

Yellowtail Dam Water Supply and Projected Operations



— BUREAU OF —
RECLAMATION

February 2020



Bighorn River Basin Map Source: DEMIS Mapserver

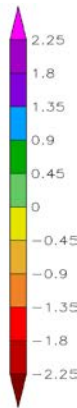
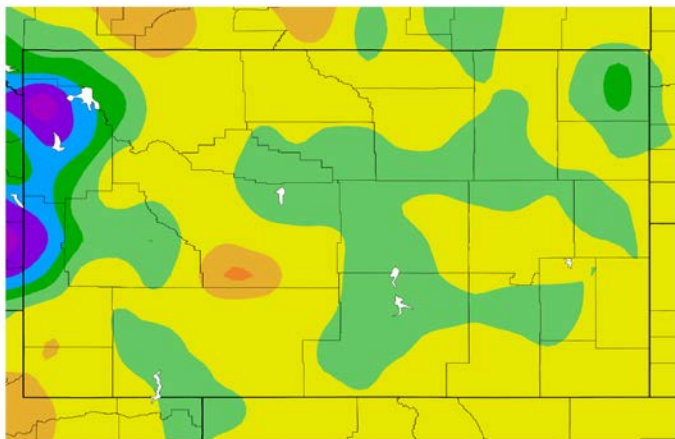
February Operating Range			
Forecast	Minimum	Median	Maximum
Monthly Average Inflow (cfs)	2,210	2,350	2,480
Monthly Average River Release (cfs)	3,260	3,260	3,630
End of February Elevation (feet)	3620.7	3621.8	3619.9
February 2020 Inflow Forecast			
April-July Volume			1,216
Percent of Average			97
Water 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

January 1 through January 31, 2020

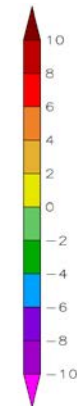
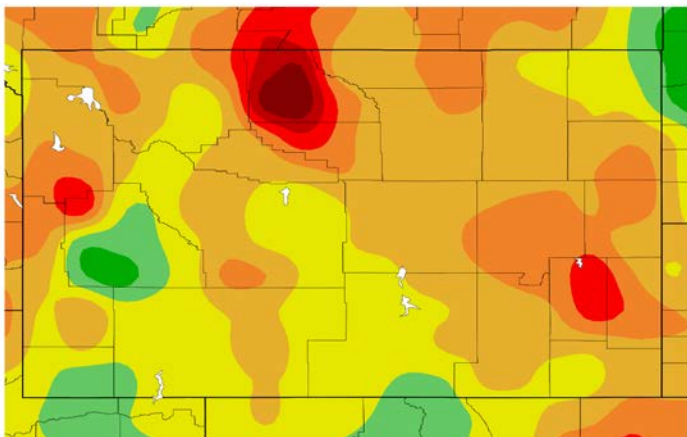
Precipitation

Departure from Normal (inches)



Temperature

Departure from Normal (°F)



HPRCC using provisional data NOAA Regional Climate Centers

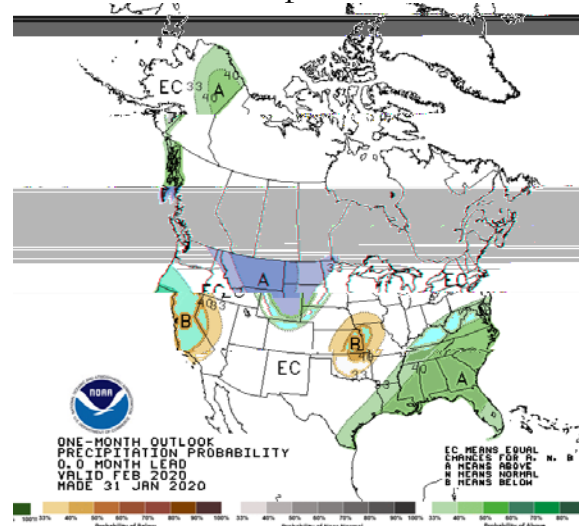
CLIMATE SUMMARY

The climate in the Bighorn Basin above Yellowtail Dam was drier than average during January. Temperatures were warmer than average in the Basin.

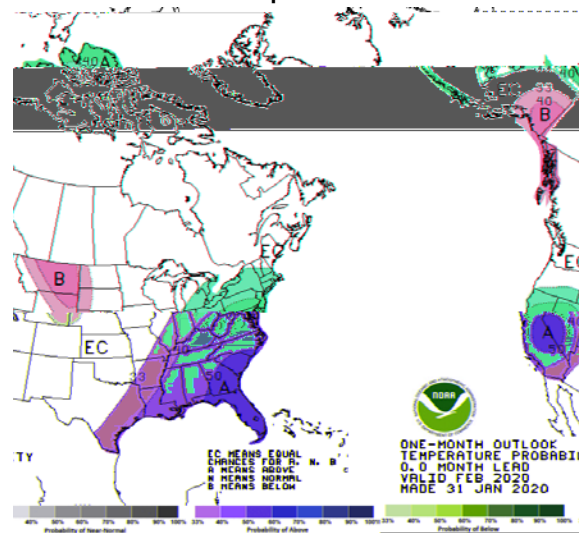
The climate outlook for February shows there is a 33-40 percent chance that precipitation will be greater than average. There is a 33-40 percent chance that the temperatures will be below average in the Bighorn River Basin.

February Climate Outlook

Precipitation



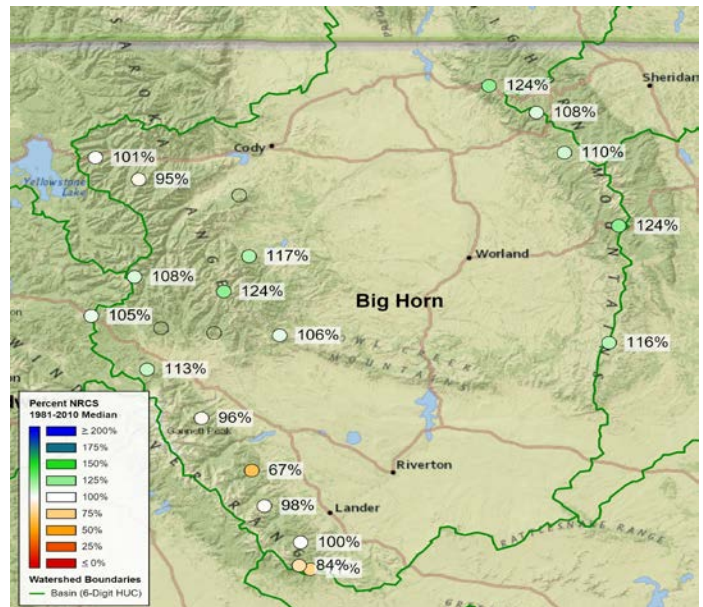
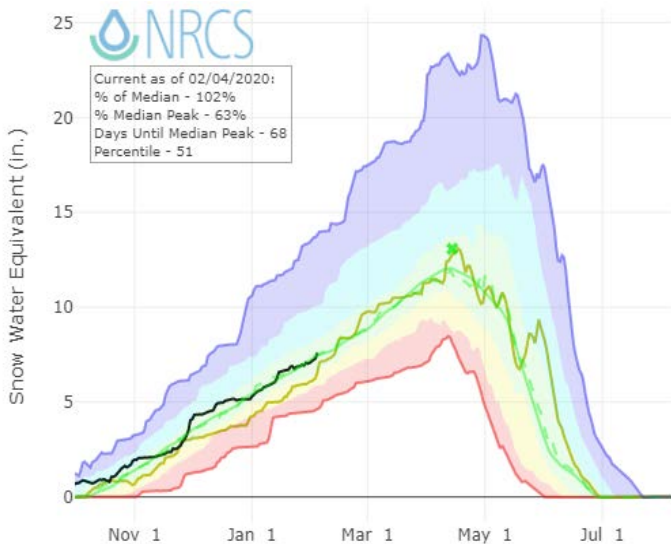
Temperature



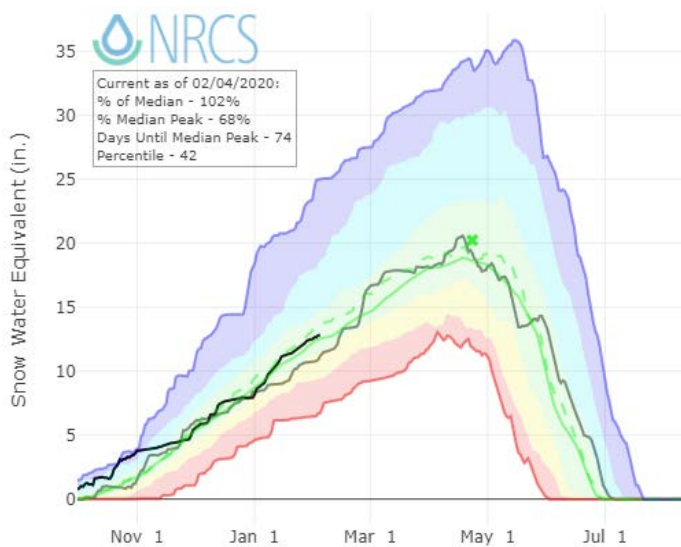
SNOWPACK SUMMARY

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).

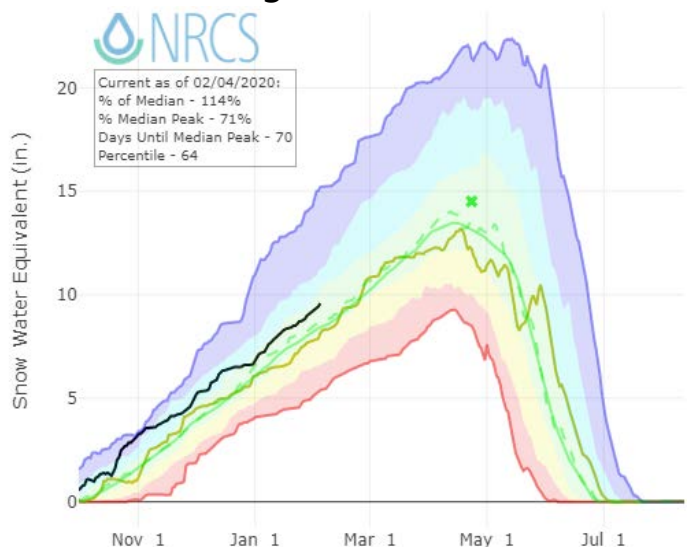
Wind River



Shoshone River



Bighorn River



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

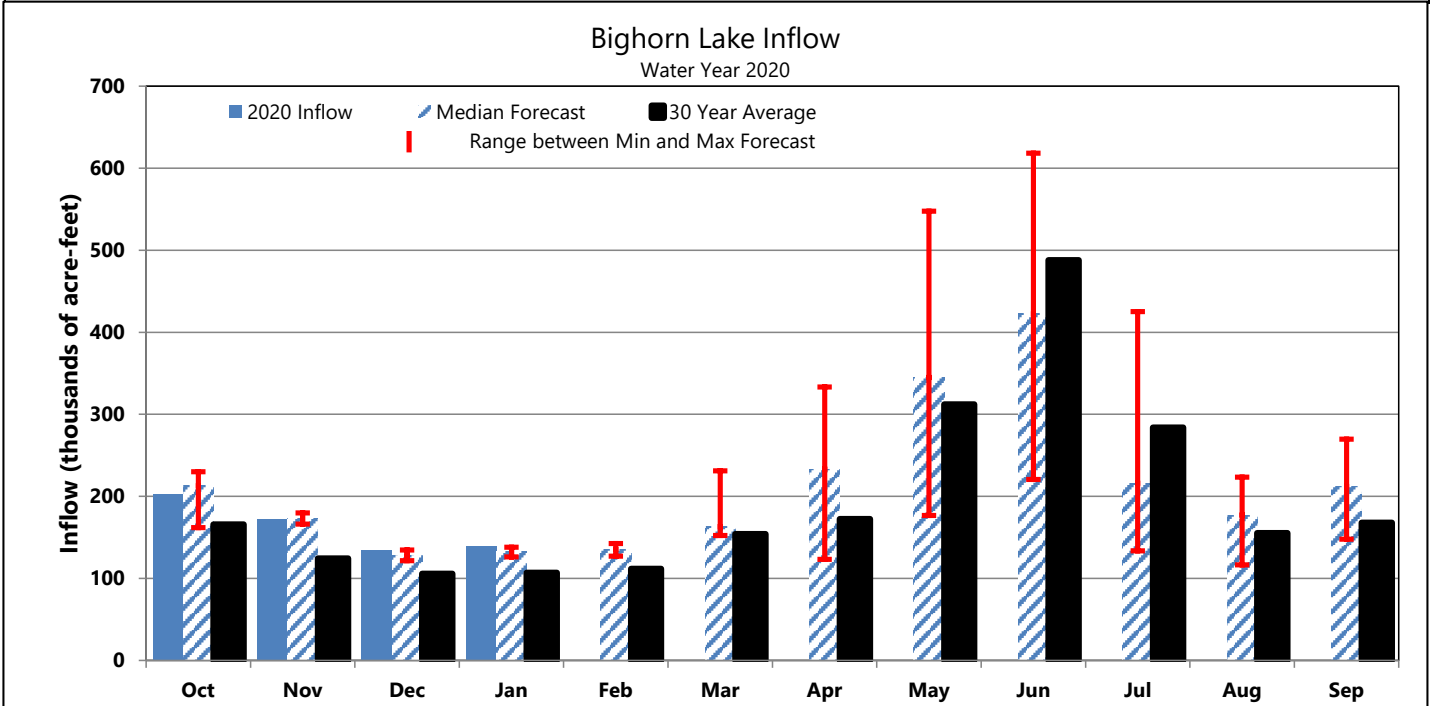
NRCS Montana Snow Survey Website: <https://www.nrcs.usda.gov/wps/portal/nrcs/mt/snow/>

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

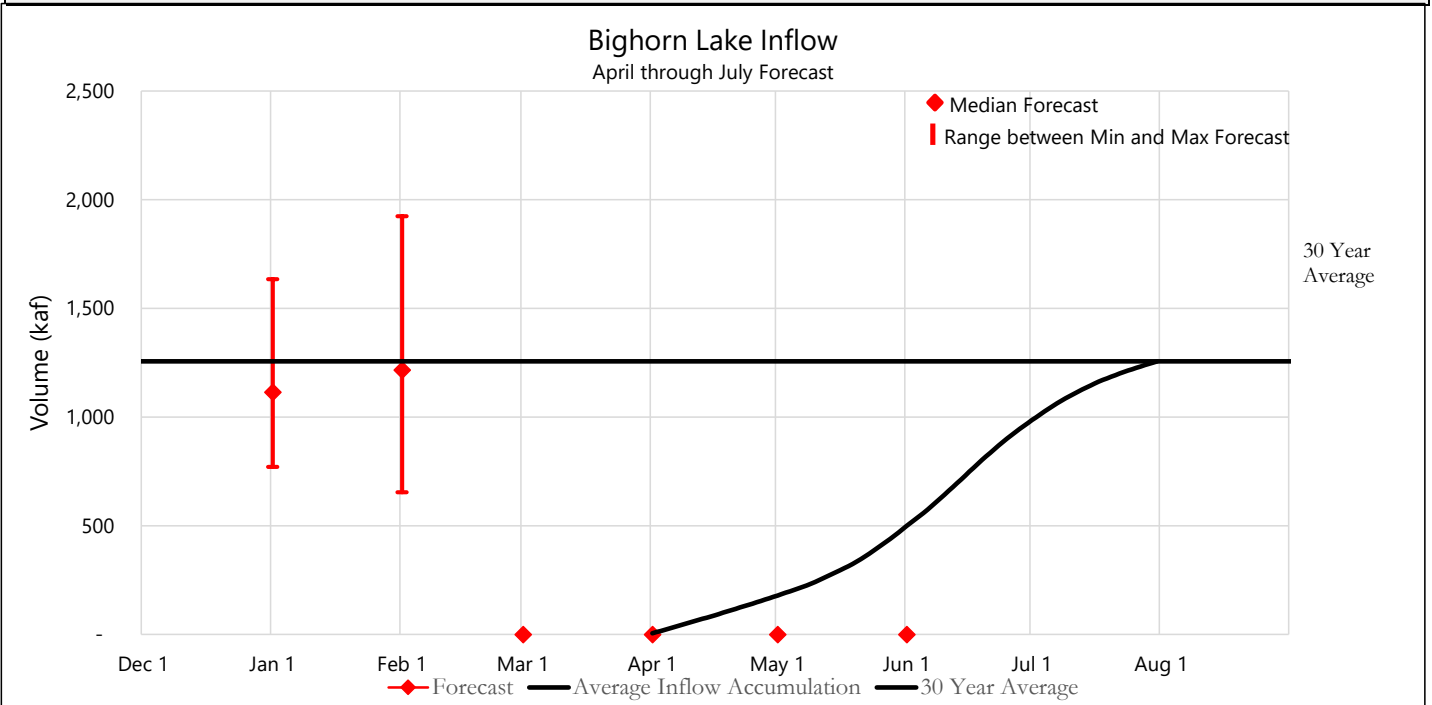
FORECAST SUMMARY

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

January Forecast Review				
	Median Forecast (kaf)	Actual (kaf)	Difference (kaf)	Actual (% of Avg)
January Inflow	132.8	139.0	6.2	130



April through July Inflow Forecast for February 1					
	Median Forecast (kaf)	% of Average	Minimum Forecast (kaf)	Maximum Forecast (kaf)	
April through July Inflow	1,216.4	97	654.1	1,924.4	
Historic Maximum (2017)	2,953.1 kaf	Historic Minimum (2004)	392.1 kaf	Average	1,256.4 kaf



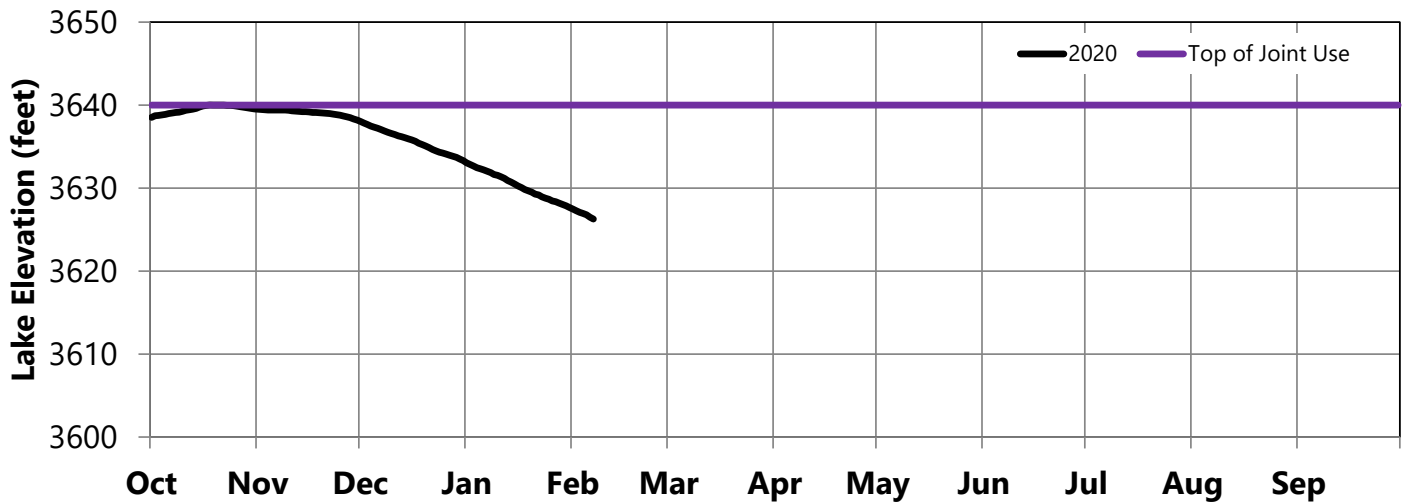
OPERATIONS REVIEW (October 1 through February 1)

River releases were increased to 3,220 cfs during January based on December inflows being higher than forecasted and the end March elevation target of 3617 feet. Storage in Bighorn Lake decreased by 5.6 feet or 52,900 AF during January. The reservoir elevation on January 31 was close to what was projected under maximum inflow conditions.

February 1 Storage Conditions

	Elevation feet	Storage acre-feet	Percent of Average	Percent Full
Bighorn Lake	3627.7	890,576	110	87
Buffalo Bill	5370.2	469,559	108	73
Boysen	4717.7	609,559	112	82

Bighorn Lake Operations Water Year 2020

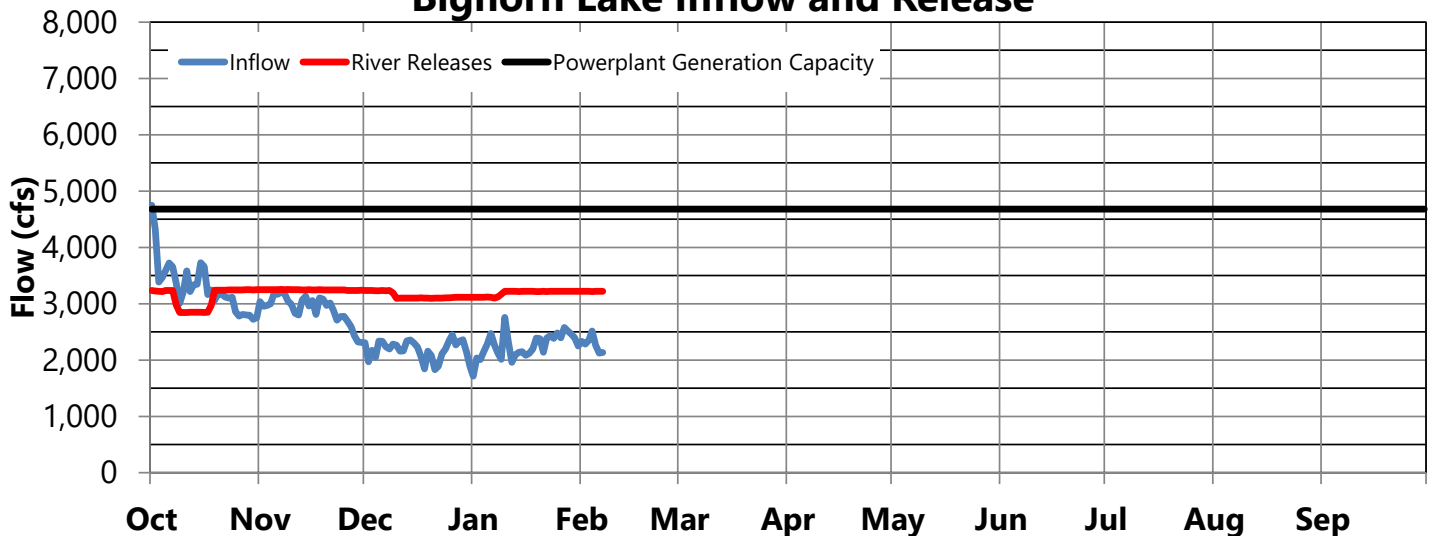


Average January Release

Average January Inflow

	Monthly Avg cfs	Percent of Average		Monthly Avg cfs	Percent of Average
Bighorn River	3,191	129	Bighorn Lake	2,261	130
Buffalo Bill Total Release	359	130	Buffalo Bill	321	126
Boysen Release	1,066	135	Boysen	736	120

Bighorn Lake Inflow and Release



OPERATIONS OUTLOOK (February 1 through July 31)

The river release rate from Yellowtail Dam is being increased to 3,270 cfs during February due to higher than forecasted inflows during the month of January. 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 March 31 elevation target of 3617 feet since the April through July inflow forecast is not unusually high or low. Starting on March 1, releases are adjusted to target the April 30 target which is dependent on the rule curves and April through July inflow forecast.

Median Inflow Conditions (April through July Inflow 1,216 kaf)

	Feb	Mar	Apr	May	Jun	Jul
Boysen Release (cfs)	1,050	1,125	1,687	2,056	2,250	1,922
Buffalo Bill Release (cfs)	355	355	1,513	2,298	2,418	2,492
Tributary Gain (cfs)	947	1,171	718	1,256	2,432	-903
Monthly Inflow (cfs)	2,352	2,651	3,917	5,609	7,100	3,511
Monthly Inflow (kaf)	135.3	163.0	233.1	344.9	422.5	215.9
Monthly Release (kaf)	183.5	225.8	246.7	294.9	254.3	183.5
Afterbay Release (cfs)	3,260	3,742	4,217	4,866	4,344	3,054
River Release (cfs)	3,260	3,742	4,195	4,672	3,961	2,597
End-of-Month Content (kaf)	842.4	779.6	766.0	816.0	984.2	1,016.6
End-of-Month Elevation (feet)	3621.8	3612.6	3610.4	3618.2	3637.0	3639.7

Minimum Inflow Conditions (April through July Inflow 654 kaf)

	Feb	Mar	Apr	May	Jun	Jul
Boysen Release (cfs)	1,050	1,075	1,074	1,075	1,901	1,900
Buffalo Bill Release (cfs)	355	355	662	1,630	1,800	1,976
Tributary Gain (cfs)	805	1,047	334	169	7	-1,703
Monthly Inflow (cfs)	2,210	2,477	2,070	2,874	3,707	2,173
Monthly Inflow (kaf)	127.1	152.3	123.2	176.7	220.6	133.6
Monthly Release (kaf)	183.5	150.9	131.7	149.6	156.7	162.1
Afterbay Release (cfs)	3,260	2,524	2,284	2,503	2,704	2,706
River Release (cfs)	3,260	2,524	2,250	2,249	2,250	2,249
End-of-Month Content (kaf)	834.2	835.6	827.1	854.2	918.1	889.6
End-of-Month Elevation (feet)	3620.7	3620.9	3619.7	3623.3	3630.7	3627.6

Maximum Inflow Conditions (April through July Inflow 1,924 kaf)

	Feb	Mar	Apr	May	Jun	Jul
Boysen Release (cfs)	1,050	1,251	1,800	3,508	3,507	3,573
Buffalo Bill Release (cfs)	355	1,195	2,563	2,814	2,934	3,010
Tributary Gain (cfs)	1,073	1,312	1,239	2,584	3,949	332
Monthly Inflow (cfs)	2,477	3,758	5,601	8,906	10,391	6,915
Monthly Inflow (kaf)	142.5	231.1	333.3	547.6	618.3	425.2
Monthly Release (kaf)	204.6	330.1	353.2	525.3	398.3	358.1
Afterbay Release (cfs)	3,627	5,438	6,006	8,613	6,764	5,894
River Release (cfs)	3,627	5,438	6,006	8,516	6,517	5,474
End-of-Month Content (kaf)	828.5	729.5	709.6	731.9	951.9	1,019.0
End-of-Month Elevation (feet)	3619.9	3603.7	3599.9	3604.2	3634.1	3639.9

OPERATIONS OUTLOOK (February 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)

	Feb	Mar	Apr	May	Jun	Jul
Median Forecast	0	0	22	194	383	457
Minimum Forecast	0	0	34	254	454	457
Maximum Forecast	0	0	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)

	Feb	Mar	Apr	May	Jun	Jul
Median Forecast	3,189	3,672	4,147	4,619	4,261	2,984
Minimum Forecast	3,189	2,454	2,214	2,434	2,634	2,637
Maximum Forecast	3,556	4,632	4,747	4,751	4,499	4,387

Yellowtail Powerplant Generation (gwh)

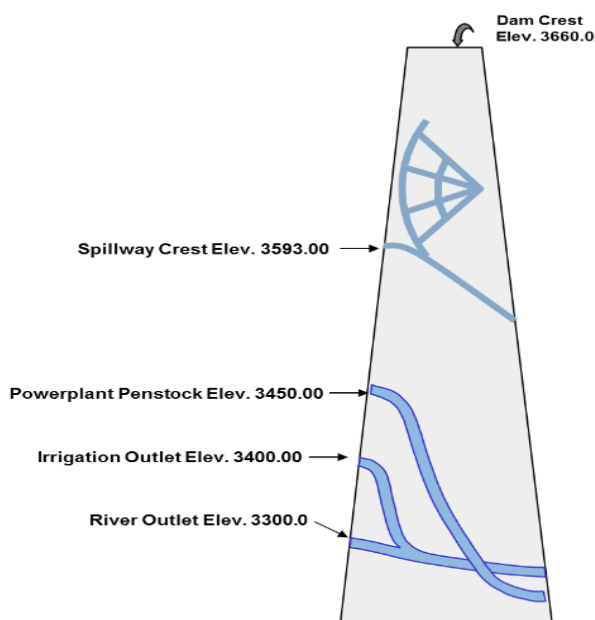
	Feb	Mar	Apr	May	Jun	Jul
Median Forecast	104.8	115.8	138.3	145.0	127.0	99.0
Minimum Forecast	104.5	79.0	70.8	79.5	88.2	87.8
Maximum Forecast	142.9	145.0	145.0	145.0	145.0	145.0

Yellowtail Spill (cfs)

	Feb	Mar	Apr	May	Jun	Jul
Median Forecast	0	0	0	177	13	0
Minimum Forecast	0	0	0	0	0	0
Maximum Forecast	0	736	1,189	3,792	2,195	1,437

Release Outlook by Outlet

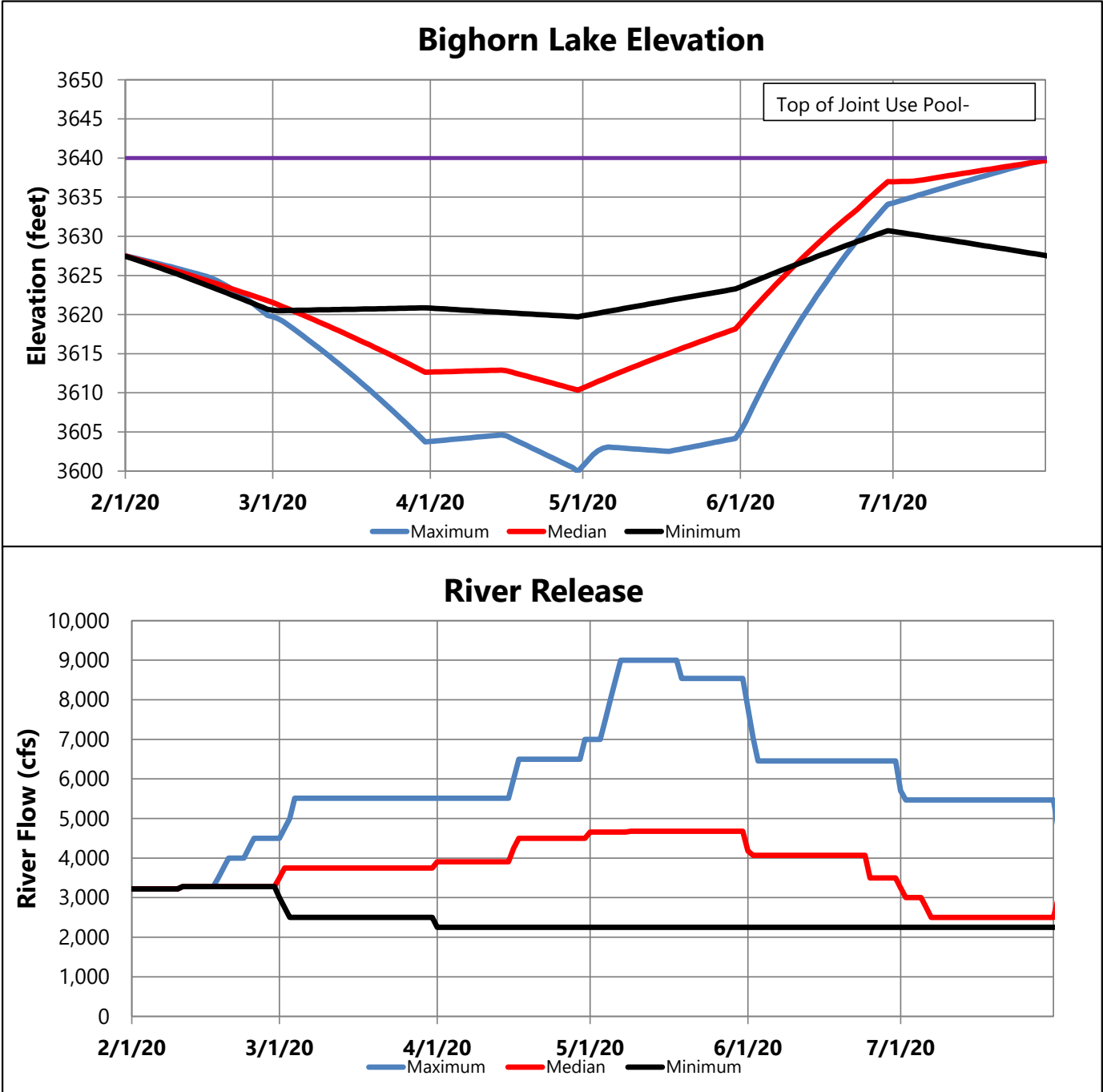
Releases through the spillway or the river outlet works occurs as early as March under maximum probable inflow conditions and May under median inflow conditions.



OPERATIONS OUTLOOK (February 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 3603.0 and 3620.8 feet. Bighorn Lake is expected to fill to normal full pool, elevation 3640 feet, under median and maximum inflow conditions.



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