RECLAMATION

*Managing Water in the West*

# DRAFT Annual Operating Plan for Colorado River Reservoirs 2012

*Edits, in red, indicate changes to the draft 2012 AOP posted on Reclamation's website for the 2012 AOP Second Consultation.*

*Hydrologic projections in this draft are based on the **August 2011 24-Month Study**.*

*Text and values highlighted in blue are provisional and subject to change.*

U.S. Department of the Interior
Bureau of Reclamation

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# INTRODUCTION

## Background

Each year's Annual Operating Plan (AOP) for Colorado River Reservoirs reports on both the past operations of the Colorado River reservoirs for the completed year as well as projected operations and releases from these reservoirs for the current (i.e., upcoming) year. Accordingly, this 2012 AOP reports on 2011 operations as well as projected operations for 2012. In recent years, additional operational rules, guidelines, and decisions have been put into place for Colorado River reservoirs including the 1996 Glen Canyon Dam Record of Decision[1] (ROD), the 1997 Operating Criteria for Glen Canyon Dam,[2] the 1999 Off-stream Storage of Colorado River Water Rule (43 CFR Part 414),[3] the 2001 Interim Surplus Guidelines[4] addressing operation of Hoover Dam, the 2006 Flaming Gorge Dam ROD,[5] the 2006 Navajo Dam ROD[6] to implement recommended flows for endangered fish, the 2007 Interim Guidelines for the operations of Lake Powell and Lake Mead,[7] and numerous environmental assessments addressing experimental releases from Glen Canyon Dam. Each AOP incorporates these rules, guidelines, and decisions and implements the criteria contained in the applicable decision document or documents. Thus, the AOP makes projections and reports on how the Bureau of Reclamation (Reclamation) will implement these decisions in response to changing water supply conditions as they unfold during the upcoming year, when conditions become known. Congress has charged the Secretary of the Interior (Secretary) with stewardship and responsibility for a wide range of natural, cultural, recreational, and tribal resources within the Colorado River Basin. The Secretary has the authority to operate and maintain Reclamation facilities within the Colorado River Basin addressed in this AOP to help manage these resources and accomplish their protection and enhancement in a manner fully consistent with applicable provisions of federal law including the Law of the River, and other project-specific operational limitations.

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[1] ROD for the Operation of Glen Canyon Dam, October 9, 1996. Available online at: http://www.usbr.gov/uc/rm/amp/pdfs/sp_appndxG_ROD.pdf.

[2] Operating Criteria for Glen Canyon Dam (62 *Federal Register* 9447, March 3, 1997).

[3] Off-stream Storage of Colorado River Water; Development and Release of Intentionally Created Unused Apportionment in the Lower Division States: Final Rule (43 CFR Part 414; 64 *Federal Register* 59006, November 1, 1999). Available online at: http://www.usbr.gov/lc/region/g4000/contracts/FinalRule43cfr414.pdf.

[4] ROD for the Colorado River Interim Surplus Guidelines, January 16, 2001 (67 *Federal Register* 7772, January 25, 2001). Available online at: http://www.usbr.gov/lc/region/g4000/surplus/surplus_rod_final.pdf.

[5] ROD for the Operation of Flaming Gorge Dam, February 16, 2006. Available online at: http://www.usbr.gov/uc/envdocs/rod/fgFEIS/final-ROD-15feb06.pdf.

[6] ROD for Navajo Reservoir Operation, Navajo Unit – San Juan River, New Mexico, Colorado, Utah, July 31, 2006. Available online at: http://www.usbr.gov/uc/envdocs/eis/navajo/pdfs/NavWaterOpsROD2006.pdf.

[7] ROD for Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead (73 *Federal Register* 19873, April 11, 2008). The ROD adopting the 2007 Interim Guidelines was signed by the Secretary on December 13, 2007. Available online at: http://www.usbr.gov/lc/region/programs/strategies/RecordofDecision.pdf.

The 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."*

## Authority

This 2012 AOP was developed in accordance with the processes set forth in: Section 602 of the CRBPA; the Criteria for Coordinated Long-Range Operation of Colorado River Reservoirs Pursuant to the Colorado River Basin Project Act of September 30, 1968 (P. L. 90-537) (Operating Criteria), as amended, promulgated by the Secretary; and Section 1804(c)(3) of the Grand Canyon Protection Act of 1992 (P. L. 102-575).

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

This AOP has been developed consistent with: the Operating Criteria; applicable Federal laws; the Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande, the Treaty Between the United States of America and Mexico, signed February 3, 1944 (1944 United States-Mexico Water Treaty); interstate compacts; court decrees; the Colorado River Water Delivery Agreement;[8] the 2007 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 2012 AOP was prepared by Reclamation on behalf of the Secretary, working with other Interior agencies and the Western Area Power Administration (Western). Reclamation consulted with: the seven Colorado River Basin States Governors' representatives; the Upper Colorado River Commission; Native American tribes; other appropriate Federal agencies; representatives of the academic and scientific communities, environmental organizations, and the recreation industry; water delivery contractors; contractors for the purchase of Federal power; others interested in Colorado River operations; and the general public, through the Colorado River Management Work Group (CRMWG).

Article I(2) of the Operating Criteria allows for revision of the projected plan of operation to reflect the current hydrologic conditions with notification to the Congress and the Governors of the Colorado River Basin States of any changes by June of each year. The process for revision of the AOP is further described in Section 7.C of the 2007 Interim Guidelines. Any

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

revision to the final AOP may occur only through the AOP consultation process as required by applicable Federal law.

## Purpose

The purpose of the AOP is to illustrate the potential range of reservoir operations that might be expected in the upcoming water year, and to determine or address: (1) the quantity of water considered necessary to be in storage in the Upper Basin reservoirs as of September 30, 2012, pursuant to Section 602(a) of the CRBPA; (2) water available for delivery pursuant to the 1944 United States-Mexico Water Treaty and Minutes No. 242,[9] 314,[10] and 318[11] of the International Boundary and Water Commission, United States and Mexico (IBWC); (3) 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 2007 Interim Guidelines; and (4) whether water apportioned to, but unused by one or more Lower Division States, exists and can be used to satisfy beneficial consumptive use requests of mainstream users in other Lower Division States as provided in the Consolidated Decree of the Supreme Court of the United States in *Arizona v. California*, 547 U.S. 150 (2006) (Consolidated Decree).

Consistent with the above determinations and in accordance with other applicable provisions of the "Law of the River," the AOP was developed with "appropriate consideration of the uses of the reservoirs for all purposes, including flood control, river regulation, beneficial consumptive uses, power production, water quality control, recreation, enhancement of fish and wildlife, and other environmental factors" (Operating Criteria, Article I(2)).

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

[9] Minute No. 242, Permanent and Definitive Solution to the International Problem of the Salinity of the Colorado River dated August 30, 1973. Available online at: http://www.ibwc.gov/Files/Minutes/Min242.pdf.

[10] Minute No. 314, Extension of the Temporary Emergency Delivery of Colorado River Water for use in Tijuana, Baja California dated November 14, 2008. Available online at: http://www.ibwc.state.gov/Files/Minutes/Minute_314.pdf.

[11] Minute No. 318, Adjustment of Delivery Schedules for Water Allotted to Mexico for the Years 2010 through 2013 as a Result of Infrastructure Damage in Irrigation District 014, Rio Colorado, Caused by the April 2010 Earthquake in the Mexicali Valley, Baja California dated December 17, 2010. Available online at: http://www.ibwc.state.gov/Files/Minutes/Min_318.pdf.

## Summary

**Upper Basin Delivery.** Taking into account (1) the existing water storage conditions in the basin, (2) the August 24-Month Study[12] projection of the most probable near-term water supply conditions in the basin, and (3) Section ~~6.B~~6.A of the 2007 Interim Guidelines, the ~~Upper Elevation Balancing~~Equalization Tier will govern the operation of Lake Powell for water year 2012. The ~~July~~ August 2011 24-Month Study of the most probable inflow scenario projects ~~Equalization is likely during~~the water year 2012 ~~with the annual~~ release from Glen Canyon Dam ~~projected~~ to be 13.57 million acre-feet (maf) (16,730 million cubic meters [mcm]). Given the hydrologic variability of the Colorado River System and actual 2011 water year operations, the water year release from Lake Powell in 2012 could be in the range of 9.96 maf (12,290 mcm) to 14.48 maf (17,860 mcm) or greater.

For further information about the variability of projected inflow into Lake Powell, see the 2012 Water Supply Assumptions section and the Lake Powell section under the Summary of Reservoir Operations in 2011 and Projected 2012 Reservoir Operations, and Tables 3 and 4.

**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 2007 Interim Guidelines, the Intentionally Created Surplus (ICS) Surplus Condition governs the operation of Lake Mead for calendar year 2012 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 2012 is anticipated. If any unused apportionment becomes available after adoption of this AOP, Reclamation, on behalf of the Secretary, may allocate any such available unused apportionment for calendar year 2012. Any such allocation shall be made in accordance with Article II(B)(6) of the Consolidated Decree and the Lower Colorado Region Policy for Apportioned but Unused Water[13] (Unused Water Policy).

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

[12] The 24-Month Study refers to the operational study conducted by Reclamation to project future reservoir operations. The most recent 24-Month Study is available on Reclamation's Water Operations websites and is updated each month. Available online at: http://www.usbr.gov/uc/water/crsp/studies/index.html and http://www.usbr.gov/lc/region/g4000/24mo.pdf.

[13] Lower Colorado Region Policy for Apportioned but Unused Water, February 11, 2010.

The Inadvertent Overrun and Payback Policy (IOPP), which became effective January 1, 2004, will be in effect during calendar year 2012.[14]

The 2007 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 2012 pursuant to the 2007 Interim Guidelines and appropriate delivery and forbearance agreements.

**1944 United States-Mexico Water Treaty Delivery**. A volume of up to 1.500 maf (1,850 mcm) of water will be available to be scheduled for delivery to Mexico during calendar year 2012 in accordance with Article 15 of the 1944 United States-Mexico Water Treaty and Minutes No. 242, 314, and 318 of the IBWC.

[14] 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). Available online at: http://www.usbr.gov/lc/region/g4000/crwda/crwda_rod.pdf.

# 2011 HYDROLOGY SUMMARY AND RESERVOIR STATUS

Above average stream flows were observed throughout much of the Colorado River Basin during water year 2011. Unregulated[15] inflow to Lake Powell in water year 2011 was 17.08 maf (21,070 mcm), or 142 percent of the 30-year average[16] which is 12.0 maf (14,900 mcm). Unregulated inflow to Flaming Gorge, Blue Mesa, and Navajo Reservoirs was 143, 118, and 70 percent of average, respectively.

Precipitation in the Upper Colorado River Basin was well above average during the period of October through December 2010 but was below average in January 2011. During the months of February through April 2011, precipitation was again well above average and by May 1, 2011, the overall accumulated water year precipitation received within the Upper Colorado River Basin was 125 percent of average. On September 30, 2011, the cumulative precipitation for water year 2011 was 126 percent of average.

Snowpack conditions trended near average in the northern reaches of the Colorado River Basin until December 2010. A significant storm in mid-December elevated the snowpack conditions to well above average and these above average conditions were sustained throughout the winter. Snowpack conditions in the southern reaches of the Colorado River Basin were also above average as a result of the mid-December storm; however, below average precipitation during the months of January and February caused the snowpack conditions in the southern reaches to fall below average by early March 2011. On April 1, 2011, the snow water equivalents for the Green River, Upper Colorado River Headwater, and San Juan River Basins were 121, 131 and 81 percent of average, respectively. The overall snow water equivalent for the Upper Colorado River Basin above Lake Powell on April 1, 2011, was 119 percent of average.

During the 2011 spring runoff season, inflows to Lake Powell began to increase in April as temperatures increased across the basin. On June 12, 2011, inflows to Lake Powell peaked at approximately 96,600 cubic feet per second (cfs) (2,734 cubic meters per second [cms]). During the spring runoff period Lake Powell storage increased by 5.80 maf (7,150 mcm). The April through July unregulated inflow volume for Lake Powell was 12.92 maf (15,940 mcm) which was 163 percent of average based on the historic period from 1971 through 2000.

Inflow to Lake Powell has been below average in nine of the past twelve water years (2000-2011). ~~Although slightly above average inflows occurred in 2005 and 2008, and above average conditions occurred in 2011, drought conditions in the Colorado River Basin have persisted.~~ Provisional calculations of the natural flow for the Colorado River at Lees Ferry, Arizona, show that the average natural flow since water year 2000 (2000-2011, inclusive~~ly~~)

[15] 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.
[16] Inflow statistics throughout this document will be compared to the 30-year average, 1971-2000, unless otherwise noted.

is 12.84 maf (15,840 mcm). This is the second lowest twelve-year average in over 100 years of record keeping on the Colorado River.

Lower Basin tributary inflows above Lake Mead varied, with some below average and some above average for water year 2011. Tributary inflow from the Little Colorado River for water year 2011 totaled 0.058 maf (72 mcm), or 32 percent of the long-term average.[17] Tributary inflow from the Virgin River for water year 2011 totaled 0.364 maf (449 mcm), or 211 percent of the long-term average.

Tributary inflows in the Lower Colorado River Basin below Hoover Dam were below average during water year 2011. Total tributary inflow for water year 2011 from the Bill Williams River was 0.029 maf (36 mcm), or 29 percent of the long-term average and total inflow from the Gila River was 0.006 maf (7 mcm).[18]

The Colorado River total system storage experienced a net gain of 6.10 maf (7,520 mcm) in water year 2011. Reservoir storage in Lake Powell increased during water year 2011 by 2.83 maf (3,490mcm). Reservoir storage in Lake Mead increased during water year 2011 by 2.85 maf (3,510 mcm). At the beginning of water year 2011 (October 1, 2010), Colorado River total system storage was 56 percent of capacity. As of September 30, 2011, total system storage was 66 percent of capacity.

Tables 1 and 2 list the October 1, 2011, reservoir vacant space, live storage, water elevation, percent of capacity, change in storage, and change in water elevation during water year 2011.

[17] The basis for the long-term average of tributary inflows in the Lower Basin is natural flow data from 1906 to 2008. Additional information regarding natural flows may be found at http://www.usbr.gov/lc/region/g4000/NaturalFlow/current.html.

[18] 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.

## Table 1. Reservoir Conditions on October 1, 2011 (English Units)

| Reservoir | Vacant Space (maf) | Live Storage (maf) | Water Elevation (ft) | Percent of Capacity (%) | Change in Storage* (maf) | Change in Elevation* (ft) |
|---|---|---|---|---|---|---|
| Fontenelle | 0.002 | 0.343 | 6,505.7 | 99 | 0.064 | 8.4 |
| Flaming Gorge | 0.284 | 3.47 | 6,033.0 | 92 | 0.312 | 8.2 |
| Blue Mesa | 0.127 | 0.702 | 7,504.9 | 85 | 0.093 | 11.4 |
| Navajo | 0.327 | 1.37 | 6,061.6 | 81 | -0.044 | -3.4 |
| Lake Powell | 6.23 | 18.1 | 3,656.9 | 74 | 2.825 | 23.3 |
| Lake Mead | 12.9 | 12.9 | 1,115.6 | 50 | 2.847 | 31.8 |
| Lake Mohave | 0.246 | 1.56 | 638.0 | 86 | -0.011 | -0.4 |
| Lake Havasu | 0.049 | 0.571 | 447.5 | 92 | 0.010 | 0.6 |
| ---------- | ------ | ------- | | --------- | ------- | |
| Totals | 20.0 | 39.0 | | 66 | 6.097 | |

* From October 1, 2010, to September 30, 2011.

## Table 2. Reservoir Conditions on October 1, 2011 (Metric Units)

| Reservoir | Vacant Space (mcm) | Live Storage (mcm) | Water Elevation (m) | Percent of Capacity (%) | Change in Storage* (mcm) | Change in Elevation* (m) |
|---|---|---|---|---|---|---|
| Fontenelle | 2.5 | 423 | 1,982.9 | 99 | 78.9 | 2.6 |
| Flaming Gorge | 350 | 4280 | 1,838.9 | 92 | 385 | 2.5 |
| Blue Mesa | 157 | 866 | 2,287.5 | 85 | 115 | 3.5 |
| Navajo | 403 | 1,690 | 1,847.6 | 81 | -54.2 | -1.0 |
| Lake Powell | 7,700 | 22,300 | 1,114.6 | 74 | 3,485 | 7.1 |
| Lake Mead | 15,900 | 15,900 | 340.0 | 50 | 3,512 | 9.7 |
| Lake Mohave | 303 | 1,920 | 194.5 | 86 | -13.6 | -0.1 |
| Lake Havasu | 60.4 | 704 | 136.4 | 92 | 12.3 | 0.2 |
| ---------- | ------ | ------- | | --------- | ------- | |
| Totals | 24,700 | 48,100 | | 66 | 7,520 | |

* From October 1, 2010, to September 30, 2011.

# 2012 WATER SUPPLY ASSUMPTIONS

For 2012 operations, three reservoir unregulated inflow scenarios were developed and analyzed: minimum probable, most probable, and maximum probable.

There is considerable uncertainty associated with streamflow forecasts and projections of reservoir operations made a year in advance. The National Weather Service's Colorado Basin River Forecast Center (CBRFC) forecasts the inflow for the minimum probable (90 percent exceedance), most probable (50 percent exceedance), and maximum probable (10 percent exceedance) inflow scenarios for 2012 using an Ensemble Streamflow Prediction model. Based upon the August CBRFC forecast, the range of unregulated inflows is projected to be as follows:

- The forecasted minimum probable unregulated inflow to Lake Powell in water year 2012 is 7.00 maf (8,630 mcm), or 58 percent of average.
- The forecasted most probable unregulated inflow to Lake Powell in water year 2012 is 12.60 maf (15,540 mcm), or 105 percent of average.
- The forecasted maximum probable unregulated inflow to Lake Powell in water year 2012 is 19.50 maf (24,050 mcm), or 162 percent of average.

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

Inflows to the mainstream from Lake Powell to Lake Mead, Lake Mead to Lake Mohave, Lake Mohave to Lake Havasu, and below Lake Havasu are projected using historic data over the five-year period of January 2006 through December 2010, inclusive. These five years of historic data are representative of the most recent hydrologic conditions in the Lower Basin. The most probable side inflows into each reach are estimated as the arithmetic mean of the five-year record. The maximum probable and minimum probable projections for each reach are the 10 percent and 90 percent exceedance values, respectively, of the five-year record. For the reach from Lake Powell to Lake Mead, the minimum probable inflow during water year 2012 is 0.480 maf (592 mcm), the most probable inflow is 0.815 maf (1,005 mcm), and the maximum probable inflow is 1.208 maf (1,490 mcm).

The projected monthly volumes of inflow were input into the 24-Month Study and used to project potential reservoir operations for 2012. Starting with the projected October 1, 2011, 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.

For the latest monthly projections for the major reservoirs in the Colorado River system, please see the most recent 24-Month Study available on these Reclamation websites:

http://www.usbr.gov/uc/water/crsp/studies/index.html, or
http://www.usbr.gov/lc/region/g4000/24mo.pdf.

**Table 3. Projected Unregulated Inflow into Lake Powell for Water Year 2012 (English Units)[19]**

| Time Period | Minimum Probable (maf) | Most Probable (maf) | Maximum Probable (maf) |
|---|---|---|---|
| 10/11–12/11 | 1.67 | 1.90 | 2.05 |
| 1/12 – 3/12 | 1.42 | 1.65 | 1.99 |
| 4/12– 7/12 | 3.41 | 8.00 | 13.60 |
| 8/12 – 9/12 | 0.51 | 1.05 | 1.88 |
| 10/12 – 12/12 | 1.18 | 1.50 | 1.96 |
| WY 2012 | 7.00 | 12.60 | 19.50 |
| CY 2012 | 6.52 | 12.20 | 19.43 |

**Table 4. Projected Unregulated Inflow into Lake Powell for Water Year 2012 (Metric Units)**

| Time Period | Minimum Probable (mcm) | Most Probable (mcm) | Maximum Probable (mcm) |
|---|---|---|---|
| 10/11 –12/11 | 2,060 | 2,340 | 2,530 |
| 1/12–3/12 | 1,750 | 2,040 | 2,450 |
| 4/12 –7/12 | 4,210 | 9,870 | 16,780 |
| 8/12 –9/12 | 628 | 1,300 | 2,320 |
| 10/12 –12/12 | 1,460 | 1,850 | 2,420 |
| WY 2012 | 8,640 | 15,540 | 24,050 |
| CY 2012 | 8,040 | 15,050 | 23,970 |

[19] All values in Tables 3 and 4 are projected inflows based upon the August CBRFC forecast with the exception of the values for 10/12-12/12. 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 10/12-12/12 time period.

# SUMMARY OF RESERVOIR OPERATIONS IN 2011 AND PROJECTED 2012 RESERVOIR OPERATIONS

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

In the Upper Basin, public stakeholder work groups have been established at Fontenelle Dam, Flaming Gorge Dam, the Aspinall Unit, and Navajo Dam. These work groups provide a public forum for dissemination of information regarding ongoing and projected reservoir operations throughout the year and allow stakeholders the opportunity to provide information and feedback with respect to ongoing reservoir operations. Additionally, the Glen Canyon Dam Adaptive Management Work Group (AMWG)[20] was established in 1997 as a chartered committee under the Federal Advisory Committee Act of 1972 (Public Law 92-463).

Modifications to projected operations are routinely made based on changes in forecasted conditions or other relevant factors. Consistent with the Upper Colorado River Endangered Fish Recovery Program (Upper Colorado Recovery Program),[21] the San Juan River Basin Recovery Implementation Program (San Juan Recovery Program),[22] Section 7 consultations under the Endangered Species Act (ESA), and other downstream concerns, modifications to projected monthly operations may be based on other factors in addition to changes in streamflow forecasts. Decisions on spring peak releases and downstream habitat target flows may be made midway through the runoff season. Reclamation will conduct meetings with the U.S. Fish and Wildlife Service (Service), other Federal agencies, representatives of the Basin States, and with public stakeholder work groups to facilitate the discussions necessary to finalize site-specific projected operations.

The following paragraphs discuss reservoir operations in 2011 and the range of probable projected 2012 operations of each of the reservoirs with respect to applicable provisions of compacts, the Consolidated Decree, statutes, regulations, contracts, and instream flow needs for maintaining or improving aquatic and riparian resources where appropriate.

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

## Fontenelle Reservoir

Hydrologic conditions in water year 2011 in the Upper Green River Basin were significantly wetter than average. The April through July inflow to Fontenelle Reservoir during water year 2011 was 1.22 maf (1,500 mcm), which was 142 percent of average. Snowpack conditions in the Upper Green River Basin were significantly above average with the peak snow water equivalent reaching 139 percent of seasonal average on May 3, 2011. The Upper Green River Basin has experienced a decade of drought conditions with below average inflows the past nine out of ten years. Inflows in water year 2011, however, were higher than have been experienced since 1997.

Fontenelle Reservoir filled in water year 2011. The reservoir elevation peaked at 6,502.84 feet (1,982.07 meters) on August 16, 2011, 3.16 feet (0.96 meters) below the spillway crest. In anticipation of significantly above average inflows, releases were increased beginning on April 20, 2011, to maintain safe operating levels in Fontenelle Reservoir. Releases peaked at 8,800 cfs (249 cms) on July 15, 2011, and continued for four days. These releases were made through the powerplant and bypass tubes at Fontenelle Dam. Releases were reduced to 1,200 cfs (34.0 cms) after the inflow subsided. Inflow peaked at 13,500 cfs (382 cms) on July 3, 2011.

Based on the August 2011 24-Month Study, the most probable April through July inflow scenario for Fontenelle Reservoir during water year 2012 is 0.752 maf (928 mcm), or 88 percent of average. This volume far exceeds the 0.345 maf (426 mcm) storage capacity of Fontenelle Reservoir. For this reason, the most probable and maximum probable inflow scenarios would require releases during the spring that exceed the capacity of the powerplant to avoid uncontrolled spills from the reservoir. It is very likely that Fontenelle Reservoir will fill during water year 2012. 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 6,468.00 feet (1,971.45 meters) by early April 2012, which is 5.00 feet (1.52 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 2011 was above average. Unregulated inflow in water year 2011 was 2.46 maf (3,030 mcm), which is 143 percent of average. On October 1, 2010, the beginning of water year 2011, the reservoir elevation was 6,024.83 feet (1,836.37 meters). The reservoir elevation showed an overall increase during water year 2011 with an ending water year (September 30, 2011) elevation of 6,032.99 feet (1,838.86 meters) corresponding to a volume of 3.47 maf (4,280 mcm). Flaming Gorge Reservoir reached a maximum elevation of 6,036.11 feet (1,839.81 meters), with 3.59 maf (4,430 mcm) in storage, on August 1, 2011. The end of water year reservoir elevation was 7.01 feet (2.14 meters) below the full pool elevation (6,040.0 feet, 1,841.0 meters) which corresponds to an available storage space of 0.284 maf (350 mcm).

Reclamation operated Flaming Gorge Dam in compliance with the Flaming Gorge ROD in 2011. The hydrologic conditions during the spring of 2011 met the moderately wet designation under the ROD. Reclamation convened the Flaming Gorge Technical Working Group (FGTWG) comprised of the Service, Western, and Reclamation personnel. The FGTWG proposed Reclamation manage releases to the Green River to attempt to meet the Upper Colorado Endangered Species Recovery Implementation Program (Recovery Program) research request primary and secondary objectives. The first criterion of the primary objective was to alter the timing of releases from Flaming Gorge Reservoir for an experiment that would allow for better understanding of the relationship between timed river flows, the abundance of wild razorback sucker larvae, and the rate of larval entrainment. The second criterion of the primary objective was to meet the target outlined in the 2000 Flow and Temperature Recommendations for Reach 2 of at least 18,600 cfs (526 cms) for a minimum of two weeks. The second objective was to maintain flows at or above 15,000 cfs (425 cms) for at least five consecutive days in Reach 2 during the Yampa River peak flows, if hydrology permitted, in order to continue the Stirrup Floodplain research. Moderately wet conditions prevailed in the Green River Basin and wet conditions prevailed in the Yampa River Basin, and continued precipitation and low temperatures resulted in increased snow accumulation and delayed runoff. Runoff conditions in 2011 and Flaming Gorge operations achieved the Recovery Program research request with 10 days above 15,000 cfs (425 cms). The requirements of 26,400 cfs (747 cms) for one day, 22,700 cfs (642 cms) for two weeks or more and 18,600 cfs (526 cms) for four weeks or more in Reach 2 under the wet designation of the ROD were also met. The requirement of one day at or above 26,400 cfs (747 cms) was achieved on June 11, 2011, with a one-day peak of 32,100 cfs (908 cms) pursuant to the ROD.

Releases from Flaming Gorge Reservoir were increased to powerplant capacity of 4,600 cfs (130 cms) on April 28, 2011, in order to evacuate storage for dam safety in anticipation of high spring flows in the Upper Green River. Releases were increased to full powerplant and bypass tube capacity of 8,600 cfs (243 cms) from May 3 to May 7, 2011, and again from June 11 to July 10, 2011, in order to evacuate storage for dam safety in anticipation of high spring flows in the Upper Green River. Releases were maintained at powerplant capacity from July 14, 2011, until July 27, 2011. Green River flows at Jensen remained above 8,300 cfs (235 cms) from April 20, 2011, to July 27, 2011 (98 days). Flows at Jensen reached 32,100 cfs (908 cms) on June 11, 2011, for a single day as a result of releases from Flaming Gorge Dam and flows on the Yampa River. Releases from Flaming Gorge Reservoir were reduced by 350 cfs (9.9 cms) per day beginning on July 11, 2011. The use of the bypass tubes was not required to meet these flow objectives. However, bypass tubes were required in order to evacuate storage for dam safety in anticipation of high spring flows.

As of August 2011, the hydrologic classification as defined by the Flaming Gorge ROD was wet. 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 the base flow levels be based on research related to maximum critical habitat available in Reach 2. Reclamation

convened the FGTWG to consult on a flow proposal for the Green River during the base flow period (August through February of the following year). The FGTWG proposed to Reclamation that flows in the Green River, during the base flow period, should fall within the moderately wet range, as described in the Flaming Gorge Final Environmental Impact Statement for the Action Alternative. Consistent with the ROD, and considering information provided to the FGTWG, Reclamation operated Flaming Gorge Dam to provide base flows in the Green River during the summer of 2011 that maximized critical habitat in Reach 2 according to the flexibility outlined in the ROD and requested by the Service. It is anticipated that 2011-2012 winter releases from Flaming Gorge Dam will follow a daily double peak pattern (peaking during the morning and evening hours) for hydropower purposes during the months of November through March if hydrology permits flows above an 800 cfs (22.6 cms) daily average.

During water year 2012, Flaming Gorge Dam will continue to be operated in accordance with the Flaming Gorge ROD. High spring releases are scheduled to occur in 2012, timed with the Yampa River's spring runoff peak flow, followed by lower summer and autumn base flows. Under the most probable inflow scenario, base flow releases are projected to be 2,450 cfs (69.3 cms) through September 30 and then decrease to approximately 2,050 cfs (58.0 cms) beginning in October 2011, and will likely continue at that rate until spring runoff begins in May 2012. A spring peak release is projected to occur sometime in May 2012, and will be timed to coincide with the peak flows of the Yampa River.

The Recovery Program, in coordination with Reclamation, the Service, and Western, will continue conducting studies associated with floodplain inundation. Such studies may result in alternatives for meeting flow and temperature recommendations at lower peak flow levels where feasible.[23]

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

Above average snowpack conditions prevailed in the Gunnison Basin during water year 2011. Snow measurement sites in the basin reported mostly above average snow water equivalent levels throughout the winter and into the spring of 2011. The April through July unregulated inflow into Blue Mesa Reservoir in 2011 was 0.892 maf (1,100 mcm), which was 124 percent of average. Water year 2011 unregulated inflow into Blue Mesa Reservoir was 1.18 maf (1,460 mcm), which was 118 percent of average. Blue Mesa Reservoir effectively filled in 2011. The reservoir reached a peak elevation of 7,519.22 feet (2,291.86 meters) on July 16, 2011, 0.18 feet (0.05 meters) below full pool. Storage in Blue Mesa Reservoir increased during water year 2011 by 0.093 maf (115 mcm). Storage in Blue Mesa Reservoir on September 30, 2011, was 0.702 maf (866 mcm), or 85 percent of capacity.

[23] Flow and Temperature Recommendations for Endangered Fishes in the Green River Downstream of Flaming Gorge Dam, September 2000. Available online at: http://www.ead.anl.gov/pub/doc/flaminggorgeflowrecs.pdf.

Releases from Aspinall Unit reservoirs in 2011 were about average and provided flows of approximately 500 cfs (14 cms) from early October 2010 to early February and then approximately 800 cfs (23 cms) through mid-February in the Gunnison River through the Black Canyon (below the Gunnison Tunnel). On February 18, 2011, releases were increased to 1,100 cfs (31.1 cms) in response to increases in forecasted inflow. Other increases followed in short time intervals until the peak powerplant capacity of 2,100 cfs (59.4 cms) was reached at Crystal Dam ~~of 2,100 cfs (59.4 cms)~~ on June 3, 2011.

Beginning June 4, 2011, releases from Crystal Reservoir were increased on a daily basis until reaching 8,040 cfs (228 cms) resulting in 7,150 cfs (202 cms) in the Black Canyon below the diversion tunnel on June 8, 2011. Releases were then ramped down on a daily basis starting the morning of June 9, 2011, and leveled off at 1,900 cfs (53.8 cms) from Crystal Dam resulting in 1,060 cfs (30.0 cms) in the Black Canyon below the diversion tunnel and Gunnison Gorge on July 2, 2011. Reservoir release flows again increased starting on July 7, 2011, in response to higher than predicted inflows caused from monsoonal moisture combined with late season snowmelt. Release rates were increased on a daily basis of 200 cfs (5.7 cms) increments until reaching a total release rate of 3,650 cfs (103 cms) from Crystal Reservoir on July 14, 2011. Reservoir releases were then reduced starting on July 30, 2011, at 200 cfs (5.7 cms) daily reduction until reaching a total release rate of 2,050 cfs (58.0 cms) from Crystal Reservoir.

Flows stabilized for the summer season during mid-August at about 1,200 cfs (34.0 cms) through the Black Canyon and Gunnison Gorge.

For water year 2012, the Aspinall Unit will be operated to conserve storage while meeting downstream delivery requirements, consistent with authorized project purposes. Releases include the delivery requirements of the Uncompahgre Valley Project and other senior water rights downstream, including the Black Canyon Water Right.[24] As part of the operational process, Reclamation will continue to coordinate operations through tri-annual Aspinall Operations meetings.

Under the minimum probable, most probable, and maximum probable inflow scenarios, Blue Mesa Reservoir is projected to fill in 2012.

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

## Navajo Reservoir

Inflow to Navajo Reservoir in water year 2011 was below the 30-year average. Water year 2011 unregulated inflow was 0.779 maf (961 mcm), or 70 percent of average. The April through July unregulated inflow into Navajo Reservoir in water year 2011 was 0.579 maf (714 mcm), or 74 percent of average. Unregulated inflow to Navajo Reservoir was below average for all water years from 2000 through 2011, 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 6,068.67 feet (1,849.73 meters) on July 1, 2011, 16.30 feet (4.97 meters) below full pool. The water surface elevation at Navajo Reservoir on September 30, 2011, was 6,061.57 feet (1,847.57 meters), with reservoir storage at 80 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.[25] 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.

Navajo Reservoir was operated in compliance with the ROD in 2011, including the San Juan Flow Recommendations which required a 1-week spring peak release at 5,000 cfs (141.5 cms) with a week-long ramp up and down.

In 2009, a four-year agreement was developed among major users to limit their water use to the rates and volumes indicated in the agreement.[26] The 2009-2012 agreement was similar to agreements that were developed in 2003, 2004, 2005, 2006, and 2007-2008. Ten major water users (the Jicarilla Apache and Navajo Nations, Hammond Conservancy District, Public Service Company of New Mexico, City of Farmington, Arizona Public Service Company, BHP-Billiton, Bloomfield Irrigation District, Farmers Mutual Ditch, and Jewett Valley Ditch) endorsed the flow recommendations. The recommendations included limitations on diversions for 2009-2012, criteria for determining a shortage, and shortage-sharing requirements in the event of a water supply shortfall, including sharing of shortages between the water users and the flow demands for endangered fish habitat. In addition to the ten major water users, the New Mexico Interstate Stream Commission, the Bureau of

[25] Flow Recommendations for the San Juan River, May 1999. Available online at: http://www.fws.gov/southwest/sjrip/pdf/DOC_Flow_recommendations_San_Juan_River.pdf.
[26] Recommendations for San Juan River Operations and Administration for 2009-2012, January 29, 2009.

Indian Affairs, the Service, and the San Juan Recovery Program all provided input to the recommendations. The recommendations were acknowledged by Reclamation and the New Mexico State Engineer for reservoir operation and river administration purposes.

During water year 2012, Navajo Reservoir will be operated in accordance with the Navajo Reservoir Operations ROD. Navajo Reservoir storage levels are expected to be near average in 2012 under the most probable inflow forecast. Releases from the reservoir will likely remain at a 500 cfs (14.2 cms) base release through the winter. Under the most probable inflow forecast in 2012, 1.04 maf (1,280 mcm), the spring release will likely include a 3-week peak release at 5,000 cfs (141.5 cms), a weeklong ramp up, and a weeklong ramp down, as described in the San Juan Flow Recommendations.

Under the minimum probable inflow forecast, 0.450 maf (555 mcm), there will likely not be a spring peak release made during the spring of 2012. If a perturbation year, as defined in the San Juan Flow Recommendations, has been calculated, a 1-week spring peak hydrograph would likely be released. Under the maximum probable inflow forecast, 1.66 maf (2,050 mcm), a maximum spring peak release (21 days at 5,000 cfs [141.5 cms]) will likely be required as described in the San Juan Flow Recommendations.

## Lake Powell

Reservoir storage in Lake Powell increased during water year 2011. On October 1, 2010, the beginning of water year 2011, reservoir storage in Lake Powell was 63 percent of capacity at elevation 3,633.66 feet (1,107.54 meters), with 15.27 maf (18,840 mcm) in storage. On September 30, 2011, the reservoir storage in Lake Powell was 18.09 maf (22,310 mcm) at 74 percent of full capacity indicating a net gain over water year 2011 of 2.83 maf (3,490 mcm). The unregulated inflow to Lake Powell during water year 2011 was above average at 142 percent of average. Lake Powell ended the water year on September 30, 2011, at elevation 3,656.91 feet (1,114.63 meters).

The August 2010 24-Month Study, using the most probable inflow scenario, was run to project the January 1, 2011, Lake Powell elevation. The projected January 1, 2011, elevation, and guidance under Section 6.B of the 2007 Interim Guidelines, determined the Upper Elevation Balancing Tier to be the applicable operational tier for water year 2011. This resulted in a volume of 8.23 maf (10,150 mcm) being initially scheduled for release from Glen Canyon Dam for water year 2011.

Using an 8.23 maf (10,150 mcm) release volume, the August 2010 24-Month Study also projected that the end of water year 2011 elevation would be above 3,643.00 feet (1,110.39 meters), the Equalization Level for water year 2011. Thus, the August 2010 24-Month Study projected that an adjustment would be made in April and “the Equalization Tier would govern the operation of Lake Powell for the remainder of the water year.” In April 2011, the 24-Month Study, with a release of 8.23 maf (10,150 mcm), projected that the end of water year 2011 elevation of Lake Powell would be 3,662.63 feet (1,116.37 meters).

Based on this projection and c~~C~~onsistent with Section 6.B.3 of the 2007 Interim Guidelines, ~~this condition did trigger~~ the Equalization Tier (Section 6.A) ~~to~~ governed the operation of Glen Canyon Dam for the remainder of water year 2011~~. For this reason~~, and resulted in an ~~the~~ annual release volume during water year 2011 from Glen Canyon Dam of~~is projected to be~~ 12.45 maf (15,360 mcm).

The April through July unregulated inflow to Lake Powell in water year 2011 was 12.92 maf (15,940 mcm) which was 163 percent of average. Lake Powell reached peak elevation for water year 2011 of 3,660.90 feet (1,115.84 meters) on July 30, 2011, which was 39.10 feet (11.92 meters) below full pool.

In addition to a spring high flow test conducted in March 2008, a five-year period of steady flows in September and October of each year is being implemented during the period from 2008 through 2012 with flows in accordance with the 1997 Glen Canyon Dam Operating Criteria 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 2011, a test of steady flows (steady daily releases), as described in the EA, was conducted consistent with Reclamation's February 29, 2008, FONSI. Steady flows of approximately 14,800 cfs (419 cms) were made during the two-month period in 2011. In 2012, a test of steady flows will be repeated during September and October.

**2012 Operating Tier and Projected Operations~~Determination~~ for Glen Canyon Dam.**
The January 1, 2012, reservoir elevation of Lake Powell ~~and Lake Mead~~ is projected under the most probable inflow scenario to be 3,646.26 feet (1,111.38 meters) ~~and 1,133.34 feet (345.44 meters), respectively,~~ based on the August 2011 24-Month Study. Given thi~~s~~ese projection~~s~~, the ~~annual~~ water year release volume from Lake Powell during water year 2012 will be consistent with the ~~Upper Elevation Balancing~~Equalization Tier (Section 6.A~~B~~ of the 2007 Interim Guidelines)~~. and under Section 6.B.1, the total annual release would be 10.06 maf (12,410 mcm), given actual 2011 water year operations. The Upper Elevation Balancing Tier, however, does provide for the possibility of adjustments to operation of Lake Powell and these adjustments will be based on the projected end of water year conditions of Lake Powell and Lake Mead from the April 2012 24-Month Study.~~

~~If the April 2012 24-Month Study, with a water year release volume of 8.23 maf (10,150 mcm), projects the September 30, 2012, Lake Powell elevation to be greater than 3,645 feet (1,111.0 meters), the Equalization Level for water year 2012, operations will be adjusted and "the Equalization Tier will govern the operation of Lake Powell for the remainder of the water year" consistent with Section 6.B.3. If this condition occurs, and an adjustment is made, the water year release volume will likely be greater than 10.06 maf (12,410 mcm) and will be determined based on the Equalization Tier as described in Section 6.A of the 2007 Interim Guidelines.~~

~~If the April 2012 24-Month Study projects the September 30, 2012, Lake Mead elevation to be below 1,075 feet (327.7 meters) and the September 30, 2012, Lake Powell elevation to be at or above elevation 3,575 feet (1,089.7 meters), the Secretary shall balance the contents of Lake Mead and Lake Powell, but shall release not more than 9.0 maf (11,100 mcm) and not less than 8.23 maf (10,150 mcm) from Lake Powell in water year 2012 consistent with Section 6.B.4 of the 2007 Interim Guidelines.~~

~~**2012 Projected Operation for Glen Canyon Dam.** The August 2011 24-Month Study projects an April 2012 adjustment to the Equalization Tier governing operation of Glen Canyon Dam in water year 2012 is likely to occur under the most probable and maximum probable inflow scenarios. The August 24-Month Study under the minimum probable inflow scenario does not project an April adjustment to occur in 2012. The actual hydrologic conditions during the water year through March will determine if an adjustment will be made and what that adjustment will be.~~

Under the minimum probable inflow scenario and recognizing actual 2011 water year operations, the August 2011 24-Month Study, with a projected water year release volume of 9.96 maf (12,290 mcm) in water year 2012, projects that the end of water year elevation~~s~~ and storage of Lake Powell ~~and Lake Mead~~ will~~ould~~ be 3,638.20 feet (1,108.92 meters) and 15.79 maf (19,480 mcm), respectively. ~~Based on this projected condition, the August 2011 24-Month Study minimum probable inflow scenario would project no April adjustment in water year 2012 and consistent with Section 6.B.1 of the 2007 Interim Guidelines the annual release from Lake Powell would be X.XX maf (XX,XXX mcm). The August 2011 24-Month Study under the minimum probable inflow scenario projects that the end of water year 2012 elevation and storage in Lake Powell to be X,XXX feet (X,XXX meters) and XX.X maf (XX,XXX mcm), respectively.~~

Under the most probable inflow scenario, the August 2011 24-Month Study, with a projected water year release volume ~~in 2012~~ of 13.57 maf (16,740 mcm) in water year 2012, project~~sed~~ that the end of water year elevation and storage of Lake Powell ~~and Lake Mead would~~ will be 3,646.40 feet (1,111.42 meters) and 16.77~~1,119.82~~ maf~~feet~~ (20,690 mcm)~~341.32 meters)~~, respectively. ~~Based on this projected condition, the July 2011 24-Month Study most probable inflow scenario would project an April 2012 adjustment to the Equalization Tier governing the operation of Lake Powell for the remainder of water year 2012 consistent with Section 6.B.3 of the 2007 Interim Guidelines. Under this scenario the water year release volume is projected to be 12.48 maf (15,390 mcm). The end of water year 2012 (September 30, 2012) elevation and reservoir storage are projected to be 3,645.00 feet (1,111.00 meters) and 16.60 maf (20,480 mcm), respectively.~~

Under the maximum probable inflow scenario, the August 2011 24-Month Study, with a projected water year release volume of ~~8.23~~14.48 maf (~~10,150~~17,860 mcm) in water year 2012, projects the end of water year elevation~~s~~ and storage of Lake Powell ~~and Lake Mead would~~ will be 3,685.51 feet (1,123.34 meters) and 22.07 maf ~~feet~~ (27,220 mcm ~~meters~~), respectively. ~~Based on this projected condition, the August 2011 24-Month Study~~

~~maximum probable inflow scenario would project an April adjustment to the Equalization Tier governing the operation of Lake Powell for the remainder of water year 2012 consistent with section 6.B.3 of the 2007 Interim Guidelines. The water year release volume under this scenario to achieve Equalization would be XX.X maf (XX,XXX mcm) and the projected elevations of Lake Powell and Lake Mead at the end of water year 2012 would be X,XXX feet (X,XXX meters) and XX.X feet(X,XXX meters), respectively.~~

Recognizing the August 2011 maintenance plan for Glen Canyon Dam during water year 2012, the full release capability of Glen Canyon Powerplant would result in an estimated annual release volume through the powerplant of approximately 14.48 maf (17,860 mcm). At any point throughout water year 2012, if the 24-Month Study projects the remaining water year release volume to be greater than the release capability of Glen Canyon Powerplant, Reclamation will strive to adjust the maintenance plan as much as possible to accommodate a higher release volume through the powerplant during water year 2012.

In accordance with the CRBPA of 1968, the Operating Criteria, and Section 6 of the 2007 Interim Guidelines, Reclamation will attempt to achieve equalization as nearly as practicable by the end of the water year. Consistent with Section II(4) of the Operating Criteria, "[a]ny water thus retained [after September 30] in Lake Powell to avoid bypass of water at the Glen Canyon Powerplant will be released through the Glen Canyon Powerplant as soon as practicable" to achieve Equalization.

The August 2011 24-Month Study under the maximum probable inflow scenario with an annual release volume that achieves Equalization by September 30, 2012 (16.69 maf [20,590 mcm]) and an annual volume that recognizes the August 2012 maintenance plan (14.48 maf [17,860 mcm]) project~~ed~~ a range of end of water year conditions at Lake Powell. Under these two release scenarios, the projected end of water year 2012 elevation and storage in Lake Powell range from 3,671.43 feet (1,119.05 meters) to 3,685.51 feet (1,123.34 meters) and 20.04 maf (24,720 mcm) to 22.07 maf (27,220 mcm), respectively.

In 2012, 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 2012. If implemented, releases greater than powerplant capacity would be made consistent with the 1956 Colorado River Storage Project Act, the CRBPA, and to the extent practicable, the recommendations made pursuant to the Grand Canyon Protection Act of 1992. Reservoir releases in excess of powerplant capacity required for dam safety purposes during high reservoir conditions may be used to accomplish the objectives of the beach/habitat-building flow according to the terms contained in the 1996 Glen Canyon Dam ROD and as published in the 1997 Glen Canyon Dam Operating Criteria.

Daily and hourly releases in 2012 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 (Federal Register, Volume 62, No. 41, March 3, 1997). These parameters set the maximum and minimum flows and ramp rates within which the releases must be made. Exceptions to these parameters may be made during power system emergencies, during experimental releases, or for purposes of humanitarian search and rescue.

Releases from Lake Powell in water year 2012 will continue to reflect consideration of the uses and purposes identified in the authorizing legislation for Glen Canyon Dam. Releases will reflect criteria based on the findings, conclusions, and recommendations made in the 1996 Glen Canyon Dam ROD for the GCDFEIS (required by the Grand Canyon Protection Act of 1992) and other Secretarial decisions.

Monthly releases for 2012 will be consistent with the GCDFEIS/ROD and the 2008 EA/FONSI for Experimental Releases for Glen Canyon Dam, Arizona, 2008-2012.

For the latest monthly projections for Lake Powell, please see the most recent 24-Month Study available on Reclamation's Upper Colorado Region Water Operations website:

http://www.usbr.gov/uc/water/crsp/studies/index.html.

The ten-year total flow of the Colorado River at Lee Ferry[27] for water years 2002 through 2011 is 89.13 maf (109,940 mcm). This total is computed as the sum of the flow of the Colorado River at Lees Ferry, Arizona, and the Paria River at Lees Ferry, Arizona, surface water discharge stations which are operated and maintained by the United States Geological Survey.

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

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

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

## Lake Mead

For calendar year 2011, 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 2007 Interim Guidelines. ~~A volume of 1.500 maf (1,850 mcm) of water was scheduled for delivery~~ Delivery of water to Mexico was scheduled in accordance with Article 15 of the 1944 United States-Mexico Treaty and Minutes No. 242, 314, and 318 of the IBWC.

Lake Mead began water year 2011 on October 1, 2010, at elevation 1,083.81 feet (330.3 meters), with 10.09 maf (12,450 mcm) in storage, which is 39 percent of the conservation capacity[28] of 25.88 maf (31,920 mcm). On November 27, 2010, Lake Mead's elevation decreased to 1,081.89 feet (329.76 meters), the lowest on record since filling in the late 1930s. Lake Mead's elevation is projected to increase throughout 2011 to an elevation of 1,134.12 feet (345.68 meters) by the end of December 2011. The September 30, 2011, end of water year elevation at Lake Mead was 1,115.64 feet (340.05 meters), with 12.94 maf (15,960 mcm) in storage (50 percent of capacity).

The total release from Lake Mead through Hoover Dam during water year 2011 was 9.76 maf (12,040 mcm). The total release from Lake Mead through Hoover Dam during calendar year 2011 is projected to be 9.24 maf (11,400 mcm). Consumptive use from Lake Mead during calendar year 2011 resulting from diversions for Nevada above Hoover Dam is projected to be 0.233 maf (287 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 2011, inflow into Lake Mead was 13.59 maf (16,760 mcm). For water year 2012, under the most probable assumptions, total inflow into Lake Mead is anticipated to be 14.38 maf (17,740 mcm).

Under the most probable inflow scenario during 2012, the elevation of Lake Mead is projected to increase to 1,152.61 feet (351.32 meters), with 16.77 maf (20,690 mcm) in storage, at the end of September 2012, and continue to increase to ~~its~~a maximum elevation

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

of 1,158.56 feet (353.13 meters), with 17.46 maf (21,540 mcm) in storage, at the end of December 2012.

Based on the August 2011 24-Month Study, Lake Mead's elevation on January 1, 2012, is projected to be 1,134.12 feet (345.68 meters). In accordance with Section 2.B.5 of the 2007 Interim Guidelines, the ICS Surplus Condition will govern the releases from Lake Mead in calendar year 2012. Releases from Lake Mead through Hoover Dam for water year and calendar year 2012 are anticipated to be approximately the same as 2011 releases.

For the latest monthly projections for Lake Mead, please see the most recent 24-Month Study available on Reclamation's Lower Colorado Region Water Operations website:

http://www.usbr.gov/lc/region/g4000/24mo.pdf.

## Lakes Mohave and Havasu

At the beginning of water year 2011, Lake Mohave was at an elevation of 638.40 feet (194.58 meters), with an active storage of 1.58 maf (1,950 mcm). The water level of Lake Mohave was regulated between elevation 633.10 feet (192.97 meters) and 644.04 feet (196.30 meters) during the water year, ending at an elevation of 638.00 feet (194.46 meters), with 1.56 maf (1,930 mcm) in storage. The total release from Lake Mohave through Davis Dam for water year 2011 was 9.46 maf (11,670 mcm) for downstream water use requirements. The calendar year 2011 total release is projected to be 9.01 maf (11,110 mcm).

For water year and calendar year 2012, Davis Dam is projected to release approximately the same amount of water as in 2011. The water level in Lake Mohave will be regulated between an elevation of approximately ~~633~~ 630 feet (~~193~~ 192 meters) and 645 feet (197 meters).

Lake Havasu started water year 2011 at an elevation of 446.95 feet (136.23 meters) with 0.560 maf (691 mcm) in storage. The water level of Lake Havasu was regulated between elevation 446.40 feet (136.06 meters) and 449.14 feet (136.90 meters) during the water year, ending at an elevation of 447.5 feet (136.40 meters), with 0.57 maf (700 mcm) in storage. During water year 2011, 6.81 maf (8,400 mcm) was released from Parker Dam. The calendar year 2011 total release is projected to be 6.69 maf (8,250 mcm). Diversions from Lake Havasu during calendar year 2011 by the Central Arizona Project (CAP) and the Metropolitan Water District of Southern California (MWD) are projected to be 1.59 maf (1,960 mcm) and 0.707 maf (872 mcm), respectively.

For water year 2012, Parker Dam is expected to release approximately the same amount of water as in water year 2011. Diversions from Lake Havasu in calendar year 2012 by CAP and MWD are projected to be 1.55 maf (1,910 mcm) and 0.802 maf (989 mcm), respectively.

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

At Davis Dam, a major turbine overhaul of Unit No. 4 is scheduled to begin on October 3, 2011, and the unit is scheduled to return to service on March 8, 2012. This overhaul will include removal and maintenance of the fixed wheel gate and hydraulic cylinder, as well as testing the generator windings.

At Parker Dam, no major turbine overhauls are scheduled in 2012.

## Bill Williams River

Abnormally dry to moderate drought conditions persisted in southwestern Arizona, including the Bill Williams River watershed, during water year 2011. Tributary inflows into Alamo Lake were below average during water year 2011 and water released by the U.S. Army Corps of Engineers (USACE) from Alamo Dam totaled 0.029 maf (35.8 mcm) for water year 2011, approximately 29 percent of the long-term average.

Due to the lack of significant runoff and precipitation events during water year 2011, Alamo Lake storage decreased by 0.032 maf (39.5 mcm) from October 1, 2010, to July 31, 2011. During this period, Alamo Lake decreased from elevation 1,120.55 feet (341.54 meters) to elevation 1,112.95 feet (339.23 meters). In 2011, riparian releases from Alamo Lake ranged from 25 to 50 cfs (0.71 to 1.4 cms).

During water year 2011, the USACE did not coordinate experimental releases from Alamo Dam with the Service and the Bill Williams River Corridor Steering Committee (BWRCSC), as in previous years. Past data collection associated with Alamo Dam releases supports ongoing studies conducted by the BWRCSC, including the maintenance of riparian habitat established in water years 2005, 2006, and 2010. 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 2012.

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 2011 are projected to be 5.62 maf (6,930 mcm). The flows arriving at Imperial Dam for calendar year 2012 are projected to be 5.45 maf (6,720 mcm).

## Gila River Flows

During water year 2011, there was well below average snowfall in the Gila and Salt River watersheds and slightly above average snowfall in the Verde River watershed. The combined snowpack in the Salt and Verde River watersheds peaked at 82 percent of average on March 1, 2011. Cumulative precipitation for water year 2011 in the Gila River Basin was 79 percent of average. The Salt River Project did not release water from its system in excess of diversion requirements at Granite Reef Diversion Dam; therefore, no water reached or was released from Painted Rock Dam by the USACE in water year 2011.

## Warren H. Brock Reservoir

The Warren H. Brock (Brock) reservoir is located near the All-American Canal in Imperial County, California. Construction of the reservoir began in 2008 and was completed in the summer of 2010 with commissioning in September. The first filling and drainage test began in September 2010 and was completed in November 2010. In February 2011, Reclamation began operating the reservoir with the Imperial Irrigation District (IID) under an interim operating agreement. Reclamation is currently working with IID to develop a long-term operations and maintenance agreement.

The purpose of the 0.008 maf (9.9 mcm) Brock Reservoir is to reduce nonstorable flows and to enhance beneficial use of Colorado River water within the United States. The reservoir reduces the impact of loss of water storage at Senator Wash due to operational restrictions and provides additional regulatory storage, allowing for more efficient management of water below Parker Dam.

## Yuma Desalting Plant

The Yuma Desalting Plant (YDP) was authorized in 1974 under the Colorado River Basin Salinity Control Act (Public Law 93-320) which authorized the federal government to construct the YDP to desalt the drainage flows from the Wellton-Mohawk Division of the Gila Project. This would allow the treated water to be delivered to Mexico as part of its ~~1.5 maf (1,850 mcm)~~ 1944 United States-Mexico Water Treaty allotment. The United States has met salinity requirements established in IBWC Minute No. 242 primarily through use of a canal to bypass Wellton-Mohawk drain water to the Ciénega de Santa Clara (Ciénega), a wetland of open water, vegetation, and mudflats within a Biosphere Reserve in Mexico. In calendar year 2011, the amount of water discharged from the Wellton-Mohawk Division through the bypass canal is anticipated to be 0.100 maf (120 mcm), measured at the Southerly International Boundary (SIB), at an approximate concentration of total dissolved solids of 2,700 parts per million (ppm).

Reclamation commenced Pilot Run operation of the YDP on May 3, 2010, and operated the plant for 328 days at one-third capacity. A total of approximately 0.030 maf (37.0 mcm) of plant product water blended with drainage flows was discharged into the Colorado River as a result of the Pilot Run. MWD, the Southern Nevada Water Authority (SNWA), and the Central Arizona Water Conservation District (CAWCD) received an amount of water in proportion to their capital contributions to the Pilot Run in accordance with the ICS provisions in the 2007 Interim Guidelines (Section 3.A.3).

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

(a) Collecting performance and cost data;
(b) Identifying any remaining equipment improvements that are needed;
(c) Testing changes that have already been made to the plant; and
(d) Performing research utilizing new technology.

Because plant operation reduces the volume of the flow from the bypass drain to the Ciénega, Reclamation consulted with Mexico through the IBWC. As a result of those consultations, the two countries reached an agreement of joint cooperative actions in connection with the changes associated with reduction in flows as described in IBWC Minute No. 316.[29] Pursuant to this agreement, during the Pilot Run project, a total of 0.030 maf (37 mcm) will be conveyed to the Ciénega to offset the flow reduction from the bypass drain for plant operation. One third of those flows originated from non-storable flows in the United States. The remaining two-thirds will be accounted for from Mexico's 1944 United States-Mexico Water Treaty allotment. As of September 8, 2010, the United States has delivered 0.010 maf (12 mcm) to satisfy the requirements of this agreement. As of June 2011, the United States has delivered 0.019 maf (23.4 mcm) for Mexico and non-governmental organizations, pending verification from the IBWC.

## Off-stream Storage Agreements

Colorado River water may be stored off-stream pursuant to individual SIRAs and 43 CFR Part 414 within the Lower Division States. The Secretary shall make ICUA available to contractors in Arizona, California, or Nevada pursuant to individual SIRAs and 43 CFR Part 414. SNWA may propose to make unused Nevada basic apportionment available for storage by MWD and ~~CAP~~ Arizona Water Banking Authority (AWBA) in calendar years 2011 and 2012.[30,31]

## Intentionally Created Surplus

The 2007 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

[29] Minute No. 316, Utilization of the Wellton-Mohawk Bypass Drain and Necessary Infrastructure in the United States for the Conveyance of Water by Mexico and Non-Governmental Organizations of Both Countries to the Santa Clara Wetland During the Yuma Desalting Plant Pilot Run dated April 16, 2010.
[30] 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.
[31] Storage and Interstate Release Agreement among The United States of America, acting through the Secretary of the Interior; The Arizona Water Banking Authority; the Southern Nevada Water Authority; and the Colorado River Commission of Nevada, December 18, 2002.

implementing agreements[32] were executed concurrent with the issuance of the ROD for the 2007 Interim Guidelines. ICS credits may be created and delivered in 2012 pursuant to the 2007 Interim Guidelines and the implementing agreements. ICS balances by state, user, and type of ICS may be found in the annual Colorado River Accounting and Water Use Report, Arizona, California, and Nevada.[33]

**Extraordinary Conservation ICS.** IID has an approved plan to create up to 0.025 maf (30.8 mcm) of Extraordinary Conservation ICS in 2011 and has submitted a plan to create up to 0.025 maf (30.8 mcm) in 2012 for approval. MWD has an approved plan to create up to 0.200 maf (247 mcm) of Extraordinary Conservation ICS in 2011 and has submitted a plan to create up to 0.200 maf (247 mcm) in 2012 for approval. ~~IID anticipates creating up to 0.025 maf (30.8 mcm) of Extraordinary Conservation ICS credits each year in 2011 and 2012. MWD anticipates creating up to 0.200 maf (247 mcm) of Extraordinary Conservation ICS credits each year in 2011 and 2012.~~ If ~~unplanned~~ unanticipated circumstances arise, MWD and IID may take~~request~~ delivery of Extraordinary Conservation ICS credits in 2011 and 2012.

**System Efficiency ICS.** When the Brock reservoir project was funded, CAWCD, MWD, and SNWA received System Efficiency ICS credits in exchange for funding. In calendar years 2011 and 2012, MWD and SNWA may request an annual delivery of up to 0.025 maf (30.8 mcm) and 0.040 maf (49.3 mcm) of those System Efficiency ICS credits, respectively. ~~created from the Warren H. Brock Reservoir project.~~ When the YDP Pilot Run was conducted, CAWCD, MWD, and SNWA received System Efficiency ICS credits in exchange for funding. Approximately 0.030 maf (37.0 mcm) of System Efficiency ICS credits from the YDP Pilot Run were created in 2010 and 2011. ~~The System Efficiency ICS credits created in 2010 and 2011 will remain in Lake Mead in 2011.~~ MWD and SNWA may request delivery of ~~their~~ these System Efficiency ICS credits in proportion to their capital contributions in 2012 or a subsequent year. System Efficiency ICS credits created for CAWCD will remain in Lake Mead through at least 2015. ~~It is not anticipated that MWD or SNWA will request delivery of System Efficiency credits in 2011.~~

**Tributary Conservation ICS.** ~~SNWA anticipates creating up to 0.037 maf (45.6 mcm) of Tributary Conservation ICS credits each year in 2011 and 2012.~~SNWA has an approved plan to create up to 0.037 maf (45.6 mcm) of Tributary Conservation ICS in 2011 and has submitted a plan to create up to 0.037 maf (45.6 mcm) in 2012 for approval. Any Tributary Conservation ICS not delivered for use by SNWA in the year created will, at the beginning of the following year, be converted to Extraordinary Conservation ICS pursuant to the 2007 Interim Guidelines.

[32] 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, Coachella Valley Water District (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.

[33] An archive of Colorado River Accounting and Water Use Report, Arizona, California, and Nevada reports is available online at: http://www.usbr.gov/lc/region/g4000/wtracct.html.

**Imported ICS.** ~~SNWA anticipates creating up to 0.007 maf (8.6 mcm) of Imported ICS credits each year in 2011 and 2012.~~SNWA has an approved plan to create up to 0.007 maf (8.6 mcm) of Imported ICS in 2011 and has submitted a plan to create up to 0.007 maf (8.6 mcm) in 2012 for approval. Any Imported ICS not delivered for use by SNWA in the year created will, at the beginning of the following year, be converted to Extraordinary Conservation ICS pursuant to the 2007 Interim Guidelines.

## Delivery of Water to Mexico

Delivery to Mexico pursuant to the 1944 United States-Mexico Water Treaty, and Minute No. 318, is anticipated to be approximately 1.450 maf (1,790 mcm) in calendar year 2011,~~.~~ reflecting a downward adjustment of approximately 0.050 maf (61.7 mcm) in accordance with Minute No. 318. Excess flows arriving at the NIB are anticipated to be 0.063 maf (77.7 mcm) in calendar year 2011. Excess flows result from a combination of factors, including heavy rain from winter storms, water ordered but not delivered to United States users downstream of Parker Dam, inflows into the Colorado River below Parker Dam, and spills from irrigation facilities below Imperial Dam.

Of the scheduled delivery to Mexico in calendar year 2011, approximately 1.310 maf (1,620 mcm) is projected to be delivered at NIB and approximately 0.140 maf (173 mcm) is projected to be delivered at SIB. Although the~~The~~ Mexican Section of the IBWC initially~~has~~ requested the delivery of water~~0.001 maf (1.2 mcm)~~ under IBWC Minute No. 314 and the Emergency Delivery Agreement,~~.~~[34] the request for these deliveries was later withdrawn. Therefore, no water will be diverted from Lake Havasu and delivered to Tijuana, Baja California in 2011.

Of the total delivery at SIB projected in calendar year 2011, approximately 0.094 maf (116 mcm) is projected to be delivered from the Yuma Project Main Drain and approximately 0.046 maf (56.7 mcm) is expected to be delivered by the Protective and Regulatory Pumping Unit (Minute 242 wells).

Pursuant to the 1944 United States-Mexico Water Treaty, and Minute No. 318, a volume of up to 1.500 maf (1,850 mcm) will be available to be scheduled for delivery to Mexico in calendar year 2012, of which 0.140 maf (173 mcm) is projected to be delivered at SIB. Under IBWC Minute No. 314, and the Emergency Delivery Agreement, approximately 0.002 maf (2.5 mcm) may be delivered for Tijuana through MWD, the San Diego County Water Authority (SDCWA), and the Otay Water District's respective distribution system facilities in California. The remainder of the ~~1.500 maf (1,850 mcm)~~water to be scheduled for delivery to Mexico in 2012 will be delivered at NIB.

[34] 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.

Drainage flows to the Colorado River from the Yuma Mesa Conduit (YMC) and South Gila Drain Pump Outlet Channels are projected to be 0.035 maf (43.2 mcm) and 0.035 maf (43.2 mcm), respectively, for calendar year 2011. This water is available for delivery at NIB in satisfaction of the 1944 United States-Mexico Water Treaty. Reclamation holds a permit[35] from the Arizona Department of Water Resources (ADWR) to pump an additional 0.025 maf (30.8 mcm) of groundwater annually for water delivery to Mexico to replace water bypassed to the Ciénega through the bypass canal. Salinity conditions have not allowed for increased pumping and Reclamation will continue to monitor and evaluate conditions under the permit in the future.

As stated in Minute No. 242, the maximum allowable salinity differential is 145 ppm by the United States' measurement or count and 151 ppm by the Mexican count. The salinity differential for calendar year 2011 is projected to be 141 ppm by the United States' count.

Mexico has identified four critical months, October through January, regarding improving the quality of water delivered at SIB. As a matter of comity, the United States has agreed to reduce the salinity of water delivered at SIB during this period. To accomplish the reduction in salinity, the United States constructed a diversion channel to bypass up to 0.008 maf (9.87 mcm) of Yuma Valley drainage water during the four critical months identified by Mexico. This water will be replaced by better quality water from the Minute No. 242 well field to reduce the salinity at SIB. Reclamation anticipates bypassing approximately 0.001 maf (1.2 mcm) in calendar year 2011 to the diversion channel for salinity control and up to 0.008 maf (9.87 mcm) in calendar year 2012.

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

# 2012 DETERMINATIONS

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

## Upper Basin Reservoirs

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

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

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

- to avoid anticipated spills from Lake Powell.

Taking into consideration all relevant factors required by Section 602(a)(3) of the CRBPA and the Operating Criteria, it is determined that the active storage in Upper Basin reservoirs projected for September 30, 2012, under the most probable inflow scenario would exceed the storage required under Section 602(a) of the CRBPA.

Taking into account (1) the existing water storage conditions in the basin, (2) the August 24-Month Study projection of the most probable near-term water supply conditions in the basin, and (3) Section ~~6.B~~6.A of the 2007 Interim Guidelines, the ~~Upper Elevation Balancing~~ Equalization Tier will govern the operation of Lake Powell for water year 2012. The ~~July~~ August 2011 24-Month Study of the most probable inflow scenario projects ~~Equalization is likely to occur in~~the water year 2012 ~~with the annual~~ release from Glen Canyon Dam

~~projected~~ to be 13.57 maf (16,730 mcm). Given the hydrologic variability of the Colorado River System and actual 2011 water year operations, the water year release from Lake Powell in 2012 could be in the range of 9.96 maf (12,290 mcm) to 14.48 maf (17,860 mcm) or greater.

## Lower Basin Reservoirs

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

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

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

The 2007 Interim Guidelines are being utilized in calendar year 2012 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 2007 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 2007 Interim Guidelines, the August 2011 24-Month Study was used to forecast the system storage as of January 1, 2012. Based on a projected January 1, 2012, Lake Mead elevation of 1,134.12 feet (345.68 meters) and consistent with Section 2.B.5 of the 2007 Interim Guidelines, the ICS Surplus Condition will govern releases for use in the states of Arizona, Nevada, and California during calendar year 2012 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 2012 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 2012 in accordance with Article II(B)(6) of the Consolidated Decree and the Unused Water Policy.

Water may be stored off-stream pursuant to individual SIRAs and 43 CFR Part 414 within the Lower Division States. The Secretary shall make ICUA available to contractors in Arizona, California, or Nevada pursuant to individual SIRAs and 43 CFR Part 414. SNWA may propose to make unused Nevada basic apportionment available for storage by MWD and ~~CAP~~ AWBA in calendar year 2012.

The IOPP, which became effective January 1, 2004, will be in effect during calendar year 2012. There are no new IOPP paybacks anticipated for 2012; however, outstanding paybacks from prior years may carry over to 2012.

The 2007 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 2012 and ICS credits will be created and delivered pursuant to the 2007 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 twelve-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 2007 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 2007 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 up to 1.500 maf (1,850 mcm) of water will be available to be scheduled for delivery to Mexico during calendar year 2012 in accordance with Article 15 of the 1944 United States-Mexico Water Treaty and Minutes No. 242, 314, and 318 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, subject to the provisions of the 1944 United States-Mexico Water Treaty and Minute 318.

# 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) or Minute No. 314 of November 26, 2008, or Minute No. 318 of December 17, 2010; 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).

# Acronyms and Abbreviations

| | |
|---|---|
| ADWR | Arizona Department of Water Resources |
| AMP | Glen Canyon Dam Adaptive Management Program |
| AMWG | Glen Canyon Dam Adaptive Management Work Group |
| AOP | Annual Operating Plan |
| AWBA | Arizona Water Banking Authority |
| BWRCSC | Bill Williams River Corridor Steering Committee |
| CAP | Central Arizona Project |
| CAWCD | Central Arizona Water Conservation District |
| CBRFC | National Weather Service's Colorado Basin River Forecast Center |
| cfs | cubic feet per second |
| cms | cubic meters per second |
| CRBPA | Colorado River Basin Project Act of 1968 |
| CRCN | Colorado River Commission of Nevada |
| CRMWG | Colorado River Management Work Group |
| CVWD | Coachella Valley Water District |
| EA | Environmental Assessment |
| EIS | Environmental Impact Statement |
| ESA | Endangered Species Act |
| FGTWG | Flaming Gorge Technical Work Group |
| FONSI | Finding of No Significant Impact |
| ft | feet |
| GCDFEIS | Glen Canyon Dam Final Environmental Impact Statement of 1996 |
| ~~GCPA~~ | ~~Grand Canyon Protection Act of 1992~~ |
| IBWC | International Boundary and Water Commission, United States and Mexico |
| ICS | Intentionally Created Surplus |
| ICUA | Intentionally Created Unused Apportionment |
| IID | Imperial Irrigation District |
| IOPP | Inadvertent Overrun and Payback Policy |
| m | meters |
| maf | million acre-feet |
| mcm | million cubic meters |
| MWD | The Metropolitan Water District of Southern California |
| NEPA | National Environmental Policy Act of 1969, as amended |
| NIB | Northerly International Boundary |
| P.L. | Public Law |
| ppm | parts per million |
| Reclamation | United States Bureau of Reclamation |
| ROD | Record of Decision |
| SDCWA | San Diego County Water Authority |
| Secretary | Secretary of the United States Department of the Interior |
| Service | United States Fish and Wildlife Service |
| SIB | Southerly International Boundary |

| | | |
|---|---|---|
| SIRA | Storage and Interstate Release Agreement |
| SNWA | Southern Nevada Water Authority |
| ~~SRP~~ | ~~Salt River Project~~ |
| USACE | United States Army Corps of Engineers |
| Western | Western Area Power Administration |
| ~~WMIDD~~ | ~~Wellton-Mohawk Irrigation and Drainage District~~ |
| YDP | Yuma Desalting Plant |