

May 24-Month Study
Date: May 14, 2021

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

Current Reservoir Status

Reservoir	April Inflow (unregulated) (acre-feet)	Percent of Average (%)	May 12, Midnight Elevation (feet)	May 12, Midnight Reservoir Storage (acre-feet)
Fontenelle	54,000	63	6,473.18	126,000
Flaming Gorge	71,700	54	6,025.55	3,181,000
Blue Mesa	47,400	61	7,456.86	348,300
Navajo	81,400	48	6,035.04	1,060,000
Powell	288,900	27	3,560.98	8,397,700

Expected Operations

The operation of Lake Powell and Lake Mead in this May 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). Pursuant to the Interim Guidelines, the August 2020 24-Month Study projections of the January 1, 2021, system storage and reservoir water surface elevations set the operational tier for the coordinated operation of Lake Powell and Lake Mead during 2021.

The August 2020 24-Month Study projected the January 1, 2021, Lake Powell elevation to be below the 2021 Equalization Elevation of 3,659 feet and above elevation 3,575 feet. Consistent with Section 6.B of the Interim Guidelines, Lake Powell is operating under the Upper Elevation Balancing Tier for water year 2021. With an 8.23 million acre-foot (maf) release from Lake Powell in water year 2021, the April 2021 24-Month Study projected the end of water year elevation at Lake Powell to be below 3,575 feet. Therefore, in accordance with Section 6.B.1 of the Interim Guidelines, Lake Powell will continue to release 8.23 maf through the remainder of the water year 2021.

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 2021 AOP is available for download at:

<https://www.usbr.gov/lc/region/g4000/aop/AOP21.pdf>.

The Interim Guidelines are available for download at:

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

The Colorado River DCPs are available for download at:

<https://www.usbr.gov/lc/region/programs/dcp.html>.

Fontenelle Reservoir -- As of May 5, 2021, the Fontenelle Reservoir pool elevation is 6473.17 feet, which amounts to 38 percent of live storage capacity. Inflows for the month of April totaled 54,000 acre-feet (af) or 63 percent of average.

Fontenelle's releases are currently set at 825 cfs. Due to the dry hydrologic conditions and current forecast this release is scheduled to be maintained through at least mid-summer.

The May final forecast for unregulated inflows into Fontenelle for the next three months projects dry conditions. May, June, and July inflow volumes amount to 80,000 af (49 percent of average), 160,000 af (53 percent of average), and 86,000 af (48 percent of average), respectively.

The 2021 water year unregulated inflow volume is forecasted to be 630,000 af (58 percent of average) based on the May forecast.

The April 22, 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 10:00 am on August 26, 2021. Due to the ongoing COVID pandemic this meeting will be held virtually via WebEX. 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 5, 2021 Flaming Gorge Reservoir pool elevation is 6025.53 feet, which amounts to 85 percent of live storage capacity. Unregulated inflows for the month of April is approximately 72,000 acre-feet (af), which is 54% of the average April unregulated inflow volume.

The May final forecast for unregulated inflows into Flaming Gorge for the next three months projects below average conditions. May, June, and July forecasted unregulated inflow volumes amount to 102,000 af (42% of average), 185,000 af (47% of average), and 91,000 af (43% of average), respectively.

The May water supply forecast of the April through July unregulated inflow volume into Flaming Gorge Reservoir is 450,000 acre-feet (46% of average).

The Flaming Gorge Operation Plan from May 2021 through April 2022 has been signed. As of May 6, 2021, average daily releases will likely remain at 860 cfs through the end of May, or until the 2000 Flow and Temperature Recommendation spring release. This release will be timed with the Yampa River spring peak. The current goal, a dry hydrologic condition, is to achieve

8,300 cfs at Reach 2 for at least 2 days. This will be achieved by using full power plant releases, 4,600 cfs. This is estimated to occur mid-May to late May and could be extended to early June.

As part of the adaptive management process, new this year is the smallmouth bass flow spike experiment that could occur mid-June to early July. The purpose of this flow spike is to reduce reproductive success of the smallmouth bass. This spike flow will include a one day ramp up to full power plant capacity releases, 4,600 cfs, and this will be sustained for 3 days. Down ramping will be at a maximum of 2000 cfs per day.

Reclamation is planning to hold the next Flaming Gorge Working Group meeting on August 12, 2021 at 10:00 am MDT 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 May 11, 2021 releases from Crystal Dam are approximately 1700 cfs. Gunnison Tunnel diversions have begun for the irrigation season and are currently about 1040 cfs and is near full capacity. Flows of the Gunnison River in the Black Canyon are being maintained at about 700 cfs.

Based on the May forecast for the April through July volume of unregulated inflow to Blue Mesa, which is now 340,000 acre-feet (50 percent of average), the Aspinall Record of Decision (Aspinall ROD) calls for a spring peak flow in the Whitewater reach of the Gunnison River that is in the Dry hydrologic category. Under this category peak flows in the Whitewater reach are to greater than 900 cfs for a single day. As of May 11th, flows in the Whitewater reach are 1,364 cfs so no special operation at Aspinall will be required this year to meet Aspinall ROD spring peak flow conditions.

The Black Canyon Reserved Water Right, given the current forecast condition, calls for a single day peak flow in the Black Canyon of 973 cfs. To achieve this target, releases from Crystal are to be increased from 1700 cfs to 2,050 cfs on Saturday, May 15, 2021. After this peak release from Crystal, releases will be gradually reduced to about 1,500 cfs by May 18, 2021. Flows in the Black Canyon will be maintained near 500 cfs for the foreseeable future.

The unregulated inflow volume in April to Blue Mesa was 47,355 af (62 percent of average). Unregulated Inflow volumes forecasted for Blue Mesa for the next three months (and May, June, and July) are projected to be: 114,000 af (52 percent of average), 130,000 af (50 percent of average) and 49,000 af (42 percent of average), respectively. The May 24-Month Study is reflective of these new forecasts.

The 2021 water year unregulated inflow volume is projected to be 539,620 af (57 percent of average). The water supply period (April-July) for 2021 is forecasted to have 340,000 af of unregulated inflow (50 percent of average). At this point in the year there is a great deal of uncertainty for how the year will ultimately turn out. Current forecasting projects at a

probability of 80 percent that the water year unregulated inflow volume to Blue Mesa will be in the range from 433,000 acre-feet to 687,000 acre-feet.

Blue Mesa is not projected to fill in 2021 under the most probable inflow scenario. Blue Mesa is projected to be at a peak elevation of approximately 7,471 feet by late July, 2021. This will be down approximately 48 feet from the full pool elevation (7,519.4 feet) and water storage in Blue Mesa at this time will be approximately 438,000 acre-feet which is 53 percent of live 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 on August 19, 2021 at 1:00 pm MDT. It is not yet decided if this will be an in person meeting or virtual. Contact Erik Knight in the Grand Junction Area Office at (970) 248-0629 to get the web address for the virtual Operations Group meeting or for additional information.

Navajo Reservoir – On May 6th, the daily average release rate from Navajo Dam was 500 cfs while reservoir inflow was averaging approximately 1,580 cfs. The water surface elevation was 6034.3 feet above sea level. At this elevation the live storage is 1.052 maf (62 percent of live storage capacity) and the active storage is 0.391 maf (38 percent of active storage capacity). NIIP is diverting 530 cfs. The San Juan-Chama project is currently diverting 320 cfs from the basin above the reservoir. The river flow measured at the Animas River at Farmington USGS gage was at 280 cfs. River flow at the San Juan River at Four Corners USGS gage was 670 cfs.

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 350 and 600 cfs to accomplish this for the remainder of spring. The current calculated weekly baseflow average is 726, which is within the recommended range.

Navajo was at 6033.5 ft of pool elevation and 1,044,597 acre-ft of storage by the end of April, which was 78 percent of average for the end of the month. The release averaged 530 cfs (as measured at the USGS San Juan at Archuleta gage) and totaled 31 kaf, which was 46 percent of average for the month. Preliminary modified unregulated inflow (MUI) into Navajo was 81kaf, which was 51 percent of average for the month. Calculated evaporation for the month was 2 kaf. Navajo had a net storage gain of 2.3 kaf in April.

The most probable MUI forecast for May, June, and July is 145 kaf (52 percent of average), 75 kaf (34 percent of average), and 24 kaf (36 percent of average), respectively.

The April-July runoff forecasts are as follows:

Min Probable: 265 kaf (36 percent of average, a decrease of 5 kaf since the last forecast)

Most Probable: 325 kaf (44 percent of average, a decrease of 45 kaf since the last forecast)

Max Probable: 410 kaf (56 percent of average, a decrease of 140 kaf since the last forecast)

Based on the current storage levels and inflow forecast, there is no planned spring peak release this year.

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, August 24th, at 1:00 PM.

Glen Canyon Dam / Lake Powell

Current Status

The unregulated inflow volume to Lake Powell during April was 289 thousand acre-feet (kaf) (27% of average). The release volume from Glen Canyon Dam in April was 628 kaf. The end of April elevation and storage of Lake Powell were 3562.37 feet (138 feet from full pool) and 8.5 million acre-feet (maf) (35% of live capacity), respectively.

Water year 2021 observed unregulated inflows from October 2020 through April 2021 are 300 kaf less than the observed unregulated inflows at this point in water year 2002, the driest year on record.

Current Operations

The operating tier for water year 2021 (September 2020 through October 2021) was established in August 2020 as the Upper Elevation Balancing Tier, consistent with Section 6.B of the Interim Guidelines. Consistent with Section 6.B of the Interim Guidelines, Lake Powell's operations in water year 2021 will be governed by the Upper Elevation Balancing Tier. With an 8.23 maf release from Lake Powell in water year 2021, the April 2021 24-Month Study projects the end of water year elevation at Lake Powell to be below 3,575 feet. Therefore, in accordance with Section 6.B.1 of the Interim Guidelines, Lake Powell will continue to release 8.23 maf through the remainder of the water year 2021.

In May the release volume will be approximately 628 kaf, with fluctuations anticipated between about 7,300 cubic feet per second (cfs) in the nighttime to about 12,953 cfs in the daytime, and consistent with the Glen Canyon Dam, Record of Decision (dated December 2016). Beginning May 28, 2021, at 6:00 pm releases shall be decreased to a steady 8,000 cfs and remain at that level through the end of May 30, 2021, for the scheduled GCMRC overflight. The anticipated release volume for June 2021 is 651,000 af with the GCMRC overflight steady releases of 8,000 cfs continuing through June 4, 2021, barring weather issues with data collection.

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 2021 unregulated inflow to Lake Powell, issued on April 2, 2021, by the Colorado Basin River Forecast Center, projects that the most probable (median) unregulated inflow volume this year will be 3.64 maf (34% of average).

There is significant uncertainty regarding next season's snowpack development and resulting runoff into Lake Powell. Reclamation updates the minimum and maximum probable forecasts four times a year: January, April, August, and October. Under the January minimum probable 24-Month Study, the forecast projected Lake Powell's water surface elevation to fall below 3,525 feet in 2022. This model result initiated enhanced monitoring and coordination under the Agreement for Drought Response Operations at the Initial Units of the Colorado River Storage Project Act (Drought Response Operations Agreement "DROA"). This model result does not initiate operational changes to Reclamation facilities. Modeling results in February through May 24-Month Studies minimum probable Lake Powell elevation projections continue to fall below the target elevation of 3,525 feet in 2022.

The Upper Division States and the Upper Colorado River Commission (UCRC) enhanced monitoring and coordination involves a monthly meeting communicating monthly model results from the minimum, most, and maximum projected operations. Please note that 90% of the suite of results are expected to be above the minimum probable projections and there is currently a 10% expectation to be below elevation 3525 feet under the minimum probable scenario.

The minimum probable 24-Month Study will continue showing operations under the Lower Elevation Balancing Tier (LEBT) that is pursuant to the 2007 Record of Decision on the Colorado River Interim Guidelines for Lower Basin Shortages and the Coordinated Operations of Lake Powell and Lake Mead (Interim Guidelines).

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 May forecast for water year 2021 ranges from a minimum probable of 3.33 maf (31% of average) to a maximum probable of 7.49 maf (69% 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 3.64 maf unregulated inflow, the May 24-Month Study projects Lake Powell elevation will end water year 2021 near 3,543.84 feet with approximately 7.15 maf in storage (29% of capacity). Note that projections of elevation and storage for water year 2021 have significant uncertainty at this point in the season. Projections of end of water year 2021 elevation and storage using the minimum and maximum probable inflow forecast from and results from the May DROA 2021 model runs are 3,537.63 feet (6.73 maf, 28% of capacity) and 3,558.85 feet (8.24 maf, 34% of capacity), respectively. Under these scenarios, there is a 10% chance that inflows will be higher, resulting in higher elevation and storage, and 10% chance that inflows will be lower, resulting in lower elevation and storage. The annual release volume from Lake Powell during water year 2021 will be 8.23 maf as determined under Section 6.B.1 of the Interim Guidelines.

Upper Colorado River Basin Hydrology

Upper Colorado River Basin regularly experiences significant year to year hydrologic variability. During the 21-year period 2000 to 2020, 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 4 out of the past 19 years. The period 2000-2020 is the lowest 21-year period since the closure of Glen Canyon Dam in 1963, with an average unregulated inflow of 8.62 maf, or 80% of the 30-year average (1981-2010). (For comparison, the 1981-2010 total water year average is 10.83 maf.) The unregulated inflow during the 2000-2020 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 2018 unregulated inflow volume to Lake Powell was 4.6 maf (43% of average), the third driest year on record above 2002 and 1977. Under the current most probable forecast, the total water year 2021 unregulated inflow to Lake Powell is projected to be 3.64 maf (34% of average).

At the beginning of water year 2021, total system storage in the Colorado River Basin was 28.88 maf (48% of 59.6 maf total system capacity). This is a decrease of 2.77 maf over the total storage at the beginning of water year 2020 when total system storage was 31.64 maf (53% 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 48% of capacity at the beginning of water year 2021. Based on current inflow forecasts, the current projected end of water year total Colorado Basin reservoir storage for water year 2021 is approximately 23.04 maf (39% of total system capacity). The actual end of water year 2021 system storage may vary from this projection, primarily due to uncertainty regarding this season's runoff and reservoir inflow.