

Yellowtail Dam Water Supply and Projected Operations



BUREAU OF RECLAMATION

April 2020



Bighorn River Basin Map Source: DEMIS Mapsver

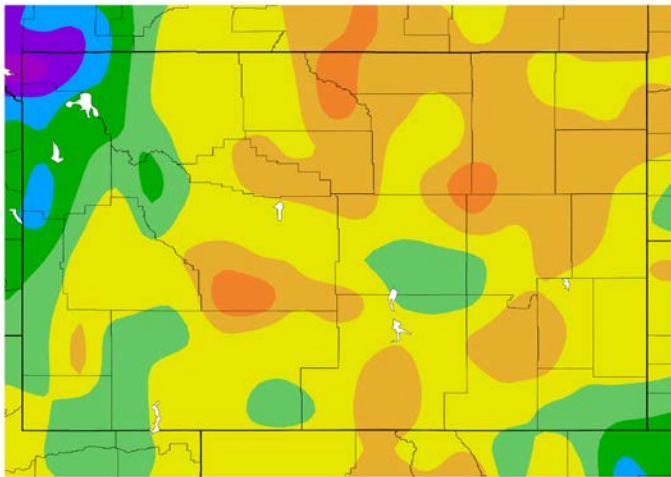
April Operating Range			
Forecast	Minimum	Median	Maximum
Monthly Average Inflow (cfs)	2,775	4,780	5,455
Monthly Average River Release (cfs)	3,735	5,385	7,150
End of April Elevation (feet)	3604.8	3608.8	3597.2
April 2020 Inflow Forecast			
April-July Volume		1,469	
Percent of Average		117	
Water Year	Historic Inflow (kaf)	Rank	
2019	1,678	12	
2018	2,318	3	
2017	2,953	1	
2016	1,032	33	
30 Year Average	1,256		

Climate Departure from Normal

March 1 through March 31, 2020

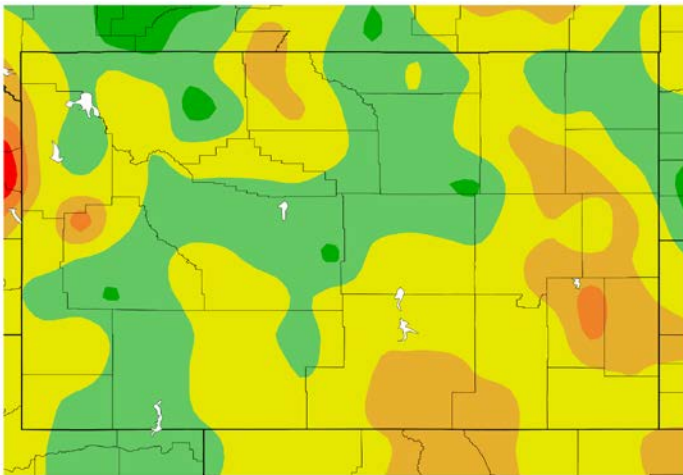
Precipitation

Departure from Normal (inches)



Temperature

Departure from Normal (°F)



HPRCC using provisional data NOAA Regional Climate Centers

CLIMATE SUMMARY

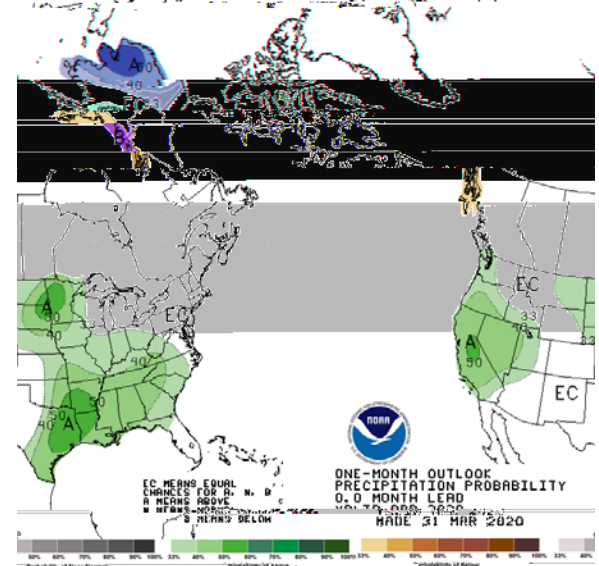
The climate in the Bighorn Basin above Yellowtail Dam was drier than average with near average temperatures during March.

Warm temperatures in early March melted low elevation snowpack resulting in higher tributary gains above Yellowtail Dam.

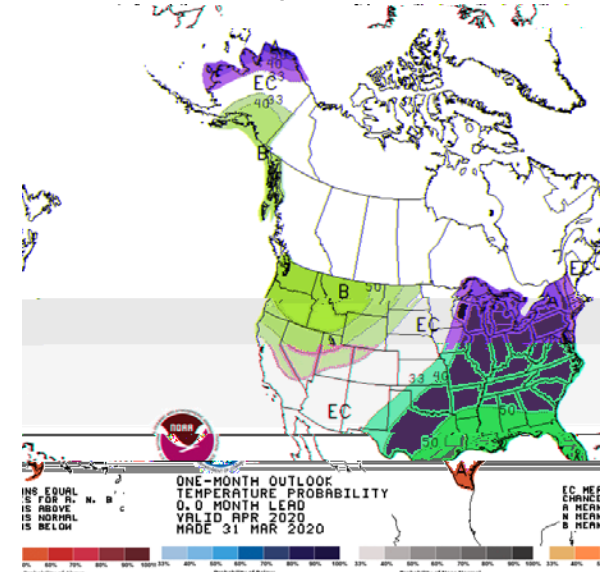
The climate outlook for April shows there is an equal chance precipitation will be above average, below average or average. in the Bighorn River Basin. There is a 33-50 percent change temperatures will be below average.

April Climate Outlook

Precipitation



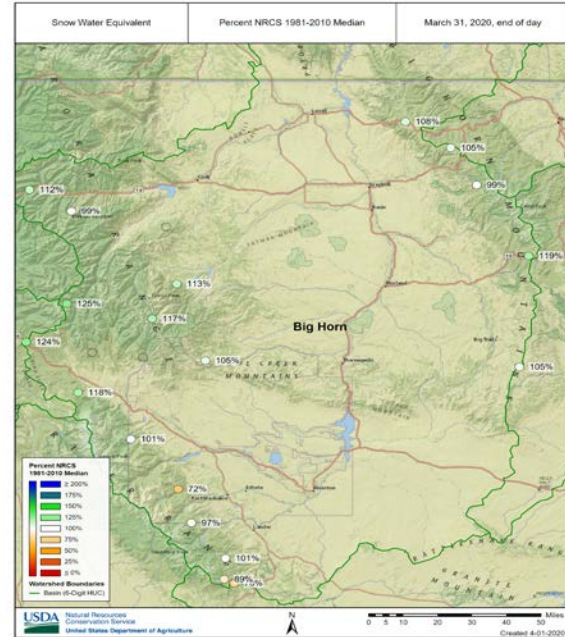
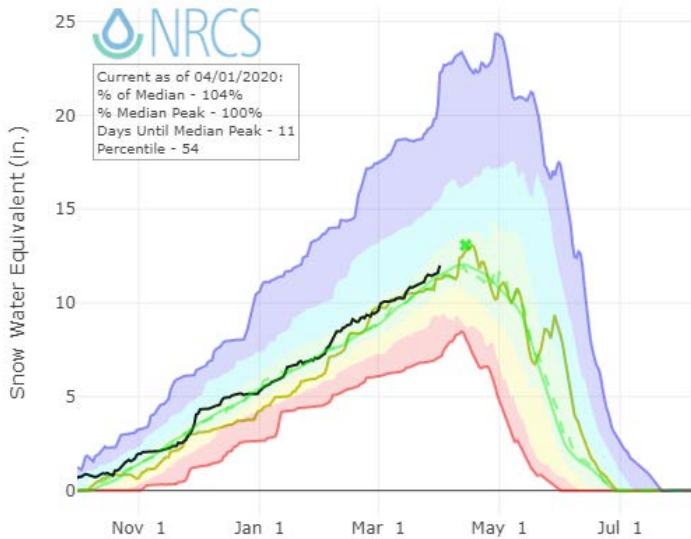
Temperature



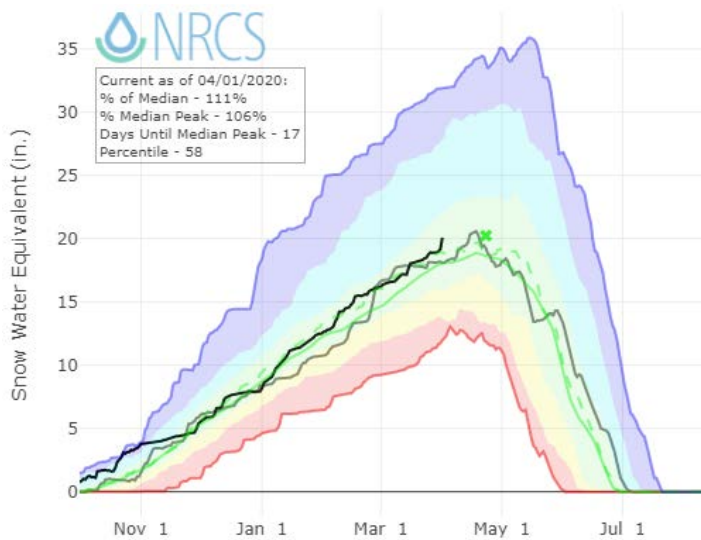
SNOWPACK SUMMARY

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

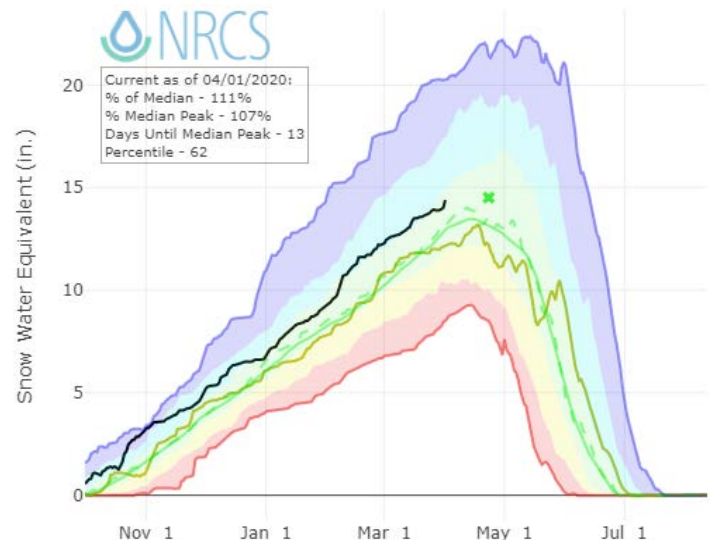
Wind River



Shoshone River



Bighorn River



- ✱ Median Peak SWE
- Max
- - - Median (POR)
- Median ('81-'10)
- Min
- Stats. Shading
- 2020 (15 sites)
- 2019 (15 sites)

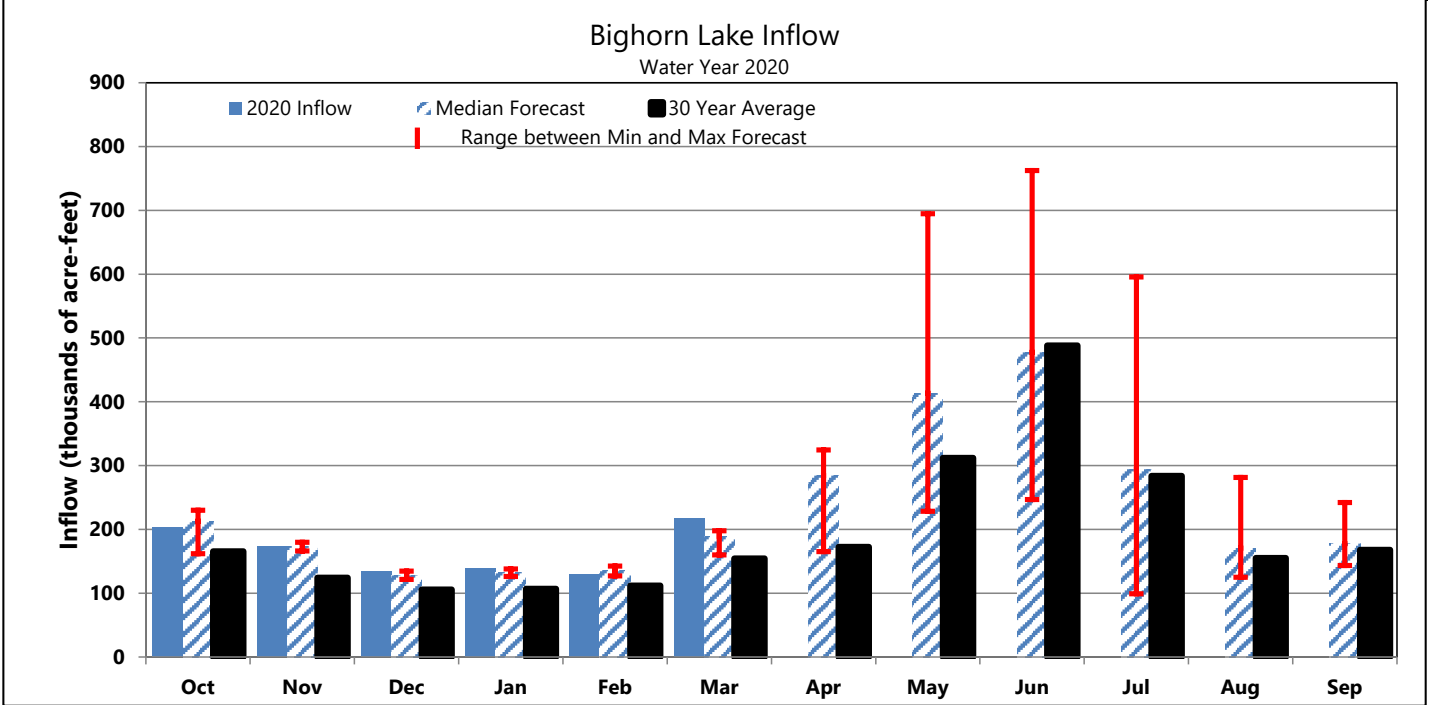
NRCS Montana Snow Survey Website: <https://www.nrcs.usda.gov/wps/portal/nrcs/mt/snow/>

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

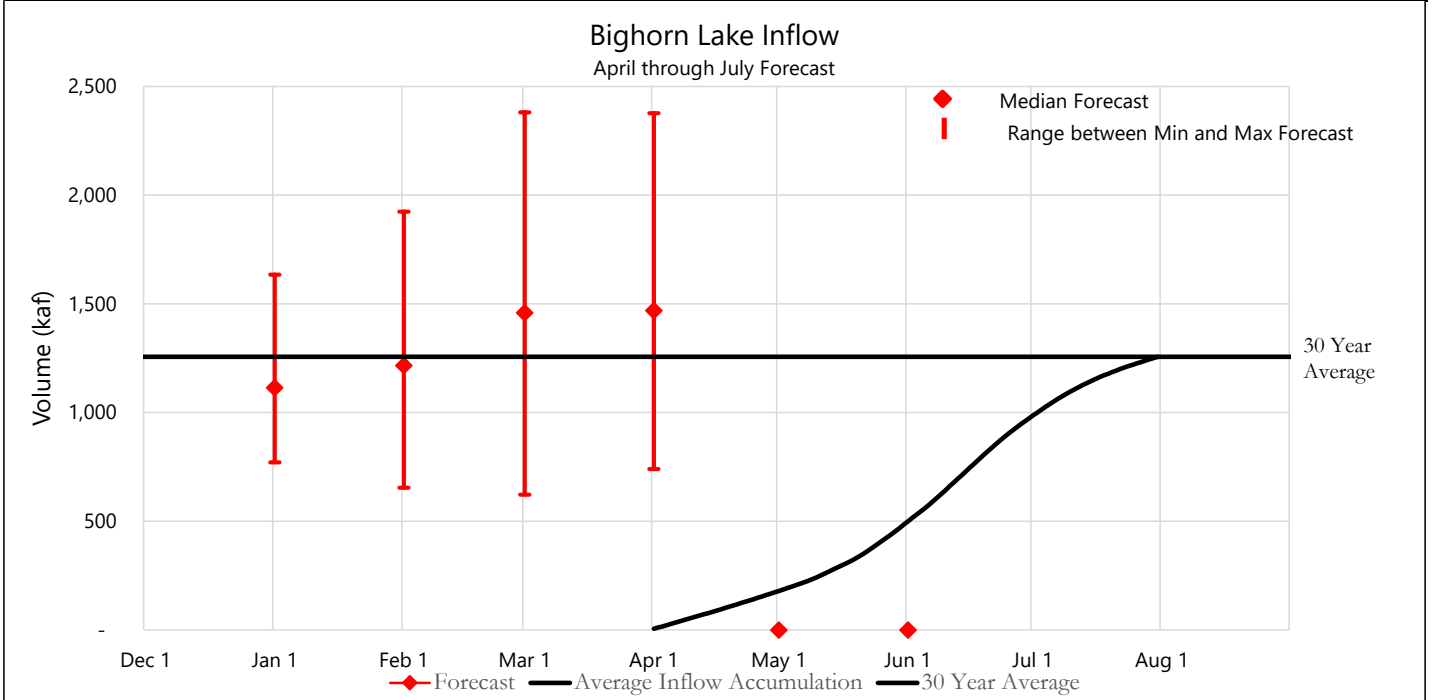
FORECAST SUMMARY

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	189.1	217.6	28.5	141



April through July Inflow Forecast for April 1					
	Median Forecast (kaf)	% of Average	Minimum Forecast (kaf)	Maximum Forecast (kaf)	
April through July Inflow	1,468.9	117	739.5	2,377.2	
Historic Maximum (2017)	2,953.1 kaf	Historic Minimum (2004)	392.1 kaf	Average	1,256.4 kaf



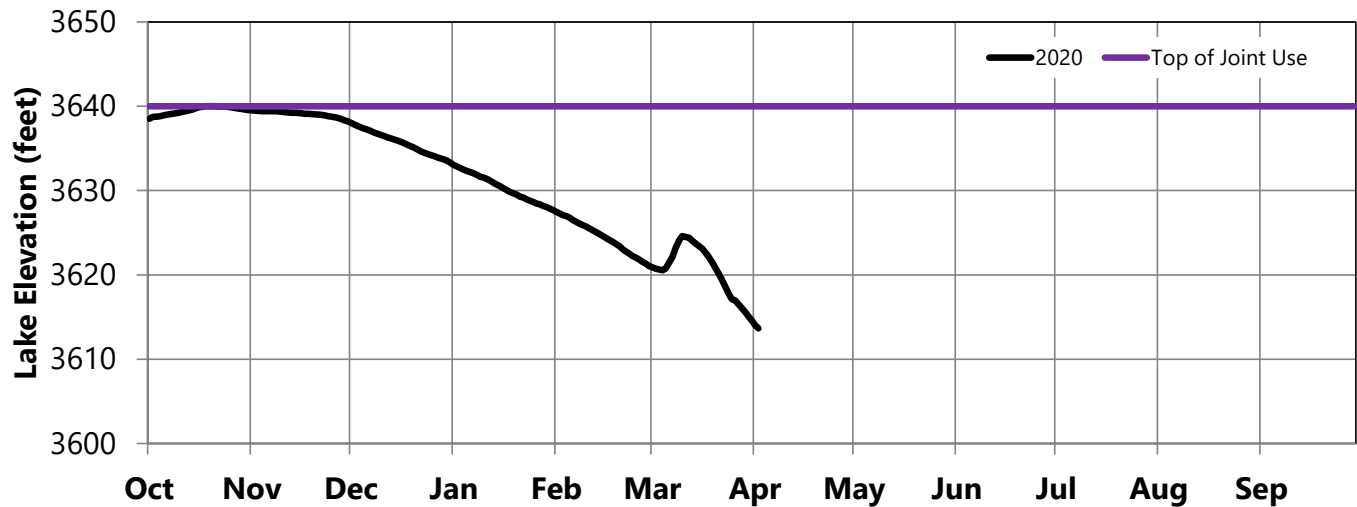
OPERATIONS REVIEW (October 1 through April 1)

River releases were increased to 5,250 cfs during March due higher than forecasted tributary gains along with a April 30 elevation target of 3611.9 feet. Storage in Bighorn Lake decreased by 6.5 feet or 45,200 AF during March. The reservoir elevation on March 31 was approximately 4 feet higher than what forecasted under median inflow conditions.

April 1 Storage Conditions

	Elevation feet	Storage acre-feet	Percent of Average	Percent Full
Bighorn Lake	3614.6	791,971	103	78
Buffalo Bill	5368.3	455,710	108	70
Boysen	4715.9	579,711	105	78

Bighorn Lake Operations Water Year 2020

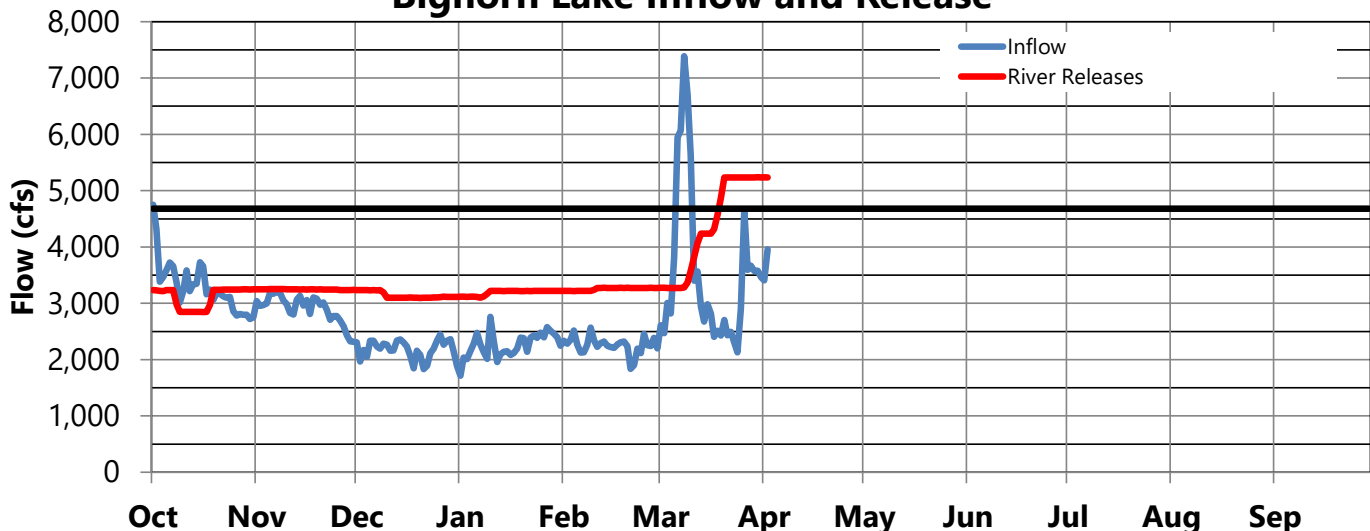


Average March Release

Average March Inflow

	Monthly Avg cfs	Percent of Average		Monthly Avg cfs	Percent of Average
Bighorn River	4,340	151	Bighorn Lake	3,538	141
Buffalo Bill Total Release	485	116	Buffalo Bill	336	95
Boysen Release	1,432	157	Boysen	1,228	143

Bighorn Lake Inflow and Release



OPERATIONS OUTLOOK (April 1 through July 31)

The river release rate from Yellowtail Dam may increase or decrease during April based on actual conditions. In accordance with current criteria, releases from Yellowtail Dam are adjusted as needed based on actual and revised forecasted inflows to stay on track with the April 30 elevation target. The end of April elevation target based on the current April through July inflow forecast, 1,468 kaf, is 3611.8 feet. Releases towards the end of April are expected to increase based on the maximum drawdown rule curve target of 3609.3 feet.

Median Inflow Conditions (April through July Inflow 1,469 kaf)

	Apr	May	Jun	Jul
Boysen Release (cfs)	2,149	2,287	2,287	2,287
Buffalo Bill Release (cfs)	1,933	3,243	3,363	3,436
Tributary Gain (cfs)	696	1,190	2,373	-942
Monthly Inflow (cfs)	4,778	6,720	8,023	4,781
Monthly Inflow (kaf)	288.5	417.5	481.6	298.3
Monthly Release (kaf)	323.6	390.9	287.7	254.7
Afterbay Release (cfs)	5,439	6,357	4,835	4,143
River Release (cfs)	5,383	6,163	4,452	3,686
End-of-Month Content (kaf)	756.8	783.4	977.3	1,020.9
End-of-Month Elevation (feet)	3608.8	3613.2	3636.4	3640.0

Minimum Inflow Conditions (April through July Inflow 740 kaf)

	Apr	May	Jun	Jul
Boysen Release (cfs)	1,501	1,051	1,250	1,251
Buffalo Bill Release (cfs)	998	2,597	3,166	2,176
Tributary Gain (cfs)	277	67	-269	-1,815
Monthly Inflow (cfs)	2,776	3,715	4,148	1,612
Monthly Inflow (kaf)	169.4	232.7	251.0	103.4
Monthly Release (kaf)	226.1	138.6	160.9	166.4
Afterbay Release (cfs)	3,801	2,254	2,704	2,707
River Release (cfs)	3,733	2,000	2,250	2,250
End-of-Month Content (kaf)	735.2	829.3	919.4	856.4
End-of-Month Elevation (feet)	3604.8	3620.0	3630.9	3623.5

Maximum Inflow Conditions (April through July Inflow 2,377 kaf)

	Apr	May	Jun	Jul
Boysen Release (cfs)	2,250	3,755	3,756	4,178
Buffalo Bill Release (cfs)	1,933	4,887	5,006	5,082
Tributary Gain (cfs)	1,271	2,656	4,050	426
Monthly Inflow (cfs)	5,453	11,298	12,813	9,687
Monthly Inflow (kaf)	328.7	699.0	766.6	599.9
Monthly Release (kaf)	425.5	696.7	523.9	520.1
Afterbay Release (cfs)	7,150	11,330	8,804	8,459
River Release (cfs)	7,150	11,233	8,557	8,039
End-of-Month Content (kaf)	695.2	697.5	940.2	1,020.0
End-of-Month Elevation (feet)	3597.2	3597.6	3633.0	3640.0

OPERATIONS OUTLOOK (April 1 through July 31)

There is approximately 70 cfs of gain between Yellowtail Dam and Yellowtail Afterbay Dam from spring 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 diversions are expected to begin during April.

Irrigation Demands Outlook

Bighorn Canal (cfs)

	Apr	May	Jun	Jul
Median Forecast	55	194	383	457
Minimum Forecast	67	254	454	457
Maximum Forecast	0	98	247	420

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	4,648	4,665	4,435	4,069
Minimum Forecast	3,569	2,184	2,634	2,637
Maximum Forecast	4,644	4,799	4,552	4,386

Yellowtail Powerplant Generation (gwh)

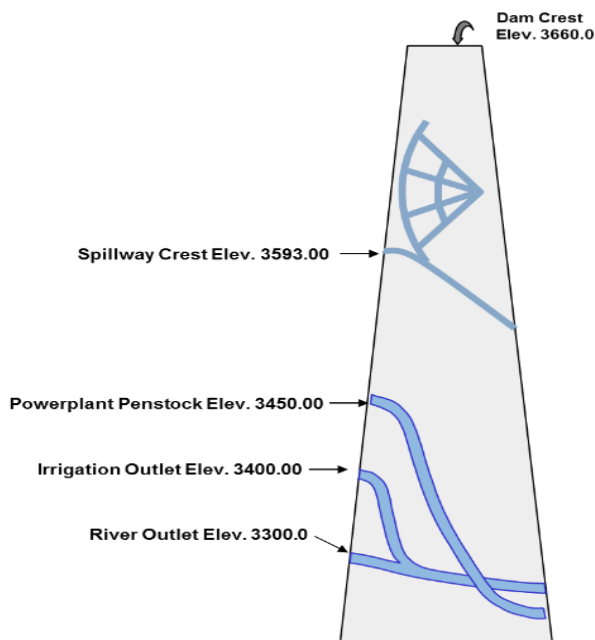
	Apr	May	Jun	Jul
Median Forecast	145.0	145.0	145.0	135.3
Minimum Forecast	110.1	68.6	87.3	87.8
Maximum Forecast	145.0	145.0	145.0	145.0

Yellowtail Spill (cfs)

	Apr	May	Jun	Jul
Median Forecast	720	1,622	330	0
Minimum Forecast	162	0	0	0
Maximum Forecast	2,436	6,461	4,182	4,003

Release Outlook by Outlet

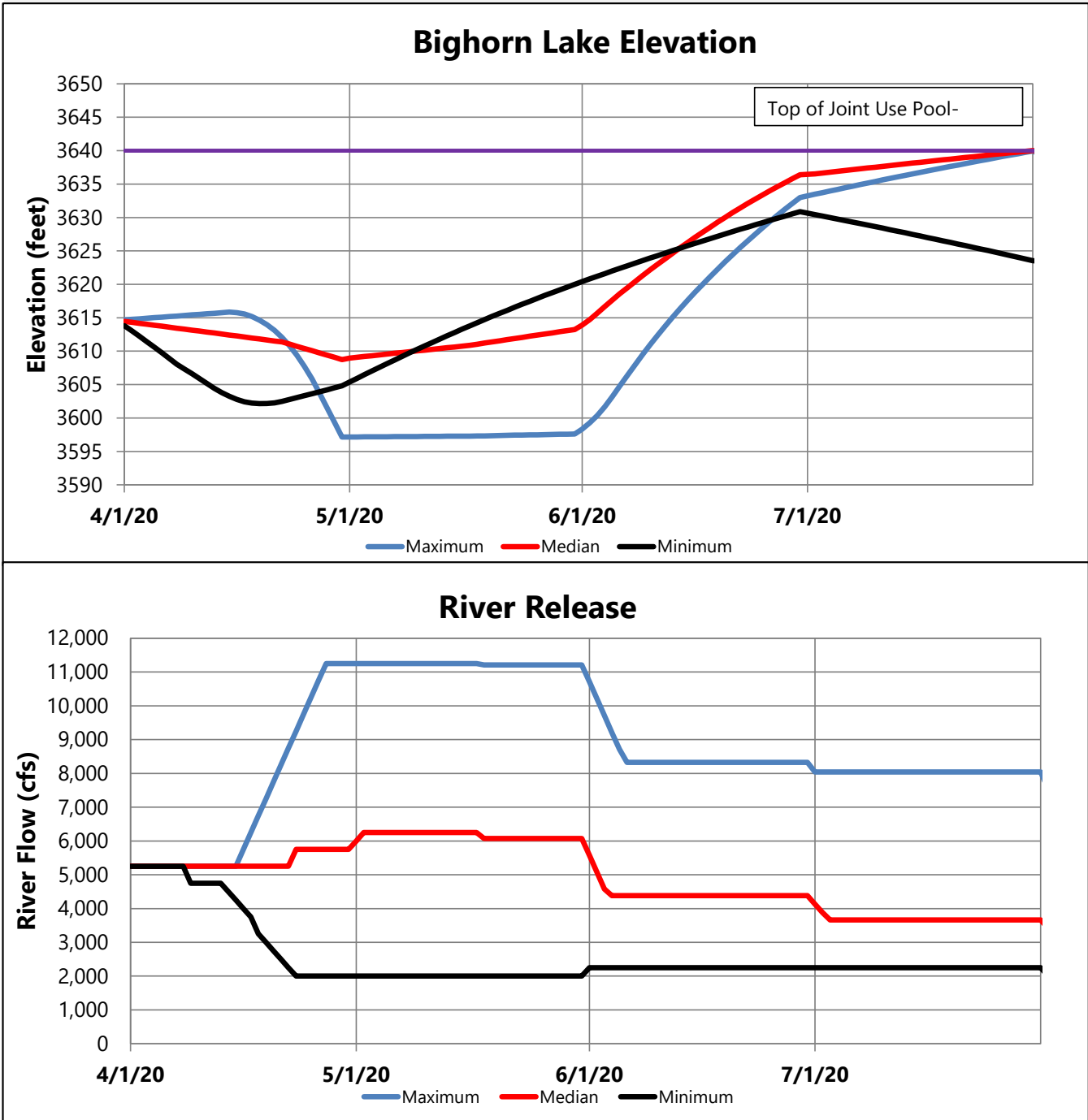
Current releases through the river outlet works are 500 cfs. Powerplant bypass releases are expected to continue to through June under median probable conditions and into July under maximum probable conditions.



OPERATIONS OUTLOOK (April 1 through July 31)

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.

The elevation of Bighorn Lake at the end of April is expected to be between 3597.1 and 3608.8 feet. Bighorn Lake is expected to fill to normal full pool, elevation 3640 feet, under median and maximum inflow conditions.



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