Yellowtail Dam Water Supply and Projected Operations

BUREAU OF RECLAMATION

April 2021

Bighorn River Basin Map Source: DEMIS Mapserver

April Operating Range

Forecast	Minimum	Median	Maximum
Monthly Average Inflow (cfs)	2,480	2,855	3,825
Monthly Average River Release (cfs)	2,170	2,905	4,020
End of April Elevation (feet)	3621.9	3618.9	3619.2

April through July 2021 Inflow Forecast (kaf)

April through July Volume	939
Percent of Average	74

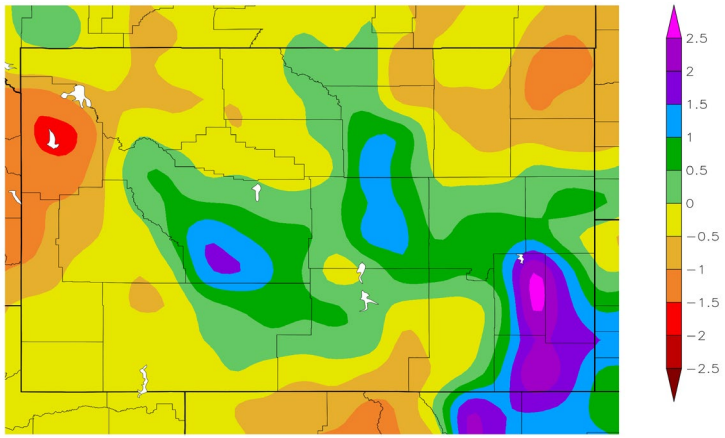
Water Year	Historic Inflow	Rank
2020	1,042	32
2019	1,678	12
2018	2,318	3
2017	2,953	1
30 Year Average	1,262	

Climate Departure from Normal

March 1 through March 31, 2021

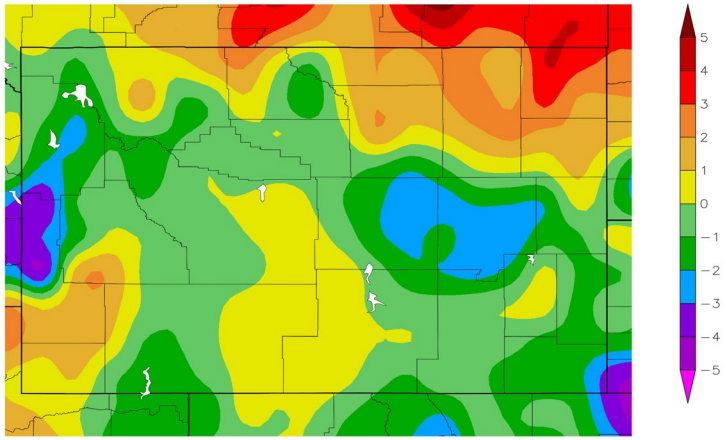
Precipitation

Departure from Normal (inches)



Temperature

Departure from Normal (°F)



HPRCC using provisional data from NOAA Regional Climate Centers

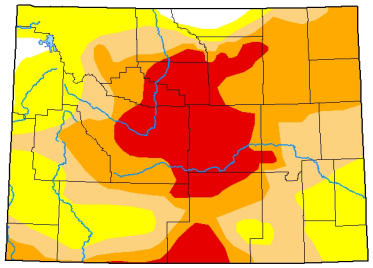
CLIMATE SUMMARY

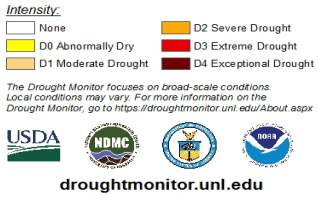
The Bighorn Basin above Yellowtail Dam saw a mix of climate conidtions during March. Some areas received much above average precipitation while other areas received below average precipitation. Likewise, some areas were warmer than average while other areas were cooler than average. A weather system on March 13 and 14 produced the greatest amount of precipitation for the month.

The climate outlook shows there is a 33 to 40 percent chance precipitation will be below average during April. There is a 40 to 50 percent chance temperatures will be above average.

Wyoming Drought Monitor Map

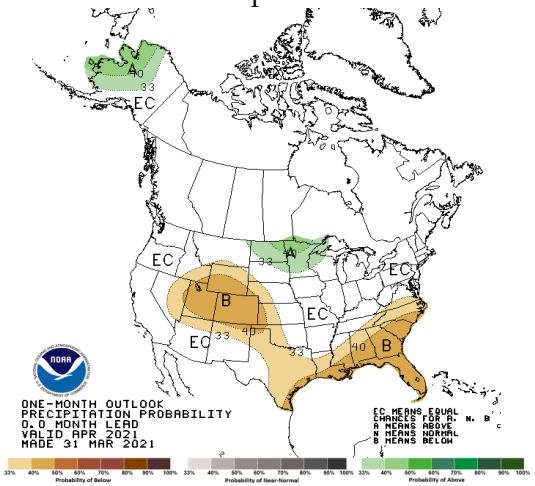
March 30, 2021



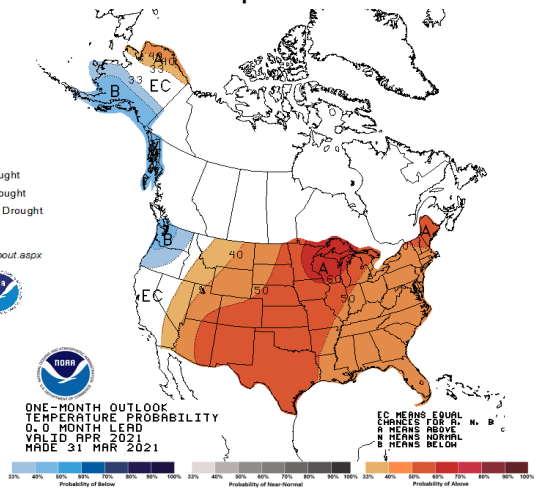


April Climate Outlook

Precipitation



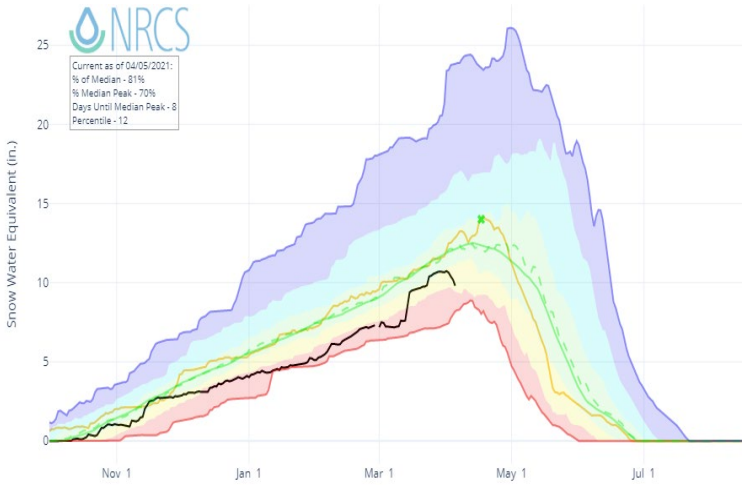
Temperature

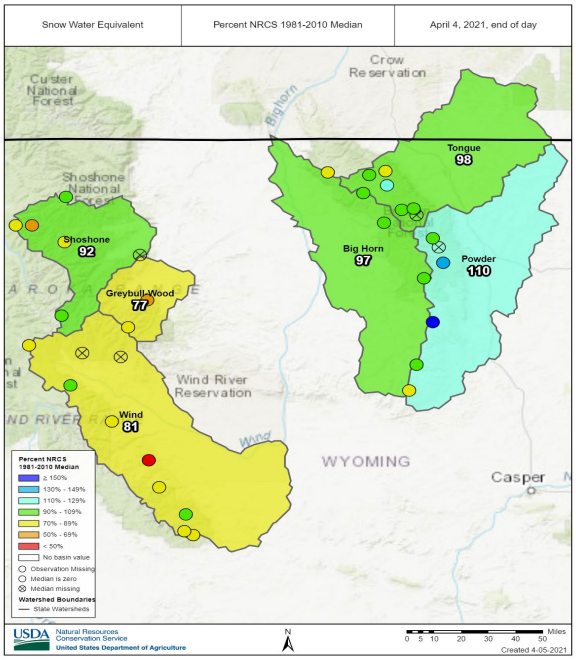


SNOWPACK SUMMARY

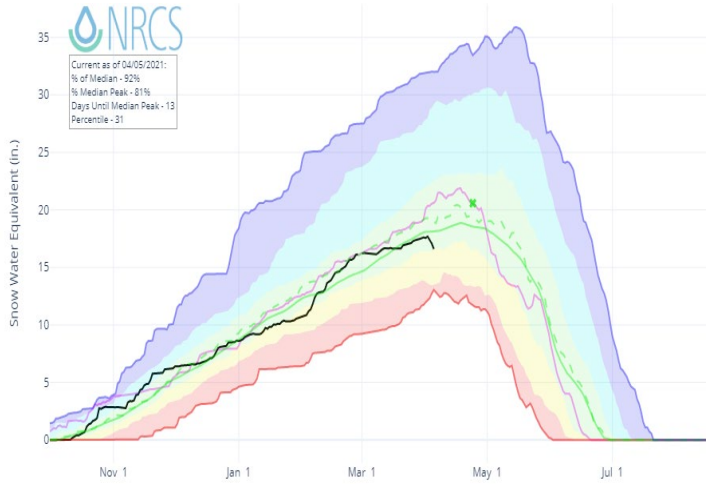
The snow water equivalent (SWE) graphs are a composite of SNOTEL sites within the Bighorn River Basin managed by the Natural Resources Conservation Service (NRCS).

Wind River

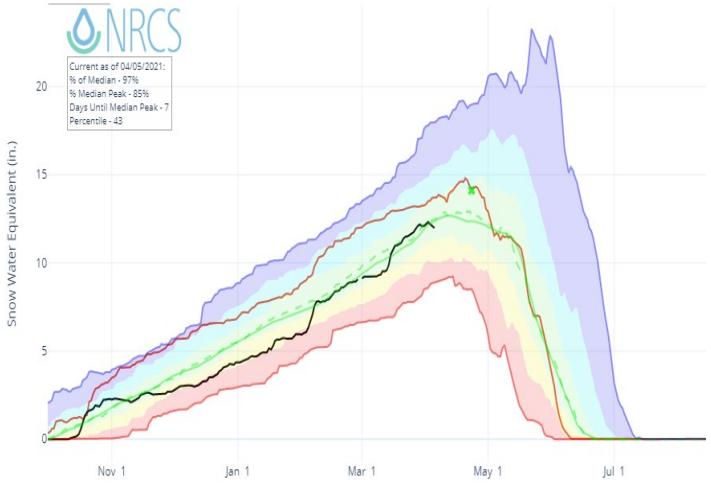


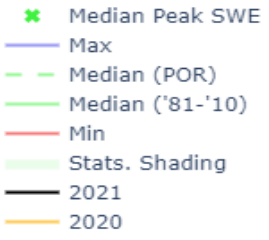


Shoshone River



Bighorn River





NRCS Montana Snow Survey Website: https://www.nrcs.usda.gov/wps/portal/nrcs/mt/snow/

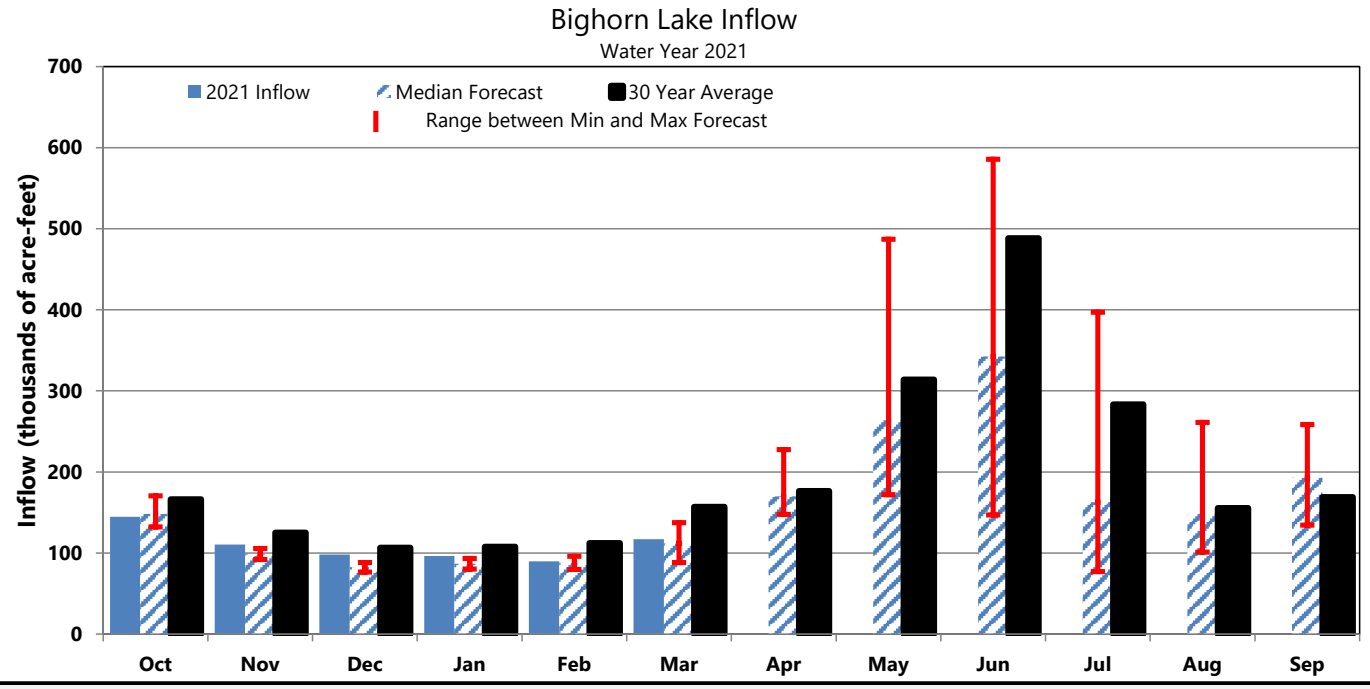
Statistical shading breaks at 10th, 30th,50th, 70th, and 90th Percentiles
Normal ('81-'10) – Official median calculated from 1981-2010 data
Normal (POR) – Unofficial mean calculated from Period of Record data

FORECAST SUMMARY

SNOTEL data, streamflow data and planned releases from Boysen and Buffalo Bill Reservoirs are used to compute an inflow forecast for Bighorn Lake.

March Forecast Review

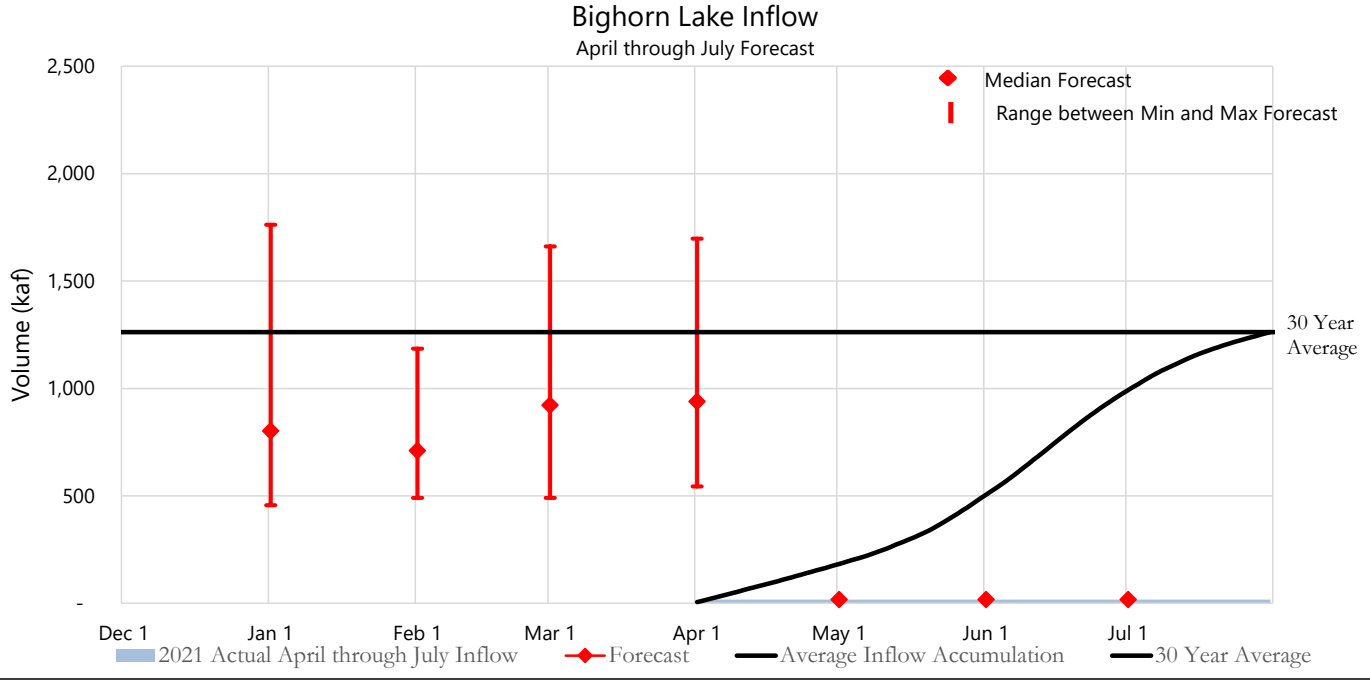
	Median Forecast (kaf)	Actual (kaf)	Difference (kaf)	Actual (% of Avg)
March Inflow	112.0	117.1	5.1	75



April through July Inflow Forecast for April 1

	Median Forecast (kaf)	% of Average	Minimum Forecast (kaf)	Maximum Forecast (kaf)
April through July Inflow	939	74	544	1,697

Historic Maximum (2017)	2,953 kaf	Historic Minimum (2004)	392 kaf	Average	1,262 kaf

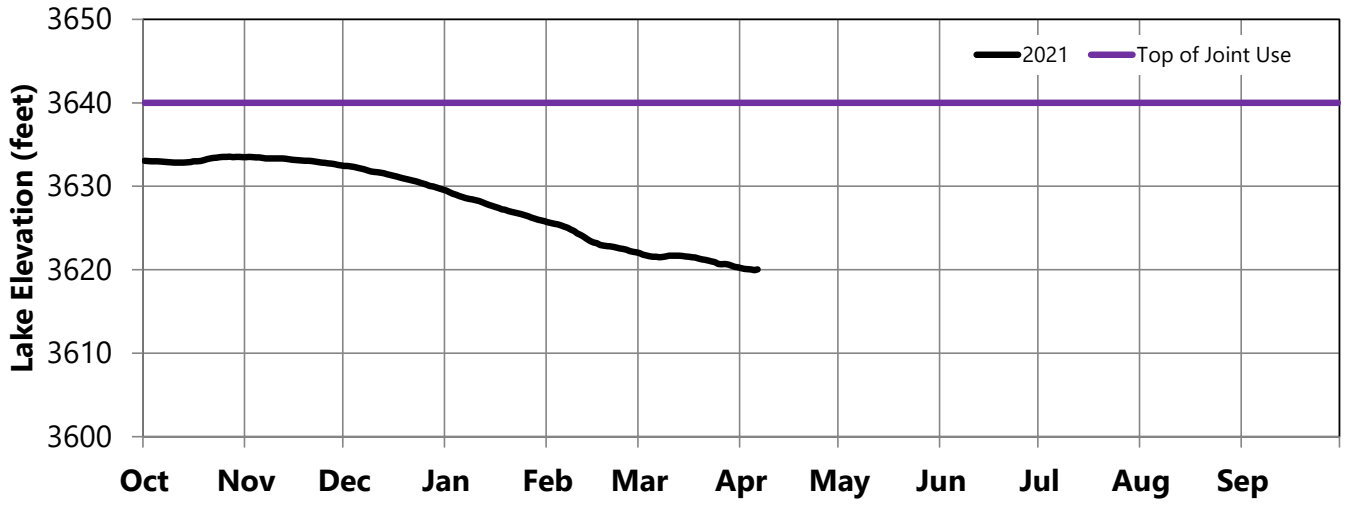


OPERATIONS REVIEW (October 1, 2020 through March 31, 2021)

River releases were maintained at 2,220 cfs during March based on inflows during March and the end of April storage target of 3616.2 feet. Inflows remained below releases for most of March allowing storage to be evacuated through the month. The elevation of Bighorn Lake decreased by 1.8 feet during March.

April 1 Storage Conditions

	Elevation feet	Storage acre-feet	Percent of Average	Percent Full
Bighorn Lake	3620.3	818,702	107	81
Buffalo Bill	5368.5	457,280	110	71
Boysen	4714.8	562,465	104	76

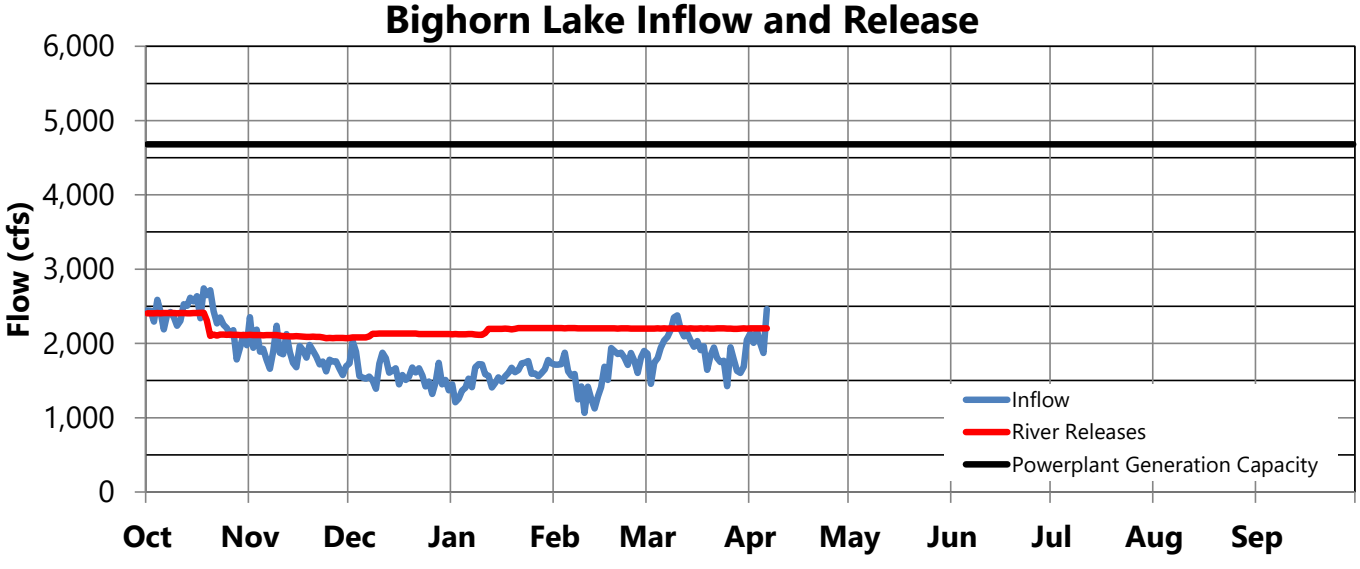


Average March Inflow

	Monthly Avg cfs	Percent of Average
Bighorn Lake	1,905	75
Buffalo Bill	320	91
Boysen	795	91

Average March Release

	Monthly Avg cfs	Percent of Average
Bighorn River	2,200	75
Buffalo Bill Total Release	225	52
Boysen Release	610	65



OPERATIONS OUTLOOK (April 1, 2021 through July 31, 2021)

River releases are increasing April 7 to 2,500 cfs. Additional changes to the river release are expected during the remainder of April. The current April 30 storage target is 3616.1 feet based on the April through July forecast of 939 kaf. Under median inflow conditions releases are expected to increase up to expected May releases of approximately 3,350 cfs. Matching expected May releases will result in April 30 storage being slightly higher than the rule curve target.

Median Inflow Conditions (April through July Inflow: 939 kaf)

	Apr	May	Jun	Jul
Boysen Release (cfs)	701	1,325	1,324	1,278
Buffalo Bill Release (cfs)	1,581	2,135	2,460	2,534
Tributary Gain (cfs)	573	831	1,973	-1,164
Monthly Inflow (cfs)	2,855	4,291	5,757	2,648
Monthly Inflow (kaf)	169.9	263.8	342.6	162.8
Monthly Release (kaf)	183.5	226.5	201.4	182.4
Afterbay Release (cfs)	3,084	3,684	3,385	2,966
River Release (cfs)	2,906	3,358	3,000	2,570
End-of-Month Content (kaf)	809.2	850.9	996.2	980.9
End-of-Month Elevation (feet)	3618.9	3624.7	3638.9	3637.7

Minimum Inflow Conditions (April through July Inflow: 544 kaf)

	Apr	May	Jun	Jul
Boysen Release (cfs)	701	1,099	1,250	1,251
Buffalo Bill Release (cfs)	1,581	1,781	1,901	1,976
Tributary Gain (cfs)	200	-83	-681	-1,973
Monthly Inflow (cfs)	2,482	2,797	2,470	1,254
Monthly Inflow (kaf)	147.7	172.0	147.0	77.1
Monthly Release (kaf)	140.9	129.0	127.7	131.9
Afterbay Release (cfs)	2,368	2,097	2,146	2,146
River Release (cfs)	2,168	1,747	1,750	1,750
End-of-Month Content (kaf)	829.6	877.0	900.5	850.0
End-of-Month Elevation (feet)	3621.9	3627.8	3630.4	3624.6

Maximum Inflow Conditions (April through July Inflow: 1,697 kaf)

	Apr	May	Jun	Jul
Boysen Release (cfs)	1,101	2,249	2,665	2,736
Buffalo Bill Release (cfs)	1,581	3,367	3,487	3,563
Tributary Gain (cfs)	1,143	2,305	3,691	158
Monthly Inflow (cfs)	3,825	7,921	9,843	6,457
Monthly Inflow (kaf)	227.6	487.0	585.7	397.0
Monthly Release (kaf)	239.1	550.2	377.4	355.0
Afterbay Release (cfs)	4,019	8,949	6,343	5,774
River Release (cfs)	4,019	8,749	6,093	5,378
End-of-Month Content (kaf)	811.3	752.4	964.8	1,011.1
End-of-Month Elevation (feet)	3619.2	3609.5	3636.4	3640.0

OPERATIONS OUTLOOK (March 1, 2021 through July 31, 2021)

There is approximately 70 cfs of gain between Yellowtail Dam and Yellowtail Afterbay Dam from springs flowing into Yellowtail Afterbay. Total release from Yellowtail Dam is 70 cfs less than total release from Yellowtail Afterbay Dam. Yellowtail Powerplant is limited to 3 units due to on-going refurbishment project.

Irrigation Demands Outlook

Bighorn Canal (cfs)

	Apr	May	Jun	Jul
Median Forecast	178	326	385	396
Minimum Forecast	200	350	396	396
Maximum Forecast	0	200	250	396

Power Generation Outlook

Current Number of Units Available: 3 of 4
Approximate Yellowtail Powerplant Turbine Capacity: 6,150 cfs
Approximate Yellowtail Powerplant Generation Limit: 4,615 cfs

Yellowtail Powerplant Release (cfs)

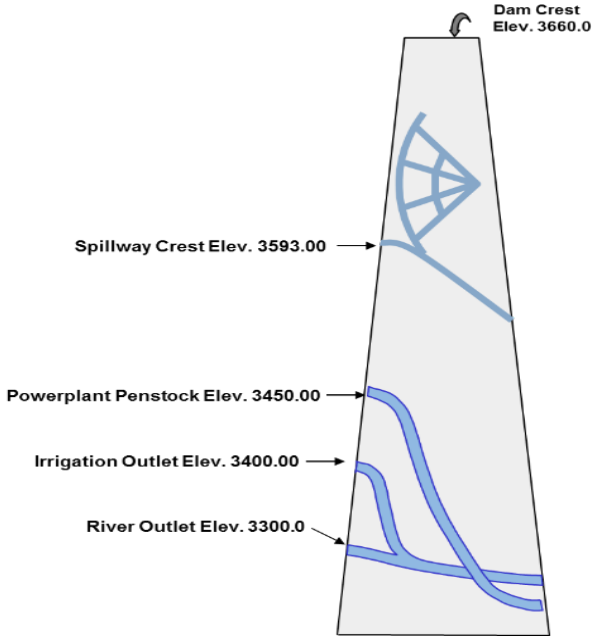
	Apr	May	Jun	Jul
Median Forecast	3,014	3,614	3,315	2,896
Minimum Forecast	2,298	2,027	2,076	2,076
Maximum Forecast	3,424	4,872	4,712	4,623

Yellowtail Powerplant Generation (gwh)

	Apr	May	Jun	Jul
Median Forecast	70.2	87.0	79.7	73.7
Minimum Forecast	53.8	48.8	48.7	50.2
Maximum Forecast	80.5	113.8	110.2	113.8

Yellowtail Spill (cfs)

	Apr	May	Jun	Jul
Median Forecast	0	0	0	0
Minimum Forecast	0	0	0	0
Maximum Forecast	525	4,007	1,561	1,081

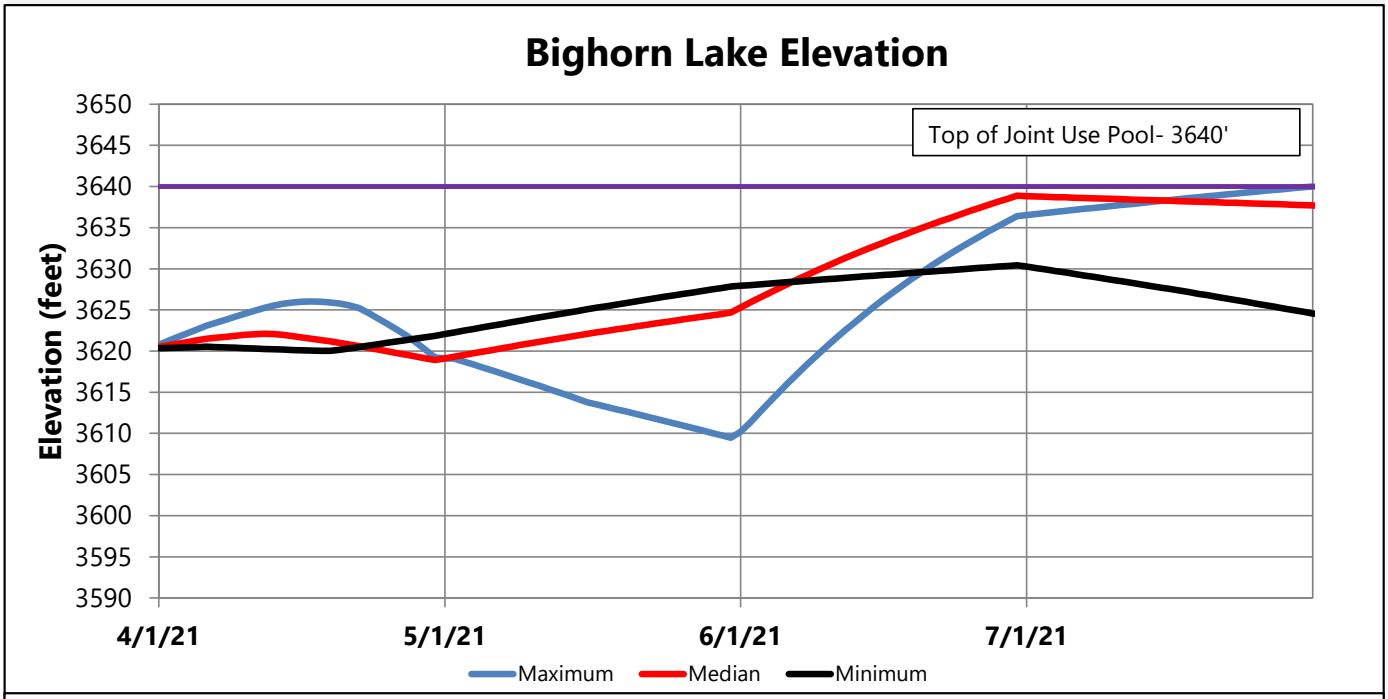


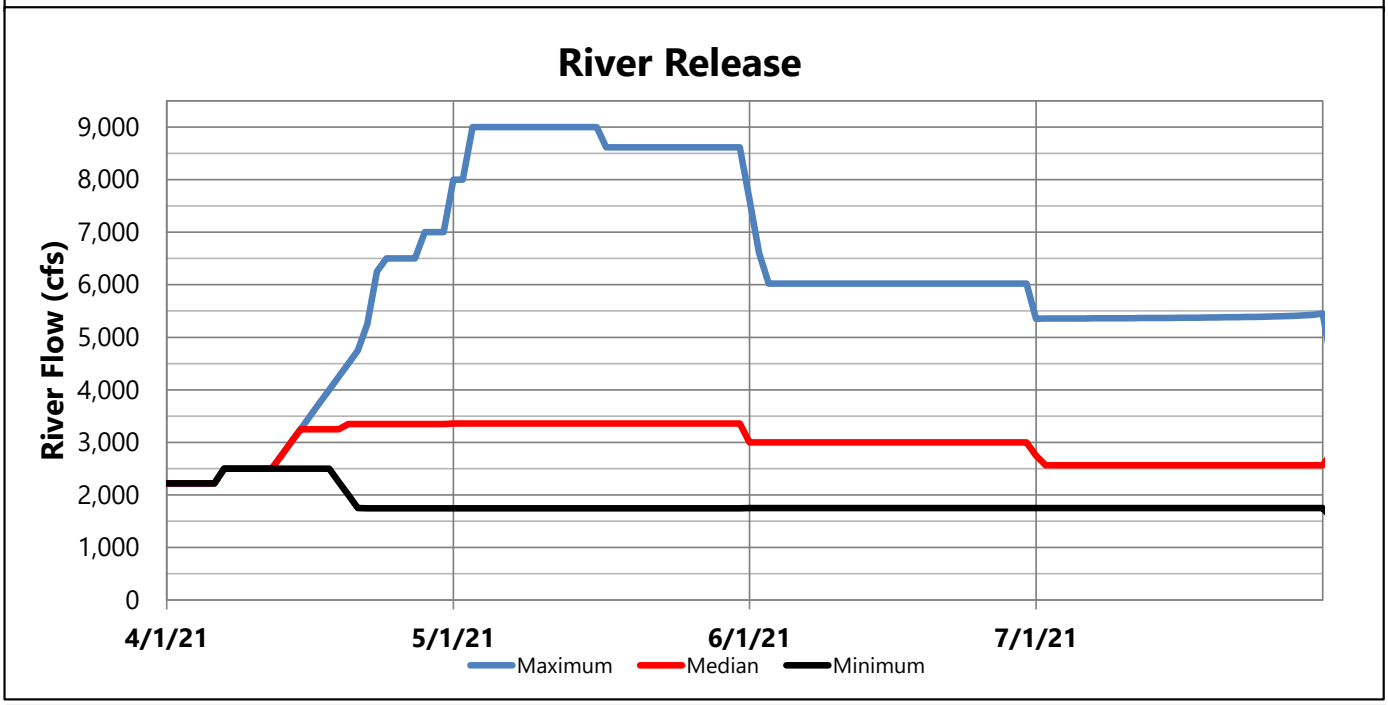
Release Outlook by Outlet

All releases are currently going through the powerplant and are expected to go through the powerplant through the end of July under median and minimum inflow conditions. Additional releases would be made through the spillway or river outlet works during April through July under maximum inflow conditions.

OPERATIONS OUTLOOK (March 1, 2021 through July 31, 2021)

Projected elevations and the range of river releases are based on the median, minimum, and maximum inflow forecasts. End-of-month elevations and river releases vary based on the difference between forecasted inflow scenarios.





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Monthly Operating Plans, Current Conditions, Snowpack and Other Water Management Information
https://www.usbr.gov/gp/lakes_reservoirs/wareprts/main_menu.html