

**November 24-Month Study**  
**Date: November 15, 2021**

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

**Current Reservoir Status**

|               | October<br>Inflow<br>(unregulated)<br>(acre-feet) | Percent<br>of Average<br>(%) | November 15,<br>Midnight<br>Elevation<br>(feet) | November 15,<br>Midnight<br>Reservoir<br>Storage<br>(acre-feet) |
|---------------|---|------------------------------|---|---|
| Fontenelle    | 37,000  | 82                           | 6,491.98  | 231,487   |
| Flaming Gorge | 48,700  | 91                           | 6,018.07  | 2,912,015   |
| Blue Mesa     | 26,600  | 73                           | 7,430.63  | 213,795   |
| Navajo        | 21,800  | 57                           | 6,021.91  | 883,421   |
| Powell        | 316,700   | 70                           | 3,543.34  | 7,118,100   |

**Expected Operations**

The operation of Lake Powell and Lake Mead in this November 2021 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 2021 Annual Operating Plan (AOP) and draft 2022 AOP. Pursuant to the Interim Guidelines, the August 2021 24-Month Study projections of the January 1, 2022, system storage and reservoir water surface elevations set the operational tier for the coordinated operation of Lake Powell and Lake Mead during 2022.

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 2021. In addition, Section III.B of Exhibit 1 to the Lower Basin Drought Contingency Plan (DCP) Agreement is also governing the operation of Lake Mead in calendar year 2021.

The August 2021 24-Month study projected the January 1, 2022, Lake Powell elevation to be less than 3,575 feet and at or above 3,525 feet and the Lake Mead elevation to be at or above 1,025 feet. Consistent with Section 6.C.1 of the Interim Guidelines the operational tier for Lake Powell in water year 2022 will be the Mid-Elevation Release Tier and the water year release volume from Lake Powell will be 7.48 maf.

The August 2021 24-Month Study projected the January 1, 2022 Lake Mead elevation to be at or below 1,075 feet and at or above 1,050 feet. Consistent with Section 2.D.1 of the Interim Guidelines, a Shortage Condition consistent with Section 2.D.1.a will govern the operation of

Lake Mead for calendar year 2022. 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 2022.

Consistent with the Upper Basin Drought Response Operations Agreement (DROA) provisions to protect a target elevation at Lake Powell of 3,525 feet, this November 2021 24-Month Study includes releases from the upstream initial units of the Colorado River Storage Project Act to deliver an additional 181 thousand acre-feet (kaf) to Lake Powell by the end of December 2021. The additional releases began in July and will continue to be implemented through December 2021. The table below contains the observed DROA releases and additional planned releases:

**DROA Releases for the November 24MS Model Run**

|               | Jul   | Aug   | Sep   | Oct   | Nov   | Dec   |     |
|---------------|-------|-------|-------|-------|-------|-------|-----|
|               | (kaf) | (kaf) | (kaf) | (kaf) | (kaf) | (kaf) | Sum |
| Flaming Gorge | 12    | 45    | 44    | 24    | 0     | 0     | 125 |
| Blue Mesa     | 0     | 17    | 16    | 3     | 0     | 0     | 36  |
| Navajo        | 0     | 0     | 0     | 0     | 0     | 20    | 20  |
| Sum:          | 12    | 62    | 60    | 27    | 0     | 20    | 181 |

The releases detailed above are in addition to the already established releases determined by operational plans for each of the identified facilities. The additional delivery of 181 kaf is equivalent to Lake Powell’s elevation of approximately three feet. Water year 2021 releases from Lake Powell to Lake Mead were not adjusted as those are determined consistent with the Interim Guidelines.

The 2021 AOP is available online at:

<https://www.usbr.gov/lc/region/g4000/aop/AOP21.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 Upper Basin Hydrology Summary is available online at:

[https://www.usbr.gov/uc/water/crsp/studies/24Month\\_08\\_ucb.pdf](https://www.usbr.gov/uc/water/crsp/studies/24Month_08_ucb.pdf).

***Fontenelle Reservoir*** – As of November 3, 2021, the Fontenelle Reservoir pool elevation is 6491.75 feet, which amounts to 69 percent of live storage capacity. Inflows for the month of October totaled 37,000 acre-feet (af) or 82 percent of average.

Fontenelle’s releases will remain at 600 cfs until the winter release is set in mid-November. The winter release will be maintained until March or April when the ice along the Green River begins to melt.

The November final forecast for unregulated inflows into Fontenelle for the next three months projects below average conditions. November, December, and January inflow volumes amount to 35,000 af (84 percent of average), 27,000 af (84 percent of average), and 23,000 af (76 percent of average), respectively.

The August 26, 2021, 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 next Fontenelle Working Group meeting is scheduled for April 21, 2021 at 10:00 am. Details on the meeting will be provided as we get closer to the meeting date. 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 November 10, 2021, Flaming Gorge Reservoir pool elevation is 6018.17 feet, which amounts to 78 percent of live storage capacity. The planned average daily release at Flaming Gorge for November is planned to be 850 cfs. Unregulated inflow volume for the month of October is approximately 49,000 acre-feet (af), which is 90% of the average October unregulated inflow volume.

The November final forecast for unregulated inflows into Flaming Gorge for the next three months projects below average conditions. November, December, and January forecasted unregulated inflow volumes amount to 43,000 af (87% of average), 27,000 af (82% of average), and 29,000 af (72% of average), respectively.

Pursuant to provisions of the Drought Response Operations Agreement (DROA), releases from Flaming Gorge have been achieved to deliver an additional 125,000 af to Lake Powell by the end of October 2021. This decision was made in response to basin-wide drought and storage concerns at Lake Powell. The Flaming Gorge Operation Plan is currently being amended and releases will be made within the flexibility of the 2006 Flaming Gorge Record of Decision and within the provisions of the DROA. Reclamation and the Colorado Basin states remain committed to working together to develop future drought response plans.

Reclamation is planning to hold the next Flaming Gorge Working Group meeting on March 17, 2022 at 10:00 am MDT (tentative) via WebEx. 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 November 8, 2021 releases from Crystal Dam are approximately 350 cfs. Gunnison Tunnel diversions have terminated for the irrigation season. Flows of the Gunnison River in the Black Canyon are being maintained at about 340 cfs.

The unregulated inflow volume in October to Blue Mesa was 26,613 af (72 percent of average). Unregulated Inflow volumes forecasted for Blue Mesa for the next three months (November, December and January) are projected to be: 22,000 af (73 percent of average), 19,000 af (76

percent of average) and 17,000 af (71 percent of average), respectively. The October 24-Month Study is reflective of these new forecasts.

The 2022 water year unregulated inflow volume is projected to be 754,000 af (83 percent of average). The water supply period (April-July) for 2022 is projected to be 545,000 af of unregulated inflow (86 percent of average).

In August, September and part of October, releases were increased as a response to a continual declining dry hydrologic condition for the Colorado River system. This drought operation was implemented under the Upper Basin Drought Response Operations Agreement. The maximum flexibility within the Aspinall Record of Decision was utilized under this drought operation to release 36.11 kaf more than what would have been released under normal operations for the hydrology that occurred during the period. The intent of this operation was to support Lake Powell to maintain hydropower operations.

Under the Aspinall Record of Decision (2012), base flow minimum targets flows, measured in the Whitewater Reach of the Gunnison River, are established for 6 categories of hydrological conditions. The category for this year is the dry category. The baseflow minimum target flow for dry category years during the months of August through March is 750 cfs in the Whitewater Reach. Flows in the Whitewater Reach are approximately 1030 cfs.

Blue Mesa will not fill in water year 2021. Blue Mesa reached a peak elevation of 7,464.28 feet on June 22, 2021. The elevation reached a low elevation 7429.49 feet on November 1, 2021 with a storage level of 208,761 acre-feet (25% of full capacity). The elevation is now increasing.

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 in January, 2022. The meeting may be virtual or in person and a decision has not yet been made. 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 November 9<sup>th</sup>, the daily average release rate from Navajo Dam was 300 cfs while reservoir inflow was averaging approximately 260 cfs. The water surface elevation was 6022.06 feet above sea level. At this elevation the live storage is 0.884 maf (54 percent of live storage capacity) and the active storage is 0.258 maf (25 percent of active storage capacity). The Navajo Indian Irrigation Project (NIIP) is shut down for the season. The San Juan-Chama project is not currently diverting from the basin above the reservoir due to low flows.

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 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). Current modeling shows the release will most likely vary between 250 and 500 as we progress into winter.

Preliminary modified unregulated inflow (MUI) into Navajo in October was 21.8 kaf. The volume released downstream totaled 29.9 kaf, which was 86 percent of average for the month. NIIP diverted a total of 2.4 kaf in October.

The most probable MUI forecast for November, December, and January is 21 kaf (79 percent of average), 17 kaf (82 percent of average), and 17 kaf (85 percent of average), respectively.

In the second half of December of 2021, releases are scheduled to increase in response to a continual declining dry hydrologic condition for the Colorado River system. This drought operation is implemented under the Upper Basin Drought Response Operations Agreement. The maximum flexibility within the Record of Decision will be used. Notification of releases will occur prior to the scheduled release change.

Beginning October 1st of 2021 (the start of WY 2022), the area-capacity table for Navajo Reservoir was updated based on a 2019 Survey.

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 virtually on Tuesday, January 18<sup>th</sup> 2022, at 1:00 PM.

### **Glen Canyon Dam / Lake Powell**

#### **Current Status**

The unregulated inflow volume to Lake Powell during October was 317 thousand acre-feet (kaf) (70% of average)<sup>1</sup>. The release volume from Glen Canyon Dam in October was 481 kaf. The end of October elevation and storage of Lake Powell were 3,544.25 feet (156 feet from full pool) and 7.18 million acre-feet (maf) (30% of live capacity), respectively.

#### **Current Operations**

The operating tier for water year 2022 (October 2021 through September 2022) was established in August 2021 as the Mid-Elevation Release Tier consistent with Section 6.C.1 of the Interim Guidelines. The August 2021 24-Month study projected the January 1, 2022, Lake Powell elevation to be less than 3,575 feet and at or above 3,525 feet and the Lake Mead elevation to be at or above 1,025 feet. Consistent with Section 6.C.1 of the Interim Guidelines the operational

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<sup>1</sup> This November 2021 24-Month Study includes the Colorado Basin River Forecast Center shift to the 1991-2020 period of record. Values associated with water year 2021 continue to use the 1981-2010 period of record to calculate averages.

tier for Lake Powell in water year 2022 will be the Mid-Elevation Release Tier and the water year release volume from Lake Powell will be 7.48 maf.

The November anticipated release is 500,000 af with fluctuations between about 6,240 cfs to around 9,870 cfs with a three-hour evening weekend peak on Saturday of 10,240 cfs and a Sunday peak of 9,100 cfs, which is consistent with the Glen Canyon Dam, Record of Decision (dated December 2016). The December anticipated release is 600,000 af with fluctuations between about 6,949 cfs to around 12,349 cfs on weekdays and Saturdays, with a Sunday peak of 11,466 cfs. The January anticipated release is 600,000 af.

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 1,100 cfs above or below the hourly scheduled release rate. Under system normal 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 800 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 2022 unregulated inflow to Lake Powell, issued on November 1, 2021, by the Colorado Basin River Forecast Center, projects that the most probable (median) unregulated inflow volume this year will be 7.80 maf (81% of average).

In addition to the November 2021 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 November to determine a possible range of reservoir elevations under probable minimum and probable maximum inflow scenarios. Probable minimum and probable maximum model runs are conducted in January, April, August, and October. The probable minimum inflow scenario reflects a dry hydrologic condition which statistically would be exceeded 90% of the time. The most probable inflow scenario reflects a median hydrologic condition which statistically would be exceeded 50% of the time. The probable maximum inflow scenario reflects a wet hydrologic condition which statistically would be exceeded 10% of the time. There is approximately an 80% 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.

The November forecast for water year 2022 ranges from a minimum probable of 5.00 maf (52% of average) to a maximum probable of 14.02 maf (146% of average) with the most probable forecast for water year 2022 of 7.80 maf (81% of average). There is a 10% chance that inflows could be higher than the current maximum probable forecast and a 10% chance that inflows could be lower than the minimum probable forecast.

Based on the current forecast of 7.80 maf unregulated inflow for water year 2022, the November 24-Month Study projects Lake Powell elevation will end water year 2022 near 3,540.91 feet with approximately 6.95 maf in storage (29% of capacity). Note that projections of elevation and storage for water year 2022 have significant uncertainty at this point in the season. Projections of end of water year 2022 elevation using the minimum and maximum probable inflow forecast results from the November 2021 model runs are 3,510.72 feet and 3,596.54 feet, respectively. Under these scenarios, there is a 10% chance that inflows will be higher, resulting in higher elevation, and 10% chance that inflows will be lower, resulting in lower elevation. The annual release volume from Lake Powell during water year 2022 will be 7.48 maf as determined under Section 6.C.1 of the Interim Guidelines.

### **Upper Colorado River Basin Hydrology**

Upper Colorado River Basin regularly experiences significant year to year hydrologic variability. During the 22-year period 2000 to 2021, however, the unregulated inflow to Lake Powell, which is a good measure of hydrologic conditions in the Colorado River Basin, was above average in only 5 out of the past 22 years. The period 2000-2021 is the lowest 22-year period since the closure of Glen Canyon Dam in 1963, with an average unregulated inflow of 8.46 maf, or 88% 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 2000-2021 period has ranged from a low of 2.64 maf (24% of average) in water year 2002 to a high of 15.97 maf (147% of average) in water year 2011. In water year 2021 unregulated inflow volume to Lake Powell was 3.50 maf (32% of average), the second driest year on record above 2002. Under the current most probable forecast, the total water year 2022 unregulated inflow to Lake Powell is projected to be 7.80 maf (81% of average).

At the beginning of water year 2022, total system storage in the Colorado River Basin was 22.80 maf (38% of 59.60 maf total system capacity). This is a decrease of 5.97 maf over the total storage at the beginning of water year 2021 when total system storage was 28.77 maf (48% 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% of capacity at the beginning of 2000 to the now current level of 38% of capacity at the beginning of water year 2022. Based on current inflow forecasts, the current projected end of water year total Colorado Basin reservoir storage for water year 2022 is approximately 21.86 maf (37% of total system capacity). The actual end of water year 2022 system storage may vary

from this projection, primarily due to uncertainty regarding this season's runoff and reservoir inflow.