

Yellowtail Dam Water Supply and Projected Operations



— BUREAU OF —
RECLAMATION

March 2020



Bighorn River Basin Map Source: DEMIS Mapserver

March Operating Range			
Forecast	Minimum	Median	Maximum
Monthly Average Inflow (cfs)	2,600	3,080	3,220
Monthly Average River Release (cfs)	3,160	4,260	4,680
End of March Elevation (feet)	3616.8	3610.8	3607.8
March 2020 Inflow Forecast			
April-July Volume		1,459	
Percent of Average		116	
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		

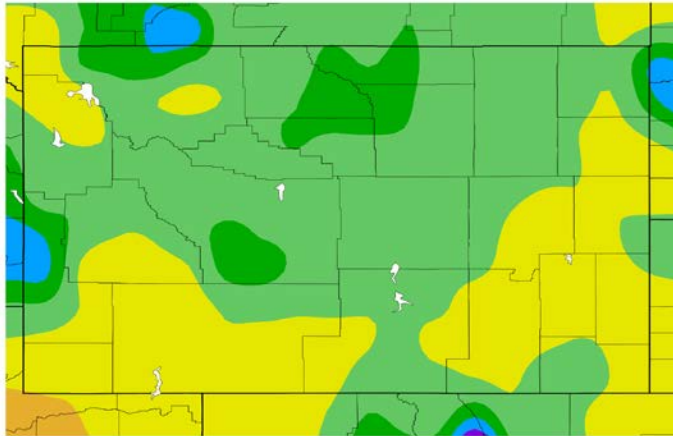


Climate Departure from Normal

February 1 through February 29, 2020

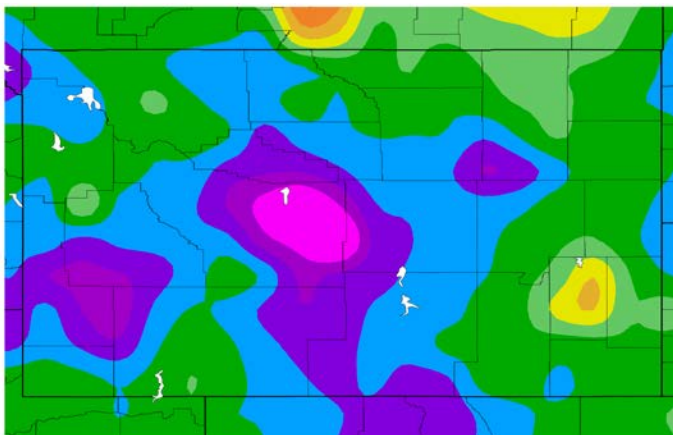
Precipitation

Departure from Normal (inches)



Temperature

Departure from Normal (°F)



HPRCC using provisional data NOAA Regional Climate Centers

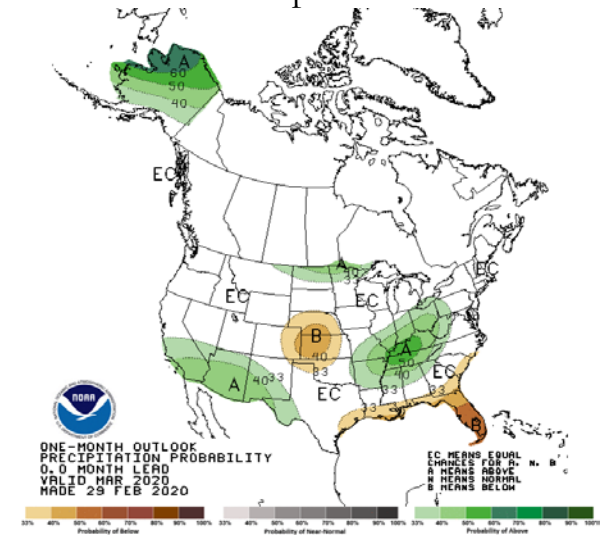
CLIMATE SUMMARY

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

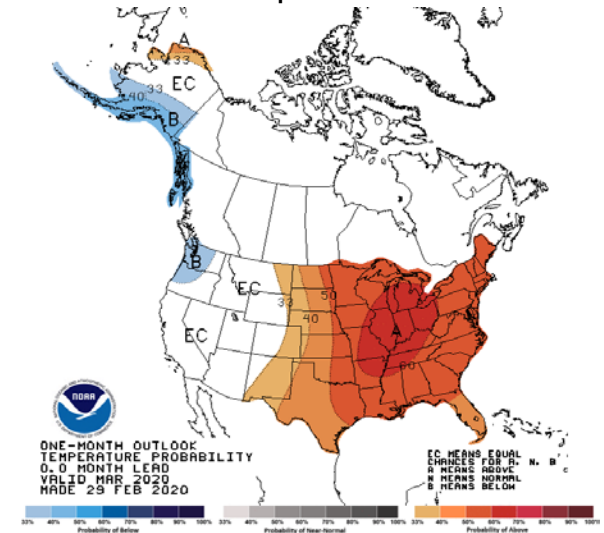
The climate outlook for March shows there is an equal chance precipitation and the temperatures will be above average, below average or average, in the Bighorn River Basin.

March Climate Outlook

Precipitation



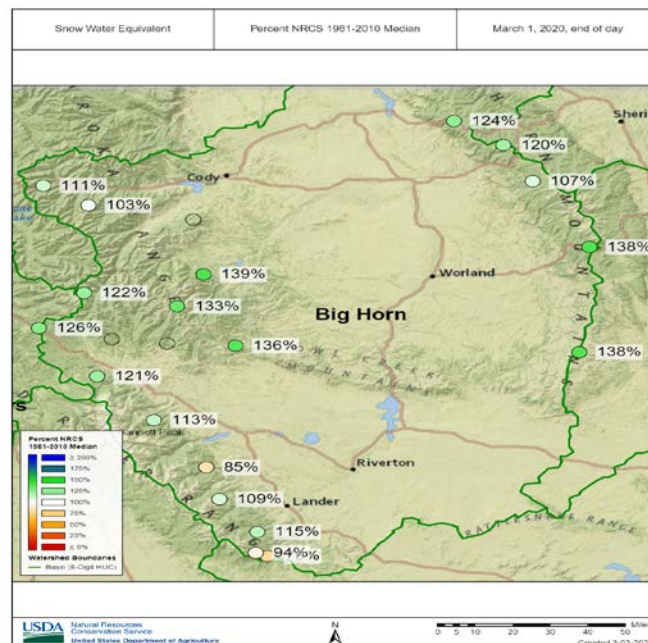
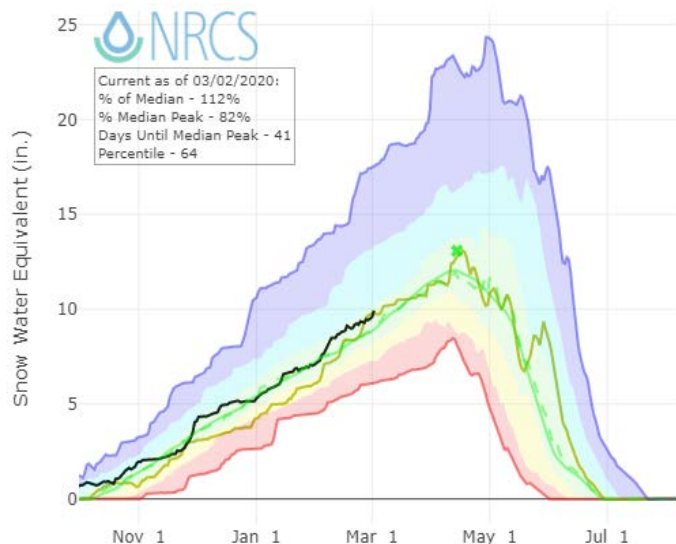
Temperature



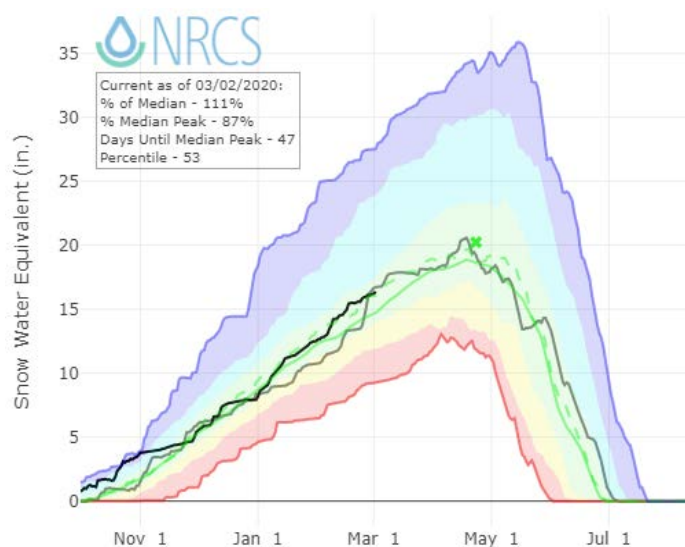
SNOWPACK SUMMARY

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).

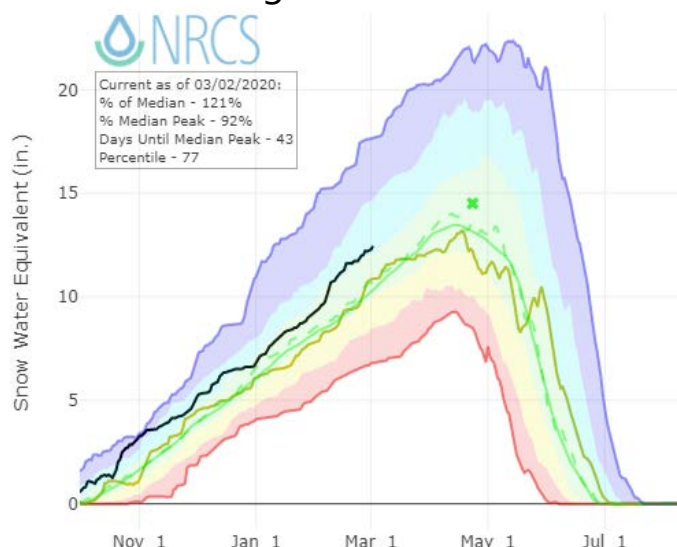
Wind River



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

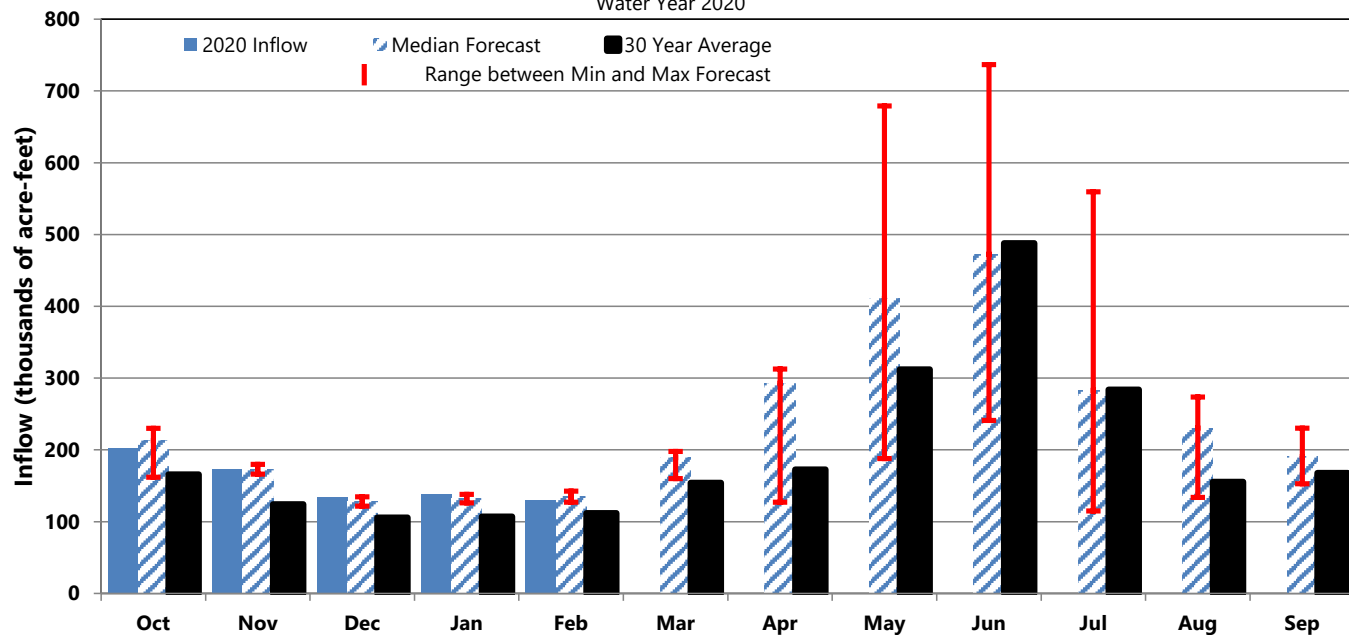
SNOTEL data, streamflow data and planned releases from Boysen and Buffalo Bill Reservoirs are used to compute an inflow forecast for Bighorn Lake.

February Forecast Review

	Median Forecast (kaf)	Actual (kaf)	Difference (kaf)	Actual (% of Avg)
February Inflow	135.3	129.7	(5.6)	116

Bighorn Lake Inflow

Water Year 2020

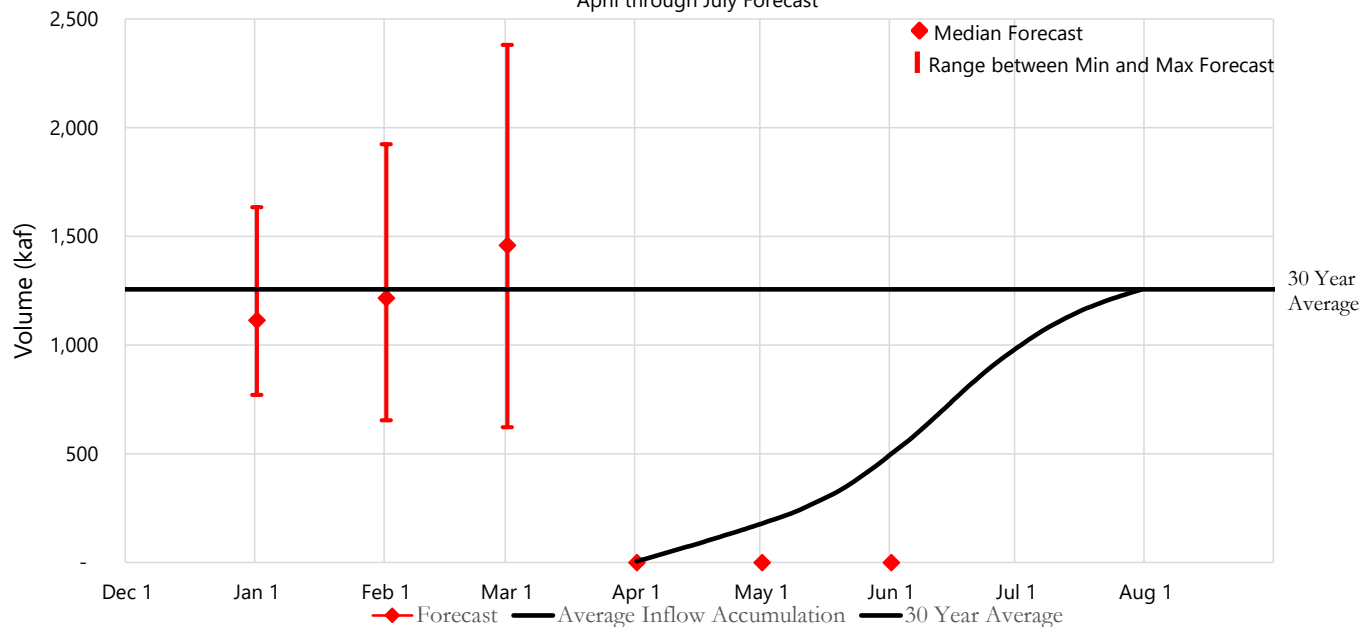


April through July Inflow Forecast for March 1

	Median Forecast (kaf)	% of Average	Minimum Forecast (kaf)	Maximum Forecast (kaf)
April through July Inflow	1,458.7	116	621.9	2,380.9
Historic Maximum (2017)	2,953.1 kaf	Historic Minimum (2004)	392.1 kaf	Average 1,256.4 kaf

Bighorn Lake Inflow

April through July Forecast



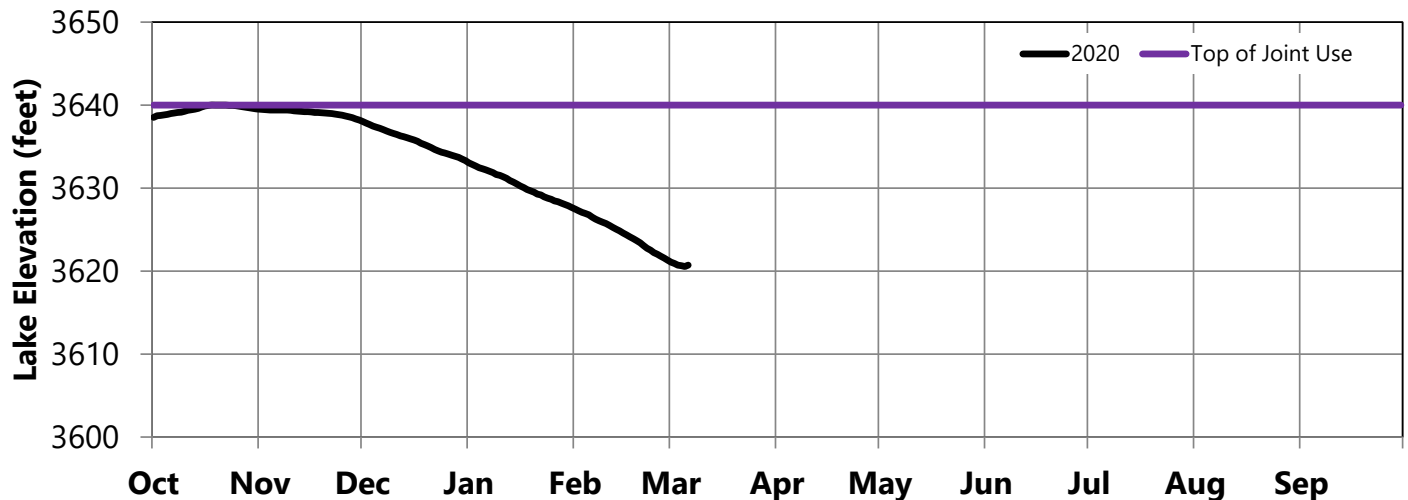
OPERATIONS REVIEW (October 1 through March 1)

River releases were increased to 3,280 cfs during February based on January inflows being higher than forecasted and the end March elevation target of 3617 feet. Storage in Bighorn Lake decreased by 6.6 feet or 53,400 AF during February. The reservoir elevation on February 29 was close to what was projected under minimum inflow conditions.

March 1 Storage Conditions

	Elevation feet	Storage acre-feet	Percent of Average	Percent Full
Bighorn Lake	3621.1	837,140	107	82
Buffalo Bill	5369.5	464,882	109	72
Boysen	4716.7	593,145	106	80

Bighorn Lake Operations Water Year 2020

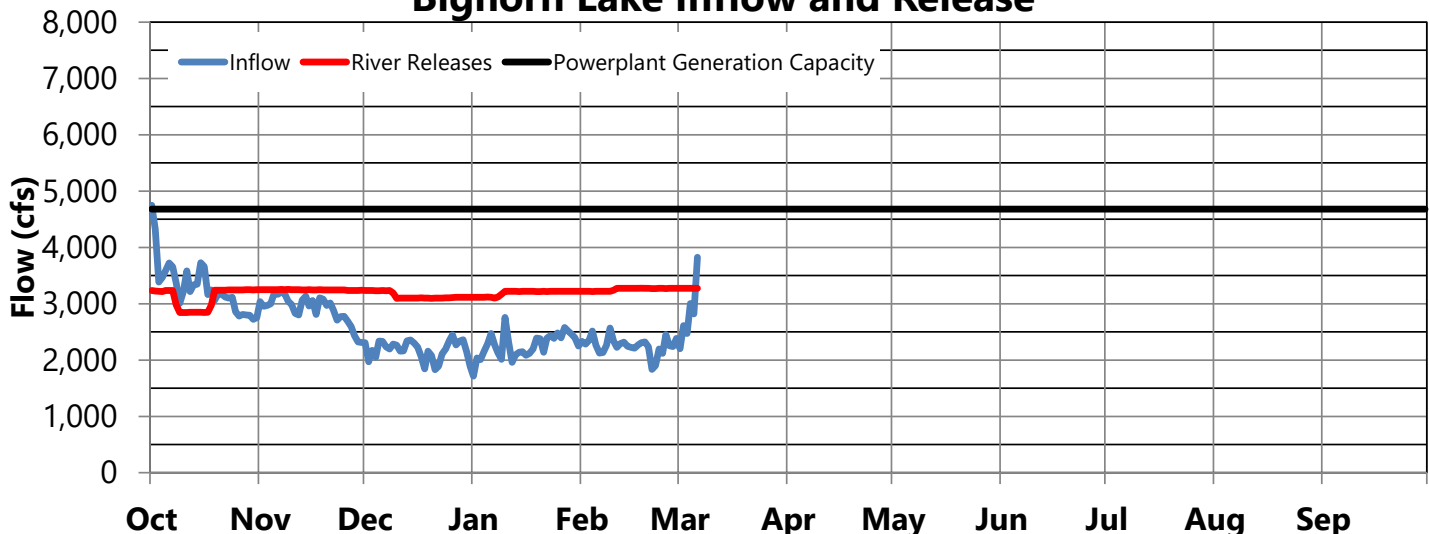


Average February Release

Average February Inflow

	Monthly Avg cfs	Percent of Average		Monthly Avg cfs	Percent of Average
Bighorn River	3,255	129	Bighorn Lake	2,255	113
Buffalo Bill Total Release	355	117	Buffalo Bill	273	114
Boysen Release	1,049	136	Boysen	839	122

Bighorn Lake Inflow and Release



OPERATIONS OUTLOOK (March 1 through July 31)

The river release rate from Yellowtail Dam will be increased during March. 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 since we are now past March 1. Releases are adjusted to target the April 30 target which is dependent on the rule curves and April through July inflow forecast. The end of April elevation target based on the current April through July inflow forecast, 1,459 kaf, is 3611.9 feet.

Median Inflow Conditions (April through July Inflow 1,459 kaf)

	Mar	Apr	May	Jun	Jul
Boysen Release (cfs)	1,400	2,149	2,160	2,160	2,200
Buffalo Bill Release (cfs)	504	1,933	2,888	3,010	3,084
Tributary Gain (cfs)	1,171	842	1,628	2,768	-683
Monthly Inflow (cfs)	3,075	4,924	6,676	7,938	4,601
Monthly Inflow (kaf)	193.4	297.2	414.8	476.5	287.2
Monthly Release (kaf)	261.8	300.3	395.7	283.9	243.6
Afterbay Release (cfs)	4,258	5,047	6,435	4,771	3,962
River Release (cfs)	4,258	5,025	6,241	4,388	3,505
End-of-Month Content (kaf)	768.7	765.6	784.7	977.3	1,020.9
End-of-Month Elevation (feet)	3610.8	3610.3	3613.4	3636.4	3640.0

Minimum Inflow Conditions (April through July Inflow 622 kaf)

	Mar	Apr	May	Jun	Jul
Boysen Release (cfs)	1,050	1,050	1,051	1,250	1,251
Buffalo Bill Release (cfs)	504	684	1,680	2,348	2,176
Tributary Gain (cfs)	1,047	402	325	452	-1,558
Monthly Inflow (cfs)	2,601	2,136	3,056	4,050	1,869
Monthly Inflow (kaf)	164.2	131.3	192.2	245.2	119.2
Monthly Release (kaf)	194.5	127.7	138.6	145.1	151.1
Afterbay Release (cfs)	3,164	2,146	2,254	2,439	2,457
River Release (cfs)	3,164	2,112	2,000	2,000	2,000
End-of-Month Content (kaf)	806.8	810.4	864.0	964.1	932.2
End-of-Month Elevation (feet)	3616.8	3617.4	3624.5	3635.2	3632.2

Maximum Inflow Conditions (April through July Inflow 2,381 kaf)

	Mar	Apr	May	Jun	Jul
Boysen Release (cfs)	1,400	2,250	3,767	3,766	3,991
Buffalo Bill Release (cfs)	504	1,933	5,063	5,183	5,256
Tributary Gain (cfs)	1,312	1,071	2,215	3,432	-148
Monthly Inflow (cfs)	3,216	5,254	11,045	12,381	9,099
Monthly Inflow (kaf)	202.0	316.8	683.4	740.9	563.8
Monthly Release (kaf)	287.9	395.7	652.3	502.9	485.7
Afterbay Release (cfs)	4,682	6,651	10,609	8,451	7,900
River Release (cfs)	4,682	6,651	10,511	8,212	7,480
End-of-Month Content (kaf)	751.3	672.4	703.5	941.5	1,019.6
End-of-Month Elevation (feet)	3607.8	3592.6	3598.8	3633.1	3639.9

OPERATIONS OUTLOOK (March 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 Demands Outlook

Bighorn Canal (cfs)

	Mar	Apr	May	Jun	Jul
Median Forecast	0	22	194	383	457
Minimum Forecast	0	34	254	439	457
Maximum Forecast	0	0	98	239	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)

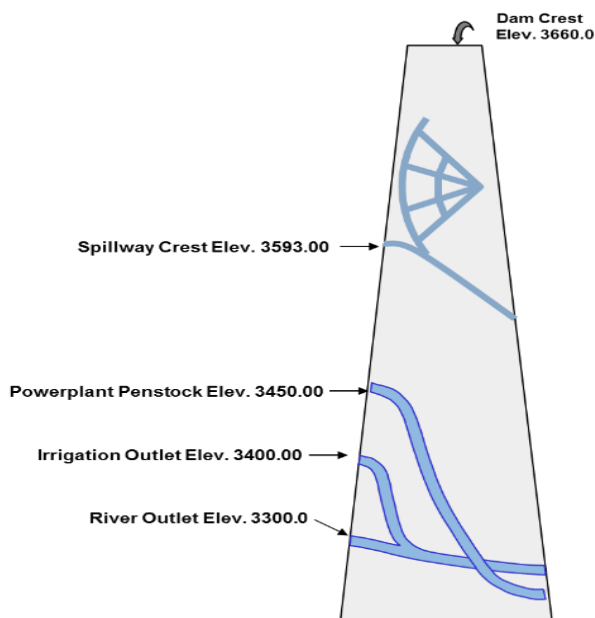
	Mar	Apr	May	Jun	Jul
Median Forecast	4,097	4,661	4,668	4,432	3,889
Minimum Forecast	3,094	2,076	2,184	2,369	2,387
Maximum Forecast	4,101	4,765	4,819	4,539	4,386

Yellowtail Powerplant Generation (gwh)

	Mar	Apr	May	Jun	Jul
Median Forecast	130.3	145.0	145.0	145.0	129.7
Minimum Forecast	99.2	66.0	70.0	78.2	79.4
Maximum Forecast	130.4	145.0	145.0	145.0	145.0

Yellowtail Spill (cfs)

	Mar	Apr	May	Jun	Jul
Median Forecast	90	316	1,698	269	0
Minimum Forecast	0	0	0	0	0
Maximum Forecast	510	1,816	5,720	3,841	3,444



Release Outlook by Outlet

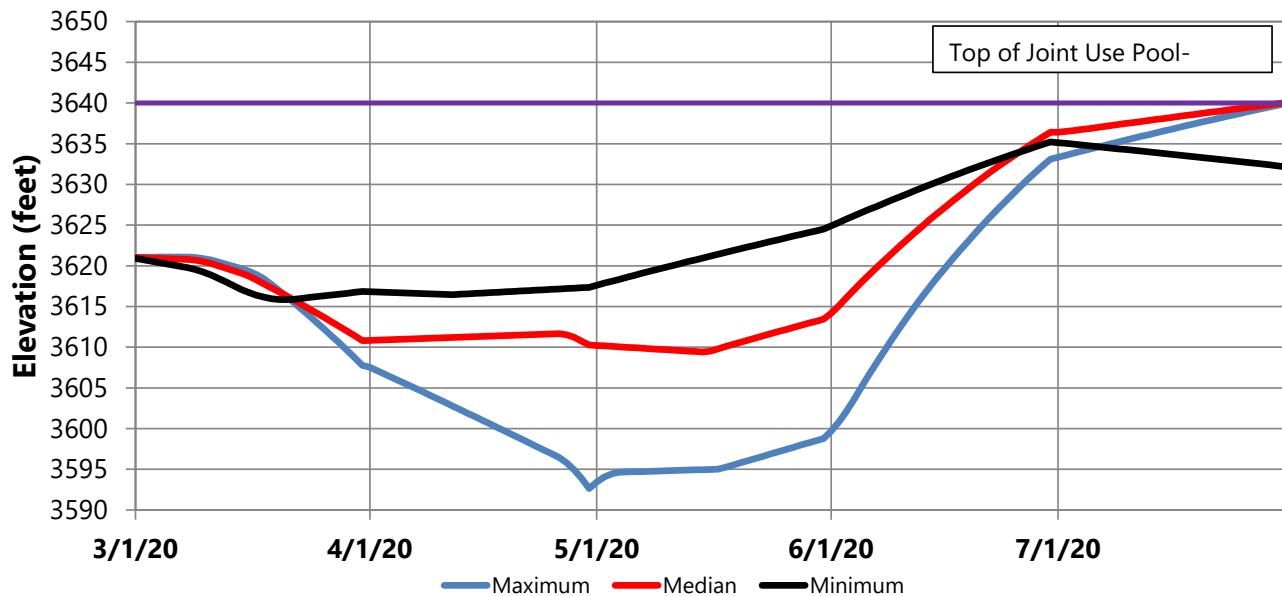
Releases through the spillway or the river outlet works occurs as early as March under median and maximum probable inflow conditions.

OPERATIONS OUTLOOK (March 1 through July 31)

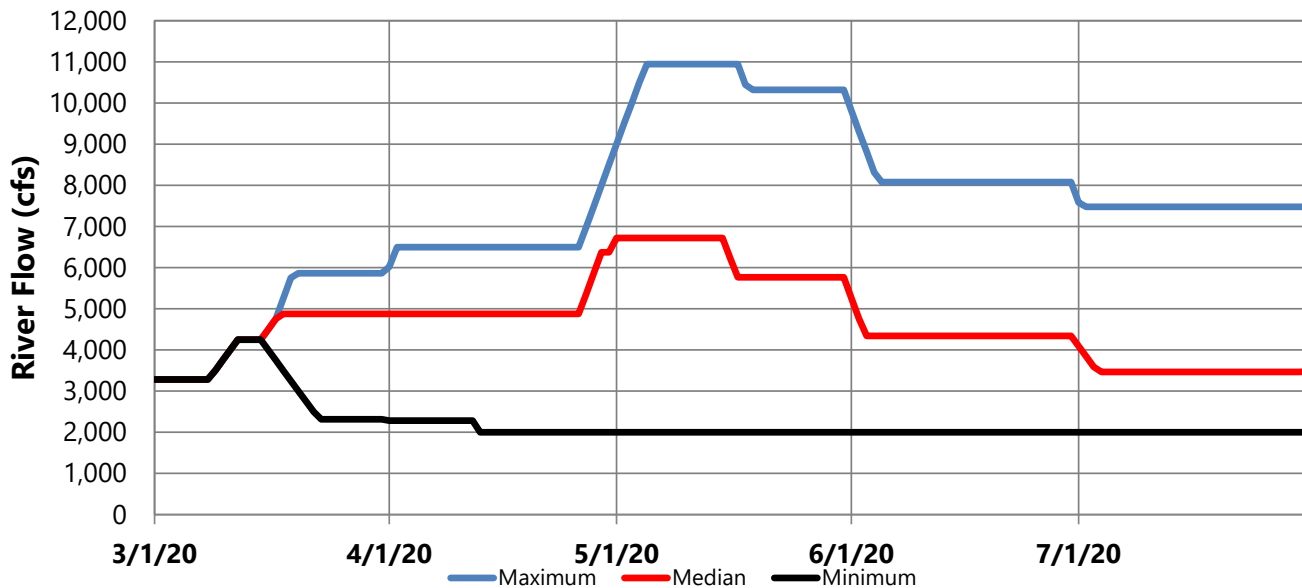
Projected elevations and the range of river releases are based on the median, minimum, and maximum inflow forecasts. End-of-month elevations and river releases vary based on the difference between forecasted inflow scenarios.

Under the current outlook, the elevation of Bighorn Lake at the end of March is expected to be between 3607.8 and 3618.5 feet. Bighorn Lake is expected to fill to normal full pool, elevation 3640 feet, under median and maximum inflow conditions.

Bighorn Lake Elevation



River Release



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Monthly Operating Plans, Current Conditions, Snowpack and Other Water Management Information
https://www.usbr.gov/gp/lakes_reservoirs/warepts/main_menu.html