RECLAMATION

Managing Water in the West

DRAFT Annual Operating Plan for Colorado River Reservoirs 2017

Edits, in red, indicate changes from the Draft 2017 AOP posted on Reclamation's website for the 2017 AOP Second Consultation.

Hydrologic projections in this draft document of the 2017 AOP are based on the ***August 2016 24-Month Study****. Subsequent drafts will be updated with observed hydrology.*

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

U.S. Department of the Interior
Bureau of Reclamation

TABLE OF CONTENTS

LIST OF TABLES

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 2017 AOP reports on 2016 operations as well as projected operations for 2017. In recent years, additions to the Law of the River such as 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] the 2012 Aspinall ROD,[8] Minute No. 319 of the International Boundary and Water Commission (IBWC),[9] 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

[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). Available online at: https://www.gpo.gov/fdsys/granule/FR-1997-03-03/97-5144.
[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 Operations, 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.
[8] ROD for the Aspinall Unit Operations, Final Environmental Impact Statement, April 2012. Available online at: http://www.usbr.gov/uc/envdocs/eis/AspinallEIS/ROD.pdf.
[9] IBWC Minute No. 319, Interim International Cooperative Measures in the Colorado River Basin Through 2017 and Extension of Minute 318 Cooperative Measures to Address the Continued Effects of the April 2010 Earthquake in the Mexicali Valley, Baja California dated November 20, 2012. Available online at: http://www.ibwc.gov/Files/Minutes/Minute_319.pdf.

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.

The Secretary recognized in the 2007 Interim Guidelines that the AOP provides an integrated report on reservoir operations affected by numerous federal policies: *"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)][10] *regarding past and anticipated operations."*

Authority

This 2017 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 (Public Law 90-537) (Operating Criteria), as amended, promulgated by the Secretary;[11] and Section 1804(c)(3) of the Grand Canyon Protection Act of 1992 (Public Law 102-575).[12]

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);[13] interstate compacts; court decrees; the Colorado River Water Delivery Agreement;[14] 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 2017 AOP was prepared by Reclamation on behalf of the Secretary, working with other Interior agencies and the Western Area Power Administration (WAPA). Reclamation consulted with: the seven Colorado River Basin States Governors' representatives;

[10] Available online at: http://www.usbr.gov/lc/region/pao/pdfiles/crbproj.pdf .
[11] Available online at: http://www.usbr.gov/lc/region/pao/pdfiles/opcriter.pdf.
[12] Available online at: https://www.usbr.gov/uc/rm/amp/legal/gcpa1992.html.
[13] Available online at: http://www.ibwc.state.gov/Files/1944Treaty.pdf.
[14] 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). Available online at: http://www.usbr.gov/lc/region/g4000/crwda/crwda.pdf.

representatives from Mexico; the Upper Colorado River Commission; Native American tribes; other appropriate Federal agencies; representatives of academic and scientific communities; environmental organizations; 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.

Article I(2) of the Operating Criteria allows for revision of the projected plan of operation to reflect 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 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 report on the past year's operations and 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, 2017, 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,[15] 314,[16] and 319 of the 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).[17]

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

[15] IBWC 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.
[16] IBWC 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.
[17] Available online at: http://www.usbr.gov/lc/region/pao/pdfiles/scconsolidateddecree2006.pdf.

forecasts are adjusted to reflect existing snowpack, basin storage, flow conditions, and as changes occur in projected water deliveries.

Summary of Projected 2017 Operations

Upper Basin Delivery. Taking into account (1) the existing water storage conditions in the basin, (2) the August 2016 24-Month Study[18] projection of the most probable near-term water supply conditions in the basin, and (3) Section 6.B of the 2007 Interim Guidelines, the Upper Elevation Balancing Tier will govern the operation of Lake Powell for water year 2017. The August 2016 24-Month Study of the most probable inflow scenario projects the water year 2017 release from Glen Canyon Dam to be 9.00 million acre-feet (maf) (11,100 million cubic meters [mcm]). Given the hydrologic variability of the Colorado River System and based on actual 2016 water year operations, the projected water year release from Lake Powell in 2017 is likely to be in the estimated range of 8.23 maf (10,150 mcm) to 11.89 maf (14,670 mcm) or greater.

For further information about the variability of projected inflow into Lake Powell, see the 2017 Water Supply Assumptions section and the Lake Powell section within the Summary of Reservoir Operations in 2016 and Projected 2017 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 will govern the operation of Lake Mead for calendar year 2017 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 2017 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 2017. Any such allocation shall be made in accordance with Article II(B)(6) of the Consolidated Decree, the Lower Colorado Region Policy for Apportioned but Unused Water[19] (Unused Water Policy), and giving further consideration to the water conservation objectives of the July 30, 2014 agreement for a pilot system conservation program (SC Program)[20] and Section III.A of the December 10, 2014 Memorandum of Understanding (MOU) for Lower Basin Pilot Drought Response Actions.[21]

[18] The 24-Month Study refers to the operational study conducted by Reclamation to project future reservoir operations. The most recent 24-Month Study report 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/index.html.

[19] Lower Colorado Region Policy for Apportioned but Unused Water, February 11, 2010. Available online at: http://www.usbr.gov/lc/region/g4000/UnusedWaterPolicy.pdf.

[20] Available online at: http://www.usbr.gov/lc/region/programs/PilotSysConsProg/PilotSCPFundingAgreement7-30-2014.pdf.

[21] Available online at: http://www.usbr.gov/lc/region/g4000/LB_DroughtResponseMOU.pdf.

In calendar year 2017, Colorado River water may be stored off-stream pursuant to individual Storage and Interstate Release Agreements (SIRAs) and 43 CFR Part 414 within the Lower Division States. The Secretary shall make Intentionally Created Unused Apportionment (ICUA) available to contractors in Arizona, California, or Nevada pursuant to individual SIRAs and 43 CFR Part 414.

The Inadvertent Overrun and Payback Policy (IOPP),[22] which became effective January 1, 2004, will be in effect during calendar year 2017.

Conserved Colorado River water is anticipated to be added to system reservoirs pursuant to system conservation agreements in calendar year 2017.

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 calendar year 2017 pursuant to the 2007 Interim Guidelines and applicable delivery and forbearance agreements.

1944 United States-Mexico Water Treaty Delivery. A volume of 1.500 maf (1,850 mcm) of water will be available to be scheduled for delivery to Mexico during calendar year 2017 in accordance with Article 15 of the 1944 United States-Mexico Water Treaty and Minutes No. 242 and 314 of the IBWC. In accordance with IBWC Minute No. 319, Mexico may defer delivery of water pursuant to Sections III.1 and III.4, create Intentionally Created Mexican Allocation (ICMA) pursuant to Section III.4, or take delivery of additional water pursuant to Section III.4.

[22] 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.

2016 HYDROLOGY SUMMARY AND RESERVOIR STATUS

Below to near average stream flows were observed throughout much of the Colorado River Basin during water year 2016. Unregulated[23] inflow to Lake Powell in water year 2016 was 9.78 maf (12,060 mcm), or 90 percent of the 30-year average[24] which is 10.83 maf (13,360 mcm). Unregulated inflow to Flaming Gorge, Blue Mesa, and Navajo Reservoirs was 100, 91, and 87 percent of average, respectively.

Precipitation in the Upper Colorado River Basin was below average[25] during the first part of water year 2016 and above average during the second part of the water year. On September 30, 2016, the cumulative precipitation received within the Upper Colorado River Basin for water year 2016 was 97 percent of average.

Snowpack conditions trended near average[26] across most of the Colorado River Basin throughout the snow accumulation season. The basin-wide snow water equivalent measured 97 percent of average on April 1, 2016. Total seasonal accumulation peaked at approximately 97 percent of average on April 3, 2016. On April 1, 2016, the snow water equivalents for the Green River, Upper Colorado River Headwaters, and San Juan River Basins were 107, 109, and 82 percent of average, respectively.

During the 2016 spring runoff period, inflows to Lake Powell peaked on June 11, 2016 at approximately 58,900 cubic feet per second (cfs) (1,670 cubic meters per second [cms]). The April through July unregulated inflow volume for Lake Powell was 6.61 maf (8,150 mcm) which was 92 percent of average.

Lower Basin tributary inflows above Lake Mead were below average for water year 2016. Tributary inflow from the Little Colorado River for water year 2016 totaled 0.070 maf (86 mcm), or 49 percent of the long-term average.[27] Tributary inflow from the Virgin River for water year 2016 totaled 0.112 maf (138 mcm), or 62 percent of the long-term average.

Tributary inflows in the Lower Colorado River Basin below Hoover Dam were below average during water year 2016. Total tributary inflow for water year 2016 from the Bill

[23] 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.
[24] Inflow statistics throughout this document will be compared to the mean of the 30-year period 1981-2010, unless otherwise noted.
[25] Precipitation statistics throughout this document are provided by the National Weather Service's Colorado Basin River Forecast Center and are based on the mean for the 30-year period 1981-2010, unless otherwise noted.
[26] Snowpack and snow water equivalent statistics throughout this document are provided by the Natural Resources Conservation Service and are based on the median for the 30-year period 1981-2010, unless otherwise noted.
[27] The basis for the long-term average of tributary inflows in the Lower Basin is natural flow data from 1981 to 2010. Additional information regarding natural flows may be found at http://www.usbr.gov/lc/region/g4000/NaturalFlow/current.html.

Williams River was 0.021 maf (26 mcm), or 22 percent of the long-term average, and total tributary inflow from the Gila River was 0.019 maf (23 mcm).[28]

The Colorado River total system storage experienced a net increase of 0.068 maf (84 mcm) in water year 2016. Reservoir storage in Lake Powell increased during water year 2016 by 0.613 maf (756 mcm). Reservoir storage in Lake Mead decreased during water year 2016 by 0.174 maf (215 mcm). At the beginning of water year 2016 (October 1, 2015), Colorado River total system storage was 51 percent of capacity. As of September 30, 2016, total system storage was 51 percent of capacity.

Tables 1 and 2 list the October 1, 2016, reservoir vacant space, live storage, water elevation, percent of capacity, change in storage, and change in water elevation during water year 2016.

[28] 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, 2016 (English Units)

Reservoir	Vacant Space	Live Storage	Water Elevation	Percent of Capacity	Change in Storage*	Change in Elevation*
	(maf)	(maf)	(ft)	(%)	(maf)	(ft)
Fontenelle	0.091	0.254	6,493.9	74	0.001	0.0
Flaming Gorge	0.541	3.21	6,026.3	86	-0.241	-6.3
Blue Mesa	0.160	0.669	7,500.9	81	-0.057	-6.8
Navajo	0.385	1.31	6,057.0	77	-0.082	-6.4
Lake Powell	11.37	12.95	3,612.1	53	0.613	6.1
Lake Mead	16.44	9.68	1,076.0	37	-0.174	-2.1
Lake Mohave	0.193	1.62	640.0	89	0.012	0.4
Lake Havasu	0.044	0.576	447.8	93	-0.004	-0.2
---	---	---		---	---	
Totals	29.23	30.26		51	0.068	

* From October 1, 2015, to September 30, 2016.

Table 2. Reservoir Conditions on October 1, 2016 (Metric Units)

Reservoir	Vacant Space	Live Storage	Water Elevation	Percent of Capacity	Change in Storage*	Change in Elevation*
	(mcm)	(mcm)	(m)	(%)	(mcm)	(m)
Fontenelle	112	314	1,979.3	74	0.9	0.0
Flaming Gorge	667	3,960	1,836.8	86	-297	-1.9
Blue Mesa	198	825	2,286.3	81	-70	-2.1
Navajo	475	1.620	1,846.2	77	-101	-2.0
Lake Powell	14,030	16,000	1,101.0	53	756	1.9
Lake Mead	20,280	11,900	328.0	37	-214	-0.6
Lake Mohave	237	2,000	195.1	89	14	0.1
Lake Havasu	54	711	136.5	93	-5.5	-0.1
---	---	---		---	---	
Totals	36,050	37,330		51	84	

* From October 1, 2015, to September 30, 2016.

SYSTEM CONSERVATION

The Colorado River Basin is experiencing its worst drought in recorded history. Based on natural flow[29] on the Colorado River at Lees Ferry, Arizona, ~~The~~ the period from 2000 to 2015 was the driest 16-year period in more than 100 years of record keeping. During this time, storage in Colorado River system reservoirs has declined from nearly full to about half of capacity. Entities that rely on Colorado River water are concerned with the ongoing drought and declining reservoir levels at Lake Powell and Lake Mead. In response, several programs are being implemented to help mitigate the impact of the ongoing drought.

System conservation agreements allow water users to participate in pilot projects designed to determine whether voluntary, temporary, and compensated programs to conserve or reduce consumptive use of Colorado River water can benefit the entire Colorado River system by mitigating the effect on declining storage levels in Colorado River reservoirs.

An $11 million funding agreement for system conservation (SC Funding Agreement) was executed in 2014 among Reclamation, the Central Arizona Water Conservation District (CAWCD), The Metropolitan Water District of Southern California (MWD), Denver Water (DW), and the Southern Nevada Water Authority (SNWA) (the Funding Partners). The SC Funding Agreement establishes the ~~a pilot system conservation program (~~SC Program~~)~~[30] for funding the creation of Colorado River system water through voluntary water conservation actions and reductions in water use beginning in 2015 and continuing through at least 2016. The purpose of this SC Program is to explore and learn about the effectiveness of voluntary compensated measures that could be used, when needed, to help maintain water levels in Lake Powell and Lake Mead above critical levels. All water conserved as a result of the pilot program is considered Colorado River system water. To facilitate administration and implementation of the SC Program in the Upper Basin, the Upper Colorado River Commission and the Funding Partners entered into a facilitation agreement in May 2015, clarifying how the SC Program will be administered in the Upper Basin.

Since the SC Program was implemented, 29 projects were implemented in the Upper Basin resulting in approximately 10,370 acre-feet (12.8 mcm) of system water created and six projects were implemented in the Lower Basin resulting in approximately 63,000 acre-feet (78 mcm) of system water created. The SC Program received funding in 2016 to implement additional projects. Requests for proposals have been received by potential program participants in both the Upper and Lower Basins and implementation agreements are anticipated to be executed in 2016 and 2017.

A pilot fallowing program agreement was executed in 2013 between CAWCD, through the Central Arizona Groundwater Replenishment District, and the Yuma Mesa Irrigation and Drainage District (YMIDD) (Pilot Fallowing Program).[31] ~~CAWCD and YMIDD proposed~~

[29] Natural flow represents the flow that would have occurred at the location had depletions and reservoir regulation not been present upstream of that location.

[30] More information about the SC Program can be found at: http://www.usbr.gov/lc/region/programs/PilotSysConsProg/pilotsystem.html.

[31] Yuma Mesa Irrigation and Drainage District and Central Arizona Water Conservation District Pilot Fallowing and Forbearance Agreement, dated September 12, 2013.

~~that t~~The water conserved under this program during 2014 through 2016 will~~ould~~ remain in Lake Mead as system water~~.~~ and ~~A~~approximately 7,000 acre-feet (8.6 mcm) will be conserved in 2016~~ under this program~~.

In addition to the previously mentioned activities, Reclamation, CAWCD, MWD, SNWA, and the Lower Division States signed an MOU on December 10, 2014 to use best efforts to implement further voluntary measures designed to add to storage in Lake Mead. Furthermore, Congress has provided authorization for additional funding through Reclamation for drought-related activities to increase Colorado River system water in Lake Mead, Lake Powell, and other Colorado River system reservoirs for the benefit of the system.[32] A report evaluating the effectiveness of the water conservation pilot projects is due to Congress in 2018, including a recommendation on whether the activities undertaken by the pilot projects should be continued.[33]

[32] Explanatory Statement in Division D which accompanied H.R. 2029, Consolidated Appropriations Act, 2016 (Public Law 114-113) (December 18, 2015).
[33] Consolidated and Further Continuing Appropriations Act, 2015 (Public Law 113-235, Div. D., Secs. 204-206) (December 16, 2014).

2017 WATER SUPPLY ASSUMPTIONS

For 2017 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 2017 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 2017 is 6.60 maf (8,140 mcm), or 61 percent of average.
- The forecasted most probable unregulated inflow to Lake Powell in water year 2017 is 9.63 maf (11,880 mcm), or 89 percent of average.
- The forecasted maximum probable unregulated inflow to Lake Powell in water year 2017 is 17.00 maf (20,970 mcm), or 157 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 2011 through December 2015, 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 2017 is 0.682 maf (841 mcm), the most probable inflow is 0.795 maf (981 mcm), and the maximum probable inflow is 0.939 maf (1,160 mcm).

The projected monthly volumes of inflow were input into the 24-Month Study and used to project potential reservoir operations for 2017. Starting with the August 2016 24-Month Study projection of the October 1, 2016 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 report available on these Reclamation websites: http://www.usbr.gov/uc/water/crsp/studies/index.html, or http://www.usbr.gov/lc/region/g4000/24mo/index.html.

Table 3. Projected Unregulated Inflow into Lake Powell for Water Year 2017 (English Units)[34]

Time Period	Minimum Probable (maf)	Most Probable (maf)	Maximum Probable (maf)
10/2016 – 12/2016	1.32	1.20	1.49
1/2017 – 3/2017	1.43	1.22	1.76
4/2017 – 7/2017	3.32	5.63	9.95
8/2017 – 9/2017	0.53	1.58	3.80
10/2017 – 12/2017	1.12	1.26	1.73
WY 2017	6.60	9.63	17.00
CY 2017	6.40	9.69	17.24

Table 4. Projected Unregulated Inflow into Lake Powell for Water Year 2017 (Metric Units)

Time Period	Minimum Probable (mcm)	Most Probable (mcm)	Maximum Probable (mcm)
10/2016 – 12/2016	1,630	1,480	1,840
1/2017 – 3/2017	1,760	1,500	2,170
4/2017 – 7/2017	4,100	6,940	12,270
8/2017 – 9/2017	650	1,950	4,680
10/2017 – 12/2017	1,380	1,560	2,130
WY 2017	8,140	11,880	20,970
CY 2017	7,890	11,960	21,260

[34] All values in Tables 3 and 4 are projected inflows based upon the August CBRFC forecast with the exception of the values for 10/2017-12/2017. The values for 10/2017-12/2017 are based upon average unregulated inflow from 1981-2010. The calendar year totals in Tables 3 and 4 also reflect average values for the 10/2017-12/2017 time period. The CBRFC Most Probable forecast is issued as monthly values. The CBRFC Minimum and Maximum Probable forecasts are issued as water year totals, which Reclamation disaggregates to monthly values using monthly proportions of the 10th and 90th percentiles, respectively, of the 1981-2010 unregulated inflow.

SUMMARY OF RESERVOIR OPERATIONS IN 2016 AND PROJECTED 2017 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 can 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)[35] 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. Within the parameters set forth in the Law of the River and consistent with the Upper Colorado River Endangered Fish Recovery Program (UCRIP),[36] the San Juan River Basin Recovery Implementation Program (SJRIP),[37] Section 7 consultations under the Endangered Species Act, 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 Recovery Program participants, 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 2016 and the range of probable projected 2017 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.

[35] Information on the AMWG can be found at www.usbr.gov/uc/rm/amp.
[36] Information on the UCRIP can be found at http://coloradoriverrecovery.org.
[37] Information on the SJRIP can be found at www.fws.gov/southwest/sjrip.

Fontenelle Reservoir

Reservoir storage in Fontenelle decreased during water year 2016. At the beginning of water year 2016, Fontenelle storage was 92 percent of live capacity at elevation 6,493.88 feet (1,979.33 meters), with 0.254 maf (313 mcm) in storage. The unregulated inflow to Fontenelle during water year 2016 was 0.968 maf (1,190 mcm) which is 90 percent of average. At the end of the water year, September 30, 2016, Fontenelle storage was at 75 percent of full capacity at elevation 6,493.87 feet (1,979.33 meters), with 0.254 maf (313 mcm) resulting in a net loss during water year 2016 of 0.01 maf (12.3 mcm).

Hydrologic conditions in the Upper Green River Basin were near average in water year 2016. Snowpack development tracked close to median; however, dry fall conditions decreased soil moisture resulting in below average runoff forecasts. Peak snow water equivalent reached 101 percent of seasonal median on April 1, 2016. The April forecast for the April through July inflow to Fontenelle Reservoir was 0.565 maf (697 mcm), or 76 percent of average. The observed inflow during the April to July season was 0.650 maf (802 mcm), or 90 percent of average. Due to unexpected and significantly above average precipitation in May, the resulting April through July runoff was much greater than anticipated in April.

Fontenelle Reservoir filled in water year 2016. The reservoir elevation peaked at 6,504.61 feet (1,982.61 meters) on June 16, 2016, which was 1.39 feet (0.42 meters) below the spillway crest. Inflow peaked at 8,329 cfs (235 cms) on June 12, 2016. Reservoir releases were made to balance downstream water resources needs and power production, while also allowing for filling the reservoir to maintain sufficient water in storage for use through the fall and winter months. Releases peaked at 6,200 cfs (175 cms) during June and were reduced to 900 cfs (25.5 cms) in September.

Based on the August 2016 24-Month Study, the most probable April through July inflow scenario for Fontenelle Reservoir during water year 2017 is 0.663 maf (818 mcm), or 91 percent of average. This volume far exceeds the 0.345 maf (426 mcm) storage capacity of Fontenelle Reservoir. For this reason, the 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 likely that Fontenelle Reservoir will fill during water year 2017. 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 2017, 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

Reservoir storage in Flaming Gorge decreased during water year 2016. At the beginning of water year 2016, Flaming Gorge storage was 92 percent of live capacity at elevation 6,032.59 feet (1,838.73 meters), with 3.45 maf (4,260 mcm) in storage. The unregulated inflow to Flaming Gorge during water year 2016 was 1.455 maf (1,795 mcm) which is 100 percent of average. At the end of the water year, Flaming Gorge storage was at 88 percent of full capacity at elevation 6,026.32 feet (1,836.82 meters), with 3.21 maf (3,959 mcm) resulting in a net reduction during water year 2016 of 0.24 maf (296 mcm).

Flaming Gorge Dam operations in 2016 were conducted in compliance with the 2006 Flaming Gorge ROD. Reclamation convened the Flaming Gorge Technical Working Group (FGTWG) comprised of Service, WAPA, and Reclamation personnel. The FGTWG proposed that Reclamation manage releases to the Green River to meet the commitments of the ROD and, to the extent possible, meet the experimental design parameters outlined in the UCRIP Larval Trigger Study Plan (LTSP).[38] Larvae were detected on May 28, 2016 and releases from Flaming Gorge were increased to full powerplant capacity and additional bypass on May 31, 2016 (in combination, the peak release was approximately 8,600 cfs [243 cms]) for a total of 19 days. Yampa River flows at the Deerlodge gage peaked twice during the spring runoff season, at 13,400 cfs (379 cms) on May 11, 2016 and at 15,600 cfs (441 cms) on May 18, 2016. The first peak resulted from increased precipitation in the basin during May and rain and snow events. The peak release from Flaming Gorge occurred after the Yampa River peak flows and supported larval entrainment and reservoir management during unexpected high spring inflows. Deerlodge flows were less than or equal to 12,900 cfs (365 cms) when Flaming Gorge releases were at powerplant capacity with additional bypass in support of the LTSP. Flows measured on the Green River at Jensen, Utah reached levels at or above 18,600 cfs (526 cms) for 9 days between June 6 and 15, 2016 with a peak of 20,500 cfs (580 cms) for one day on June 12, 2016. The peak flow at Jensen ~~falls~~ fell within the moderately wet hydrologic classification under the LTSP.

The hydrologic conditions during spring 2016 consisted of near average snow accumulation beginning in December 2015 and continuing through February 2016, although dry fall soil moisture conditions and below average snowpack in higher elevations resulted in lower forecasted inflows. Snow water equivalent peaked on April 1, 2016 at 105 percent of average with hydrologic conditions improving through May. The May final forecast for the April through July unregulated inflow volume into Flaming Gorge Reservoir was 79 percent of average. Significant precipitation events in the Green and Yampa River Basins occurred during May and June. Flaming Gorge unregulated inflow forecasts increased from 79 percent of average on May 1 to 119 percent of average on June 16. Yampa River spring peak flows fell into the moderately wet hydrology classification, increasing from average (below median) on May 1. The ROD hydrologic classification for the Upper Green was average and the LTSP hydrologic classification was average (below median) based on the May 1 forecast, although the base flow hydrology classification based on observed spring

[38] The LTSP's primary objective is to determine the effects of timing of Flaming Gorge spring release on razorback sucker larvae in the reach below the confluence of the Green and Yampa Rivers. The LTSP Report is available online at: http://www.usbr.gov/uc/water/crsp/wg/fg/twg/twgSummaries.html.

runoff was average (above median). Yampa River conditions were average (above median), while the observed spring flows were moderately wet. Releases from Flaming Gorge Dam remained at an average daily release of 800 cfs (22.6 cms) through May 31, 2016, when releases were increased to meet the LTSP request. After releases for the LTSP concluded, releases were decreased to base flow releases of 1,200 cfs (34 cms) while the Yampa River decreased to base flow levels, at which time releases increased between 1,700 cfs (48.1 cms) and 1,900 cfs (53.8 cms). Flows at Jensen met or exceeded ROD flow targets in Reach 2 for the ROD Flow Recommendation of at least one day peak duration at 18,600 cfs (526 cms) in one of two average years, and the LTSP moderately wet flow target of between 20,300 cfs (574 cms) and 26,400 cfs (747 cms) for between one to fourteen days, all of which occurred during larval drift.

Consistent with the ROD, considering information provided to the FGTWG, average (above median) hydrologic conditions and in response to the Recovery Program's request, Reclamation operated Flaming Gorge Dam to produce flows in Reach 2 to assist in the recovery of Colorado Pikeminnow during the summer of 2016. The ROD base flow period hydrologic classification was average (above median) as of August 2016. Daily base flows fluctuated during the summer to meet or exceed 2,000 cfs 56.6 cms) on the Green River at Jensen, Utah through September 30, 2016.

During water year 2017, Flaming Gorge Dam will continue to be operated in accordance with the ROD. Under the most probable inflow scenario, winter base flow releases are projected to be in the average classification range with a 25 percent increase above the average daily base flows calculated through the base flow period. Winter releases are projected to be approximately 1,850 cfs (52.4 cms). Daily base flows will likely fluctuate during the winter in response to hydropower needs during November through February and meet the average-year reservoir upper level drawdown elevation target of 6,027.00 feet (1,837.03 meters) by May 1, 2017. A spring peak release is projected to occur sometime in May or June 2017, and will be timed to coincide with either the peak flows of the Yampa River or emergence of razorback sucker larvae. Reclamation is considering long-term implementation strategies for the Recovery Program LTSP.

The UCRIP, in coordination with Reclamation, the Service, and WAPA, 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.[39]

[39] Flow and Temperature Recommendations for Endangered Fishes in the Green River Downstream of Flaming Gorge Dam, September 2000. Available online at: http://ulpeis.anl.gov/documents/dpeis/references/pdfs/Muth_et_al_2000.pdf.

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

Reservoir storage in Blue Mesa at the end of water year 2016 was somewhat lower than the storage it started with at the beginning of the water year. At the beginning of water year 2016, Blue Mesa storage was 87 percent of live capacity at elevation 7,507.65 feet (2,288.33 meters), with 0.726 maf (896 mcm) in storage. The unregulated inflow to Blue Mesa during water year 2016 was 0.867 maf (1,070 mcm) which was 89 percent of average. At the end of the water year, Blue Mesa storage was 80 percent of live capacity at elevation 7,500.90 feet (2,286.27 meters), with 0.669 maf (825 mcm) resulting in a net reduction during water year 2016 of 0.057 maf (70 mcm).

Near average snowpack conditions occurred during the winter months of water year 2016 in the Gunnison River Basin. Snow measurement sites in the basin reported near average seasonal snow water equivalent levels throughout the winter and into the spring of 2016 resulting in an April 1, 2016 snow water equivalent for the Gunnison River Basin that was 96 percent of average.

The fall through winter releases from Crystal Dam varied between approximately 600 cfs (17.0 cms) and 1,100 cfs (31.1 cms) from the beginning of November 2015 through the end of March 2016. On March 28, 2016, releases from Crystal Dam were increased for operation of the Gunnison Tunnel. Flows through the Black Canyon were maintained within ~~in~~ the range ~~from~~ of approximately 540 cfs (15.3 cms) to approximately 780 cfs (22.1 cms) until May 11, 2016 when releases from Crystal Dam were increased consistent with the 2012 ROD flow targets.

The May 2016 final forecast for the unregulated inflow to Blue Mesa for the April through July runoff period was 0.525 maf (648 mcm) which was 78 percent of average. ~~Pursuant to the 2012 ROD, this~~ This forecast was used to establish a peak flow target for the Gunnison River for the spring of 2016. The ~~2012 ROD~~ peak flow target was established to be a peak flow in the Gunnison River in the Whitewater Reach with a magnitude of no less than 8,070 cfs (228 cms) for a duration of no less than 10 days. Reclamation operated the Aspinall Unit consistent with attempting to meet this peak flow target by increasing total releases from Crystal Dam to approximately 5,300 cfs (150 cms) for nine days from May 16, 2016 through May 24, 2016. Gunnison River flows resulted in 10 consecutive days with flows above 8,070 cfs (228 cms) ending on May 25, 2016.

Releases from Crystal Dam during spring operation, ~~made for the purposes of achieving~~consistent with the 2012 ROD peak flow target, resulted in a peak flow ~~Gunnison River flows in~~ through the Black Canyon and the Gunnison River Gorge of 5,100 cfs (144 cms) for 24 hours on May 23, 2016 and Gunnison River flows in the Black Canyon that exceeded the flows described in the Black Canyon Water Right Decree.[40] ~~Flows through the Black Canyon and Gunnison River Gorge reached a peak flow of ,5,100 cfs (144 cms) for 24 hours on May 23, 2016.~~

[40] 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~~December 31, 2008.

The actual April through July unregulated inflow into Blue Mesa Reservoir in 2016 was 0.582 maf (718 mcm), which was 86 percent of average.

For water year 2017, the Aspinall Unit will be operated in accordance with the 2012 ROD, including all required consultations, while maintaining and continuing to meet its Congressionally-authorized purposes.

Based on the August 2016 24-Month Study, the ~~The~~ projected most probable unregulated inflow for water year 2017 into Blue Mesa Reservoir is 0.840 maf (1,036 mcm), or 88 percent of average. The reservoir is expected to decrease to a seasonal low elevation of 7,485.26 feet (2.281.51 meters) by late May 2017. The peak elevation is expected to be approximately 7,508.88 feet (2,288.71 meters) near the end of July 2017. By the end of water year 2017, Blue Mesa Reservoir is projected to be at elevation 7,498.17 feet (2,285.44 meters), with a storage of 0.646 maf (797 mcm), or 78 percent of capacity.

Navajo Reservoir

Storage in Navajo Reservoir decreased during water year 2016. At the beginning of water year 2016, Navajo storage was 82 percent of live capacity at elevation 6,063.41 feet (1,848.13 meters), with 1.39 maf (1,710 mcm) in storage. The modified unregulated inflow to Navajo during water year 2016 was 0.857 maf (1,058 mcm) which is 80 percent of average. At the end of the water year, Navajo storage was at 77 percent of full capacity at elevation 6,056.9 feet (1,846.1 meters), with 1.31 maf (1,616 mcm) resulting in a net reduction during water year 2016 of 0.082 maf (101 mcm).

Navajo Reservoir reached a peak water surface elevation of 6,075.65 feet (1,851.86 meters) on June 9, 2016, which was 9.35 feet (2.85 meters) below full pool. The April through July modified unregulated inflow into Navajo Reservoir in water year 2016 was 0.562 maf (693 mcm), or 76 percent of average.

The San Juan Flow Recommendations,[41] completed by the SJRIP in May 1999, provide flow recommendations that promote the recovery of the endangered Colorado 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. The flow recommendations are currently under review by the SJRIP.

In 2006, Reclamation completed a NEPA process on the implementation of operations at Navajo Dam. The ROD for the Navajo Reservoir Operations Final EIS (Navajo Reservoir ROD)[42] was signed by the Regional Director of Reclamation's Upper Colorado Region on July 31, 2006.

[41] 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.
[42] Record of Decision for the Navajo Reservoir Operations, Navajo Unit –San Juan River, New Mexico, Colorado, Utah Final Environmental Impact Statement. Available online at: http://www.usbr.gov/uc/envdocs/eis/navajo/pdfs/NavWaterOpsROD2006.pdf.

In water year 2016, Navajo Reservoir operated under the SJRIP and Reclamation's interim operations. Interim operations were discussed and adopted for water year 2016 at a SJRIP workshop held April 5-6, 2016. Under the interim operations, releases for SJRIP recovery purposes are dependent on annual hydrology and available water may be released as a spring peak release, an augmentation of existing target base flows, or some other SJRIP purposes. The interim operations specify an End of Water Year Storage Target equal to elevation 6,050.00 feet (1,844.04 meters) for the purposes of calculating water available to release as a spring peak release. All available water over this target, minus the water required for minimum releases and contracts, will be available to be released as a spring peak hydrograph. The available water must equate to at least 21 days at 5,000 cfs (142 cms) to be released.

Navajo Reservoir was operated in compliance with the Navajo Reservoir ROD in 2016, including the SJRIP's target base flows. Based on the SJRIP and Reclamation's interim operations for water year 2016, there was a spring peak release for 33 days with a 3-day ramp up and a 2-week ramp down. The release totaled 0.383 maf (472 mcm).

During water year 2017, Navajo Reservoir will be operated in accordance with the Navajo Reservoir ROD. Navajo Reservoir storage levels are expected to be below average in 2017 under the most probable inflow forecast. Base releases from the reservoir will likely range from 350 cfs (9.91 cms) to 500 cfs (14.2 cms) through the winter. Based on the August 2016 24-Month Study, ~~Under~~ the most probable April through July modified unregulated inflow forecast of 0.655 maf (808 mcm) in 2017, a 25-day spring peak release would be recommended by the anticipated SJRIP and Reclamation's interim operations for water year 2017. The reservoir is projected to reach a peak elevation of 6,069.05 feet (1,849.85 meters) in May 2017. The reservoir is projected to reach a minimum elevation of 6,050.40 feet (1,844.16 meters) in October 2017.

Under the minimum probable 2017 April through July inflow forecast of 0.284 maf (351 mcm), there will be no spring peak release during the spring of 2017. Under the maximum probable 2017 April through July inflow forecast of 1.104 maf (1,357 mcm), a 60-day spring peak release will be recommended as described by the anticipated SJRIP and Reclamation's interim operations for water year 2017.

In 2012, a four-year agreement on recommendations for San Juan River operations and administration was developed among major users to limit their water use in years 2013-2016, to the rates and volumes indicated in the agreement.[43] The agreement includes limitations on diversions for 2013-2016, 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 flows for endangered fish habitat. This agreement is currently being revised for 2017-2020.

[43] Recommendations for San Juan River Operations and Administration for 2013-2016, July 2, 2012. Available online at: http://www.fws.gov/southwest/sjrip/DR_SS03.cfm.

Lake Powell

Reservoir storage in Lake Powell increased during water year 2016. At the beginning of water year 2016, Lake Powell storage was 51 percent of live capacity at elevation 3,606.01 feet (1,099.11 meters), with 12.33 maf (15,160 mcm) in storage. The unregulated inflow to Lake Powell during water year 2016 was 9.78 maf (12,063 mcm) which is 90 percent of average. At the end of the water year, Lake Powell storage was at 53 percent of full capacity at elevation 3,612.13 feet (1,100.98 meters), with 12.95 maf (15,973 mcm) resulting in a net increase during water year 2016 of 0.613 maf (756 mcm).

The August 2015 24-Month Study was run to project the January 1, 2016, elevations of Lake Powell and Lake Mead and determine the water year 2016 operating tier for Lake Powell. Using the most probable inflow scenario, and with an 8.23 maf (10,150 mcm) annual release pattern for Lake Powell, the January 1, 2016, reservoir elevations of Lake Powell and Lake Mead were projected to be 3,596.62 feet (1,096.25 meters) and 1,083.37 feet (330.21 meters), respectively. Given these projections, the annual release volume from Lake Powell during water year 2016 was consistent with the Upper Elevation Balancing Tier (Section 6.B of the 2007 Interim Guidelines) and under Section 6.B.1, the annual release would be 8.23 maf (10,150 mcm).

The Upper Elevation Balancing Tier provides for the possibility of adjustments to the operation of Lake Powell based on the projected end of water year condition of Lake Powell and Lake Mead from the April 24-Month Study. The April 2016 24-Month Study was run with an 8.23 maf (10,150 mcm) annual release volume to project the September 30, 2016, elevations of Lake Powell and Lake Mead. Under the most probable inflow scenario, and with an 8.23 maf (10,150 mcm) annual release volume, the projected end of water year elevation at Lake Powell was 3,607.25 feet (1,099.49 meters) and Lake Mead was 1,064.61 feet (324.49 meters). Since the projected end of water year elevation at Lake Powell was below the 2016 Equalization elevation of 3,651.00 feet (1,112.83 meters) and above 3,575.00 feet (1,089.66 meters) and the projected Lake Mead elevation was below 1,075.00 feet (327.66 meters), Section 6.B.4 of the 2007 Interim Guidelines governed for the remainder of water year 2016. Under Section 6.B.4, the Secretary shall balance the contents of Lake Mead and Lake Powell, but shall release not more than 9.00 maf (11,100 mcm) and not less than 8.23 maf (10,150 mcm) from Lake Powell. The annual release volume during water year 2016 was 9.00 maf (11,100 mcm).

The April through July unregulated inflow to Lake Powell in water year 2016 was 6.61 maf (8,153 mcm) which was 92 percent of average. Lake Powell reached a peak elevation for water year 2016 of 3,621.45 feet (1,103.82 meters) on July 9, 2016, which was 78.55 feet (23.94 meters) below full pool. This peak elevation corresponds to a live storage content of 13.92 maf (17,170 mcm).

~~Due to resource concerns, the~~The Department of the Interior decided not to conduct a High-Flow Experiment (HFE) under the 2012 High-Flow Experiment Protocol (Protocol)[44] at Glen Canyon Dam in the fall of 2015. Although sediment inflows in the Grand Canyon were of sufficient mass to trigger an ~~conditions in the Canyon supported a~~ HFE, a ~~concentration~~ high abundance of green sunfish - invasive to the area - was discovered in a back water slough downstream of Glen Canyon Dam. There was concern that an HFE could disperse this harmful nonnative fish downstream into the Colorado River, posing a threat to native endangered species in the ~~Canyon~~canyon. While response actions were under taken to ~~effectively~~ address the green sunfish problem, the time required to address the problem precluded conducting an HFE in the fall of 2015.

The ten-year total flow of the Colorado River at Lee Ferry[45] for water years 2007 through 2016 is 90.74 maf (111,930 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.

2017 Operating Tier and Projected Operations for Glen Canyon Dam. The January 1, 2017 reservoir elevations of Lake Powell and Lake Mead are projected under the most probable inflow scenario to be 3,605.83 feet (1,199.06 meters) and 1,078.93 feet (328.86 meters), respectively, based on the August 2016 24-Month Study. Given these projections, the operating tier and annual release volume from Lake Powell during water year 2017 will be consistent with the Upper Elevation Balancing Tier (Section 6.B of the 2007 Interim Guidelines) and, under Section 6.B.1, the annual release would be 8.23 maf (10,150 mcm). The Upper Elevation Balancing Tier, provides for the possibility of adjustments to the operation of Lake Powell based on the projected end of water year conditions of Lake Powell and Lake Mead from the April 24-Month Study.

If the April 2017 24-Month Study, with a water year release volume of 8.23 maf (10,150 mcm) projects the September 30, 2017, Lake Powell elevation to be greater than 3,652.00 feet (1,113.13 meters), 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 8.23 maf (10,150 mcm) and will be determined based on the Equalization Tier as described in Section 6.A of the 2007 Interim Guidelines.

If the April 2017 24-Month Study, with a water year release volume of 8.23 maf (10,150 mcm), projects the September 30, 2017, Lake Powell elevation to be at or above 3,575.00 feet (1,089.66 meters) and below the 2017 Equalization level of 3,652.00 feet (1,113.13 meters), and the September 30, 2017, Lake Mead elevation to be below 1,075.00 feet (327.66 meters), the Secretary shall balance the contents of Lake Mead and Lake Powell, but shall release not more than 9.00 maf (11,100 mcm) and not less than 8.23 maf (10,150 mcm)

[44] Finding of No Significant Impact for the Environmental Assessment for Development and Implementation of a Protocol for High-Flow Experimental Releases from Glen Canyon Dam, Arizona through 2020. Available online at: http://www.usbr.gov/uc/envdocs/ea/gc/HFEProtocol/index.html.

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

from Lake Powell in water year 2017 consistent with Section 6.B.4 of the 2007 Interim Guidelines.

Under the minimum probable inflow scenario, the August 2016 24-Month Study, with a projected water year release volume of 8.23 maf (10,150 mcm) in water year 2017, projects the elevations of Lake Powell and Lake Mead on September 30, 2017, would be 3,596.49 feet (1,096.21 meters) and 1,059.57 feet (322.96 meters), respectively. Based on these projections, an April adjustment to balancing is projected to govern Lake Powell operations under the minimum probable inflow scenario and the water year release for 2017 is projected to be 9.00 maf (11,100 mcm). The end of water year elevation and storage of Lake Powell is projected to be 3,588.79 feet (1,093.86 meters) and 10.71 maf (13,210 mcm), respectively, based on the minimum probable inflow scenario.

Under the most probable inflow scenario, the August 2016 24-Month Study, with a projected water year release volume of 8.23 maf (10,150 mcm) in water year 2017, projects the elevations of Lake Powell and Lake Mead on September 30, 2017, would be 3,619.82 feet (1,103.32 meters) and 1,060.94 feet (323.37 meters), respectively. Based on these projections, under the most probable inflow scenario, an April adjustment to balancing is projected to occur during water year 2017. Consistent with Section 6.B.4, the 2017 water year release volume projected under the most probable inflow scenario is 9.00 maf (11,100 mcm) and the end of water year elevation and storage of Lake Powell is projected to be 3,613.02 feet (1,101.25 meters) and 13.04 maf (16,085 mcm), respectively.

Under the maximum probable inflow scenario, the August 2016 24-Month Study, with a projected water year release volume of 8.23 maf (10,150 mcm) in water year 2017, projects the elevation of Lake Powell on September 30, 2017, would be 3,671.13 feet (1,118.96 meters). This elevation is above the Equalization Level for water year 2017 of 3,652.00 feet (1,113.13 meters). Based on this projection, an April adjustment to equalization is projected to occur under the maximum probable inflow scenario and the water year release for 2017 is projected to be 11.89 maf (14,670 mcm). The end of water year elevation and storage of Lake Powell is projected to be 3,645.34 feet (1,111.10 meters) and 16.64 maf 20,530 mcm), respectively, based on the maximum probable inflow scenario.

In 2017, 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, and WAPA 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 2017. If implemented, releases greater than powerplant capacity would be made consistent with the 1956 Colorado River Storage Project Act,[46] 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

[46] Available online at: http://www.usbr.gov/lc/region/pao/pdfiles/crspuc.pdf.

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 (*Federal Register*, Volume 62, No. 41, March 3, 1997).[47]

Releases from Lake Powell in water year 2017 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 Glen Canyon Dam Final Environmental Impact Statement (GCDFEIS) (consistent with the Grand Canyon Protection Act of 1992) and applicable Secretarial decisions.

Monthly releases are updated to be consistent with annual volumes determined pursuant to the 2007 Interim Guidelines. Monthly releases for 2017 will also be consistent with the GCDFEIS/ROD.

For the latest monthly projections for Lake Powell, please see the most recent 24-Month Study report available on Reclamation's Upper Colorado Region Water Operations website: http://www.usbr.gov/uc/water/crsp/studies/index.html.

Daily and hourly releases in 2017 will be made according to the parameters of the 1996 Glen Canyon Dam ROD for the GCDFEIS and the 1997 Glen Canyon Dam Operating Criteria. These parameters set the maximum and minimum flows and ramp rates within which reservoir releases must be made. Exceptions to these parameters will be made in accordance with the Emergency Exception Criteria as described in the 1997 Glen Canyon Dam Operating Criteria.

The Department of the Interior is ~~conducting~~ coordinating planning for ~~high-flow experimental releases~~an HFE from Glen Canyon Dam in November 2016 and March-April 2017 in accordance with the Protocol or other applicable documents.

Lake Mead

For calendar year 2016, 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. Delivery of water to Mexico was scheduled in accordance with Article 15 of the 1944 United States-Mexico Treaty and Minutes No. 242 and 319 of the IBWC.

Lake Mead began water year 2016 on October 1, 2015, at elevation 1,078.10 feet (328.60 meters), with 9.85 maf (12,150 mcm) in storage, which is 38 percent of the conservation

[47] Available online at: http://www.gpo.gov/fdsys/pkg/FR-1997-03-03/pdf/97-5144.pdf.

capacity[48] of 26.12 maf (32,220 mcm). Lake Mead ended water year 2016 at elevation 1,075.98 feet (327.96 meters) with 9.68 maf (11,940 mcm) in storage (37 percent of capacity) on September 30, 2016.

The total release from Lake Mead through Hoover Dam during water year 2016 was 9.28 maf (11,450 mcm). The total release from Lake Mead through Hoover Dam during calendar year 2016 is projected to be 9.21 maf (11,360 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 2016, inflow into Lake Mead was 9.84 maf (12,140 mcm), consisting of 9.0 maf (11,100 mcm) of water released from Glen Canyon Dam and 0.842 maf (1,040 mcm) of inflows between Glen Canyon and Hoover Dams. For water year 2017, under the most probable inflow scenario, total inflow into Lake Mead is anticipated to be 9.80 maf (12,090 mcm).

Based on the August 2016 24-Month Study, Lake Mead's elevation on January 1, 2017, is projected to be 1,078.93 feet (328.86 meters). In accordance with Section 2.B.5 of the 2007 Interim Guidelines, the ICS Surplus Condition will govern the releases and diversions from Lake Mead in calendar year 2017. Releases from Lake Mead through Hoover Dam for water year and calendar year 2017 are anticipated to be approximately the same as 2016 releases.

Under the most probable inflow scenario, Lake Mead is projected to end water year 2017 at elevation 1,070.15 feet (326.18 meters), with 9.21 maf (11,360 mcm) in storage (35 percent of capacity). Lake Mead is projected to increase to elevation 1,074.31 feet (327.45 meters) with 9.55 maf (11,780 mcm) in storage (37 percent of capacity) at the end of calendar year 2017.

For the latest monthly projections for Lake Mead, please see the most recent 24-Month Study report available on Reclamation's Lower Colorado Region Water Operations website: http://www.usbr.gov/lc/region/g4000/24mo/index.html.

Lakes Mohave and Havasu

Lake Mohave started water year 2016 at an elevation of 639.56 feet (194.94 meters) with 1.61 maf (1,990 mcm) in storage. The water level of Lake Mohave was regulated between elevation 635.80 feet (193.79 meters) and 644.70 feet (196.50 meters) during the water year, ending at an elevation of 640.01 feet (195.08 meters), with 1.62 maf (2,000 mcm) in storage. During water year 2016, 8.88 maf (10,950 mcm) was released from Davis Dam. The calendar year 2016 total release is projected to be 8.84 maf (10,900 mcm).

[48] 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.

For water and calendar years 2017, Davis Dam is projected to release approximately the same amount of water as in 2016, and the water level in Lake Mohave will be regulated between an elevation of approximately 633 feet (193 meters) and 645 feet (197 meters).

Lake Havasu started water year 2016 at an elevation of 448.04 feet (136.56 meters) with 0.581 maf (717 mcm) in storage. The water level of Lake Havasu was regulated between elevation 446.50 feet (136.09 meters) and 449.03 feet (136.86 meters) during the water year, ending at an elevation of 447.80 feet (136.49 meters), with 0.576 maf (710 mcm) in storage. During water year 2016, 6.37 maf (7,860 mcm) was released from Parker Dam. The calendar year 2016 total release is projected to be 6.33 maf (7,810 mcm).

For water and calendar years 2017, Parker Dam is expected to release approximately the same amount of water as in 2016, and the water level in Lake Havasu will be regulated between an elevation of approximately 446 feet (136 meters) and 450 feet (137 meters).

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.

Bill Williams River

Abnormally dry to moderate drought conditions persisted in the Bill Williams River watershed during water year 2016. Tributary inflows into Alamo Lake were below average during water year 2016 and water released by the U.S. Army Corps of Engineers (USACE) from Alamo Dam totaled 0.021 maf (26 mcm) for water year 2016, approximately 22 percent of the long-term average.

Alamo Lake elevation and storage decreased during water year 2016. Alamo Lake started water year 2016 at elevation 1,088.25 feet (331.70 meters) with 0.053 maf (65.3 mcm) in storage, and ended water year 2016 at elevation 1,081.33 feet (329.59 meters) with 0.040 maf (49.3 mcm) in storage. In water year 2016, average daily releases from Alamo Lake ranged from about 10 to 25 cfs (0.28 to 0.71 cms).

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 mcm) at full pool elevation of 251.00 feet (76.50 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 Arizona and California and the delivery obligation to Mexico.

Since 1992, elevation restrictions have been in place on Senator Wash Reservoir due to potential piping and liquefaction of foundation and embankment materials at West Squaw

Lake Dike and Senator Wash Dam. Senator Wash Reservoir is restricted to an elevation of 240.00 feet (73.15 meters) with 0.009 maf (11 mcm) of storage, a loss of about 0.005 maf (6.2 mcm) of storage from its original capacity. Senator Wash Reservoir elevation must not exceed an elevation of 238.00 feet (72.54 meters) for more than 10 consecutive days. This reservoir restriction is expected to continue in 2017.

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 0.0015 maf (1.9 mcm) to approximately 0.0004 maf (0.5 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.

Sediment removal at Laguna Reservoir has begun so that operational sluicing can be reestablished. The Laguna Basin Dredging project will dredge approximately 2.25 million cubic yards (1.7 mcm) of sediment, reestablishing 140 acres (0.57 square kilometers) of open water. As of September 2016, approximately 1.376 million cubic yards (1.056 mcm) of material have been removed. All dredged material will be disposed of in a designated area adjacent to the project site. The project incorporates the use of both land-based and waterborne heavy equipment. The project permit was obtained from the USACE in May 2013 and is valid through May 2017.

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 on the California side of the dam and into the Gila Gravity Main Canal on the Arizona side of the dam. These diversions provide water to the Gila Project, the Yuma Project, the Imperial Irrigation District, the Coachella Valley Water District, and the City of Yuma, and through Siphon Drop and Pilot Knob to the Northerly International Boundary (NIB) for diversion at Morelos Dam in Mexico. Flows arriving at Imperial Dam for calendar year 2016 are projected to be 5.42 maf (6,690 mcm). The flows arriving at Imperial Dam for calendar year 2017 are projected to be 5.45 maf (6,720 mcm).

Gila River Flows

During water year 2016, there was below average snowfall in the Gila River Basin, including the Salt and Verde River watersheds. 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 2016.

Warren H. Brock Reservoir

The Warren H. Brock (Brock) Reservoir is located near the All-American Canal in Imperial County, California. 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)[49] 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 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 2016, the amount of water discharged from the Wellton-Mohawk Division through the bypass canal is anticipated to be 0.108 maf (133 mcm) measured at station 0+00 and 0.117 maf (144 mcm) measured at the Southerly International Boundary (SIB), at an approximate concentration of total dissolved solids of 2,200 parts per million (ppm).

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 ~~has proposed to make unused Nevada basic apportionment available for storage by MWD in calendar year 2016 and~~ may propose to make unused Nevada basic apportionment available for storage by MWD and/or the Arizona Water Banking Authority (AWBA) in calendar years 2016 and 2017.[50,51]

[49] Available online at: http://www.usbr.gov/lc/region/pao/pdfiles/crbsalct.pdf.

[50] 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. Available online at: http://www.usbr.gov/lc/region/g4000/contracts/SNWA_MWDSIRAfinal.pdf.

[51] 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. Available online at: http://www.usbr.gov/lc/region/g4000/contracts/SIRAfinal.pdf.

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 over the course of a calendar year. Several implementing agreements[52] were executed concurrent with the issuance of the ROD for the 2007 Interim Guidelines. ICS credits may be created and delivered in calendar years 2016 and 2017 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.[53]

IBWC Minute No. 319 identifies cooperative measures that the United States and Mexico will take through December 31, 2017, including a pilot program for ICMA/ICS Exchange. Consistent with Section III.6.e.iii of IBWC Minute No. 319, a total of 0.124 maf (153 mcm) of water will be converted from ICMA, ~~or~~ water deferred under Section III.1 of IBWC Minute No. 319, or from any other source for use in the United States before December 31, 2017.

Extraordinary Conservation ICS. IID has an approved plan to create up to 0.025 maf (31 mcm) of Extraordinary Conservation ICS in 2016 and ~~is anticipated to~~ has submitted a plan to create up to 0.025 maf (31 mcm) in 2017. MWD has an approved plan to create up to 0.200 maf (247 mcm) of Extraordinary Conservation ICS in 2016 and ~~is anticipated to~~ has submitted a plan to create up to 0.200 maf (247 mcm) in 2017. Contractors with available Extraordinary Conservation ICS may request delivery of ICS credits in 2016 and 2017.

System Efficiency ICS. In 2016 and 2017, CAWCD, MWD, and SNWA may request delivery of Brock Reservoir System Efficiency ICS credits. The annual maximum delivery of Brock Reservoir System Efficiency ICS is 0.065 maf (80 mcm). In 2016 and 2017, CAWCD, MWD, and SNWA may request delivery of YDP Pilot Run System Efficiency ICS credits in proportion to their capital contributions.

Tributary Conservation ICS. SNWA has an approved plan to create up to 0.0295 maf (36.4 mcm) of Tributary Conservation ICS in 2016 and ~~is anticipated to~~ has submitted a plan to create up to 0.047 maf (58 mcm) in 2017. Any Tributary Conservation ICS not delivered for use by SNWA in the calendar year created will, at the beginning of the following year, be converted to Extraordinary Conservation ICS pursuant to the 2007 Interim Guidelines.

Imported ICS. SNWA has an approved plan to create up to 0.009 maf (11 mcm) of Imported ICS in 2016 and ~~is anticipated to~~ has submitted a plan to create up to 0.009 maf (11 mcm) in 2017. Any Imported ICS not delivered for use by SNWA in the calendar year

[52] Information on forbearance and delivery agreements related to the creation and delivery of ICS can be found at: http://www.usbr.gov/lc/region/programs/strategies/documents.html.
[53] Available online at: http://www.usbr.gov/lc/region/g4000/wtracct.html.

created will, at the beginning of the following year, be converted to Extraordinary Conservation ICS pursuant to the 2007 Interim Guidelines.

Binational ICS. Parties to the funding agreement for the ICMA/ICS Exchange pilot program (CAWCD, MWD, and SNWA) may request delivery of Binational ICS credits subsequent to its conversion in proportion to their capital contributions. MWD will arrange with Reclamation for the delivery to IID of an amount of Colorado River water equal to 50 percent of Binational ICS credits provided to MWD when requested by IID.

Delivery of Water to Mexico

Delivery to Mexico pursuant to the 1944 United States-Mexico Water Treaty and IBWC Minute No. 319 is anticipated to be 1.500 maf (1,850 mcm) in calendar year 2016. In accordance with IBWC Minute No. 319, Mexico may defer delivery of water pursuant to Sections III.1 and III.4, create ICMA pursuant to Section III.4, or take delivery of additional water pursuant to Section III.4 in calendar year 2016. Balances of water deferred by Mexico in previous years may be found in the annual Colorado River Accounting and Water Use Report, Arizona, California, and Nevada.[54]

Of the scheduled delivery to Mexico in calendar year 2016, approximately 1.360 maf (1,680 mcm) is projected to be delivered at NIB and approximately 0.140 maf (173 mcm) is projected to be delivered at SIB. No water is anticipated to be delivered to Tijuana, Baja California in calendar year 2016.[55]

Of the total delivery at SIB projected in calendar year 2016, approximately 0.110 maf (136 mcm) is projected to be delivered from the Yuma Project Main Drain and approximately 0.030 maf (37 mcm) is expected to be delivered by the Protective and Regulatory Pumping Unit (Minute No. 242 wells).

Excess flows arriving at the NIB are anticipated to be approximately 0.012 maf (15 mcm) in calendar year 2016. 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.

Pursuant to the 1944 United States-Mexico Water Treaty, a volume of 1.500 maf (1,850 mcm) will be available to be scheduled for delivery to Mexico in calendar year 2017. In accordance with IBWC Minute No. 319, Mexico may defer delivery of water pursuant to Sections III.1 and III.4, create ICMA pursuant to Section III.4, or take delivery of additional water pursuant to Section III.4 in calendar year 2017. Under IBWC Minute No. 314 and the

[54] Available online at: http://www.usbr.gov/lc/region/g4000/wtracct.html.

[55] IBWC Minute No. 314 and the Emergency Delivery Agreement expired on November 9, 2013; therefore, a new minute and Emergency Delivery Agreement are required to continue the temporary emergency delivery of Colorado River water for use in Tijuana.

Emergency Delivery Agreement, [56] Mexico, through IBWC, may request water to be delivered for Tijuana through MWD, the San Diego County Water Authority, and the Otay Water District's respective distribution system facilities in California. Approximately 0.140 maf (173 mcm) is projected to be delivered at SIB and the remainder of the water to be scheduled for delivery to Mexico in 2017 will be delivered at NIB.

Drainage flows to the Colorado River from the Yuma Mesa Conduit and South Gila Drain Pump Outlet Channels are projected to be 0.0 maf (0.0 mcm) and 0.027 maf (33 mcm), respectively, for calendar year 2016. This water is available for delivery at NIB in satisfaction of the 1944 United States-Mexico Water Treaty. Reclamation holds a permit from the Arizona Department of Water Resources (ADWR)[57] to pump an additional 0.025 maf (31 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 2016 is projected to be 140 ppm by the United States' count.

Mexico has identified four critical months for agriculture, October through January, regarding improving the quality of water delivered at SIB. Consistent with an MOU between Reclamation and the U.S. Section of the IBWC,[58] the United States has agreed to ~~reduce~~ limit the salinity of water delivered at SIB during this period to a monthly average of 1,200 ppm. To accomplish the reduction in salinity, the United States constructed a diversion channel to bypass up to 0.008 maf (9.9 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 2016 to the diversion channel for salinity control and up to 0.008 maf (9.9 mcm) in calendar year 2017.

[56] 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 Operation of Facilities in the United States, dated November 26, 2008.
[57] ADWR Transport Permit Number 30-001 entitled Permit to Transport Groundwater Withdrawn from the Yuma Groundwater Basin, March 1, 2007.
[58] Available online at: http://www.usbr.gov/lc/region/g4000/10_2001MOU.pdf.

2017 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, 2017, under the most probable inflow scenario would be below the threshold required under Section 602(a) of the CRBPA.

Taking into account (1) the existing water storage conditions in the basin, (2) the August 2016 24-Month Study projection of the most probable near-term water supply conditions in the basin, and (3) Section 6.B of the 2007 Interim Guidelines, the Upper Elevation Balancing Tier will govern the operation of Lake Powell for water year 2017. The August 2016 24-Month Study of the most probable inflow scenario projects the water year 2017 release from Glen Canyon Dam to be 9.00 maf (11,100 mcm). Given the hydrologic variability of the Colorado River System and based on actual 2016 water year operations, the projected water year release from Lake Powell in 2017 could be in the estimated range of 8.23 maf (10,150 mcm) to 11.89 maf (14,670 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 Central Arizona Project, 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 (9,250 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 (9,250 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 1,075.0 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 (9,250 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 2017 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 2016 24-Month Study was used to forecast the system storage as of January 1, 2017. Based on a projected January 1, 2017 Lake Mead elevation of 1,078.93 feet (328.86 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 2017 in accordance with Article III(3)(b) of the Operating Criteria and Article II(B)(2) of the Consolidated Decree.

Water deliveries in the Lower Basin during calendar year 2017 will be limited to 7.500 maf (9,250 mcm) plus or minus any credits for ICS.

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 2017 is anticipated. If any unused apportionment becomes available after adoption of this AOP, Reclamation, on behalf of the Secretary, ~~shall~~ may allocate any such available unused apportionment for calendar year 2017 in accordance with Article II(B)(6) of the Consolidated Decree, the Unused Water Policy, and giving further consideration to the water conservation objectives of the July 30, 2014 agreement for the SC Program and Section III.A of the December 10, 2014 MOU for Lower Basin Pilot Drought Response Actions.

In calendar year 2017, ~~Water~~ 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/or AWBA in calendar year 2017.

The IOPP, which became effective January 1, 2004, will be in effect during calendar year 2017. Payback balances by state and user may be found in the annual Colorado River Accounting and Water Use Report, Arizona, California, and Nevada.[59]

In calendar year 2017, conserved Colorado River water is anticipated to be added to system reservoirs pursuant to the SC Funding Agreement.

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 2017 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 recent low inflow amounts within the Colorado River Basin, 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.

[59] Available online at: http://www.usbr.gov/lc/region/g4000/wtracct.html.

1944 United States-Mexico Water Treaty

Under the minimum probable, most probable, and maximum probable inflow scenarios, water in excess of that required to supply uses in the United States and the guaranteed quantity of 1.500 maf (1,850 mcm) allotted to Mexico will not be available, subject to any increased amounts delivered consistent with Section III.4 of IBWC Minute No. 319. Vacant storage space in mainstream reservoirs is substantially greater than that required by flood control regulations. Therefore, a volume of 1.500 maf (1,850 mcm) of water will be available to be scheduled for delivery to Mexico during calendar year 2017 subject to and in accordance with Article 15 of the 1944 United States-Mexico Water Treaty and Minutes No. 242 and 314 of the IBWC. In accordance with IBWC Minute No. 319, Mexico may defer delivery of water pursuant to Sections III.1 and III.4, create ICMA pursuant to Section III.4, or take delivery of additional water pursuant to Section III.4.

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-day 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 IBWC Minute No. 319 (which contains specific provisions regarding adjustment of delivery schedules).

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. 319 of November 20, 2012; 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; 43 U.S.C. 617); 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 Hoover Power Allocation Act of 2011 (125 Stat. 777); the Colorado River Floodway Protection Act (100 Stat. 1129; 43 U.S.C. 1600); the Grand Canyon Protection Act of 1992 (Title XVIII of Public Law 102-575, 106 Stat. 4669); or the Decree Quantifying the Federal Reserved Right for Black Canyon of the Gunnison National Park (Case No. 01CW05, District Court, Colorado Water Division No. 4, 2008).

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
CAWCD	Central Arizona Water Conservation District
CBRFC	National Weather Service's Colorado Basin River Forecast Center
CFR	Code of Federal Regulations
cfs	cubic feet per second
cms	cubic meters per second
CRBPA	Colorado River Basin Project Act of 1968
CRCN	Colorado River Commission of Nevada
~~CVWD~~	~~Coachella Valley Water District~~
DW	Denver Water
EIS	Environmental Impact Statement
FGTWG	Flaming Gorge Technical Work Group
GCDFEIS	Glen Canyon Dam Final Environmental Impact Statement of 1996
IBWC	International Boundary and Water Commission, United States and Mexico
ICMA	Intentionally Created Mexican Allocation
ICS	Intentionally Created Surplus
ICUA	Intentionally Created Unused Apportionment
IID	Imperial Irrigation District
IOPP	Inadvertent Overrun and Payback Policy
LTSP	Larval Trigger Study Plan
maf	million acre-feet
mcm	million cubic meters
MOU	Memorandum of Understanding
MWD	The Metropolitan Water District of Southern California
NEPA	National Environmental Policy Act of 1969, as amended
NIB	Northerly International Boundary
ppm	parts per million
PVID	Palo Verde Irrigation District
Reclamation	United States Bureau of Reclamation
ROD	Record of Decision
SC	System Conservation
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
SJRIP	San Juan River Basin Recovery Implementation Program
SNWA	Southern Nevada Water Authority
USACE	United States Army Corps of Engineers
UCRIP	Upper Colorado River Endangered Fish Recovery Program
WAPA	Western Area Power Administration
YDP	Yuma Desalting Plant

1 YMIDD Yuma Mesa Irrigation and Drainage District