

# Yellowtail Dam Water Supply and Projected Operations



— BUREAU OF —  
RECLAMATION

July 2020



Bighorn River Basin Map Source: DEMIS Mapserver

July Operating Range			
Forecast	Minimum	Median	Maximum
<b>Monthly Average Inflow (cfs)</b>	2,310	3,120	3,590
<b>Monthly Average River Release (cfs)</b>	2,875	3,035	3,265
<b>End of July Elevation (feet)</b>	3633.2	3636.8	3638.3
July 2020 Inflow Forecast			
July Volume			192
Percent of Average			68
Water Year	Historic Inflow (kaf)		Rank
2019	461		11
2018	373		17
2017	616		6
2016	129		40
<b>30 Year Average</b>	284		

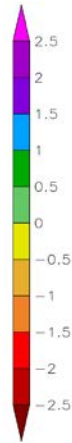
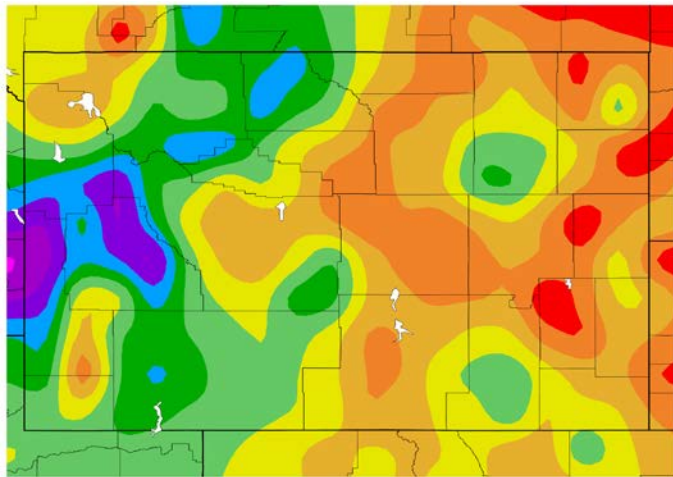


## Climate Departure from Normal

June 1 through June 30, 2020

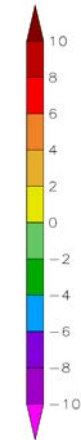
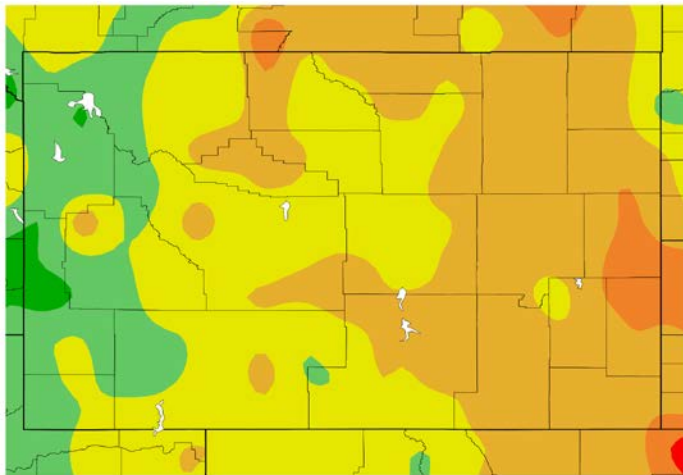
### Precipitation

Departure from Normal (inches)



### Temperature

Departure from Normal (°F)



HPRCC using provisional data NOAA Regional Climate Centers

## CLIMATE SUMMARY

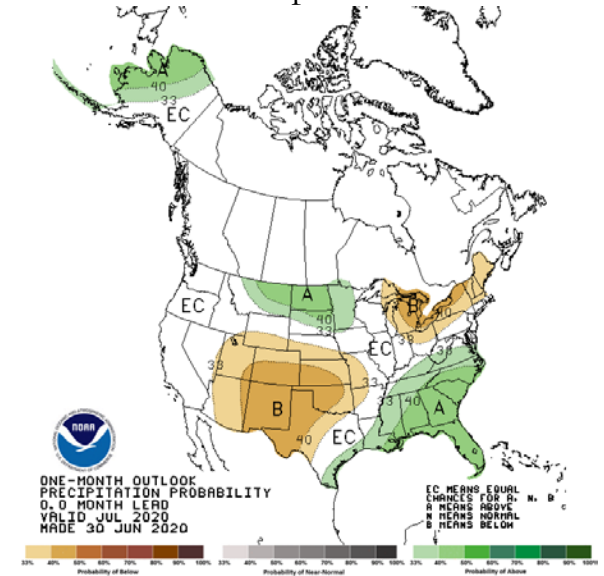
The climate in the Bighorn Basin above Yellowtail Dam was mixed. Generally, the western portion of the basin was wetter than average while the eastern area was drier than average. Temperatures were near normal.

Precipitation at the end of the month increased streamflows across the basin and improved the outlook for Yellowtail Dam operations.

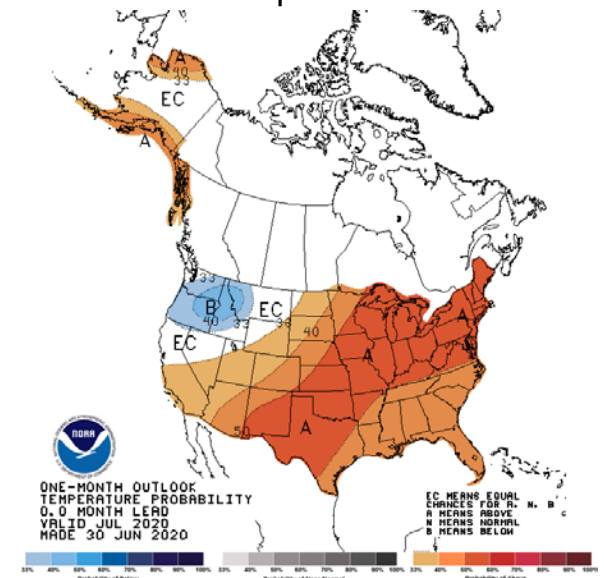
The climate outlook for July shows there is an equal chance precipitation will be above average, below average or average for most of the Bighorn Basin. There is also an equal chance temperatures will be either above average, below average or average for most of the Basin.

## July Climate Outlook

### Precipitation



### Temperature

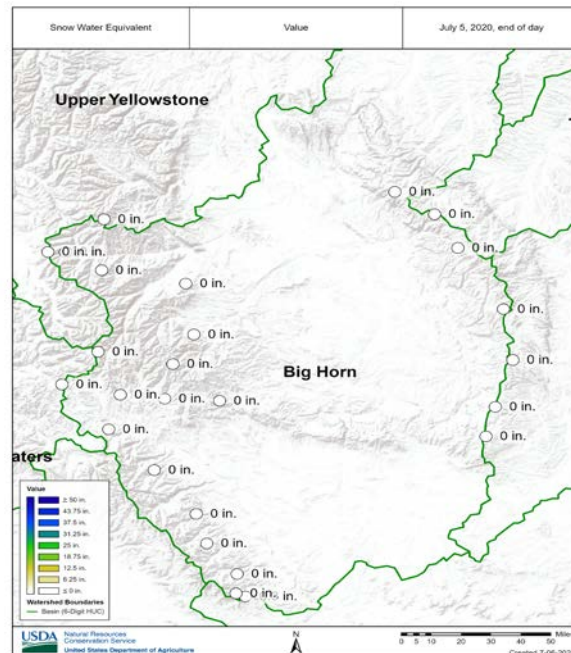
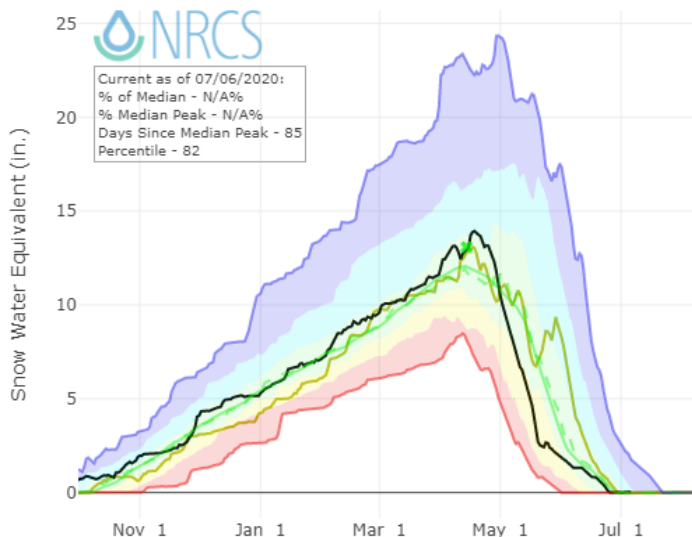




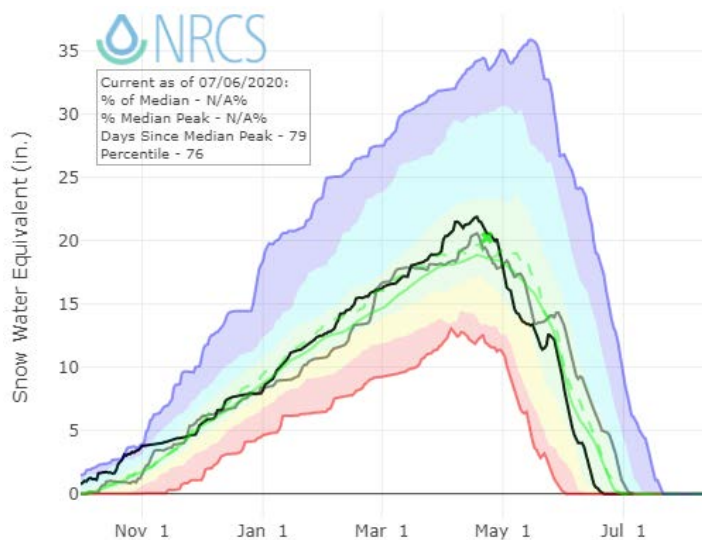
# SNOWPACK SUMMARY

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).

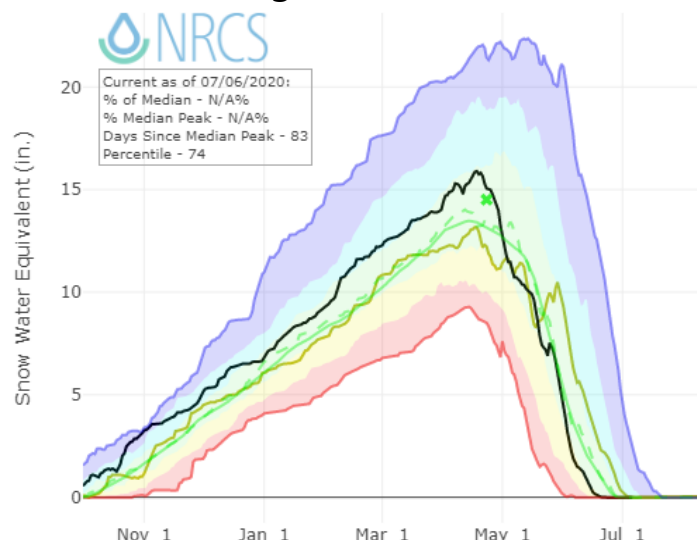
## Wind River



## Shoshone River



## Bighorn River



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

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

# FORECAST SUMMARY

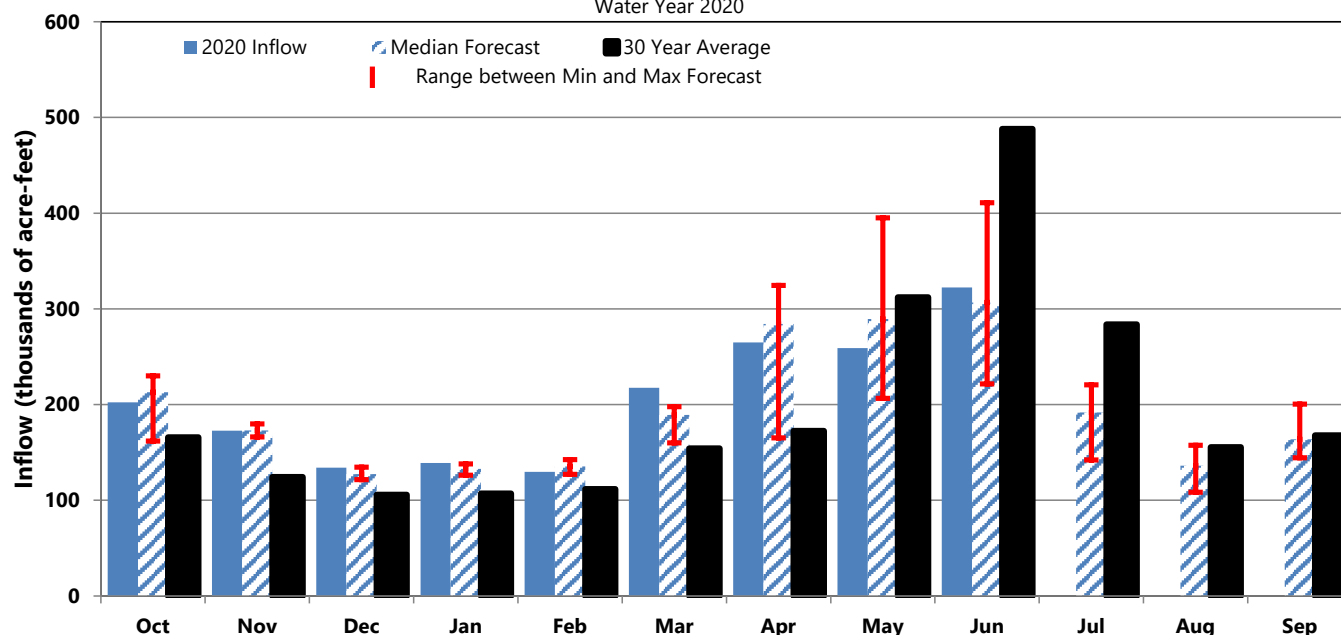
SNOTEL data, streamflow data and planned releases from Boysen and Buffalo Bill Reservoirs are used to compute an inflow forecast for Bighorn Lake.

## June Forecast Review

	Median Forecast (kaf)	Actual (kaf)	Difference (kaf)	Actual (% of Avg)
June Inflow	306.6	322.5	15.9	66

## Bighorn Lake Inflow

Water Year 2020

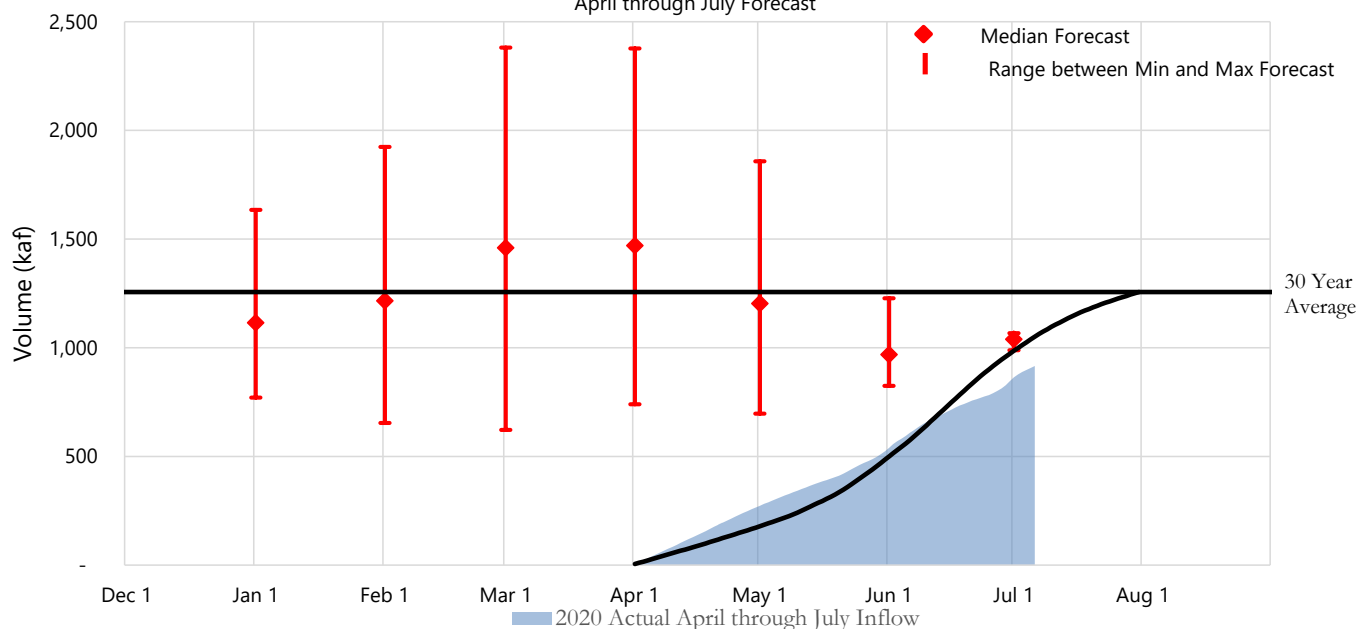


## July Inflow Forecast

	Median Forecast (kaf)	% of Average	Minimum Forecast (kaf)	Maximum Forecast (kaf)
July Inflow	191.8	68	142.1	220.6
Actual April-June Inflow	846.4 kaf	April through July Inflow	1,038.20 kaf	30 Year Average, 1,256.4 kaf

## Bighorn Lake Inflow

April through July Forecast



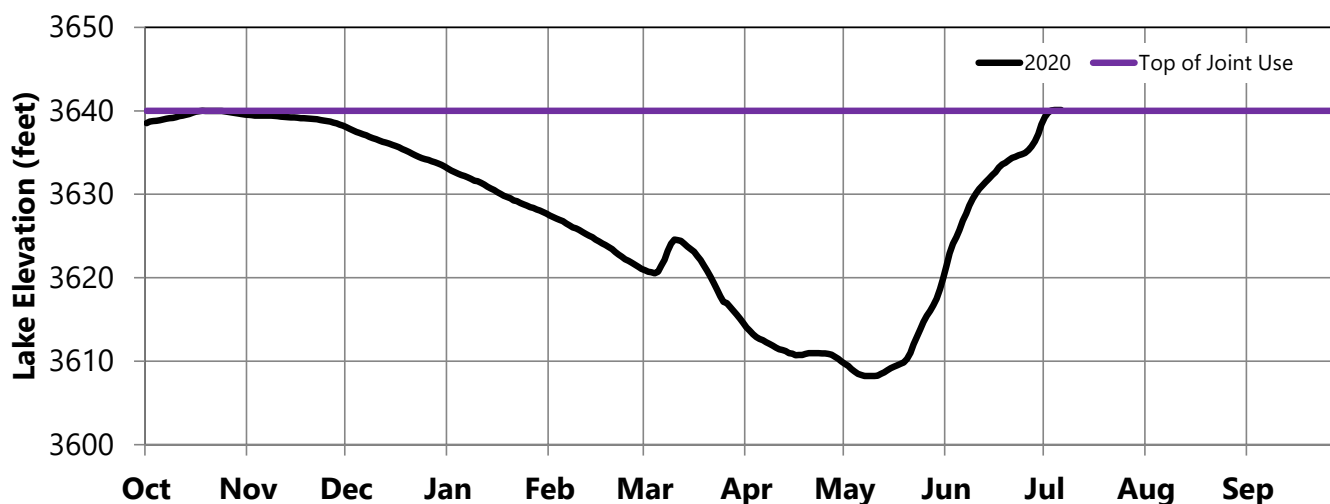
# OPERATIONS REVIEW (October 1 through July 1)

River releases fluctuated between 2,000 and 2,250 cfs for most of June based on fluctuating inflow forecasts. Storage in Bighorn Lake increased by 18.1 feet or 171,760 AF during June. The reservoir elevation on May 31 was approximately 1 foot higher than what forecasted under median inflow conditions. Precipitation at the end of June caused an increase in inflows and releases increased as the Bighorn Lake approached normal full pool, elevation 3640 feet.

## July 1 Storage Conditions

	Elevation feet	Storage acre-feet	Percent of Average	Percent Full
Bighorn Lake	3638.4	1,000,351	106	98
Buffalo Bill	5392.3	636,746	105	98
Boysen	4719.8	644,300	99	87

## Bighorn Lake Operations Water Year 2020

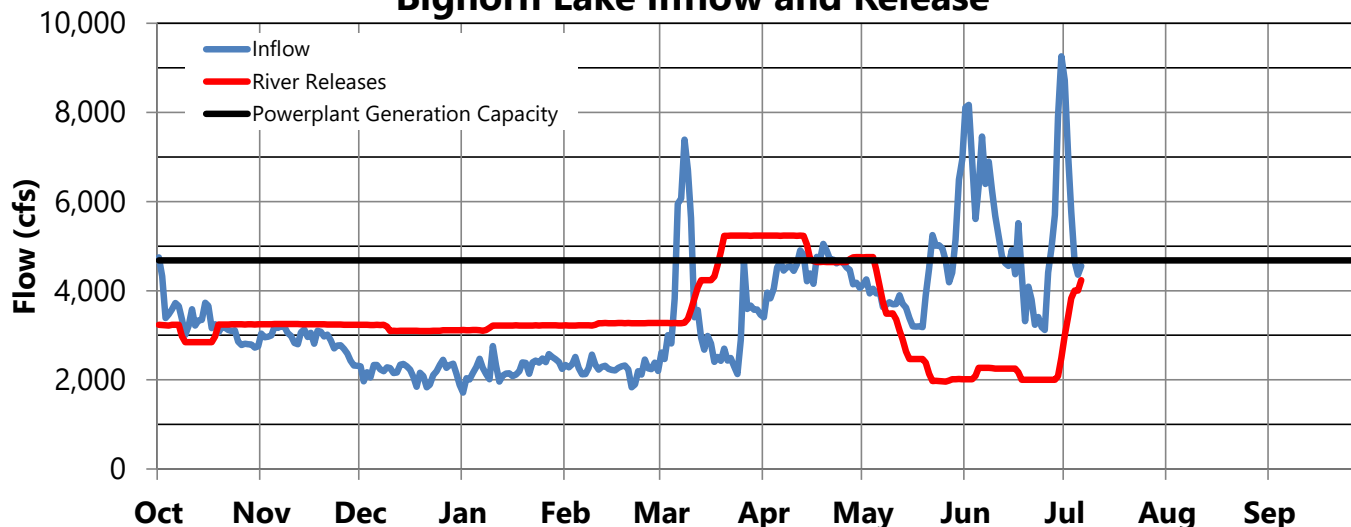


## Average June Release

## Average June Inflow

	Monthly Avg cfs	Percent of Average		Monthly Avg cfs	Percent of Average
Bighorn River	2,135	38	Bighorn Lake	5,420	66
Buffalo Bill Total Release	3,505	105	Buffalo Bill	6,040	108
Boysen Release	1,430	44	Boysen	3,340	69

## Bighorn Lake Inflow and Release



# OPERATIONS OUTLOOK (July 1 through November 30)

The river release rate from Yellowtail Dam was increased to 4,000 cfs by July 3. Shift changes applied to the river gage on July 6 and 7 indicate that release were as high as 5,300 cfs. Inflows and releases are decreasing with releases to the river expected to be 2,500 cfs around mid-July under median inflow 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 October 31 elevation target if river releases can be maintained at 2,500 cfs or more. The end of October elevation target is a range between 3635 to 3640 feet. If river releases can not be maintained at 2,500 cfs or more while using the end of October elevation target, river releases are adjusted to approximate the expected winter release.

## Median Inflow Conditions

	Jul	Aug	Sep	Oct	Nov
Boysen Release (cfs)	1,400	1,251	1,101	1,000	600
Buffalo Bill Release (cfs)	3,151	2,062	1,600	696	205
Tributary Gain (cfs)	-1,431	-1,099	50	953	862
Monthly Inflow (cfs)	3,120	2,214	2,751	2,649	1,667
Monthly Inflow (kaf)	191.8	136.1	163.7	162.9	99.2
Monthly Release (kaf)	214.6	180.7	159.7	144.4	132.5
Afterbay Release (cfs)	3,490	2,939	2,685	2,349	2,227
River Release (cfs)	3,037	2,500	2,400	2,300	2,227
End-of-Month Content (kaf)	981.9	941.6	949.7	972.5	943.4
End-of-Month Elevation (feet)	3636.8	3633.1	3633.9	3636.0	3633.3

## Minimum Inflow Conditions

	Jul	Aug	Sep	Oct	Nov
Boysen Release (cfs)	1,251	1,251	1,150	1,000	600
Buffalo Bill Release (cfs)	3,001	1,862	1,499	696	205
Tributary Gain (cfs)	-1,940	-1,350	-222	729	830
Monthly Inflow (cfs)	2,312	1,763	2,427	2,425	1,635
Monthly Inflow (kaf)	142.1	108.4	144.4	149.1	97.3
Monthly Release (kaf)	204.7	153.7	139.8	129.0	120.4
Afterbay Release (cfs)	3,329	2,500	2,350	2,099	2,024
River Release (cfs)	2,876	2,050	2,050	2,050	2,024
End-of-Month Content (kaf)	942.1	901.1	909.9	934.2	915.2
End-of-Month Elevation (feet)	3633.2	3628.9	3629.8	3632.4	3630.4

## Maximum Inflow Conditions

	Jul	Aug	Sep	Oct	Nov
Boysen Release (cfs)	1,400	1,400	1,200	1,099	1,000
Buffalo Bill Release (cfs)	3,245	2,062	1,949	953	355
Tributary Gain (cfs)	-1,057	-901	220	1,073	886
Monthly Inflow (cfs)	3,588	2,561	3,369	3,125	2,241
Monthly Inflow (kaf)	220.6	157.5	200.5	192.2	133.3
Monthly Release (kaf)	225.3	206.0	185.1	181.4	167.8
Afterbay Release (cfs)	3,664	3,350	3,110	2,950	2,819
River Release (cfs)	3,264	2,950	2,950	2,950	2,819
End-of-Month Content (kaf)	1,000.0	955.8	975.4	990.5	960.2
End-of-Month Elevation (feet)	3638.3	3634.5	3636.2	3637.5	3634.9

# OPERATIONS OUTLOOK (July 1 through November 30)

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)	Jul	Aug	Sep	Oct	Nov
Median Forecast	453	439	285	49	0
Minimum Forecast	453	450	300	49	0
Maximum Forecast	400	400	160	0	0

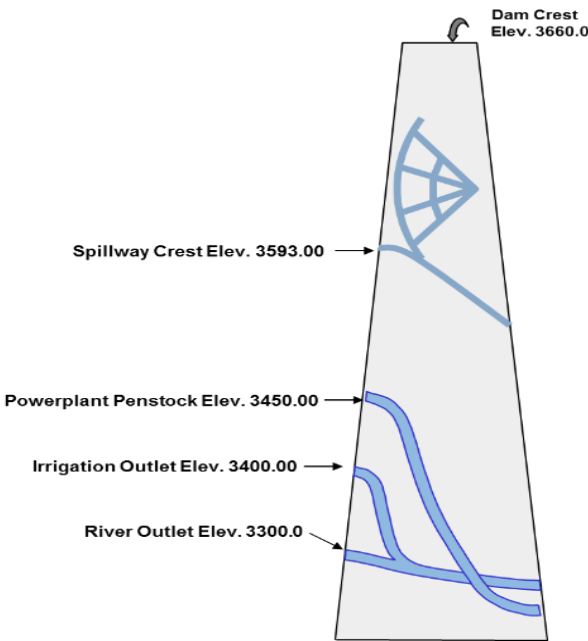
## Power Generation Outlook

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)	Jul	Aug	Sep	Oct	Nov
Median Forecast	3,312	2,869	2,615	2,279	2,157
Minimum Forecast	3,152	2,430	2,280	2,029	1,954
Maximum Forecast	3,485	3,280	3,040	2,880	2,749

Yellowtail Powerplant Generation (gwh)	Jul	Aug	Sep	Oct	Nov
Median Forecast	111.9	97.6	88.0	75.4	70.9
Minimum Forecast	105.8	80.6	74.8	66.5	64.3
Maximum Forecast	117.4	110.5	102.9	98.3	93.7

Yellowtail Spill (cfs)	Jul	Aug	Sep	Oct	Nov
Median Forecast	108	0	0	0	0
Minimum Forecast	107	0	0	0	0
Maximum Forecast	109	0	0	0	0



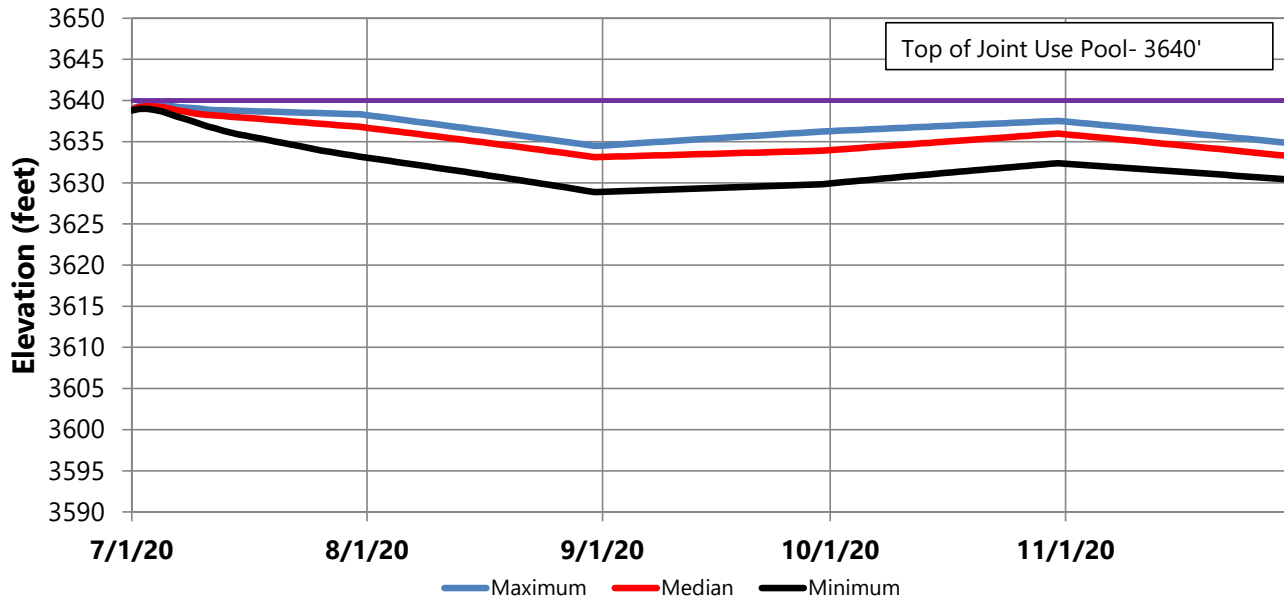
## Release Outlook by Outlet

Currently releases are going through the powerplant and the river outlet works. Powerplant bypass releases are only expected until approximately the middle of July.

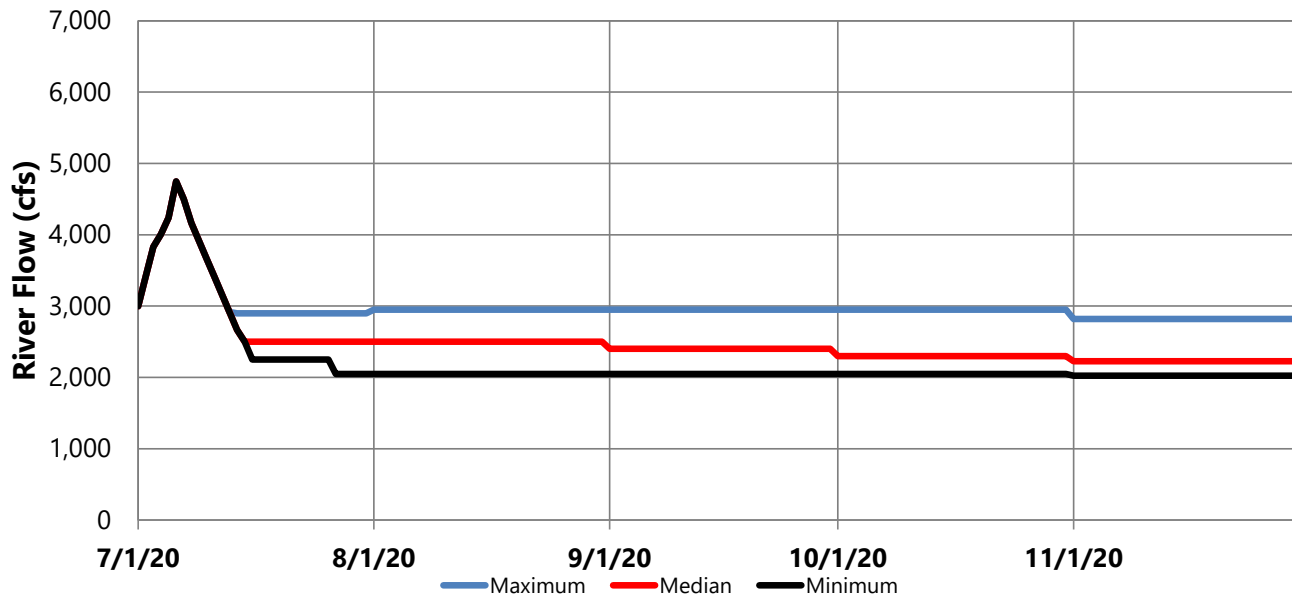
# OPERATIONS OUTLOOK (July 1 through November 30)

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.

## Bighorn Lake Elevation



## River Release



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Monthly Operating Plans, Current Conditions, Snowpack and Other Water Management Information  
<https://www.usbr.gov/so/lakes/reservoirs/warents/mainmenu.html>