

May 24-Month Study
Date: May 15th 2023

From: Water Resources Group, Salt Lake City
To: All Colorado River Annual Operating Plan (AOP) Recipients

Current Reservoir Status

	April Inflow (unregulated) (acre-feet)	Percent of Average (percent)	May 14 Midnight Elevation (feet)	May 14, Midnight Reservoir Storage (acre-feet)
Fontenelle	75,100	89	6,479.41	155,428
Flaming Gorge	188,200	150	6,013.65	2,700,249
Blue Mesa	77,500	99	7,473.62	456,374
Navajo	244,800	167	6,057.16	1,256,893
Powell	1,398,500	155	3,538.09	6,329,279

Expected Operations

The operation of Lake Powell and Lake Mead in the May 2023 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 2023 Annual Operating Plan (AOP). Pursuant to the Interim Guidelines, the August 2022 24-Month Study projections of the January 1, 2023, system storage and reservoir water surface elevations set the operational tier for the coordinated operation of Lake Powell and Lake Mead during 2023.

The August 2022 24-Month Study projected the January 1, 2023 Lake Powell elevation to be less than 3,525 feet. Consistent with Section 6.D.1 of the Interim Guidelines, Lake Powell’s operation in Water Year (WY) 2023 is governed by the Lower Elevation Balancing Tier with an initial projected water year release volume of 7.00 million acre-feet (maf). Based on hydrologic conditions in April 2023, in which the most probable inflow into Lake Powell was projected to be 11.30 maf (177 percent of average) during the 2023 April-July runoff period, Reclamation has determined that conditions are sufficient to release up to 9.50 maf from Lake Powell in WY 2023 consistent with Section 6.D.1 of the Interim Guidelines, but could be as low as 7.00 maf consistent with the Interim Guidelines and to protect Lake Powell from declining below elevation 3,525 feet at the end of December 2023. In addition, Reclamation has removed the operational neutrality of the 0.480 maf that was retained in Lake Powell under the May 2022 action,¹ such that balancing releases are based on the projected end of water year physical contents of Lake Powell and Lake Mead. Further, Lower Basin projections for Lake Mead take into consideration: updated water orders to reflect additional conservation efforts; new completed system conservation agreements under the Lower Colorado River Basin System Conservation and Efficiency Program (LC Conservation Program); and updated Lower Basin tributary inflow projections (reflecting current conditions) above Lake Mead, for the Bill Williams and for the Gila River.

Consistent with this operating approach and based on the most probable inflow forecast, the May 2023 24-Month Study projects a balancing release of 9.29 maf from Lake Powell in WY 2023; however, the actual release in WY 2023 will range between 7.00 and 9.50 maf and will depend on actual hydrology and

reservoir conditions at Lake Powell and Lake Mead during the remainder of the water year. The projected release from Lake Powell in WY 2023 will be updated each month throughout the remainder of the water year. The modeling approach for 2024 and beyond will be consistent with the Interim Guidelines, based on projected physical elevations at Lake Powell and Lake Mead, and assume the 0.480 maf retained in Lake Powell under the May 2022 action was released as part of the WY 2023 balancing release only if the release volume is 7.48 maf or greater.

The 2022 Drought Response Operations Agreement (DROA) Plan² for May 2022 through April 2023 has been amended to suspend 2022 DROA Plan releases for the remainder of April 2023. The suspension of 2022 DROA Plan releases occurred on March 7, 2023. A total DROA release of approximately 463 thousand acre-feet (kaf) occurred under the 2022 DROA Plan. Reclamation will attempt to maximize DROA recovery in the Upper Initial Units in WY 2023 and through April 2024. Reclamation will provide monthly DROA accounting, including DROA releases and recovery, which can be found online at:

<https://www.usbr.gov/dcp/DROSummarySheet.pdf>.

Reclamation continues to consult with the DROA Parties and to consult with the Lower Division States and others in accordance with the DROA on the implementation of the Drought Response Operations Plans and consideration of 2023 DROA Plan.

Reclamation will continue to carefully monitor hydrologic and operational conditions and assess the need for additional responsive actions and/or changes to operations. Reclamation will continue to consult with the Basin States, Basin Tribes, Mexico, and other partners on Colorado River operations to consider and determine whether additional measures should be taken to further enhance the preservation of these benefits, as well as recovery protocols, including those of future protective measures for both Lakes Powell and Mead.

The August 2022 24-Month Study projected the January 1, 2023 Lake Mead elevation, determined as if the 0.480 maf had been delivered to Lake Mead in WY 2022, to be below 1,050 feet and above 1,045 feet. Consistent with Section 2.D.1 of the Interim Guidelines, a Shortage Condition consistent with Section 2.D.1.b will govern the operation of Lake Mead for Calendar Year (CY) 2023. In addition, Section III.B of Exhibit 1 to the Lower Basin Drought Contingency Plan (DCP) Agreement will govern the operation of Lake Mead for CY 2023. Efforts to conserve additional water in Lake Mead under a 2021 Lower Basin Memorandum of Understanding (MOU) to facilitate near-term actions to maintain the water surface elevation of Lake Mead and the LC Conservation Program will also take place in CY 2023.

Current runoff projections into Lake Powell are provided by the National Weather Service's Colorado Basin River Forecast Center and are as follows. The observed unregulated inflow into Lake Powell for the month of April was 1.400 maf or 155 % of the 30-year average from 1991 to 2020. The May 2023 unregulated inflow forecast for Lake Powell is 4.00 maf or 193 % of the 30-year average. The 2023 April through July unregulated inflow forecast is 11.00 maf or 172 % of average.

The 2023 AOP is available online at:

<https://www.usbr.gov/uc/water/rsvrs/ops/aop/AOP23.pdf>.

The Interim Guidelines are available online at:

<https://www.usbr.gov/lc/region/programs/strategies/RecordofDecision.pdf>.

The Colorado River DCPs are available online at:

<https://www.usbr.gov/dcp/finaldocs.html>.

The 2021 Lower Basin MOU is available online at:

https://www.usbr.gov/lc/region/g4000/2021_MOU.pdf.

The Upper Basin DROA is online at:

<https://www.usbr.gov/dcp/droa.html>.

The Upper Basin Hydrology Summary is available online at:

https://www.usbr.gov/uc/water/crsp/studies/24Month_05_ucb.pdf.

Information on the LC Conservation Program is available online at:

<https://www.usbr.gov/lc/LCBConservation.html>.

Fontenelle Reservoir

As of May 4, 2023, the Fontenelle Reservoir pool elevation is 6475.71 feet, which amounts to 41 percent of live storage capacity. Inflows for the month of April totaled approximately 75,085 acre-feet (af) or 89 percent of average.

Ice along the Green River has thawed, and spring releases have started. Releases from the dam will increase throughout spring to meet elevation targets. Per the May final forecast, maximum total release rates are forecasted to occur in late June at approximately 5,000 cfs, subject to hydrology.

The May final forecast for unregulated inflows into Fontenelle for the next three months projects above average conditions. May, June, and July Most Probable inflow volumes amount to 240,000 af (137 percent of average), 335,000 af (109 percent of average), and 180,000 af (107 percent of average), respectively.

The next Fontenelle Working Group meeting is scheduled for August 24, 2023 at 10:00 a.m at Green River, WY, tentatively. Details on the meeting will be provided as we get closer to the meeting date. Prior Fontenelle Working Group meeting minutes are available online on USBR's website at <https://www.usbr.gov/uc/water/crsp/wg/ft/ftcurrnt.html>. The Fontenelle Working Group is an open public forum for information exchange between Reclamation and other parties associated with the operation of Fontenelle Reservoir.

Flaming Gorge

As of May 8, 2023 (end of day), Flaming Gorge Reservoir pool elevation is 6012.21 feet, which amounts to 72 percent of live storage capacity. Unregulated inflow volume for the month of April is approximately 188,000 acre-feet (af), which is 150 percent of the average April unregulated inflow volume. The current average daily release is 800 cfs.

The 2023 DROA Plan is being finalized and will be provided through processes outlined in the DROA Framework, <https://www.usbr.gov/dcp/droa.html>.

A new operational plan will be finalized in May 2023, and this will contain an operation plan from May 2023 through April 2024.

Spring Release -- The Larval Trigger Study Plan to assist in the recovery of the Razorback sucker (protected under the Endangered Species Act) is the next operational plan to occur this spring. The adaptive management experiment is triggered by appearance of razorback sucker larvae which is correlated to the weather. Current models show that the trigger could occur in early June, pending hydrology and weather. Below is a description of the likelihood of the trigger occurring. The mean calendar date of the first capture of razorback sucker larvae (i.e., the "larval trigger") is May 28 (median May 27) and ranges from May 7 to June 24. Historically, 50% of first captures occurred between May 21

and June 2; 75% occurred between May 16 and June 4. In general, first capture of larvae is earliest in years characterized by low flows and/or warmer conditions, and latest in years characterized by high flows and/or cooler conditions. Pending the timing of the trigger and Yampa River flows, the goal is to achieve greater than 18,600 cfs for at least 5 days in Reach 2, near Jensen Utah. Releases from Flaming Gorge Dam will vary to meet target flows in Reach 2.

The May unregulated inflows into Flaming Gorge for the next three months projects above average. May, June, and July forecasted unregulated inflow volumes amount to 415,000 af (167 percent of average), 490,000 af (126 percent of average), and 207,000 af (103 percent of average), respectively. The May water supply forecast of the April through July unregulated inflow volume into Flaming Gorge Reservoir is 1,300,000 acre-feet (135% of average). Due to the May official forecast Upper Green April – July forecast being at a 31% exceedance value, spring operations will use an average hydrologic classification operation.

Reclamation is planning to hold Flaming Gorge Working Group meetings on August 15, 2023, at 10:00 am in Vernal (and Teams virtual meeting) (tentative). The Flaming Gorge Working Group is an open public forum for information exchange between Reclamation and the stakeholders of Flaming Gorge Dam. The public is encouraged to attend and comment on the operations and plans presented by Reclamation at these meetings. Meeting notes from past Working Group meetings are posted on the Working Group webpage. For more information on this group and these meetings please contact Dale Hamilton at 801-379-1186.

Aspinall Unit Reservoirs

As of May 10, 2023, releases from Crystal Dam are approximately 1,375 cfs. Flows of the Gunnison River in the Black Canyon are being maintained at about 805 cfs while the Gunnison Tunnel is diverting 600 cfs. Flows in the Whitewater Reach of the Gunnison River are about 10,400 cfs.

The unregulated inflow volume in April to Blue Mesa was 77,500 af (99 percent of average). Unregulated Inflow volumes forecasted for Blue Mesa for the next three months (May, June and July) are projected to be: 255,000 af (127 percent of average), 365,000 af (146 percent of average) and 132,000 af (122 percent of average), respectively. The May 24-Month Study will be reflective of these new forecasted inflows.

The forecasted 2023 water year unregulated inflow volume to Blue Mesa is projected to be 1,082,600 af (119 percent of average). The water supply period (April-July) for 2023 is forecasted to be 830,000 af of unregulated inflow (130 percent of average).

Blue Mesa elevation has increased dramatically over the past month and as of May 10, 2023, was 7,470.36 feet above sea level corresponding to a live storage of 433,950 acre-feet which is 52 percent of capacity. By the end of water year 2023 (September 30, 2023) Blue Mesa elevation is projected to be approximately 7,504 feet with about 695,000 acre-feet of storage which will be 84 percent of capacity.

The Aspinall Unit Operations Group is an open public forum for information exchange between Reclamation and the stakeholders of the Aspinall Unit. The public is encouraged to attend and comments on the operations and plans presented by Reclamation at these meetings. Meeting notes from past working Group meetings are posted on the Operations Group webpage. For more information on this group and these meetings please contact Erik Knight in the Grand Junction Area Office at (970) 248-0629.

The next Operations Group meeting will be held August 24, 2023 at 1:00 p.m., in person at the Elk Creek Visitor Center at Blue Mesa Reservoir. This will be an in-person meeting with an option for remote participation. Contact Erik Knight in the Grand Junction Area Office at (970) 248-0629 to get more information regarding this Operation Group meeting.

Navajo Reservoir

On May 8th, the daily average release rate from Navajo Dam was 500 cfs while reservoir inflow was averaging 4,980 cfs. The water surface elevation was 6053.17 feet above sea level. At this elevation the live storage is 1.210 maf (73 percent of live storage capacity) and the active storage is 0.582 maf (57 percent of active storage capacity). An average of 337 cfs is currently being diverted to Cutter Reservoir for the Navajo Indian Irrigation Project (NIIP). Approximately 937 cfs is being diverted to the San Juan-Chama Project (SJC) above Navajo Reservoir.

Releases from Navajo Dam are made for authorized purposes of the Navajo Unit and are pursuant to the Record of Decision for the Navajo Reservoir Operations. Releases target the San Juan River Recovery Implementation Program's (SJ RIP) recommended downstream baseflow range of 500 cfs to 1,000 cfs through the critical habitat reach of the San Juan River (Farmington, NM to Lake Powell).

Preliminary modified unregulated inflow (MUI) into Navajo in April was 245 kaf, which was 167 percent of average for the month. The release averaged 350 cfs and totaled 21.1 kaf, which was 40 percent of average for the month.

The most probable MUI forecast for May, June, and July, is 435 kaf (179 percent of average), 275 kaf (145 percent of average), and 55 kaf (115 percent of average), respectively.

The official April-July forecasts are as follows:

MIN: 905 kaf (144 percent of average, an increase of 105 kaf since the April Forecast)

MOST: 1,010 kaf (161 percent of average, an increase of 65 kaf since the April Forecast)

MAX: 1,160 kaf (185 percent of average, a decrease of 10 kaf since the April Forecast)

There is sufficient water available, based on this forecast, for a SJ RIP-recommended spring peak release with 21-days at a peak of 5,000 cfs. Beginning on May 15th, the release is scheduled to increase, peaking on May 25th at 5,000 cfs, and holding for 21 days before ramping back down to base releases. The release is forecast to total 290 kaf over base releases.

Reclamation conducts Public Operations Meetings three times per year to gather input for determining upcoming operations for Navajo Reservoir. Input from individuals, organizations, and agencies along with other factors such as weather, water rights, endangered species requirements, flood control, hydro power, recreation, fish and wildlife management, and reservoir levels, will be considered in the development of these reservoir operation plans. In addition, the meetings are used to coordinate activities and exchange information among agencies, water users, and other interested parties concerning the San Juan River and Navajo Reservoir. The next meeting will be held on Tuesday, August 22nd at 1:00 PM. This meeting is open to the public, and will be held at the Farmington Civic Center, 200 West Arrington, in Farmington, New Mexico (subject to change based on guidance at the time). The meeting will also have a virtual option.

Glen Canyon Dam / Lake Powell

Current Status

The August 2022 24-Month Study projected the January 1, 2023 Lake Powell elevation to be less than 3,525 feet. Consistent with Section 6.D.1 of the Interim Guidelines, Lake Powell's operation in WY 2023 is governed by the Lower Elevation Balancing Tier with an initial projected WY release volume of 7.00 maf. Based on hydrologic conditions as of April 2023, in which the most probable inflow into Lake Powell is projected to be 11.30 maf (177 percent of average) during the 2023 April-July runoff period, Reclamation has determined that conditions are sufficient to release up to 9.50 maf from Lake Powell in WY 2023 consistent with Section 6.D.1 of the Interim Guidelines, but could be as low as 7.00 maf consistent with the Interim Guidelines and to protect Lake Powell from declining below elevation 3,525 feet at the end of December 2023. In addition, Reclamation has removed the operational neutrality of the 0.480 maf that was retained in Lake Powell under the May 2022 action, such that balancing releases are based on physical elevations of Lake Powell and Lake Mead.

Consistent with this operating approach and based on the most probable inflow forecast, the May 2023 24-Month Study projects a balancing release of 9.29 maf from Lake Powell in WY 2023; however, the actual release in WY 2023 will range between 7.00 and 9.50 maf and will depend on actual hydrology and reservoir conditions at Lake Powell and Lake Mead during the remainder of the water year. The projected release from Lake Powell in WY 2023 will be updated each month throughout the remainder of the water year. The modeling approach for 2024 and beyond will be consistent with the Interim Guidelines, based on projected physical elevations at Lake Powell and Lake Mead, and assume the 0.480 maf retained in Lake Powell under the May 2022 action was released as part of the WY 2023 balancing release only if the release volume is 7.48 maf or greater.

Reclamation will continue to carefully monitor hydrologic and operational conditions and assess the need for additional responsive actions and/or changes to operations. Reclamation will continue to consult with the Basin States, Basin Tribes, Mexico, and other partners on Colorado River operations to consider and determine whether additional measures should be taken to further enhance the preservation of these benefits, as well as recovery protocols, including those of future protective measures for both Lakes Powell and Mead.

The unregulated inflow volume to Lake Powell during April was 1,399 kaf (155 percent of average). The release volume from Glen Canyon Dam in April was 909 kaf. The end of April elevation and storage of Lake Powell were 3,524.99 feet (175 feet from full pool) and 5.54 maf (23 percent of live capacity), respectively.

Current Operations

Hourly releases during May 2023 will fluctuate from a low of approximately 14,051 cfs during the early morning hours to a high of 18,909 cfs during the afternoon and evening hours and may follow a steady release pattern around 17,500 cfs, all within the May release volume of 1,088,000 acre-feet. The anticipated monthly release volume for June is anticipated to be 1,064,000 acre-feet and will be confirmed toward the end of May.

In addition to daily scheduled fluctuations for power generation, the instantaneous releases from Glen Canyon Dam may also fluctuate to provide 40 megawatts (MW) of system regulation. These instantaneous release adjustments stabilize the electrical generation and transmission system and translate to a range of about 1,300 cfs above or below the hourly scheduled release rate. Under normal

system conditions, fluctuations for regulation are typically short lived and generally balance out over the hour with minimal or no noticeable impacts on downstream river flow conditions.

Releases from Glen Canyon Dam can also fluctuate beyond scheduled releases when called upon to respond to unscheduled power outages or power system emergencies. Depending on the severity of the system emergency, the response from Glen Canyon Dam can be significant, within the full range of the operating capacity of the power plant for as long as is necessary to maintain balance in the transmission system. Glen Canyon Dam currently maintains 30 MW (approximately 1,300 cfs) of generation capacity in reserve in order to respond to a system emergency even when generation rates are already high. System emergencies occur infrequently and typically require small responses from Glen Canyon Dam. However, these responses can have a noticeable impact on the river downstream of Glen Canyon Dam.

Inflow Forecasts and Model Projections

The forecast for water year 2023 unregulated inflow to Lake Powell, issued on May 4, 2023, by the Colorado Basin River Forecast Center, projects that the most probable (median) unregulated inflow volume in water year 2023 will be 14.17 maf (148 percent of average).

In addition to the May 2023 24-Month Study based on the Most Probable inflow scenario, and in accordance with the Upper Basin Drought Response Operations Agreement (DROA), Reclamation has conducted model runs in May April to determine a possible range of reservoir elevations. The May 2023 24-Month Study probable most and minimum probable inflow scenarios and the April maximum probable inflow scenario were used to determine the range of probable outcomes. The probable minimum and probable maximum model runs are conducted simultaneously in January, April, August, and October, or when necessary to incorporate changing conditions. The probable minimum inflow scenario reflects a dry hydrologic condition which statistically would be exceeded 90 percent of the time. The most probable inflow scenario reflects a median hydrologic condition which statistically would be exceeded 50 percent of the time. The probable maximum inflow scenario reflects a wet hydrologic condition which statistically would be exceeded 10 percent of the time. There is approximately an 80 percent probability that a future elevation will fall inside the range of the minimum and maximum inflow scenarios. Additionally, there are possible inflow scenarios that would result in reservoir elevations falling outside the ranges indicated in these reports.

The DROA coordination will continue until either (i) the minimum probable projected elevation remains above 3,525 feet for 24 months or (ii) the process moves to the next step when the most probable projected elevation indicates Powell elevations below 3,525 feet and a Drought Response Operations Plan is developed. This 2022 Plan is described above and available for review here:

<https://www.usbr.gov/dcp/droa.html>.

The May forecast for water year 2023 ranges from a minimum probable of 12.81 maf (133 percent of average) to a forecasted maximum probable of 16.31 maf (170 percent of average) with the most probable forecast for water year 2023 of 14.17 maf (148 percent of average). There is a 10 percent chance that inflows could be higher than the current maximum probable forecast and a 10 percent chance that inflows could be lower than the minimum probable forecast.

Based on the current forecast for water year 2023 of 14.17 maf unregulated, the May 24-Month Study projects Lake Powell elevation will end water year 2023 near 3575.77 feet with approximately 8.96 maf in storage (37 percent of capacity). Note that projections of elevation and storage for water year 2023 have significant uncertainty at this point in the season. Projections of end of water year 2023 elevation using

the May minimum and April maximum inflow forecast results are 3,570.24 feet and 3,606.71 feet, respectively. The annual release volume from Lake Powell during water year 2023 will be 9.29 maf under the Lower Elevation Balancing Tier and will balance the contents between Powell and Mead with annual release volumes from Glen Canyon Dam between 7.00 maf and 9.50 maf as determined under Section 6.D.1 and 7.D of the Interim Guidelines as determined by the Department of the Interior as described above.

Upper Colorado River Basin Hydrology

Upper Colorado River Basin regularly experiences significant year to year hydrologic variability. The 30-year average was updated in October 2022 from 1981 through 2010 to 1991 through 2020. Shifting the period of record decreased the average unregulated inflow 1.20 maf. The period 2000-2022 is the lowest 23-year period since the closure of Glen Canyon Dam in 1963, with an average unregulated inflow of 8.29 maf, or 93 percent of the 30-year average (1991-2020). (For comparison, the 1991-2020 total water year average is 9.60 maf.) The unregulated inflow during the 2000-2022 period has ranged from a low of 2.64 maf (28 percent of average) in water year 2002 to a high of 15.97 maf (166 percent of average) in water year 2011. In water year 2021 unregulated inflow volume to Lake Powell was 3.50 maf (36 percent of average), the second driest year on record above 2002. Under the current most probable forecast, the total water year 2023 unregulated inflow to Lake Powell is projected to be 14.17 maf (148 percent of average).

At the beginning of water year 2023, total system storage in the Colorado River Basin was 19.54 maf (33 percent of 58.48 maf total system capacity). This is a decrease of 3.33 maf over the total storage at the beginning of water year 2022 when total system storage was 22.87 maf (39 percent of capacity). Since the beginning of water year 2000, total Colorado Basin storage has experienced year to year increases and decreases in response to wet and dry hydrology, ranging from a high of 94 percent of capacity at the beginning of 2000 to the now current level of 33 percent of capacity at the beginning of water year 2023. Based on current inflow forecasts, the current projected end of water year 2023 total Colorado Basin reservoir storage is approximately 25.54 maf (44 percent of total system capacity). The actual end of water year 2023 system storage may vary from this projection, primarily due to uncertainty regarding this season's runoff and reservoir inflow.