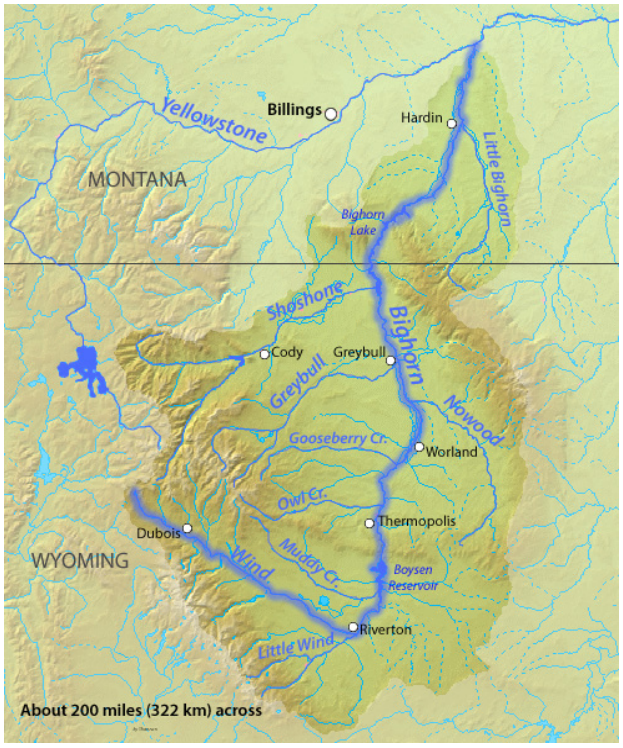
RECLAMATION

Managing Water in the West

Yellowtail Dam Water Supply and Projected Operations **May 2019**



Bighorn River Basin Map Source: DEMIS Mapserver

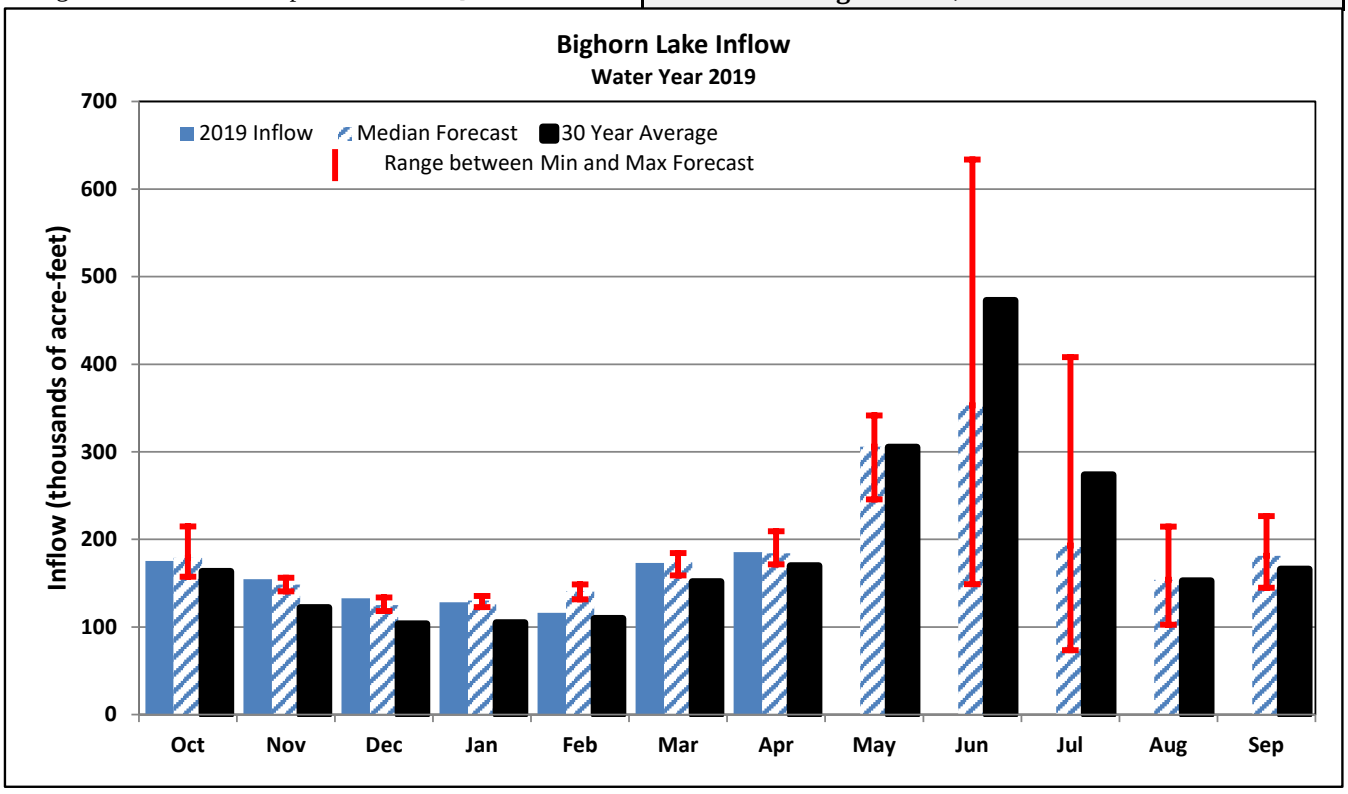
Forecasted May Operating Range

Forecast	Minimum	Median	Maximum
Monthly Average Inflow (cfs)	4,000	4,970	5,550
Monthly Average River Release (cfs)	3,000	3,750	4,750
End of May Elevation (feet)	3621.3	3623.1	3620.6

May 2019 Inflow Forecast

May through July Volume (kaf)	852
Percent of Average	81

Water Year	Historic Inflow (kaf)	Rank
2018	1,927	4
2017	2,350	1
2016	910	31
2015	1,412	14
30 Year Average	1,052	

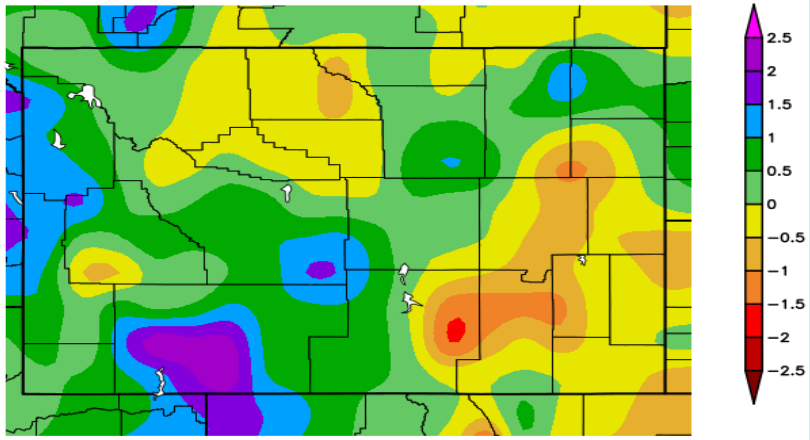


Climate Departure from Normal

April 1 through April 30, 2019

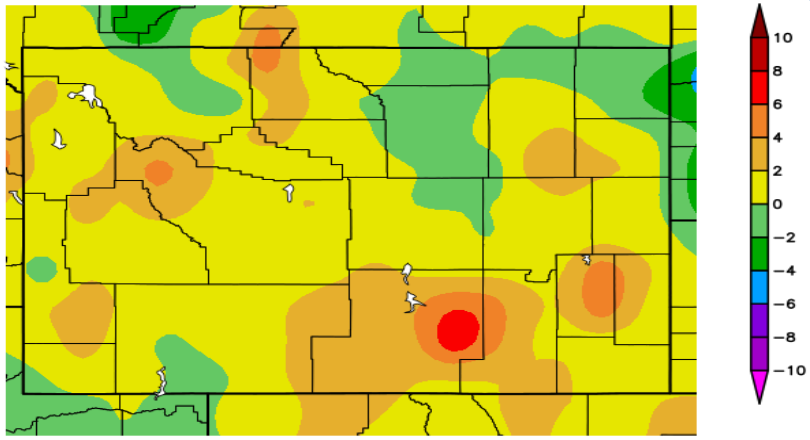
Precipitation

Departure from Normal (inches)



Temperature

Departure from Normal (°F)



HPRCC using provisional data NOAA Regional Climate Centers

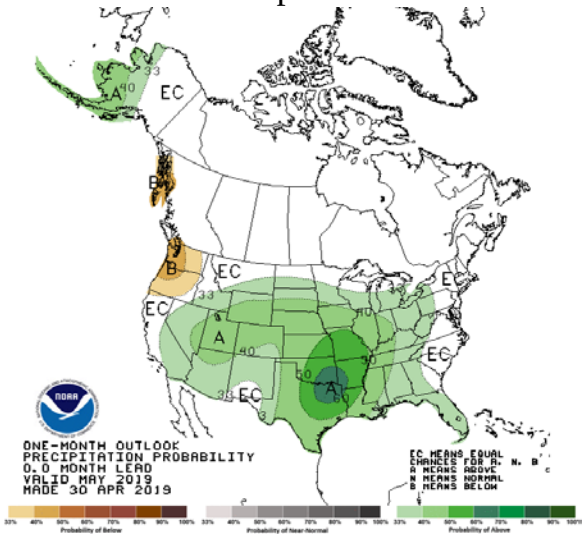
CLIMATE SUMMARY

Precipitation was below average in the northern portion of the Bighorn River Basin and above average in the southern portion during April. Temperatures were near average throughout the Bighorn River Basin during April.

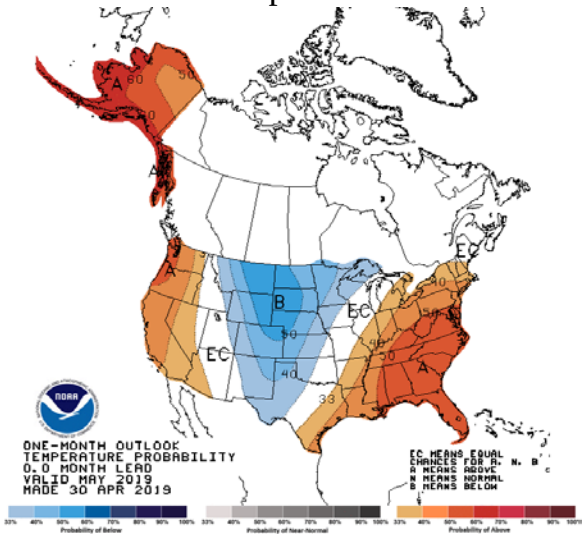
The May outlook is for a greater chance for above average precipitation and below average temperatures throughout the Bighorn River Basin.

May Climate Outlook

Precipitation



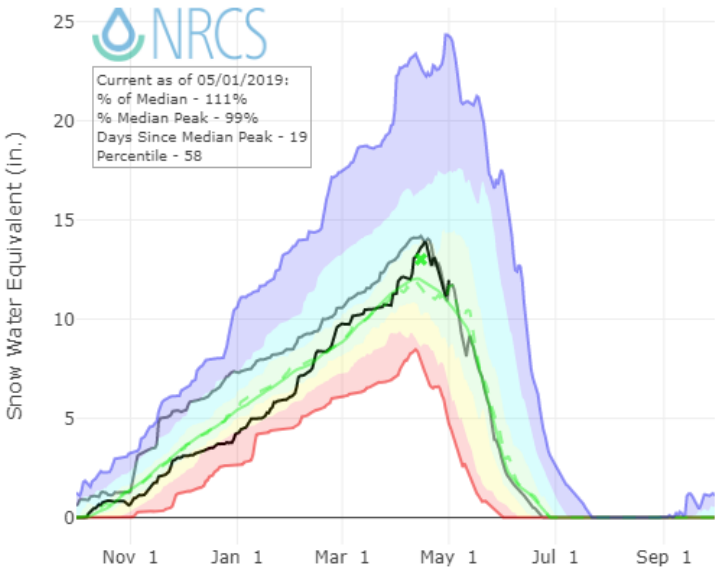
Temperature

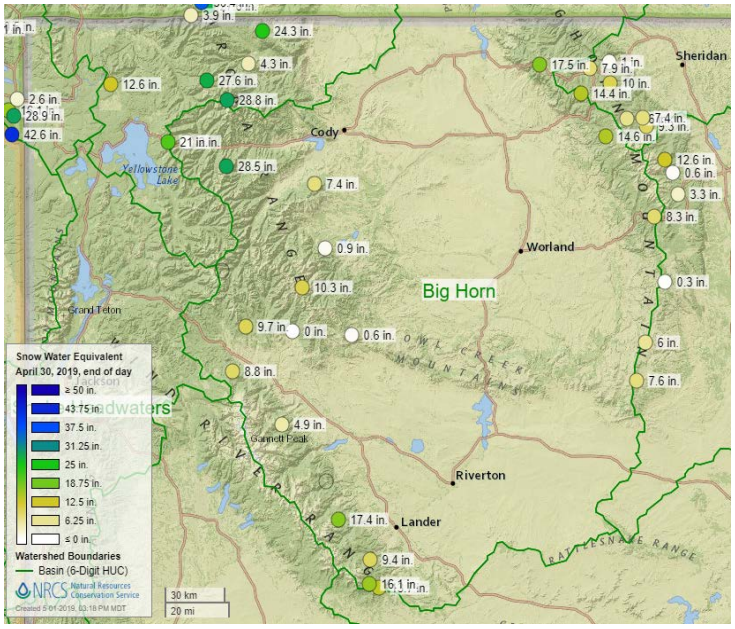


SNOWPACK SUMMARY

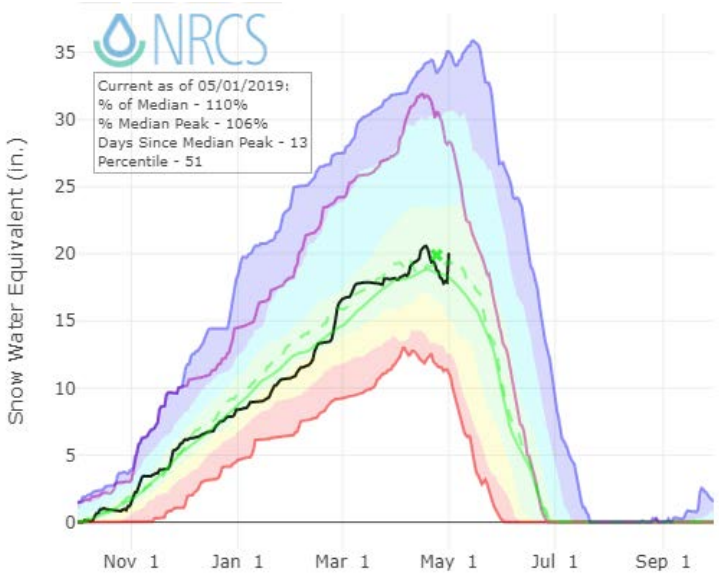
The snow water equivalent (SWE) graphs are a composite of SNOTEL sites within the Bighorn River Basin that is managed by the Department of Natural Resources Conservation Service (NRCS). The May 1, 2019 SNOTEL data along with streamflow data was used to compute a May through July runoff inflow forecast volume into Bighorn Lake of 851,600 acre-feet, or 81 percent of average.

Wind River

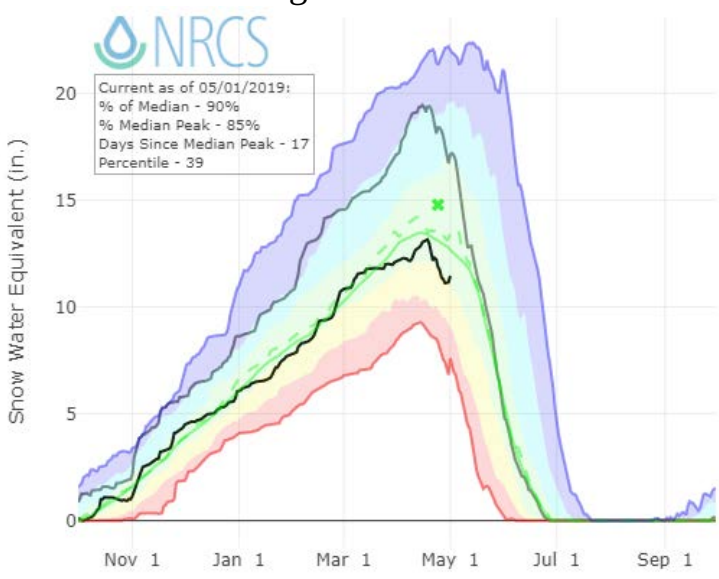




Shoshone River



Bighorn River



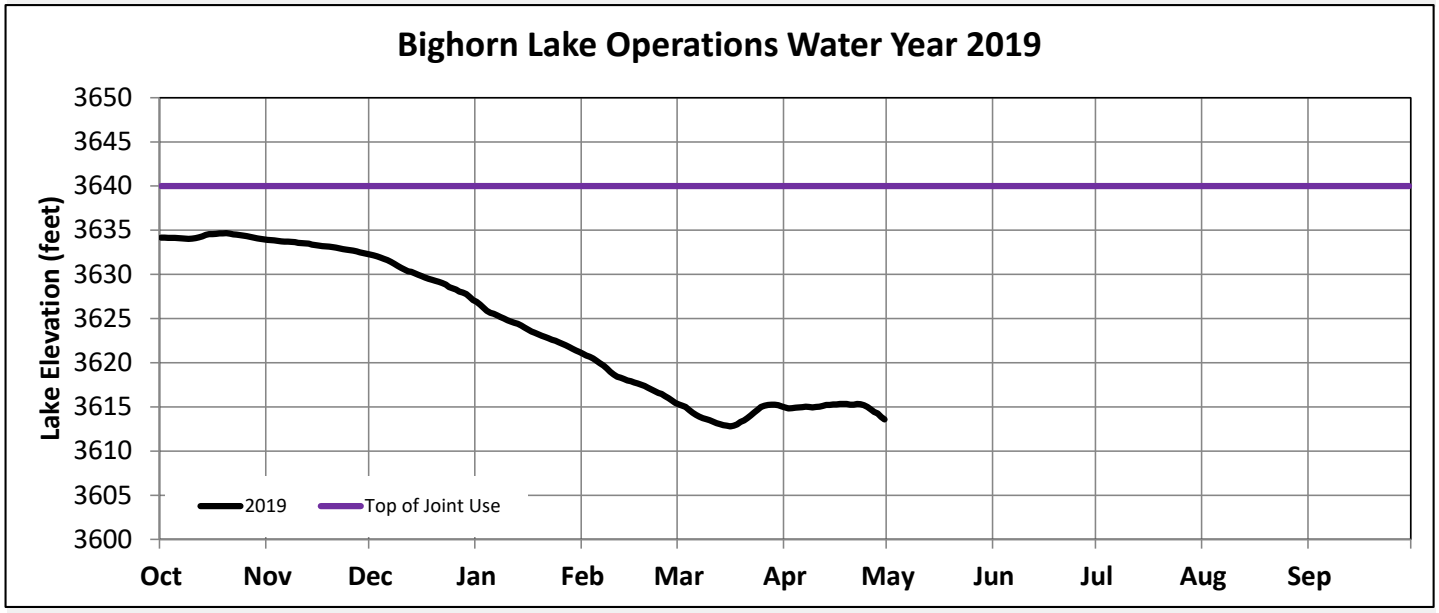
NRCS Montana Snow Survey Website: https://www.nrcs.usda.gov/wps/portal/nrcs/mt/snow/

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
- 2019 (15 sites)
- 2018 (14 sites)

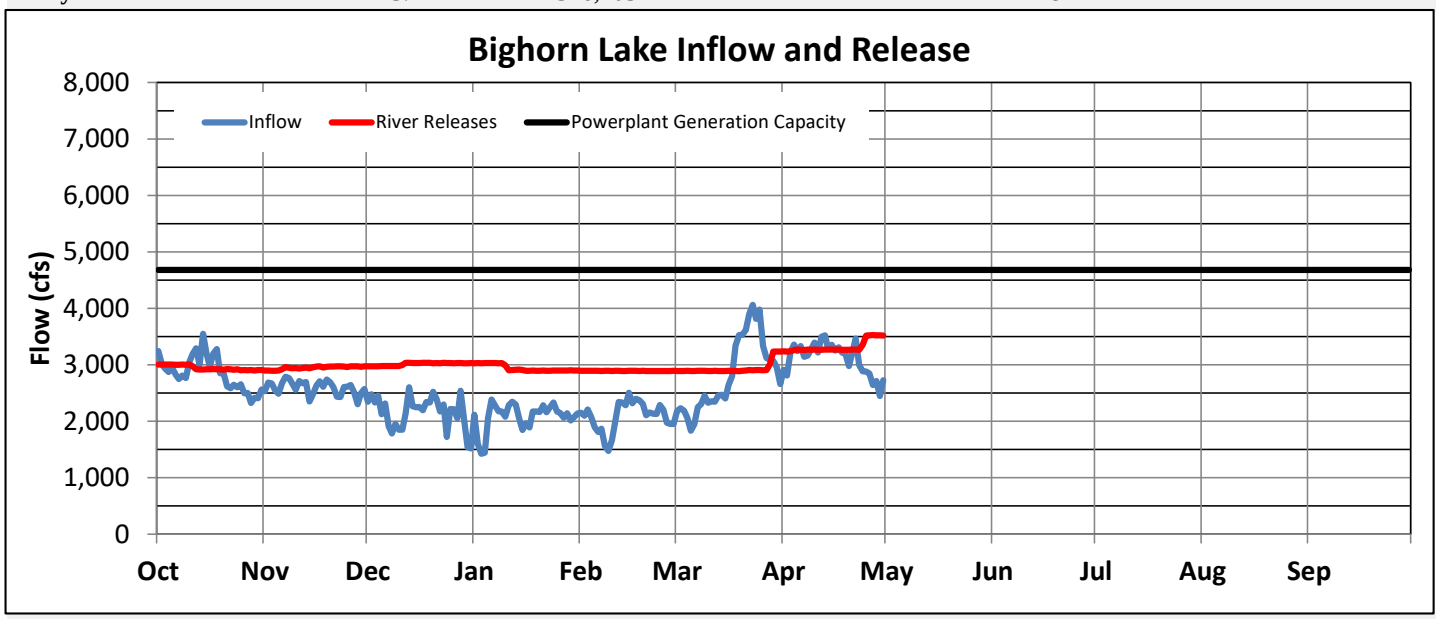
OPERATIONS REVIEW

Releases to the Bighorn River were increased to 3,500 cfs on April 24 based on storage conditions and forecasted inflow. April inflows, April releases and end of April elevation were near what was forecasted under median inflow conditions.



May 1 Storage Conditions

	Elevation feet	Storage acre-feet	Percent of Average	Percent Full
Bighorn Lake	3613.6	785,623	105	77
Buffalo Bill	5359.5	396,776	101	61
Boysen	4715.7	576,405	112	78



Average April Release

	Monthly Avg cfs	Percent of Average
Bighorn River	3,318	104
Buffalo Bill Total Release	1,520	136
Boysen Release	1,013	87

Average April Inflow

	Monthly Avg cfs	Percent of Average
Bighorn Lake	3,117	109
Buffalo Bill	944	120
Boysen	1,094	132

OPERATIONS OUTLOOK

Releases to the Bighorn River may increase or decrease from the current release rate of 3,500 cfs during May depending upon tributary gains and forecasted outlook for Boysen and Buffalo Bill releases. Bighorn Lake is expected to fill to normal full pool, elevation 3640 feet, under median and maximum inflow conditions.

Median Inflow Conditions (May through July Inflow: 852 kaf)

	May	Jun	Jul	Aug	Sep	Oct
Boysen Release (cfs)	1,890	2,151	1,794	1,654	1,250	1,000
Buffalo Bill Release (cfs)	2,531	2,652	2,726	1,888	1,694	899
Tributary Gain (cfs)	551	1,128	-1,381	-1,038	104	990
Monthly Inflow (cfs)	4,972	5,931	3,139	2,505	3,049	2,890
Monthly Inflow (kaf)	305.7	352.9	193.0	154.0	181.4	177.7
Monthly Release (kaf)	238.2	219.3	190.6	191.8	176.9	167.8
Afterbay Release (cfs)	3,944	3,756	3,170	3,189	3,043	2,799
River Release (cfs)	3,750	3,373	2,750	2,750	2,749	2,750
End-of-Month Content (kaf)	853.1	986.7	989.1	951.3	955.8	965.7
End-of-Month Elevation (feet)	3623.1	3637.2	3637.4	3634.0	3634.5	3635.4

Minimum Inflow Conditions (May through July Inflow: 468 kaf)

	May	Jun	Jul	Aug	Sep	Oct
Boysen Release (cfs)	1,501	1,200	1,199	1,200	1,150	1,000
Buffalo Bill Release (cfs)	2,531	1,850	1,926	1,812	1,499	675
Tributary Gain (cfs)	-36	-548	-1,929	-1,343	-215	735
Monthly Inflow (cfs)	3,996	2,502	1,195	1,669	2,433	2,410
Monthly Inflow (kaf)	245.7	148.9	73.5	102.6	144.8	148.2
Monthly Release (kaf)	192.1	122.7	124.0	125.2	112.9	101.2
Afterbay Release (cfs)	3,194	2,133	2,087	2,106	1,968	1,716
River Release (cfs)	3,001	1,749	1,667	1,667	1,667	1,667
End-of-Month Content (kaf)	839.2	865.4	814.9	792.3	824.2	871.2
End-of-Month Elevation (feet)	3621.3	3624.7	3618.0	3614.6	3619.3	3625.4

Maximum Inflow Conditions (May through July Inflow: 1,383 kaf)

	May	Jun	Jul	Aug	Sep	Oct
Boysen Release (cfs)	1,890	4,023	3,232	2,150	1,707	1,000
Buffalo Bill Release (cfs)	2,531	4,304	4,380	2,103	1,795	1,189
Tributary Gain (cfs)	1,134	2,323	-974	-763	306	1,122
Monthly Inflow (cfs)	5,554	10,650	6,637	3,490	3,808	3,311
Monthly Inflow (kaf)	341.5	633.7	408.1	214.6	226.6	203.6
Monthly Release (kaf)	293.8	489.5	365.0	237.9	219.6	196.2
Afterbay Release (cfs)	4,848	8,297	6,006	3,939	3,761	3,261
River Release (cfs)	4,751	8,050	5,586	3,500	3,501	3,249
End-of-Month Content (kaf)	833.3	977.5	1,020.6	997.3	1,004.3	1,011.7
End-of-Month Elevation (feet)	3620.6	3636.4	3640.0	3638.1	3638.7	3639.3

OPERATIONS OUTLOOK

Irrigation diversions were started on April 24 at 100 cfs. The canal was shutdown on May 8 due to rain. The canal is expected to resume operations on May 16.

Irrigation Demands Outlook

Bighorn Canal (cfs)

	May	Jun	Jul	Aug	Sep	Oct
Median Forecast	194	383	420	439	294	49
Minimum Forecast	194	383	420	439	301	49
Maximum Forecast	98	247	420	439	260	11

Power Generation Outlook

Current Number of Units Available: 3
Approximate Yellowtail Powerplant Turbine Capacity: 6,150 cfs
Approximate Yellowtail Powerplant Generation Limit: 4,680 cfs

Yellowtail Powerplant Release (cfs)

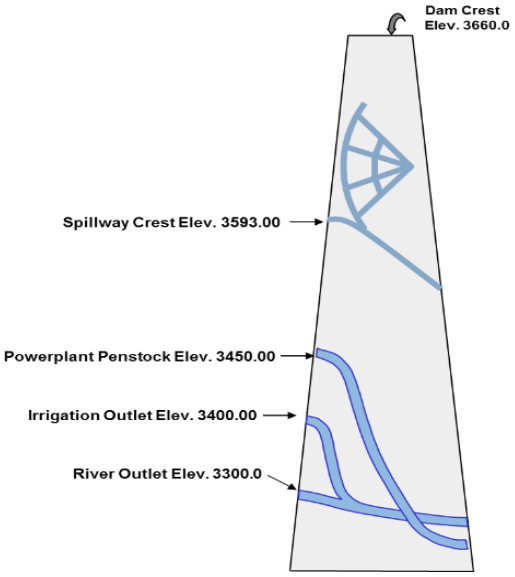
	May	Jun	Jul	Aug	Sep	Oct
Median Forecast	3,874	3,685	3,100	3,119	2,973	2,729
Minimum Forecast	3,124	2,062	2,017	2,036	1,897	1,646
Maximum Forecast	4,778	4,080	4,752	3,869	3,691	3,191

Yellowtail Powerplant Generation (gwh)

	May	Jun	Jul	Aug	Sep	Oct
Median Forecast	94.1	88.9	76.0	76.0	69.4	65.4
Minimum Forecast	74.0	44.1	44.0	44.1	39.4	35.0
Maximum Forecast	116.1	99.1	119.3	97.2	89.3	78.9

Yellowtail Spill (cfs)

	May	Jun	Jul	Aug	Sep	Oct
Median Forecast	0	0	0	0	0	0
Minimum Forecast	0	0	0	0	0	0
Maximum Forecast	0	4,146	1,184	0	0	0



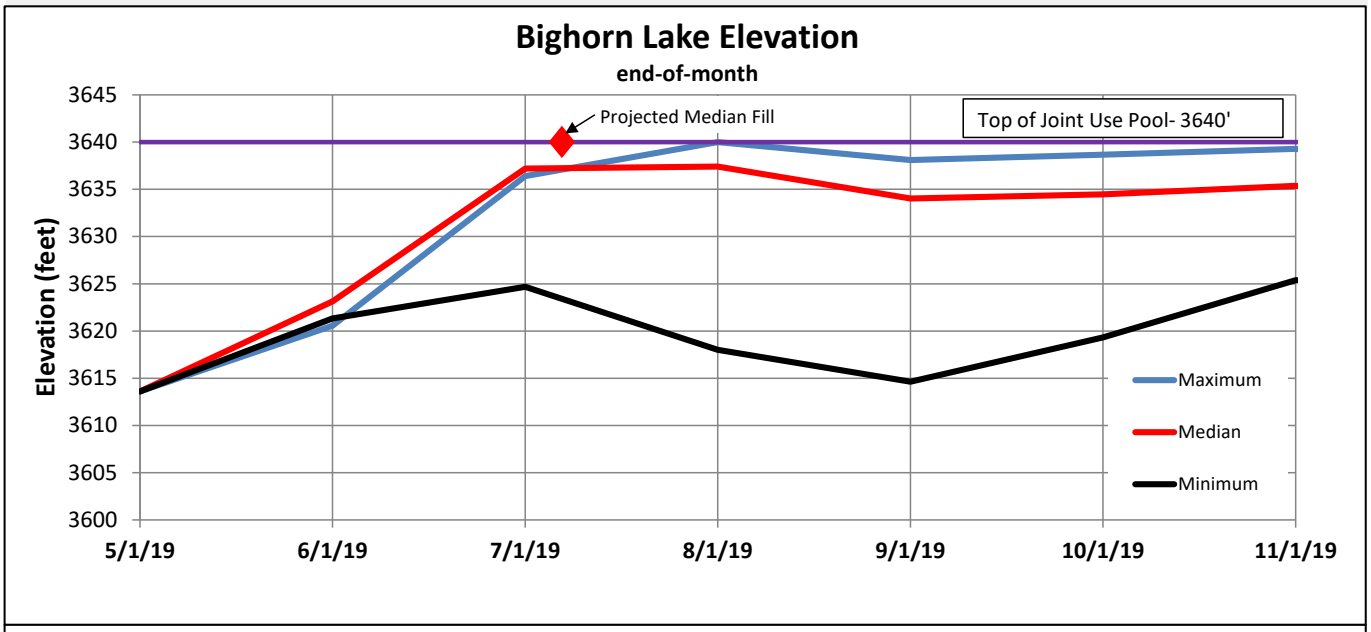
Release Outlook by Outlet

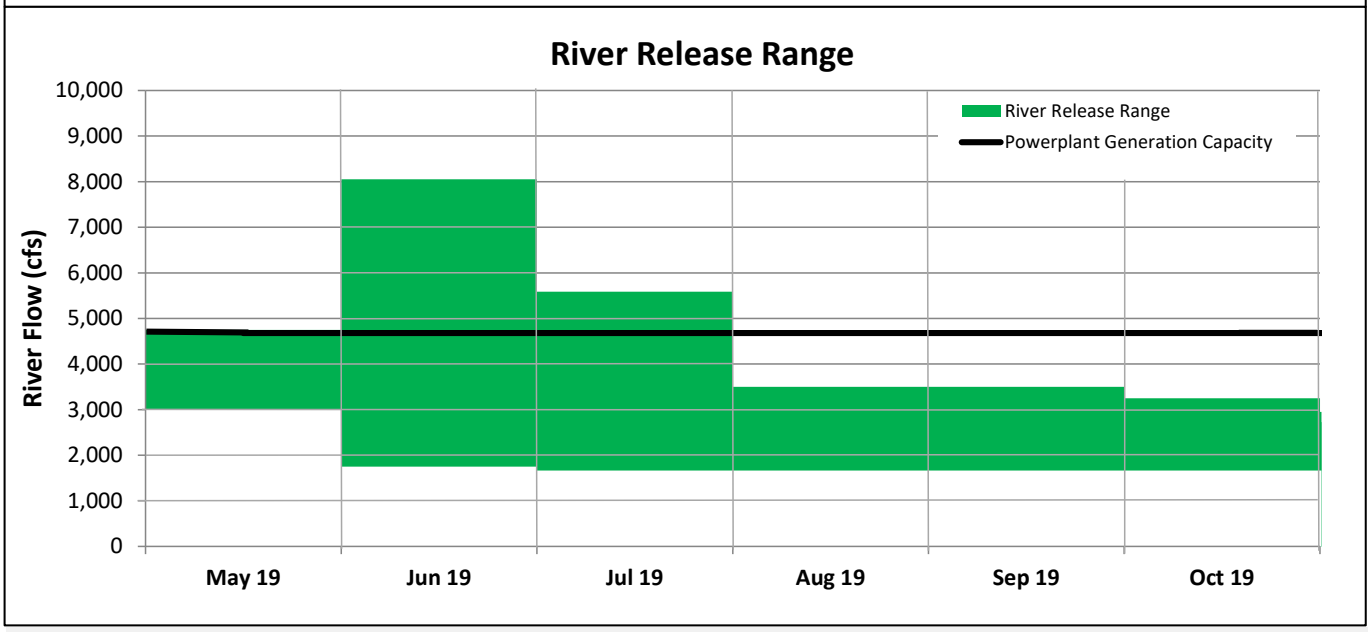
Release through either the spillway or river outlet works are likely during June, and July for maximum inflow forecast. Releases through either the spillway or river outlet works are possible duirng June during scheduled maintenance and inpsection of the Yellowtail Powerplant whic will limit Yellowtail Powerplan to two units.

OPERATIONS OUTLOOK

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 monthly average river releases during May through July range between 1,660 and 8,050 cfs.

The current median May through July inflow forecast calls for a drawdown to 3615.6 feet and under the maximum inflow forecast a drawdown to 3607.8 feet. The rule curves do not apply to the minimum inflow forecast because the volume, 468,000 acre-feet, is under the minimum reservoir fill volume.





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