

June 24-Month Study
Date: June 14, 2021

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

Current Reservoir Status

Reservoir	May Inflow (unregulated) (acre-feet)	Percent of Average (%)	June 13, Midnight Elevation (feet)	June 13, Midnight Reservoir Storage (acre-feet)
Fontenelle	76,000	47	6,489.80	217,000
Flaming Gorge	95,900	39	6,024.63	3,146,600
Blue Mesa	89,600	41	7,463.47	388,800
Navajo	169,200	61	6,041.47	1,128,800
Powell	542,900	23	3,561.76	8,457,500

Expected Operations

The operation of Lake Powell and Lake Mead in this June 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 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_06_ucb.pdf.

Fontenelle Reservoir -- As of June 7, 2021, the Fontenelle Reservoir pool elevation is 6483.38 feet, which amounts to 53 percent of live storage capacity. Inflows for the month of May totaled 76,000 acre-feet (af) or 47 percent of average.

Due to dry hydrologic conditions in the Upper Green River Basin, Fontenelle's releases were lowered from 825 cfs to 700 cfs on May 24, 2021. Based on the latest observed inflows and June forecast for the period between April and July, this year's inflows into Fontenelle Dam are projected to be the 7th driest since 1966.

The June final forecast for unregulated inflows into Fontenelle for the next three months projects dry conditions. June, July, and August inflow volumes amount to 150,000 af (50 percent of average), 65,000 af (37 percent of average), and 35,000 af (46 percent of average), respectively.

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 June 11, 2021, Flaming Gorge Reservoir pool elevation is 6024.67 feet, which amounts to 84 percent of live storage capacity. Unregulated inflows for the month of May are approximately 96,000 acre-feet (af), which is 40% of the average May unregulated inflow volume.

The June final forecast for unregulated inflows into Flaming Gorge for the next three months projects below average conditions. June, July and August forecasted unregulated inflow volumes amount to 160,000 af (41% of average), 67,000 af (32% of average), and 37,000 af (42% of average), respectively.

The June water supply forecast of the April through July unregulated inflow volume into Flaming Gorge Reservoir is 395,000 acre-feet (40% of average).

As part of the adaptive management process, the smallmouth bass flow spike experiment is anticipated to begin on June 21. This experiment is being conducted for the first this year. Full power plant releases (4,600 cfs) are expected to begin at 4 p.m. (MDT) and this will be sustained

for 72 hours. Once the experiment is completed, release will begin ramping down at a maximum of 2000 cfs per day. Releases are anticipated to be 860 cfs on June 26.

The following paragraph provides further details on the experimental smallmouth bass flow spike. In addition to increasing flow in the river, water temperatures will also decrease, which are conditions that have been shown to reduce the survival rate of smallmouth bass eggs and fry by sweeping them off the spawning nests and disrupting parental habits of adults. Smallmouth bass larvae and fry (the target of the Flow Spike Experiment) typically emerge from eggs in greatest abundance about 10-14 days following onset of spawning activity. We believe spawning activity has begun or will begin very soon (early to mid-June), as river temperatures have increased beyond 16 degrees C (about 61 degree F). We plan to schedule the experiment to happen during the week to avoid weekend recreational levels. As this week approaches, we will send out additional information including a hydrograph outlining the proposed timing and release schedule.

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 June 8, 2021 releases from Crystal Dam are approximately 1520 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 485 cfs.

The June forecast for the April through July volume of unregulated inflow to Blue Mesa has been issued and is now 310,000 acre-feet (46 percent of average). Under the Aspinall Record of Decision (Aspinall ROD), in combination with the Black Canyon Reserved Water Right Decree (BC Reserved Water Right), a spring peak release from Crystal Dam was made on May 15th and May 16th resulting in a mean flow for 24 hours in the Black Canyon of 1,023 cfs. This was slightly above what is required under the BC Reserved Water Right which, for this year computed to a target flow of 973 cfs. Flows in the Whitewater Reach were required to reach only 900 cfs under the Aspinall ROD this year based on the dry conditions that are occurring. Flows in this reach have been well above 900 cfs for most of the spring so far.

The unregulated inflow volume in May to Blue Mesa was 90,000 af (41 percent of average). Unregulated Inflow volumes forecasted for Blue Mesa for the next three months (June, July and August) are projected to be: 125,000 af (48 percent of average), 47,000 af (40 percent of average) and 33,000 af (87 percent of average), respectively. The June 24-Month Study is reflective of these new forecasts.

The 2021 water year unregulated inflow volume is projected to be 506,478 af (53 percent of average). The water supply period (April-July) for 2021 is forecasted to have 310,000 af of

unregulated inflow (46 percent of average). 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 250,000 acre-feet to 370,000 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 7,459 feet by late July, 2021. This will be down approximately 60 feet from the full pool elevation (7,519.4 feet) and water storage in Blue Mesa at this time will be approximately 361,000 acre-feet which is 44 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 June 7th, the daily average release rate from Navajo Dam was 300 cfs while reservoir inflow was averaging approximately 2,266 cfs. The water surface elevation was 6040.83 feet above sea level. At this elevation the live storage is 1.122 maf (66 percent of live storage capacity) and the active storage is 0.460 maf (44 percent of active storage capacity). The Navajo Indian Irrigation Project (NIIP) is diverting 567 cfs. The San Juan-Chama project is diverting 584 cfs from the basin above the reservoir. The river flow measured at the Animas River at Farmington USGS gage was at 2,380 cfs. River flow at the San Juan River at Four Corners USGS gage was 2,640 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 300 and 600 cfs to accomplish this for the remainder of spring.

Navajo was at 6039.3 ft of pool elevation and 1,104,936 acre-ft of storage by the end of May, which was 79 percent of average for the end of the month. The release averaged 440 cfs (as measured at the USGS San Juan at Archuleta gage) and totaled 27 kaf, which was 24 percent of average for the month. Preliminary modified unregulated inflow (MUI) into Navajo was 169 kaf, which was 66 percent of average for the month. Calculated evaporation for the month was 3 kaf. Navajo had a net storage gain of 60 kaf in May.

The most probable MUI forecast for June, July, and August is 75,000 af (34% of average), 10,000 af (15% of average), and 20,000 af (44% of average), respectively.

From April 1st through today, modified unregulated inflow to the reservoir has totaled 293.9 kaf.

The April-July runoff forecasts are as follows:

Min Probable: 300 kaf (41% of average, an increase of 30 kaf since the last forecast). Of this volume 98% has already been observed.

Most Probable: 335 kaf (45% of average, an increase of 25 kaf since the last forecast). Of this volume 88% has already been observed.

Max Probable: 380 kaf (52% of average, a decrease of 5 kaf since the last forecast). Of this volume 77% has already been observed.

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 May was 543 thousand acre-feet (kaf) (23% of average). The release volume from Glen Canyon Dam in April was 624 kaf. The end of May elevation and storage of Lake Powell were 3560.57 feet (139 feet from full pool) and 8.37 million acre-feet (maf) (34% of live capacity), respectively.

Water year 2021 observed unregulated inflows from October 2020 through June 13, 2021 are 215 kaf greater 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 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.

In June the release volume will be approximately 651 kaf, with fluctuations anticipated between about 7,359 cubic feet per second (cfs) in the nighttime to about 13,869 cfs in the daytime, and

consistent with the Glen Canyon Dam, Record of Decision (dated December 2016). The anticipated release volume for July 2021 is 766,000 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 2021 unregulated inflow to Lake Powell, issued on June 3, 2021, by the Colorado Basin River Forecast Center, projects that the most probable (median) unregulated inflow volume this year will be 3.37 maf (31% of average).

In addition to the June 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 June to determine a possible range of reservoir elevations under Probable Minimum and Probable Maximum inflow scenarios. Normally, outside of the DROA, Probable Minimum and Probable Maximum model runs are only 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 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 June forecast for water year 2021 ranges from a minimum probable of 2.83 maf (26% of average) to a maximum probable of 4.46 maf (41% 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 3.37 maf unregulated inflow, the June 24-Month Study projects Lake Powell elevation will end water year 2021 near 3,542.42 feet with approximately 7.06 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 June DROA 2021 model runs are 3,538.92 feet (6.82 maf, 28% of capacity) and 3,552.55 feet (7.77 maf, 32% 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 3.37 maf (31% 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 22.82 maf (38% 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.

