

Yellowtail Dam Water Supply and Projected Operations



BUREAU OF RECLAMATION

May 2021



Bighorn River Basin Map Source: DEMIS Mapserver

May Operating Range			
Forecast	Minimum	Median	Maximum
Monthly Average Inflow (cfs)	3,315	4,210	8,365
Monthly Average River Release (cfs)	2,575	3,495	6,170
End of May Elevation (feet)	3623.1	3623.2	3634.0
May through July 2021 Inflow Forecast (kaf)			
May through July Volume			835
Percent of Average			77
Water Year	Historic Inflow	Rank	
2020	777	36	
2019	1,493	12	
2018	1,927	4	
2017	2,350	1	
30 Year Average	1,086		

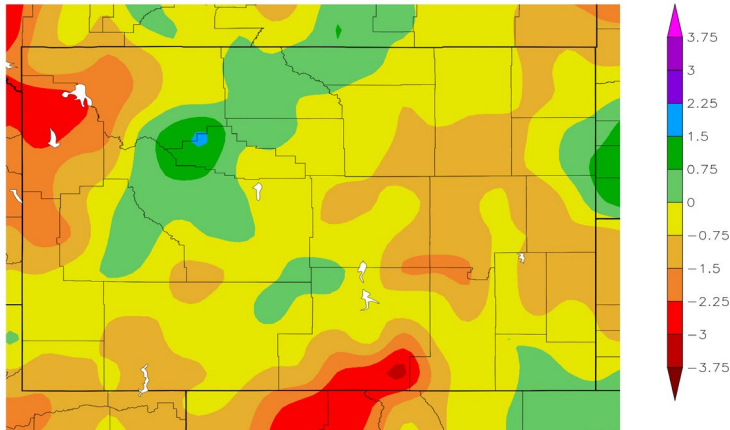


Climate Departure from Normal

April 1 through April 30, 2021

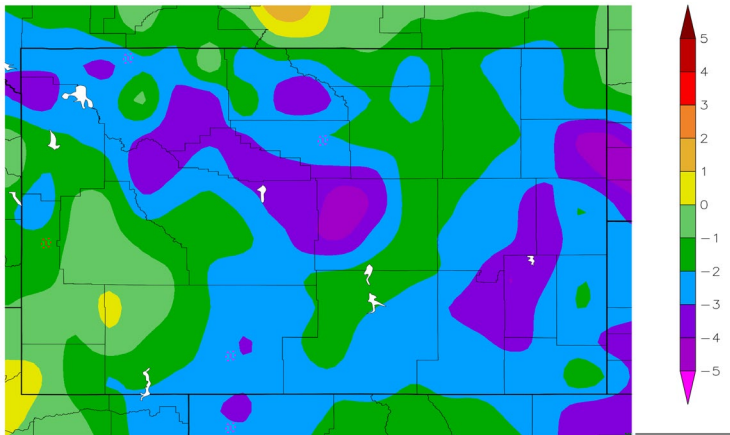
Precipitation

Departure from Normal (inches)



Temperature

Departure from Normal (°F)



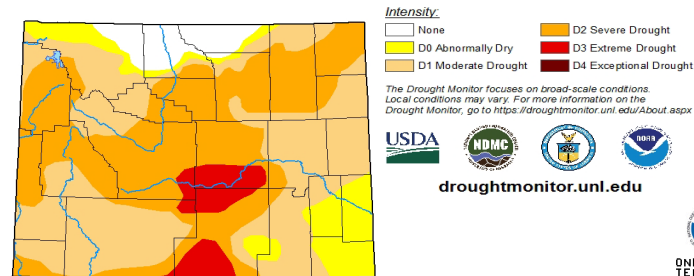
CLIMATE SUMMARY

The Bighorn Basin above Yellowtail Dam saw a mix of precipitation conditions during April. The Shoshone River Basin received less than average precipitation while the area below Boysen and Buffalo Dams received above average precipitation. The entire Basin was cooler than average which resulted in not much snowmelt for most of the month.

The climate outlook shows there is an equal chance precipitation will be below, above, or average during May. There is a 33 to 40 percent chance temperatures will be above average.

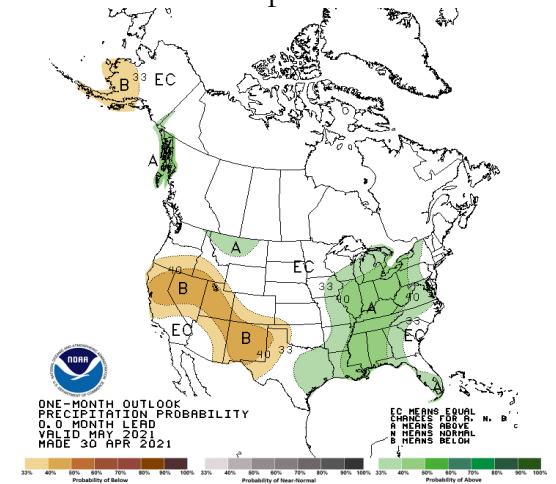
Wyoming Drought Monitor Map

April 27, 2021

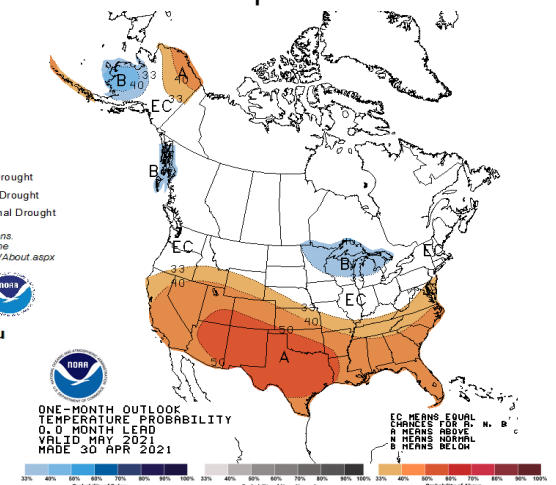


May Climate Outlook

Precipitation



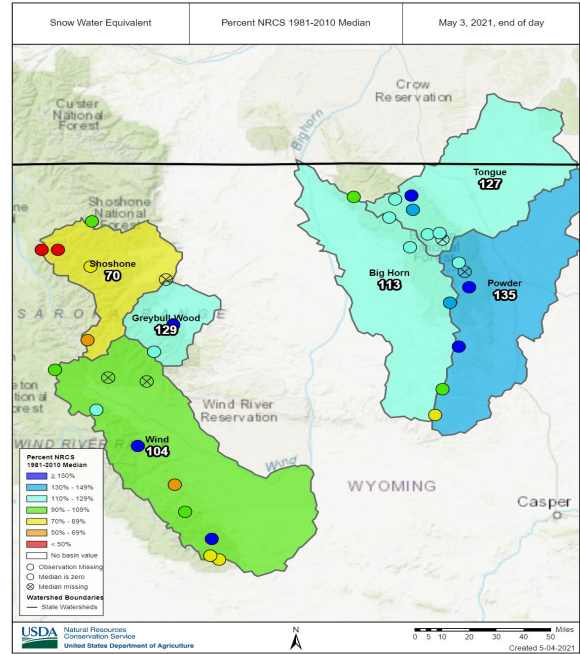
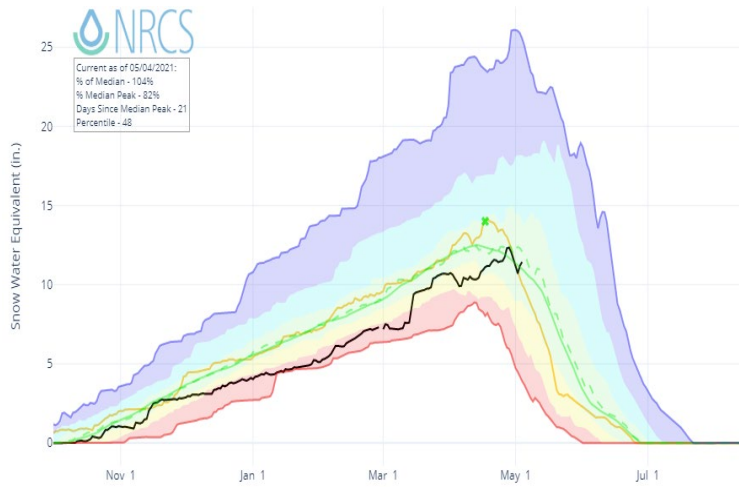
Temperature



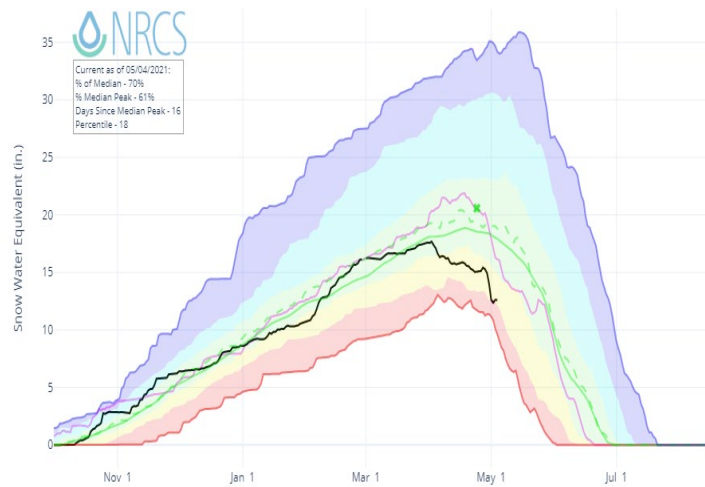
SNOWPACK SUMMARY

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).

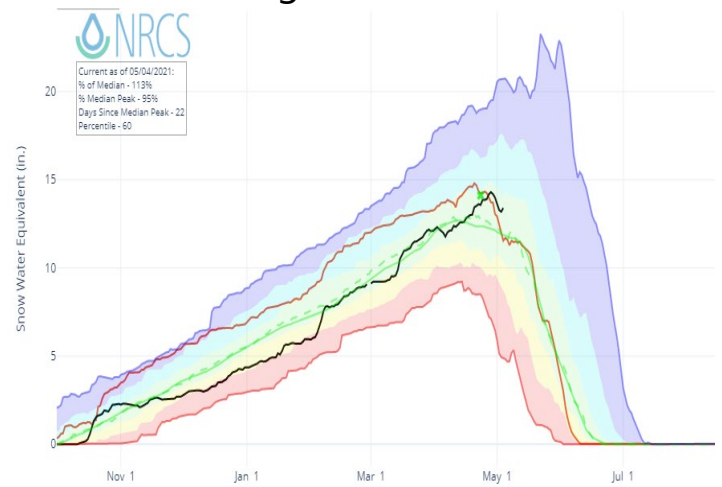
Wind River



Shoshone River



Bighorn River



- ✱ Median Peak SWE
- Max
- - - Median (POR)
- Median ('81-'10)
- Min
- Stats. Shading
- 2021
- 2020

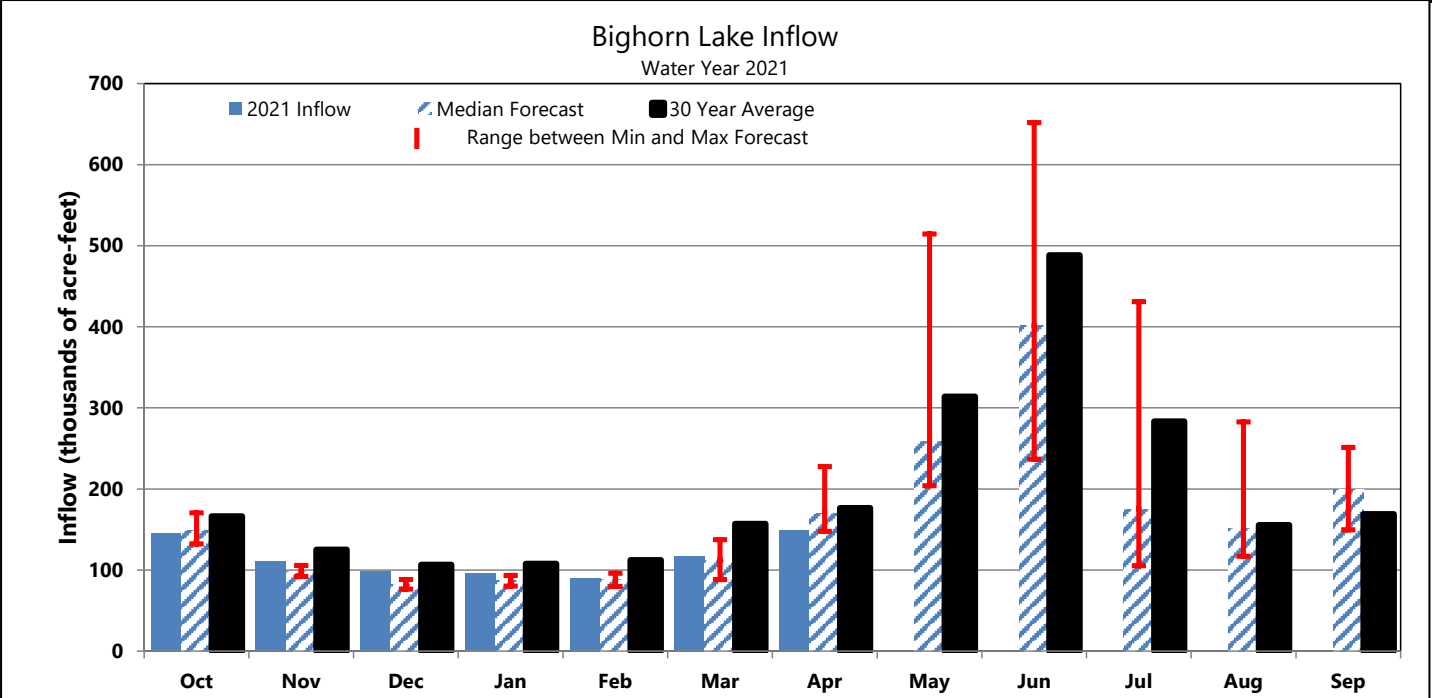
NRCS Montana Snow Survey Website: <https://www.nrcs.usda.gov/wps/portal/nrcs/mt/snow/>

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

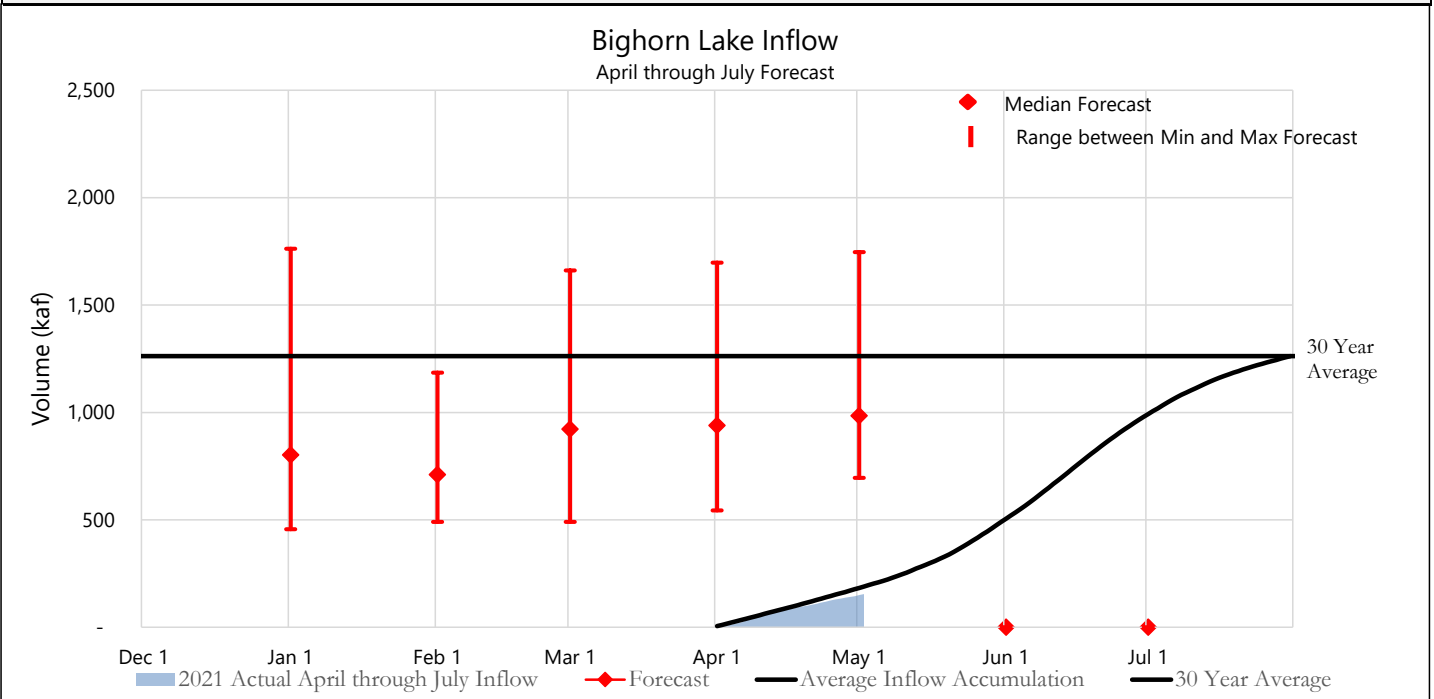
FORECAST SUMMARY

SNOTEL data, streamflow data and planned releases from Boysen and Buffalo Bill Reservoirs are used to compute an inflow forecast for Bighorn Lake. Actual April inflows were near the minimum inflow forecast. However, basin hydrologic conditions remained near median conditions.

April Forecast Review				
	Median Forecast (kaf)	Actual (kaf)	Difference (kaf)	Actual (% of Avg)
April Inflow	169.9	149.1	(20.8)	84



May through July Inflow Forecast for May 1					
	Median Forecast (kaf)	% of Average	Minimum Forecast (kaf)	Maximum Forecast (kaf)	
May through July Inflow	835	66	546	1,597	
Actual April Inflow	149 kaf	April through July Inflow	984 kaf	Average	1,262 kaf



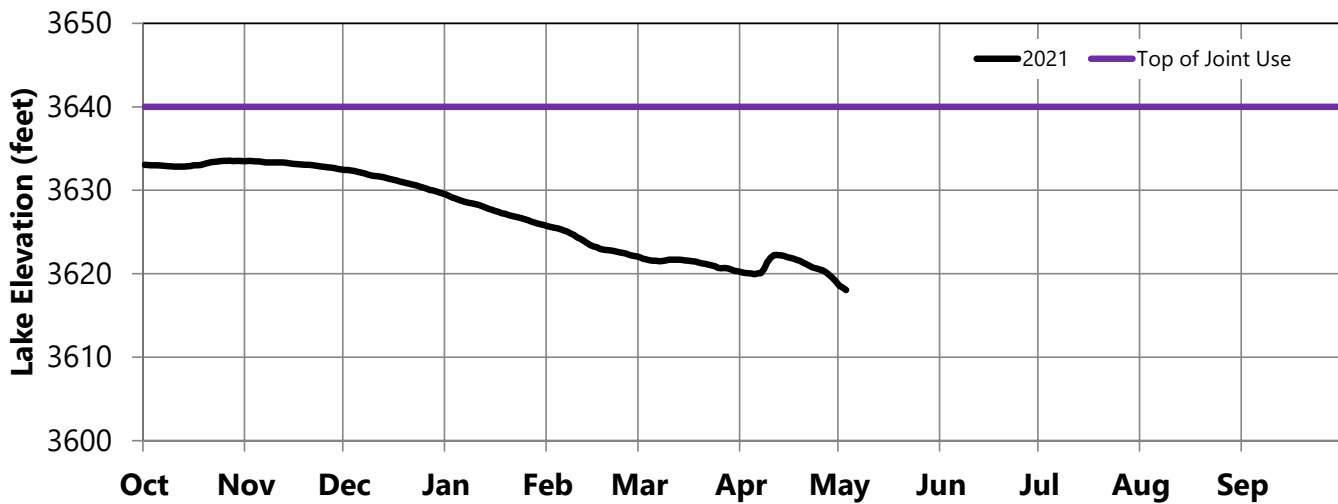
OPERATIONS REVIEW (October 1, 2020 through April 30, 2021)

River releases were increased to 3,250 cfs during April based on inflows and snowpack conditions during the month. Inflows remained below releases for most of April allowing storage to be evacuated during the month. Inflow peaked above 5,000 cfs during the first part of April due to a flushing flow release from Buffalo Bill Reservoir. The elevation of Bighorn Lake decreased by 1.3 ft during April.

May 1 Storage Conditions

	Elevation feet	Storage acre-feet	Percent of Average	Percent Full
Bighorn Lake	3619.0	809,968	108	80
Buffalo Bill	5362.8	418,328	107	65
Boysen	4715.1	567,069	109	76

Bighorn Lake Operations Water Year 2020

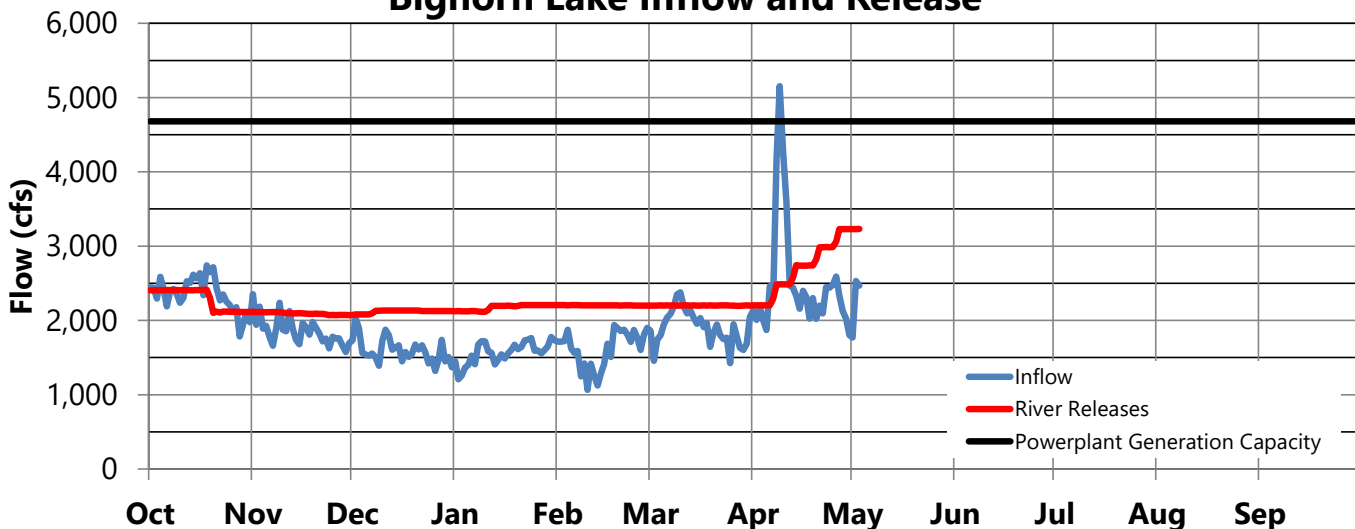


Average April Inflow

Average April Release

	Monthly Avg cfs	Percent of Average		Monthly Avg cfs	Percent of Average
Bighorn Lake	2,505	84	Bighorn River	2,690	80
Buffalo Bill	670	86	Buffalo Bill Total Release	1,325	113
Boysen	700	82	Boysen Release	625	51

Bighorn Lake Inflow and Release



OPERATIONS OUTLOOK (May 1, 2021 through October 31, 2021)

River releases are decreasing on May 6 to 3,000 cfs based on current storage and inflow. Additional changes to the river release are expected during the remainder of May based on actual conditions. The current May 31 storage target is 3623.2 feet which is based on the May through July forecast of 835 kaf. Under median and maximum inflow conditions, releases are expected to increase later in the month. Under minimum inflow conditions, releases are expected to decrease later in the month. Current storage levels are near the minimum storage target for spring runoff. The operation objective is to start filling the reservoir to the end of May storage target. Down and up release changes will be determined by actual and forecasted daily inflows.

Median Inflow Conditions (May through July Inflow: 835 kaf)

	May	Jun	Jul	Aug	Sep	Oct
Boysen Release (cfs)	1,308	1,390	1,303	1,299	1,250	1,000
Buffalo Bill Release (cfs)	1,781	1,938	2,013	1,761	1,600	696
Tributary Gain (cfs)	1,119	3,415	-467	-594	496	1,247
Monthly Inflow (cfs)	4,208	6,743	2,849	2,466	3,346	2,943
Monthly Inflow (kaf)	258.7	401.2	175.2	151.7	199.1	181.0
Monthly Release (kaf)	233.4	249.9	212.7	199.2	184.2	175.2
Afterbay Release (cfs)	3,796	4,200	3,460	3,240	3,095	2,850
River Release (cfs)	3,496	3,800	3,000	2,800	2,800	2,800
End-of-Month Content (kaf)	839.6	995.1	961.8	918.5	937.6	947.7
End-of-Month Elevation (feet)	3623.2	3638.8	3636.2	3632.3	3634.0	3634.9

Minimum Inflow Conditions (May through July Inflow: 546 kaf)

	May	Jun	Jul	Aug	Sep	Oct
Boysen Release (cfs)	1,099	1,250	1,251	1,251	1,000	800
Buffalo Bill Release (cfs)	1,781	1,901	1,976	1,761	1,499	696
Tributary Gain (cfs)	437	827	-1,514	-1,109	15	912
Monthly Inflow (cfs)	3,317	3,978	1,713	1,903	2,514	2,408
Monthly Inflow (kaf)	204.0	236.7	105.3	117.0	149.6	148.1
Monthly Release (kaf)	179.7	146.1	151.3	150.0	136.6	126.0
Afterbay Release (cfs)	2,923	2,455	2,460	2,440	2,295	2,050
River Release (cfs)	2,573	2,000	2,000	2,000	2,000	2,000
End-of-Month Content (kaf)	838.5	933.3	891.7	862.9	880.1	906.5
End-of-Month Elevation (feet)	3623.1	3633.7	3629.5	3626.2	3628.2	3631.1

Maximum Inflow Conditions (May through July Inflow: 1,597 kaf)

	May	Jun	Jul	Aug	Sep	Oct
Boysen Release (cfs)	2,916	2,916	3,097	2,249	1,250	1,200
Buffalo Bill Release (cfs)	2,901	3,023	3,097	2,361	1,953	727
Tributary Gain (cfs)	2,550	5,017	816	-13	1,018	1,576
Monthly Inflow (cfs)	8,367	10,956	7,010	4,597	4,221	3,503
Monthly Inflow (kaf)	514.5	651.9	431.1	282.7	251.2	215.4
Monthly Release (kaf)	391.6	609.9	407.6	287.0	268.7	270.5
Afterbay Release (cfs)	6,369	10,250	6,628	4,667	4,515	4,400
River Release (cfs)	6,169	10,000	6,208	4,262	4,350	4,400
End-of-Month Content (kaf)	937.1	983.3	1,011.1	1,011.1	997.7	946.9
End-of-Month Elevation (feet)	3634.0	3637.9	3640.0	3640.0	3639.0	3634.9

OPERATIONS OUTLOOK (May 1, 2021 through October 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)

	May	Jun	Jul	Aug	Sep	Oct
Median Forecast	300	400	460	440	295	50
Minimum Forecast	350	455	460	440	295	50
Maximum Forecast	200	250	420	405	165	0

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)

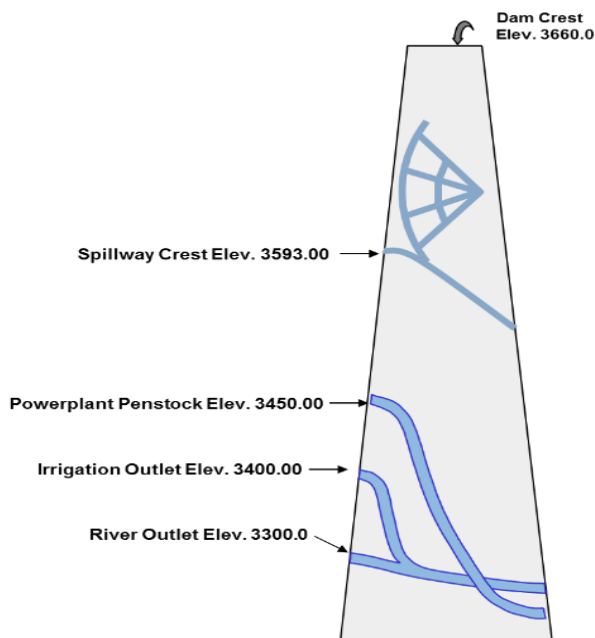
	May	Jun	Jul	Aug	Sep	Oct
Median Forecast	3,726	4,130	3,390	3,170	3,025	2,780
Minimum Forecast	2,853	2,385	2,390	2,370	2,225	1,980
Maximum Forecast	4,079	4,638	4,620	4,573	4,445	4,330

Yellowtail Powerplant Generation (gwh)

	May	Jun	Jul	Aug	Sep	Oct
Median Forecast	90.4	97.5	84.9	79.4	73.5	70.3
Minimum Forecast	68.5	56.6	58.9	58.0	52.2	48.2
Maximum Forecast	100.1	110.2	113.8	113.1	106.3	106.5

Yellowtail Spill (cfs)

	May	Jun	Jul	Aug	Sep	Oct
Median Forecast	0	0	0	0	0	0
Minimum Forecast	0	0	0	0	0	0
Maximum Forecast	2,221	5,542	1,938	24	0	0

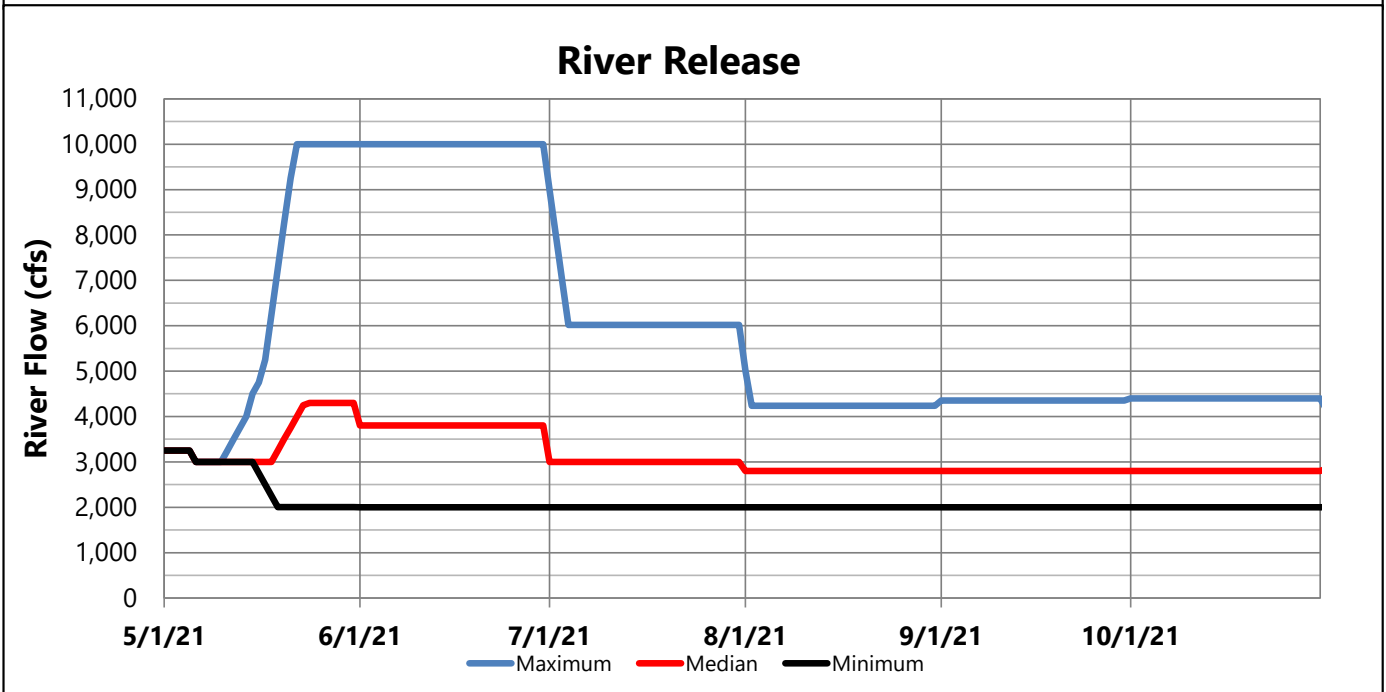
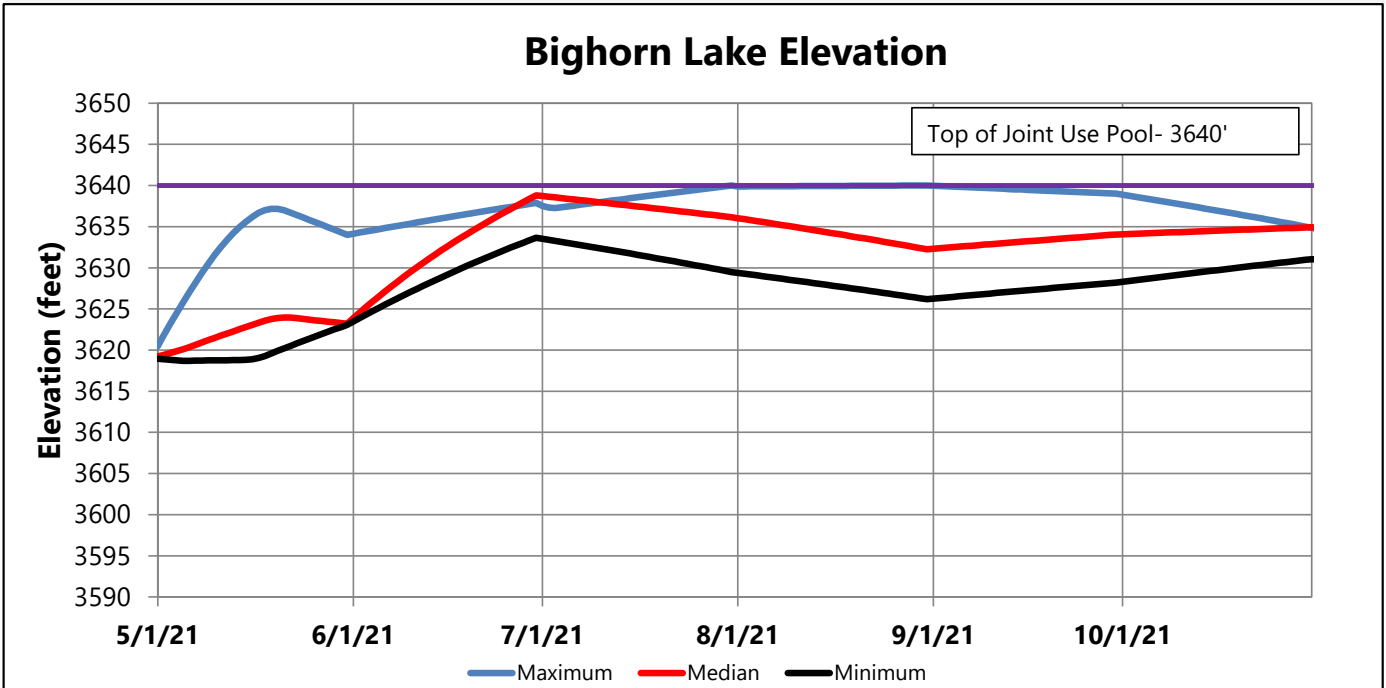


Release Outlook by Outlet

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 May into August under maximum inflow conditions.

OPERATIONS OUTLOOK (May 1, 2021 through October 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.



Contact Us

Clayton Jordan
cjordan@usbr.gov
 406-247-7334

Stephanie Micek
smicek@usbr.gov
 406-247-7320

Chris Gomer
cgomer@usbr.gov
 406-247-7307