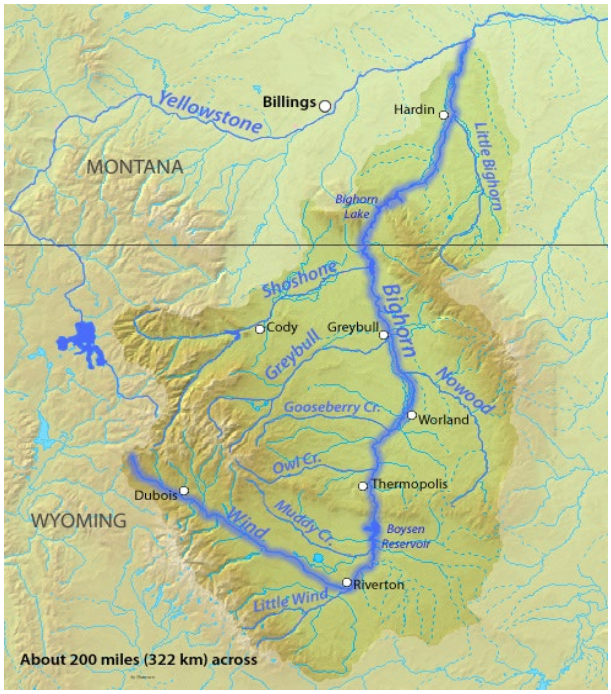
Yellowtail Dam Water Supply and Projected Operations

BUREAU OF RECLAMATION

January 2023



Bighorn River Basin Map Source: DEMIS Mapserver

January Operating Range			
Forecast	**Minimum**	**Median**	**Maximum**
Monthly Average Inflow (cfs)	1,620	1,730	1,835
Monthly Average River Release (cfs)	2,465	2,465	2,465
End of January Elevation (feet)	3619.9	3620.9	3621.8

April through July 2023 Inflow Forecast (kaf)		
April through July Volume		1,277
Percent of Average		103
Water Year	**Historic Inflow**	**Rank**
2022	990	37
2021	607	48
2020	1,042	32
2019	1,678	12
30 Year Average	1,235	

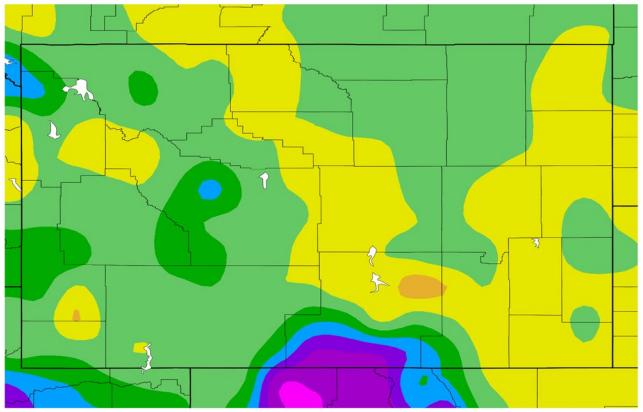
CLIMATE SUMMARY

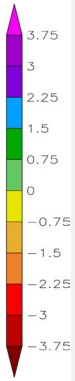
Climate Departure from Normal

December 1 through December 31, 2023

Precipitation

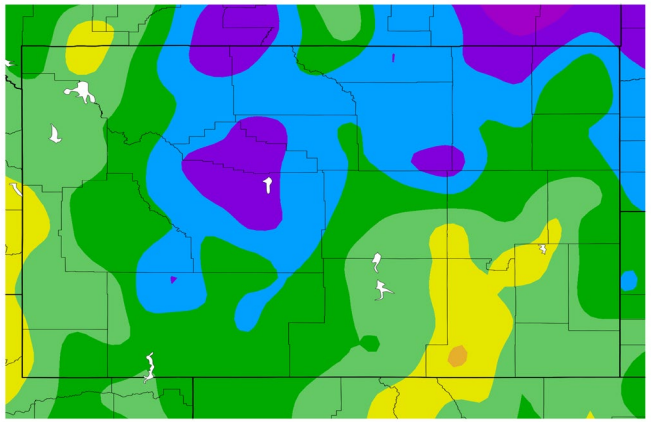
Departure from Normal (inches)

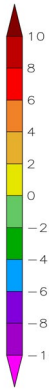




Temperature

Departure from Normal (°F)





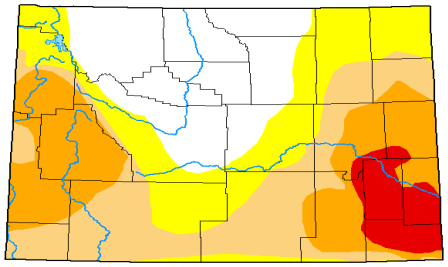
HPRCC using provisional data from NOAA Regional Climate Centers

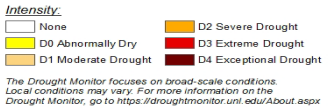
Precipitation was near average in the Bighorn Basin during December. Temperatures were below average. Abnormally dry conditions persist in southern portion of the basin.

The Bighorn River Basin has a 33 to 50 percent chance that precipitation will be above average during January. There is an equal chance temperatures will be above, near or below average during January.

Wyoming Drought Monitor Map

January 3, 2023

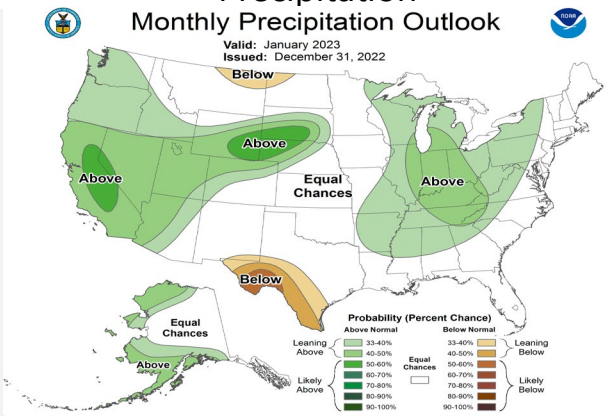




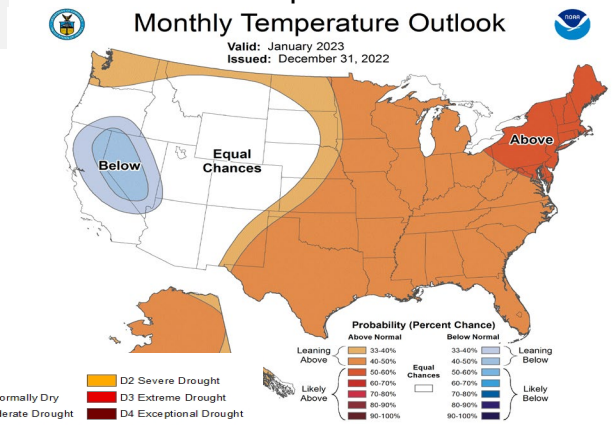
droughtmonitor.unl.edu

January Climate Outlook

Precipitation



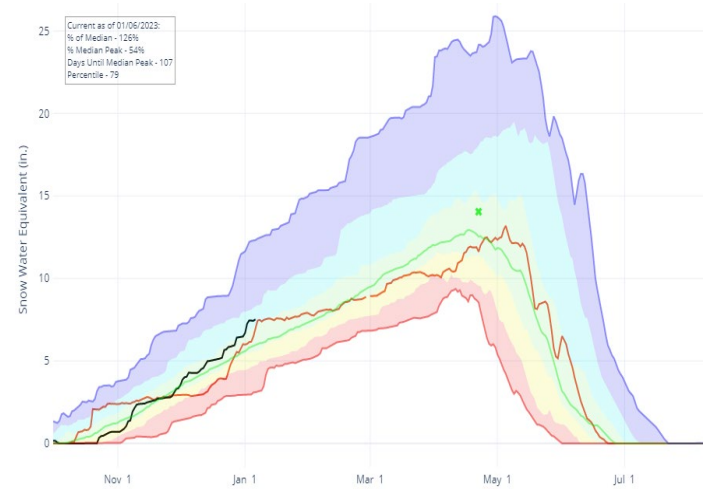
Temperature

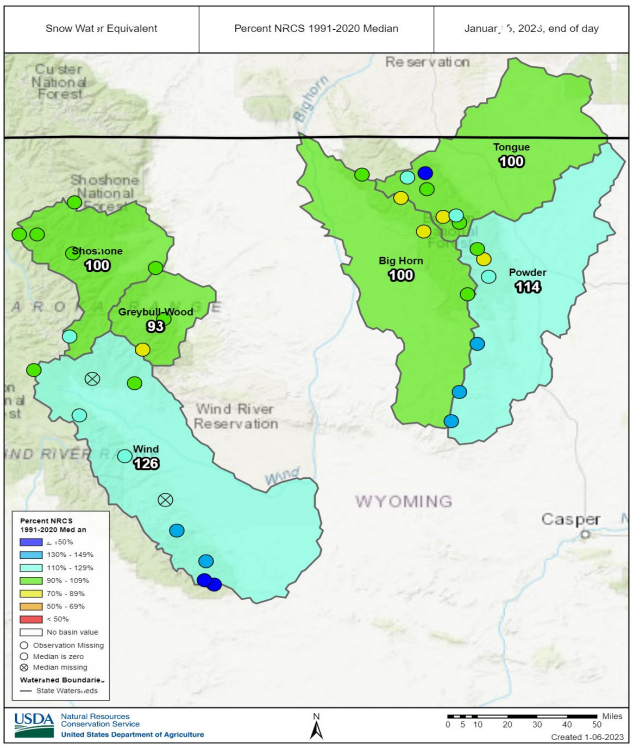


SNOWPACK SUMMARY

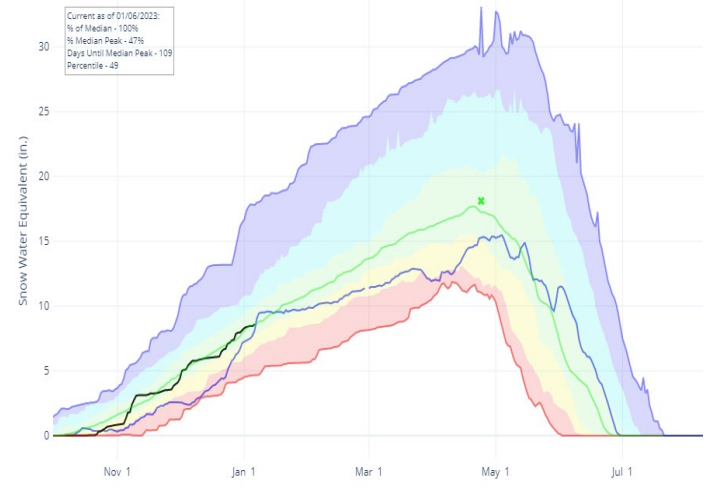
The snow water equivalent (SWE) graphs are a composite of SNOTEL sites within the Bighorn River Basin managed by the Natural Resources Conservation Service (NRCS).

Wind River

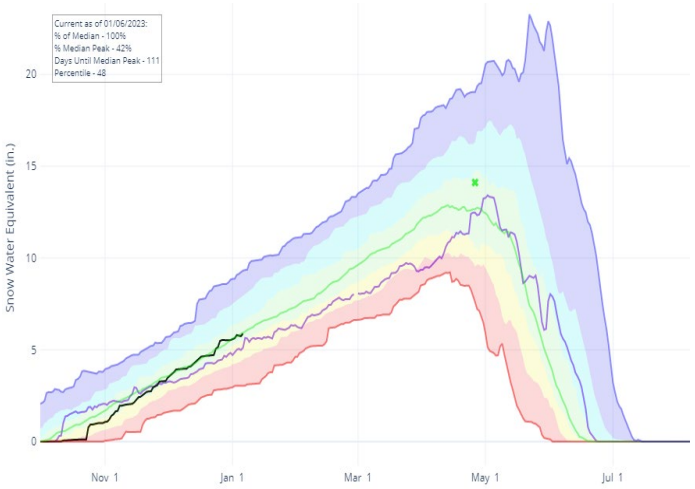




Shoshone River



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 ('91-'20) – Official median calculated from 1991-2020 data
Normal (POR) – Unofficial mean calculated from Period of Record data

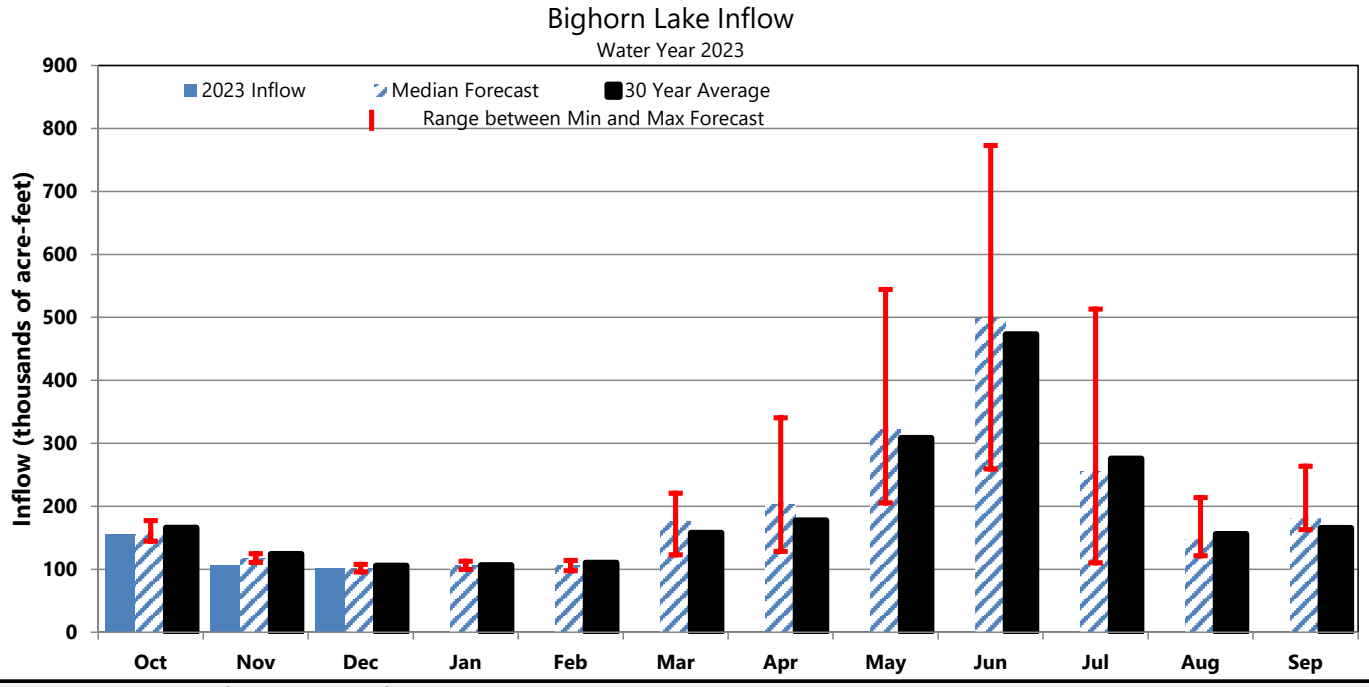
Median Peak SWE
Max
Median (POR)
Median ('91-'20)
Min
Stats. Shading

FORECAST SUMMARY

Streamflow data and planned releases from Boysen and Buffalo Bill Reservoirs are used to compute an inflow forecast for Bighorn Lake. Actual December inflow was less than the median inflow forecast.

December Forecast Review

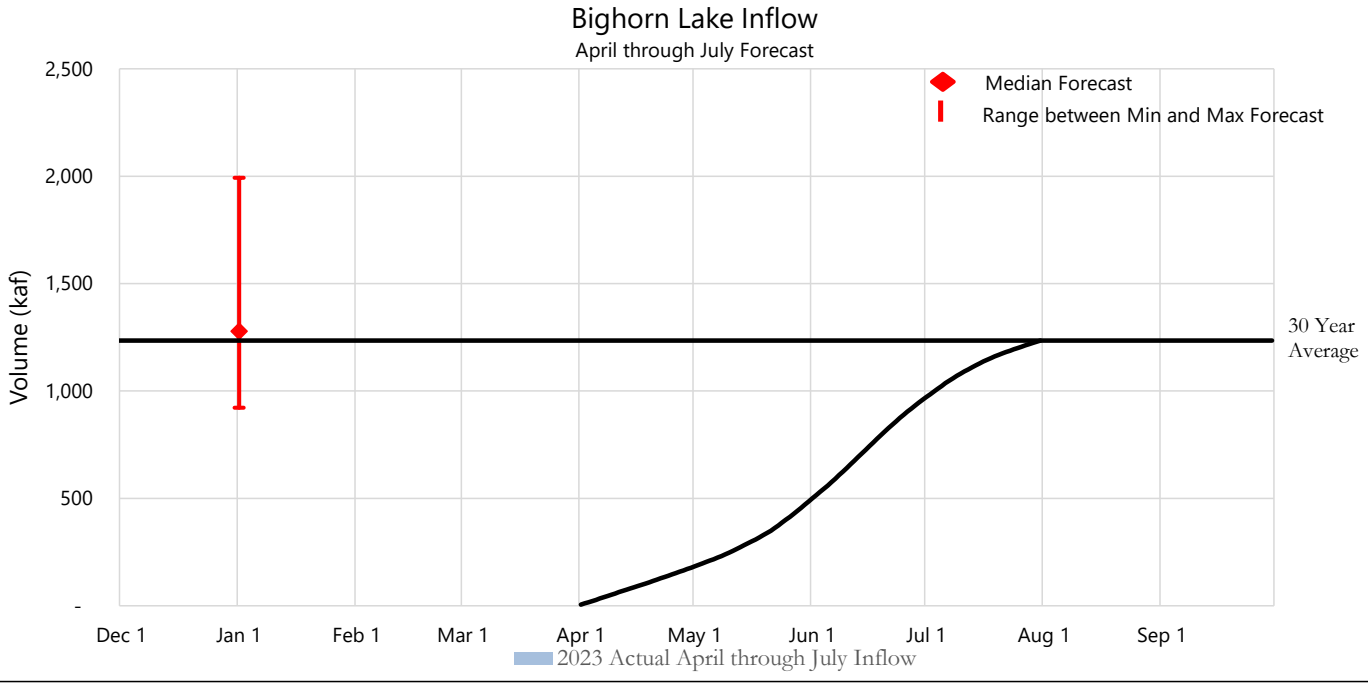
	Median Forecast (kaf)	Actual (kaf)	Difference (kaf)	Actual (% of Avg)
December Inflow	101.8	100.9	(0.9)	95



April through July Inflow Forecast for January 1

	Median Forecast (kaf)	% of Average	Minimum Forecast (kaf)	Maximum Forecast (kaf)
April through July Inflow	1,277	103	704	2,171

Historic Maximum (2017)	2,953 kaf	Historic Minimum (2004)	392 kaf	Average	1,228 kaf

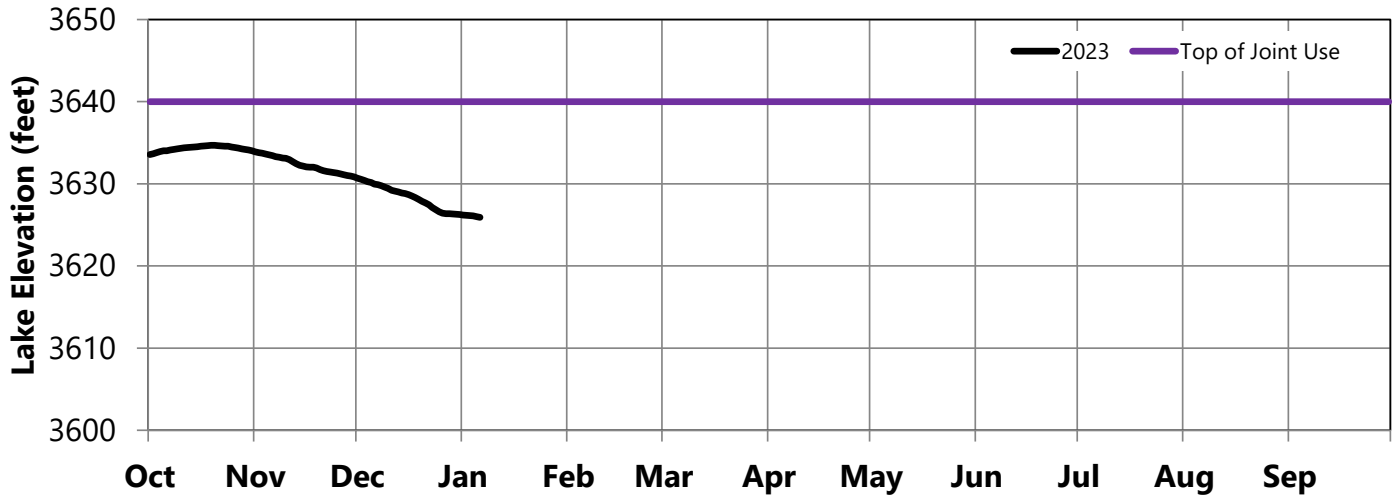


OPERATIONS REVIEW (October 1, 2022 through December 31, 2022)

River releases were decreased to 2,365 cfs during the first part of December based on forecasted inflows and the March 31, 2023 carryover storage target of 3617. Storage in Bighorn Lake decreased 4.5 feet during December .

January 1 Storage Conditions

	Elevation feet	Storage acre-feet	Percent of Average	Percent Full
Bighorn Lake	3626.3	863,635	103	85
Buffalo Bill	5369.3	463,310	109	72
Boysen	4718.2	616,590	111	83

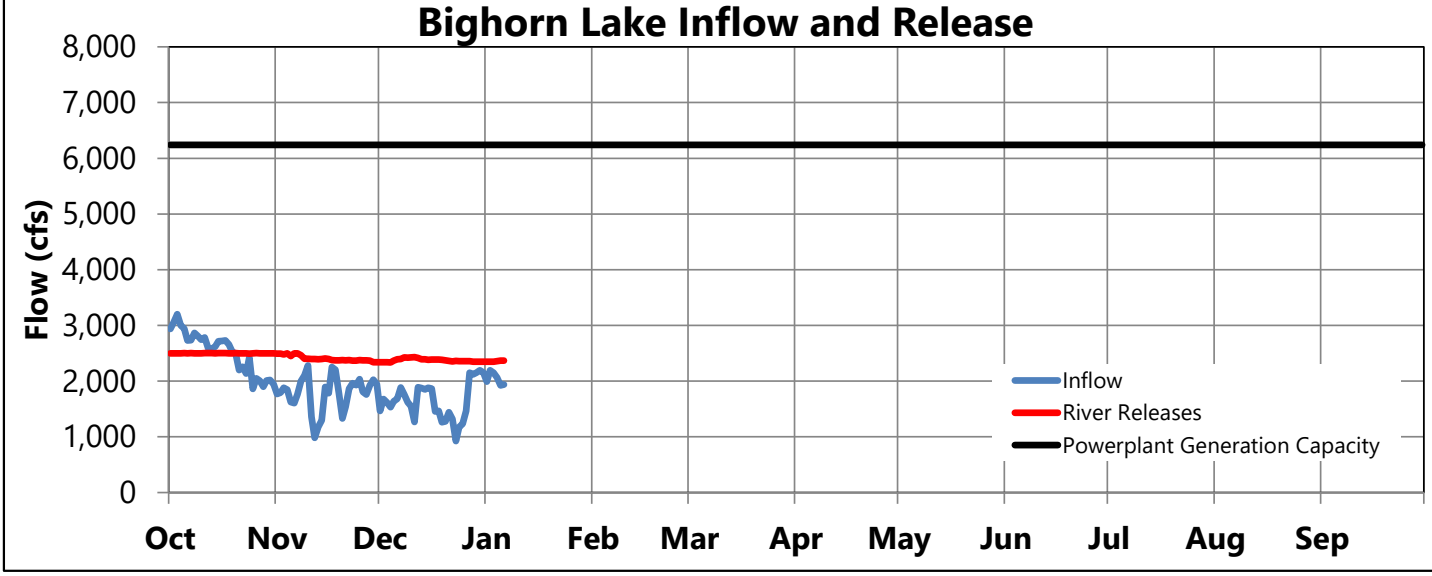


Average December Inflow

	Monthly Avg cfs	Percent of Average
Bighorn Lake	1,640	95
Buffalo Bill	270	97
Boysen	645	101

Average December Release

	Monthly Avg cfs	Percent of Average
Bighorn River	2,375	99
Buffalo Bill Total Release	210	70
Boysen Release	910	117



OPERATIONS OUTLOOK (January 1, 2023 through July 31, 2023)

Releases to the Bighorn River will be increased to 2,500 cfs in the beginning of January. Releases are based on forecasted inflows and the end of March storage target of 3617 feet.

Median Inflow Conditions (April through July Inflow: 1,227 kaf)

	Jan	Feb	Mar	Apr	May	Jun	Jul
Boysen Release (cfs)	900	900	1,100	1,500	2,000	3,062	2,298
Buffalo Bill Release (cfs)	205	205	745	1,163	1,952	2,765	2,633
Tributary Gain (cfs)	623	799	1,020	744	1,272	2,534	-769
Monthly Inflow (cfs)	1,728	1,904	2,865	3,407	5,224	8,361	4,162
Monthly Inflow (kaf)	106.2	105.8	176.1	202.8	321.2	497.5	255.9
Monthly Release (kaf)	151.6	148.8	184.1	215.4	269.9	363.8	214.0
Afterbay Release (cfs)	2,465	2,680	2,994	3,620	4,389	6,115	3,480
River Release (cfs)	2,465	2,680	2,994	3,598	4,189	5,730	3,020
End-of-Month Content (kaf)	822.6	783.4	779.8	771.3	827.0	964.8	1,011.1
End-of-Month Elevation (feet)	3620.9	3614.9	3614.3	3612.8	3621.5	3636.4	3640.0

Minimum Inflow Conditions (April through July Inflow: 704 kaf)

	Jan	Feb	Mar	Apr	May	Jun	Jul
Boysen Release (cfs)	900	900	900	1,000	1,025	1,200	1,200
Buffalo Bill Release (cfs)	205	205	205	686	1,730	1,901	1,976
Tributary Gain (cfs)	517	654	896	472	585	1,259	-1,382
Monthly Inflow (cfs)	1,622	1,759	2,001	2,158	3,340	4,360	1,794
Monthly Inflow (kaf)	99.7	97.7	123.0	128.4	205.4	259.4	110.3
Monthly Release (kaf)	151.6	118.0	130.4	132.6	150.5	151.9	157.3
Afterbay Release (cfs)	2,465	2,125	2,120	2,228	2,448	2,553	2,558
River Release (cfs)	2,465	2,125	2,120	2,193	2,193	2,098	2,098
End-of-Month Content (kaf)	816.1	799.7	796.7	796.6	855.8	967.5	924.8
End-of-Month Elevation (feet)	3619.9	3617.4	3617.0	3617.0	3625.3	3636.6	3632.9

Maximum Inflow Conditions (April through July Inflow: 2,171 kaf)

	Jan	Feb	Mar	Apr	May	Jun	Jul
Boysen Release (cfs)	900	900	1,251	2,749	3,601	4,822	4,614
Buffalo Bill Release (cfs)	205	205	1,195	1,862	3,030	4,569	3,646
Tributary Gain (cfs)	729	947	1,143	1,111	2,222	3,598	85
Monthly Inflow (cfs)	1,834	2,052	3,589	5,722	8,853	12,989	8,345
Monthly Inflow (kaf)	112.7	114.0	220.7	340.5	544.3	772.9	513.1
Monthly Release (kaf)	151.6	194.4	245.5	360.4	531.0	556.4	461.0
Afterbay Release (cfs)	2,465	3,500	3,992	6,058	8,636	9,350	7,497
River Release (cfs)	2,465	3,500	3,992	6,058	8,436	9,100	7,077
End-of-Month Content (kaf)	829.1	752.6	732.1	716.3	733.9	954.6	1,011.1
End-of-Month Elevation (feet)	3621.8	3609.5	3605.7	3602.6	3606.0	3635.5	3640.0

OPERATIONS OUTLOOK (January 1, 2023 through July 31, 2023)

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.

Irrigation Demands Outlook

Bighorn Canal (cfs)

	Jan	Feb	Mar	Apr	May	Jun	Jul
Median Forecast	0	0	0	22	200	385	460
Minimum Forecast	0	0	0	35	255	455	460
Maximum Forecast	0	0	0	0	200	250	420

Power Generation Outlook

Current Number of Units Available: 4 of 4
Approximate Yellowtail Powerplant Turbine Capacity: 8,200 cfs
Approximate Yellowtail Powerplant Scheduled Generation Limit: 6,240 cfs

Yellowtail Powerplant Release (cfs)

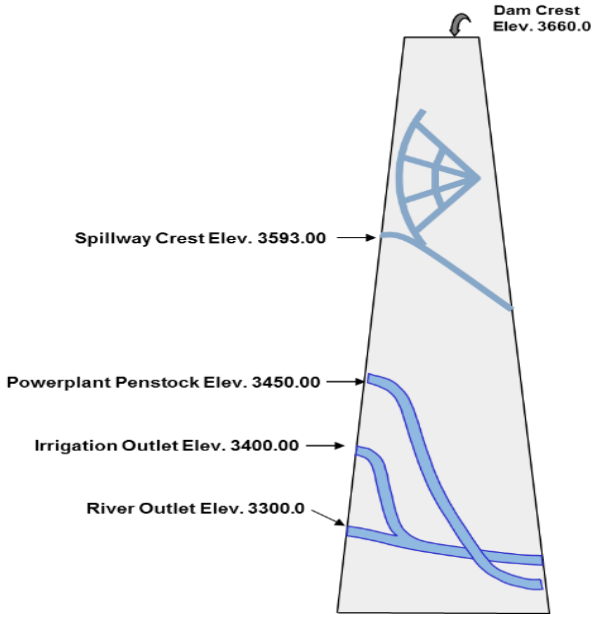
	Jan	Feb	Mar	Apr	May	Jun	Jul
Median Forecast	2,395	2,610	2,924	3,550	4,319	6,045	3,410
Minimum Forecast	2,395	2,055	2,050	2,158	2,378	2,483	2,488
Maximum Forecast	2,395	3,430	3,922	5,988	6,661	6,372	6,172

Yellowtail Powerplant Generation (gwh)

	Jan	Feb	Mar	Apr	May	Jun	Jul
Median Forecast	58.2	57.2	69.8	80.8	102.2	142.0	85.5
Minimum Forecast	58.1	43.9	48.3	49.2	57.4	59.5	62.0
Maximum Forecast	58.2	73.5	90.2	132.2	151.8	146.9	151.8

Yellowtail Spill (cfs)

	Jan	Feb	Mar	Apr	May	Jun	Jul
Median Forecast	0	0	0	0	0	0	0
Minimum Forecast	0	0	0	0	0	0	0
Maximum Forecast	0	0	0	0	1,905	2,908	1,255

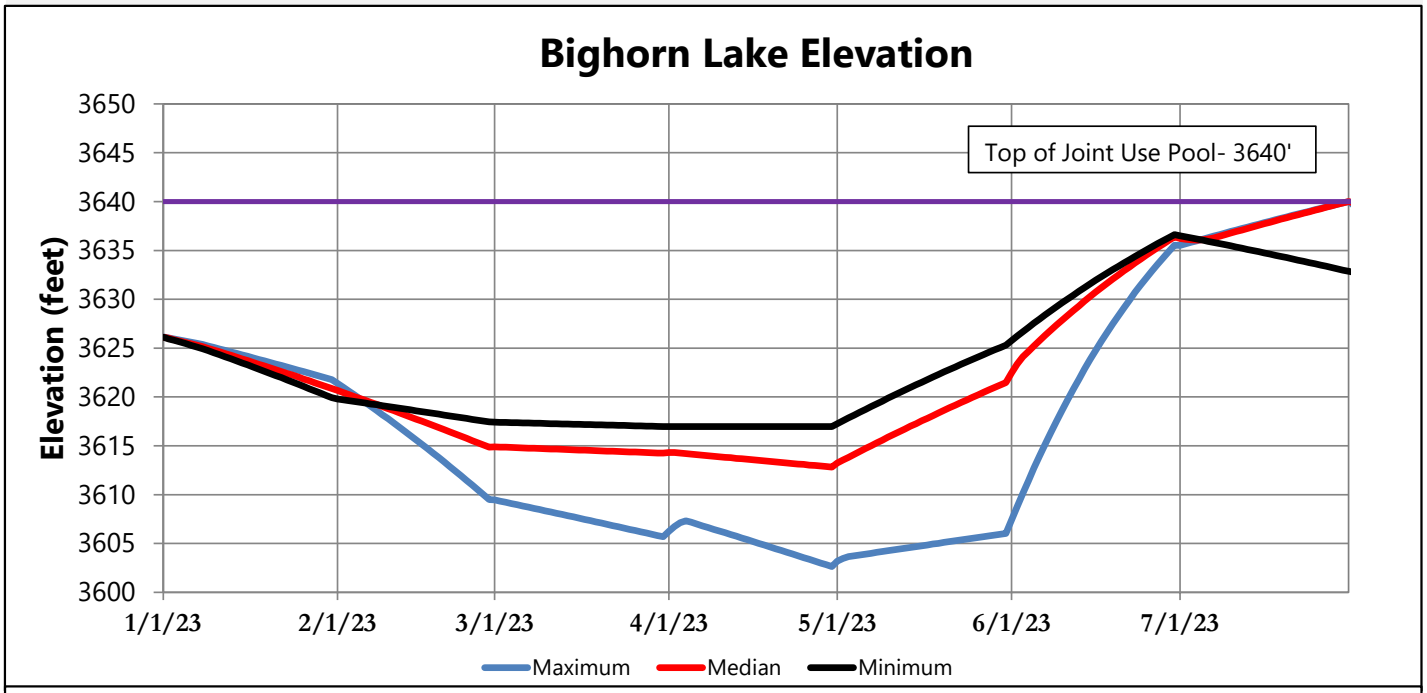


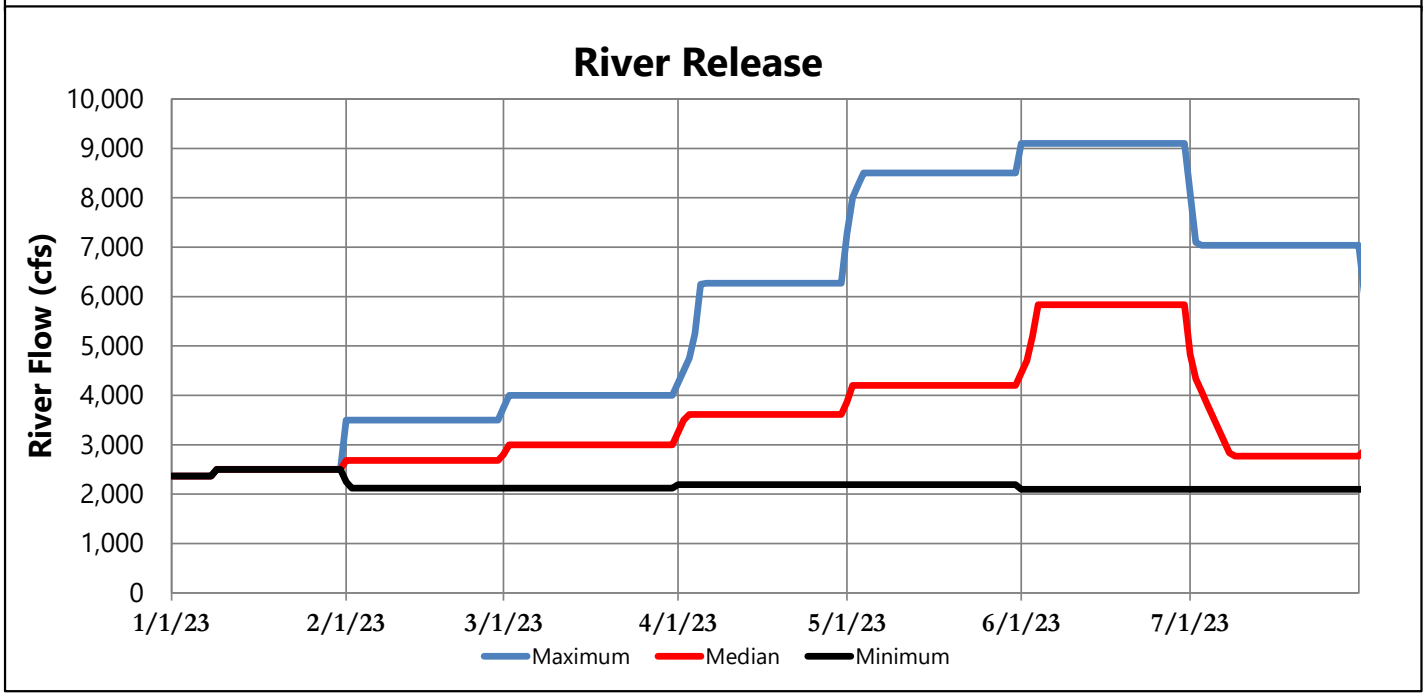
Release Outlook by Outlet

All releases are currently going through the powerplant and are expected to go through the powerplant under median and minimum inflow conditions. Under maximum conditions, a bypass release is expected to start in May.

OPERATIONS OUTLOOK (January 1, 2023 through July 31, 2023)

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