

# Yellowtail Dam Water Supply and Projected Operations



BUREAU OF RECLAMATION

**May 2020**



Bighorn River Basin Map Source: DEMIS Mapsver

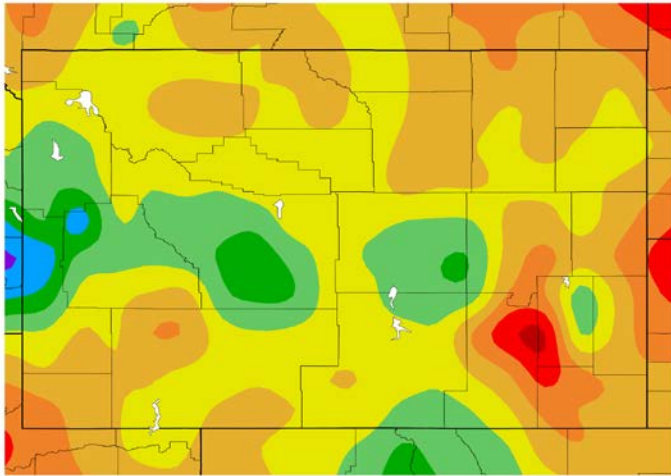
<b>May Operating Range</b>			
<b>Forecast</b>	<b>Minimum</b>	<b>Median</b>	<b>Maximum</b>
<b>Monthly Average Inflow (cfs)</b>	3,360	4,710	6,425
<b>Monthly Average River Release (cfs)</b>	2,750	3,290	4,825
<b>End of May Elevation (feet)</b>	3613.3	3621.0	3622.9
<b>May 2020 Inflow Forecast</b>			
May-July Volume		938	
Percent of Average		87	
<b>Water Year</b>	<b>Historic Inflow (kaf)</b>	<b>Rank</b>	
2019	1,493	12	
2018	1,927	4	
2017	2,350	1	
2016	910	32	
<b>30 Year Average</b>	1,084		

# Climate Departure from Normal

April 1 through April 30, 2020

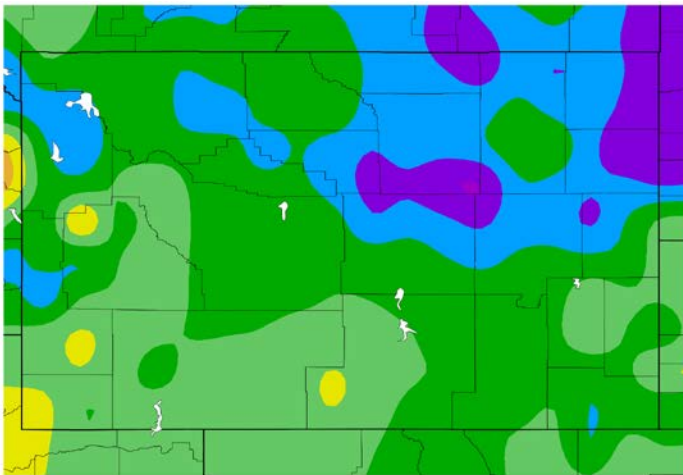
## Precipitation

Departure from Normal (inches)



## Temperature

Departure from Normal (°F)



HPRCC using provisional data NOAA Regional Climate Centers

# CLIMATE SUMMARY

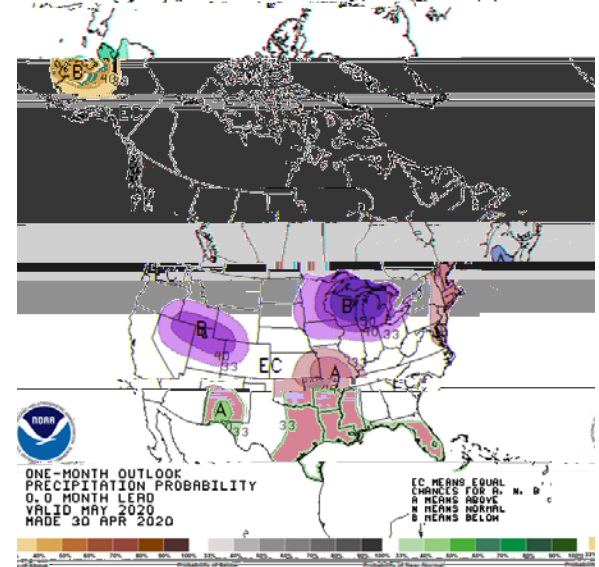
The climate in the Bighorn Basin above Yellowtail Dam was drier and cooler than average during April.

Warm temperatures at the end of April melted some of the mid-level snowpack. The dry conditions led to lower inflow forecasts for May.

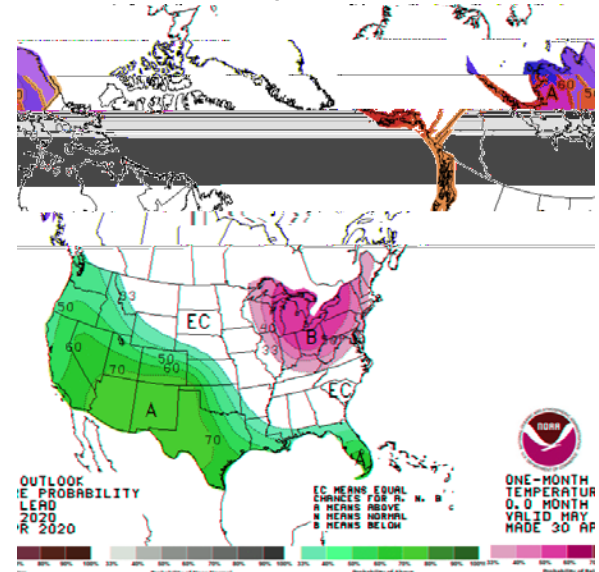
The climate outlook for May shows there is an equal chance precipitation will be above average, below average or average in the northern half in the Bighorn Basin but a greater chance of being below average in the southern part of the Basin. There is an equal chance temperatures will be above average, below average, or average in the northern part of the Basin but greater chance temperatures will be above average in the southern part of the Basin.

# May Climate Outlook

## Precipitation



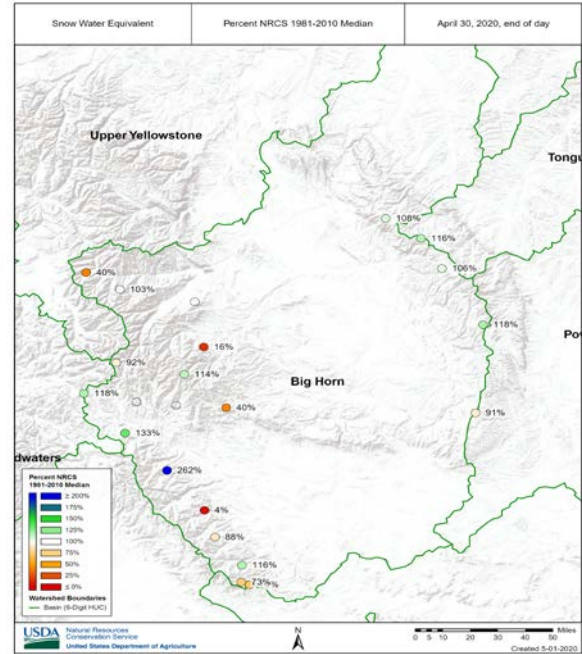
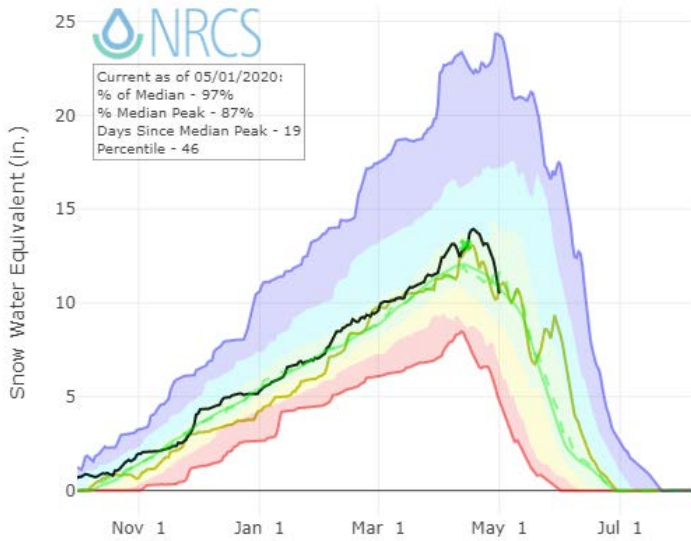
## Temperature



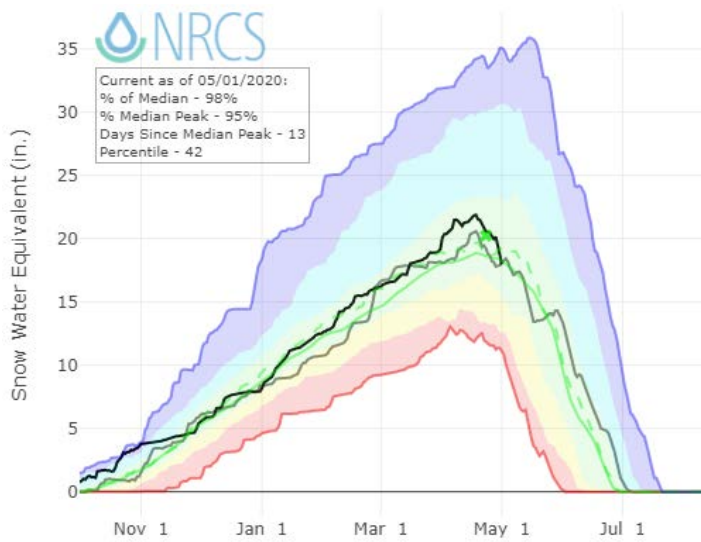
# SNOWPACK SUMMARY

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

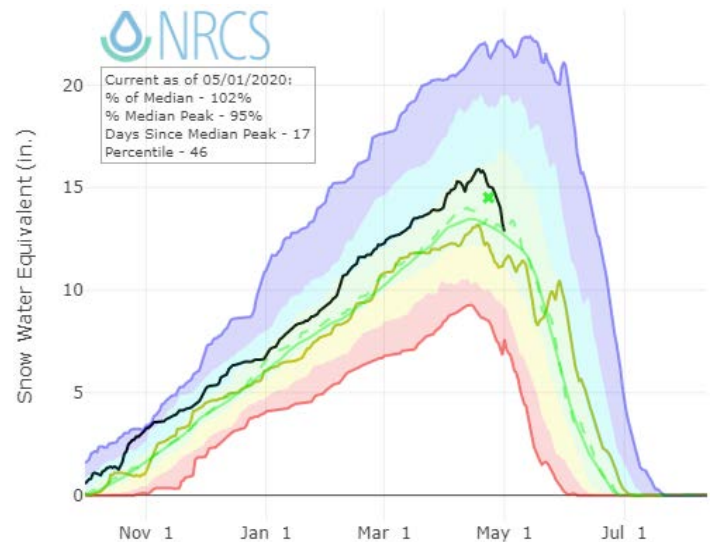
### Wind River



### Shoshone River



### Bighorn River



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

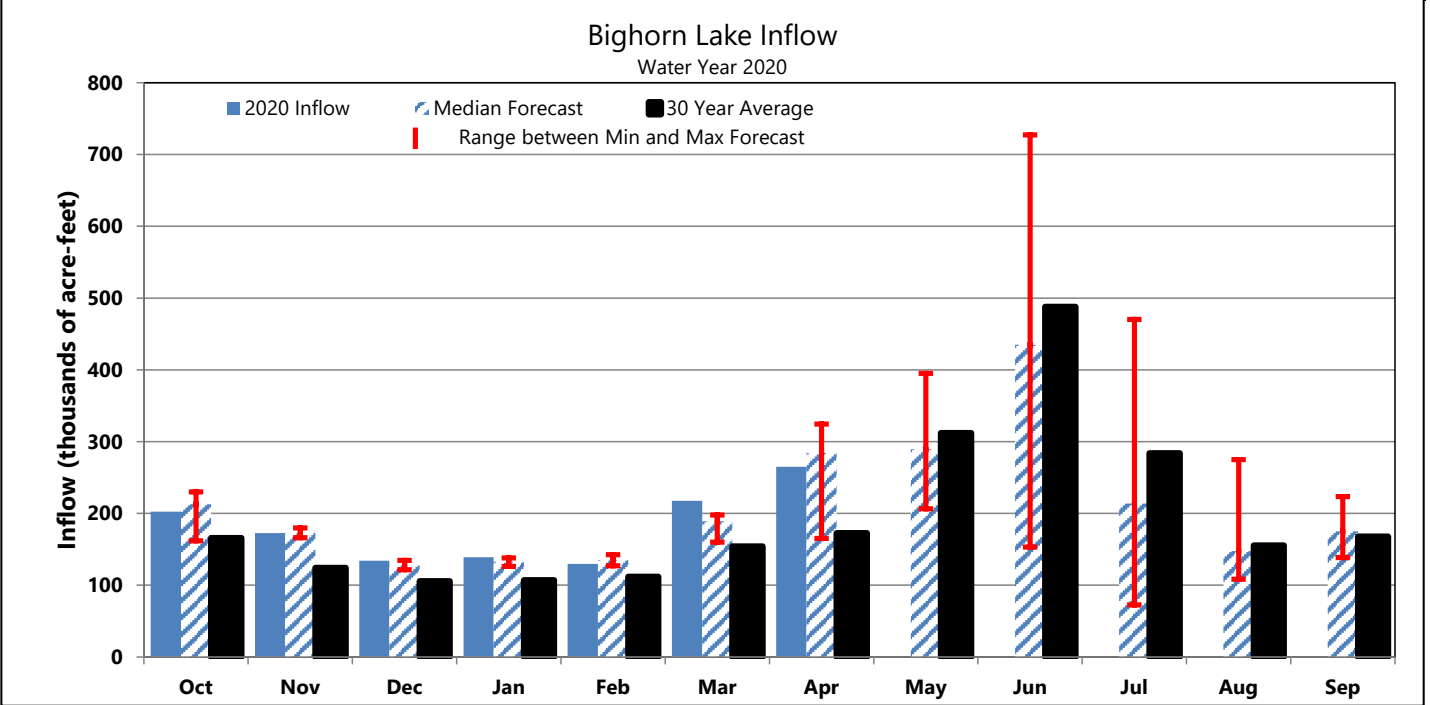
NRCS Montana Snow Survey Website: <https://www.nrcs.usda.gov/wps/portal/nrcs/mt/snow/>

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

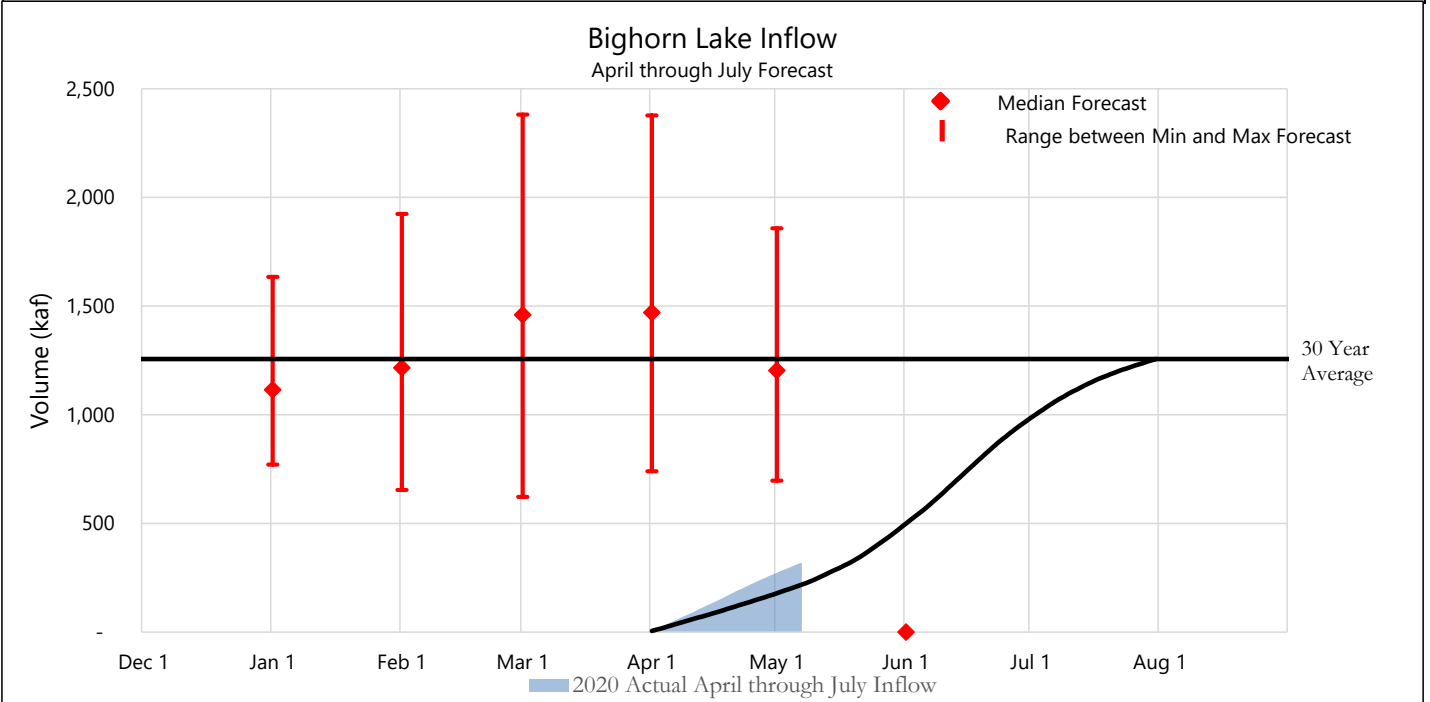
# FORECAST SUMMARY

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

April Forecast Review				
	Median Forecast (kaf)	Actual (kaf)	Difference (kaf)	Actual (% of Avg)
April Inflow	284.3	264.8	(19.5)	154



May through July Inflow Forecast for May 1				
	Median Forecast (kaf)	% of Average	Minimum Forecast (kaf)	Maximum Forecast (kaf)
May through July Inflow	938.2	87	432.3	1,592.7
Actual April Inflow	264.8 kaf	April through July Inflow	1203 kaf	30 Year Average 1,256.4 kaf





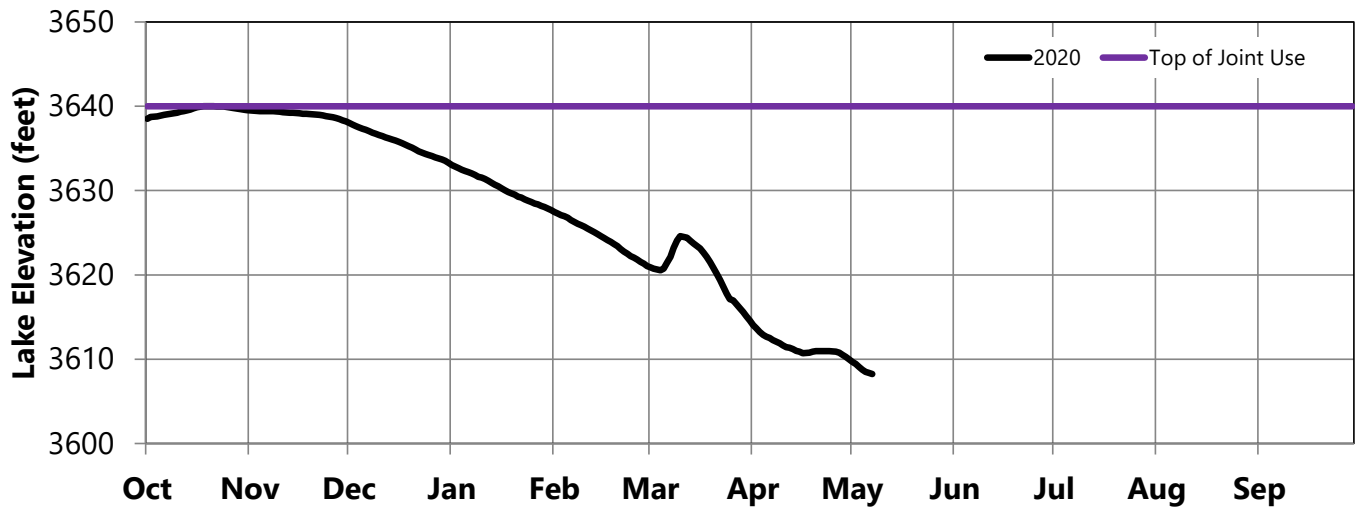
# OPERATIONS REVIEW (October 1 through May 1)

River releases were decreased to 4,650 cfs and later adjusted to 4,750 cfs during April due to lower than forecasted inflows. Storage in Bighorn Lake decreased by 4.6 feet or 28,100 AF during April. The reservoir elevation on April 30 was approximately 1 foot higher than what forecasted under median inflow conditions.

## May 1 Storage Conditions

	Elevation feet	Storage acre-feet	Percent of Average	Percent Full
Bighorn Lake	3610.0	763,861	101	75
Buffalo Bill	5359.1	394,623	108	61
Boysen	4711.8	518,509	105	70

## Bighorn Lake Operations Water Year 2020



## Average April Release

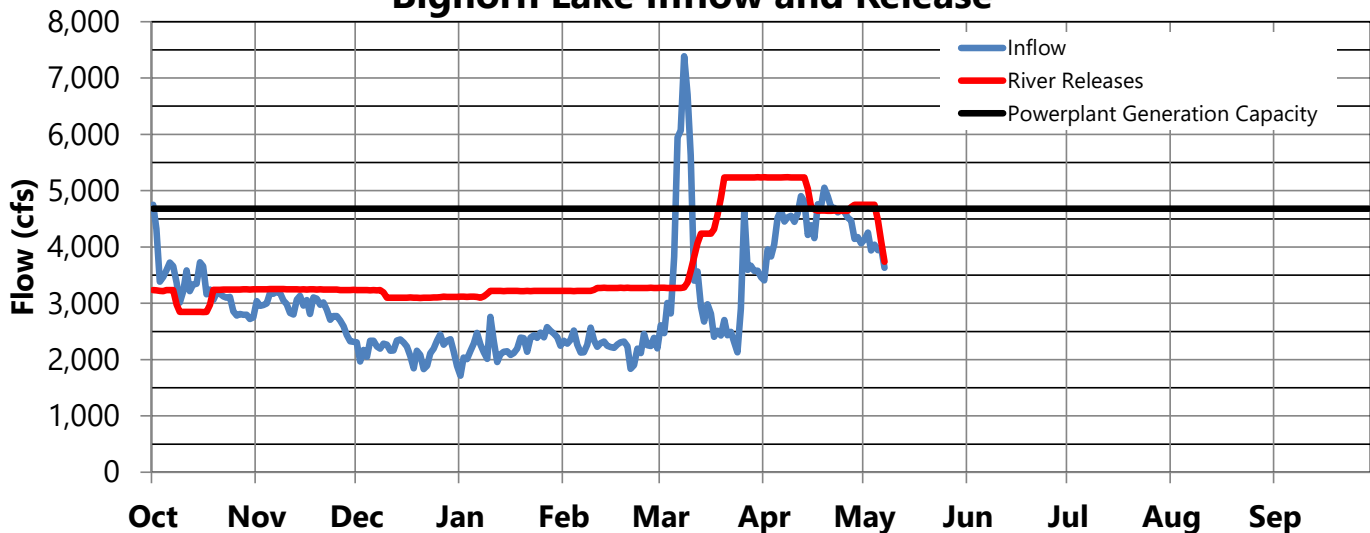
Monthly Avg cfs	Percent of Average
Bighorn River	148
Buffalo Bill Total Release	160
Boysen Release	172

## Average April Inflow

Monthly Avg cfs	Percent of Average
Bighorn Lake	154
Buffalo Bill	102
Boysen	117

Bighorn River	4,929	148	Bighorn Lake	4,451	154
Buffalo Bill Total Release	1,830	160	Buffalo Bill	804	102
Boysen Release	2,033	172	Boysen	1,005	117

## Bighorn Lake Inflow and Release



# OPERATIONS OUTLOOK (May 1 through October 31)

The river release rate from Yellowtail Dam is being decreased to 3,000 cfs by May 12. Releases may decrease or increase during the rest of May 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 May 31 elevation target. The end of May elevation target based on the current May through July inflow forecast, 938 kaf, is 3621.1 feet.

## Median Inflow Conditions (May through July Inflow 938 kaf)

	May	Jun	Jul	Aug	Sep	Oct
Boysen Release (cfs)	1,800	2,479	1,929	1,251	1,232	950
Buffalo Bill Release (cfs)	2,331	2,640	2,716	2,062	1,499	696
Tributary Gain (cfs)	577	2,191	-1,169	-916	208	1,065
Monthly Inflow (cfs)	4,708	7,310	3,476	2,397	2,939	2,711
Monthly Inflow (kaf)	289.5	435.0	213.7	147.4	174.9	166.7
Monthly Release (kaf)	220.8	275.6	198.0	189.9	174.6	165.9
Afterbay Release (cfs)	3,591	4,631	3,220	3,089	2,935	2,699
River Release (cfs)	3,292	4,192	2,763	2,650	2,650	2,650
End-of-Month Content (kaf)	836.8	1,000.5	1,020.5	982.2	986.7	991.8
End-of-Month Elevation (feet)	3621.0	3638.4	3640.0	3636.8	3637.2	3637.6

## Minimum Inflow Conditions (May through July Inflow 432 kaf)

	May	Jun	Jul	Aug	Sep	Oct
Boysen Release (cfs)	1,400	1,250	1,251	1,251	1,050	600
Buffalo Bill Release (cfs)	2,005	1,901	1,976	1,862	1,499	696
Tributary Gain (cfs)	-47	-576	-2,046	-1,350	-222	729
Monthly Inflow (cfs)	3,358	2,575	1,181	1,763	2,327	2,025
Monthly Inflow (kaf)	206.5	153.2	72.6	108.4	138.5	124.5
Monthly Release (kaf)	190.7	116.0	123.0	119.9	107.1	110.6
Afterbay Release (cfs)	3,102	1,950	2,000	1,950	1,800	1,799
River Release (cfs)	2,752	1,500	1,500	1,500	1,500	1,750
End-of-Month Content (kaf)	783.9	825.2	779.2	772.0	807.5	825.7
End-of-Month Elevation (feet)	3613.3	3619.5	3612.6	3611.4	3617.0	3619.5

## Maximum Inflow Conditions (May through July Inflow 1,593 kaf)

	May	Jun	Jul	Aug	Sep	Oct
Boysen Release (cfs)	1,800	4,391	3,331	2,249	1,101	1,000
Buffalo Bill Release (cfs)	2,331	4,290	4,363	2,482	1,949	733
Tributary Gain (cfs)	2,295	3,541	-46	-259	706	1,366
Monthly Inflow (cfs)	6,426	12,222	7,648	4,472	3,756	3,099
Monthly Inflow (kaf)	395.1	727.3	470.3	275.0	223.5	190.6
Monthly Release (kaf)	312.0	616.1	420.5	279.3	227.7	224.4
Afterbay Release (cfs)	5,075	10,354	6,839	4,542	3,826	3,650
River Release (cfs)	4,825	10,114	6,419	4,142	3,666	3,650
End-of-Month Content (kaf)	851.2	966.5	1,020.6	1,020.6	1,020.6	991.0
End-of-Month Elevation (feet)	3622.9	3635.4	3640.0	3640.0	3640.0	3637.6

# OPERATIONS OUTLOOK (May 1 through October 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 started on April 16.

## Irrigation Demands Outlook

Bighorn Canal (cfs)

	May	Jun	Jul	Aug	Sep	Oct
Median Forecast	299	439	457	439	285	49
Minimum Forecast	350	450	500	450	300	49
Maximum Forecast	250	240	420	400	160	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)

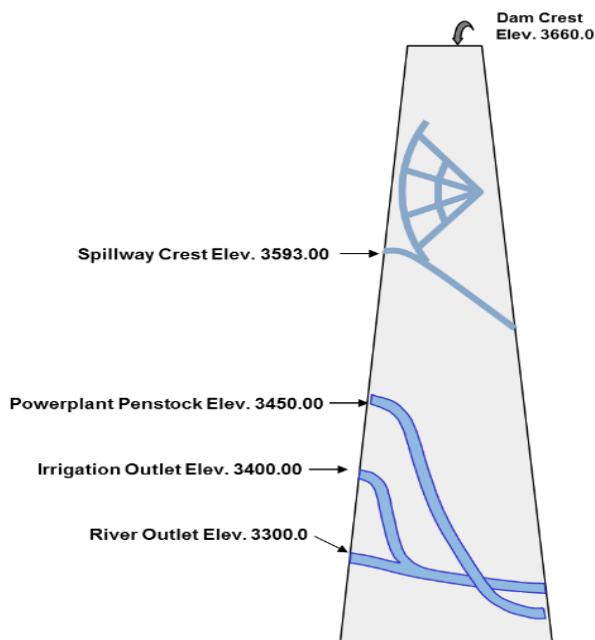
	May	Jun	Jul	Aug	Sep	Oct
Median Forecast	3,516	4,426	3,150	3,019	2,865	2,629
Minimum Forecast	3,021	1,880	1,930	1,880	1,730	1,729
Maximum Forecast	4,199	4,625	4,631	4,412	3,756	3,580

Yellowtail Powerplant Generation (gwh)

	May	Jun	Jul	Aug	Sep	Oct
Median Forecast	111.5	146.1	107.1	102.9	97.9	89.3
Minimum Forecast	93.7	59.7	61.2	59.0	54.9	55.5
Maximum Forecast	135.5	153.0	153.0	146.6	126.1	120.4

Yellowtail Spill (cfs)

	May	Jun	Jul	Aug	Sep	Oct
Median Forecast	6	135	0	0	0	0
Minimum Forecast	11	0	0	0	0	0
Maximum Forecast	806	5,659	2,138	61	0	0



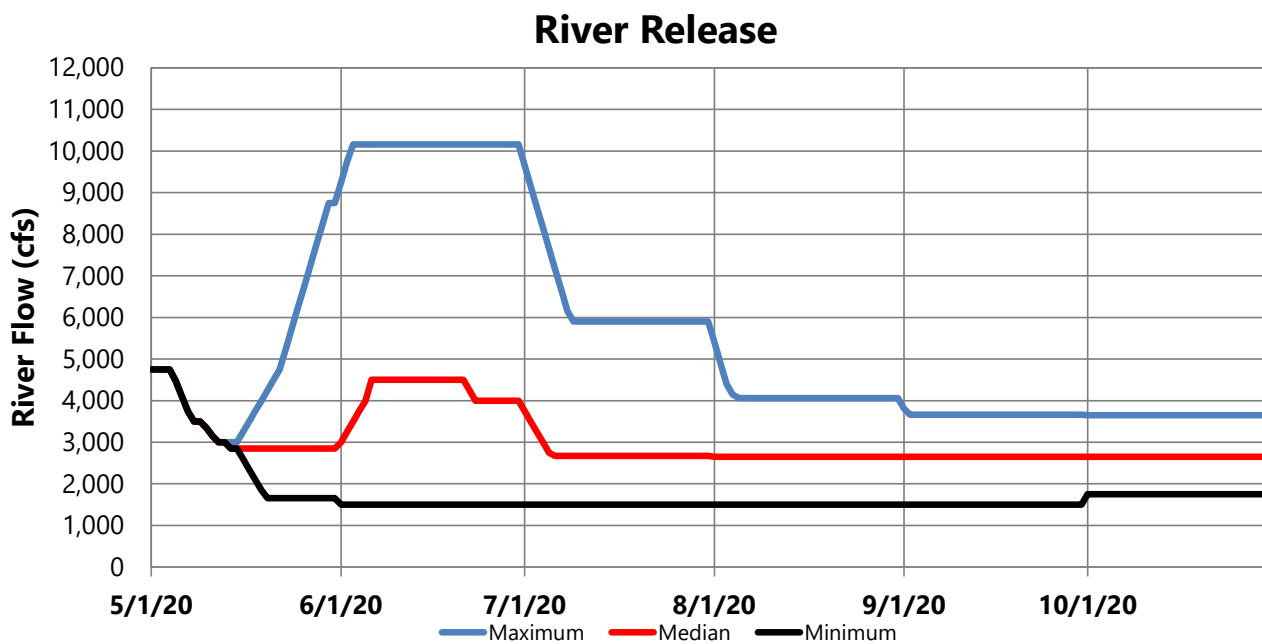
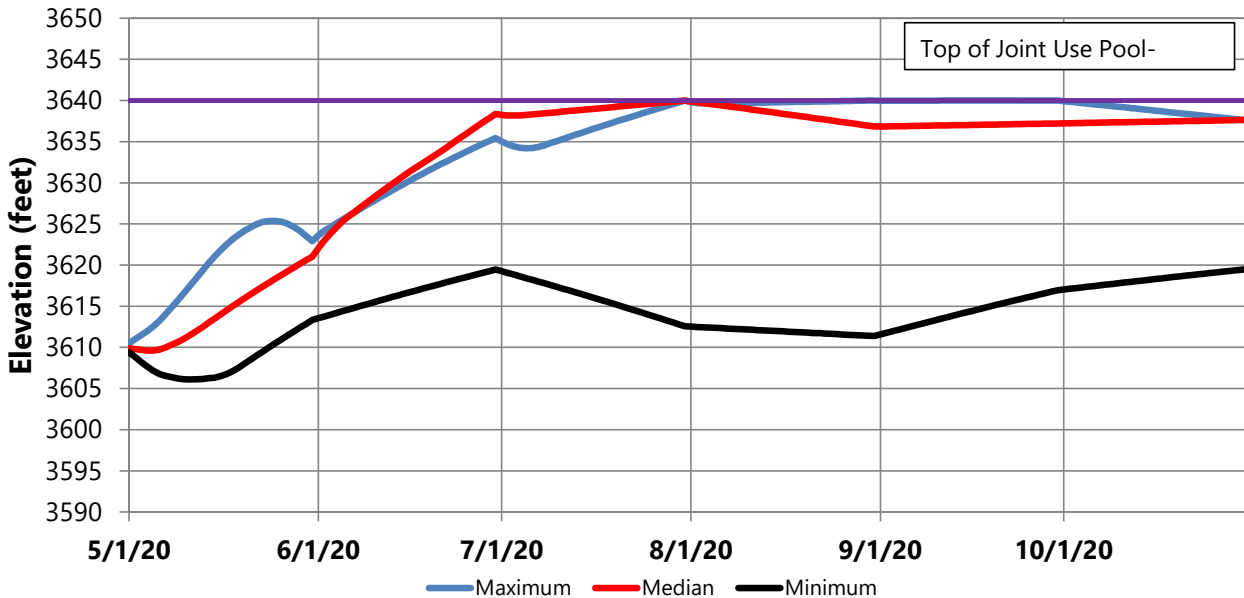
## Release Outlook by Outlet

Currently all releases are through the powerplant. Powerplant bypass releases are expected during June under median inflow conditions and from late May through early August under maximum inflow conditions..

# OPERATIONS OUTLOOK (May 1 through October 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 May is expected to be between 3613 and 3623 feet. Bighorn Lake is expected to fill to normal full pool, elevation 3640 feet, under median and maximum inflow conditions.



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