

Hydrology Report - September 2021

- **Upper Basin precipitation and Temperature**

Precipitation in the Upper Basin for August was 113% of average bringing the cumulative precipitation total to 82% of average for the year. Although July and August had above average precipitation, the soil moisture in the Upper Basin continues to be dry resulting in next year's forecasts for runoff to be reduced by about 2 million acre-feet. The majority of this year had above average temperatures which contributed to reducing the runoff from snowpack. Temperatures in August were slightly above average in the Upper Basin.

- **Upper Basin Snowpack**

Snowpack in the Upper Basin peaked at the end of March with 83% of the seasonal average. The typical runoff period for snow melt is from April through July. The majority of this year's snowpack melted by June. The snowpack this year, was reduced by below average precipitation, above average temperatures, and dry soil conditions which negatively impacted runoff. The Colorado River Basin Forecast Center estimates runoff from snowpack this year to be at only 33% of average.

- **Current reservoir status**

The lack of runoff this year is causing both major reservoirs to decrease in elevation. As of September 7, 2021, Lake Mead is at an elevation of 1,067.9 feet and has about 9 million acre-feet in storage (35% capacity). As of September 7, 2021, Lake Powell is at an elevation of 3,549.0 feet and has about 7.5 million acre-feet in storage (31% capacity). Since this time last year, Lake Mead has decreased about 16 feet and Lake Powell has decreased about 50 feet. Total system storage for the Upper and Lower Basin is around 24 million-acre-feet (39% capacity).

- **Reclamation's August Determination**

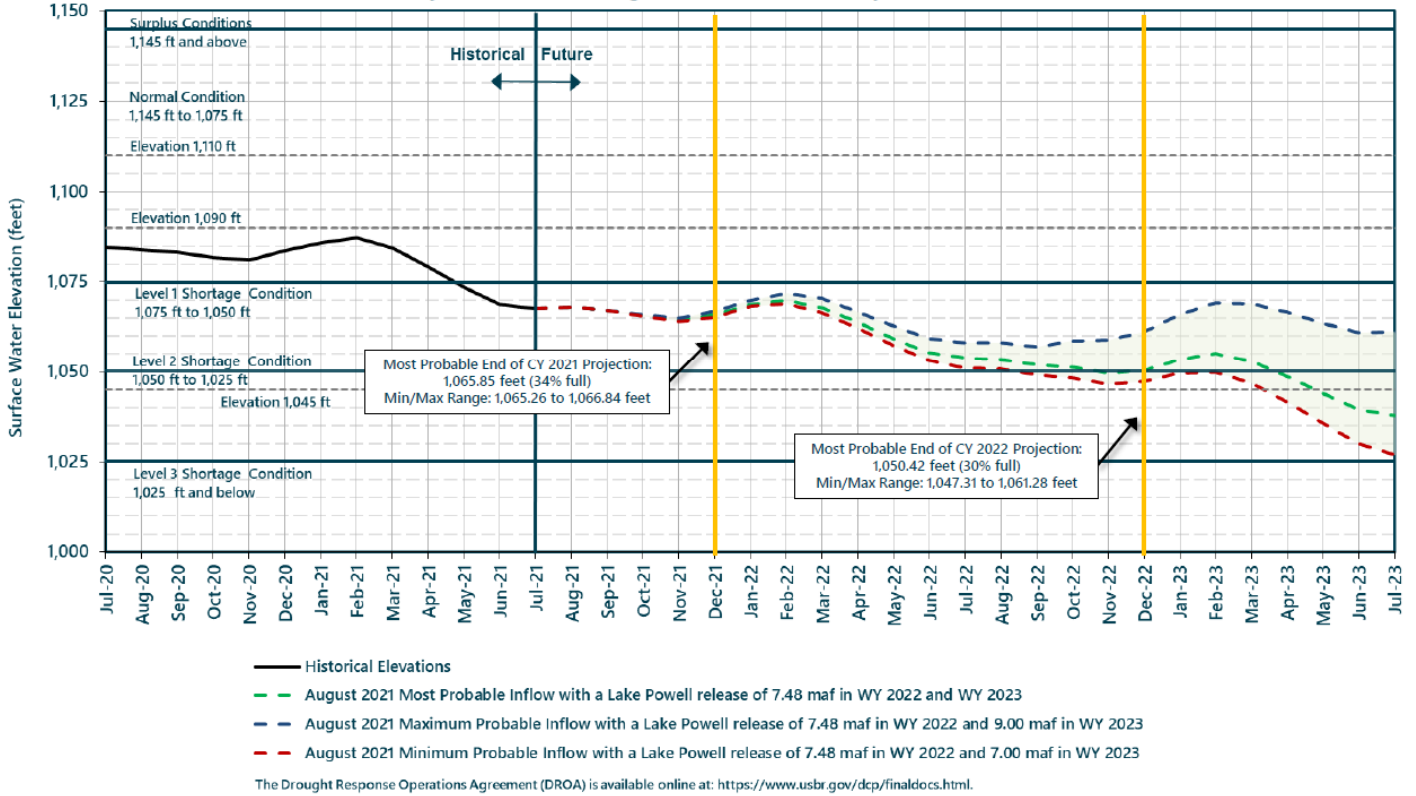
On August 16th, Reclamation released the August 24 Month Study, which is used to determine the upcoming years operations. Reclamation announced that in calendar year 2022, there will be a first ever Tier 1 shortage declared under the 2007 Guidelines and there also will be a required Drought Contingency Plan contribution for Nevada and Arizona. Accordingly, in 2022, Nevada will be required to reduce consumptive use by 13,000 acre-feet under the 2007 Interim Guidelines and have a Drought Contingency Plan contribution of 8,000 acre-feet. Arizona and Mexico are also required to take shortage and make a water savings contribution in 2022. Those amounts are significantly larger than Nevada's obligations. The total combined volumes for Arizona, Nevada, and Mexico are 613,000 acre-feet in calendar year 2022, which will save the equivalent of about 8 feet in elevation in Lake Mead.

- **Reclamation's Lake Mead Projection**

Reclamation uses computer models to forecast reservoir elevations based on planned water use and anticipated runoff. The most current model (August 24 month study) is forecasting Lake Mead to be at an elevation of 1,065.3 feet at the end of the year. This is about 2 feet decrease from the current elevation. Lake Mead elevation is forecasted to be at an elevation of 1,050.4 feet by the end of calendar year 2023.

Lake Mead End of Month Elevations

Projections from the August 2021 24-Month Study Inflow Scenarios



- **Water Use in Southern Nevada**

Southern Nevada’s consumptive use from January through July of 2021 was 148,337 acre-feet, which is very close to last year this time. In 2020, Southern Nevada consumed less Colorado River water than it is 300,000 acre-feet entitlement: specifically, 44,432 (15%) acre feet less. The Southern Nevada Water Authority stored the unused water in Lake Mead to help maintain water levels. This stored water is accessible to the Southern Nevada in the future if necessary. The Southern Nevada Water Authority aggressively reduced consumptive uses through turf removal and conservation programs allowing over 2.1 million acre-feet in total to be stored for future use.



Colorado River Commission of Nevada

Hydrology and Water Use Update

Warren Turkett

September 14, 2021





Summary

Lake Powell

- Water Year 2021¹ is one of the driest in recorded history.
- Unregulated inflow for water year 2021 is forecasted at 33% of average.
- Upper Basin cumulative precipitation is 82% of the seasonal average.

Lake Mead

- Lake Mead is forecasted to decrease about 2 feet in elevation by the end of calendar year 2021.
- Reclamation released the August 24 Month Study, which is used to determine the upcoming years operations. In calendar year 2022, there will be a federally declared shortage under the 2007 Guidelines for the Lower Basin.

Nevada Water Supply

- Southern Nevada has about 9 years of water supply banked. ²
- **In 2020, Southern Nevada used 44,432 af less than our annual allocation.**

Storage	Elevation (f)	% Capacity	Change since last year
Lake Mead	1,067.9	35%	-16.2 ft
Lake Powell	3,549.0	31%	-49.8 ft

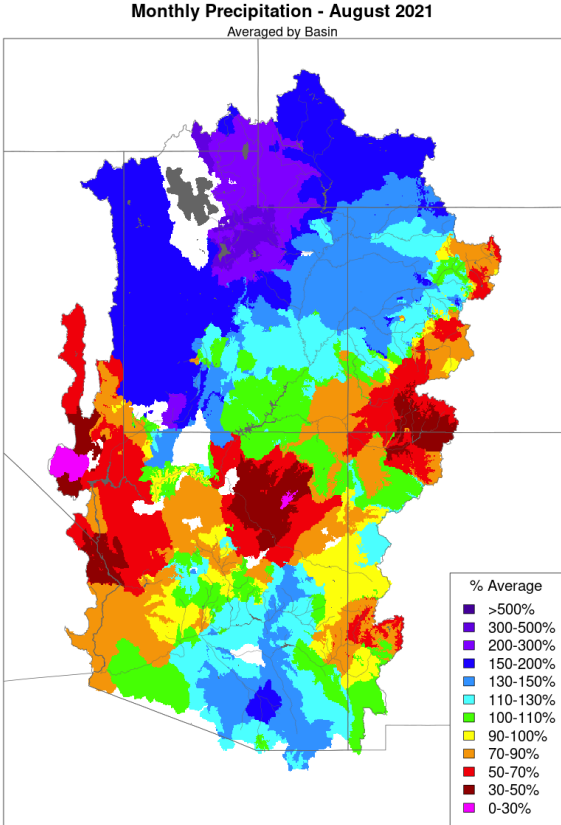
Data retrieved September 7, 2021.

¹ Water year is defined as October through September.

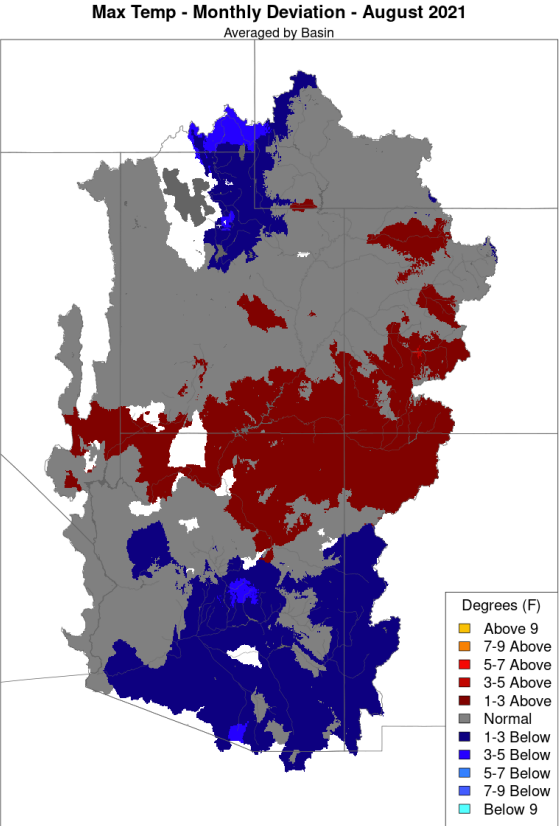
² Based on 2020 consumptive use and storage volumes through 2020.



Precipitation and Temperature



Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov



Prepared by NOAA, Colorado Basin River Forecast Center
Salt Lake City, Utah, www.cbrfc.noaa.gov

Above Lake Powell August precipitation: 113%
Above Lake Powell water year 2021 cumulative precipitation: 82%



Unregulated Inflow, Current and Projected Reservoir Status

Projected unregulated inflow to Lake Powell Acre-Feet % Average

Water Year 2021	3,560,000	33%
April thru July 2021	1,850,000	26%

Reservoir	Current Elevation	Current Storage Acre-Feet	Current % Capacity	Projected Elevation on 1/1/2022 ¹
Lake Mead	1,067.9	9,030,000	35%	1,065.9
Lake Powell	3,549.0	7,517,000	31%	3,535.4

Data retrieved September 7, 2021

¹ Based on Reclamation's August 2020 24 Month Study Most Probable Inflow.



August 24 Month Study

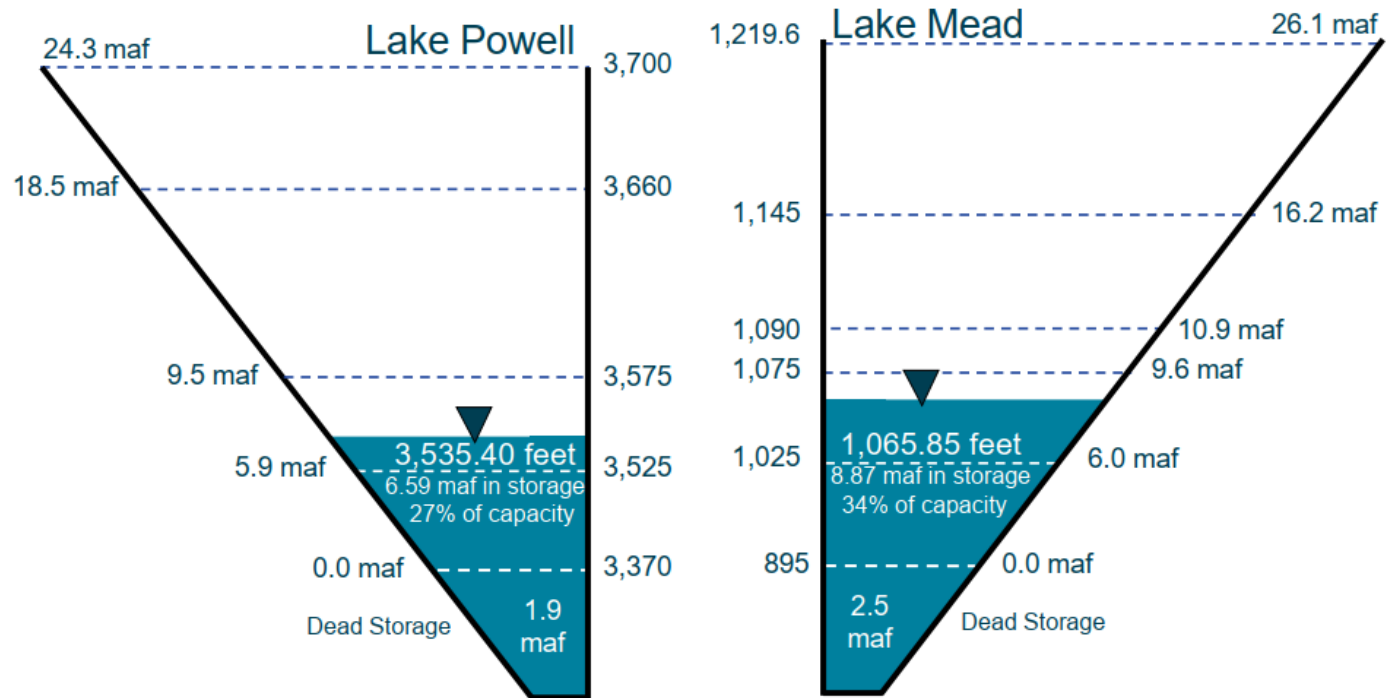
- Operations for the upcoming year are determined every year in August.
- Reclamation uses the August 24 Month Study to project the January 1 elevations in both reservoirs.
- The projected elevations set the operating tiers for each reservoir according to the 2007 Interim Guidelines.



End of Calendar Year 2021 Projections

August 2021 24-Month Study Most Probable Inflow Scenario¹

Based on a Lake Powell release of 8.23 maf in WY 2021 and 7.48 maf in WY 2022



Not to Scale

¹ WY 2021 unregulated inflow into Lake Powell is based on the CBRFC forecast dated 8/2/21.



Lake Powell & Lake Mead Operational Table

Lake Mead Operating Condition Determination for CY 2022¹

Lake Powell			Lake Mead		
Elevation (feet)	Operation According to the Interim Guidelines	Live Storage (maf) ¹	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	1,220	Flood Control Surplus or Quantified Surplus Condition Deliver > 7.5 maf	25.9
3,636 - 3,666 (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	15.5 - 19.3 (2008-2026)	1,200 (approx.) ²	Domestic Surplus or ICS Surplus Condition Deliver > 7.5 maf	22.9 (approx.) ²
3,575			1,145	Normal or ICS Surplus Condition Deliver ≥ 7.5 maf	15.9
	Mid-Elevation Release Tier Release 7.48 maf, if Lake Mead < 1,025 feet, release 8.23 maf	9.5	1,105		11.9
			1,075	Shortage Condition Deliver 7.167 ⁴ maf	9.4
	3,535.40 ft		1,050	1.065.85 ft Jan 1, 2022 Projection	7.5
3,525	Jan 1, 2022 Projection	5.9	1,025	Shortage Condition Deliver 7.083 ⁵ maf	5.8
3,490	Lower Elevation Balancing Tier Balance contents with a min/max release of 7.0 and 9.5 maf	4.0	1,000	Shortage Condition Deliver 7.0 ⁶ maf Further measures may be undertaken ⁷	4.3
3,370		0	895		0





2007 Interim Guidelines, Minute 323, Lower Basin Drought Contingency Plan, and Binational Water Scarcity Contingency Plan Total Volumes (kaf)

Lake Mead Elevation (feet msl)	2007 Interim Guidelines Shortages		Minute 323 Delivery Reductions	Total Combined Reductions	DCP Water Savings Contributions			Binational Water Scarcity Contingency Plan Savings	Combined Volumes by Country <i>US: (2007 Interim Guidelines Shortages + DCP Contributions)</i> <i>Mexico: (Minute 323 Delivery Reductions + Binational Water Scarcity Contingency Plan Savings)</i>					Total Combined Volumes
	AZ	NV	Mexico	Lower Basin States + Mexico	AZ	NV	CA	Mexico	AZ Total	NV Total	CA Total	Lower Basin States Total	Mexico Total	Lower Basin States + Mexico
1,090 - 1,075	0	0	0	0	192	8	0	41	192	8	0	200	41	241
1,075 - 1050	320	13	50	383	192	8	0	30	512	21	0	533	80	613
1,050 - 1,045	400	17	70	487	192	8	0	34	592	25	0	617	104	721
1,045 - 1,040	400	17	70	487	240	10	200	76	640	27	200	867	146	1,013
1,040 - 1,035	400	17	70	487	240	10	250	84	640	27	250	917	154	1,071
1,035 - 1,030	400	17	70	487	240	10	300	92	640	27	300	967	162	1,129
1,030 - 1,025	400	17	70	487	240	10	350	101	640	27	350	1,017	171	1,188
<1,025	480	20	125	625	240	10	350	150	720	30	350	1,100	275	1,375

→
2022 Reductions + Contributions

The Secretary of the Interior will take affirmative actions to implement programs designed to create or conserve 100,000 acre-ft per annum or more of Colorado River System water to contribute to conservation of water supplies in Lake Mead and other Colorado River reservoirs in the lower basin. All actions taken by the United States shall be subject to applicable law, including availability of appropriations.



Water Use In Southern Nevada

Southern Nevada Water Use	2020 Actual Use in Acre-Feet
Nevada Annual Allocation	300,000
Diversion	478,969
Return Flows	223,401
Consumptive Use	255,568
Unused Allocation Available for Banking	44,432 (15%)

Southern Nevada Water Use	Diversions	Return Flows	Consumptive Use
January - July 2021	283,635	135,298	148,337

Banked Water (through end of 2020)	Acre-Feet
Ground Water Recharge in So. Nevada	357,643
Banked in Lake Mead	865,741
Banked in California and Arizona	944,071
Total	2,167,455