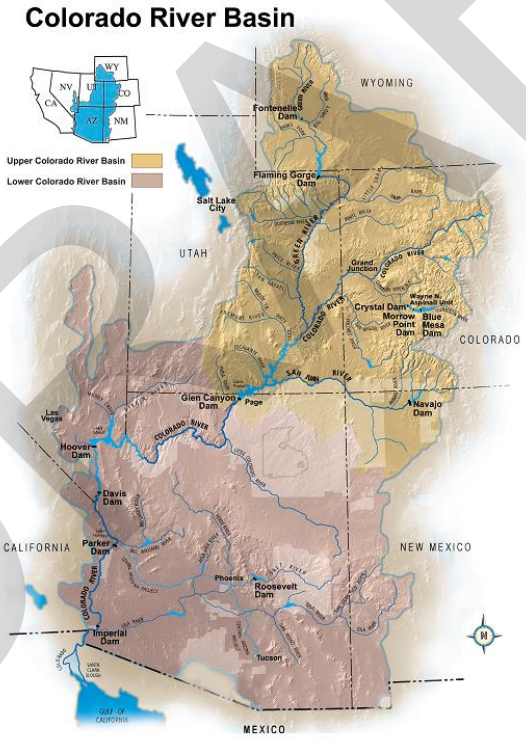
RECLAMATION

Managing Water in the West

Annual Operating Plan for Colorado River Reservoirs 2018



U.S. Department of the Interior
Bureau of Reclamation

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INTRODUCTION

Background

Each year's Annual Operating Plan (AOP) for Colorado River Reservoirs reports on both the past operations of the Colorado River reservoirs for the completed year as well as projected operations and releases from these reservoirs for the current (i.e., upcoming) year. Accordingly, this 2018 AOP reports on 2017 operations as well as projected operations for 2018. 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 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] Minutes No. 319[9] and 323[10] of the International Boundary and Water Commission (IBWC),[11] and the 2016 Glen Canyon Dam Long-Term Experimental and Management Plan

[1] ROD for the Operation of Glen Canyon Dam, October 9, 1996. Available online at: https://www.usbr.gov/uc/rm/amp/pdfs/sp_appndxG_ROD.pdf.
[2] The 1997 Operating Criteria for Glen Canyon Dam (62 *Federal Register* 9447, March 3, 1997) were in effect in water year 2017 (available online at: https://www.gpo.gov/fdsys/pkg/FR-1997-03-03/pdf/97-5144.pdf). Following the implementation of the LTEMP ROD, the Glen Canyon Dam operating criteria were revised and are in effect in water year 2018 (available online at: https://www.usbr.gov/uc/water/crsp/studies/GCOC.pdf).
[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: https://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: https://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: https://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: https://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: https://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: https://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: https://www.ibwc.gov/Files/Minutes/Minute_319.pdf.
[10] IBWC Minute No. 323, Extension of Cooperative Measures and Adoption of a Binational Water Scarcity Contingency Plan in the Colorado River Basin dated September 21, 2017. Available online at: https://www.ibwc.gov/Files/Minutes/Min323.pdf.
[11] Upon its entry into force on September 27, 2017, IBWC Minute No. 323 superceded IBWC Minute No. 319 except for those provisions of Section III.6 of IBWC No. Minute 319 that are not consistent with IBWC Minute No. 323. These provisions remain in effect through December 31, 2017.

(LTEMP) ROD.[12] Each AOP incorporates these and other rules, guidelines, and decisions, and reports on how the criteria contained in the applicable decision document or documents are implemented. Thus, the AOP makes projections and reports on how the Bureau of Reclamation (Reclamation) will implement these decisions in response to changing water supply conditions as they unfold during the upcoming year, when conditions become known. Congress has charged the Secretary of the Interior (Secretary) with stewardship and responsibility for a wide range of natural, cultural, recreational, and tribal resources within the Colorado River Basin. The Secretary has the authority to operate and maintain Reclamation facilities within the Colorado River Basin addressed in this AOP to help manage these resources and accomplish their protection and enhancement in a manner fully consistent with applicable provisions of Federal law including the Law of the River, and other project-specific operational limitations.

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)][13] *regarding past and anticipated operations."*

Authority

This 2018 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;[14] and Section 1804(c)(3) of the Grand Canyon Protection Act of 1992 (Public Law 102-575).[15]

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);[16] interstate compacts; court decrees; the Colorado River Water

[12] ROD for the Glen Canyon Dam Long-Term Experimental and Management Plan Final Environmental Impact Statement, December 2016. Available online at: http://ltempeis.anl.gov/documents/docs/LTEMP_ROD.pdf.
[13] Available online at: https://www.usbr.gov/lc/region/pao/pdfiles/crbproj.pdf.
[14] Available online at: https://www.usbr.gov/lc/region/g4000/lroc/frmar2905.pdf.
[15] Available online at: https://www.usbr.gov/uc/rm/amp/legal/gcpa1992.html.
[16] Available online at: https://www.ibwc.gov/Files/1944Treaty.pdf.

Delivery Agreement;[17] 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 2018 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; 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, 2018, 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,[18] 319, 322,[19] and 323 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).[20]

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

[17] 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: https://www.usbr.gov/lc/region/g4000/crwda/crwda.pdf.
[18] 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: https://www.ibwc.gov/Files/Minutes/Min242.pdf.
[19] IBWC Minute No. 322, Extension of the Temporary Emergency Delivery of Colorado River Water for use in Tijuana, Baja California dated January 19, 2017. Available online at: https://www.ibwc.gov/Files/Minutes/Minute_322_1.pdf.
[20] Available online at: https://www.usbr.gov/lc/region/pao/pdfiles/scconsolidateddecree2006.pdf.

the reservoirs for all purposes, including flood control, river regulation, beneficial consumptive uses, power production, water quality control, recreation, enhancement of fish and wildlife, and other environmental factors" (Operating Criteria, Article I(2)).

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

Summary of Projected 2018 Operations

Upper Basin Delivery. Taking into account (1) the existing water storage conditions in the basin, (2) the August 2017 24-Month Study[21] 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 2018. The August 2017 24-Month Study of the most probable inflow scenario projects the water year 2018 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 2017 water year operations, the projected water year release from Lake Powell in 2018 is likely to be in the estimated range of 8.23 maf (10,150 mcm) to 13.82 maf (17,050 mcm) or greater.

For further information about the variability of projected inflow into Lake Powell, see the 2018 Water Supply Assumptions section and the Lake Powell section within the Summary of Reservoir Operations in 2017 and Projected 2018 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 2018 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 2018 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 2018. 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[22] (Unused Water Policy), and

[21] 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: https://www.usbr.gov/uc/water/crsp/studies/index.html and https://www.usbr.gov/lc/region/g4000/24mo/index.html.

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

giving further consideration to the water conservation objectives of the July 30, 2014 agreement for a pilot system conservation program (PSCP)[23] and the December 10, 2014 Memorandum of Understanding (MOU) for Lower Basin Pilot Drought Response Actions.[24]

In calendar year 2018, 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),[25] which became effective January 1, 2004, will be in effect during calendar year 2018.

Conserved Colorado River water is anticipated to be added to system reservoirs pursuant to system conservation agreements in calendar year 2018.

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 2018 pursuant to the 2007 Interim Guidelines and applicable forbearance and delivery 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 2018 in accordance with Article 15 of the 1944 United States-Mexico Water Treaty and Minutes No. 242 and 322 of the IBWC. In accordance with IBWC Minute No. 323, Mexico may create water for or take delivery of water from Mexico's Water Reserve pursuant to Section V of IBWC Minute No. 323.

[23] Available online at: https://www.usbr.gov/lc/region/programs/PilotSysConsProg/PilotSCPFundingAgreement7-30-2014.pdf.
[24] Available online at: https://www.usbr.gov/lc/region/g4000/LB_DroughtResponseMOU.pdf.
[25] ROD 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: https://www.usbr.gov/lc/region/g4000/crwda/crwda_rod.pdf.

2017 HYDROLOGY SUMMARY AND RESERVOIR STATUS

Above to near average stream flows were observed throughout much of the Colorado River Basin during water year 2017. Unregulated[26] inflow to Lake Powell in water year 2017 was 11.90 maf (14,680 mcm), or 110 percent of the 30-year average[27] which is 10.83 maf (13,360 mcm). Unregulated inflow to Flaming Gorge, Blue Mesa, and Navajo Reservoirs was 217, 131, and 108 percent of average, respectively.

Precipitation in the Upper Colorado River Basin was above average[28] during water year 2017. On September 30, 2017, the cumulative precipitation received within the Upper Colorado River Basin for water year 2017 was 110 percent of average.

Snowpack conditions trended above average[29] across most of the Colorado River Basin throughout the snow accumulation season. The basin-wide snow water equivalent measured 122 percent of average on April 1, 2017. Total seasonal accumulation peaked at approximately 126 percent of average on March 10, 2017. On April 1, 2017, the snow water equivalents for the Green River, Upper Colorado River Headwaters, and San Juan River Basins were 157, 97, and 120 percent of average, respectively.

During the 2017 spring runoff period, inflows to Lake Powell peaked on June 13, 2017 at approximately 60,600 cubic feet per second (cfs) (1,710 cubic meters per second [cms]). The April through July unregulated inflow volume for Lake Powell was 8.17 maf (10,080 mcm) which was 114 percent of average.

Lower Basin tributary inflows above Lake Mead were near average for water year 2017. Tributary inflow from the Little Colorado River for water year 2017 totaled 0.130 maf (160 mcm), or 90 percent of average. Tributary inflow from the Virgin River for water year 2017 totaled 0.159 maf (196 mcm), or 88 percent of average.

Tributary inflows in the Lower Colorado River Basin below Hoover Dam were below average during water year 2017. Total tributary inflow for water year 2017 from the Bill Williams River was 0.022 maf (27 mcm), and total tributary inflow from the Gila River was 0.006 maf (7.4 mcm).[30]

The Colorado River total system storage experienced a net increase of 2.73 maf (3,370 mcm) in water year 2017. Reservoir storage in Lake Powell increased during water year 2017 by 1.84

[26] 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.
[27] Inflow statistics throughout this document will be compared to the mean of the 30-year period 1981-2010, unless otherwise noted.
[28] 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.
[29] 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.
[30] Tributary inflows from the Bill Williams River and Gila River to the mainstream are very sporadic. These flows occur very seldom and when they do they are typically of high magnitude.

maf (2,270 mcm). Reservoir storage in Lake Mead increased during water year 2017 by 0.562 maf (693 mcm). At the beginning of water year 2017 (October 1, 2016), Colorado River total system storage was 51 percent of capacity. As of September 30, 2017, total system storage was 55 percent of capacity.

Tables 1 and 2 list the October 1, 2017, reservoir vacant space, live storage, water elevation, percent of capacity, change in storage, and change in water elevation during water year 2017.

Table 1. Reservoir Conditions on October 1, 2017 (English Units)

Reservoir	Vacant Space	Live Storage	Water Elevation	Percent of Capacity	Change in Storage*	Change in Elevation*
	(maf)	(maf)	(ft)	(%)	(maf)	(ft)
Fontenelle	0.082	0.263	6,495.2	76	0.035	5.0
Flaming Gorge	0.259	3.49	6,033.6	93	0.284	7.4
Blue Mesa	0.097	0.732	7,508.4	88	0.067	8.0
Navajo	0.412	1.29	6,055.3	76	-0.021	-1.7
Lake Powell	9.66	14.66	3,628.3	60	1.84	17.4
Lake Mead	15.94	10.18	1,082.1	39	0.562	6.8
Lake Mohave	0.207	1.60	639.5	89	-0.023	-0.9
Lake Havasu	0.056	0.56	447.2	91	-0.015	-0.8
Totals	26.70	32.79		55	2.73	

* From October 1, 2016, to September 30, 2017.

Table 2. Reservoir Conditions on October 1, 2017 (Metric Units)

Reservoir	Vacant Space	Live Storage	Water Elevation	Percent of Capacity	Change in Storage*	Change in Elevation*
	(mcm)	(mcm)	(m)	(%)	(mcm)	(m)
Fontenelle	101	324	1,979.7	76	43	1.5
Flaming Gorge	319	4,310	1,839.1	93	350	2.2
Blue Mesa	119	903	2,288.6	88	83	2.4
Navajo	509	1,590	1,845.6	76	-26	-0.5
Lake Powell	11,910	18,090	1,105.9	60	2,270	5.3
Lake Mead	19,660	12,560	329.8	39	693	2.1
Lake Mohave	255	1,980	194.9	89	-29	-0.3
Lake Havasu	69	696	136.3	91	-19	-0.2
Totals	32,930	40,450		55	3,370	

* From October 1, 2016, to September 30, 2017.

SYSTEM CONSERVATION

The Colorado River Basin is experiencing its worst drought in recorded history. Based on natural flow[31] on the Colorado River at Lees Ferry, Arizona, the period from 2000 through 2017 was the driest 18-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 agreement for system conservation was executed in 2014 among Reclamation, the Central Arizona Water Conservation District (CAWCD), The Metropolitan Water District of Southern California (MWD), Denver Water, and the Southern Nevada Water Authority (SNWA). This agreement established the PSCP[32] to fund the creation of Colorado River system water through voluntary water conservation actions and reductions in water use. For the period from 2015 through 2017, agreements for 45 projects were implemented in the Upper Basin resulting in approximately 21,600 acre-feet (26.6 mcm) of system water, and agreements for 10 projects were implemented in the Lower Basin resulting in approximately 117,000 acre-feet (144 mcm) of system water. Additional agreements may be implemented in 2018.

In addition to the PSCP, 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.[33,34] 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.[35]

[31] Natural flow represents the flow that would have occurred at the location had depletions and reservoir regulation not been present upstream of that location.
[32] More information about the PSCP can be found at: https://www.usbr.gov/lc/region/programs/PilotSysConsProg/pilotsystem.html and http://www.ucrcommission.com/RepDoc/SCPilotP.html.
[33] Explanatory Statement in Division D which accompanied H.R. 2029, Consolidated Appropriations Act, 2016 (Public Law 114-113) (December 18, 2015). More information on additional funding for western drought response in 2016 can be found at: https://www.usbr.gov/newsroom/newsrelease/detail.cfm?RecordID=52587.
[34] Explanatory Statement in Division D which accompanied H.R. 244, Consolidated Appropriations Act, 2017 (Public Law 115-31) (May 4, 2017). More information on additional funding for western drought response in 2017 can be found at: https://www.usbr.gov/newsroom/newsrelease/detail.cfm?RecordID=59916.
[35] Consolidated and Further Continuing Appropriations Act, 2015 (Public Law 113-235, Div. D., Secs. 204-206) (December 16, 2014).

2018 WATER SUPPLY ASSUMPTIONS

For 2018 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 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 2018 is 6.00 maf (7,400 mcm), or 55 percent of average.
- The forecasted most probable unregulated inflow to Lake Powell in water year 2018 is 9.76 maf (12,040 mcm), or 90 percent of average.
- The forecasted maximum probable unregulated inflow to Lake Powell in water year 2018 is 17.50 maf (21,590 mcm), or 162 percent of average.

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

Inflows to the mainstream from Lake Powell to Lake Mead, Lake Mead to Lake Mohave, Lake Mohave to Lake Havasu, and below Lake Havasu are projected using historic data over the five-year period of January 2012 through December 2016, 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 2018 is 0.682 maf (841 mcm), the most probable inflow is 0.757 maf (934 mcm), and the maximum probable inflow is 0.831 maf (1,030 mcm).

The projected monthly volumes of inflow were input into the 24-Month Study and used to project potential reservoir operations for 2018. Starting with the August 2017 24-Month Study projection of the October 1, 2017 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: https://www.usbr.gov/uc/water/crsp/studies/index.html, or https://www.usbr.gov/lc/region/g4000/24mo/index.html.

Table 3. Projected Unregulated Inflow into Lake Powell for Water Year 2018 (English Units)[36]

Time Period	Minimum Probable (maf)	Most Probable (maf)	Maximum Probable (maf)
10/2017 – 12/2017	1.12	1.37	1.85
1/2018 – 3/2018	1.32	1.34	1.78
4/2018 – 7/2018	3.19	6.30	12.35
8/2018 – 9/2018	0.37	0.75	1.52
10/2018 – 12/2018	1.09	1.28	1.74
WY 2018	6.00	9.76	17.50
CY 2018	5.97	9.67	17.39

Table 4. Projected Unregulated Inflow into Lake Powell for Water Year 2018 (Metric Units)

Time Period	Minimum Probable (mcm)	Most Probable (mcm)	Maximum Probable (mcm)
10/2017 – 12/2017	1,380	1,690	2,280
1/2018 – 3/2018	1,630	1,650	2,200
4/2018 – 7/2018	3,930	7,770	15,230
8/2018 – 9/2018	460	930	1,870
10/2018 – 12/2018	1,340	1,580	2,150
WY 2018	7,400	12,040	21,590
CY 2018	7,360	11,930	21,450

[36] All values in Tables 3 and 4 are projected inflows based upon the August 2017 CBRFC forecast with the exception of the values for 10/2018-12/2018. The values for 10/2018-12/2018 are based upon average unregulated inflow from 1981-2010. The calendar year totals in Tables 3 and 4 also reflect average values for the 10/2018-12/2018 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 2017 AND PROJECTED 2018 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)[37] 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),[38] the San Juan River Basin Recovery Implementation Program (SJRIP),[39] 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 2017 and the range of probable projected 2018 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.

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

Fontenelle Reservoir

Reservoir storage in Fontenelle increased during water year 2017. At the beginning of water year 2017, Fontenelle storage was 66 percent of live capacity at elevation 6,490.22 feet (1,978.22 meters), with 0.229 maf (282 mcm) in storage. The unregulated inflow to Fontenelle during water year 2017 was 2.32 maf (2,860 mcm) which is 214 percent of average. At the end of the water year, September 30, 2017, Fontenelle storage was at 76 percent of live capacity at elevation 6,495.21 feet (1,979.74 meters), with 0.263 maf (324 mcm) resulting in a net increase during water year 2017 of 0.035 maf (43 mcm).

Hydrologic conditions in the Upper Green River Basin were above average in water year 2017. Snowpack development tracked above median with wet fall conditions increasing soil moisture resulting in above average runoff forecasts. Peak snow water equivalent reached 161 percent of seasonal median on April 11, 2017. The April forecast for the April through July inflow to Fontenelle Reservoir was 1.68 maf (2,070 mcm), or 232 percent of average. The observed inflow during the April to July season was 1.72 maf (2,120 mcm), or 237 percent of average.

Fontenelle Reservoir filled in water year 2017. The reservoir elevation peaked at 6,505.93 feet (1,983.01 meters) on July 23, 2017, which was 0.07 feet (0.02 meters) below the spillway crest. Inflow peaked at 15,995 cfs (453 cms) on June 11, 2017. 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 9,775 cfs (277 cms) on June 26, 2017 and were reduced to 1,300 cfs (36.8 cms) in September.

Based on the August 2017 24-Month Study, the most probable April through July inflow scenario for Fontenelle Reservoir during water year 2018 is 0.743 maf (916 mcm), or 100 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 2018. 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 2018, 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 increased during water year 2017. At the beginning of water year 2017, Flaming Gorge storage was 85 percent of live capacity at elevation 6,026.27 feet (1,836.81 meters), with 3.21 maf (3,960 mcm) in storage. The unregulated inflow to Flaming Gorge during water year 2017 was 3.15 maf (3,890 mcm) which is 217 percent of average. At the end of the water year, Flaming Gorge storage was at 94 percent of live capacity at elevation 6,033.63 feet (1,839.05 meters), with 3.49 maf (4,300 mcm) resulting in a net increase during water year 2017 of 0.284 maf (350 mcm).

Flaming Gorge Dam operations in 2017 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 2006 Flaming Gorge ROD and, to the extent possible, meet the experimental design parameters outlined in the UCRIP Larval Trigger Study Plan (LTSP).[40] The significant snow accumulation and record forecast volumes required Reclamation to focus on operations for wet hydrologic conditions. Larvae were detected on June 3, 2017. After public notification, releases from Flaming Gorge were increased to full powerplant capacity and additional bypass on June 5, 2017 (in combination, the peak release was approximately 8,600 cfs [243 cms]) for a total of 29 days. Flaming Gorge Dam released powerplant capacity releases of 4,600 cfs (130 cms) for 122 days and above powerplant capacity for a total of 103 days during the April through July runoff period. Yampa River flows at the Deerlodge gage peaked twice during the spring runoff season, at 10,600 cfs (300 cms) on May 15, 2017 and at 9,980 cfs (282 cms) on June 9, 2017. The first peak resulted from increased temperatures in the basin during May and the second from the remaining high elevation snowmelt. The peak release from Flaming Gorge occurred during the second Yampa River peak flows and supported larval entrainment and reservoir management during high spring inflows. Deerlodge flows were less than or equal to 9,980 cfs (282 cms) when Flaming Gorge releases were at powerplant capacity with additional bypass. Flows measured on the Green River at Jensen, Utah reached levels at or above 14,000 cfs (396 cms) for 12 days between June 4 and 15, 2017 with a peak of 17,900 cfs (507 cms) for one day on June 9, 2017. The peak flow at Jensen fell within the average (above median) hydrologic classification under the LTSP.

The hydrologic conditions during spring 2017 consisted of above average snow accumulation beginning in December 2016 and continuing through February 2017, although wet fall soil moisture conditions and much above average snowpack in higher elevations resulted in record forecasted inflows. Snow water equivalent peaked on May 4, 2017 at 194 percent of average. The May final forecast for the April through July unregulated inflow volume into Flaming Gorge Reservoir was 226 percent of average. Significant snow accumulation and above average precipitation events in the Green and Yampa River Basins occurred during January through March. Yampa River spring peak flows were significantly different than the Upper Green and fell into the average (below median) hydrology classification, decreasing from

[40] 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: https://www.usbr.gov/uc/water/crsp/wg/fg/twg/twgSummaries.html.

average (above median) hydrology classification on May 1. The 2006 Flaming Gorge ROD hydrologic classification for the Upper Green was characterized as wet. The flexibility in the ROD allows for a change in hydrology classification two higher and one lower than that designated by the unregulated inflow volume on May 1 depending upon Yampa River conditions. It was determined that, with the drier conditions in the Yampa River Basin, the hydrology classification was moderately wet and the LTSP hydrologic classification was moderately wet based on the May 1 forecast. Yampa River conditions were average (below median), while the observed spring flows were average (below median) as well. Releases began increasing in mid-February to 3,000 cfs (84.9 cms) at rates consistent with 2006 Flaming Gorge ROD requirements. Responding to continued increases in the forecast volume, releases were increased to full powerplant capacity (approximately 4,600 cfs [130 cms]) by March 9, 2017. Releases were increased to one-half the total bypass rate plus powerplant capacity totaling 6,600 cfs (187 cms) on March 27, 2017. Record Flaming Gorge inflows in March of 0.400 maf (493 mcm) (392 percent of average) and increasing forecast volumes necessitated increasing to full powerplant and bypass capacity (approximately 8,600 cfs [243 cms]) by March 30, 2017. Forecasted inflow volumes were unrealized in April and May, which allowed Reclamation to conserve storage and releases were decreased to 6,600 cfs (187 cms) on Thursday, May 11, 2017. Releases again increased to full powerplant and bypass capacity (approximately 8,600 cfs [243 cms]) on June 5, 2017, prior to notification of larval razorback sucker emergence, and remained at this level through July 5, 2017. The Yampa River peaked on May 15, 2017 during 6,600 cfs (187 cms) releases from Flaming Gorge Dam. Larvae spawning was delayed due to the cold temperatures and high releases and occurred on June 3, 2017 after the peak of the Yampa River had occurred. Flows at Jensen did not meet or exceed 2006 Flaming Gorge ROD flow targets in Reach 2 for the ROD Flow Recommendation of at least one day peak duration at 20,300 cfs (574 cms) and 18,600 cfs (526 cms) for two weeks in moderately wet years. 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 did not occur during larval drift.

Consistent with the 2006 Flaming Gorge ROD, considering information provided to the FGTWG, moderately wet 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 2017. The 2006 Flaming Gorge ROD base flow period hydrologic classification was moderately wet as of August 2017. Daily base flows fluctuated during the summer to meet or exceed 2,500 cfs (70.8 cms) on the Green River at Jensen, Utah through September 30, 2017.

During water year 2018, Flaming Gorge Dam will continue to be operated in accordance with the 2006 Flaming Gorge ROD. Under the August 2017 most probable inflow scenario, winter base flow releases are projected to be in the average classification range with a 16 percent increase above the average daily base flows calculated through the base flow period. Winter releases are projected to be approximately 2,800 cfs (79.2 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, 2018. A spring peak release is projected to occur in May or June 2018, 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.[41]

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

Reservoir storage in Blue Mesa increased during water year 2017. At the beginning of water year 2017, Blue Mesa storage was 80 percent of live capacity at elevation 7,500.48 feet (2,286.15 meters), with 0.665 maf (820 mcm) in storage. The unregulated inflow to Blue Mesa during water year 2017 was 1.25 maf (1,540 mcm) which was 131 percent of average. At the end of the water year, Blue Mesa storage was 88 percent of live capacity at elevation 7,508.43 feet (2,288.57 meters), with 0.732 maf (903 mcm) resulting in a net increase during water year 2017 of 0.067 maf (83 mcm).

Above average snowpack conditions occurred during the winter months of water year 2017 in the Gunnison River Basin. Snow measurement sites in the basin reported above average seasonal snow water equivalent levels throughout the winter and into the spring of 2017 resulting in an April 1, 2017 snow water equivalent for the Gunnison River Basin that was 123 percent of average.

The fall through winter releases from Crystal Dam varied between approximately 600 cfs (17.0 cms) and 1,200 cfs (34.0 cms) from the beginning of November 2016 through the end of March 2017. On March 17, 2017, releases from Crystal Dam were increased for operation of the Gunnison Tunnel. Flows through the Black Canyon were maintained within the range of approximately 600 cfs (17.0 cms) to approximately 1,200 cfs (34.0 cms) until May 14, 2017 when releases from Crystal Dam were increased consistent with the 2012 Aspinall ROD flow targets.

The May 2017 final forecast for the unregulated inflow to Blue Mesa for the April through July runoff period was 0.850 maf (1,050 mcm) which was 126 percent of average. This forecast was used to establish an initial peak flow target for the Gunnison River for the spring of 2017. The 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 14,350 cfs (406 cms) for a duration of no less than 10 days with 40 days of shoulder flows with a magnitude no less than 8,070 cfs (228 cms). However, the mid-month April through July forecast dropped to 0.825 maf (1,020 mcm) and this lower forecast resulted in Reclamation adjusting the initial peak flow target to 14,040 cfs (397 cms) for a duration of no less than 2 days with 20 days of shoulder flows at a rate of no less than 8,070 cfs (228 cms). Reclamation operated the Aspinall Unit consistent with attempting to meet this peak flow target by increasing total releases from Crystal Dam to between 11,700 and 13,100 cfs (331 and 371 cms, respectively) for four days beginning on

[41] 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.

May 24, 2017 and ending on May 27, 2017. Gunnison River flows resulted in four consecutive days with flows above 14,040 cfs (397 cms) ending on May 28, 2017.

Releases from Crystal Dam during spring operation, consistent with the 2012 Aspinall ROD peak flow target, resulted in a peak flow through the Black Canyon and the Gunnison River Gorge of 12,200 cfs (345 cms) for 24 hours on May 25, 2017 and Gunnison River flows in the Black Canyon that exceeded the flows described in the Black Canyon Water Right Decree.[42]

The actual April through July unregulated inflow into Blue Mesa Reservoir in 2017 was 0.915 maf (1,130 mcm), which was 137 percent of average.

For water year 2018, the Aspinall Unit will be operated in accordance with the 2012 Aspinall ROD, including all required consultations and consistent with applicable law, while maintaining and continuing to meet its Congressionally-authorized purposes.

Based on the August 2017 24-Month Study, the projected most probable unregulated inflow for water year 2018 into Blue Mesa Reservoir is 0.955 maf (1,080 mcm), or 100 percent of average. The reservoir is expected to reach a seasonal low elevation of 7,482.65 feet (2,280.71 meters) by late March 2018. The peak elevation is expected to be approximately 7,516.74 feet (2,291.10 meters) near the end of July 2018. By the end of water year 2018, Blue Mesa Reservoir is projected to be at elevation 7,506.60 feet (2,288.01 meters), with a storage of 0.717 maf (884 mcm), or 86 percent of capacity.

Navajo Reservoir

Storage in Navajo Reservoir decreased during water year 2017. At the beginning of water year 2017, Navajo storage was 77 percent of live capacity at elevation 6,056.98 feet (1,846.17 meters), with 1.31 maf (1,620 mcm) in storage. The modified unregulated inflow[43] to Navajo during water year 2017 was 1.16 maf (1,430 mcm) which is 108 percent of average. At the end of the water year, Navajo storage was at 76 percent of live capacity at elevation 6,055.28 feet (1,845.65 meters), with 1.29 maf (1,590 mcm) resulting in a net decrease during water year 2017 of 0.021 maf (26 mcm).

Navajo Reservoir reached a peak water surface elevation of 6,078.10 feet (1,852.61 meters) on May 3, 2017, which was 6.9 feet (2.1 meters) below full pool. The April through July modified unregulated inflow into Navajo Reservoir in water year 2017 was 0.776 maf (957 mcm), or 106 percent of average.

The San Juan Flow Recommendations,[44] completed by the SJRIP in May 1999, provide flow recommendations that promote the recovery of the endangered Colorado pikeminnow and

[42] 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 December 31, 2008.
[43] Modified unregulated inflow into Navajo Reservoir is calculated as the observed inflow adjusted for the San Juan Chama diversions and change in storage at Vallecito Reservoir.
[44] Flow Recommendations for the San Juan River, May 1999. Available online at: https://www.fws.gov/southwest/sjrip/pdf/DOC_Flow_recommendations_San_Juan_River.pdf.

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 water year 2017, Navajo Reservoir operated under the SJRIP and Reclamation's interim operations. 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 for 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 2006 Navajo Reservoir ROD in 2017, including the SJRIP's target base flows. Based on the SJRIP and Reclamation's interim operations for water year 2017, there was a spring peak release with peak flows for 31 days, a 16-day ramp up and a 12-day ramp down. The release peaked at 4,900 cfs (139 cms) and totaled 0.495 maf (611 mcm).

During water year 2018, Navajo Reservoir will be operated in accordance with the 2006 Navajo Reservoir ROD. Navajo Reservoir storage levels are expected to be near average in 2018 under the most probable inflow forecast. Base releases from the reservoir will likely range from 350 cfs (9.91 cms) to 600 cfs (17.0 cms) through the winter. Based on the August 2017 most probable April through July modified unregulated inflow forecast of 0.616 maf (760 mcm) in 2018, the August 2017 24-Month Study projects a 21-day spring peak release would be recommended by the anticipated SJRIP and Reclamation's interim operations for water year 2018. The reservoir is projected to reach a peak elevation of 6,067.29 feet (1,849.31 meters) in May 2018. The reservoir is projected to reach a minimum elevation of 6,050.96 feet (1,844.33 meters) in September 2018.

Under the minimum probable 2018 April through July inflow forecast of 0.347 maf (428 mcm), there will be no spring peak release during the spring of 2018. Under the maximum probable 2018 April through July inflow forecast of 1.19 maf (1,470 mcm), a 60-day spring peak release will be recommended as described by the anticipated SJRIP and Reclamation's interim operations for water year 2018.

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.[45] 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.

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

Lake Powell

Reservoir storage in Lake Powell increased during water year 2017. At the beginning of water year 2017, Lake Powell storage was 53 percent of live capacity at elevation 3,610.93 feet (1,100.61 meters), with 12.82 maf (15,810 mcm) in storage. The unregulated inflow to Lake Powell during water year 2017 was 11.90 maf (14,680 mcm) which is 110 percent of average. At the end of the water year, Lake Powell storage was at 60 percent of live capacity at elevation 3,628.31 feet (1,105.91 meters), with 14.66 maf (18,080 mcm) resulting in a net increase during water year 2017 of 1.84 maf (2,270 mcm).

The August 2016 24-Month Study was run to project the January 1, 2017, elevations of Lake Powell and Lake Mead and determine the water year 2017 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, 2017, reservoir elevations of Lake Powell and Lake Mead were projected to be 3,605.83 feet (1,099.06 meters) and 1,078.93 feet (328.86 meters), respectively. Given these projections, the annual release volume from Lake Powell during water year 2017 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 2017 24-Month Study was run with an 8.23 maf (10,150 mcm) annual release volume to project the September 30, 2017, 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 3,646.82 feet (1,111.55 meters) and Lake Mead was 1,072.07 feet (326.77 meters). Since the projected end of water year elevation at Lake Powell was below the 2017 Equalization elevation of 3,652.00 feet (1,113.13 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 2017. 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 2017 was 9.00 maf (11,100 mcm).

The April through July unregulated inflow to Lake Powell in water year 2017 was 8.17 maf (10,080 mcm) which was 114 percent of average. Lake Powell reached a peak elevation of 3,635.80 feet (1,108.19 meters) for water year 2017 on July 11, 2017, which was 64.20 feet (19.57 meters) below full pool. This peak elevation corresponds to a live storage content of 15.51 maf (19,130 mcm).

The fourth experimental release under the High-Flow Experimental Protocol[46] was conducted during November 2016 (water year 2017). Reclamation released 38,000 cfs (1,080 cms), the maximum capacity available during the experiment, beginning on November 7 and ending on November 12, 2016. The release at its maximum rate consisted of approximately 23,000 cfs (651 cms) through the turbines and 15,000 cfs (425 cms) through the bypass tubes. Approximately 0.132 maf (163 mcm) was bypassed during the experiment. The total annual release from Glen Canyon Dam in water year 2017 did not change as a result of the High Flow Experiment (HFE).

In December 2016, the Secretary signed the LTEMP ROD. In water year 2017, Glen Canyon Dam operations transitioned to implement the LTEMP ROD.

The ten-year total flow of the Colorado River at Lee Ferry[47] for water years 2008 through 2017 is 91.67 maf (113,070 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.

2018 Operating Tier and Projected Operations for Glen Canyon Dam. The January 1, 2018 reservoir elevations of Lake Powell and Lake Mead are projected under the most probable inflow scenario to be 3,627.34 feet (1,105.61 meters) and 1,083.46 feet (330.24 meters), respectively, based on the August 2017 24-Month Study. Given these projections, the operating tier and annual release volume from Lake Powell during water year 2018 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 2018 24-Month Study, with a water year release volume of 8.23 maf (10,150 mcm) projects the September 30, 2018, Lake Powell elevation to be greater than 3,654.00 feet (1,113.74 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 2018 24-Month Study, with a water year release volume of 8.23 maf (10,150 mcm), projects the September 30, 2018, Lake Powell elevation to be at or above 3,575.00 feet (1,089.66 meters) and below the 2018 Equalization level of 3,654.00 feet (1,113.74 meters), and the September 30, 2018, 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) from Lake Powell in water year 2018 consistent with Section 6.B.4 of the 2007 Interim Guidelines.

[46] 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: https://www.usbr.gov/uc/envdocs/ea/gc/HFEProtocol/index.html.

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

Under the minimum probable inflow scenario, the August 2017 24-Month Study, with a projected water year release volume of 8.23 maf (10,150 mcm) in water year 2018, projects that the elevations of Lake Powell and Lake Mead on September 30, 2018, would be 3,613.22 feet (1,101.31 meters) and 1,064.43 feet (324.44 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 2018 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 3,606.21 feet (1,099.17 meters) and 12.35 maf (15,230 mcm), respectively, based on the minimum probable inflow scenario.

Under the most probable inflow scenario, the August 2017 24-Month Study, with a projected water year release volume of 8.23 maf (10,150 mcm) in water year 2018, projects that the elevations of Lake Powell and Lake Mead on September 30, 2018, would be 3,641.00 feet (1,109.78 meters) and 1,067.10 feet (325.25 meters), respectively. Based on these projections, under the most probable inflow scenario, an April adjustment to balancing is projected to occur during water year 2018. Consistent with Section 6.B.4, the 2018 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 3,634.82 feet (1,107.89 meters) and 15.40 maf (19,000 mcm), respectively.

Under the maximum probable inflow scenario, the August 2017 24-Month Study, with a projected water year release volume of 8.23 maf (10,150 mcm) in water year 2018, projects that the elevation of Lake Powell on September 30, 2018, would be 3,690.53 feet (1,124.87 meters). This elevation is above the Equalization Level for water year 2018 of 3,654.00 feet (1,113.74 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 2018 is projected to be 13.82 maf (17,050 mcm). The end of water year elevation and storage of Lake Powell is projected to be 3,654.00 feet (1,113.74 meters) and 17.72 maf (21,860 mcm), respectively, based on the maximum probable inflow scenario.

In 2018, 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.

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 2018. If implemented, releases greater than powerplant capacity would be made consistent with the 1956 Colorado River Storage Project Act,[48] the CRBPA, the LTEMP ROD, and the Glen Canyon Dam Operating Criteria.

Releases from Lake Powell in water year 2018 will continue to reflect consideration of the uses and purposes identified in the authorizing legislation for Glen Canyon Dam. Monthly releases will also be consistent with the LTEMP ROD and applicable Secretarial decisions, and are

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

updated to be consistent with annual volumes determined pursuant to the 2007 Interim Guidelines.

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

Daily and hourly releases in 2018 will be made according to the parameters of the 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 Glen Canyon Dam Operating Criteria.

During water year 2018, the Department of the Interior will coordinate planning for experimental flows from Glen Canyon Dam in accordance with the 2016 Glen Canyon Dam LTEMP ROD.

Lake Mead

For calendar year 2017, 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, 319, 322, and 323 of the IBWC.

Lake Mead began water year 2017 on October 1, 2016, at elevation 1,075.23 feet (327.73 meters), with 9.62 maf (11,870 mcm) in storage, which is 37 percent of the conservation capacity[49] of 26.12 maf (32,220 mcm). Lake Mead ended water year 2017 at elevation 1,082.05 feet (329.81 meters) with 10.18 maf (12,560 mcm) in storage (39 percent of capacity) on September 30, 2017.

The total release from Lake Mead through Hoover Dam during water year 2017 was 8.62 maf (10,630 mcm). The total release from Lake Mead through Hoover Dam during calendar year 2017 is projected to be 8.65 maf (10,670 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 2017, inflow into Lake Mead was 9.99 maf (12,320 mcm), consisting of 9.00 maf (11,100 mcm) of water released from Glen Canyon Dam and 0.994 maf (1,230 mcm) of inflows between Glen Canyon and Hoover Dams. For water year 2018, under the most probable inflow scenario, total inflow into Lake Mead is anticipated to be 9.76 maf (12,040 mcm).

[49] 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.

Based on the August 2017 24-Month Study, Lake Mead's elevation on January 1, 2018, is projected to be 1,083.46 feet (330.24 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 2018. Releases from Lake Mead through Hoover Dam for water year and calendar year 2018 are anticipated to be approximately the same as 2017 releases.

Under the most probable inflow scenario, Lake Mead is projected to end water year 2018 at elevation 1,076.04 feet (327.98 meters), with 9.69 maf (11,950 mcm) in storage (37 percent of capacity). Lake Mead is projected to increase to elevation 1,079.47 feet (329.02 meters) with 9.97 maf (12,300 mcm) in storage (38 percent of capacity) at the end of calendar year 2018.

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: https://www.usbr.gov/lc/region/g4000/24mo/index.html.

Lakes Mohave and Havasu

Lake Mohave started water year 2017 at an elevation of 640.34 feet (195.18 meters) with 1.63 maf (2,010 mcm) in storage. The water level of Lake Mohave was regulated between elevation 634.86 feet (193.51 meters) and 644.65 feet (196.49 meters) during the water year, ending at an elevation of 639.47 feet (194.91 meters), with 1.60 maf (1,980 mcm) in storage. During water year 2017, 8.26 maf (10,190 mcm) was released from Davis Dam. The calendar year 2017 total release is projected to be 8.37 maf (10,320 mcm).

For water and calendar years 2018, Davis Dam is projected to release approximately the same amount of water as in 2017, 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 2017 at an elevation of 447.97 feet (136.54 meters) with 0.579 maf (714 mcm) in storage. The water level of Lake Havasu was regulated between elevation 446.33 feet (136.04 meters) and 448.73 feet (136.77 meters) during the water year, ending at an elevation of 447.17 feet (136.30 meters), with 0.564 maf (696 mcm) in storage. During water year 2017, 6.20 maf (7,650 mcm) was released from Parker Dam. The calendar year 2017 total release is projected to be 6.32 maf (7,790 mcm).

For water and calendar years 2018, Parker Dam is expected to release approximately the same amount of water as in 2017, 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

Alamo Lake elevation and storage increased during water year 2017. Alamo Lake started water year 2017 at elevation 1,079.48 feet (329.03 meters) with 0.037 maf (45.9 mcm) in storage, and ended water year 2017 at elevation 1,113.58 feet (339.42 meters) with 0.120 maf (148 mcm) in storage. In water year 2017, average daily releases from Alamo Lake ranged from about 10 to 50 cfs (0.28 to 1.13 cms). Water released by the U.S. Army Corps of Engineers (USACE) from Alamo Dam totaled 0.022 maf (27 mcm) for water year 2017.

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 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 2018.

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 (1.73 mcm) of sediment, reestablishing 140 acres (0.57 square kilometers) of open water. As of October 2017, approximately 1.83 million cubic yards (1.40 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 2019.

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 (IID), 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 2017 are projected to be 5.34 maf (6,590 mcm). The flows arriving at Imperial Dam for calendar year 2018 are projected to be 5.45 maf (6,720 mcm).

Gila River Flows

During water year 2017, there was above 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 2017.

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)[50] 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 2017, the amount of water discharged from the Wellton-Mohawk Division through the bypass canal is anticipated to be 0.106 maf (131 mcm) measured at station 0+00 and 0.120 maf (148 mcm) measured at the Southerly International Boundary (SIB), at an approximate concentration of total dissolved solids of 2,400 parts per million (ppm).

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

Off-stream Storage Agreements

Colorado River water may be stored off-stream pursuant to individual SIRAs and 43 CFR Part 414 within the Lower Division States. The Secretary shall make ICUA available to contractors in Arizona, California, or Nevada pursuant to individual SIRAs and 43 CFR Part 414. SNWA may propose to make unused Nevada basic apportionment available for storage by MWD and/or the Arizona Water Banking Authority (AWBA) in calendar years 2017 and 2018.[51,52]

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[53] were executed concurrent with the issuance of the ROD for the 2007 Interim Guidelines. ICS credits may be created and delivered in calendar years 2017 and 2018 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.[54]

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 Intentionally Created Mexican Allocation (ICMA), 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.

[51] 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: https://www.usbr.gov/lc/region/g4000/contracts/SNWA_MWDSIRAfinal.pdf.

[52] 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: https://www.usbr.gov/lc/region/g4000/contracts/SIRAfinal.pdf.

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

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

Extraordinary Conservation ICS. IID has approved plans to create up to 0.025 maf (31 mcm) of Extraordinary Conservation ICS in 2017 and 2018. MWD has an approved plan to create up to 0.398 maf (491 mcm) of Extraordinary Conservation ICS in 2017[55] and has submitted a plan to create up to 0.390 maf (481 mcm) in 2018. Contractors with available Extraordinary Conservation ICS may request delivery of ICS credits in 2017 and 2018.

System Efficiency ICS. In 2017 and 2018, 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 2017 and 2018, 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 approved plans to create up to 0.047 maf (58 mcm) of Tributary Conservation ICS in 2017 and 2018. 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 2017 and may submit a plan to create Imported ICS in 2018. Any Imported 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.

Binational ICS. Parties to the funding agreement for the IBWC Minute No. 319 ICMA/ICS Exchange pilot program (CAWCD, MWD, and SNWA) may request delivery of Binational ICS credits subsequent to their conversion in proportion to each party's net capital contributions. Subject to the provisions of an exhibit to the funding agreement, dated September 21, 2017, IID may request delivery of Binational ICS credits subsequent to their conversion in proportion to its capital contribution funded through an agreement with MWD.

Delivery of Water to Mexico

Delivery to Mexico pursuant to the 1944 United States-Mexico Water Treaty and IBWC Minutes No. 319 and 323 is anticipated to be 1.500 maf (1,850 mcm) in calendar year 2017. It is not anticipated that Mexico will create water for or take delivery of water from Mexico's Water Reserve pursuant to Section V of IBWC Minute No. 323 in calendar year 2017. 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.[56]

Of the scheduled delivery to Mexico in calendar year 2017, approximately 1.360 maf (1,680 mcm) is projected to be delivered at NIB and approximately 0.140 maf (173 mcm) is projected

[55] MWD's initial plan to create up to 0.200 maf (247 mcm) of Extraordinary Conservation ICS in 2017 was approved by Reclamation on November 30, 2016. In July 2017, MWD submitted a modified plan to create up to 0.398 maf (491 mcm) in 2017, which was recommended for approval by the Colorado River Basin States Governors' representatives and the Upper Colorado River Commission. Consistent with this recommendation, MWD's modified ICS plan for 2017 was approved by Reclamation on October 11, 2017.

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

to be delivered at SIB. Under IBWC Minute No. 322 and the Emergency Delivery Agreement,[57] water may be delivered for Tijuana through MWD, the San Diego County Water Authority, and the Otay Water District's respective distribution system facilities in California. No water is anticipated to be delivered to Tijuana, Baja California in calendar year 2017.

Of the total delivery at SIB projected in calendar year 2017, 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 0.020 maf (25 mcm) in calendar year 2017. 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 2018. In accordance with IBWC Minute No. 323, Mexico may create water for or take delivery of water from Mexico's Water Reserve pursuant to Section V of IBWC Minute No. 323. 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 2018 will be delivered at NIB. Mexico, through IBWC, may request water to be delivered to Tijuana in calendar year 2018, consistent with IBWC Minute No. 322 and the Emergency Delivery Agreement.

Drainage flows to the Colorado River from the Yuma Mesa Conduit and South Gila Drain Pump Outlet Channels are projected to be 0.0045 maf (5.6 mcm) and 0.037 maf (46 mcm), respectively, for calendar year 2017. This water is available for delivery at NIB in satisfaction of the 1944 United States-Mexico Water Treaty. Through February 2017, Reclamation held a permit from the Arizona Department of Water Resources (ADWR)[58] 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. The permit expired on March 1, 2017. Salinity conditions did not allow for increased pumping in 2017.

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 2017 is projected to be 138 ppm by the United States' count.

Mexico has identified four critical months for agriculture, September through December, regarding improving the quality of water delivered at SIB. Consistent with an MOU between

[57] 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 January 18, 2017.

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

Reclamation and the U.S. Section of the IBWC[59] and Section VI.B of IBWC Minute No. 323,[60] the United States has improved the water quality delivered at the SIB to approximately 1,200 ppm during this four-month period. 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. Reclamation anticipates bypassing approximately 0.001 maf (1.2 mcm) in calendar year 2017 to the diversion channel for salinity control and up to 0.008 maf (9.9 mcm) in calendar year 2018.

[59] Available online at: https://www.usbr.gov/lc/region/g4000/10_2001MOU.pdf.

[60] The MOU between Reclamation and the U.S. Section of the IBWC was in effect in calendar year 2017. Upon entry into force of IBWC Minute No. 323 on September 27, 2017, Section VI.B of IBWC Minute No. 323 was in effect for the remainder of 2017 and in calendar year 2018.

2018 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, 2018, 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 2017 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 2018. The August 2017 24-Month Study of the most probable inflow scenario projects the water year 2018 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 2017 water year operations, the projected water year release from Lake Powell in 2018 is likely to be in the estimated range of 8.23 maf (10,150 mcm) to 13.82 maf (17,050 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 2018 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 2017 24-Month Study was used to forecast the system storage as of January 1, 2018. Based on a projected January 1, 2018 Lake Mead elevation of 1,083.46 feet (330.24 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 2018 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 2018 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 2018 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 2018 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 PSCP and the December 10, 2014 MOU for Lower Basin Pilot Drought Response Actions.

In calendar year 2018, 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 2018.

The IOPP, which became effective January 1, 2004, will be in effect during calendar year 2018. Payback balances by state and user may be found in the annual Colorado River Accounting and Water Use Report, Arizona, California, and Nevada.[61]

In calendar year 2018, conserved Colorado River water is anticipated to be added to system reservoirs pursuant to system conservation agreements.

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 2018 and ICS credits will be created and delivered pursuant to the 2007 Interim Guidelines and appropriate forbearance and delivery 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.

[61] Available online at: https://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 V of IBWC Minute No. 323. 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 2018 subject to and in accordance with Article 15 of the 1944 United States-Mexico Water Treaty and Minutes No. 242 and 322 of the IBWC. In accordance with IBWC Minute No. 323, Mexico may create water for or take delivery of water from Mexico's Water Reserve pursuant to Section V of IBWC Minute No. 323.

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 (which contains specific provisions regarding adjustment of delivery schedules) and IBWC Minute No. 323.

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 agreements in Minute No. 242 of August 30, 1973 (Treaty Series 7708; 24 UST 1968), Minute No. 319 of November 20, 2012, Minute No. 322 of January 19, 2017, or Minute No. 323 of September 21, 2017; 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); 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); or the rules, criteria, guidelines, and decisions referenced within this AOP.

ACRONYMS AND ABBREVIATIONS

ADWR	Arizona Department of Water Resources
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
cfs	cubic feet per second
cms	cubic meters per second
CRBPA	Colorado River Basin Project Act of 1968
FGTWG	Flaming Gorge Technical Working Group
HFE	High Flow Experiment
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
LTEMP	Long-Term Experimental and Management Plan
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
PSCP	Pilot System Conservation Program
Reclamation	Bureau of Reclamation
ROD	Record of Decision
Secretary	Secretary of the U.S. Department of the Interior
Service	U.S. 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	U.S. Army Corps of Engineers
UCRIP	Upper Colorado River Endangered Fish Recovery Program
WAPA	Western Area Power Administration
YDP	Yuma Desalting Plant