Colorado River Board of California

August 29, 2019

NOTICE OF REGULAR MEETING OF THE COLORADO RIVER BOARD

NOTICE IS HEREBY GIVEN pursuant to the call of the Chairperson, Peter Nelson, by the undersigned Executive Director of the Colorado River Board of California that a regular meeting of the Board Members is to be held as follows:

Date:	Wednesday, September 11, 2019
Time:	10:00 a.m.
Place:	Orchid Room Sheraton Ontario Airport Hotel 429 North Vineyard Avenue Ontario, CA 91764

The Colorado River Board of California welcomes any comments from members of the public pertaining to items included on this agenda and related topics. Oral comments can be provided at the beginning of each Board meeting; while written comments may be sent to Mr. Peter Nelson, Chairperson, Colorado River Board of California, 770 Fairmont Avenue, Suite 100, Glendale, California, 91203-1068.

Requests for additional information may be directed to: Mr. Christopher S. Harris, Executive Director, Colorado River Board of California, 770 Fairmont Avenue, Suite 100, Glendale, CA 91203-1068, or 818-500-1625. A copy of this Notice and Agenda may be found on the Colorado River Board's web page at www.crb.ca.gov.

A copy of the meeting agenda, showing the matters to be considered and transacted, is attached.

Christopher S. Harris
Executive Director

Regular Meeting
COLORADO RIVER BOARD OF CALIFORNIA
Wednesday, September 11, 2019
10:00 a.m.

At the discretion of the Board, all items appearing on this agenda, whether or not expressly listed for action, may be deliberated upon and may be subject to action by the Board. Items may not necessarily be taken up in the order shown.

1. Call to Order

2. Opportunity for the Public to Address the Board (Limited to 5 minutes)
In accordance with California Government Code, Section 54954.3(a)

3. Administration
a. Consideration and approval of the Minutes of the meeting held June 12, 2019 (Action)

4. Water Supply and Operations Reports
a. Colorado River Basin Report
b. State and Local Reports

5. Staff Reports regarding Colorado River Basin Programs
a. Glen Canyon Dam Adaptive Management Program
b. Lower Colorado River Multi-Species Conservation Program
c. Colorado River Basin Salinity Control Program
d. Basin States Climate and Hydrology State of the Science draft report
e. General announcements

6. Executive Session
An Executive Session may be held by the Board pursuant to provisions of Article 9 (commencing with Section 11120) of Chapter 1 of Part 1 of Division 3 of Title 2 of the Government Code and Sections 12516 and 12519 of the Water Code to discuss matters concerning interstate claims to the use of Colorado River system waters in judicial proceedings, administrative proceedings, and/or negotiations with representatives from other states or the federal government.
a. California's Negotiating Strategy for the next set of Interim Operating Guidelines

7. Other Business

8. Future Agenda Items

Next Scheduled Board Meeting: October 9, 2019
10:00 a.m.
Sheraton Ontario Airport Hotel
Orchid Room
429 North Vineyard Avenue
Ontario, California 91764

Minutes of Meeting
COLORADO RIVER BOARD OF CALIFORNIA
Wednesday, June 12, 2019

A meeting of the Colorado River Board (Board) of California was held on Wednesday, June 12, 2019 at the Sheraton Ontario Airport Hotel, 429 North Vineyard Avenue, Ontario, California 91764 on Wednesday, June 12, 2019.

Board Members and Alternates Present:

David DeJesus (MWD Alternate)
Jeanine Jones (DWR Designee)
Henry Kuiper (Public Member)
Peter Nelson, Chairman (CVWD)
Glen D. Peterson (MWD)
David R. Pettijohn (LADWP)
Jack Seiler (PVID Alternate)
David Vigil (DFW Alternate)
Mark Watton (SDCWA Alternate)

Board Members and Alternates Absent:

Nicole Neeman-Brady (Public Member)
Evelyn Cortez-Davis (LADWP Alternate)
Dana B. Fisher, Jr. (PVID)
Norma Sierra Galindo (IID Alternate)
James Hanks (IID)
Christopher Hayes (DFW Designee)
Jim Madaffer (SDCWA)
John Powell, Jr. (CVWD Alternate)

Others Present:

Steve Abbott
Brian Alvarez
Roberto Gonzalez
Melissa Brown-Haley
Christopher Harris
Michael Hernandez
Ned Hyduke
David De Jesus
Lisa Johansen
Rich Juricich
Tom Levy
Kara Mathews
Ivory Reyburn
Tom Ryan
Eric Ruckdaschel
Gary Tavetian
Kimberlyn Velasquez
Jerry Zimmerman

CALL TO ORDER

Chairman Nelson announced the presence of a quorum and called the meeting to order at 10:05 a.m.

OPPORTUNITY FOR THE PUBLIC TO ADDRESS THE BOARD

Chairman Nelson invited members of the audience to address the Board on items on the agenda or matters related to the Board. Hearing none, Chairman Nelson moved to the next item on the agenda.

ADMINISTRATION

Chairman Nelson asked for a motion to approve the May 15, 2019, Board meeting minutes. Mr. Pettijohn moved that the minutes be approved, seconded by Mr. Peterson. By roll-call vote, the minutes were unanimously approved.

Chairman Nelson asked for a motion to approve the Fiscal Year 2019-2020 budget. Mr. Pettijohn moved that the budget be approved, seconded by Mr. Kuiper. By roll-call vote, the budget was unanimously approved.

Overview of the Improving Sub-Seasonal to Seasonal Precipitation Forecasting Workshop, Western States Water Council/DWR

Ms. Jones, representing the California Department of Water Resources (CA DWR), reported on the Western States Water Council and CA DWR's annual workshop focused on improving longer term precipitation forecasting held on May 22-24, 2019 in San Diego, California. Ms. Jones explained that the Western States Water Council is comprised of 18 western states with representatives appointed by their governors. The council was originally formed through the Western's Governors' Association. Further, she explained that the council provides the opportunity for state water agencies to coordinate on several issues, like federal appropriation lobbying.

Ms. Jones reported that 2018 marked the 10-year anniversary of CA DWR's Winter Outlook Workshops with the research community, which began as a result of the 2007-2009 drought in California. She noted that over the years there has been great progress in improving sub-seasonal to seasonal forecasting (S2S) and more work on this effort is underway. She stated that the National Academies of Science released a report outlining a ten-year research direction for National Oceanic and Atmospheric Administration's (NOAA) to follow that will continue to improve S2S forecasting. She added that the recent legislation, the Weather Research and

Forecasting Innovation Act of 2017, will require NOAA to prepare a report to Congress outlining how it will improve its S2S forecasting abilities.

Ms. Jones reported that the goal of improving forecasting is to develop a seamless suite of forecasts that extend from forecasts of hourly precipitation, needed for managing flooding, to longer time scales, that would be helpful with dealing with droughts. She noted that CA DWR has been doing a lot of groundwork to support this effort. Ms. Jones stated that CA DWR's decade long partnership with NOAA on the Hydrometerology Testbed program has funded research to observed and analyze atmospheric rivers (AR), which contribute to much of the State's extreme precipitation events. She noted that various water agencies throughout California have been using improved forecasting of extreme precipitation events to run operations of its reservoir, adding that there are pilot projects underway in the counties of Sonoma, Orange, and Yuba. Ms. Jones noted that most reservoirs use rule curves for flood control operations, which have no forecasting skill.

Ms. Jones displayed a graphic showing the various ranges of seasonal precipitation prediction skill that the National Weather Service possesses for many areas of the United States. She reported that forecasting skill quickly declines as the time scale increases beyond two weeks. Ms. Jones explained that for several areas in the western U.S. there is little to no forecasting skill. She reiterated that CA DWR's investment in the AR observing station will help improve forecasting in these areas.

Ms. Jones reported that in December 2018, CA DWR and NOAA executed a 5-year contract for $750,000 a year to develop near to longer-term projects ranging from statistical post-processing of current weather model runs to model data assimilation, to improving model representation of tropical convection. She explained that the contract will also include collaborating with NASA Jet Propulsion Lab (JPL) to explore forecasting pressure ridges, which disrupt precipitation patterns. She noted the that during the last drought, the "ridiculously resilient ridge" persisted during 2014 and 2015. She stated that JPL has identified the ideal locations of possible ridges locations in California and the Colorado River Basin where precipitation conditions are expected to be dry.

Ms. Jones also reported that CA DWR has contracted with the Universities of California at Los Angeles (UCLA) and Irvine (UCI) for climate-scale analyses. She stated that the contract with UCLA will focus on experimental season statistical model forecast for California and the Upper Colorado River Basin. The contract with UCI will be for an analysis of climate diagnostics associated with wet season transitions.

Ms. Jones reported that during the workshop, Park Williams, a researcher at Columbia University, Lamont-Doherty Earth Observatory, discussed research on cold season (from November to March) precipitation variability and the development of more severe droughts in the mid-1970s through analysis of the long-term paleo record on precipitation.

Ms. Jones concluded that CA DWR will continue to work with NOAA to progress the science and research for S2S forecasting and NOAA's report to Congress is expected soon.

COLORADO RIVER BASIN WATER REPORTS

Colorado River Basin Report

Mr. Harris reported that as of June 10th, the water level at Lake Powell was 3,590.27 feet with 10.85 million-acre feet (MAF) of storage, or 45% of capacity. The water level at Lake Mead was 1,085.71 feet with 10.49 MAF of storage, or 40% of capacity. As of June 9th, the total system storage was 29.15 MAF, or 49% of capacity, which is about 1.5 MAF less than the system storage at this same time last year.

Mr. Harris reported that the forecasted Water Year 2019 inflow in Lake Powell is 13.49 MAF, or 125% of normal. The forecasted April to July 2019 runoff into Lake Powell is projected to be 10.30 MAF, or 144% of normal. The May 2019 observed Lake Powell inflow was 2.51 MAF (107% of normal), and the June Lake Powell inflow forecast is 4.40 MAF (165% of normal). To date, the WY-2019 precipitation is 125% of normal and the current basin snowpack is 765% of normal.

Mr. Harris reported on the monthly precipitation conditions in the Basin, noting that conditions in April were below average in the Lower Basin. He noted that during the last week of April, precipitation conditions greatly improved and precipitation conditions in May were wet and cool throughout most of the Basin.

Mr. Harris reported that intervening flows between Glen Canyon Dam and Lake Mead, were 1.1 MAF this year, noting that the average flows are close to 800,000 AF. He added that during this time of the year, 500,000 AF more is released from Hoover Dam to meet downstream demands but demands have declined due to cooler weather in the Lower Basin. He noted that in conjunction with the proposed conservation in the Lower Basin, the Lower Basin has set the stage for formal implementation of the Drought Contingency Plan (DCP).

Mr. Harris reported that as of May 30th, Brock and Senator Wash Reservoirs captured 58,072AF and 47,800 AF, respectively. She also reported that excess deliveries to Mexico through June 2nd, were 3,370 AF. As of June 3rd, the total bypassed to the Cienega de Santa Clara in Mexico is 38,483 AF.

State and Local Report

Mr. Harris reported that the State's reservoir system storage is above average. He noted that CA DWR has activated its flood operation center, noting that there is a possibility for localized flooding due to increased snow melt in the Sierras due to increasing temperatures.

Board member Peterson, representing The Metropolitan Water District of Southern California (MWD), stated as of June 1st, the combined reservoir storage is 95% of capacity. He also noted MWD continues to conserve water. Board member Pettijohn, representing the Los Angeles Department of Water and Power (LADWP), added that by the end of the year MWD will have 3.3 MAF in combined storage, which the most MWD has ever had in its history.

Board member Pettijohn reported that as of June 5th, the Eastern Sierra snowpack is 64% of the April 1st normal.

STATUS OF COLORADO RIVER BASIN PROGRAMS
Status of the Lower Basin Drought Contingency Plan

Mr. Harris reported that the Colorado River Basin Drought Contingency Plans had been executed on May 20th in a ceremony at Hoover Dam, at which the Colorado River commissioners and Bureau of Reclamation signed the final agreements. A small binational work group continues efforts to reconcile the operational and accounting aspects of the Lower Basin Drought Contingency Plan and the Binational Water Scarcity Contingency Plan, which will be finalized in a Joint Engineer's Report from USIBWC/CILA. With the completion of this report, possibly by early July, the United States and Mexico will be prepared to begin contributions to Lake Mead in Water Year 2020, if needed.

Status of the Salinity Control Program

Board Staff Rich Juricich reported on the Work Group, Forum, and Advisory Council meetings held on June 3rd to 6th in Denver, Colorado. This meeting marked the 100th meeting of the Forum since the first one in November of 1973. The first meeting was also held in Denver. Mr. Juricich reported that Mr. William Hasencamp was elected to chair the Forum for the next two years. Mr. Harris added that this is the first time a representative from the Metropolitan Water District has been the Forum Chair. Mr. Juricich reported that Ms. Rebecca Mitchell from Colorado will be the Vice Chair.

Mr. Juricich reported that the Paradox Valley Unit EIS continues to be on schedule with the Administrative Draft EIS to be released for a 30-day review by the cooperating agencies in

August, after which the Draft EIS for public comment will be out in November or December. The Final EIS is scheduled for release next year. Mr. Juricich reported that there was a discussion on the March 4th earthquake near the Paradox Valley Unit. More than 1,700 aftershocks occurred through May. Reclamation is completing their analysis of what the earthquake means in terms of project operations moving forward. The injection facility is currently shut down and brine is flowing down the Dolores into the Colorado River system.

Mr. Juricich reported that Reclamation's Funding Opportunity Announcement (FOA) was released on May 31st. Reclamation held a couple of workshops this week in Colorado, where most of the interest was. Reclamation will select projects in November. Mr. Juricich reported that the Program Funding Committee continues to discuss the Lower Colorado River Basin Development Fund's revenue shortfall to meet required cost-share dollars.

Mr. Juricich reported that there was long discussion at the meeting on the 2020 Triennial Review, looking at three scenarios on different levels of salinity control. Discussion will continue over the next year or so. Reclamation has included the DCP in the Colorado River Simulation System (CRSS) modeling runs with a stress test that include a dry period in 1988 and 2017 to show how it affects the river system. As expected, the salinity was higher in those dry periods.

Mr. Juricich reported that USGS continues to evaluate Pah Tempe Springs as a location for another potential salinity control project. USGS was able to recover an existing Reclamation well that goes right through the high salinity water. USGS will do additional test on the well before deciding whether they need to drill a new well in the area.

In terms of next meetings, the Work Group will meet in Salt Lake City on August 26-28 and the Forum and Advisory Council will have theirs in late October in Arizona.

Status of the Glen Canyon Dam Adaptive Management Program

Mr. Harris reported that the Glen Canyon Dam Adaptive Management Work Group met via webinar on May 22nd. The group heard from researchers on the impacts of high flow experiments (HFEs) on various resources. Researchers reported that HFE implementation appears to have no population-level effects on native fish or brown trout. Although there may be a link between spring HFEs and increased rainbow trout reproduction, more research is needed. Mr. Harris reported that the Technical Work Group (TWG) was meeting June 11-12 in Phoenix, Arizona.

ANNOUNCEMENTS

Mr. Harris reported briefly on the Fontanelle Dam Riprap Expansion Project. Mr. Harris indicated that the State of Wyoming postponed the expansion project until the reservoir is drawn down in the future drought.

Mr. Harris reported on the first minibus appropriations package. Mr. Harris stated that the Rules Committee will meet to determine which amendment will be offered and the Senate will follow suite in late June or July after review of the appropriation bills.

Mr. Harris reported on the United States Bureau of Reclamation Title Transfer. Mr. Harris indicated that Reclamation made changes to their processes and requirements for title transfer, which will help streamline the process. Mr. Harris reported that Districts interested in title transfers, should submit a written request to the appropriate Reclamation area office and Reclamation will determine the process.

Mr. Harris reported that the House passed the $19 billion disaster aid bill which the Senate previously passed. Mr. Harris reported that the monies will go to certain Federal Agencies for disaster related projects.

Finally, Mr. Harris noted that the next meeting of the Colorado River Board would be July 10th and would be held in Ontario, California; however, it may be cancelled and moved to August 14, 2019.

ADJOURNMENT

With no further items to be brought before the Board, Chairman Nelson adjourned the meeting at 10:53 a.m.

9/3/2019

LOWER COLORADO WATER SUPPLY REPORT

River Operations
Bureau of Reclamation

Questions: BCOOWaterops@usbr.gov
(702)293-8373
http://www.usbr.gov/lc/region/g4000/weekly.pdf

CURRENT STORAGE	PERCENT FULL	Content 1000 ac-ft (kaf)	Elev. (Feet above mean sea level)	7-Day Release (CFS)
LAKE POWELL	56%	13,589	3,618.35	13,700
* LAKE MEAD	39%	10,309	1,083.57	13,300
LAKE MOHAVE	93%	1,675	642.14	12,900
LAKE HAVASU	91%	562	447.07	9,700
TOTAL SYSTEM CONTENTS **	54%	32,242		
As of 9/2/2019				
SYSTEM CONTENT LAST YEAR	48%	28,815		

* Percent based on capacity of 26,120 kaf or elevation 1,219.6 feet.

** TOTAL SYSTEM CONTENTS includes Upper & Lower Colorado River Reservoirs, less Lake Mead exclusive flood control space.

Salt/Verde System[1]	71%	1,621		
Painted Rock Dam	0%	0	530.00	0
Alamo Dam	13%	132	1,117.13	25

Forecasted Water Use for Calendar Year 2019 (as of 9/3/2019) (values in kaf)

NEVADA	254	
SOUTHERN NEVADA WATER SYSTEM		223
OTHERS		32
CALIFORNIA	4,039	
METROPOLITAN WATER DISTRICT OF CALIFORNIA		566
IRRIGATION DISTRICTS		3,460
OTHERS		13
ARIZONA	2,624	
CENTRAL ARIZONA PROJECT		1,491
OTHERS		1,134
TOTAL LOWER BASIN USE		6,918
DELIVERY TO MEXICO - 2019 (Mexico Scheduled Delivery + Preliminary Yearly Excess[2])		1,516

OTHER SIGNIFICANT INFORMATION

UNREGULATED INFLOW INTO LAKE POWELL - AUGUST MID-MONTH FORECAST DATED 8/14/2019

	MILLION ACRE-FEET	% of Normal
FORECASTED WATER YEAR 2019	13.510	125%
PRELIMINARY OBSERVED APRIL-JULY 2019	10.410	145%
JULY OBSERVED INFLOW	2.451	225%
AUGUST INFLOW FORECAST	0.675	135%

	Upper Colorado Basin	Salt/Verde Basin
WATER YEAR 2019 PRECIP TO DATE	114% (33.3")	105% (27.6")
CURRENT BASIN SNOWPACK	NA% (NA)	NA% (NA)

[1] SRP Data as of 8/28/2019

[2] Delivery to Mexico forecasted yearly excess calculated using year-to-date observed and projected excess.

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LOWER COLORADO REGION
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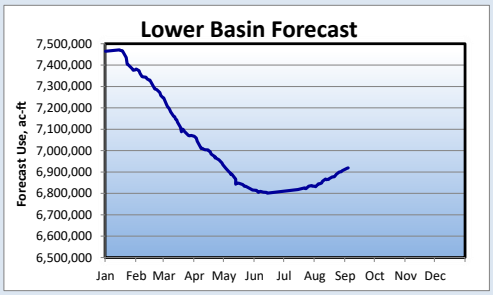
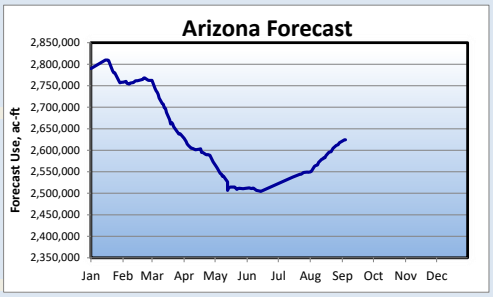
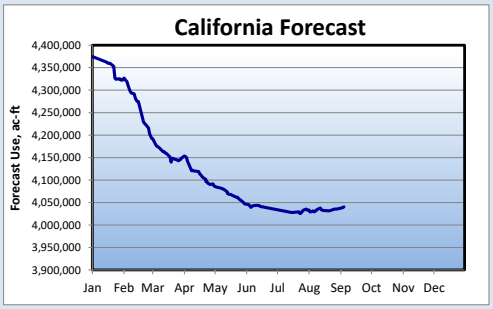
ARIZONA, CALIFORNIA, NEVADA, MEXICO
FORECAST OF END OF YEAR CONSUMPTIVE USE
FORECAST BASED ON USE TO DATE AND APPROVED ANNUAL WATER ORDERS [1]
(ACRE-FEET)

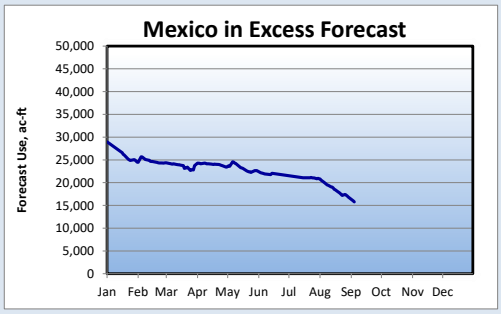
WATER USE SUMMARY	Use To Date CY2019	Forecast Use CY2019	Approved Use [2] CY2019	Excess to Approval CY2019
ARIZONA	1,772,073	2,624,432	2,758,672	-134,240
CALIFORNIA	2,939,129	4,040,334	4,371,121	-330,787
NEVADA	165,072	254,640	300,000	-45,360
STATES TOTAL [3]	4,876,274	6,919,406	7,429,793	-510,387
MEXICO IN SATISFACTION OF TREATY (Including downward delivery)	1,150,128	1,515,781	1,500,000	**15,781**
TO MEXICO AS SCHEDULED	1,145,561	1,500,000		
MEXICO IN EXCESS OF TREATY [4]	4,567	15,781		
BYPASS PURSUANT TO MINUTE 242 [5]	62,914	100,750		
TOTAL LOWER BASIN & MEXICO	6,089,316	8,535,937		

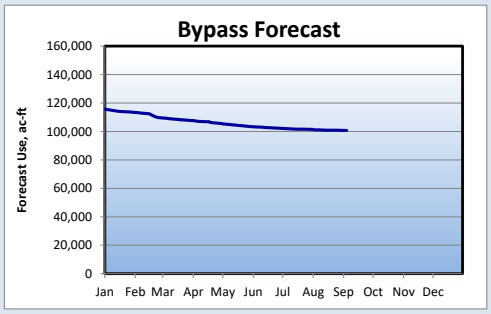
1/ Incorporates 80 daily reporting stations which may be revised after provisional data reports are distributed by the USGS. Use to date estimated for users reporting monthly and annually.
2/ These values reflect adjusted apportionments. See Adjusted Apportionment calculation on each state page.
3/ Includes unmeasured returns based on estimated consumptive use/diversion ratios by user from studies provided by Arizona Department of Water Resources, Colorado River Board of California, and Reclamation.
4/ Mexico excess forecast is based on the 5-year average for the period 2013-2017.
5/ Bypass forecast is based on the average for the period 1990-2017.

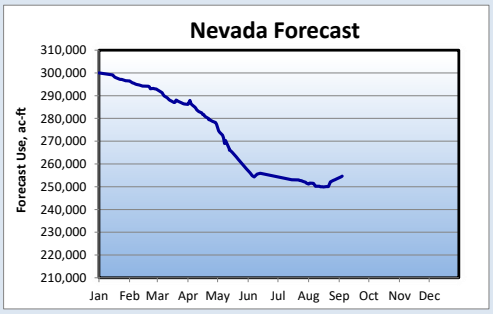


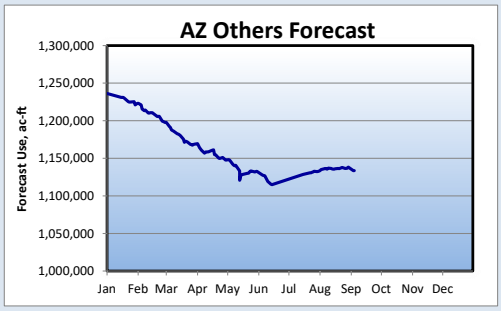


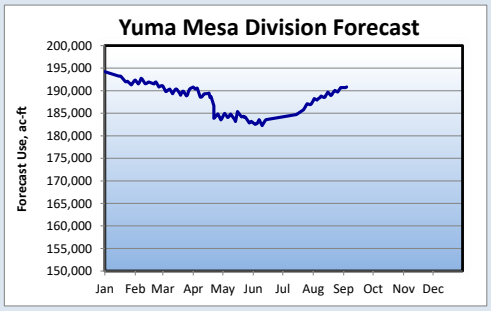


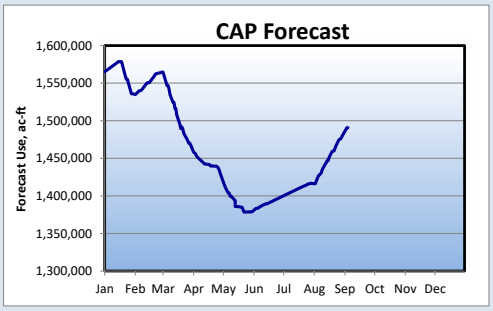


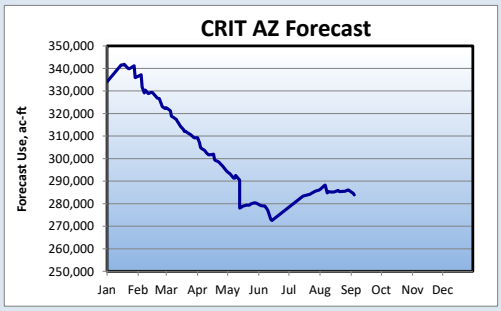


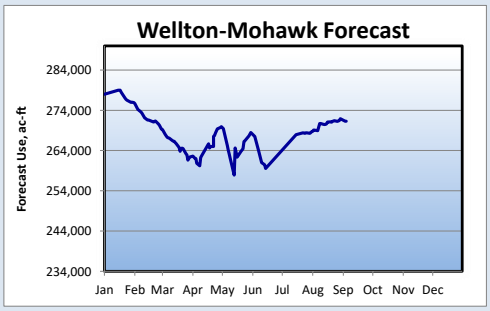


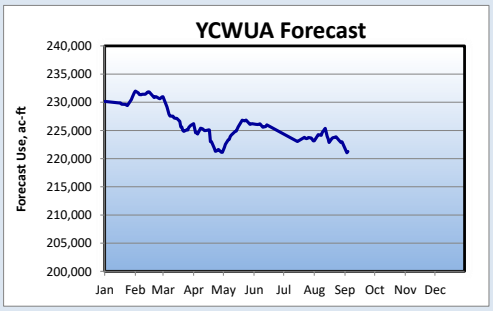












Graph notes: Jan 1 forecast use is scheduled use in accordance with the Annual Operating Plan's state entitlements, available unused entitlements, and over-run paybacks. A downward sloping line indicates use at a lower rate than scheduled, upward sloping is above schedule, and a flat line indicates a use rate equal to schedule. Lower priority users such as CAP, MWD, and Robert B. Griffith may adjust use rates to meet state entitlements as higher priority use deviates from schedule. Abrupt changes in the forecast use line may be due to a diversion schedule change or monthly updating of provisional realtime diversions.

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NOTE:
- Diversions and uses that are pending approval are noted in *red italics*.
- Water users with a consumptive use entitlement - **Excess to Estimated Use** column indicates overrun/underrun of entitlement. Dash in this column indicates water user has a diversion entitlement.
- Water user with a diversion entitlement - **Excess to Approved Diversion** column indicates overrun/underrun of entitlement. Dash in this column indicates water user has a consumptive use entitlement.

ARIZONA WATER USERS
FORECAST OF END OF YEAR CONSUMPTIVE USE
FORECAST BASED ON USE TO DATE AND APPROVED ANNUAL WATER ORDERS
Arizona Schedules and Approvals
Historic Use Records (Water Accounting Reports)

WATER USER	Use To Date CY2019	Forecast Use CY2019	Estimated Use CY2019	Excess to Estimated Use CY2019	Diversion To Date CY2019	Forecast Diversion CY2019	Approved Diversion CY2019	Excess to Approved Diversion CY2019
ARIZONA PUMPERS	10,966	14,444	14,444	---	16,896	22,255	22,255	0
LAKE MEAD NRA, AZ - Diversions from Lake Mead	56	85	111	---	56	85	111	-26
LAKE MEAD NRA, AZ - Diversions from Lake Mohave	124	182	185	---	124	182	185	-3
DAVIS DAM PROJECT	2	2	2	---	15	20	20	0
BULLHEAD CITY	4,691	7,179	7,683	---	7,423	11,542	12,720	-1,178
MOHAVE WATER CONSERVATION DISTRICT	480	632	632	---	717	944	944	0
BROOKE WATER LLC	239	315	315	---	361	475	475	0
MOHAVE VALLEY IDD	13,848	20,219	21,464	---	25,644	37,438	39,746	-2,308
FORT MOJAVE INDIAN RESERVATION, AZ	24,664	32,872	44,550	---	45,289	60,489	82,500	-22,011
GOLDEN SHORES WATER CONSERVATION DISTRICT	203	268	268	---	305	402	402	0
HAVASU NATIONAL WILDLIFE REFUGE	2,190	2,826	3,563	---	18,322	25,779	41,820	-16,041
LAKE HAVASU CITY	5,347	8,242	8,928	---	8,623	13,293	14,400	-1,107
CENTRAL ARIZONA PROJECT	936,396	1,490,839		---	936,396	1,490,839		
TOWN OF PARKER	266	396	430	---	582	870	933	-63
COLORADO RIVER INDIAN RESERVATION, AZ	225,961	283,913	316,645	---	428,735	580,293	612,125	-31,832
EHRENBURG IMPROVEMENT ASSOCIATION	178	234	234	---	249	328	328	0
CIBOLA VALLEY [1]	11,890	15,661	15,661	---	16,619	21,891	21,891	0
CIBOLA NATIONAL WILDLIFE REFUGE	11,713	14,636	14,016	**620**	18,893	23,606	22,605	**1,001**
IMPERIAL NATIONAL WILDLIFE REFUGE	1,357	2,548	3,799	-1,251	2,192	4,112	6,128	-2,016
BLM PERMITEES (PARKER DAM to IMPERIAL DAM)	830	1,093	1,093		1,275	1,680	1,680	
CHA CHA, LLC	743	1,126	1,365	---	1,143	1,732	2,100	-368
BEATTIE FARMS	450	654	724	---	692	1,004	1,110	-106
YUMA PROVING GROUND	225	347	479	---	225	347	479	-132
GILA MONSTER FARMS	3,410	4,565	5,254	---	5,968	7,971	9,156	-1,185
WELLTON-MOHAWK IDD	195,889	271,280	278,000	-6,720	271,662	388,045	412,965	-24,920
BLM PERMITEES (BELOW IMPERIAL DAM)	74	97	97	0	112	148	148	0
CITY OF YUMA	8,868	13,873	15,962	-2,089	15,449	24,155	26,700	-2,545
MARINE CORPS AIR STATION YUMA	899	1,292	1,359	---	899	1,292	1,359	-67
UNION PACIFIC RAILROAD	16	24	24	---	32	48	48	0
UNIVERSITY OF ARIZONA	630	901	928	---	630	901	928	-27
YUMA UNION HIGH SCHOOL DISTRICT	94	133	151	---	128	180	200	-20
DESERT LAWN MEMORIAL	13	17	17	---	17	23	23	0
NORTH GILA VALLEY IRRRIGATION DISTRICT	7,693	10,835	12,141	---	28,426	41,516	44,200	-2,684
YUMA IRRIGATION DISTRICT	27,472	39,008	39,007	---	47,728	69,028	71,900	-2,872
YUMA MESA IDD	101,781	140,990	143,060	---	161,880	227,154	239,724	-12,570
UNIT "B" IRRIGATION DISTRICT	13,413	19,064	21,483	---	19,059	26,669	29,400	-2,731
FORT YUMA INDIAN RESERVATION	955	1,258	1,258	---	1,471	1,937	1,937	0
YUMA COUNTY WATER USERS' ASSOCIATION	157,377	221,278	230,166	---	225,529	337,409	360,400	-22,991
COCOPAH INDIAN RESERVATION	601	1,013	1,691	---	685	1,315	2,580	-1,265
RECLAMATION-YUMA AREA OFFICE	69	91	91	---	69	91	91	0
RETURN FROM SOUTH GILA WELLS								
TOTAL ARIZONA	1,772,073	2,624,432	2,758,672		2,310,520	3,427,488	3,638,108	
CAP	936,396	1,490,839				1,490,839		
ALL OTHERS	835,677	1,133,593	1,207,280			1,936,649	2,086,716	
YUMA MESA DIVISION, GILA PROJECT	136,946	190,833	171,610	19,223		337,698		

ARIZONA ADJUSTED APPORTIONMENT CALCULATION

Arizona Basic Apportionment	2,800,000
System Conservation Water - Pilot System Conservation Program [2]	-41,328
Total State Adjusted Apportionment	2,758,672
Excess to Total State Adjusted Apportionment	-134,240
Estimated Allowable Use for CAP	**1,625,700**

[1] Includes the following water users within the Cibola Valley: Cibola Valley IDD, Arizona Game and Fish Commission, GSC Farms, Red River Land Co., Western Water, and the Hopi Tribe.
[2] System Conservation Water to be conserved by Bullhead City, Fort McDowell Yavapai Nation, and the Colorado River Indian Tribes pursuant to System Conservation Implementation Agreements executed under the Pilot System Conservation Program. This water will remain in Lake Mead to benefit system storage.

NOTES: Click on Arizona Schedules and Approvals above for incoming diversion schedules and approvals.

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U.S. BUREAU OF RECLAMATION
LOWER COLORADO REGION
CY 2019

NOTE:
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- Water user with a diversion entitlement - **Excess to Approved Diversion** column indicates overrun/underrun of entitlement. Dash in this column indicates water user has a consumptive use entitlement.

CALIFORNIA WATER USERS
FORECAST OF END OF YEAR CONSUMPTIVE USE
FORECAST BASED ON USE TO DATE AND APPROVED ANNUAL WATER ORDERS
California Schedules and Approvals
Historic Use Records (Water Accounting Reports)

WATER USER	Use To Date CY2019	Forecast Use CY2019	Estimated Use CY2019	Excess to Estimated Use CY2019	Diversion To Date CY2019	Forecast Diversion CY2019	Approved Diversion CY2019	Excess to Approved Diversion CY2019
CALIFORNIA PUMPERS	1,385	1,824	1,824	---	2,505	3,300	3,300	0
FORT MOJAVE INDIAN RESERVATION, CA	3,909	5,480	8,996	---	7,266	10,186	16,720	-6,534
CITY OF NEEDLES (includes LCWSP use)	774	1,260	1,605	-345	1,329	2,013	2,261	-248
METROPOLITAN WATER DISTRICT	394,234	565,909	840,734	---	396,115	568,781	843,474	---
COLORADO RIVER INDIAN RESERVATION, CA	1,934	2,548	2,548	---	3,204	4,220	4,220	0
PALO VERDE IRRIGATION DISTRICT	307,699	387,829	422,468	---	604,645	827,845	856,000	-28,155
YUMA PROJECT RESERVATION DIVISION	26,914	40,265	47,045	---	55,614	84,560	98,928	-14,368
YUMA PROJECT RESERVATION DIVISION - INDIAN UNIT	---	---	---	---	30,035	43,131	46,128	-2,997
YUMA PROJECT RESERVATION DIVISION - BARD UNIT	---	---	---	---	25,579	41,429	52,800	-11,371
YUMA ISLAND PUMPERS	2,029	2,673	2,673	---	3,669	4,833	4,833	0
FORT YUMA INDIAN RESERVATION - RANCH 5	397	523	523	---	717	945	945	0
IMPERIAL IRRIGATION DISTRICT	1,943,960	2,660,535	2,652,800	**7,735**	1,928,630	2,683,214	2,755,109	---
SALTON SEA SALINITY MANAGEMENT	0	0	0	0	0	0	0	---
COACHELLA VALLEY WATER DISTRICT	255,083	370,420	388,837	-18,417	257,882	379,637	404,914	---
OTHER LCWSP CONTRACTORS	629	829	829	---	984	1,296	1,296	0
CITY OF WINTERHAVEN	51	67	67	---	75	99	99	0
CHEMEHUEVI INDIAN RESERVATION	131	172	172	---	8,609	11,340	11,340	0

CALIFORNIA ADJUSTED APPORTIONMENT CALCULATION

California Basic Apportionment	4,400,000
System Conservation Water - Pilot System Conservation Program [1]	-3,879
Creation of Additional Conserved Water (IID) [2]	-25,000
Creation of Extraordinary Conservation ICS (MWD) [3]	-
Total State Adjusted Apportionment	4,371,121
Excess to Total State Adjusted Apportionment	-330,787

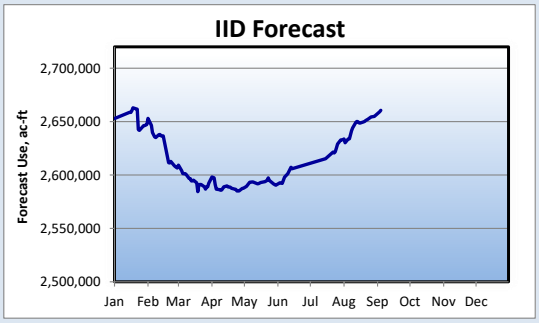
Estimated Allowable Use for MWD **904,431**

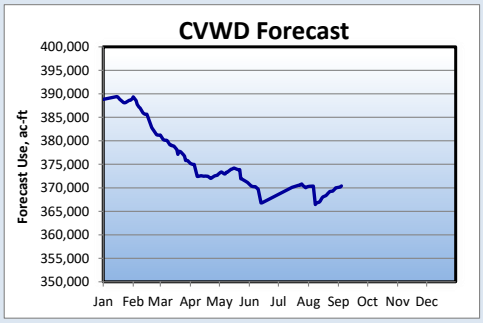
NOTES: Click on California Schedules and Approvals above for incoming diversion schedules and approvals.

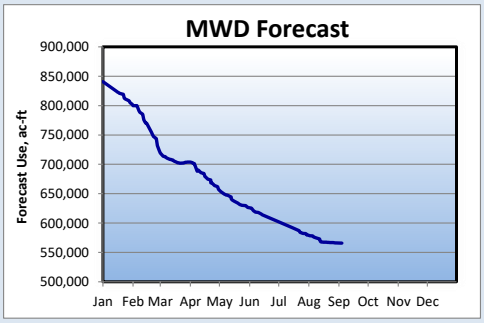
[1] System Consevation Water to be conserved by the City of Needles, the Coachella Valley Water District, and Bard Water District pursuant to System Conservation Implementation Agreements executed under the Pilot System Conservation Program. This water will remain in Lake Mead to benefit system storage.

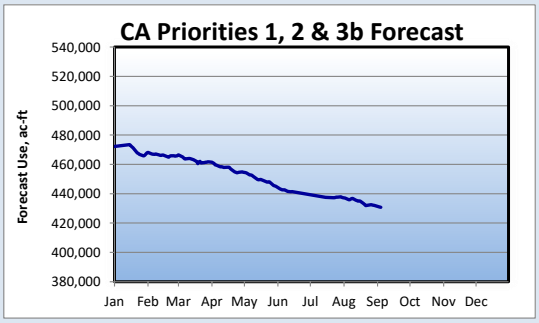
[2] IID's CY 2019 water order incorporates an "Estimate of Additonal Conserved Water" for purposes including, but not limited to, storage in The Metropolitan Water District of Southern California's system (with the written consent of MWD) or in Lake Mead as Intentionally Created Suprlus (ICS). As of the date of this forecast, approval of IID's CY 2019 ICS Plan of Creation (Plan) is pending. Use by IID of Additional Conserved Water to create ICS for storage in Lake Mead is conditional upon Reclamation's approval of IID's CY 2019 Plan.

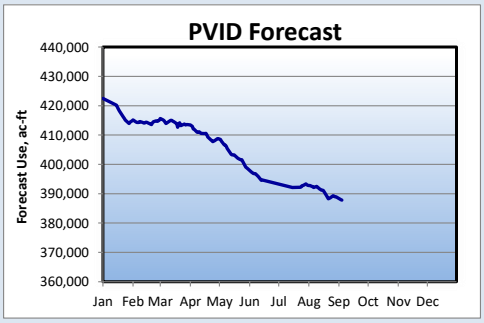
[3] MWD's CY 2019 water order incorporates the creation of up to 299,300 AF of Extraordinary Conservation Intentionally Created Suprlus (ICS). As of the date of this forecast, approval of MWD's CY 2019 ICS Plan of Creation (Plan) is pending; therefore the estimate of the amount of water available to MWD does not incorporate ICS creation by MWD. Upon approval of MWD's CY 2019 ICS Plan, Reclamation will revise MWD's water order approval accordingly.











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U.S. BUREAU OF RECLAMATION
LOWER COLORADO REGION
CY 2019

NOTE:
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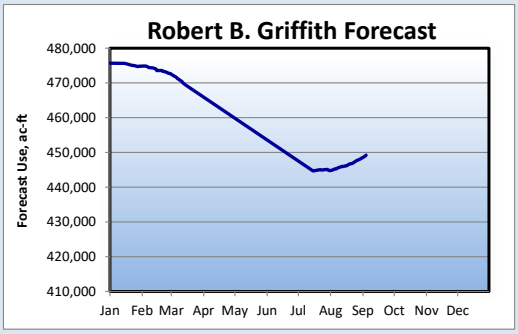
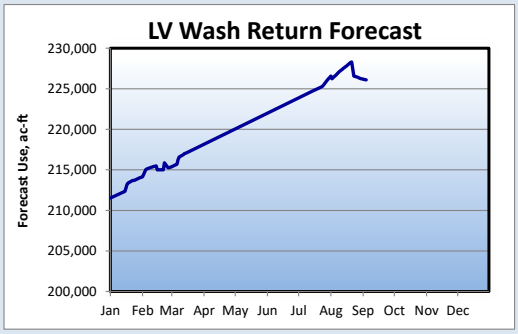
● Water user with a diversion entitlement - **Excess to Approved Diversion** column indicates overrun/underrun of entitlement. Dash in this column indicates water user has a consumptive use entitlement.

NEVADA WATER USERS
FORECAST OF END OF YEAR CONSUMPTIVE USE
FORECAST BASED ON USE TO DATE AND APPROVED ANNUAL WATER ORDERS
Nevada Schedules and Approvals
Historic Use Records (Water Accounting Reports)

WATER USER	Use To Date CY2019	Forecast Use CY2019	Estimated Use CY2019	Excess to Estimated Use CY2019	Diversion To Date CY2019	Forecast Diversion CY2019	Approved Diversion CY2019	Excess to Approved Diversion CY2019
ROBERT B. GRIFFITH WATER PROJECT (SNWS)	301,716	449,219	475,686	-26,467	301,716	449,219	475,686	-26,467
LAKE MEAD NRA, NV - Diversions from Lake Mead	499	945	1,500	---	499	945	1,500	-555
LAKE MEAD NRA, NV - Diversions from Lake Mohave	191	356	500	---	191	356	500	-144
BASIC MANAGEMENT INC.	4,047	6,816	8,208	---	4,047	6,816	8,208	-1,392
CITY OF HENDERSON (BMI DELIVERY)	10,648	16,020	15,878	---	10,648	16,020	15,878	**142**
NEVADA DEPARTMENT OF WILDLIFE	6	10	12	-2	499	782	1,000	---
PACIFIC COAST BUILDING PRODUCTS INC.	645	926	928	---	645	926	928	-2
BOULDER CANYON PROJECT	131	173	173	---	228	300	300	0
BIG BEND WATER DISTRICT	1,813	3,348	4,619	---	3,947	7,049	10,000	-2,951
FORT MOJAVE INDIAN TRIBE	2,103	2,934	4,020	---	3,139	4,379	6,000	-1,621
LAS VEGAS WASH RETURN FLOWS	-156,727	-226,107	-211,524	---				
TOTAL NEVADA	165,072	254,640	300,000	-26,469	325,559	486,792	520,000	-32,990
SOUTHERN NEVADA WATER SYSTEM (SNWS)	144,989	223,112				449,219		
ALL OTHERS	20,083	31,528				37,573		
NEVADA USES ABOVE HOOVER	161,156	248,358				475,364		
NEVADA USES BELOW HOOVER	3,916	6,282				11,428		

Tributary Conservation & Imported Intentionally Created Surplus	
Total Requested Tributary Conservation Intentionally Created Surplus	42,000
Total Requested Imported Conservation Intentionally Created Surplus	0
5% System Assessment for Creation of Intentionally Created Surplus	-2,100
Total Intentionally Created Surplus Left in Lake Mead	39,900
NEVADA ADJUSTED APPORTIONMENT CALCULATION	
Nevada Basic Apportionment	300,000
Creation of Protection Volume [2]	0
Total State Adjusted Apportionment	300,000
Excess to Total State Adjusted Apportionment	-45,360



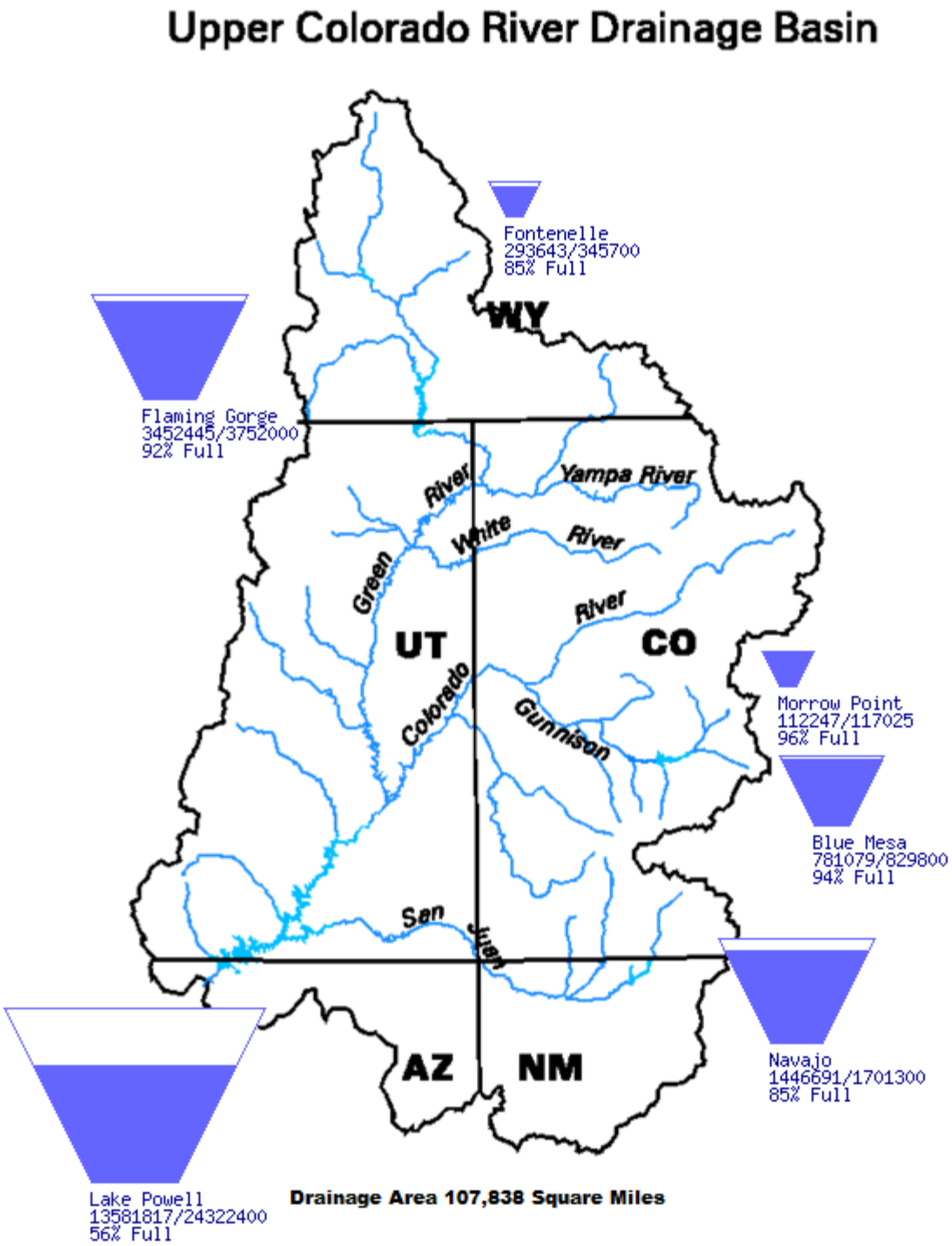


NOTES: Click on Nevada Schedules and Approvals above for incoming diversion schedules and approvals.

Upper Colorado Region Water Resources Group

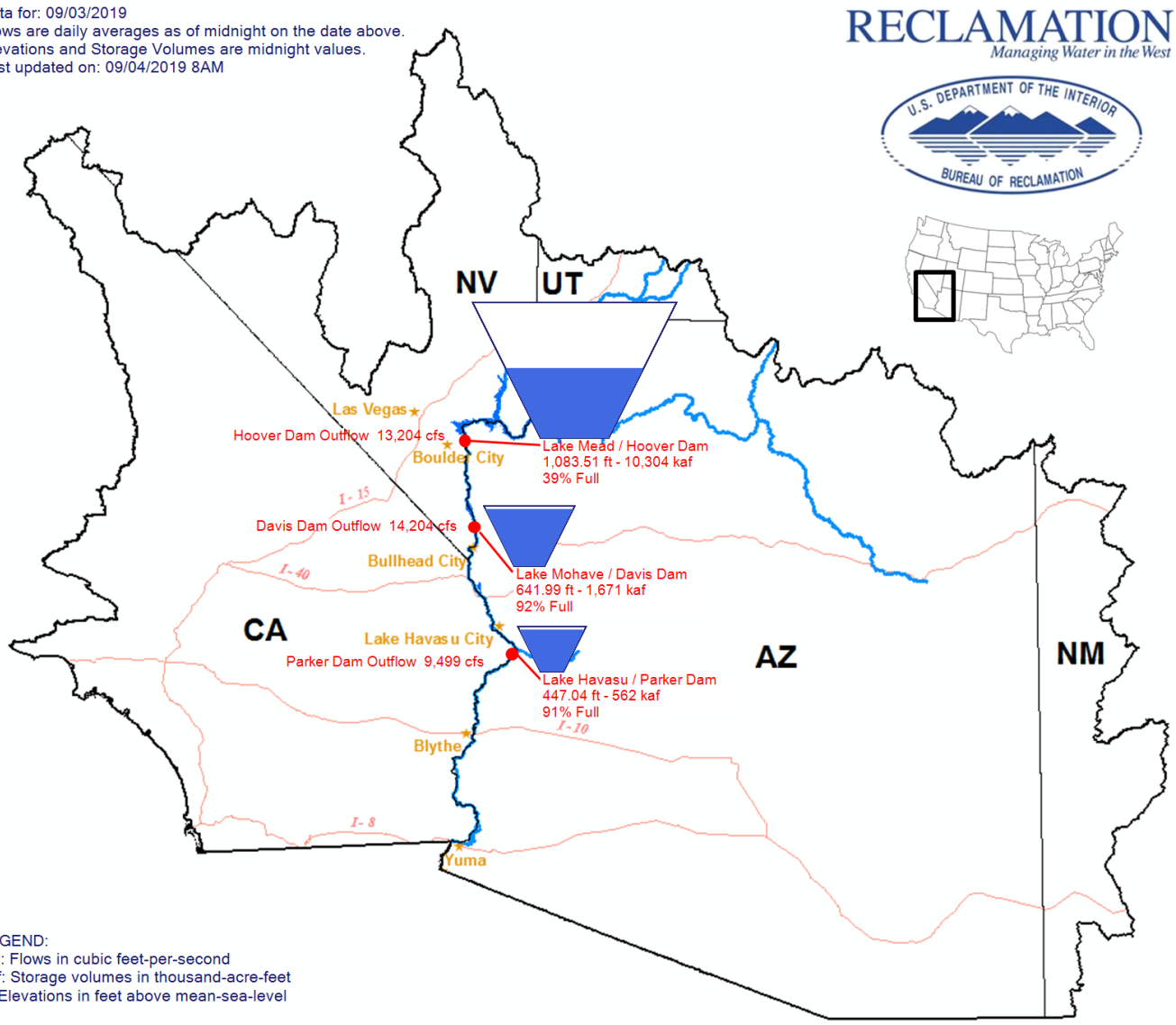
River Basin Tea-Cup Diagrams

Data Current as of:
09/03/2019



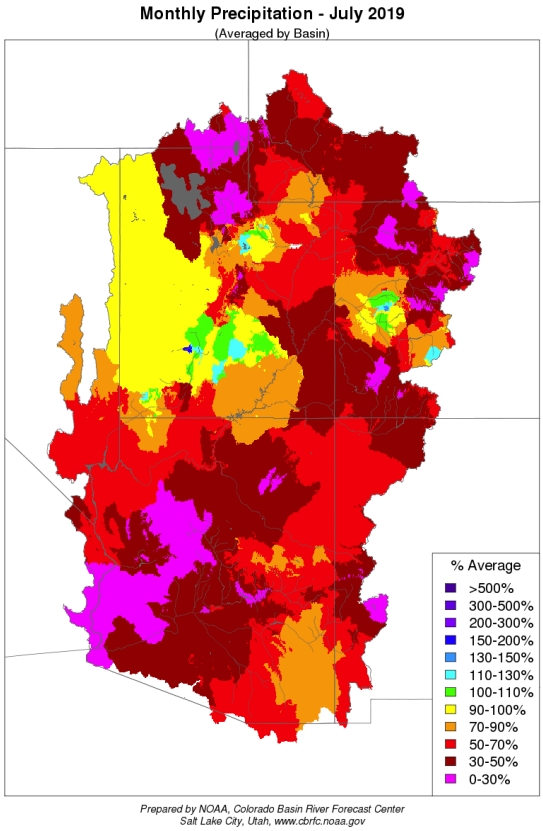
Lower Colorado River Teacup Diagram

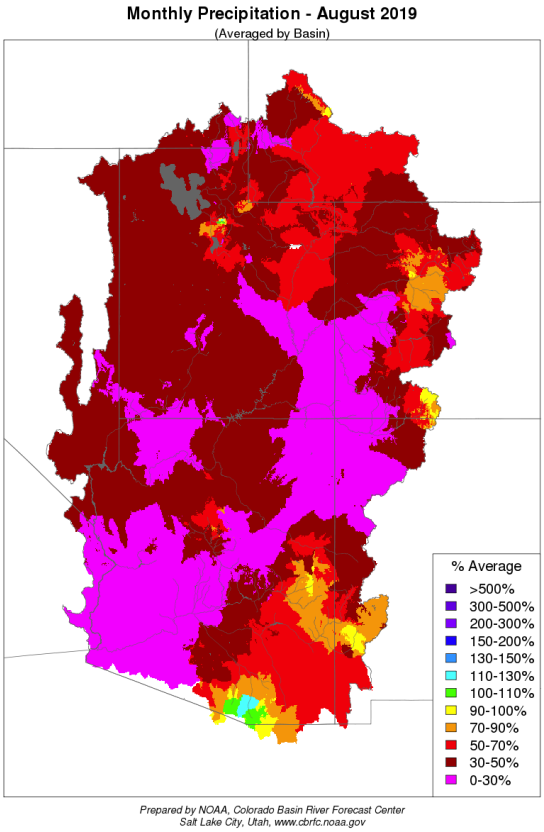
Data for: 09/03/2019
Flows are daily averages as of midnight on the date above.
Elevations and Storage Volumes are midnight values.
Last updated on: 09/04/2019 8AM

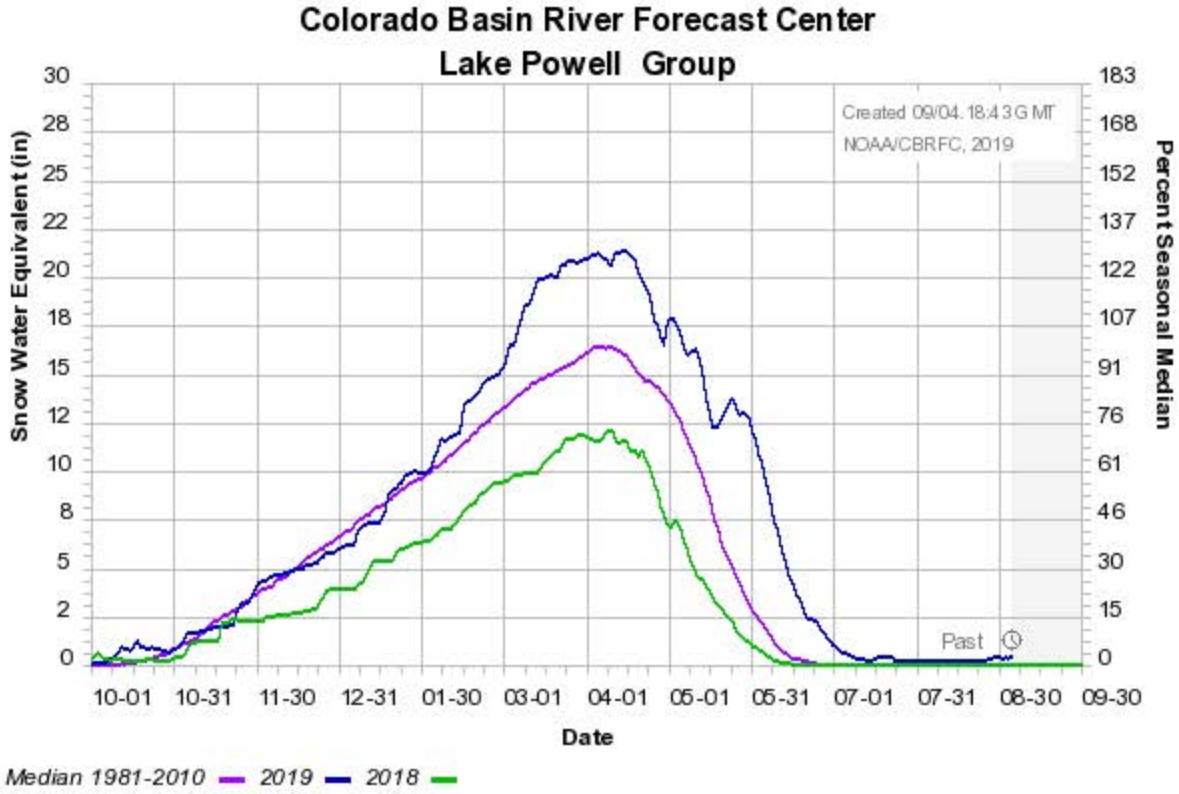


LEGEND:
cfs: Flows in cubic feet-per-second
kaf: Storage volumes in thousand-acre-feet
ft: Elevations in feet above mean-sea-level

NOAA National Weather Service Monthly Precipitation Map July and August 2019

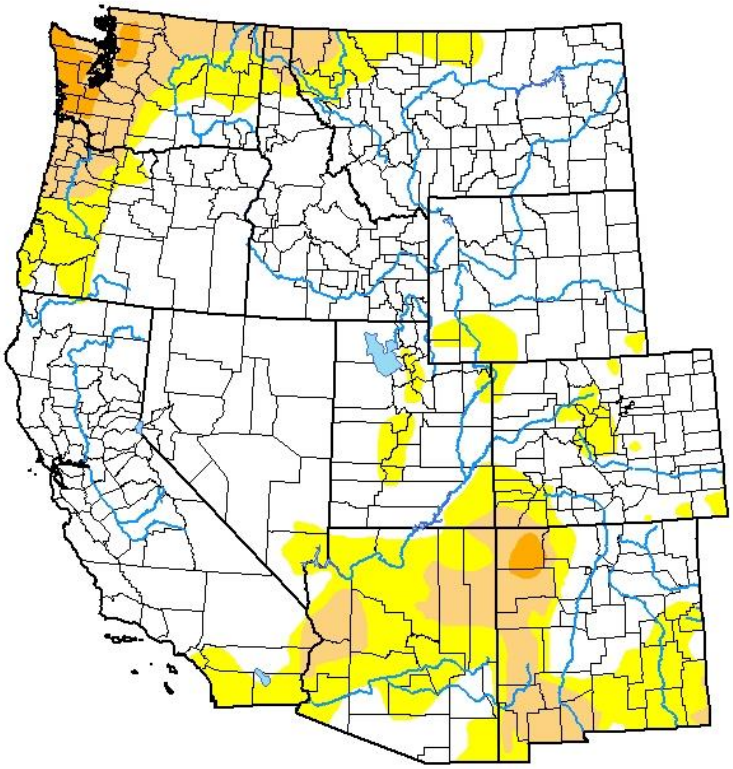





Colorado Basin River Forecast Center
Lake Powell Group
Created 09/04.18:43 GMT
NOAA/CBRFC, 2019
Past
Snow Water Equivalent (in)
Percent Seasonal Median
Date
30
28
25
22
20
18
15
12
10
8
5
2
0
183
168
152
137
122
107
91
76
61
46
30
15
0
10-01
10-31
11-30
12-31
01-30
03-01
04-01
05-01
05-31
07-01
07-31
08-30
09-30
Median 1981-2010
2019
2018

USDA United States Drought Monitor Map

U.S. Drought Monitor
West



August 27, 2019
(Released Thursday, Aug. 29, 2019)
Valid 8 a.m. EDT

Drought Conditions (Percent Area)

	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current	71.53	28.47	10.10	1.07	0.00	0.00
Last Week *08-20-2019*	76.68	23.32	6.83	0.77	0.00	0.00
3 Months Ago *05-28-2019*	87.15	12.85	5.41	0.00	0.00	0.00
Start of Calendar Year *01-01-2019*	28.03	71.97	53.25	27.22	8.35	2.88
Start of Water Year *09-25-2018*	13.91	86.09	59.57	39.68	18.15	4.36
One Year Ago *08-28-2018*	15.89	84.11	58.28	36.50	15.77	3.58

Intensity:

- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

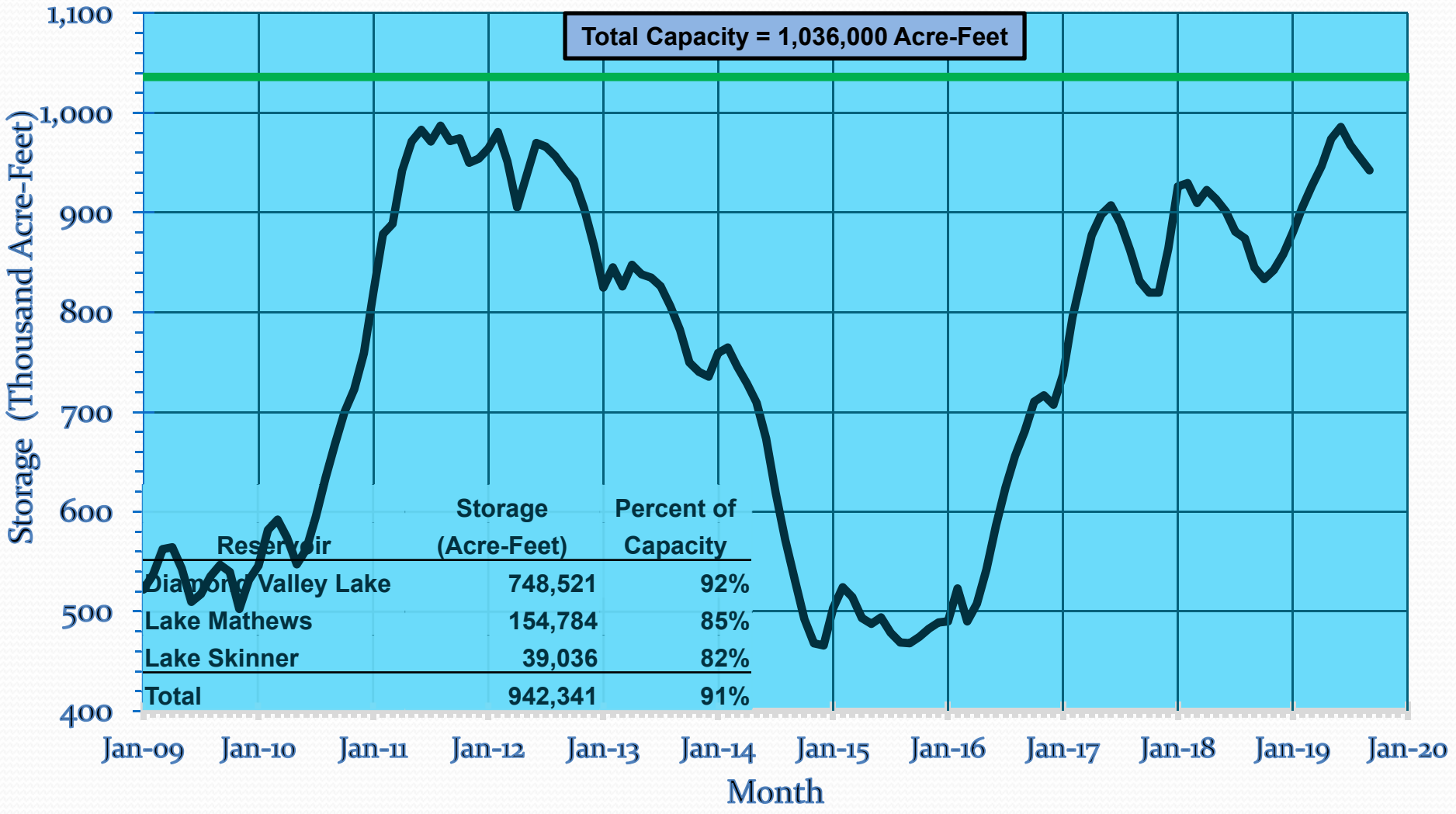
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

Author:
Jessica Blunden
NCEI/NOAA

droughtmonitor.unl.edu

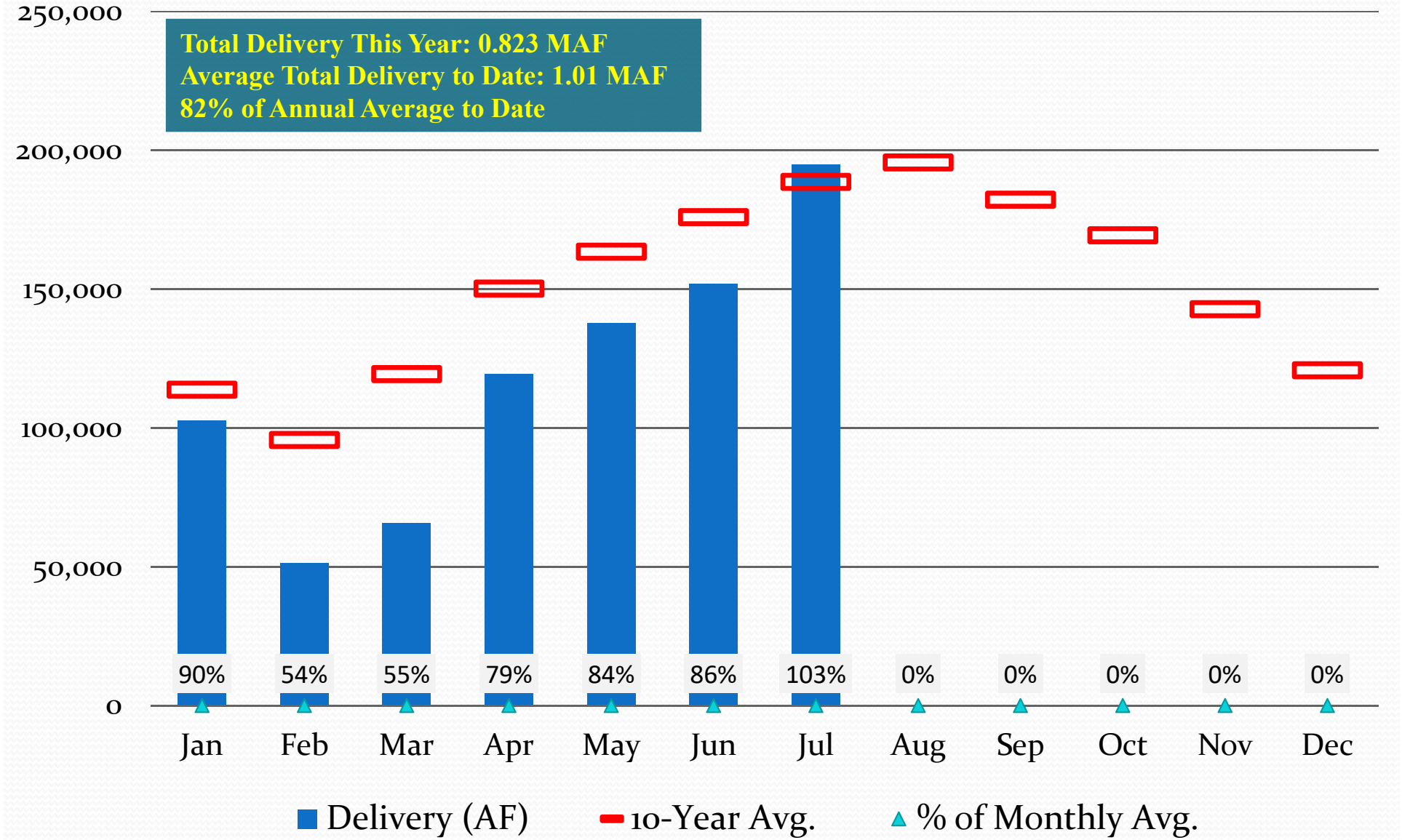
MWD's Combined Reservoir Storage as of September 1, 2019

Lake Skinner, Lake Mathews, and Diamond Valley Lake



Reservoir	Storage (Acre-Feet)	Percent of Capacity
Diamond Valley Lake	748,521	92%
Lake Mathews	154,784	85%
Lake Skinner	39,036	82%
Total	942,341	91%

2019 Water Deliveries to Agencies (AF)



Colorado River Basin
August 2019 24-Month Study Webinar

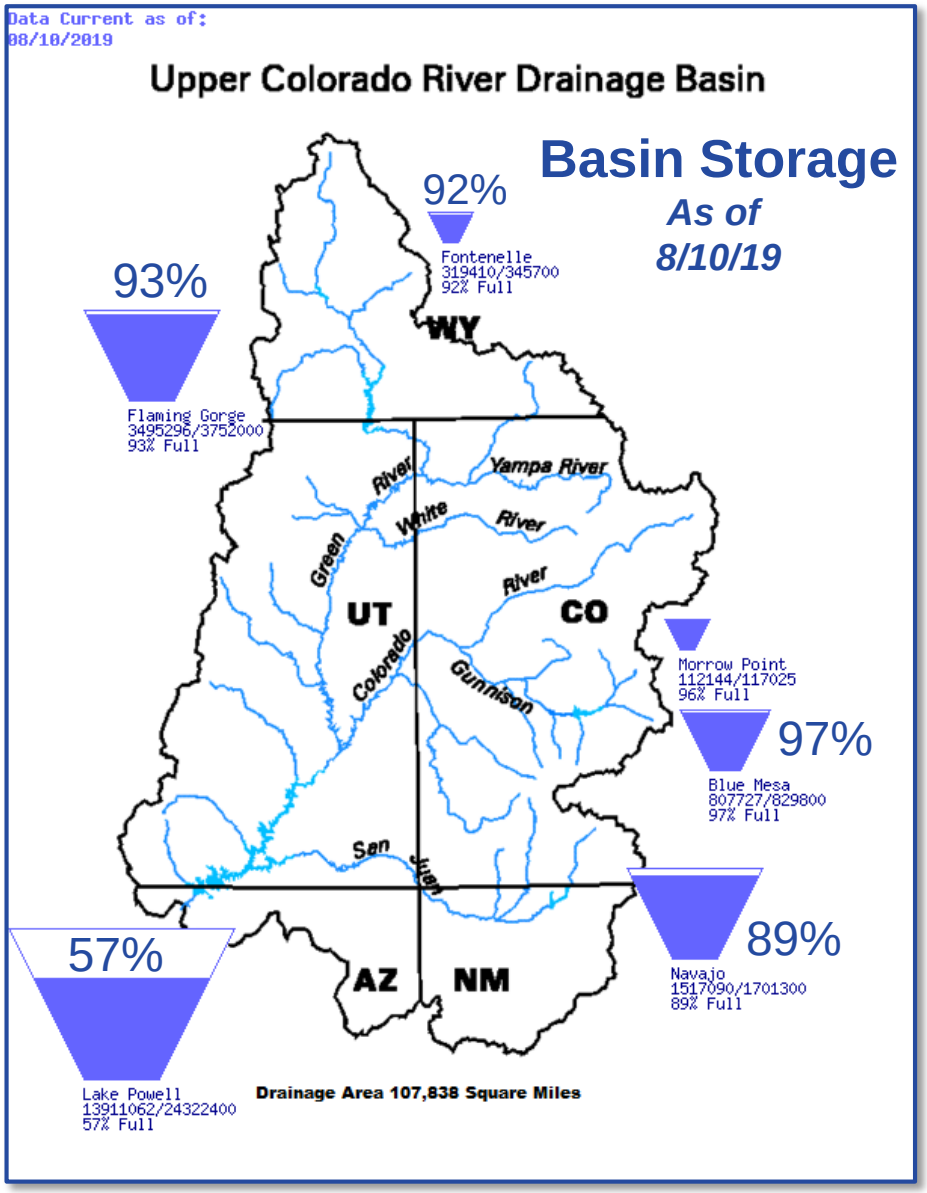
August 15, 2019

Presentation Outline

- Upper Basin hydrology and projected operations
- Lower Basin hydrology and projected operations
- Questions/Discussion

RECLAMATION
Managing Water in the West

Upper Basin Storage



2019 April - July Preliminary Observed Unregulated Inflow

Reservoir	Forecast (kaf)	Percent of Average[1]
Fontenelle	802	111
Flaming Gorge	1,179	120
Blue Mesa	1,088	161
Navajo	1,162	158
Powell	10,410	145

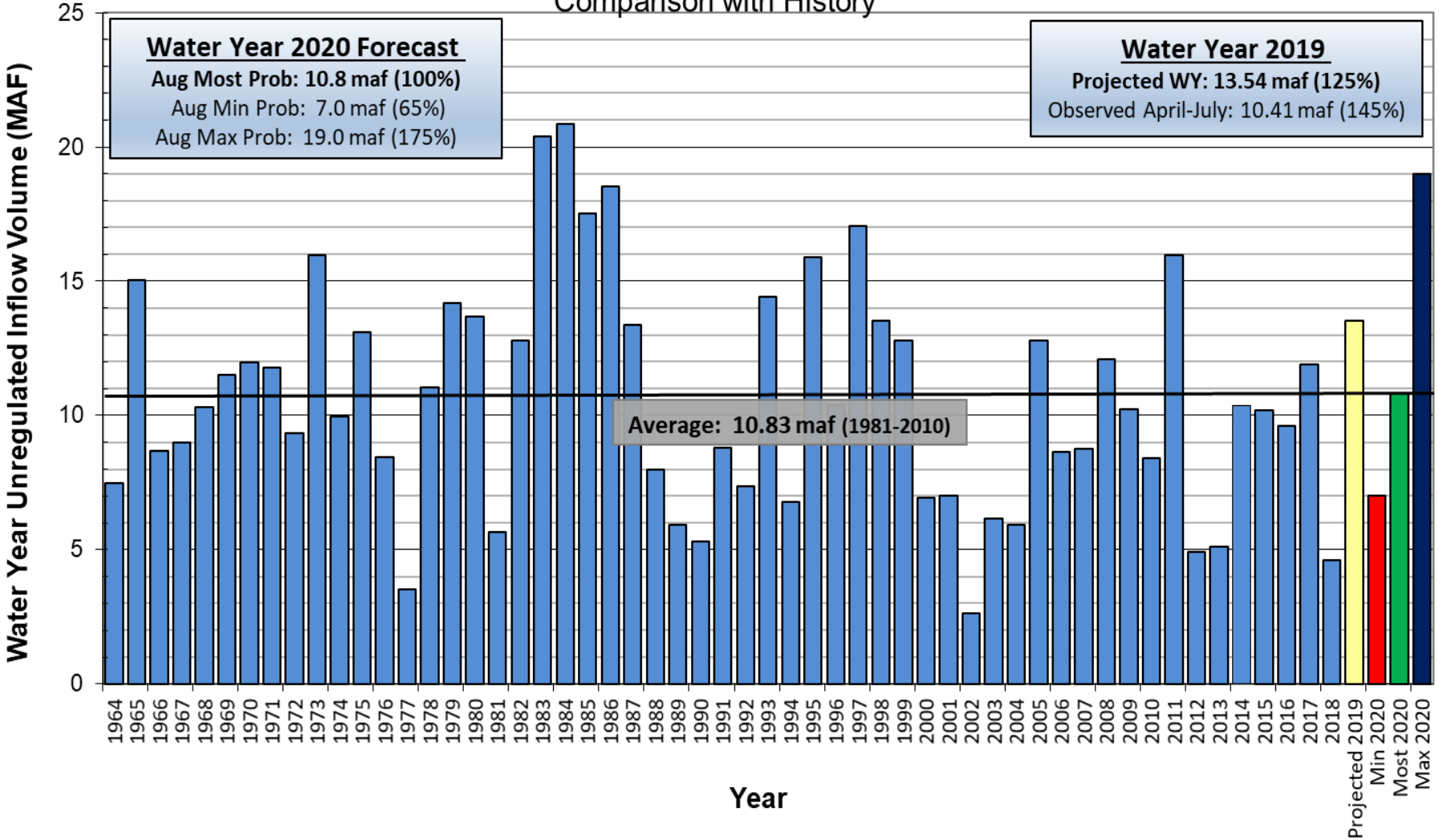
[1] Percent of average based on the period of record from 1981-2010.

Available online at: www.usbr.gov/uc/water/basin/index.html

Lake Powell Unregulated Inflow

Water Year 2020 Forecast *(issued August 1)*

Comparison with History

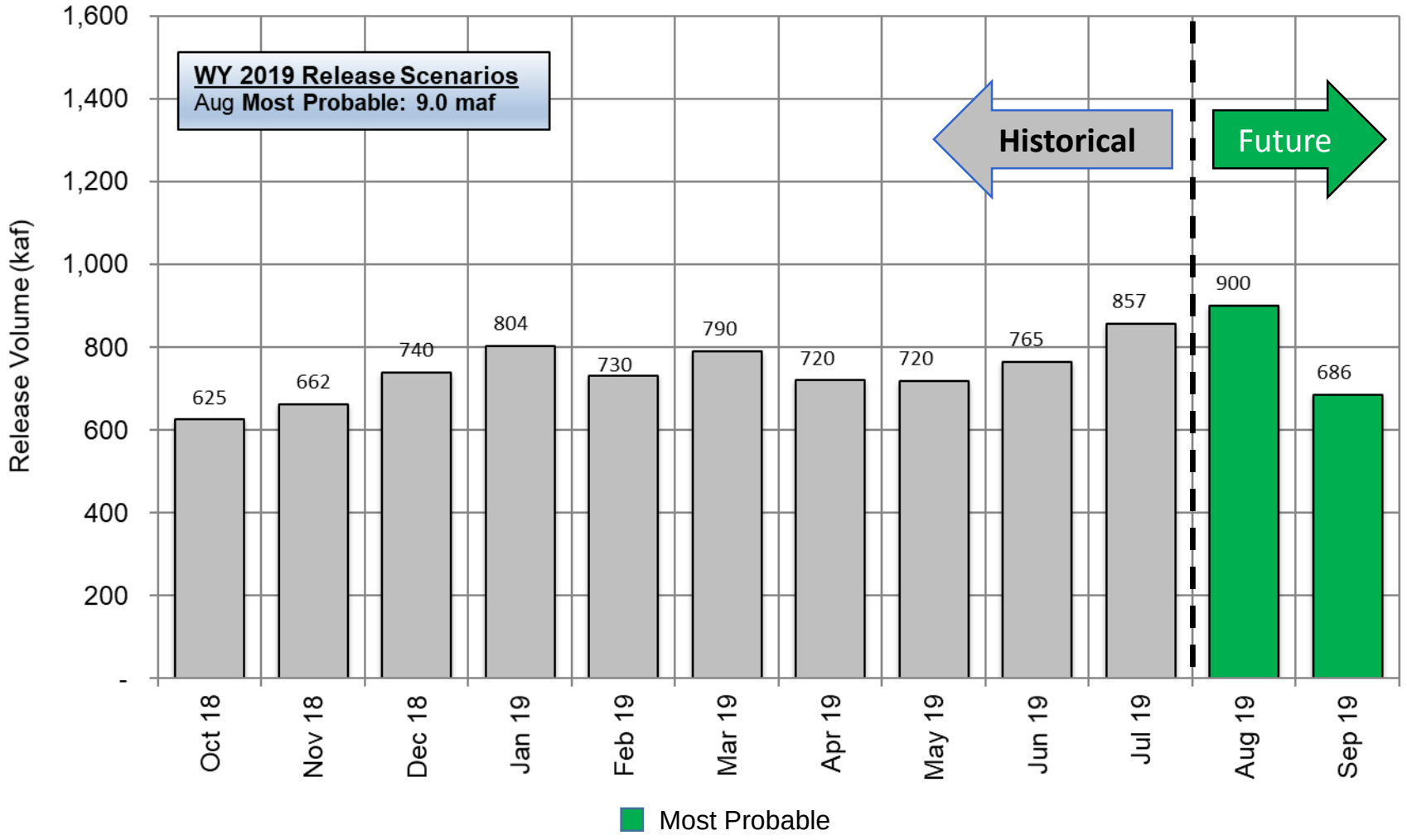


RECLAMATION
Managing Water in the West

Projected Lake Powell Monthly Release Volume Distribution

Release Scenarios for Water Year 2019

Based on August 2019 modeling



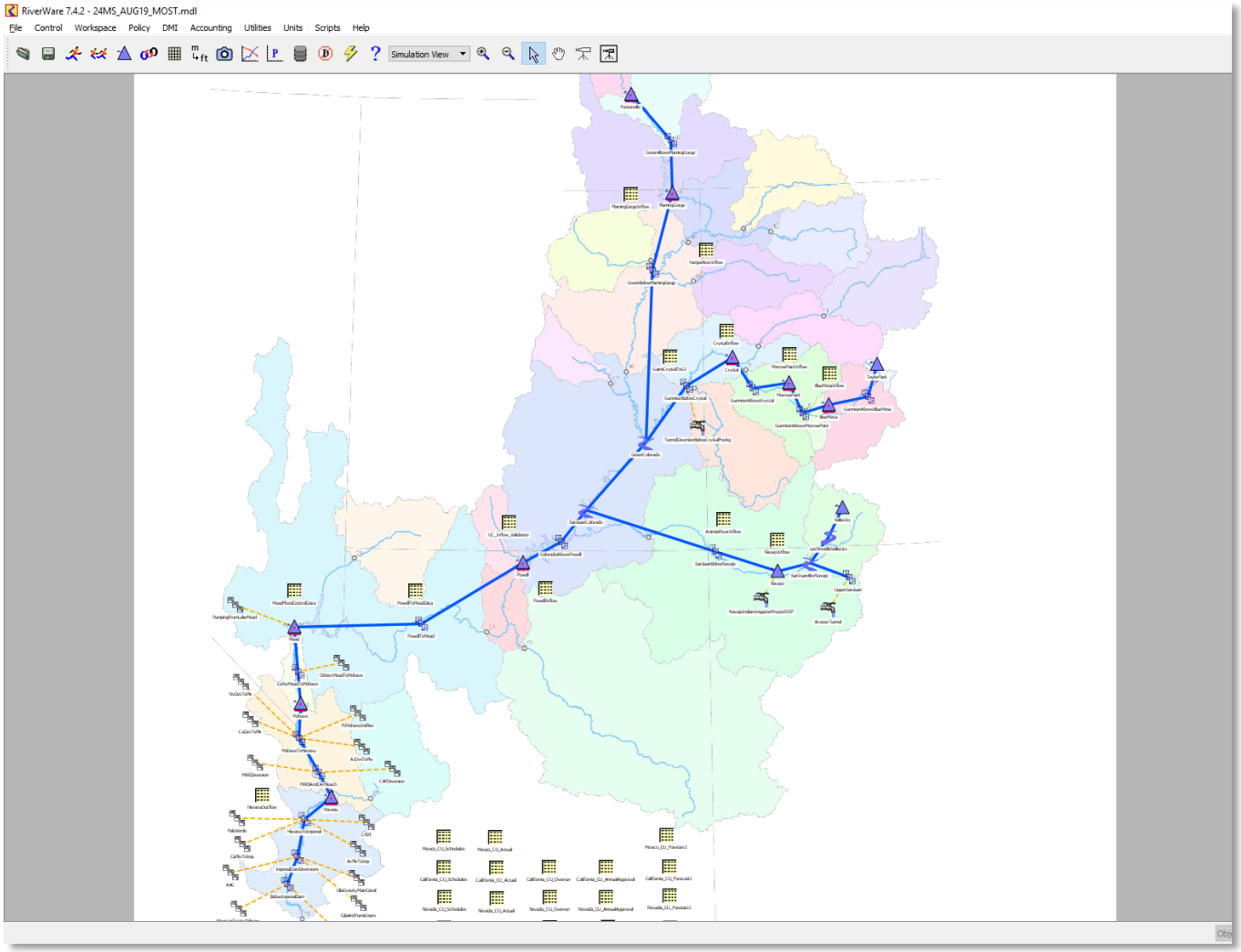
RECLAMATION
Managing Water in the West

August 24-Month Study Projections

Upper Colorado Operations

WY 2020 Official Operations Run

Reclamation's 24-Month Study Model



- Basin-wide operations
  - 2-year projections
  - Updated monthly
- Monthly reservoir conditions based on most probable CBRFC unregulated inflow forecasts

RECLAMATION
Managing Water in the West

Timing of Operational Decisions

- August 24-Month Study projections of January 1 elevations sets the operating tiers for Lake Powell and Lake Mead
- When Lake Powell is in Upper Elevation Balancing Tier, April 24-Month Study projections of September 30 elevations may result in an adjustment to Powell's operations

B. Upper Elevation Balancing Tier

1. In Water Years when the projected January 1 Lake Powell elevation is below the elevation stated in the Lake Powell Equalization Elevation Table and at or above 3,575 feet, the Secretary shall release 8.23 maf from Lake Powell if the projected January 1 Lake Mead elevation is at or above 1,075 feet.

2. If the projected January 1 Lake Powell elevation is below the elevation stated in the Lake Powell Equalization Elevation Table and at or above 3,575 feet and the projected January 1 Lake Mead elevation is below 1,075 feet, the Secretary shall balance the contents of Lake Mead and Lake Powell, but shall release not more than 9.0 maf and not less than 7.0 maf from Lake Powell in the Water Year.

3. When operating in the Upper Elevation Balancing Tier, if the April 24-Month Study projects the September 30 Lake Powell elevation to be greater than the elevation in the Lake Powell Equalization Elevation Table, the Equalization Tier will govern the operation of Lake Powell for the remainder of the Water Year (through September).

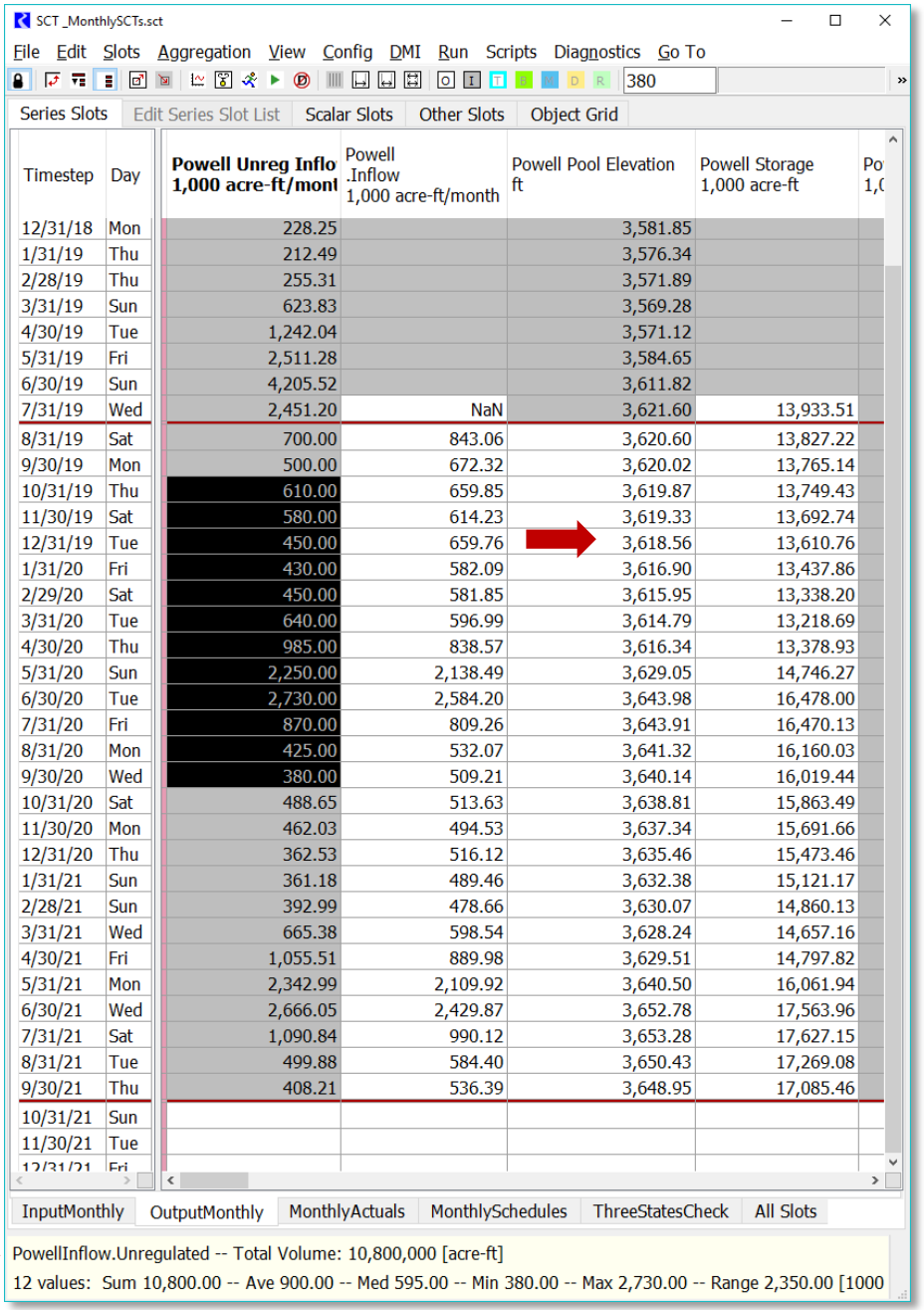
4. When operating under Section 6.B.1, if the April 24-Month Study projects the September 30 Lake Mead elevation to be below 1,075 feet and the September 30 Lake Powell elevation to be at or above 3,575 feet, the Secretary shall balance the contents of Lake Mead and Lake Powell, but shall release not more than 9.0 maf and not less than 8.23 maf from Lake Powell in the Water Year.

5. When Lake Powell is projected to be operating under Section 6.B.2. and more than 8.23 maf is projected to be released from Lake Powell during the upcoming Water Year, the Secretary shall recalculate the August 24-Month Study projection of the January 1 Lake Mead elevation to include releases above 8.23 maf that are scheduled to be released from Lake Powell during the months of October, November, and December of the upcoming Water Year, for the purposes of determining Normal or Shortage conditions pursuant to Sections 2.A. or 2.D. of these Guidelines.

August Determination

April Determination

RECLAMATION
Managing Water in the West



Timestep	Day	Powell Unreg Inflo 1,000 acre-ft/mont	Powell .Inflow 1,000 acre-ft/month	Powell Pool Elevation ft	Powell Storage 1,000 acre-ft	Po 1,(
12/31/18	Mon	228.25		3,581.85		
1/31/19	Thu	212.49		3,576.34		
2/28/19	Thu	255.31		3,571.89		
3/31/19	Sun	623.83		3,569.28		
4/30/19	Tue	1,242.04		3,571.12		
5/31/19	Fri	2,511.28		3,584.65		
6/30/19	Sun	4,205.52		3,611.82		
7/31/19	Wed	2,451.20	NaN	3,621.60	13,933.51	
8/31/19	Sat	700.00	843.06	3,620.60	13,827.22	
9/30/19	Mon	500.00	672.32	3,620.02	13,765.14	
10/31/19	Thu	610.00	659.85	3,619.87	13,749.43	
11/30/19	Sat	580.00	614.23	3,619.33	13,692.74	
12/31/19	Tue	450.00	659.76	3,618.56	13,610.76	
1/31/20	Fri	430.00	582.09	3,616.90	13,437.86	
2/29/20	Sat	450.00	581.85	3,615.95	13,338.20	
3/31/20	Tue	640.00	596.99	3,614.79	13,218.69	
4/30/20	Thu	985.00	838.57	3,616.34	13,378.93	
5/31/20	Sun	2,250.00	2,138.49	3,629.05	14,746.27	
6/30/20	Tue	2,730.00	2,584.20	3,643.98	16,478.00	
7/31/20	Fri	870.00	809.26	3,643.91	16,470.13	
8/31/20	Mon	425.00	532.07	3,641.32	16,160.03	
9/30/20	Wed	380.00	509.21	3,640.14	16,019.44	
10/31/20	Sat	488.65	513.63	3,638.81	15,863.49	
11/30/20	Mon	462.03	494.53	3,637.34	15,691.66	
12/31/20	Thu	362.53	516.12	3,635.46	15,473.46	
1/31/21	Sun	361.18	489.46	3,632.38	15,121.17	
2/28/21	Sun	392.99	478.66	3,630.07	14,860.13	
3/31/21	Wed	665.38	598.54	3,628.24	14,657.16	
4/30/21	Fri	1,055.51	889.98	3,629.51	14,797.82	
5/31/21	Mon	2,342.99	2,109.92	3,640.50	16,061.94	
6/30/21	Wed	2,666.05	2,429.87	3,652.78	17,563.96	
7/31/21	Sat	1,090.84	990.12	3,653.28	17,627.15	
8/31/21	Tue	499.88	584.40	3,650.43	17,269.08	
9/30/21	Thu	408.21	536.39	3,648.95	17,085.46	
10/31/21	Sun					
11/30/21	Tue					
12/31/21	Fri					

Powell Operating Tier Determination Run

8.23 maf release in WY 2020

Water Year 2020

Most Probable Inflow
10.80 maf (100% of average)

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Lake Powell & Lake Mead Operational Table

Operational Tiers for Water/Calendar Year 2020[1]

Lake Powell

Elevation (feet)	Operation According to the Interim Guidelines	Live Storage (maf)[1]
3,700	**Equalization Tier** Equalize, avoid spills or release 8.23 maf	24.3
3,636 - 3,666 (2008-2026)		15.5 - 19.3 (2008-2026)
3,618.56 ft **Jan 1, 2020 Projection**	**Upper Elevation Balancing Tier**[3] Release 8.23 maf; if Lake Mead < 1,075 feet, balance contents with a min/max release of 7.0 and 9.0 maf	
3,575		9.5
	Mid-Elevation Release Tier Release 7.48 maf; if Lake Mead < 1,025 feet, release 8.23 maf	
3,525		5.9
	Lower Elevation Balancing Tier Balance contents with a min/max release of 7.0 and 9.5 maf	
3,490		4.0
3,370		0

Lake Mead

Elevation (feet)	Operation According to the Interim Guidelines	Live Storage (maf)[1]
1,220	**Flood Control Surplus or Quantified Surplus Condition** Deliver > 7.5 maf	25.9
1,200 (approx.)[2]		22.9 (approx.)[2]
	Domestic Surplus or ICS Surplus Condition Deliver > 7.5 maf	
1,145		15.9
1,105	**Normal or ICS Surplus Condition** Deliver ≥ 7.5 maf	11.9
1,075		9.4
	Shortage Condition Deliver 7.167[4] maf	
1,050		7.5
	Shortage Condition Deliver 7.083[5] maf	
1,025		5.8
1,000	**Shortage Condition** Deliver 7.0[6] maf Further measures may be undertaken[7]	4.3
895		0

Diagram not to scale

[1] Acronym for million acre-feet

[2] This elevation is shown as approximate as it is determined each year by considering several factors including Lake Powell and Lake Mead storage, projected Upper Basin and Lower Basin demands, and an assumed inflow.

[3] Subject to April adjustments which may result in a release according to the Equalization Tier

[4] Of which 2.48 maf is apportioned to Arizona, 4.4 maf to California, and 0.287 maf to Nevada

[5] Of which 2.40 maf is apportioned to Arizona, 4.4 maf to California, and 0.283 maf to Nevada

[6] Of which 2.32 maf is apportioned to Arizona, 4.4 maf to California, and 0.280 maf to Nevada

[7] Whenever Lake Mead is below elevation 1,025 feet, the Secretary shall consider whether hydrologic conditions together with anticipated deliveries to the Lower Division States and Mexico is likely to cause the elevation at Lake Mead to fall below 1,000 feet. Such consideration, in consultation with the Basin States, may result in the undertaking of further measures, consistent with applicable Federal law.

[1] Lake Powell and Lake Mead operational tier determinations were based on August 2019 24-Month Study projections and will be documented in the draft 2020 AOP.

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B. Upper Elevation Balancing Tier

1. In Water Years when the projected January 1 Lake Powell elevation is below the elevation stated in the Lake Powell Equalization Elevation Table and at or above 3,575 feet, the Secretary shall release 8.23 maf from Lake Powell if the projected January 1 Lake Mead elevation is at or above 1,075 feet.

2. If the projected January 1 Lake Powell elevation is below the elevation stated in the Lake Powell Equalization Elevation Table and at or above 3,575 feet and the projected January 1 Lake Mead elevation is below 1,075 feet, the Secretary shall balance the contents of Lake Mead and Lake Powell, but shall release not more than 9.0 maf and not less than 7.0 maf from Lake Powell in the Water Year.

3. When operating in the Upper Elevation Balancing Tier, if the April 24-Month Study projects the September 30 Lake Powell elevation to be greater than the elevation in the Lake Powell Equalization Elevation Table, the Equalization Tier will govern the operation of Lake Powell for the remainder of the Water Year (through September).

4. When operating under Section 6.B.1, if the April 24-Month Study projects the September 30 Lake Mead elevation to be below 1,075 feet and the September 30 Lake Powell elevation to be at or above 3,575 feet, the Secretary shall balance the contents of Lake Mead and Lake Powell, but shall release not more than 9.0 maf and not less than 8.23 maf from Lake Powell in the Water Year.

5. When Lake Powell is projected to be operating under Section 6.B.2. and more than 8.23 maf is projected to be released from Lake Powell during the upcoming Water Year, the Secretary shall recalculate the August 24-Month Study projection of the January 1 Lake Mead elevation to include releases above 8.23 maf that are scheduled to be released from Lake Powell during the months of October, November, and December of the upcoming Water Year, for the purposes of determining Normal or Shortage conditions pursuant to Sections 2.A. or 2.D. of these Guidelines.

August Determination

April Determination

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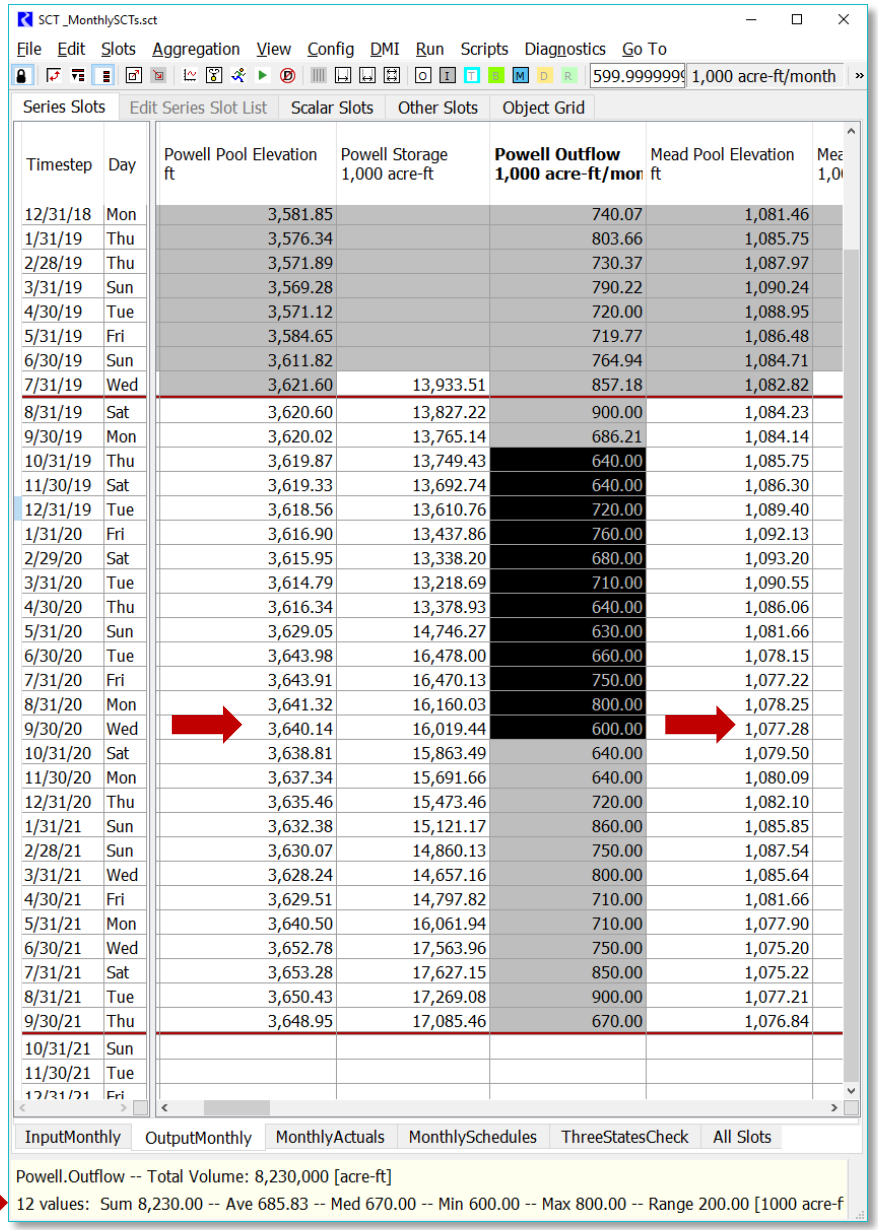
Managing Water in the West

Official WY 2020 Operations Run


SCT _MonthlySCTs.sct

File Edit Slots Aggregation View Config DMI Run Scripts Diagnostics Go To

599.9999999 1,000 acre-ft/month

Series Slots | Edit Series Slot List | Scalar Slots | Other Slots | Object Grid

Timestep	Day	Powell Pool Elevation ft	Powell Storage 1,000 acre-ft	**Powell Outflow 1,000 acre-ft/mon**	Mead Pool Elevation ft	Mea 1,0
12/31/18	Mon	3,581.85		740.07	1,081.46	
1/31/19	Thu	3,576.34		803.66	1,085.75	
2/28/19	Thu	3,571.89		730.37	1,087.97	
3/31/19	Sun	3,569.28		790.22	1,090.24	
4/30/19	Tue	3,571.12		720.00	1,088.95	
5/31/19	Fri	3,584.65		719.77	1,086.48	
6/30/19	Sun	3,611.82		764.94	1,084.71	
7/31/19	Wed	3,621.60	13,933.51	857.18	1,082.82	
8/31/19	Sat	3,620.60	13,827.22	900.00	1,084.23	
9/30/19	Mon	3,620.02	13,765.14	686.21	1,084.14	
10/31/19	Thu	3,619.87	13,749.43	640.00	1,085.75	
11/30/19	Sat	3,619.33	13,692.74	640.00	1,086.30	
12/31/19	Tue	3,618.56	13,610.76	720.00	1,089.40	
1/31/20	Fri	3,616.90	13,437.86	760.00	1,092.13	
2/29/20	Sat	3,615.95	13,338.20	680.00	1,093.20	
3/31/20	Tue	3,614.79	13,218.69	710.00	1,090.55	
4/30/20	Thu	3,616.34	13,378.93	640.00	1,086.06	
5/31/20	Sun	3,629.05	14,746.27	630.00	1,081.66	
6/30/20	Tue	3,643.98	16,478.00	660.00	1,078.15	
7/31/20	Fri	3,643.91	16,470.13	750.00	1,077.22	
8/31/20	Mon	3,641.32	16,160.03	800.00	1,078.25	
9/30/20	Wed	3,640.14	16,019.44	600.00	1,077.28	
10/31/20	Sat	3,638.81	15,863.49	640.00	1,079.50	
11/30/20	Mon	3,637.34	15,691.66	640.00	1,080.09	
12/31/20	Thu	3,635.46	15,473.46	720.00	1,082.10	
1/31/21	Sun	3,632.38	15,121.17	860.00	1,085.85	
2/28/21	Sun	3,630.07	14,860.13	750.00	1,087.54	
3/31/21	Wed	3,628.24	14,657.16	800.00	1,085.64	
4/30/21	Fri	3,629.51	14,797.82	710.00	1,081.66	
5/31/21	Mon	3,640.50	16,061.94	710.00	1,077.90	
6/30/21	Wed	3,652.78	17,563.96	750.00	1,075.20	
7/31/21	Sat	3,653.28	17,627.15	850.00	1,075.22	
8/31/21	Tue	3,650.43	17,269.08	900.00	1,077.21	
9/30/21	Thu	3,648.95	17,085.46	670.00	1,076.84	
10/31/21	Sun					
11/30/21	Tue					
12/31/21	Fri					

InputMonthly | OutputMonthly | MonthlyActuals | MonthlySchedules | ThreeStatesCheck | All Slots

Powell.Outflow -- Total Volume: 8,230,000 [acre-ft]

12 values: Sum 8,230.00 -- Ave 685.83 -- Med 670.00 -- Min 600.00 -- Max 800.00 -- Range 200.00 [1000 acre-f

Water Year 2020

Based on Tier Determination Run:
Start with Powell Release = 8.23 maf.

Operating under Upper Elevation Balancing Tier (6.B.1).

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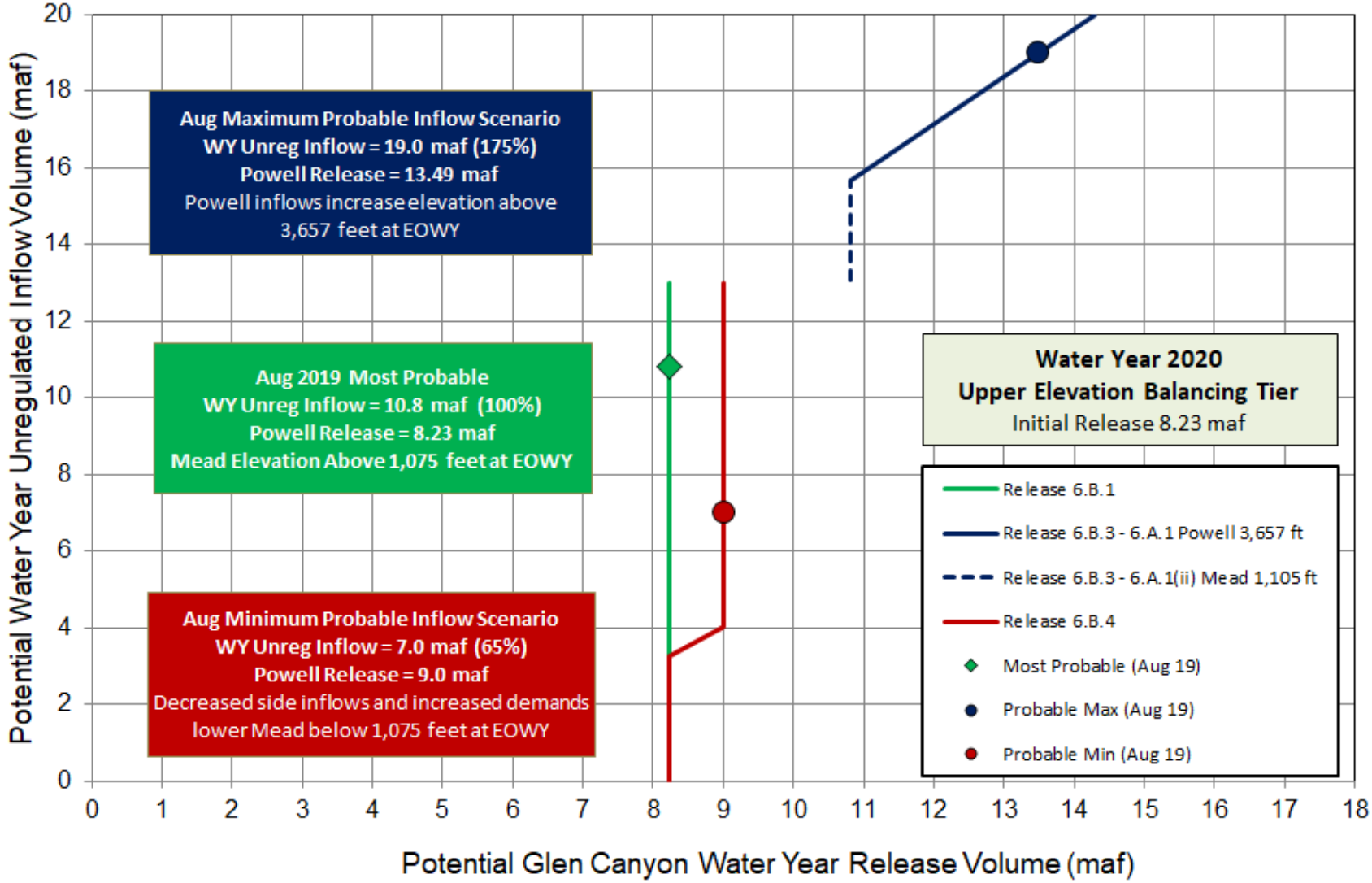
Managing Water in the West

Lake Powell Release Scenarios under Section 6.B

Water Year 2020 Release Volume as a Function of Upper Elevation Balancing Tier
based on August 2019 24-Month Study Conditions



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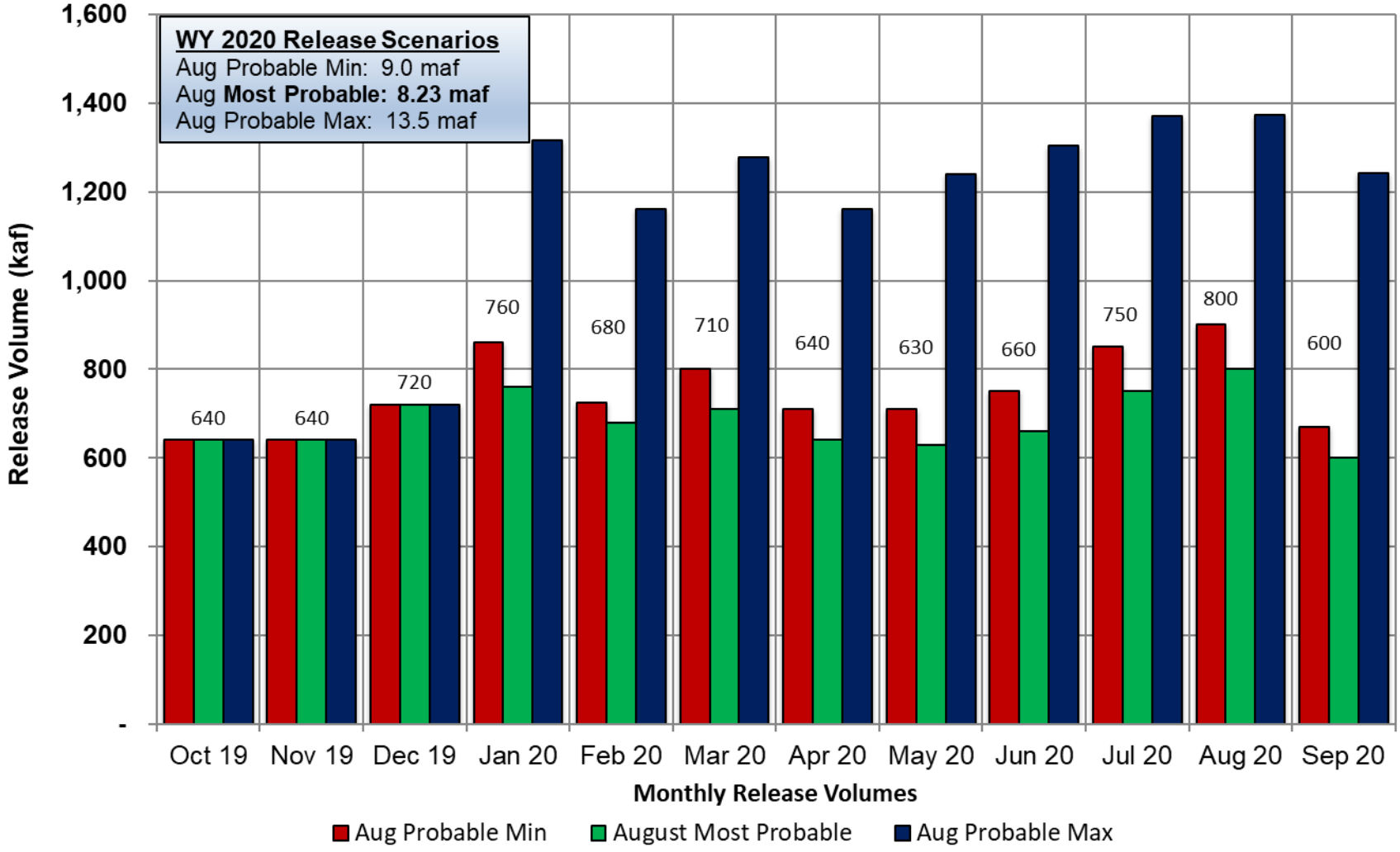
Potential Lake Powell Monthly Release Volume Distribution

Release Scenarios for Water Year 2020

Updated August 2019



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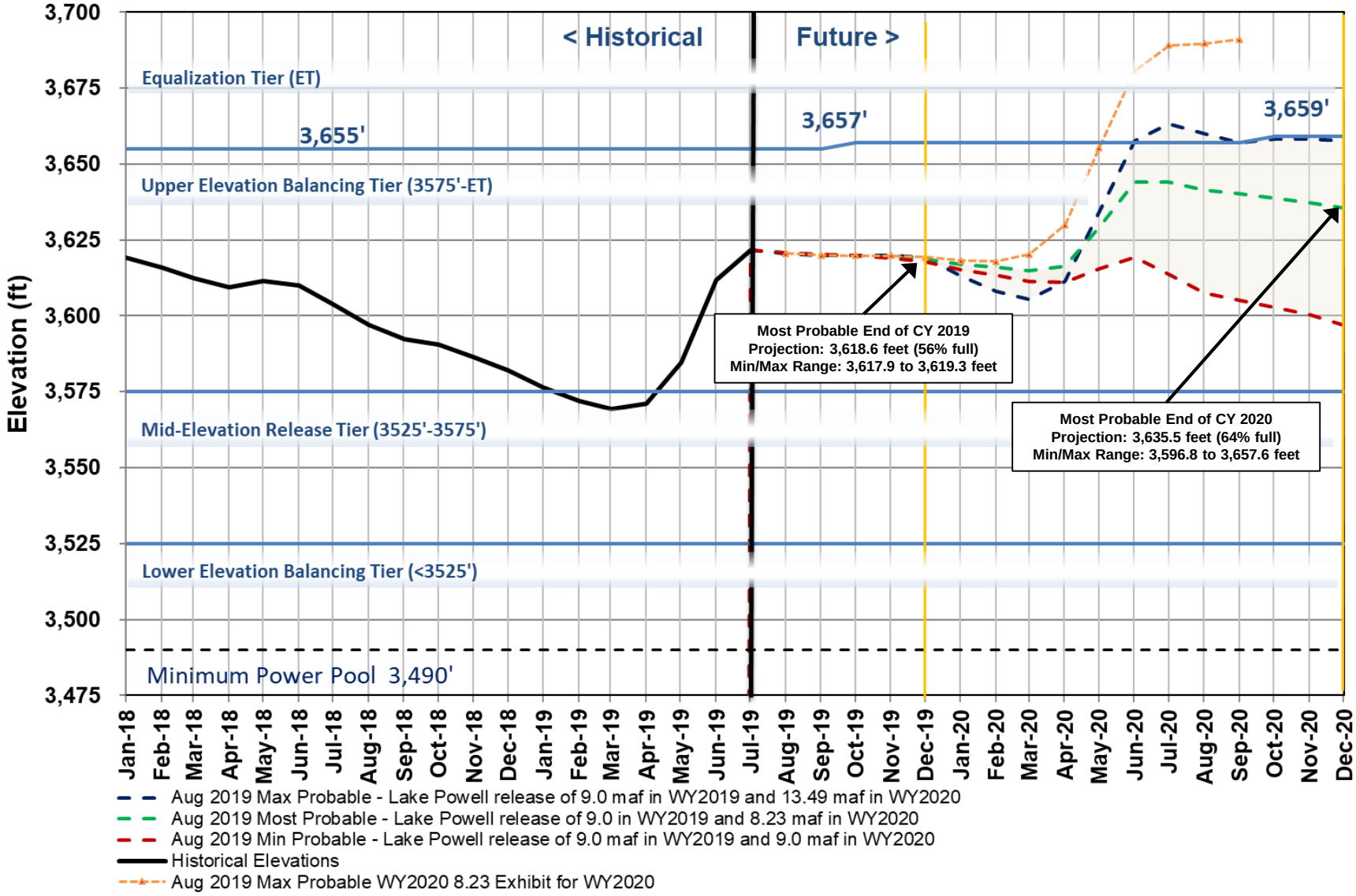
Lake Powell End of Month Elevations

Historic and Projected based on Aug 2019 Modeling



RECLAMATION
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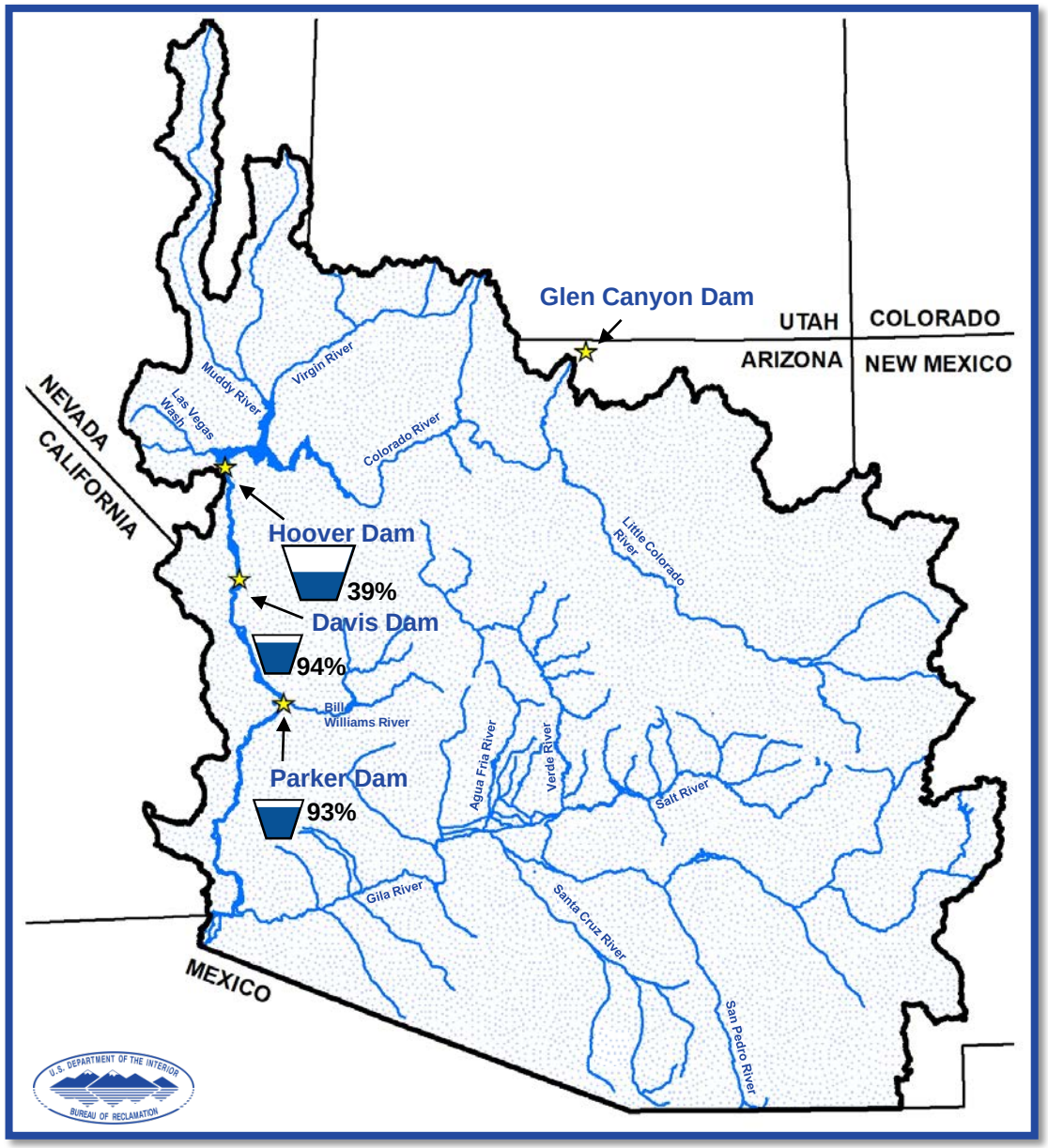
August 24-Month Study Projections

Lower Basin Operations



Lower Colorado River System Conditions

as of August 14, 2019

Reservoir	Percent Full	Storage (maf)	Elevation (feet)
Lake Mead	39	10.27	1,083.1
Lake Mohave	94	1.70	643.1
Lake Havasu	93	0.57	447.7
Total System Storage	55	32.67	-
Total System Storage *(at this time last year)*	*49*	*29.26*	-

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Lower Basin Side Inflows – WY/CY 2019[1,2]

Intervening Flow from Glen Canyon to Hoover Dam

	Month in WY/CY 2019	5-Year Average Intervening Flow (KAF)	Observed Intervening Flow (KAF)	Observed Intervening Flow (% of Average)	Difference From 5-Year Average (KAF)
HISTORICAL	October 2018	82	100	123%	19
	November 2018	54	67	125%	13
	December 2018	51	52	101%	<1
	January 2019	83	106	128%	23
	February 2019	91	126	138%	35
	March 2019	57	201	354%	144
	April 2019	49	118	240%	69
	May 2019	30	108	361%	78
	June 2019	17	69	408%	52
	July 2019	80	21	26%	-59
PROJECTED	August 2019	100			
	September 2019	91			
	October 2019	82			
	November 2019	54			
	December 2019	51			
	WY 2019 Totals	784	1,159	148%	374
	CY 2019 Totals	784	1,126	144%	342

[1] Values were computed with the LC's gain-loss model for the most recent 24-month study.

[2] Percents of average are based on the 5-year mean from 2014-2018.

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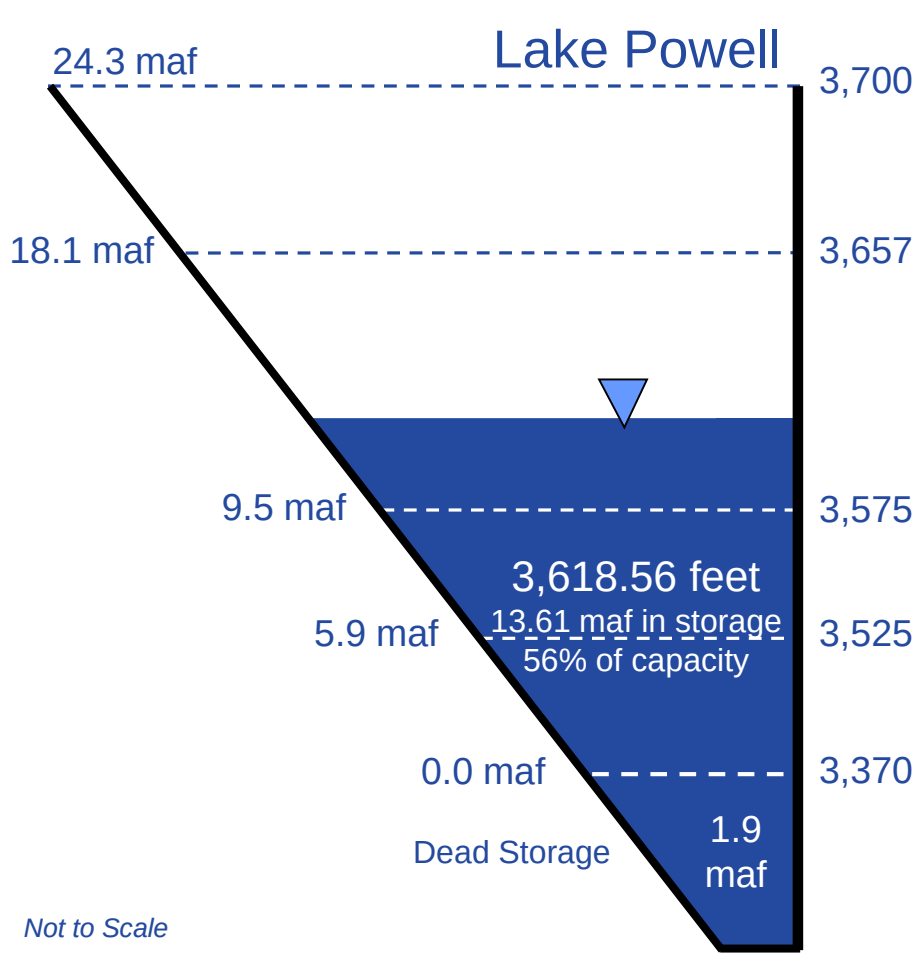
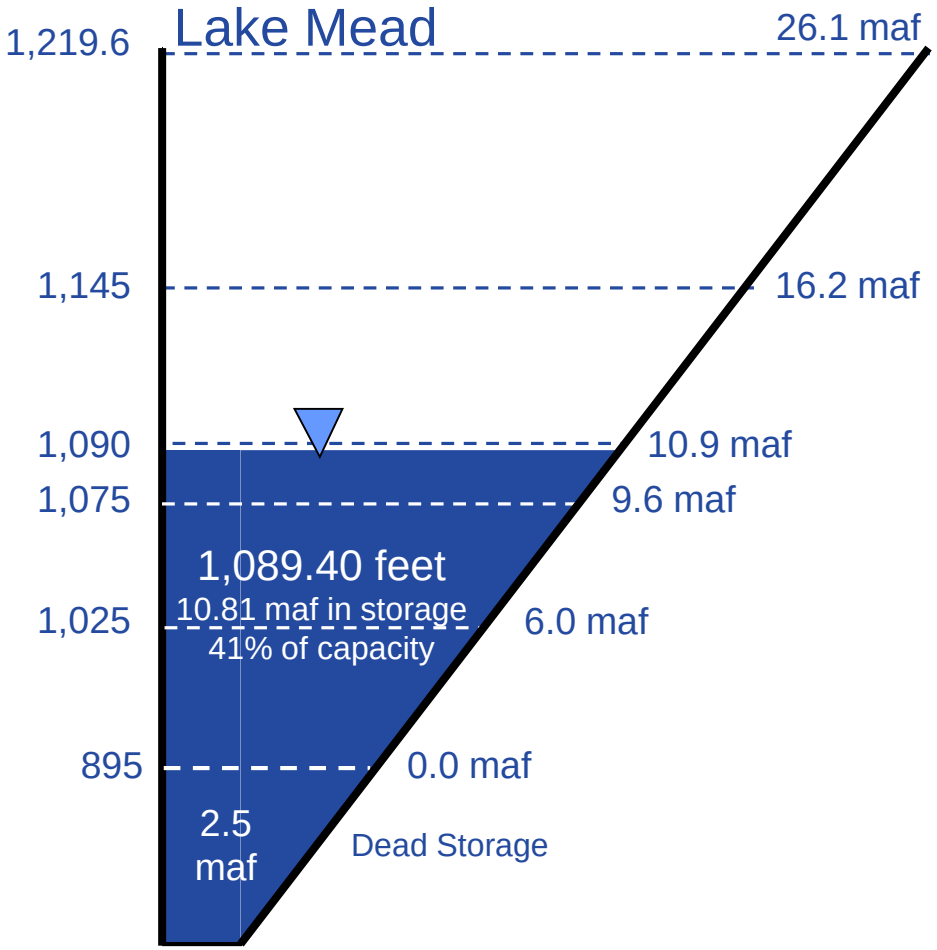
End of Calendar Year 2019 Projections

August 2019 24-Month Study Most Probable Inflow Scenario[1]

Based on a Lake Powell release of 9.00 maf in WY 2019 & 8.23 maf in WY 2020





[1] *WY 2019 unregulated inflow into Lake Powell is based on the CBRFC forecast dated 8/1/19.*

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Lower Basin Reservoir Operations
Calendar Years 2019 and 2020

- Lake Mead operated consistent with the 2007 Interim Guidelines and Lower Basin DCP Agreement.
  - Operating in a Normal/ICS Surplus Condition for the remainder of CY 2019.
  - Will operate in a Normal/ICS Surplus Condition in CY 2020 with Lower Basin DCP and Minute 323 water savings contributions.
  - ICS and system conservation water are projected to be created in both years.
- Lake Mohave/Lake Havasu operated consistent with each reservoir's respective elevation guide curves.

Lake Powell & Lake Mead Operational Table

Operational Tiers for Water/Calendar Year 2020[1]

Lake Powell

Elevation (feet)	Operation According to the Interim Guidelines	Live Storage (maf)[1]
3,700	**Equalization Tier** Equalize, avoid spills or release 8.23 maf	24.3
3,636 - 3,666 (2008-2026)		15.5 - 19.3 (2008-2026)
	Upper Elevation Balancing Tier[3] Release 8.23 maf; if Lake Mead < 1,075 feet, balance contents with a min/max release of 7.0 and 9.0 maf	
3,618.56 ft Jan 1, 2020 Projection		
3,575		9.5
	Mid-Elevation Release Tier Release 7.48 maf; if Lake Mead < 1,025 feet, release 8.23 maf	
3,525		5.9
	Lower Elevation Balancing Tier Balance contents with a min/max release of 7.0 and 9.5 maf	
3,490		4.0
3,370		0

Lake Mead

Elevation (feet)	Operation According to the Interim Guidelines	Live Storage (maf)[1]
1,220	**Flood Control Surplus or Quantified Surplus Condition** Deliver > 7.5 maf	25.9
1,200 (approx.)[2]		22.9 (approx.)[2]
	Domestic Surplus or ICS Surplus Condition Deliver > 7.5 maf	
1,145		15.9
	Normal or ICS Surplus Condition Deliver ≥ 7.5 maf	
1,105		11.9
1,089.40 ft Jan 1, 2020 Projection		
1,075		9.4
	Shortage Condition Deliver 7.167[4] maf	
1,050		7.5
	Shortage Condition Deliver 7.083[5] maf	
1,025		5.8
	Shortage Condition Deliver 7.0[6] maf Further measures may be undertaken[7]	
1,000		4.3
895		0

Diagram not to scale

[1] Acronym for million acre-feet

[2] This elevation is shown as approximate as it is determined each year by considering several factors including Lake Powell and Lake Mead storage, projected Upper Basin and Lower Basin demands, and an assumed inflow.

[3] Subject to April adjustments which may result in a release according to the Equalization Tier

[4] Of which 2.48 maf is apportioned to Arizona, 4.4 maf to California, and 0.287 maf to Nevada

[5] Of which 2.40 maf is apportioned to Arizona, 4.4 maf to California, and 0.283 maf to Nevada

[6] Of which 2.32 maf is apportioned to Arizona, 4.4 maf to California, and 0.280 maf to Nevada

[7] Whenever Lake Mead is below elevation 1,025 feet, the Secretary shall consider whether hydrologic conditions together with anticipated deliveries to the Lower Division States and Mexico is likely to cause the elevation at Lake Mead to fall below 1,000 feet. Such consideration, in consultation with the Basin States, may result in the undertaking of further measures, consistent with applicable Federal law.

[1] Lake Powell and Lake Mead operational tier determinations were based on August 2019 24-Month Study projections and will be documented in the draft 2020 AOP.

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2007 Interim Guidelines, Minute 323, Lower Basin Drought Contingency Plan & Binational Water Scarcity Contingency Plan
Total Volumes (in KAF)

CY 2020 Contributions

Lake Mead Elevation (feet msl)	Combined Volumes by Country *US: (2007 Interim Guidelines Shortages + DCP Contributions) Mexico: (Minute 323 Delivery Reductions + Binational Water Scarcity Contingency Plan Savings)*					Total Combined Volumes
	AZ Total	*NV Total*	*CA Total*	*Lower Basin States Total*	*Mexico Total*	*Lower Basin States + Mexico*
1,090 1,075	192	8	0	*200*	*41*	***241***
1,075 - 1050	512	21	0	*533*	*80*	***613***
1,050 - 1,045	592	25	0	*617*	*104*	***721***
1,045 - 1,040	640	27	200	*867*	*146*	***1,013***
1,040 - 1,035	640	27	250	*917*	*154*	***1,071***
1,035 - 1,030	640	27	300	*967*	*162*	***1,129***
1,030 - 1,025	640	27	350	*1,017*	*171*	***1,188***
<1,025	720	30	350	*1,100*	*275*	***1,375***

The US will work to create or conserve 100,000 af or more of Colorado River system water on an annual basis to contribute to conservation of water supplies in Lake Mead and other Colorado River reservoirs. All actions taken by the United States shall be subject to applicable federal law, including availability of appropriations.

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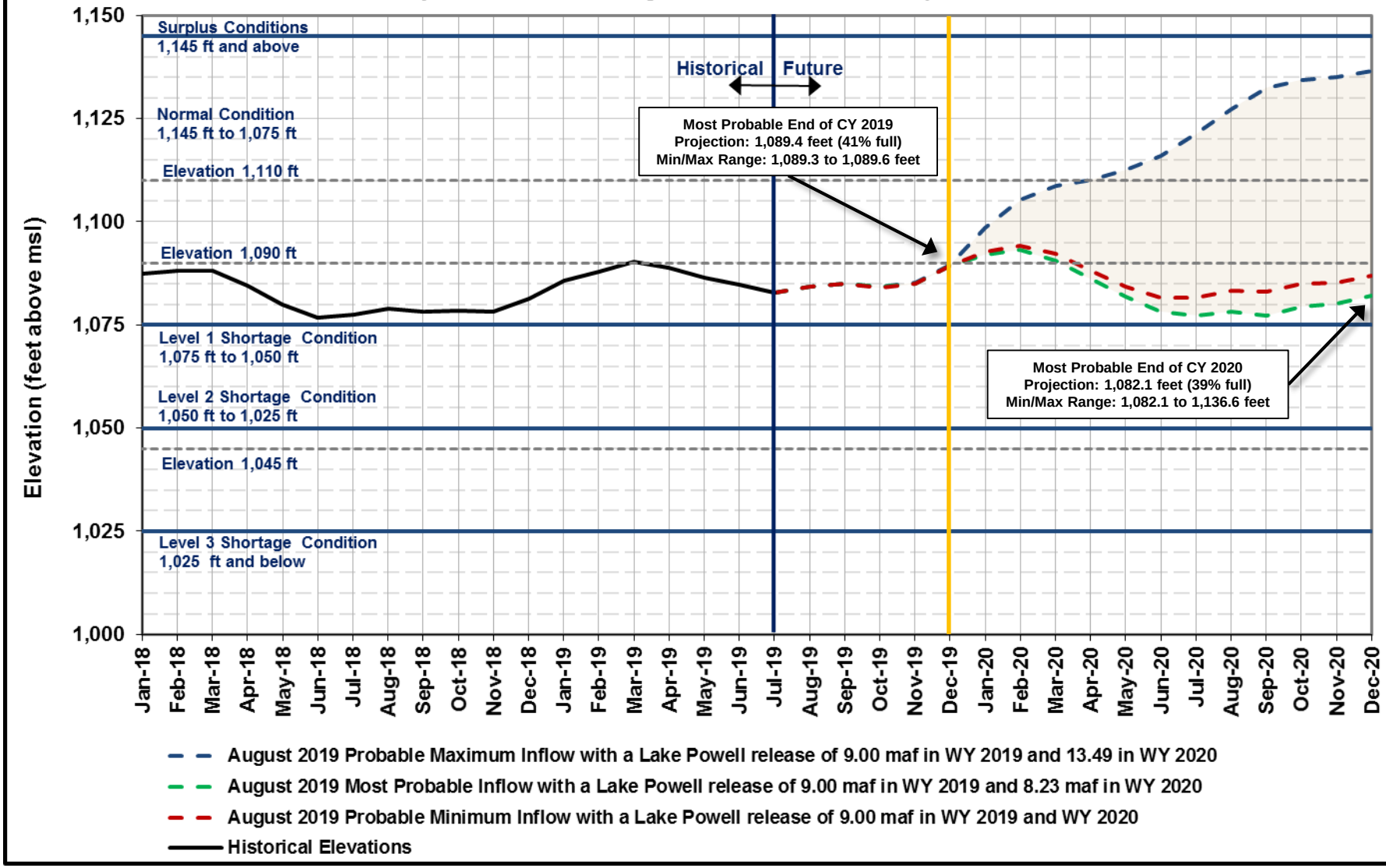
Lake Mead End of Month Elevations

Projections from the August 2019 24-Month Study Inflow Scenarios



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Next Steps

- The August 2019 24-Month Study will be distributed later this afternoon.
  - The Probable Min/Max Studies will be posted online tomorrow.
- The August 2019 CRSS run is currently being developed.
  - Results including an updated 5-year table will be provided via email.
- The 2020 Annual Operating Plan final consultation will take place on Thursday, September 5th at McCarran International Airport and with a webinar option.


Questions and Discussion
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RECLAMATION

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DRAFT Annual Operating Plan for Colorado River Reservoirs 2020

Edits, in red, indicate changes from the Draft 2020 AOP posted on Reclamation's website for the Second Consultation of the 2020 AOP.

*Hydrologic projections in this draft document of the 2020 AOP are based on the **August 2019 24-Month Study**. Subsequent drafts will be updated with contemporary projections of hydrology.*

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

U.S. Department of the Interior
Bureau of Reclamation

TABLE OF CONTENTS

LIST OF TABLES

INTRODUCTION

Background

Each year's Annual Operating Plan (AOP) for Colorado River Reservoirs reports on both the past operations of the Colorado River reservoirs for the completed year as well as projected operations and releases from these reservoirs for the current (i.e., upcoming) year. Accordingly, this 2020 AOP reports on 2019 operations as well as projected operations for 2020. 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] the 2016 Glen Canyon Dam Long-Term Experimental and Management Plan (LTEMP) ROD,[9] Minute No. 323 of the International Boundary and Water Commission (IBWC),[10] and the agreements related to the 2019 Colorado River Drought Contingency Plan (DCP)[11] as authorized by Public Law 116-14.[12] Each AOP incorporates these and other rules, guidelines, and decisions, and reports on how the criteria contained in the applicable decision document or

[1] ROD for the Operation of Glen Canyon Dam, October 9, 1996. Available online at: https://www.usbr.gov/uc/envdocs/rod/Oct1996_OperationGCD_ROD.pdf.

[2] Following the implementation of the LTEMP ROD, the Glen Canyon Dam operating criteria were revised and are in effect in water years 2019 and 2020 and 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] 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.

[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] The 2019 Colorado River DCP agreements, as authorized by Public Law 116-14, were executed on May 20, 2019. Available online at: https://www.usbr.gov/dcp/finaldocs.html.

[12] The Colorado River Drought Contingency Plan Authorization Act (Public Law 116-14) was signed into law on April 16, 2019. Available online at: https://www.congress.gov/116/bills/hr2030/BILLS-116hr2030enr.pdf.

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, applicable provisions of State law, 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 2020 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 Delivery Agreement;[17] the 2007 Interim Guidelines; the 2019 Colorado River DCP agreements; 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.

[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/legal/gcpa1992.pdf.
[16] Available online at: https://www.ibwc.gov/Files/1944Treaty.pdf.
[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.

The 2020 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 (UCRC); 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 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, 2020, 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] 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; (4) whether management and/or operationals~~~~ regimes will be required or considered as described in the 2019 Colorado River DCP; and (5) whether water apportioned to, but unused by one or more Lower Division States, exists and can be used to satisfy beneficial consumptive use requests of mainstream users in other Lower Division States as provided in the Consolidated Decree of the Supreme Court of the United States in *Arizona v. California*, 547 U.S. 150 (2006) (Consolidated Decree).[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 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)).

[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.

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 2020 Operations

Upper Basin. Taking into account (1) the existing water storage conditions in the basin, (2) the August 2019 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 2020. The August 2019 24-Month Study of the most probable inflow scenario projects the water year 2020 release from Glen Canyon Dam to be 8.23 million acre-feet (maf) (10,150 million cubic meters [mcm]). Given the hydrologic variability of the Colorado River System and based on actual 2019 water year operations, the projected water year release from Lake Powell in 2020 is likely to be in the estimated range of 8.23 maf (10,150 mcm) to 13.49 maf (16,640 mcm) or greater.

For further information about the variability of projected inflow into Lake Powell, see the 2020 Water Supply Assumptions section and the Lake Powell section within the Summary of Reservoir Operations in 2019 and Projected 2020 Reservoir Operations, and Tables 3 and 4.

Lower Basin. 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 2020 in accordance with Article III(3)(b) of the Operating Criteria and Article II(B)(2) of the Consolidated Decree. In addition, ~~consistent with Section III.A. of Exhibit 1 to~~ the Lower Basin Drought Contingency Plan Agreement (LB DCP Agreement)~~, Sections III.B.1.a and III.B.2.a of Exhibit 1 to the LB DCP Agreement~~ will also govern the operation of Lake Mead for calendar year 2020. Consistent with Sections III.B.1.a and III.B.2.a of Exhibit 1 to the LB DCP Agreement, DCP contributions will be required by Arizona and Nevada, respectively, in calendar year 2020.

No unused apportionment for calendar year 2020 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 2020. Any such allocation shall be made in accordance with Article II(B)(6) of the Consolidated Decree, the Lower

[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.

Colorado Region Policy for Apportioned but Unused Water[22] (Unused Water Policy), and giving further consideration to the water conservation objectives of the July 30, 2014 agreement for a pilot system conservation program (PSCP).[23] and as specified in Section 4.b of the LB DCP Agreement.

In calendar year 2020, 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),[24] which became effective January 1, 2004, will be in effect during calendar year 2020.

Conserved Colorado River water, created through the PSCP[25] and other voluntary agreements, is anticipated to be added to ~~system~~ Lower Basin reservoirs pursuant to system conservation agreements in the Lower Basin in calendar year 2020.

The 2007 Interim Guidelines adopted the ICS mechanism, which was expanded upon in the LB DCP Agreement, 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 2020 pursuant to the 2007 Interim Guidelines, applicable forbearance and delivery agreements, and the LB DCP Agreement.

1944 United States-Mexico Water Treaty. A volume of 1.500 maf (1,850 mcm) of water will be available to be scheduled for delivery to Mexico during calendar year 2020 in accordance with Article 15 of the 1944 United States-Mexico Water Treaty and Minutes No. 242 and 322 of the IBWC. The volume delivered will be adjusted for water savings contributions as required under Section IV of IBWC Minute No. 323. 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.

[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.
[23] Available online at: https://www.usbr.gov/lc/region/programs/PilotSysConsProg/PilotSCPFundingAgreement7-30-2014.pdf.
[24] 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.
[25] More information about the PSCP in the Lower Basin can be found at: https://www.usbr.gov/lc/region/programs/PilotSysConsProg/pilotsystem.html.

2019 HYDROLOGY SUMMARY AND RESERVOIR STATUS

Above average stream flows were observed throughout much of the Colorado River Basin during water year 2019. Unregulated[26] inflow to Lake Powell in water year 2019 was 13.54 maf (16,700 mcm), or 125 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 109, 143, and 134 percent of average, respectively.

Precipitation in the Upper Colorado River Basin was above average[28] during water year 2019. On September 30, 2019, the cumulative precipitation received within the Upper Colorado River Basin for water year 2019 was 120 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 134 percent of average on April 1, 2019. Total seasonal accumulation peaked at approximately 132 percent of average on April 15, 2019. On April 1, 2019, the snow water equivalents for the Green River, Upper Colorado River Headwaters, and San Juan River Basins were 101, 125, and 151 percent of average, respectively.

During the 2019 spring runoff period, inflows to Lake Powell peaked on June 18, 2019 at approximately 78,250 cubic feet per second (cfs) (2,210 cubic meters per second [cms]). The April through July unregulated inflow volume for Lake Powell was 10.41 maf (12,840 mcm) which was 145 percent of average.

Lower Basin tributary inflows above Lake Mead were above average for water year 2019. Tributary inflow ~~from~~ measured at the Little Colorado River near Cameron gage for water year 2019 totaled 0.201 maf (248 mcm), or 140 percent of average. Tributary inflow ~~from~~measured at the Virgin River at Littlefield gage for water year 2019 totaled 0.227 maf (280 mcm), or 125 percent of average.

Below Hoover Dam, tributary inflow for water year 2019 ~~from~~ measured at the Bill Williams River below Alamo Dam gage totaled 0.022 maf (27 mcm), and tributary inflow ~~from~~measured at the Gila River near Dome gage totaled 0.020 maf (25 mcm).[30]

The Colorado River total system storage experienced a net increase of 4.27 maf (5,270 mcm) in water year 2019. Reservoir storage in Lake Powell increased during water year 2019 by 2.74

[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 (3,380 mcm). Reservoir storage in Lake Mead increased during water year 2019 by 0.556 maf (690 mcm). At the beginning of water year 2019 (October 1, 2018), Colorado River total system storage was 47 percent of capacity. As of September 30, 2019, total system storage was 54 percent of capacity.

Tables 1 and 2 list the October 1, 2019, reservoir vacant space, live storage, water elevation, percent of capacity, change in storage, and change in water elevation during water year 2019.

Table 1. Reservoir Conditions on October 1, 2019 (English Units)

Reservoir	Vacant Space	Live Storage	Water Elevation	Percent of Capacity	Change in Storage*	Change in Elevation*
	(maf)	(maf)	(ft)	(%)	(maf)	(ft)
Fontenelle	0.058	0.287	6,498.4	83	0.024	3.2
Flaming Gorge	0.347	3.400	6,031.4	91	0.025	0.6
Blue Mesa	0.089	0.740	7,509.3	89	0.457	64.8
Navajo	0.256	1.439	6,067.0	85	0.522	46.3
Lake Powell	10.55	13.77	3,620.0	57	2.74	27.7
Lake Mead	15.69	10.43	1,085.0	40	0.556	6.7
Lake Mohave	0.272	1.540	637.0	85	-0.023	-0.9
Lake Havasu	0.049	0.571	447.5	92	-0.028	-1.4
Totals	27.32	32.17		54	4.27	

* From October 1, 2018, to September 30, 2019.

Table 2. Reservoir Conditions on October 1, 2019 (Metric Units)

Reservoir	Vacant Space	Live Storage	Water Elevation	Percent of Capacity	Change in Storage*	Change in Elevation*
	(mcm)	(mcm)	(m)	(%)	(mcm)	(m)
Fontenelle	72	354	1,980.7	83	30	1.0
Flaming Gorge	428	4,200	1,838.4	91	31	0.2
Blue Mesa	110	912	2,288.8	89	564	19.8
Navajo	315	1,780	1,849.2	85	641	14.1
Lake Powell	13,010	17,000	1,103.4	57	3,380	8.5
Lake Mead	19,350	12,900	330.7	40	686	2.0
Lake Mohave	336	1,900	194.2	85	-28	-0.3
Lake Havasu	61	704	136.4	92	-35	-0.4
Totals	33,700	39,680		54	5,270	

* From October 1, 2018, to September 30, 2019.

2020 WATER SUPPLY ASSUMPTIONS

For 2020 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 2020 is 7.00 maf (8,630 mcm), or 65 percent of average.
- The forecasted most probable unregulated inflow to Lake Powell in water year 2020 is 10.80 maf (13,320 mcm), or 100 percent of average.
- The forecasted maximum probable unregulated inflow to Lake Powell in water year 2020 is 19.00 maf (23,440, mcm), or 175 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 2014 through December 2018, 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 2020 is 0.701 maf (865 mcm), the most probable inflow is 0.784 maf (967 mcm), and the maximum probable inflow is 0.868 maf (1,070 mcm).

The projected monthly volumes of inflow were input into the 24-Month Study and used to project potential reservoir operations for 2020. Starting with the August 2019 24-Month Study projection of the October 1, 2020 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 2020 (English Units)[31]

Time Period	Minimum Probable (maf)	Most Probable (maf)	Maximum Probable (maf)
10/2019 – 12/2019	1.51	1.64	1.77
1/2020 – 3/2020	1.47	1.52	1.96
4/2020 – 7/2020	3.58	6.84	13.60
8/2020 – 9/2020	0.42	0.81	1.67
10/2020 – 12/2020	1.13	1.31	1.81
WY 2020	7.00	10.80	19.00
CY 2020	6.60	10.48	19.04

Table 4. Projected Unregulated Inflow into Lake Powell for Water Year 2020 (Metric Units)

Time Period	Minimum Probable (mcm)	Most Probable (mcm)	Maximum Probable (mcm)
10/2019 – 12/2019	1,860	2,020	2,180
1/2020 – 3/2020	1,810	1,880	2,420
4/2020 – 7/2020	4,420	8,440	16,780
8/2020 – 9/2020	518	1,000	2,060
10/2020 – 12/2020	1,390	1,620	2,230
WY 2020	8,630	13,320	23,440
CY 2020	8,140	12,930	23,490

[31] All values in Tables 3 and 4 are projected inflows based upon the August 2019 CBRFC forecast with the exception of the values for 10/2020-12/2020. The values for 10/2020-12/2020 are based upon average unregulated inflow from 1981-2010. The calendar year totals in Tables 3 and 4 also reflect average values for the 10/2020-12/2020 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 2019 AND PROJECTED 2020 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 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)[32] 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),[33] the San Juan River Basin Recovery Implementation Program (SJRIP),[34] 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 2019 and the range of probable projected 2020 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.

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

Fontenelle Reservoir

Reservoir storage in Fontenelle ended water year 2019 at approximately the same percent capacity as it started the water year. At the beginning of water year 2019, Fontenelle storage was 76 percent of live capacity at elevation 6,495.11 feet (1,979.71 meters), with 0.262 maf (323 mcm) in storage. The unregulated inflow to Fontenelle during water year 2019 was 1.12 maf (1,380 mcm) which is 104 percent of average. At the end of the water year, September 30, 2019, Fontenelle storage was at 78 percent of live capacity at elevation 6,495.92 feet (1,979.96 meters), with a storage of 0.269 maf (332 mcm) resulting in a net increase during water year 2019 of 0.007 maf (8.6 mcm).

Hydrologic conditions in the Upper Green River Basin above Fontenelle were near average in water year 2019. Snowpack development tracked near median with average fall conditions maintaining soil moisture resulting in average runoff forecasts. Peak snow water equivalent reached 105 percent of seasonal median on April 17, 2019. The July forecast for the April through July inflow into Fontenelle Reservoir was 0.825 maf (1,020 mcm), or 114 percent of average. The observed inflow during the April to July season was 0.80 maf (987 mcm), or 111 percent of average.

Fontenelle Reservoir filled in water year 2019. The reservoir elevation peaked at 6,502.79 feet (1,982.05 meters) on August 8, 2019, which was 3.21 feet (0.98 meters) below the spillway crest. Daily inflow peaked at 10,300 cfs (291 cms) on June 10, 2019. Reservoir releases were made to balance downstream water resources needs and power production, while also allowing for filling the reservoir to maintain sufficient water in storage for use through the fall and winter months. Releases peaked at 6,400 cfs (181 cms) on June 14, 2019 and were reduced to 1,200 cfs (34.0 cms) in September.

Based on the August 2019 24-Month Study, the most probable April through July inflow scenario for Fontenelle Reservoir during water year 2020 is 0.675 maf (833 mcm) or 93 percent of average. This volume exceeds the 0.346 maf (427 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 2020. 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 6,466.51 feet (1,970.99 meters) by early May 2020, which is 3.51 feet (1.07 meters) ~~below~~ above the minimum operating level for power generation, and corresponds to a volume of 0.105 maf (130 mcm) of live storage.

Flaming Gorge Reservoir

Reservoir storage in Flaming Gorge increased during water year 2019. At the beginning of water year 2019, Flaming Gorge storage was 90 percent of live capacity at elevation 6,030.75 feet (1,838.17 meters), with 3.38 maf (4,170 mcm) in storage. The unregulated inflow to Flaming Gorge during water year 2019 was 1.85 maf (2,280 mcm) which is 127 percent of average. At the end of the water year, Flaming Gorge storage was at 91 percent of live capacity at elevation 6,031.39 feet (1,838.37 meters), with 3.40 maf (4,190 mcm) resulting in a net increase during water year 2019 of 0.025 maf (31 mcm).

Flaming Gorge Dam operations in 2019 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) for the benefit of endangered razorback sucker.[35] Larvae were detected on May 21, 2019. After public notification, releases from Flaming Gorge Dam were increased to full powerplant capacity on June 3, 2019. Bypass releases were utilized to bring the total release from Flaming Gorge Dam to 8,600 cfs (240 cms) for 7 days, starting on June 5, 2019, to enhance floodplain operations in the middle Green River for the benefit of endangered species.

In total, Flaming Gorge Dam released at or above powerplant capacity releases of 4,600 cfs (130 cms) for 17 days during the April through July runoff period. Yampa River flows at the Deerlodge gage peaked at 15,600 cfs (441 cms) on June 23, 2019. The peak release from Flaming Gorge Dam occurred before the Yampa River peak to support larval entrainment and reservoir management during the high spring inflows. Flows measured on the Green River at the Jensen, Utah gage reached levels at or above 18,600 cfs (526 cms) for 9 days between June 9 and June 18, 2019 with a peak of 20,800 cfs (589 cms) on June 11, 2019.

Hydrologic conditions in the Upper Green River Basin above Flaming Gorge were average in water year 2019. Snowpack development tracked near median with average fall conditions maintaining soil moisture resulting in near average runoff forecasts. Peak snow water equivalent reached 115 percent of seasonal median on April 17, 2019. The July forecast for the April through July inflow into Flaming Gorge Reservoir was 1.22 maf (1,500 mcm), or 124 percent of average. The observed inflow during the April to July season was 1.18 maf (1,460 mcm), or 120 percent of average.

Observed flow volumes from the Yampa River Basin were significantly different than projected flow volumes from the Upper Green River Basin and fell into the moderately wet hydrologic classification. The 2006 Flaming Gorge ROD hydrologic classification for the Upper Green was characterized as average (above median). The flexibility in the ROD allows for a change in hydrology classification two higher and one lower than that designated by the forecasted unregulated inflow volume on May 1 depending upon Yampa River conditions. It

[35] 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.

was determined that, with the similar conditions in the Yampa River Basin, the hydrologic classification was average and the LTSP hydrologic classification was average (above median) based on the June forecast. Flows at Jensen ~~did meet or exceed~~met 2006 Flaming Gorge ROD flow targets in Reach 2 for the ROD Flow Recommendation of at least 18,600 cfs (526 cms) for 9 days.

Consistent with the 2006 Flaming Gorge ROD, considering information provided to the FGTWG, average 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 2019. The 2006 Flaming Gorge ROD base flow period hydrologic classification was average as of mid-June 2019. Daily base flows fluctuated during the summer to meet ~~or exceed~~ 2,000 to 2,600 cfs (56.6 to 73.6 cms) on the Green River at Jensen, Utah through September 30, 2019.

The Flaming Gorge Operation Plan for May 2019 through April 2020 (FG-Ops) has been developed and approved by Reclamation. The FG-Ops outlines the UCRIP request that includes the LTSP and Bestgen and Hill (2016)[36] study and experiments for the razorback sucker (spring peak period) and Colorado pikeminnow (autumn base flow period). The FG-Ops includes a plan release schedule for average (below and above median) and moderately wet scenarios for the spring peak flows, summer-autumn base flows, and winter base flow periods. The summer-autumn and winter base flows periods followed the 2000 Flow and Temperature Recommendations.[37]

Under the August 2019 most probable inflow scenario, winter base flow releases are projected to be in the average classification range with a 25 percent increase above the average daily base flows calculated through the base flow period. Winter releases are projected to be approximately 2,400 cfs (67.9 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, 2020. A spring peak release is projected to occur in May or June 2020, 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.

Based on the August 2019 24-Month Study, the most probable April through July inflow scenario for Flaming Gorge Reservoir during water year 2020 is 0.905 maf (1,120 mcm) or 92 percent of average. The peak elevation is expected to be approximately 6,029.79 feet (1,837.88 meters) near late-May 2020. By the end of water year 2020, Flaming Gorge Reservoir is projected to be at elevation 6,027.89 feet (1,837.30 meters), with a storage of 3.27 maf (4,030 mcm), or 87 percent of capacity.

[36] Available online at: http://www.coloradoriverrecovery.org/documents-publications/technical-reports/isf/BestgenHillFR-BWtopoGreenRiverpikeminnowreportFinalFebruary2016.pdf.

[37] Flow and Temperature Recommendations for Endangered Fishes in the Green River Downstream of Flaming Gorge Dam, September 2000. Available online at: http://www.coloradoriverrecovery.org/documents-publications/technical-reports/isf/flaminggorgeflowrecs.pdf.

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.

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

Reservoir storage in Blue Mesa increased during water year 2019. At the beginning of water year 2019, Blue Mesa storage was 34 percent of live capacity at elevation 7,444.44 feet (2,269.07 meters), with 0.282 maf (348 mcm) in storage content. The unregulated inflow to Blue Mesa during water year 2019 was 1.36 maf (1,680 mcm) which was 142 percent of average. At the end of the water year, Blue Mesa storage was 82 percent of live capacity at elevation 7,509.29 feet (2,288.83 meters), with 0.740 maf (913 mcm) resulting in a net increase during water year 2019 of 0.458 maf (565 mcm).

Above average snowpack conditions occurred during the winter months of water year 2019 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 2019 resulting in an April 1, 2019 snow water equivalent for the Gunnison River Basin that was 149 percent of average.

The fall through winter releases from Crystal Dam varied between approximately 350 cfs (9.9 cms) in November 2018 to 470 cfs (13 cms) in February 2019. On April 1, 2019, releases from Crystal Dam were increased for operation of the Gunnison Tunnel. Flows through the Black Canyon were maintained within the range of approximately 470 cfs (13 cms) to approximately 966 cfs (27 cms) until May 21, 2019.

The May 2019 final forecast for the unregulated inflow to Blue Mesa for the April through July runoff period was 0.970 maf (1,200 mcm) which was 143 percent of average. This forecast was used to establish the hydrologic category for water year 2019 as Moderately Wet as described in the 2012 Aspinall ROD. In years that fall within the average wet, moderately wet, or wet category, as described in the Aspinall ROD, that follow a year that was categorized as dry, if Blue Mesa falls below a storage level of 0.520 maf (641 mcm) on December 31 and also below 0.400 maf (493 mcm) on March 31, half-bankfull targets are reduced to the next lower category. Water year 2019 met this condition so the half-bankfull duration was reduced from 40 days to 20 days.

On May 22, 2019, releases from Crystal, Morrow Point and Blue Mesa were increased to target downstream flow levels and durations described in the Aspinall ROD and the Black Canyon Water Right Decree.[38] During spring peak operations, flows measured in the Whitewater Reach of the Gunnison River met the desired target of ~~exceeded~~ 14,350 cfs (406 cms) for 6 days between June 5, 2019 and June 10, 2019. Half-bank level flows of 8,070 cfs (228 cms) were ~~exceeded~~ met for 21 days during the spring peak operation period between May 29, 2019

[38] 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.

and June 18, 2019. Releases from Crystal Dam on June 4, 2019 ~~during spring operations, consistent with the 2012 Aspinall ROD peak flow target,~~ resulted in a 24-hour average peak flow through the Black Canyon and the Gunnison River Gorge of ~~7,670~~7,815 cfs (~~217~~ 221 cms) as measured at the streamgage located on the Gunnison River below the Gunnison Tunnel. ~~for 24 hours on June 5, 2019, and~~ Gunnison River flows in the Black Canyon ~~exceeded~~ met or exceeded the flows described in the Black Canyon Water Right Decree.

For water year 2020, the Aspinall Unit will be operated in ~~accordance~~ compliance 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 2019 24-Month Study, the projected most probable unregulated inflow for water year 2020 into Blue Mesa Reservoir is 0.970 maf (1,200 mcm), or 102 percent of average. The reservoir is expected to reach a seasonal low elevation of 7,477.40 feet (2,279.11 meters) by late May 2020. The peak elevation is expected to be approximately 7,506.70 feet (2,288.04 meters) near the end of July 2020. By the end of water year 2020, Blue Mesa Reservoir is projected to be at elevation 7,502.35 feet (2,286.72 meters), with a storage content of 0.681 maf (840 mcm), or 82 percent of capacity.

Navajo Reservoir

Storage in Navajo Reservoir increased during water year 2019. At the beginning of water year 2019, Navajo storage was 54 percent of live capacity at elevation 6,020.58 feet (1,835.07 meters), with 0.917 maf (1,130 mcm) in storage. The modified unregulated inflow[39] to Navajo during water year 2019 was 1.45 maf (1,790 mcm) which is 135 percent of average. At the end of the water year, Navajo storage was at 85 percent of live capacity at elevation 6,066.97 feet (1,849.21 meters), with 1.44 maf (1,780 mcm) resulting in a net increase during water year 2019 of 0.522 maf (644 mcm).

A channel maintenance release was conducted from June 3, 2019 through June 15, 2019, peaking at 5,060 cfs (143 cms) and totaling 0.080 maf (99 mcm) of water over the base release. Reservoir storage in Navajo largely increased throughout water year 2019 peaking at an elevation of 6,074.76 feet (1,851.59 meters) on July 9, 2019. This was 20.80 feet (6.34 meters) below full pool. The April through July modified unregulated inflow into Navajo Reservoir in water year 2019 was 1.16 maf (1,430 mcm), or 158 percent of average.

The San Juan Flow Recommendations,[40] completed by the SJRIP in May 1999, provide flow recommendations that promote the recovery of the endangered Colorado pikeminnow and razorback sucker, maintain important habitat for these two species as well as the other native species, and provide information for the evaluation of continued water development in the basin. The flow recommendations are currently under review by the SJRIP.

[39] 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.
[40] 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.

In water year 2019, 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 that the reservoir releases will be calculated to target an End of Water Year Storage Target elevation of 6,063.00 feet (1,848.00 meters). The interim operations also specify a minimum elevation of 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 if the SJRIP requests. 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 2019, including the SJRIP's target base flows. For the summer of 2019, the SJRIP has recommended an augmented target base flow of 1,500 cfs (42.5 cms) through the critical habitat area. The target base flow is calculated as the weekly average of gaged flows throughout the critical habitat area from Farmington to Lake Powell. Reclamation will attempt to maintain this augmented baseflow as long as water is available over the End of Water Year Storage Target elevation. Based on the SJRIP and Reclamation's interim operations for water year 2019, there was no spring peak release at Navajo Reservoir.

During water year 2020, Navajo Reservoir will be operated in accordance with the 2006 Navajo Reservoir ROD. Navajo Reservoir storage levels are expected to be near average in 2020 under the most probable inflow forecast. Base releases from the reservoir will likely range from 350 cfs (9.91 cms) to 600 cfs (17 cms) through the winter. Based on the August 2019 most probable April through July modified unregulated inflow forecast of 0.660 maf (814 mcm) in 2020, the August 2019 24-Month Study projects a 39-day spring peak release would be recommended by the anticipated SJRIP and Reclamation's interim operations for water year 2020. The reservoir is projected to reach a peak elevation of 6,073.44 feet (1,851.18 meters) in April 2020. The reservoir is projected to reach a minimum elevation of 6,053.90 feet (1,845.23 meters) in September 2020.

Under the minimum probable 2020 April through July inflow forecast of 0.330 maf (407 mcm), there will be no spring peak release during the spring of 2020. Under the maximum probable 2020 April through July inflow forecast of 1.24 maf (1,530 mcm), a 60-day spring peak release will be recommended as described by the anticipated SJRIP and Reclamation's interim operations for water year 2020.

In 2016, 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 2017-2020 to the rates and volumes indicated in the agreement. The agreement includes limitations on diversions for 2017-2020, 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 awaiting~~has received endorsements from all participating parties, and final signatures from the New Mexico State Engineer's office.

Lake Powell

Reservoir storage in Lake Powell increased during water year 2019. At the beginning of water year 2019, Lake Powell storage was 45 percent of live capacity at elevation 3,592.28 feet (1,094.93 meters), with 11.03 maf (13,610 mcm) in storage. The unregulated inflow to Lake Powell during water year 2019 was 13.54 maf (16,700 mcm) which is 125 percent of average. At the end of the water year, Lake Powell storage was at 57 percent of live capacity at elevation 3,620.02 feet (1,103.38 meters), with 13.77 maf (16,990 mcm) resulting in a net increase during water year 2019 of 2.74 maf (3,380 mcm).

The August 2018 24-Month Study was run to project the January 1, 2019, elevations of Lake Powell and Lake Mead and determine the water year 2019 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, 2019, reservoir elevations of Lake Powell and Lake Mead were projected to be 3,586.55 feet (1,093.18 meters) and 1,079.50 feet (329.03 meters), respectively. Given these projections, the annual release volume from Lake Powell during water year 2019 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 2019 24-Month Study was run with an 8.23 maf (10,150 mcm) annual release volume to project the September 30, 2019, 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 3,618.44 feet (1,102.90 meters) and Lake Mead was 1,072.84 feet (327.00 meters). Since the projected end of water year elevation at Lake Powell was below the 2019 Equalization elevation of 3,655.00 feet (1,114.04 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 2019. 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 2019 was 9.00 maf (11,100 mcm).

The April through July unregulated inflow to Lake Powell in water year 2019 was 10.41 maf (12,840 mcm) which was 145 percent of average. Lake Powell's water surface elevation increased throughout most of water year 2019, starting the year at 3,592.28 feet (1,094.93 meters), which was 107.72 feet (32.83 meters) below full pool. This elevation corresponds to a live storage content of 11.03 maf (13,610 mcm).

~~In December 2016, the Secretary signed the LTEMP ROD.~~ In water year 2019, Glen Canyon Dam was operated in compliance with ~~operations followed~~ the LTEMP ROD. The first High Flow Experiment~~al~~ release under the LTEMP was conducted during November 2018. Reclamation released the maximum available capacity of 38,100 cfs (1,080 cms) during the experiment, which began on November 5 and ended on November 8, 2018. Approximately 0.077 maf (95 mcm) was bypassed during the experiment. The first Macroinvertebrate

Production Flow (bug flow) experiment under the LTEMP was designed and conducted during May through August 2018, with the second bug flow experiment completed in May through August 2019. ~~Hydropower peaking~~ During these experiments, releases were held steady during Saturday and Sunday in an attempt to increase production of aquatic insects. ~~The second bug flow experiment was completed in May through August 2019.~~ The total annual release from Glen Canyon Dam in water year 2019 did not change as a result of the experimental releases.

The ten-year total flow of the Colorado River at Lee Ferry[41] for water years 2010 through 2019 is 92.50 maf (114,100 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.

2020 Operating Tier and Projected Operations for Glen Canyon Dam. The January 1, 2020 reservoir elevations of Lake Powell and Lake Mead are projected under the most probable inflow scenario to be 3,618.56 feet (1,102.94 meters) and 1,089.40 feet (332.05 meters), respectively, based on the August 2019 24-Month Study. Given these projections, the operating tier and annual release volume from Lake Powell during water year 2020 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 2020 24-Month Study, with a water year release volume of 8.23 maf (10,150 mcm) projects the September 30, 2020, Lake Powell elevation to be greater than 3,657.00 feet (1,114.65 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 2020 24-Month Study, with a water year release volume of 8.23 maf (10,150 mcm), projects the September 30, 2020, Lake Powell elevation to be at or above 3,575.00 feet (1,089.66 meters) and below the 2020 Equalization level of 3,657.00 feet (1,114.65 meters), and the September 30, 2020, 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 2020 consistent with Section 6.B.4 of the 2007 Interim Guidelines.

Under the minimum probable inflow scenario, the August 2019 24-Month Study, with a projected water year release volume of 8.23 maf (10,150 mcm) in water year 2020, projects that the elevations of Lake Powell and Lake Mead on September 30, 2020, would be 3,612.11 feet (1,100.97 meters) and 1,074.26 feet (327.43 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 2020 is projected to be 9.00

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

maf (11,100, mcm). The end of water year elevation and storage of Lake Powell is projected to be 3,605.03 feet (1,098.81 meters) and 12.24 maf (15,100 mcm), respectively, based on the minimum probable inflow scenario.

Under the most probable inflow scenario, the August 2019 24-Month Study, with a projected water year release volume of 8.23 maf (10,150 mcm) in water year 2020, projects that the elevations of Lake Powell and Lake Mead on September 30, 2020, would be 3,640.14 feet (1,109.51 meters) and 1,077.28 feet (328.35 meters), respectively. Based on these projections, under the most probable inflow scenario, an April adjustment to balancing is not projected to occur during water year 2020. Consistent with Section 6.B.1, the 2020 water year release volume projected under the most probable inflow scenario is 8.23 maf (10,150 mcm) and the end of water year elevation and storage of Lake Powell is projected to be 3,640.14 feet (1,109.51 meters) and 16.02 maf (19,760 mcm), respectively.

Under the maximum probable inflow scenario, the August 2019 24-Month Study, with a projected water year release volume of 8.23 maf (10,150 mcm) in water year 2020, projects that the elevation of Lake Powell on September 30, 2020, would be 3,691.04 feet (1,125.03 meters). This elevation is above the Equalization Level for water year 2020 of 3,657.00 feet (1,114.65 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 2020 is projected to be 13.49 maf (16,640 mcm). The end of water year elevation and storage of Lake Powell is projected to be 3,657.00 feet (1,114.65 meters) and 18.10 maf (22,330 mcm), respectively, based on the maximum probable inflow scenario.

Maintenance of the eight generating units at Glen Canyon Dam requires them to be taken out of service, in pairs, once each year for approximately one month. Additionally, in water years 2019 and 2020, all three transformers will be replaced, requiring the units to be taken out of service, in pairs, and should be completed during the summer of 2020. Outages for annual maintenance and unit replacements are coordinated between Reclamation offices in Salt Lake City, Utah, and Page, Arizona, and WAPA 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 2020. If implemented, releases greater than powerplant capacity would be made consistent with the 1956 Colorado River Storage Project Act,[42] the CRBPA, the LTEMP ROD, and the Glen Canyon Dam Operating Criteria.

Releases from Lake Powell in water year 2020 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 updated to be consistent with annual volumes determined pursuant to the 2007 Interim Guidelines.

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

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 2020 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 2020, 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 2019, 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, Section 2.B.5 of the 2007 Interim Guidelines, and applicable provisions of the LB DCP Agreement. Delivery of water to Mexico was scheduled in accordance with Article 15 of the 1944 United States-Mexico Treaty and Minutes No. 242, 322, and 323 of the IBWC.

Lake Mead began water year 2019 on October 1, 2018, at elevation 1,078.29 feet (328.66 meters), with 9.87 maf (12,170 mcm) in storage, which is 38 percent of the conservation capacity[43] of 26.12 maf (32,220 mcm). Lake Mead ended water year 2019 at elevation 1,084.96 feet (330.70 meters) with 10.43 maf (12,870 mcm) in storage (40 percent of capacity) on September 30, 2019.

The total release from Lake Mead through Hoover Dam during water year 2019 was 8.80 maf (10,850 mcm). The total release from Lake Mead through Hoover Dam during calendar year 2019 is projected to be 8.61 maf (10,620 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 2019, inflow into Lake Mead was 10.16 maf (12,530 mcm), consisting of 9.00 maf (11,100 mcm) of water released from Glen Canyon Dam and 1.16 maf (1,430 mcm) of inflows between Glen Canyon and Hoover Dams. For water year 2020, under the most probable inflow scenario, total inflow into Lake Mead is projected to be 9.01 maf (11,110 mcm).

[43] 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 2019 24-Month Study, Lake Mead's elevation on January 1, 2020, is projected to be 1,089.40 feet (332.05 meters). In accordance with Section 2.B.5 of the 2007 Interim Guidelines and the applicable provisions of the LB DCP Agreement, the ICS Surplus Condition and Sections III.B.1.a and III.B.2.a of Exhibit 1 to the LB DCP Agreement, respectively, will govern the releases and diversions from Lake Mead in calendar year 2020. Releases from Lake Mead through Hoover Dam will be adjusted for DCP and water savings contributions in calendar year 2020. ~~for water year and calendar year 2020 are anticipated to be approximately the same as 2019 releases.~~

Under the most probable inflow scenario, Lake Mead is projected to end water year 2020 at elevation 1,077.28 feet (328.35 meters), with 9.79 maf (12,080 mcm) in storage (37 percent of capacity). Lake Mead is projected to increase to elevation 1,082.10 feet (329.82 meters) with 10.19 maf (12,570 mcm) in storage (39 percent of capacity) at the end of calendar year 2020. 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 2019 at an elevation of 637.87 feet (194.42 meters) with 1.56 maf (1,920 mcm) in storage. The water level of Lake Mohave was regulated between elevation 637.08 feet (194.18 meters) and 643.32 feet (196.08 meters) during the water year, ending at an elevation of 637.00 feet (194.16 meters), with 1.54 maf (1,900 mcm) in storage. During water year 2019, 8.49 maf (10,470 mcm) was released from Davis Dam. The calendar year 2019 total release is projected to be 8.35 maf (10,300 mcm).

For water and calendar years 2020, Davis Dam is projected to release approximately the same amount of water as in 2019, 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 2019 at an elevation of 448.95 feet (136.84 meters) with 0.598 maf (738 mcm) in storage. The water level of Lake Havasu was regulated between elevation 446.53 feet (136.10 meters) and 448.62 feet (136.74 meters) during the water year, ending at an elevation of 447.50 feet (136.40 meters), with 0.570 maf (703 mcm) in storage. During water year 2019, 6.22 maf (7,670 mcm) was released from Parker Dam. The calendar year 2019 total release is projected to be 6.35 maf (7,830 mcm).

For water and calendar years 2020, Parker Dam is expected to release approximately the same amount of water as in 2019, 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 October through May.

Bill Williams River

Alamo Lake elevation and storage increased during water year 2019. Alamo Lake started water year 2019 at elevation 1,094.40 feet (333.57 meters) with 0.067 maf (82.6 mcm) in storage, and ended water year 2019 at elevation 1,117.52 feet (340.62 meters) with 0.133 maf (164 mcm) in storage. In water year 2019, average daily releases from Alamo Lake ranged from about 10 to 25 cfs (0.28 to 0.71 cms). Water released from Alamo Lake totaled 0.022 maf (27 mcm) for water year 2019.

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 2020.

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 to reestablish operational sluicing began in 2013 and the estimated completion date is 2022. In total, the Laguna Basin Dredging project will dredge approximately ~~2.25~~3.55 million cubic yards (~~1.73~~2.71 mcm) of sediment, reestablishing 140 acres (0.57 square kilometers) of open water. As of August 2019, approximately 2.48 million cubic yards (1.90 mcm) of material have been removed. All dredged material has been disposed of in a designated area adjacent to the project site. The project has incorporated the use of both land-based and waterborne heavy equipment. The project permit was obtained from the USACE in May 2013 and was valid through May 2019. Reclamation ~~is waiting for~~received approval from the USACE for a new permit with a completion date of May 2022.

Imperial Dam

Imperial Dam is the last major diversion dam on the Colorado River ~~for~~in the 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~~by Mexico. Flows arriving at Imperial Dam for calendar year 2019 are projected to be 5.41 maf (6,670 mcm). The flows arriving at Imperial Dam for calendar year 2020 are projected to be 5.45 maf (6,720 mcm).

Gila River Flows

During water year 2019, there was above average snowfall in the Gila River Basin, including the Salt and Verde River watersheds. Runoff in the Verde River watershed resulted in Salt River Project releases in excess of diversion requirements at Granite Reef Diversion Dam from February through March 2019; however, no water reached or was released from Painted Rock Dam by the USACE in water year 2019.

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)[44] 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 2019, the amount of water discharged from the Wellton-Mohawk Division through the bypass canal is anticipated to be 0.101 maf (125 mcm) measured at station 0+00 and 0.126 maf (155 mcm)

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

measured at the Southerly International Boundary (SIB), at an approximate concentration of total dissolved solids of 2,417 parts per million (ppm).

Off-stream Storage Agreements

Colorado River water may be stored off-stream pursuant to individual SIRAs and 43 CFR Part 414 within the Lower Division States. The Secretary shall make ICUA available to contractors in Arizona, California, or Nevada pursuant to individual SIRAs and 43 CFR Part 414. SNWA may propose to make unused Nevada basic apportionment available for storage by MWD[45] and/or Arizona Water Banking Authority (AWBA)[46] in calendar years 2019 and 2020.

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[47] were executed concurrent with the issuance of the ROD for the 2007 Interim Guidelines. The LB DCP Agreement, as authorized by Public Law 116-14 through the 2019 Colorado River DCP, expanded upon the ICS concept, including the execution of additional implementation agreements[48] and establishment of a DCP ICS category. ICS credits may be created and delivered in calendar years 2019 and 2020 pursuant to the 2007 Interim Guidelines, the LB DCP Agreement, 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.[49]

IBWC Minute No. 323 identified cooperative measures that the United States and Mexico will take through December 31, 2026, including water conservation projects in Mexico. Consistent with Section IX.A of IBWC Minute No. 323, these water conservation projects will generate or conserve a volume of water of which 0.109 maf (135 mcm) will be converted to Binational ICS for use in the United States and 0.050 maf (62 mcm) will be allocated to the system for the benefit of all users.

[45] 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.

[46] 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.

[47] 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.

[48] Information on the agreements related to the creation ~~and delivery~~ of ICS under the LB DCP Agreement can be found at: [Link to be added later].

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

Extraordinary Conservation ICS. Entities with approved plans may create Extraordinary Conservation ICS in 2019 and/or 2020. Table 5 provides a summary of anticipated, submitted, or approved Extraordinary Conservation ICS plans of creation in 2019 and 2020. Entities with available Extraordinary Conservation ICS may request delivery of ICS credits in 2019 and 2020.

Table 5. Summary of Extraordinary Conservation ICS Plans of Creation in Calendar Years 2019 and 2020

Entity	2019 Plan of Creation	Status of 2019 Plan	2020 Plan of Creation	Status of 2020 Plan
CAWCD	up to 0.026 maf (32 mcm)	approved	up to 0.029 maf (36 mcm)	submitted
Colorado River Indian Tribes	up to 0.006 maf (7.4 mcm)	approved	up to 0.004 maf (4.9 mcm)	submitted
Gila River Indian Community	up to 0.117 maf (144 mcm)	approved	up to 0.083 maf (102 mcm)	submitted
Mohave Valley Irrigation and Drainage District	—	—	up to 0.007 maf (8.6 mcm)	submitted
IID	up to 0.062 maf (76 mcm)	approved	up to 0.062 maf (76 mcm)	submitted
MWD	up to 0.450 maf (555 mcm)	approved	up to 0.450 maf (555 mcm)	submitted
SNWA	up to 0.100 maf (123 mcm)	approved	up to 0.100 maf (123 mcm)	submitted

System Efficiency ICS. In 2019 and 2020, 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 2019 and 2020, CAWCD, MWD, and SNWA may request delivery of YDP Pilot Run System Efficiency ICS credits.

Tributary Conservation ICS. SNWA has an approved plan to create up to 0.042 maf (52 mcm) of Tributary Conservation ICS in 2019 and ~~is anticipated to submit~~has submitted a plan to create up to 0.042 maf (52 mcm) in 2020. 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 may submit plans to create Imported ICS in 2019 and 2020. 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. In 2019 and 2020, CAWCD, IID, MWD, and SNWA may request delivery of Binational ICS subject to any applicable provisions in the delivery agreements.

DCP ICS. DCP ICS may be created in 2020 by entities making DCP contributions ~~by the parties to the LB DCP Agreement with applicable ICS implementation agreements in accordance~~ consistent with Section III.~~E~~ of Exhibit 1 to the LB DCP Agreement. Following creation, DCP ICS may be delivered in a subsequent year in accordance with Section III.F of Exhibit 1 to the LB DCP Agreement.

System Conservation

System conservation agreements under the PSCP have allowed water users to participate in 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.[50,51] Agreements previously executed under the PSCP in the Lower Basin ~~will~~ continue to be implemented in 2019 and 2020.[52] Additional agreements for new system conservation may be implemented in 2020 in the Lower Basin.

Under the LB DCP Agreement and subject to availability of appropriations, the Secretary is committed to taking affirmative actions to implement programs or projects to create or conserve 0.100 maf (123 mcm) or more of Colorado River system water annually in the Lower Basin. Projects or agreements to create or conserve system water in the Lower Basin to help meet this commitment may be implemented in 2020.

[50] For the period from 2015 through 2018, the Upper Colorado River Commission (UCRC) acted as the contracting entity for the System Conservation Pilot Program (SCPP) in the Upper Basin. In June 2018, the UCRC passed a resolution to temporarily cease to act as the contracting entity for the SCPP after fulfilling its commitments for 2018. The June 20, 2018 Resolution of the UCRC is available online at: http://www.ucrcommission.com/RepDoc/SCPPDocuments/DemandMgmtResolution062018.pdf.

[51] Pursuant to Public Law 113-235, a report from the Secretary evaluating the effectiveness of the water conservation pilot projects is under development and will be submitted to Congress, including a recommendation on whether the activities undertaken by the pilot projects should be continued.

[52] More information on the PSCP in the Lower Basin can be found at: https://www.usbr.gov/lc/region/programs/PilotSysConsProg/pilotsystem.html.

Delivery of Water to Mexico

Delivery to Mexico pursuant to the 1944 United States-Mexico Water Treaty and IBWC Minute No. 323 is anticipated to be 1.470 maf (1,813 mcm) in calendar year 2019, reflecting the creation of approximately 0.030 maf (37 mcm) of water for Mexico's Water Reserve pursuant to Section V of 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 in calendar year 2019.~~ Balances of Mexico's Water Reserve in previous years may be found in the annual Colorado River Accounting and Water Use Report, Arizona, California, and Nevada.[53]

Of the scheduled delivery to Mexico in calendar year 2019, approximately 1.330 maf (1,640 mcm) is projected to be delivered at NIB and approximately 0.140 maf (173 mcm) is projected to be delivered at SIB. Under IBWC Minute No. 322 and the Emergency Delivery Agreement,[54] water may be delivered to Tijuana, Baja California through MWD, the San Diego County Water Authority, and the Otay Water District's respective distribution system facilities in California. In calendar year 2019, approximately 706 acre-feet (0.87 mcm) is scheduled to be delivered to Tijuana, Baja California.

Of the total delivery at SIB projected in calendar year 2019, 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 (242 well field).

Excess flows arriving at the NIB are anticipated to be approximately 0.010 maf (12.3 mcm) in calendar year 2019. Excess flows result from a combination of factors, including heavy rain from seasonal 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, adjusted for water savings contributions as required under Section IV of IBWC Minute No. 323, in calendar year 2020. 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 2020 will be delivered at NIB. Mexico, through IBWC, may request water to be delivered to Tijuana in calendar year 2020, 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 0.014 maf (17 mcm) and 0.023 maf (28 mcm),

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

[54] 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.

respectively, for calendar year 2019. This water is available for delivery at NIB in satisfaction of the 1944 United States-Mexico Water Treaty.

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 2019 is projected to be 144 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 Section VI.B of IBWC Minute No. 323, the United States has improved the water quality delivered at the SIB to approximately 1,200 ppm during this four-month period.

2020 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

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, 2020, 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 2019 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 2020. The August 2019 24-Month Study of the most probable inflow scenario projects the water year 2020 release from Glen Canyon Dam to be 8.23 maf (10,150 mcm). Given the hydrologic variability of the Colorado River System and based on actual 2019 water year operations, the projected water year release from Lake Powell in 2020 is likely to be in the estimated range of 8.23 maf (10,150 mcm) to 13.49 maf (16,640 mcm) or greater.

Lower Basin

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 2020 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 and ~~applicable provisions of~~ the LB DCP Agreement, the August 2019 24-Month Study was used to forecast the system storage as of January 1, 2020. Based on a projected January 1, 2020 Lake Mead elevation of 1,089.40 feet (332.05 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 2020 in accordance with Article III(3)(b) of the Operating Criteria and Article II(B)(2) of the Consolidated Decree. In addition, consistent with Sections III.B.1.a and III.B.2.a of Exhibit 1 to the LB DCP Agreement, DCP contributions will be required by

Arizona and Nevada, respectively, in calendar year 2020. Water deliveries in the Lower Basin during calendar year 2020 will be limited to 7.500 maf (9,250 mcm), and will be adjusted for DCP contributions ~~as required under Sections III.B.1.a and III.B.2.a of Exhibit 1 to the LB DCP Agreement,~~ and creation and/or delivery of ICS credits.~~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 2020 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 2020 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 as specified in Section 4.b of the LB DCP Agreement.

In calendar year 2020, 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 2020.

The IOPP, which became effective January 1, 2004, will be in effect during calendar year 2020. Payback balances by state and user may be found in the annual Colorado River Accounting and Water Use Report, Arizona, California, and Nevada.[55]

In calendar year 2020, conserved Colorado River water, created through the PSCP and other voluntary agreements, is anticipated to be added to system reservoirs in the Lower Basin pursuant to system conservation agreements.

The 2007 Interim Guidelines included the adoption of the ICS mechanism, which was expanded upon in the LB DCP Agreement, 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 2020 and ICS credits will be created and delivered pursuant to the 2007 Interim Guidelines, appropriate forbearance and delivery agreements, and the LB DCP Agreement.

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

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

revise the determination in any mid-year review for the current year only to allow for additional deliveries from Lake Mead pursuant to Section 7.C of the 2007 Interim Guidelines.

1944 United States-Mexico Water Treaty

Under the 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 2020 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, as further adjusted for water savings contributions as required under Section IV of IBWC Minute No. 323, as described in the IBWC Joint Report of the Principal Engineers dated July 11, 2019.[56] In accordance with Section V of IBWC Minute No. 323, Mexico may create water for or take delivery of water from Mexico's Water Reserve.

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. Changes to these delivery schedules are coordinated between the United States and Mexican Sections of the IBWC pursuant to Article 15 of the 1944 United States-Mexico Water Treaty and consistent with other applicable agreements. ~~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.~~

[56] Available online at: https://www.ibwc.gov/Files/joint_report_min323_bi_water_scarcity_contingency_plan_final.pdf.

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. 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); the Colorado River Drought Contingency Plan Authorization Act (Public Law 116-14); or the rules, criteria, guidelines, and decisions referenced within this AOP.

ACRONYMS AND ABBREVIATIONS

AMWG	Glen Canyon Dam Adaptive Management Work Group
AOP	Annual Operating Plan
AWBA	Arizona Water Banking Authority
bug flow	Macroinvertebrate Production Flow
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
DCP	Drought Contingency Plan
FGTWG	Flaming Gorge Technical Working Group
FG-Ops	Flaming Gorge Operation Plan
IBWC	International Boundary and Water Commission
ICMA	Intentionally Created Mexican Allocation
ICS	Intentionally Created Surplus
ICUA	Intentionally Created Unused Apportionment
IID	Imperial Irrigation District
IOPP	Inadvertent Overrun and Payback Policy
LB DCP Agreement	Lower Basin Drought Contingency Plan Agreement
LTEMP	Long-Term Experimental and Management Plan
LTSP	Larval Trigger Study Plan
maf	million acre-feet
mcm	million cubic meters
MWD	The Metropolitan Water District of Southern California
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
SCPP	System Conservation Pilot Program
SIB	Southerly International Boundary
SIRA	Storage and Interstate Release Agreement
SJRIP	San Juan River Basin Recovery Implementation Program
SNWA	Southern Nevada Water Authority
UCRC	Upper Colorado River Commission
USACE	U.S. Army Corps of Engineers
USGS	United States Geological Survey
UCRIP	Upper Colorado River Endangered Fish Recovery Program
WAPA	Western Area Power Administration
YDP	Yuma Desalting Plant

To: All Annual Operating Plan Recipients

From: Lower Colorado Region
Boulder Canyon Operations Office
Michael Bernardo, P.E.
P.O. Box 61470
Boulder City, NV 89006-1470
Phone: 702-293-8111

RECLAMATION
Managing Water in the West

The operation of Lake Powell and Lake Mead in this August 2019 24-Month Study is pursuant to the December 2007 Record of Decision on Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations of Lake Powell and Lake Mead (Interim Guidelines), and reflects the 2019 Annual Operating Plan (AOP). Pursuant to the Interim Guidelines, the August 2018 24-Month Study projections of the January 1, 2019, system storage and reservoir water surface elevations set the operational tier for the coordinated operation of Lake Powell and Lake Mead during 2019.

Consistent with Section 6.B of the Interim Guidelines, the Lake Powell operational tier for water year 2019 is the Upper Elevation Balancing Tier. With an 8.23 million acre-feet (maf) release from Lake Powell in water year 2019, the April 2019 24-Month Study projected the end of water year elevation at Lake Powell to be above 3,575 feet and the end of water year elevation at Lake Mead to be below 1,075 feet. Therefore, in accordance with Section 6.B.4 of the Interim Guidelines, Lake Powell operations shifted to balancing releases for the remainder of water year 2019. Under Section 6.B.4, the contents of Lake Powell and Lake Mead will be balanced by the end of the water year, but not more than 9.0 maf and not less than 8.23 maf shall be released from Lake Powell. Based on the most probable inflow forecast, this August 24-Month Study projects a balancing release of 9.0 maf in water year 2019.

Consistent with Section 2.B.5 of the Interim Guidelines, the Intentionally Created Surplus (ICS) Surplus Condition is the criterion governing the operation of Lake Mead for calendar year 2019.

The August 2019 24-Month Study projects the January 1, 2020 Lake Powell elevation to be below the 2019 Equalization Elevation of 3,657 feet and above elevation 3,575 feet. Consistent with Section 6.B of the Interim Guidelines, Lake Powell's operations in water year 2020 will be governed by the Upper Elevation Balancing Tier, with an initial water year release volume of 8.23 maf and the potential for an April adjustment to equalization or balancing releases in April 2020. Based on the most probable inflow forecast, this August 24-Month Study projects an annual release of 8.23 maf in water year 2020.

The August 2019 24-Month Study projects the January 1, 2020 Lake Mead elevation to be above 1,075 feet and below 1,090 feet. Consistent with Section 2.B.5 of the Interim Guidelines, the Intentionally Created Surplus (ICS) Surplus Condition is the criterion governing the operation of Lake Mead for calendar year 2020. In addition, Section III.B of Exhibit 1 to the Lower Basin Drought Contingency Plan (DCP) Agreement will also govern the operation of Lake Mead for calendar year 2020.

The 2020 operational tier determinations for Lake Powell and Lake Mead will be documented in the 2020 AOP, which is currently in development.

The Interim Guidelines are available for download at: https://www.usbr.gov/lc/region/programs/strategies/RecordofDecision.pdf.
The 2019 AOP is available for download at: https://www.usbr.gov/lc/region/g4000/aop/AOP19.pdf.
The Colorado River DCPs are available for download at: https://www.usbr.gov/dcp/finaldocs.html.

Current runoff projections into Lake Powell are provided by the National Weather Service's Colorado Basin River Forecast Center and are as follows: Observed unregulated inflow into Lake Powell for the month of July was 2.451 maf or 225 percent of the 30-year average from 1981 to 2010. The August unregulated inflow forecast for Lake Powell is 0.700 maf or 140 percent of the 30-year average. The preliminary observed 2019 April through July unregulated inflow is 10.410 maf or 145 percent of average.

In this study, the calendar year 2019 diversion for Metropolitan Water District of Southern California (MWD) is forecasted to be 0.548 maf. The calendar year 2019 diversion for the Central Arizona Project (CAP) is forecasted to be 1.393 maf. Consumptive use for Nevada above Hoover (SNWP Use) is forecasted to be 0.218 maf for calendar year 2019.

Due to changing Lake Mead elevations, Hoover's generator capacity is adjusted based on estimated effective capacity and plant availability. The estimated effective capacity is based on projected Lake Mead elevations. Unit capacity tests will be performed as the lake elevation changes. This study reflects these changes in the projections.

Hoover, Davis, and Parker historical gross energy figures come from PO&M reports provided by the Lower Colorado Region's Power Office, Bureau of Reclamation, Boulder City, Nevada. Questions regarding these historical energy numbers can be directed to Cheri Woodward at (702) 293-8101.

OPERATION PLAN FOR COLORADO RIVER SYSTEM RESERVOIRS

RECLAMATION
Managing Water in the West

August 2019 24-Month Study

Most Probable Inflow*

Fontenelle Reservoir

	Date	Regulated Inflow (1000 Ac-Ft)	Evap Losses (1000 Ac-Ft)	Power Release (1000 Ac-Ft)	Bypass Release (1000 Ac-Ft)	Total Release (1000 Ac-Ft)	Reservoir Elev End of Month (Ft)	Live Storage (1000 Ac-Ft)
*	Aug 2018	50	2	75	1	76	6500.10	299
H	Sep 2018	30	2	7	58	65	6495.11	262
	WY 2018	**1397**	**15**	**856**	**528**	**1382**		
I	Oct 2018	42	1	45	20	65	6491.62	238
S	Nov 2018	38	1	60	0	60	6488.29	216
T	Dec 2018	30	1	61	1	61	6483.19	184
O	Jan 2019	28	1	61	0	61	6476.81	150
R	Feb 2019	26	0	55	1	56	6470.41	120
I	Mar 2019	37	0	61	0	61	6464.13	95
C	Apr 2019	114	1	71	0	71	6474.10	137
A	May 2019	167	1	98	0	98	6486.46	204
L	Jun 2019	337	2	107	171	278	6494.89	261
*	Jul 2019	184	3	86	39	125	6502.48	317
	Aug 2019	72	2	74	0	74	6501.96	314
	Sep 2019	46	2	37	35	71	6498.35	287
	WY 2019	**1121**	**15**	**817**	**266**	**1083**		
	Oct 2019	46	1	71	0	71	6494.76	261
	Nov 2019	44	1	68	0	68	6491.14	236
	Dec 2019	37	1	71	0	71	6485.85	201
	Jan 2020	32	1	71	0	71	6479.08	162
	Feb 2020	30	0	66	0	66	6471.43	125
	Mar 2020	48	0	67	0	67	6466.65	105
	Apr 2020	75	1	75	0	75	6466.51	105
	May 2020	155	1	97	8	105	6477.58	154
	Jun 2020	275	2	102	24	126	6500.35	302
	Jul 2020	170	3	101	34	135	6504.49	334
	Aug 2020	68	2	102	3	105	6499.46	295
	Sep 2020	45	2	21	75	95	6492.18	243
	WY 2020	**1025**	**14**	**911**	**144**	**1055**		
	Oct 2020	48	1	63	0	63	6489.73	227
	Nov 2020	42	1	60	0	60	6487.00	209
	Dec 2020	32	1	61	0	61	6482.08	178
	Jan 2021	30	1	61	0	61	6476.07	147
	Feb 2021	28	0	56	0	56	6469.84	118
	Mar 2021	53	0	65	0	65	6466.69	106
	Apr 2021	85	1	87	0	87	6466.03	103
	May 2021	164	1	97	8	105	6478.92	161
	Jun 2021	299	2	102	68	170	6498.59	288
	Jul 2021	178	3	102	30	132	6504.15	331

* Based on the Colorado River Basin Forecast Center's Most Probable Water Supply Forecast

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OPERATION PLAN FOR COLORADO RIVER SYSTEM RESERVOIRS

RECLAMATION
Managing Water in the West

August 2019 24-Month Study

Most Probable Inflow*

Flaming Gorge Reservoir

	Date	Unreg Inflow (1000 Ac-Ft)	Reg Inflow (1000 Ac-Ft)	Evap Losses (1000 Ac-Ft)	Power Release (1000 Ac-Ft)	Bypass Release (1000 Ac-Ft)	Total Release (1000 Ac-Ft)	Bank Storage (1000 Ac-Ft)	Reservoir Elev End of Month (Ft)	Live Storage (1000 Ac-Ft)	Jensen Flow (1000 Ac-Ft)
*	Aug 2018	42	68	13	124	0	124	139	6032.67	3453	142
H	Sep 2018	17	52	11	119	0	119	136	6030.75	3378	132
	WY 2018	**1594**	**1580**	**82**	**1608**	**7**	**1616**				**2638**
I	Oct 2018	52	75	7	99	0	99	135	6029.99	3349	131
S	Nov 2018	41	63	4	93	0	93	133	6029.15	3316	121
T	Dec 2018	29	60	2	124	0	124	131	6027.49	3253	153
O	Jan 2019	34	68	2	124	0	124	129	6026.01	3198	154
R	Feb 2019	34	63	2	112	0	112	127	6024.69	3149	143
I	Mar 2019	74	99	3	58	0	58	128	6025.67	3185	128
C	Apr 2019	240	198	5	71	0	71	133	6028.79	3303	341
A	May 2019	252	183	8	99	0	99	136	6030.71	3376	568
L	Jun 2019	460	400	11	215	100	315	139	6032.55	3448	950
*	Jul 2019	227	169	14	100	0	100	141	6033.89	3502	373
	Aug 2019	85	87	13	116	0	116	139	6032.87	3461	148
	Sep 2019	56	81	12	131	0	131	137	6031.39	3403	148
	WY 2019	**1585**	**1547**	**82**	**1339**	**100**	**1439**				**3358**
	Oct 2019	60	85	7	76	0	76	137	6031.41	3404	106
	Nov 2019	60	84	4	71	0	71	137	6031.65	3413	104
	Dec 2019	40	74	2	169	0	169	134	6029.24	3320	196
	Jan 2020	46	85	2	169	0	169	130	6027.05	3237	193
	Feb 2020	49	85	2	158	0	158	127	6025.12	3165	182
	Mar 2020	98	117	3	78	0	78	129	6026.05	3199	149
	Apr 2020	135	135	5	76	0	76	131	6027.44	3251	286
	May 2020	230	180	8	78	0	78	134	6029.79	3341	608
	Jun 2020	340	191	10	242	0	242	132	6028.23	3281	682
	Jul 2020	200	165	14	113	0	113	134	6029.20	3318	188
	Aug 2020	77	114	13	123	0	123	133	6028.64	3297	144
	Sep 2020	50	100	11	119	0	119	132	6027.89	3268	134
	WY 2020	**1385**	**1415**	**80**	**1474**	**0**	**1474**				**2974**
	Oct 2020	55	70	7	68	0	68	131	6027.77	3264	96
	Nov 2020	50	67	3	65	0	65	131	6027.72	3262	95
	Dec 2020	35	64	2	117	0	117	129	6026.34	3210	142
	Jan 2021	40	72	2	117	0	117	127	6025.12	3165	142
	Feb 2021	45	72	2	106	0	106	126	6024.20	3131	133
	Mar 2021	102	115	3	61	0	61	128	6025.51	3179	138
	Apr 2021	134	136	5	60	0	60	131	6027.34	3248	275
	May 2021	245	186	8	65	0	65	135	6030.18	3356	597
	Jun 2021	390	260	11	238	21	259	135	6029.95	3347	679
	Jul 2021	210	165	14	124	0	124	136	6030.64	3374	224

* Based on the Colorado River Basin Forecast Center's Most Probable Water Supply Forecast

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OPERATION PLAN FOR COLORADO RIVER SYSTEM RESERVOIRS

RECLAMATION
Managing Water in the West

August 2019 24-Month Study

Most Probable Inflow*

Taylor Park Reservoir

	Date	Regulated Inflow (1000 Ac-Ft)	Total Release (1000 Ac-Ft)	Reservoir Elev End of Month (Ft)	Live Storage (1000 Ac-Ft)
*	Aug 2018	3	13	9305.51	63
H	Sep 2018	3	8	9301.71	58
	WY 2018	**88**	**108**		
I	Oct 2018	5	3	9302.60	59
S	Nov 2018	3	3	9302.61	59
T	Dec 2018	4	3	9302.74	59
O	Jan 2019	4	3	9302.92	59
R	Feb 2019	3	3	9303.16	60
I	Mar 2019	5	4	9303.75	60
C	Apr 2019	10	7	9306.14	64
A	May 2019	21	26	9302.64	59
L	Jun 2019	68	38	9320.92	89
*	Jul 2019	47	32	9328.49	103
	Aug 2019	15	24	9324.14	95
	Sep 2019	9	21	9317.77	83
	WY 2019	**193**	**168**		
	Oct 2019	8	10	9316.87	81
	Nov 2019	7	6	9317.47	82
	Dec 2019	6	6	9317.39	82
	Jan 2020	5	6	9316.73	81
	Feb 2020	5	6	9316.42	81
	Mar 2020	5	6	9315.75	79
	Apr 2020	7	10	9313.99	76
	May 2020	29	18	9320.26	87
	Jun 2020	40	24	9328.61	103
	Jul 2020	16	24	9324.53	95
	Aug 2020	9	19	9319.16	85
	Sep 2020	7	18	9313.09	75
	WY 2020	**144**	**152**		
	Oct 2020	6	9	9311.53	72
	Nov 2020	5	7	9310.06	70
	Dec 2020	5	5	9310.06	70
	Jan 2021	4	5	9309.90	70
	Feb 2021	4	4	9309.58	69
	Mar 2021	4	7	9308.11	67
	Apr 2021	9	10	9307.63	66
	May 2021	28	13	9316.92	81
	Jun 2021	42	19	9329.23	105
	Jul 2021	20	23	9327.75	102

* Based on the Colorado River Basin Forecast Center's Most Probable Water Supply Forecast

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OPERATION PLAN FOR COLORADO RIVER SYSTEM RESERVOIRS

RECLAMATION
Managing Water in the West

August 2019 24-Month Study

Most Probable Inflow*

Blue Mesa Reservoir

	Date	UnReg Inflow (1000 Ac-Ft)	Regulated Inflow (1000 Ac-Ft)	Evap Losses (1000 Ac-Ft)	Power Release (1000 Ac-Ft)	Bypass Release (1000 Ac-Ft)	Total Release (1000 Ac-Ft)	Reservoir Elev End of Month (Ft)	Live Storage (1000 Ac-Ft)
*	Aug 2018	19	28	1	93	0	93	7453.77	334
H	Sep 2018	12	17	1	30	39	68	7444.44	282
	WY 2018	**433**	**453**	**7**	**856**	**39**	**895**		
I	Oct 2018	23	22	0	46	11	56	7437.59	248
S	Nov 2018	22	21	0	19	0	19	7438.08	250
T	Dec 2018	20	19	0	21	0	21	7437.82	249
O	Jan 2019	20	20	0	17	0	17	7438.40	252
R	Feb 2019	20	20	0	23	0	23	7437.59	248
I	Mar 2019	28	27	0	25	0	25	7438.01	250
C	Apr 2019	121	118	0	33	0	33	7453.91	335
A	May 2019	214	218	1	86	18	105	7471.68	447
L	Jun 2019	471	444	1	124	70	194	7504.14	696
*	Jul 2019	282	266	2	87	51	138	7518.61	823
	Aug 2019	88	97	1	108	30	138	7513.89	780
	Sep 2019	53	65	1	104	0	104	7509.29	740
	WY 2019	**1361**	**1336**	**8**	**692**	**180**	**871**		
	Oct 2019	47	49	1	84	0	84	7505.11	704
	Nov 2019	38	37	0	77	0	77	7500.28	664
	Dec 2019	33	33	0	112	0	112	7490.43	585
	Jan 2020	30	31	0	54	0	54	7487.44	562
	Feb 2020	26	27	0	51	0	51	7484.25	537
	Mar 2020	38	39	0	51	0	51	7482.54	525
	Apr 2020	73	76	1	63	0	63	7484.23	537
	May 2020	220	209	1	202	56	258	7477.40	487
	Jun 2020	275	259	1	68	0	68	7501.86	677
	Jul 2020	97	105	1	63	0	63	7506.70	717
	Aug 2020	54	64	1	72	0	72	7505.66	709
	Sep 2020	39	50	1	76	0	76	7502.35	681
	WY 2020	**970**	**978**	**8**	**973**	**56**	**1029**		
	Oct 2020	39	41	1	50	0	50	7501.25	672
	Nov 2020	31	34	0	49	0	49	7499.35	656
	Dec 2020	26	26	0	92	0	92	7491.09	590
	Jan 2021	24	25	0	67	0	67	7485.51	547
	Feb 2021	22	23	0	49	0	49	7481.97	520
	Mar 2021	36	38	0	0	57	57	7479.32	501
	Apr 2021	77	78	1	0	84	84	7478.39	494
	May 2021	221	206	1	6	232	239	7473.62	461
	Jun 2021	261	238	1	59	0	59	7497.15	638
	Jul 2021	117	120	1	75	0	75	7502.42	681

* Based on the Colorado River Basin Forecast Center's Most Probable Water Supply Forecast

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OPERATION PLAN FOR COLORADO RIVER SYSTEM RESERVOIRS

RECLAMATION
Managing Water in the West

August 2019 24-Month Study

Most Probable Inflow*

Morrow Point Reservoir

	Date	Unreg Inflow (1000 Ac-Ft)	Blue Mesa Release (1000 Ac-Ft)	Side Inflow (1000 Ac-Ft)	Total Inflow (1000 Ac-Ft)	Power Release (1000 Ac-Ft)	Bypass Release (1000 Ac-Ft)	Total Release (1000 Ac-Ft)	Reservoir Elev End of Month (Ft)	Live Storage (1000 Ac-Ft)
*	Aug 2018	19	93	0	93	94	0	94	7153.96	112
H	Sep 2018	14	68	2	70	84	0	84	7135.77	98
	WY 2018	**460**	**895**	**27**	**922**	**935**	**0**	**937**		
I	Oct 2018	24	56	1	57	56	0	56	7136.92	99
S	Nov 2018	23	19	1	20	13	0	15	7143.47	104
T	Dec 2018	21	21	1	22	18	0	18	7147.95	107
O	Jan 2019	21	17	1	17	18	0	18	7147.00	107
R	Feb 2019	20	23	0	24	23	0	23	7147.57	107
I	Mar 2019	29	25	1	26	26	0	26	7146.90	107
C	Apr 2019	136	33	15	47	41	0	41	7155.16	113
A	May 2019	240	105	25	130	127	0	131	7154.68	113
L	Jun 2019	512	194	41	235	186	0	234	7155.10	113
*	Jul 2019	295	138	13	150	151	0	151	7154.18	112
	Aug 2019	93	138	5	143	143	0	143	7153.73	112
	Sep 2019	57	104	4	108	108	0	108	7153.73	112
	WY 2019	**1470**	**871**	**109**	**980**	**912**	**0**	**966**		
	Oct 2019	50	84	3	87	87	0	87	7153.73	112
	Nov 2019	41	77	3	80	80	0	80	7153.73	112
	Dec 2019	36	112	3	115	115	0	115	7153.73	112
	Jan 2020	33	54	3	57	57	0	57	7153.73	112
	Feb 2020	29	51	3	54	54	0	54	7153.73	112
	Mar 2020	42	51	4	55	55	0	55	7153.73	112
	Apr 2020	86	63	13	76	76	0	76	7153.73	112
	May 2020	245	258	25	283	283	0	283	7153.73	112
	Jun 2020	295	68	20	88	88	0	88	7153.73	112
	Jul 2020	104	63	7	70	70	0	70	7153.73	112
	Aug 2020	57	72	3	75	75	0	75	7153.73	112
	Sep 2020	42	76	3	79	79	0	79	7153.73	112
	WY 2020	**1060**	**1029**	**90**	**1119**	**1119**	**0**	**1119**		
	Oct 2020	42	50	3	53	53	0	53	7153.73	112
	Nov 2020	34	49	2	51	51	0	51	7153.73	112
	Dec 2020	28	92	2	94	94	0	94	7153.73	112
	Jan 2021	27	67	2	70	70	0	70	7153.73	112
	Feb 2021	25	49	3	52	52	0	52	7153.73	112
	Mar 2021	40	57	4	61	61	0	61	7153.73	112
	Apr 2021	88	84	11	95	95	0	95	7153.73	112
	May 2021	247	239	26	265	265	0	265	7153.73	112
	Jun 2021	281	59	20	79	79	0	79	7153.73	112
	Jul 2021	123	75	6	81	81	0	81	7153.73	112

* Based on the Colorado River Basin Forecast Center's Most Probable Water Supply Forecast

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OPERATION PLAN FOR COLORADO RIVER SYSTEM RESERVOIRS

RECLAMATION
Managing Water in the West

August 2019 24-Month Study

Most Probable Inflow*

Crystal Reservoir

	Date	Unreg Inflow (1000 Ac-Ft)	Morrow Release (1000 Ac-Ft)	Side Inflow (1000 Ac-Ft)	Total Inflow (1000 Ac-Ft)	Power Release (1000 Ac-Ft)	Bypass Release (1000 Ac-Ft)	Total Release (1000 Ac-Ft)	Reservoir Elev End of Month (Ft)	Live Storage (1000 Ac-Ft)	Tunnel Flow (1000 Ac-Ft)	Below Tunnel Flow (1000 Ac-Ft)
*	Aug 2018	21	94	2	96	98	0	98	6744.83	15	65	36
H	Sep 2018	15	84	1	85	87	0	87	6737.22	13	59	33
	WY 2018	**505**	**937**	**45**	**982**	**959**	**26**	**985**			**438**	**553**
I	Oct 2018	27	56	3	59	55	0	55	6751.87	17	33	24
S	Nov 2018	26	15	4	19	21	0	21	6743.11	14	1	19
T	Dec 2018	25	18	4	22	21	0	22	6745.32	15	0	20
O	Jan 2019	25	18	4	22	19	3	22	6746.57	15	1	20
R	Feb 2019	24	23	3	27	9	17	26	6748.26	16	1	25
I	Mar 2019	34	26	5	32	30	0	30	6752.77	17	0	29
C	Apr 2019	150	41	15	55	55	0	55	6753.29	17	26	29
A	May 2019	264	131	24	155	108	31	153	6759.30	19	47	105
L	Jun 2019	558	234	46	280	115	73	282	6753.12	17	51	231
*	Jul 2019	321	151	26	177	121	57	178	6746.79	15	61	124
	Aug 2019	103	143	10	153	136	15	151	6753.04	17	65	86
	Sep 2019	65	108	8	116	116	0	116	6753.04	17	55	61
	WY 2019	**1621**	**966**	**151**	**1117**	**807**	**198**	**1112**			**341**	**774**
	Oct 2019	57	87	7	94	94	0	94	6753.04	17	30	64
	Nov 2019	47	80	6	86	86	0	86	6753.04	17	0	86
	Dec 2019	41	115	5	120	120	0	120	6753.04	17	0	120
	Jan 2020	39	57	6	63	63	0	63	6753.04	17	0	63
	Feb 2020	33	54	4	58	0	58	58	6753.04	17	0	58
	Mar 2020	48	55	6	61	47	15	61	6753.04	17	5	56
	Apr 2020	99	76	13	89	89	0	89	6753.04	17	42	47
	May 2020	280	283	35	318	134	184	318	6753.04	17	62	256
	Jun 2020	330	88	35	123	123	0	123	6753.04	17	61	62
	Jul 2020	116	70	12	82	82	0	82	6753.04	17	65	17
	Aug 2020	64	75	7	82	82	0	82	6753.04	17	65	17
	Sep 2020	46	79	4	83	83	0	83	6753.04	17	55	28
	WY 2020	**1200**	**1119**	**140**	**1259**	**1002**	**256**	**1259**			**385**	**874**
	Oct 2020	46	53	5	58	58	0	58	6753.04	17	30	28
	Nov 2020	38	51	4	56	56	0	56	6753.04	17	0	56
	Dec 2020	32	94	5	98	98	0	98	6753.04	17	0	98
	Jan 2021	31	70	5	74	74	0	74	6753.04	17	0	74
	Feb 2021	29	52	4	56	56	0	56	6753.04	17	0	56
	Mar 2021	46	61	6	68	68	0	68	6753.04	17	5	63
	Apr 2021	101	95	12	107	107	0	107	6753.04	17	42	65
	May 2021	281	265	34	299	134	165	299	6753.04	17	62	237
	Jun 2021	315	79	34	113	113	0	113	6753.04	17	61	52
	Jul 2021	138	81	14	96	96	0	96	6753.04	17	65	31

* Based on the Colorado River Basin Forecast Center's Most Probable Water Supply Forecast

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August 2019 24-Month Study

Most Probable Inflow*

Vallecito Reservoir

	Date	Regulated Inflow (1000 Ac-Ft)	Total Release (1000 Ac-Ft)	Reservoir Elev End of Month (Ft)	Live Storage (1000 Ac-Ft)
*	Aug 2018	5	19	7613.87	22
H	Sep 2018	3	4	7613.06	21
	WY 2018	**102**	**153**		
I	Oct 2018	9	3	7617.56	26
S	Nov 2018	5	0	7621.25	31
T	Dec 2018	3	0	7623.31	34
O	Jan 2019	4	0	7625.50	37
R	Feb 2019	4	0	7627.67	41
I	Mar 2019	6	6	7627.39	40
C	Apr 2019	32	25	7631.32	47
A	May 2019	58	41	7640.08	64
L	Jun 2019	160	101	7664.36	124
*	Jul 2019	69	68	7664.45	124
	Aug 2019	22	38	7658.33	108
	Sep 2019	19	30	7654.00	97
	WY 2019	**391**	**312**		
	Oct 2019	15	17	7653.02	94
	Nov 2019	10	6	7654.48	98
	Dec 2019	8	6	7655.06	99
	Jan 2020	7	6	7655.26	100
	Feb 2020	6	6	7655.29	100
	Mar 2020	8	2	7657.62	106
	Apr 2020	21	2	7664.77	125
	May 2020	64	63	7664.90	125
	Jun 2020	68	68	7664.81	125
	Jul 2020	27	41	7659.14	110
	Aug 2020	17	38	7650.72	89
	Sep 2020	14	29	7644.04	73
	WY 2020	**265**	**285**		
	Oct 2020	14	16	7642.66	70
	Nov 2020	8	2	7645.16	76
	Dec 2020	6	2	7647.09	80
	Jan 2021	5	2	7648.56	84
	Feb 2021	5	2	7649.81	87
	Mar 2021	9	2	7652.51	93
	Apr 2021	23	2	7660.83	114
	May 2021	71	62	7664.03	123
	Jun 2021	70	70	7663.85	122
	Jul 2021	29	42	7658.88	109

* Based on the Colorado River Basin Forecast Center's Most Probable Water Supply Forecast

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OPERATION PLAN FOR COLORADO RIVER SYSTEM RESERVOIRS

RECLAMATION
Managing Water in the West

August 2019 24-Month Study

Most Probable Inflow*

Navajo Reservoir

	Date	Mod Unreg Inflow (1000 Ac-Ft)	Azetea Tunnel Div (1000 Ac-Ft)	Reg Inflow (1000 Ac-Ft)	Evap Losses (1000 Ac-Ft)	NIIP Diversion (1000 Ac-Ft)	Total Release (1000 Ac-Ft)	Reservoir Elev End of Month (Ft)	Live Storage (1000 Ac-Ft)	Farmington Flow (1000 Ac-Ft)
*	Aug 2018	-7	0	7	3	42	51	6028.27	991	47
H	Sep 2018	2	0	3	2	27	46	6020.80	919	41
	WY 2018	**268**	**36**	**283**	**24**	**224**	**405**			**531**
I	Oct 2018	23	1	17	1	7	31	6018.35	897	40
S	Nov 2018	15	0	10	1	0	18	6017.43	888	34
T	Dec 2018	12	0	9	0	0	18	6016.39	879	30
O	Jan 2019	13	0	10	0	0	19	6015.33	869	31
R	Feb 2019	17	0	14	1	1	16	6014.90	865	37
I	Mar 2019	114	1	113	1	4	18	6024.61	955	62
C	Apr 2019	230	24	203	2	20	20	6040.36	1117	102
A	May 2019	270	34	216	3	25	25	6054.45	1279	143
L	Jun 2019	491	57	376	4	36	114	6071.44	1501	385
*	Jul 2019	171	26	141	5	47	59	6073.56	1531	224
	Aug 2019	48	2	62	4	48	62	6069.85	1478	114
	Sep 2019	42	2	51	3	26	61	6066.99	1439	98
	WY 2019	**1447**	**147**	**1221**	**26**	**214**	**460**			**1301**
	Oct 2019	45	2	45	2	10	31	6067.24	1443	61
	Nov 2019	39	1	34	1	0	22	6068.08	1454	44
	Dec 2019	29	0	27	1	0	31	6067.79	1450	49
	Jan 2020	26	0	25	1	0	31	6067.33	1444	47
	Feb 2020	31	0	31	1	0	29	6067.39	1445	43
	Mar 2020	80	7	67	2	6	31	6069.51	1474	52
	Apr 2020	145	17	109	3	21	30	6073.44	1529	83
	May 2020	275	36	238	4	36	204	6072.96	1522	351
	Jun 2020	195	24	170	4	53	276	6060.83	1358	411
	Jul 2020	45	2	58	4	57	47	6056.87	1308	102
	Aug 2020	36	1	56	3	48	31	6054.75	1282	64
	Sep 2020	34	1	48	3	26	30	6053.90	1272	56
	WY 2020	**980**	**92**	**908**	**28**	**256**	**791**			**1361**
	Oct 2020	40	2	41	2	9	31	6053.87	1272	55
	Nov 2020	31	0	25	1	0	30	6053.42	1266	47
	Dec 2020	25	0	21	1	0	31	6052.53	1256	46
	Jan 2021	22	0	18	1	0	31	6051.44	1243	44
	Feb 2021	30	0	27	1	0	28	6051.30	1241	40
	Mar 2021	92	9	77	2	6	31	6054.54	1280	53
	Apr 2021	170	21	128	2	22	30	6060.51	1354	82
	May 2021	277	37	231	4	37	133	6064.98	1413	279
	Jun 2021	224	29	195	4	53	238	6057.13	1312	389
	Jul 2021	66	5	74	4	57	32	6055.56	1292	99

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OPERATION PLAN FOR COLORADO RIVER SYSTEM RESERVOIRS

RECLAMATION
Managing Water in the West

August 2019 24-Month Study

Most Probable Inflow*

Lake Powell

	Date	Unreg Inflow (1000 Ac-Ft)	Regulated Inflow (1000 Ac-Ft)	Evap Losses (1000 Ac-Ft)	PowerPlant Release (1000 Ac-Ft)	Bypass Release (1000 Ac-Ft)	Total Release (1000 Ac-Ft)	Reservoir Elev End of Month (Ft)	Bank Storage (1000 Ac-Ft)	EOM Storage (1000 Ac-Ft)	Lees Ferry Gage (1000 Ac-Ft)
*	Aug 2018	11	260	50	900	0	900	3597.12	4972	11477	911
H	Sep 2018	1	230	45	670	0	670	3592.28	4936	11028	690
	WY 2018	**4612**	**5459**	**386**	**9000**	**0**	**9000**				**9158**
I	Oct 2018	351	477	30	625	0	625	3590.46	4923	10862	650
S	Nov 2018	254	307	29	585	77	662	3586.50	4894	10507	669
T	Dec 2018	228	322	22	740	0	740	3581.85	4862	10099	744
O	Jan 2019	212	303	7	804	0	804	3576.34	4824	9629	815
R	Feb 2019	255	339	7	730	0	730	3571.89	4795	9261	741
I	Mar 2019	624	573	11	790	0	790	3569.28	4778	9049	798
C	Apr 2019	1242	899	18	720	0	720	3571.12	4790	9198	734
A	May 2019	2511	1980	23	720	0	720	3584.65	4881	10343	752
L	Jun 2019	4206	3583	41	765	0	765	3611.82	5087	12914	808
*	Jul 2019	2451	2015	57	857	0	857	3621.60	5168	13933	905
	Aug 2019	700	843	58	900	0	900	3620.60	5160	13827	917
	Sep 2019	500	672	53	686	0	686	3620.02	5155	13765	700
	WY 2019	**13535**	**12313**	**357**	**8923**	**77**	**9000**				**9233**
	Oct 2019	610	660	37	640	0	640	3619.87	5154	13749	650
	Nov 2019	580	614	35	640	0	640	3619.33	5149	13693	641
	Dec 2019	450	660	28	720	0	720	3618.56	5143	13611	726
	Jan 2020	430	582	9	760	0	760	3616.90	5129	13438	771
	Feb 2020	450	582	9	680	0	680	3615.95	5121	13338	689
	Mar 2020	640	597	16	710	0	710	3614.79	5111	13219	724
	Apr 2020	985	839	26	640	0	640	3616.34	5124	13379	655
	May 2020	2250	2138	32	630	0	630	3629.05	5233	14746	641
	Jun 2020	2730	2584	54	660	0	660	3643.98	5372	16478	671
	Jul 2020	870	809	68	750	0	750	3643.91	5371	16470	769
	Aug 2020	425	532	67	800	0	800	3641.32	5346	16160	817
	Sep 2020	380	509	61	600	0	600	3640.14	5335	16019	614
	WY 2020	**10800**	**11107**	**442**	**8230**	**0**	**8230**				**8368**
	Oct 2020	489	514	42	640	0	640	3638.81	5323	15863	650
	Nov 2020	462	495	40	640	0	640	3637.34	5309	15692	641
	Dec 2020	363	516	32	720	0	720	3635.46	5292	15473	726
	Jan 2021	361	489	10	860	0	860	3632.38	5263	15121	871
	Feb 2021	393	479	11	750	0	750	3630.07	5243	14860	759
	Mar 2021	665	599	18	800	0	800	3628.24	5226	14657	814
	Apr 2021	1056	890	28	710	0	710	3629.51	5238	14798	725
	May 2021	2343	2110	35	710	0	710	3640.50	5339	16062	721
	Jun 2021	2666	2430	58	750	0	750	3652.78	5459	17564	761
	Jul 2021	1091	990	72	850	0	850	3653.28	5464	17627	869

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OPERATION PLAN FOR COLORADO RIVER SYSTEM RESERVOIRS

RECLAMATION
Managing Water in the West

August 2019 24-Month Study

Most Probable Inflow*

Hoover Dam - Lake Mead

	Date	Glen Release (1000 Ac-Ft)	Side Inflow Glen to Hoover (1000 Ac-Ft)	Evap Losses (1000 Ac-Ft)	Total Release (1000 Ac-Ft)	Total Release (1000 CFS)	SNWP Use (1000 Ac-Ft)	Downstream Requirements (1000 Ac-Ft)	Bank Storage (1000 Ac-Ft)	Reservoir Elev End of Month (Ft)	EOM Storage (1000 Ac-Ft)
*	Aug 2018	900	74	70	749	12.2	28	748	645	1078.88	9918
H	Sep 2018	670	84	58	725	12.2	24	723	642	1078.29	9870
	WY 2018	**9000**	**690**	**541**	**9240**		**241**	**9237**			
I	Oct 2018	625	100	42	641	10.4	23	634	643	1078.52	9889
S	Nov 2018	662	67	42	690	11.6	16	689	642	1078.32	9872
T	Dec 2018	740	52	36	468	7.6	11	467	659	1081.46	10132
O	Jan 2019	804	106	30	487	7.9	8	486	682	1085.75	10493
R	Feb 2019	730	126	28	621	11.2	6	620	694	1087.97	10682
I	Mar 2019	790	201	32	738	12.0	13	737	707	1090.24	10878
C	Apr 2019	720	118	39	902	15.2	15	900	700	1088.95	10767
A	May 2019	720	108	45	989	16.1	18	988	686	1086.48	10555
L	Jun 2019	765	69	54	912	15.3	27	911	676	1084.71	10405
*	Jul 2019	857	21	67	946	15.4	33	946	666	1082.82	10246
	Aug 2019	900	100	71	781	12.7	28	781	673	1084.16	10358
	Sep 2019	686	91	59	625	10.5	21	625	678	1084.96	10426
	WY 2019	**9000**	**1158**	**547**	**8800**		**219**	**8783**			
	Oct 2019	640	82	43	720	11.7	23	720	674	1084.24	10366
	Nov 2019	640	54	43	559	9.4	14	559	678	1085.10	10438
	Dec 2019	720	51	37	332	5.4	11	332	702	1089.40	10805
	Jan 2020	760	83	31	550	9.0	9	550	718	1092.13	11042
	Feb 2020	680	91	29	635	11.0	8	635	724	1093.20	11135
	Mar 2020	710	57	32	959	15.6	18	959	709	1090.59	10908
	Apr 2020	640	49	39	1033	17.4	22	1033	684	1086.15	10527
	May 2020	630	30	45	975	15.9	31	975	660	1081.79	10160
	Jun 2020	660	17	53	902	15.2	31	902	642	1078.29	9870
	Jul 2020	750	80	66	811	13.2	34	811	637	1077.36	9793
	Aug 2020	800	100	70	721	11.7	31	721	641	1078.25	9867
	Sep 2020	600	91	57	694	11.7	24	694	636	1077.28	9787
	WY 2020	**8230**	**784**	**545**	**8892**		**257**	**8892**			
	Oct 2020	640	82	42	459	7.5	26	459	648	1079.50	9969
	Nov 2020	640	54	42	582	9.8	18	582	651	1080.09	10018
	Dec 2020	720	51	37	543	8.8	14	543	662	1082.10	10186
	Jan 2021	860	83	30	567	9.2	9	567	683	1085.84	10501
	Feb 2021	750	91	28	651	11.7	9	651	692	1087.53	10645
	Mar 2021	800	57	31	975	15.9	18	975	682	1085.68	10487
	Apr 2021	710	49	39	1050	17.6	23	1050	660	1081.75	10157
	May 2021	710	30	44	992	16.1	32	992	640	1078.04	9849
	Jun 2021	750	17	52	919	15.4	32	919	626	1075.33	9628
	Jul 2021	850	80	65	828	13.5	34	828	626	1075.36	9630

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OPERATION PLAN FOR COLORADO RIVER SYSTEM RESERVOIRS

RECLAMATION
Managing Water in the West

August 2019 24-Month Study

Most Probable Inflow*

Davis Dam - Lake Mohave

	Date	Hoover Release (1000 Ac-Ft)	Side Inflow (1000 Ac-Ft)	Evap Losses (1000 Ac-Ft)	Power Release (1000 Ac-Ft)	Spill Release (1000 Ac-Ft)	Total Release (1000 Ac-Ft)	Total Release (1000 CFS)	Reservoir Elev End of Month (Ft)	EOM Storage (1000 Ac-Ft)
*	Aug 2018	749	-13	23	730	0	730	11.9	642.29	1679
H	Sep 2018	725	-11	18	814	0	814	13.7	637.87	1561
	WY 2018	**9240**	**-103**	**198**	**8981**	**0**	**8981**			
I	Oct 2018	641	-11	15	635	0	635	10.3	637.08	1540
S	Nov 2018	690	-28	11	610	0	610	10.3	638.62	1581
T	Dec 2018	468	-14	9	386	0	386	6.3	640.79	1639
O	Jan 2019	487	-29	10	418	0	418	6.8	641.89	1668
R	Feb 2019	621	-6	10	569	0	569	10.2	643.20	1704
I	Mar 2019	738	7	13	749	0	749	12.2	642.57	1687
C	Apr 2019	902	0	17	886	0	886	14.9	642.52	1686
A	May 2019	989	-9	22	937	0	937	15.2	643.32	1707
L	Jun 2019	912	-12	25	886	0	886	14.9	642.89	1696
*	Jul 2019	946	-11	25	895	0	894	14.5	643.48	1712
	Aug 2019	781	-11	23	780	0	780	12.7	642.25	1678
	Sep 2019	625	-12	18	735	0	735	12.3	637.00	1538
	WY 2019	**8800**	**-138**	**198**	**8486**	**0**	**8486**			
	Oct 2019	720	-4	15	676	0	676	11.0	638.00	1564
	Nov 2019	559	-19	11	503	0	503	8.5	639.01	1591
	Dec 2019	332	-12	9	319	0	319	5.2	638.70	1583
	Jan 2020	550	-16	10	441	0	441	7.2	641.80	1666
	Feb 2020	635	-13	10	612	0	612	10.6	641.80	1666
	Mar 2020	959	-15	13	896	0	896	14.6	643.05	1700
	Apr 2020	1033	-17	17	1001	0	1001	16.8	643.00	1699
	May 2020	975	-11	22	941	0	941	15.3	643.00	1699
	Jun 2020	902	-16	25	860	0	860	14.5	643.00	1699
	Jul 2020	811	-12	25	801	0	801	13.0	642.00	1671
	Aug 2020	721	-11	23	687	0	687	11.2	642.00	1671
	Sep 2020	694	-12	18	717	0	717	12.1	640.01	1618
	WY 2020	**8892**	**-159**	**198**	**8455**	**0**	**8455**			
	Oct 2020	459	-4	15	624	0	624	10.2	633.00	1434
	Nov 2020	582	-19	10	501	0	501	8.4	635.00	1486
	Dec 2020	543	-12	9	424	0	424	6.9	638.71	1583
	Jan 2021	567	-16	10	458	0	458	7.4	641.80	1666
	Feb 2021	651	-13	10	628	0	628	11.3	641.80	1666
	Mar 2021	975	-15	13	912	0	912	14.8	643.05	1700
	Apr 2021	1050	-17	17	1018	0	1018	17.1	643.00	1699
	May 2021	992	-11	22	958	0	958	15.6	643.00	1699
	Jun 2021	919	-16	25	877	0	877	14.7	643.00	1699
	Jul 2021	828	-12	25	818	0	818	13.3	642.00	1671

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OPERATION PLAN FOR COLORADO RIVER SYSTEM RESERVOIRS

RECLAMATION
Managing Water in the West

August 2019 24-Month Study

Most Probable Inflow*

Parker Dam - Lake Havasu

	Date	Davis Release (1000 Ac-Ft)	Side Inflow (1000 Ac-Ft)	Evap Losses (1000 Ac-Ft)	Total Release (1000 Ac-Ft)	Total Release (1000 CFS)	MWD Diversion (1000 Ac-Ft)	CAP Diversion (1000 Ac-Ft)	Reservoir Elev End of Month (Ft)	EOM Storage (1000 Ac-Ft)	Flow To Mexico (1000 Ac-Ft)	Flow To Mexico (1000 CFS)
*	Aug 2018	730	22	17	611	9.9	99	22	447.53	571	104	1.7
H	Sep 2018	814	9	15	512	8.6	95	164	448.95	598	94	1.6
	WY 2018	**8981**	**100**	**139**	**6479**		**910**	**1431**			**1500**	
I	Oct 2018	635	23	12	394	6.4	86	176	448.12	582	68	1.1
S	Nov 2018	610	16	9	357	6.0	85	173	447.99	580	97	1.6
T	Dec 2018	386	26	7	218	3.5	70	143	446.53	552	105	1.7
O	Jan 2019	418	19	6	250	4.1	87	91	446.58	553	122	2.0
R	Feb 2019	569	13	8	372	6.7	31	151	447.53	571	143	2.6
I	Mar 2019	749	-5	9	630	10.2	11	83	447.86	577	185	3.0
C	Apr 2019	886	6	11	712	12.0	28	144	447.29	567	170	2.9
A	May 2019	937	8	13	693	11.3	51	154	448.62	592	128	2.1
L	Jun 2019	886	11	15	717	12.0	53	104	448.47	589	138	2.3
*	Jul 2019	894	16	17	739	12.0	59	92	448.12	582	146	2.4
	Aug 2019	780	20	17	624	10.2	63	90	447.80	576	108	1.8
	Sep 2019	735	14	15	513	8.6	61	155	447.50	571	100	1.7
	WY 2019	**8486**	**167**	**140**	**6218**		**686**	**1554**			**1510**	
	Oct 2019	676	24	12	467	7.6	43	171	447.50	570	62	1.0
	Nov 2019	503	14	9	358	6.0	30	115	447.50	571	88	1.5
	Dec 2019	319	22	7	274	4.5	31	43	446.50	552	83	1.4
	Jan 2020	441	18	6	262	4.3	95	92	446.50	552	121	2.0
	Feb 2020	612	11	8	431	7.5	85	92	446.50	552	148	2.6
	Mar 2020	896	5	9	706	11.5	18	157	446.70	555	187	3.0
	Apr 2020	1001	12	11	728	12.2	74	151	448.70	593	173	2.9
	May 2020	941	13	13	695	11.3	77	157	448.70	593	116	1.9
	Jun 2020	860	11	16	718	12.1	74	50	448.70	593	124	2.1
	Jul 2020	801	19	17	677	11.0	77	50	448.00	580	131	2.1
	Aug 2020	687	20	17	598	9.7	77	13	447.50	571	101	1.6
	Sep 2020	717	14	15	508	8.5	74	124	447.50	570	93	1.6
	WY 2020	**8455**	**182**	**139**	**6422**		**754**	**1215**			**1427**	
	Oct 2020	624	24	12	487	7.9	30	112	447.50	571	63	1.0
	Nov 2020	501	14	9	359	6.0	29	112	447.50	571	96	1.6
	Dec 2020	424	22	7	311	5.1	30	112	446.50	552	106	1.7
	Jan 2021	458	18	6	262	4.3	100	104	446.50	552	121	2.0
	Feb 2021	628	11	8	430	7.7	90	104	446.50	552	148	2.7
	Mar 2021	912	5	9	704	11.5	23	169	446.70	555	187	3.0
	Apr 2021	1018	12	11	727	12.2	80	163	448.70	593	173	2.9
	May 2021	958	13	13	694	11.3	83	169	448.70	593	116	1.9
	Jun 2021	877	11	16	716	12.0	80	62	448.70	593	124	2.1
	Jul 2021	818	19	17	676	11.0	83	62	448.00	580	131	2.1

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August 2019 24-Month Study

Most Probable Inflow*

Hoover Dam - Lake Mead

	Date	Power Release (1000 Ac-Ft)	Power Release (1000 CFS)	Reservoir Elev End of Month (Ft)	EOM Storage (1000 Ac-Ft)	Change In Storage (1000 Ac-Ft)	Hoover Static Head (Ft)	Hoover Gen Capacity MW	Hoover Gross Energy MKWH	Percent of Units Available	KWH/AF
*	Aug 2018	749	12.2	1078.88	9918	119	435.01	1562.0	287.4	100	383.8
H	Sep 2018	725	12.2	1078.29	9870	-49	434.15	1562.0	278.7	100	384.7
	WY 2018	**9240**							**3614.3**		
I	Oct 2018	641	10.4	1078.52	9889	19	435.29	1406.1	247.8	87	386.7
S	Nov 2018	690	11.6	1078.32	9872	-16	434.47	755.0	266.1	49	385.8
T	Dec 2018	453	7.6	1081.46	10132	260	438.59	959.9	179.6	61	396.6
O	Jan 2019	487	7.9	1085.75	10493	361	442.10	1006.1	183.4	63	376.8
R	Feb 2019	621	11.2	1087.97	10682	189	443.82	1119.0	246.4	70	396.7
I	Mar 2019	738	12.0	1090.24	10878	195	444.26	1112.0	295.7	70	400.6
C	Apr 2019	902	15.2	1088.95	10767	-111	439.99	810.1	365.4	51	405.2
A	May 2019	989	16.1	1086.48	10555	-211	440.79	803.9	398.2	51	402.5
L	Jun 2019	912	15.3	1084.71	10405	-150	439.38	1591.0	359.0	100	393.7
*	Jul 2019	946	15.4	1082.82	10246	-159	435.56	1486.0	371.7	93	392.7
	Aug 2019	781	12.7	1084.16	10358	112	432.10	1297.0	307.4	81	393.6
	Sep 2019	625	10.5	1084.96	10426	68	433.24	1600.0	239.3	100	383.0
	WY 2019	**8785**							**3460.0**		
	Oct 2019	720	11.7	1084.24	10366	-61	435.99	1403.0	282.5	88	392.2
	Nov 2019	559	9.4	1085.10	10438	73	436.84	1190.1	218.2	74	390.4
	Dec 2019	332	5.4	1089.40	10805	367	439.07	1213.0	125.2	75	376.5
	Jan 2020	550	9.0	1092.13	11042	237	442.25	1145.0	216.2	70	392.9
	Feb 2020	635	11.0	1093.20	11135	93	443.29	1129.0	253.3	68	398.9
	Mar 2020	959	15.6	1090.59	10908	-227	440.76	1324.0	386.3	81	402.9
	Apr 2020	1033	17.4	1086.15	10527	-381	437.15	1258.1	413.5	78	400.1
	May 2020	975	15.9	1081.79	10160	-367	431.11	1493.9	382.4	94	392.3
	Jun 2020	902	15.2	1078.29	9870	-290	426.56	1576.0	347.3	100	385.1
	Jul 2020	811	13.2	1077.36	9793	-76	424.69	1576.0	313.1	100	386.0
	Aug 2020	721	11.7	1078.25	9867	73	425.00	1591.0	275.1	100	381.4
	Sep 2020	694	11.7	1077.28	9787	-80	425.61	1591.0	264.9	100	381.7
	WY 2020	**8892**							**3478.1**		
	Oct 2020	459	7.5	1079.50	9969	182	432.00	1078.1	178.7	67	389.1
	Nov 2020	582	9.8	1080.09	10018	49	435.68	1079.0	228.5	67	392.7
	Dec 2020	543	8.8	1082.10	10186	168	435.10	1087.1	210.0	68	387.0
	Jan 2021	567	9.2	1085.84	10501	315	435.49	1150.0	220.7	70	389.2
	Feb 2021	651	11.7	1087.53	10645	144	437.34	1131.9	258.6	68	397.1
	Mar 2021	975	15.9	1085.68	10487	-158	435.51	1328.7	389.1	81	399.0
	Apr 2021	1050	17.6	1081.75	10157	-331	432.53	1268.3	416.7	78	396.9
	May 2021	992	16.1	1078.04	9849	-307	427.07	1504.8	379.4	94	382.6
	Jun 2021	919	15.4	1075.33	9628	-221	423.24	1587.7	351.8	100	383.0
	Jul 2021	828	13.5	1075.36	9630	2	422.24	1587.6	318.5	100	384.6

* Based on the Colorado River Basin Forecast Center's Most Probable Water Supply Forecast

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OPERATION PLAN FOR COLORADO RIVER SYSTEM RESERVOIRS

RECLAMATION
Managing Water in the West

August 2019 24-Month Study

Most Probable Inflow*

Davis Dam - Lake Mohave

	Date	Power Release (1000 Ac-Ft)	Power Release (1000 CFS)	Reservoir Elev End of Month (Ft)	EOM Storage (1000 Ac-Ft)	Change In Storage (1000 Ac-Ft)	Davis Static Head (Ft)	Davis Gen Capacity MW	Davis Gross Energy MKWH	Percent of Units Available	KWH/AF
*	Aug 2018	730	11.9	642.29	1679	-17	141.02	255.0	92.7	100	127.1
H	Sep 2018	814	13.7	637.87	1561	-119	136.59	255.0	101.2	100	124.3
	WY 2018	**8981**							**1126.3**		
I	Oct 2018	635	10.3	637.08	1540	-21	135.95	184.3	77.8	72	122.4
S	Nov 2018	610	10.3	638.62	1581	40	137.20	158.1	78.4	62	128.4
T	Dec 2018	386	6.3	640.79	1639	58	140.00	153.0	47.3	60	122.5
O	Jan 2019	418	6.8	641.89	1668	30	143.26	159.6	56.8	63	135.8
R	Feb 2019	569	10.2	643.20	1704	36	144.69	209.5	68.8	82	120.9
I	Mar 2019	749	12.2	642.57	1687	-17	140.17	218.8	94.8	86	126.6
C	Apr 2019	886	14.9	642.52	1686	-1	142.03	210.8	111.9	83	126.3
A	May 2019	937	15.2	643.32	1707	22	139.79	238.6	119.5	94	127.6
L	Jun 2019	886	14.9	642.89	1696	-12	140.50	255.0	113.6	100	128.3
*	Jul 2019	895	14.5	643.48	1712	16	142.50	255.0	113.2	100	126.5
	Aug 2019	780	12.7	642.25	1678	-34	139.94	255.0	98.4	100	126.1
	Sep 2019	735	12.3	637.00	1538	-140	136.84	255.0	90.6	100	123.3
	WY 2019	**8486**							**1071.0**		
	Oct 2019	676	11.0	638.00	1564	26	135.25	208.9	82.3	82	121.8
	Nov 2019	503	8.5	639.01	1591	27	137.31	153.0	62.2	60	123.7
	Dec 2019	319	5.2	638.70	1583	-8	139.16	200.7	40.0	79	125.4
	Jan 2020	441	7.2	641.80	1666	83	139.62	179.3	55.5	70	125.8
	Feb 2020	612	10.6	641.80	1666	0	139.68	189.9	77.0	74	125.8
	Mar 2020	896	14.6	643.05	1700	34	138.83	255.0	112.1	100	125.1
	Apr 2020	1001	16.8	643.00	1699	-1	138.66	255.0	125.1	100	124.9
	May 2020	941	15.3	643.00	1699	0	139.15	255.0	118.0	100	125.4
	Jun 2020	860	14.5	643.00	1699	0	139.44	255.0	108.1	100	125.6
	Jul 2020	801	13.0	642.00	1671	-27	139.45	255.0	100.7	100	125.6
	Aug 2020	687	11.2	642.00	1671	0	139.67	255.0	86.5	100	125.8
	Sep 2020	717	12.1	640.01	1618	-54	138.33	255.0	89.4	100	124.6
	WY 2020	**8455**							**1056.8**		
	Oct 2020	624	10.2	633.00	1434	-183	134.59	208.9	75.7	82	121.3
	Nov 2020	501	8.4	635.00	1486	51	132.81	153.0	60.0	60	119.7
	Dec 2020	424	6.9	638.71	1583	97	136.36	200.7	52.1	79	122.8
	Jan 2021	458	7.4	641.80	1666	83	139.51	179.3	57.6	70	125.7
	Feb 2021	628	11.3	641.80	1666	0	139.41	189.4	78.9	74	125.6
	Mar 2021	912	14.8	643.05	1700	34	138.73	255.0	114.0	100	125.0
	Apr 2021	1018	17.1	643.00	1699	-1	138.56	255.0	127.1	100	124.8
	May 2021	958	15.6	643.00	1699	0	139.05	255.0	120.0	100	125.3
	Jun 2021	877	14.7	643.00	1699	0	139.34	255.0	110.1	100	125.5
	Jul 2021	818	13.3	642.00	1671	-27	139.35	255.0	102.7	100	125.5

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OPERATION PLAN FOR COLORADO RIVER SYSTEM RESERVOIRS

RECLAMATION
Managing Water in the West

August 2019 24-Month Study

Most Probable Inflow*

Parker Dam - Lake Havasu

	Date	Power Release (1000 Ac-Ft)	Power Release (1000 CFS)	Reservoir Elev End of Month (Ft)	EOM Storage (1000 Ac-Ft)	Change In Storage (1000 Ac-Ft)	Parker Static Head (Ft)	Parker Gen Capacity MW	Parker Gross Energy MKWH	Percent of Units Available	KWH/AF
*	Aug 2018	611	9.9	447.53	571	-9	79.27	120.0	42.7	100	69.9
H	Sep 2018	512	8.6	448.95	598	27	83.02	120.0	35.9	100	70.1
	WY 2018	**6479**							**451.7**		
I	Oct 2018	394	6.4	448.12	582	-16	82.83	90.0	27.9	75	70.9
S	Nov 2018	357	6.0	447.99	580	-3	82.25	93.0	26.1	78	73.0
T	Dec 2018	218	3.5	446.53	552	-27	81.03	116.1	12.9	97	59.1
O	Jan 2019	250	4.1	446.58	553	1	82.75	117.1	17.0	98	68.2
R	Feb 2019	372	6.7	447.53	571	18	81.87	95.4	25.5	79	68.6
I	Mar 2019	630	10.2	447.86	577	6	82.11	111.3	44.3	93	70.4
C	Apr 2019	712	12.0	447.29	567	-11	79.40	115.0	49.5	96	69.5
A	May 2019	673	11.3	448.62	592	25	80.51	119.0	48.6	99	72.2
L	Jun 2019	717	12.0	448.47	589	-3	80.43	120.0	50.3	100	70.2
*	Jul 2019	739	12.0	448.12	582	-7	80.11	120.0	51.4	100	69.5
	Aug 2019	624	10.2	447.80	576	-6	75.33	120.0	41.0	100	65.7
	Sep 2019	513	8.6	447.50	571	-6	75.03	120.0	33.4	100	65.1
	WY 2019	**6198**							**428.0**		
	Oct 2019	467	7.6	447.50	570	0	76.29	90.0	30.8	75	65.9
	Nov 2019	358	6.0	447.50	571	0	76.14	93.0	23.2	78	65.0
	Dec 2019	274	4.5	446.50	552	-19	74.65	114.2	17.2	95	62.6
	Jan 2020	262	4.3	446.50	552	0	75.07	94.8	16.4	79	62.7
	Feb 2020	431	7.5	446.50	552	0	75.16	93.1	28.0	78	65.1
	Mar 2020	706	11.5	446.70	555	4	74.01	120.0	45.8	100	64.9
	Apr 2020	728	12.2	448.70	593	38	75.08	120.0	48.0	100	65.9
	May 2020	695	11.3	448.70	593	0	76.05	120.0	46.2	100	66.5
	Jun 2020	718	12.1	448.70	593	0	76.05	120.0	47.8	100	66.6
	Jul 2020	677	11.0	448.00	580	-13	75.71	120.0	44.8	100	66.1
	Aug 2020	598	9.7	447.50	571	-9	75.13	120.0	39.1	100	65.4
	Sep 2020	508	8.5	447.50	570	0	74.89	120.0	33.0	100	65.0
	WY 2020	**6422**							**420.4**		
	Oct 2020	487	7.9	447.50	571	0	76.29	90.0	32.2	75	66.1
	Nov 2020	359	6.0	447.50	571	0	76.19	92.0	23.4	77	65.0
	Dec 2020	311	5.1	446.50	552	-19	74.86	109.4	19.7	91	63.3
	Jan 2021	262	4.3	446.50	552	0	75.07	94.8	16.4	79	62.7
	Feb 2021	430	7.7	446.50	552	0	75.21	92.1	28.1	77	65.2
	Mar 2021	704	11.5	446.70	555	4	74.01	120.0	45.7	100	64.9
	Apr 2021	727	12.2	448.70	593	38	75.08	120.0	47.9	100	65.9
	May 2021	694	11.3	448.70	593	0	76.05	120.0	46.1	100	66.5
	Jun 2021	716	12.0	448.70	593	0	76.05	120.0	47.7	100	66.6
	Jul 2021	676	11.0	448.00	580	-13	75.71	120.0	44.7	100	66.1

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OPERATION PLAN FOR COLORADO RIVER SYSTEM RESERVOIRS

RECLAMATION
Managing Water in the West

August 2019 24-Month Study

Most Probable Inflow*

Upper Basin Power

	Date	Glen Canyon 1000 MWHR	Flaming Gorge 1000 MWHR	Blue Mesa 1000 MWHR	Morrow Point 1000 MWHR	Crystal Reservoir 1000 MWHR	Fontenelle Reservoir 1000 MWHR
*	Aug 2018	393	50	24	33	19	7
H	Sep 2018	288	47	8	29	16	1
	Summer 2018	**2045**	**297**	**133**	**193**	**111**	**36**
I	Oct 2018	268	39	11	19	9	4
S	Nov 2018	248	36	5	4	2	5
T	Dec 2018	313	47	5	6	2	5
O	Jan 2019	335	47	4	6	1	4
R	Feb 2019	302	42	6	8	1	3
I	Mar 2019	325	22	6	9	4	3
	Winter 2019	**1790**	**233**	**36**	**51**	**19**	**24**
C	Apr 2019	294	27	9	14	10	4
A	May 2019	299	38	23	45	21	6
L	Jun 2019	332	82	33	64	22	8
*	Jul 2019	391	39	28	54	23	7
	Aug 2019	372	43	34	52	23	7
	Sep 2019	283	48	33	39	20	3
	Summer 2019	**1972**	**278**	**159**	**268**	**119**	**36**
	Oct 2019	264	28	26	31	16	6
	Nov 2019	264	26	24	29	15	6
	Dec 2019	296	62	34	41	21	6
	Jan 2020	312	62	16	21	11	5
	Feb 2020	278	58	15	19	0	5
	Mar 2020	290	29	15	20	8	4
	Winter 2020	**1704**	**265**	**129**	**161**	**71**	**32**
	Apr 2020	262	28	18	27	15	5
	May 2020	261	29	58	102	23	7
	Jun 2020	281	89	20	32	21	8
	Jul 2020	324	42	19	25	14	10
	Aug 2020	345	45	22	27	14	10
	Sep 2020	258	44	23	29	14	2
	Summer 2020	**1730**	**275**	**161**	**242**	**102**	**40**
	Oct 2020	274	25	15	19	10	5
	Nov 2020	272	24	15	19	10	5
	Dec 2020	306	43	27	34	17	5
	Jan 2021	363	43	20	25	13	5
	Feb 2021	316	38	14	19	10	4
	Mar 2021	336	22	0	22	12	4
	Winter 2021	**1531**	**172**	**92**	**115**	**59**	**23**
	Apr 2021	297	22	0	34	19	5
	May 2021	301	24	2	95	23	7
	Jun 2021	324	87	17	29	20	8
	Jul 2021	372	45	23	29	17	10

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OPERATION PLAN FOR COLORADO RIVER SYSTEM RESERVOIRS

RECLAMATION
Managing Water in the West

August 2019 24-Month Study

Most Probable Inflow*

Flood Control Criteria

Beginning of Month Conditions

Date	Flaming Gorge KAF	Blue Mesa KAF	Navajo KAF	Lake Powell KAF	Upper Basin Total KAF	Lake Mead KAF	Total KAF	Flaming Gorge KAF	Blue Mesa KAF	Navajo KAF	Tot or Max Allow KAF	Lake Powell KAF	Lake Mead KAF	Total KAF	BOM Space Required KAF	Mead Sched Rel KAF	Mead FC Rel KAF	Sys Cont MAF
	****PREDICTED SPACE****							****CREDITABLE SPACE****										
Aug 2019	274	7	165	10388	10835	17131	27966	274	7	165	447	10388	17131	27966	1500	781	0	32.7
Sep 2019	319	50	218	10495	11081	17019	28099	319	50	218	586	10495	17019	28099	2270	625	0	32.4
Oct 2019	405	90	257	10557	11308	16951	28259	405	90	257	751	10557	16951	28259	3040	720	0	32.3
Nov 2019	429	126	253	10573	11381	17011	28392	429	126	253	808	10573	17011	28392	3810	559	0	32.3
Dec 2019	445	166	242	10629	11482	16939	28421	445	166	242	853	10629	16939	28421	4580	332	0	32.3
Jan 2020	573	245	246	10711	11775	16572	28347	573	245	246	1064	10711	16572	28347	5350	550	0	32.3
								****EFFECTIVE SPACE****										
Jan 2020	573	245	246	10711	11775	16572	28347	182	151	50	384	10711	16572	27667	5350	550	0	32.3
Feb 2020	695	268	252	10884	12099	16335	28434	306	175	56	537	10884	16335	27756	1500	635	0	32.2
Mar 2020	804	292	251	10984	12331	16242	28573	415	200	54	668	10984	16242	27894	1500	959	0	31.9
Apr 2020	789	305	222	11103	12420	16469	28889	395	213	18	626	11103	16469	28198	1500	1033	0	31.8
May 2020	738	292	167	10943	12140	16850	28990	336	203	-62	477	10943	16850	28270	1500	975	0	32.9
Jun 2020	599	342	174	9576	10691	17217	27908	184	241	-95	330	9576	17217	27123	1500	902	0	34.5
Jul 2020	511	153	338	7844	8845	17507	26353	87	34	11	132	7844	17507	25483	1500	811	0	34.4
								****CREDITABLE SPACE****										
Aug 2020	442	112	388	7852	8794	17584	26377	442	112	388	942	7852	17584	26377	1500	721	0	34.1
Sep 2020	502	121	414	8162	9199	17510	26709	502	121	414	1037	8162	17510	26709	2270	694	0	33.7
Oct 2020	583	149	424	8303	9458	17590	27048	583	149	424	1156	8303	17590	27048	3040	459	0	33.5
Nov 2020	603	158	424	8459	9644	17408	27052	603	158	424	1186	8459	17408	27052	3810	582	0	33.4
Dec 2020	623	173	430	8630	9857	17359	27216	623	173	430	1227	8630	17359	27216	4580	543	0	33.2
Jan 2021	706	240	440	8849	10234	17191	27425	706	240	440	1386	8849	17191	27425	5350	567	0	33.1
								****EFFECTIVE SPACE****										
Jan 2021	706	240	440	8849	10234	17191	27425	374	128	229	731	8849	17191	26771	5350	567	0	33.1
Feb 2021	783	283	453	9201	10719	16876	27595	451	171	241	863	9201	16876	26940	1500	651	0	32.9
Mar 2021	845	309	455	9462	11071	16732	27803	512	198	242	952	9462	16732	27146	1500	975	0	32.7
Apr 2021	809	328	416	9665	11219	16890	28108	471	219	196	886	9665	16890	27441	1500	1050	0	32.6
May 2021	743	335	342	9524	10944	17220	28165	397	226	97	720	9524	17220	27465	1500	992	0	33.8
Jun 2021	577	369	283	8260	9489	17528	27017	217	244	-1	460	8260	17528	26248	1500	919	0	35.3
Jul 2021	459	191	384	6758	7792	17749	25541	87	42	42	170	6758	17749	24678	1500	828	0	35.4

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United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, DC 20240

AUG 14 2019

MEMORANDUM

To: Brent Esplin, Designated Federal Officer, Bureau of Reclamation
Regional Director, Upper Colorado Region
Kathleen Callister, Resources Management Division Manager, Bureau of Reclamation
Upper Colorado Region
Scott VanderKooi, Chief, Grand Canyon Monitoring and Research Center (GCMRC)
U.S. Geological Survey (USGS)

From: Timothy R. Petty, Ph.D.
Secretary's Designee
Assistant Secretary for Water and Science

Subject: Glen Canyon Dam Adaptive Management Program Guidance

The Colorado River faces many challenges in the coming years, especially with an ongoing drought now in its 19th year. As such, it is important that the Glen Canyon Dam Adaptive Management Program (GCDAMP) is managed in such a way as to ensure consistency with the Grand Canyon Protection Act (GCPA) and the priorities of the Secretary of the Interior, and in accordance with the Law of the Colorado River and the Glen Canyon Dam Long Term Experimental and Management Plan (LTEMP) Record of Decision (ROD) and Final Environmental Impact Statement (FEIS).

The GCDAMP plays a central role in ensuring compliance with multiple laws associated with the operation of Glen Canyon Dam. It provides a process for cooperative integration of dam operations, downstream resource protection and management, and monitoring and research. Under the GCPA, Reclamation and GCMRC conduct research and monitoring and consult with specific stakeholders on that research and monitoring. The Adaptive Management Working Group (AMWG), a Federal Advisory Committee, is the vehicle through which Reclamation accomplishes this consultation. The AMWG also makes recommendations to the Secretary per the LTEMP ROD.

LTEMP Implementation

The primary guiding documents for the GCDAMP will continue to be the LTEMP FEIS and ROD, which provide the framework for adaptively managing Glen Canyon Dam operations and management actions associated with downstream resources through 2037. This program guidance document will help ensure continuity and continued successes within the GCDAMP under the current administration and in the years to come. The priorities identified in the LTEMP ROD for the GCDAMP are as follows:

- Management and Experimental Actions
- Mitigation and Environmental Commitments
- Research and Monitoring

In addition, the Department of the Interior (Interior) has recently prioritized the responsible development and production of renewable energy on federal lands. To this end, I encourage the GCDAMP to work within the LTEMP framework to seek ways to improve the value of the hydropower resource. This work may include continued engagement with Project N of the GCDAMP Fiscal Years (FY) 2018-20 Triennial Workplan (TWP) and with interested AMWG stakeholders regarding the current science and policy regarding dam operations.

Updating Guidance Documents

I direct Reclamation, USGS, and other Interior agencies to work with the AMWG to update the GCDAMP guiding documents to reflect and be fully consistent with the priorities outlined in the LTEMP FEIS Section 1.4 and emphasized in Section 6.1(c) of the LTEMP ROD. These guiding documents include the GCDAMP strategic plan, vision, mission, and charter.

With the challenges faced in FY 2018 regarding funding for the GCDAMP and the need to ensure appropriations are requested through the federal budget process, Interior supports continuing with the three-year workplan and budget process. The current FY 2018-20 GCDAMP TWP and budget process demonstrated that it can improve program efficiency by reducing the time and effort spent on annually developing a workplan and budget. The GCDAMP should continue to review the TWP annually to ensure it meets the priorities and goals of the GCPA and GCDAMP.

The development of the TWP and budget for FY 2021-23 will commence in late FY 2019 and continue through FY 2020. Its development should include consultation with members of AMWG, who will recommend to the Secretary whether they support the planned projects and funding. Reclamation and GCMRC will take the lead in drafting the FY 2021-23 TWP. The TWP and budget should focus on compliance priorities including:

- Maintaining dam releases consistent with applicable laws;
- Activities associated with the Endangered Species Act;
- Actions necessary for compliance with the National Historic Preservation Act; and
- Research and monitoring as required by the Grand Canyon Protection Act.

Activities that concern annual release volumes from Glen Canyon Dam—including discussion of Drought Contingency Planning and new negotiations of the Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations for Lake Powell and Lake Mead—will be underway in FY 2019 or in the coming years. The GCDAMP and AMWG guidance documents discussed here should consider any implications of these ongoing discussions.

The LTEMP Scientific Monitoring Plan will continue to provide a framework for the scientific support needed to complete the monitoring and experimentation specified in the LTEMP FEIS

and ROD. This plan will help ensure that long-term monitoring and research activities are aligned with the LTEMP FEIS and ROD and the GCDAMP decision making process. In accordance with the LTEMP ROD, the Science Plan will be reviewed every three years and may be updated as needed. The next review will occur in conjunction with the start of the next TWP development process in early FY 2020. Also, in accordance with the LTEMP ROD, specific details concerning the means to collect, analyze, and report information required to support development of recommendations by the AMWG and decision making by Interior will be included in the TWP.

It is also important that the GCDAMP develops and implements monitoring metrics for the resource goals and objectives defined in the LTEMP ROD. Interior directs the AMWG to develop recommendations for these monitoring metrics to assist Interior in their development. The recommended metrics should build on existing LTEMP conservation measures, environmental and recreational goals, and other easily identifiable goals. As the process continues, additional goals can be developed.

Future research proposed and undertaken by the GCDAMP should be tied directly to LTEMP resource goals and objectives and continue to be focused on providing the best available science such that decision making is science-based and continues to work towards ensuring benefits to as many resources downstream of the dam as possible. This should be done in a collaborative process involving AMWG and TWG members, the Science Advisors Program, and ad hoc groups as needed. Several areas to consider as identified by the GCDAMP partners include:

- Evaluation of the threat posed by invasive non-native species.
- Exploring vegetation management to benefit high value recreational beaches and protect vulnerable archaeological sites.
- Considering impacts to hydropower as part of the development of a LTEMP experiments and study plans.

Operating Criteria and Operational Flexibility

The LTEMP ROD provides guidance for hourly, daily, and monthly releases (see, for example, Table 3, p. B-4). In accordance with the LTEMP ROD Attachment B Section 1.2 (Page B-7), I encourage Reclamation to continue to utilize operational flexibility at Glen Canyon Dam in response to varying hydrological and other resource-related conditions. As warranted, Reclamation, in consultation with Western Area Power Administration (WAPA), should continue to make adjustments to hourly, daily, and monthly release volumes within the water year in response to operational, resource-related, and hydropower-related issues.

In response to stakeholder input at recent AMWG meetings, the feasibility of conducting Spring High Flow Experiments (HFE), along with modeling for improvements and efficiencies that benefit resources including natural, cultural, recreational, and hydropower should be explored. As a potential starting point, I encourage you to consider opportunities to conduct higher spring releases within power plant capacity, along with spring HFEs that may be triggered under the current LTEMP Protocol.

Conclusion

This guidance is not meant to be all encompassing or to preclude additional scientific investigations that can improve the resources downstream of Glen Canyon Dam that are consistent with the LTEMP. The GCDAMP should seek ways to continuously improve the program, including searching for efficiencies and improvements and listening to the States, Tribes, and other program stakeholders.

The GCDAMP and AMWG are vital to ensuring Interior's responsibilities under the GCPA and the LTEMP ROD, and I greatly appreciate Reclamation, USGS, other Interior bureaus, and our external partners' dedication to ensuring Glen Canyon Dam is operated in a manner that protects, mitigates impacts to, and improves downstream resources.