported ICS. SNWA anticipates creating 0.005 maf (6.17 mcm) and taking delivery of 0.00475 maf (5.86 mcm) of Imported ICS credits in 2010.

System Conservation of Colorado River Water Demonstration Program

In 2006, Reclamation implemented the 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. The SC Water is retained in Lake Mead to assist in providing an interim, supplemental source of water to replace the drainage

water from the WMIDD that is bypassed to the Ciénega and the reject stream from operation of the YDP. In calendar year 2009, approximately 0.0035 maf (4.32 mcm) of SC Water is anticipated to be created by YMIDD and retained in Lake Mead. Reclamation may enter into agreements with entitlement holders to create SC Water in 2010.

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 2009. Excess flows arriving at the NIB are anticipated to be 0.060 maf (74.0 mcm) in calendar year 2009. Excess flows result from a combination of factors, including 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.

Of the scheduled delivery to Mexico in calendar year 2009, approximately 1.354 maf (1,670 mcm) is projected to be delivered at NIB and approximately 0.140 maf (172.7 mcm) is projected to be delivered at SIB. Under IBWC Minute No. 314[40] and the Emergency Delivery Agreement,[41] approximately 0.006 maf (7.4 mcm) 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 at the request of the Mexican Section of the IBWC.

Of the total delivery at SIB projected in calendar year 2009, approximately 0.085 maf (104.8 mcm) is projected to be delivered from the Yuma Project Main Drain and approximately 0.055 maf (67.8 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 2010, of which 0.140 maf (172.7 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 Conduit are projected to be 0.040 maf (49.3 mcm) and 0.043 maf (53.0 mcm), respectively, for calendar year 2009. This water is available for delivery at NIB in 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 (30.84 mcm) of groundwater annually for water delivery to Mexico to replace water bypassed to the Ciénega

[40] Minute No. 314, Extension of the Temporary Emergency Delivery of Colorado River Water for use in Tijuana, Baja California dated November 26, 2008.
[41] 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.

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 2009. In 2010, up to 0.025 maf (30.8 mcm) of groundwater may be pumped under this permit.[42]

As stated in Minute 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 2009 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 (9.868 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 242 well field to reduce the salinity at SIB. Reclamation anticipates bypassing approximately 0.001 maf (1.233 mcm) in calendar year 2009 to the diversion channel for salinity control and up to 0.008 maf (9.868 mcm) in calendar year 2010.

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

2010 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

The January 1, 2010, reservoir elevation at Lake Powell is projected to be 3,634.76 feet (1,107.87 meters) based on the August 2009 24-Month Study. Given this projection, annual releases from Lake Powell during water year 2010 shall be consistent with the Upper Elevation Balancing Tier (Section 6.B of the Interim Guidelines). The water year release from Lake Powell in 2010 shall be 8.23 maf (10,150 mcm) (Section 6.B.1) unless provisions in Section 6.B.3 occur.

Under Section 6.B.3 of the Interim Guidelines, if the April 2010 24-Month Study projects the September 30, 2010, Lake Powell elevation to be greater than elevation 3,642.0 feet (1,110.1 meters), the Equalization Tier (Section 6.A of the Interim Guidelines) will govern the release of water from Lake Powell for the remainder of water year 2010 (through September 2010). The August 2009 24-Month Study with a projected water year release volume of 8.23 maf (10,150 mcm) projects the end of water year 2010 reservoir elevation to be 3,656.44 feet (1,114.48 meters). It is currently likely that an April adjustment ~~would~~ will occur and the Equalization Tier ~~would~~ will govern releases for the remainder of water year 2010.

Based on the August 2009 24-Month Study under the most probable inflow scenario, it is anticipated that the April 2010 24-Month Study will result in the Equalization Tier governing operations of Lake Powell for the remainder of the water year. ~~r~~Releases from Lake Powell could range from:

- 8.23 maf (10,150 mcm) under the forecasted minimum probable inflow scenario to
- 10.49 maf (12,940 mcm) under the forecasted most probable inflow scenario to
- 13.44 maf (16,580 mcm) under the forecasted maximum probable inflow scenario.

For further information about the variability of projected inflow into Lake Powell, projected Lake Powell elevations, and projected monthly releases, please see Tables 3 through 6, 8, and 9 in this AOP.

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 for September 30, 2010, under the forecasted most probable inflow scenario would exceed the storage required under Section 602(a) of the CRBPA. Consistent with Section 6.B.3 of the Interim Guidelines, if the April 2010 24-Month Study projects the September 30, 2010, Lake Powell elevation to be greater than elevation 3,642.0 feet (1,110.1 meters), the Equalization Tier, Section 6.A of the Interim Guidelines, will govern the release of water from Lake Powell for the remainder of water year 2010 (through September 2010).

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 2010 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 2009 24-Month Study was used to forecast the system storage as of January 1, 2010. Based on a projected January 1, 2010, Lake Mead elevation of 1,098.47 feet (334.81 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 2010 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 2010 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 2010 in accordance with Article II(B)(6) of the Consolidated Decree.

Water may be ~~made available~~stored off-stream ~~for diversion~~ pursuant to individual SIRAs and 43 CFR Part 414 ~~to contractors~~ within the Lower Division States. The Secretary shall make ICUA available to contractors in Arizona, California, or Nevada ~~for the off-stream storage or consumptive use of water~~ pursuant to individual SIRAs and 43 CFR Part 414. In calendar year 2010, ICUA water stored in Arizona is anticipated to be recovered for use in California by MWD. SNWA may propose to make unused Nevada basic apportionment available for storage by MWD in 2010.

The IOPP, which became effective January 1, 2004, will be in effect during calendar year 2010.

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. Based on anticipated payback plans for 2009, all Exhibit C paybacks will be paid back by the end of 2009, two years ahead of schedule. In calendar year 2010, paybacks occurring in California result from IOPP overruns only. In calendar year 2010, California paybacks are projected to total 0.001 maf (1.233 mcm). In calendar year 2010, Arizona paybacks are projected to total 0.0003 maf (0.370 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 2010 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 ten-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 2010 in accordance with Article 15 of the 1944 United States-Mexico Water Treaty and Minutes 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

Monthly inflow, monthly release, and end-of-month elevations and storages for Colorado River reservoirs (October 2009 through December 2010) under the maximum probable, most probable, and minimum probable inflow scenarios, and historic end-of-month storages.