

# RECLAMATION

## *Managing Water in the West*

### Yellowtail Dam Water Supply and Projected Operations

March 2019



Bighorn River Basin Map Source DEMIS Mapserv

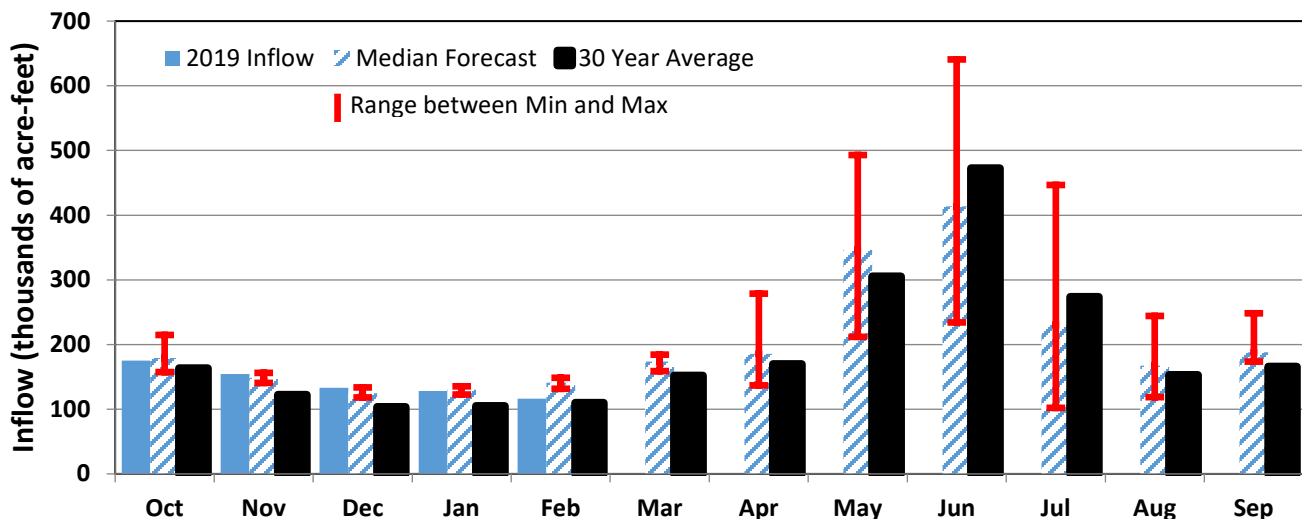
#### Forecasted March Operating Range

Forecast	Minimum	Median	Maximum
Monthly Average Inflow (cfs)	2,585	2,825	3,000
Monthly Average River Release (cfs)	2,900	2,950	3,250
End of March Elevation (feet)	3613.1	3614.9	3613.7

#### March 2019 Inflow Forecast April through July Runoff

April through July Volume (kaf)		1,176
Percent of Average		96
Water Year	Historic Inflow (kaf)	Rank
2018	2,318	3
2017	2,953	1
2016	1,032	32
2015	1,543	17
30 Year Average	1,221	

#### Bighorn Lake Inflow Water Year 2019

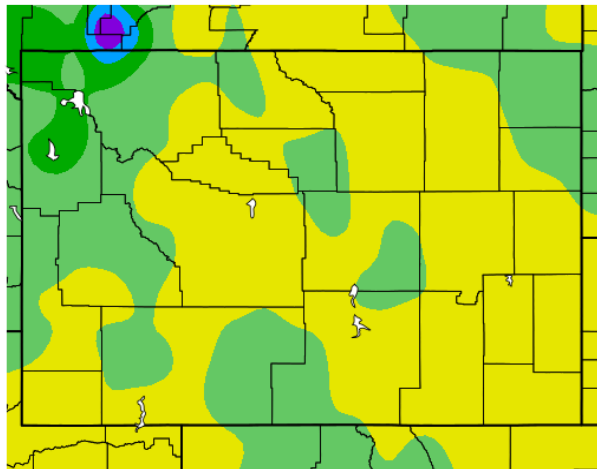


## Climate Departure from Normal

February 1 through February 28, 2019

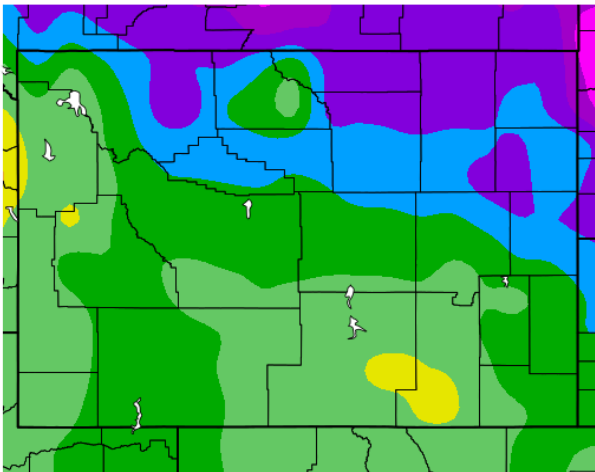
### Precipitation

Departure from Normal (inches)



### Temperature

Departure from normal (°F)



HPRCC using provisional data NOAA Regional Climate Centers

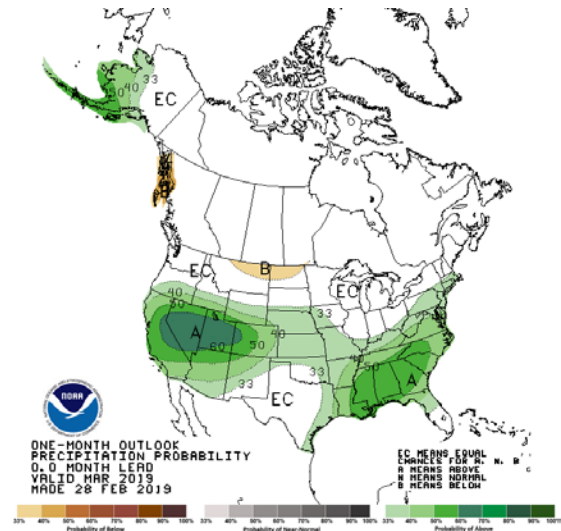
## CLIMATE SUMMARY

Precipitation was below average in the valley and above average in the mountains throughout the Bighorn River Basin during February. Temperatures were cooler than average throughout the Bighorn River Basin but much cooler than average in the northern part of the Basin during February. The cooler than average temperatures reduced tributary gains. The wetter than average conditions in the mountains contributed to an increase in the April through July runoff forecast.

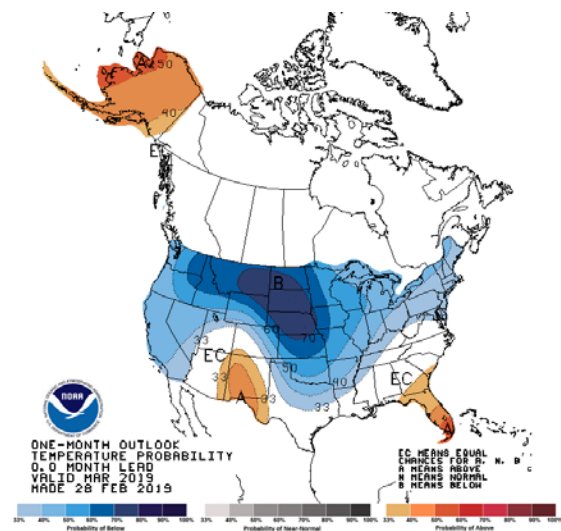
The March outlook is for a greater chance of above average precipitation in the southern part of the Bighorn Basin and below average temperatures throughout the Bighorn River Basin.

## March Climate Outlook

### Precipitation

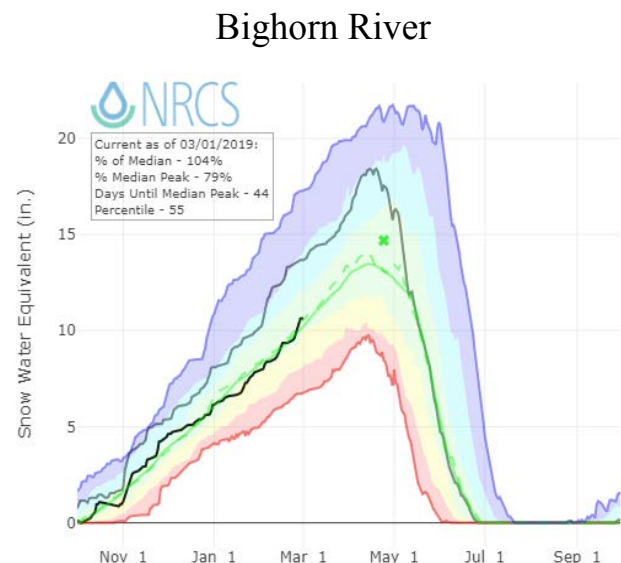
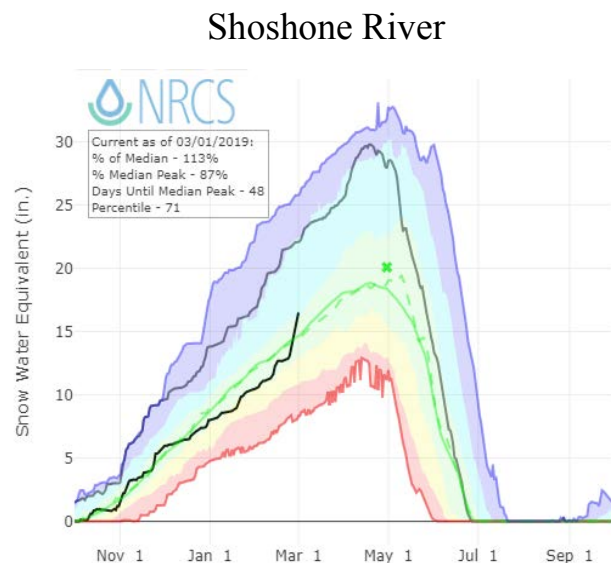
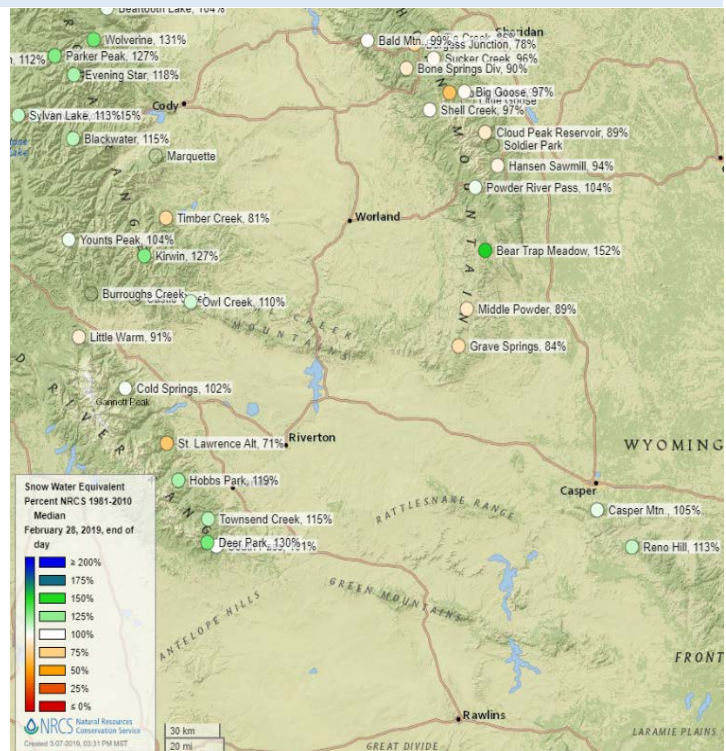
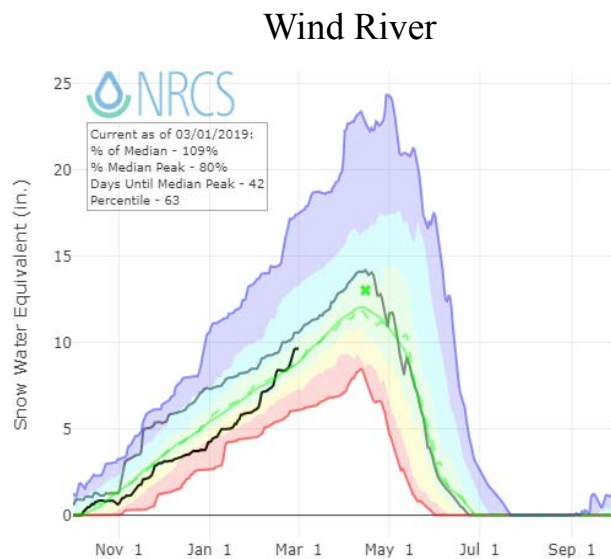


### Temperature



# SNOWPACK SUMMARY

The Snow Water Equivalent graphs are a composite of SNOTEL sites within the Bighorn River Basin that is managed by the Department of Natural Resource and Conservation Service (NRCS). The March 1, 2019 SNOTEL data along with streamflow data was used to compute an April through July runoff inflow forecast volume into Bighorn Lake of 1,176,000 acre-feet, or 96 percent of average.



- ✕ Median Peak SWE
- Max
- - Median (POR)
- Median ('81-'10)
- Min
- Stats. Shading
- 2019 (5 sites)
- 2018 (4 sites)

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

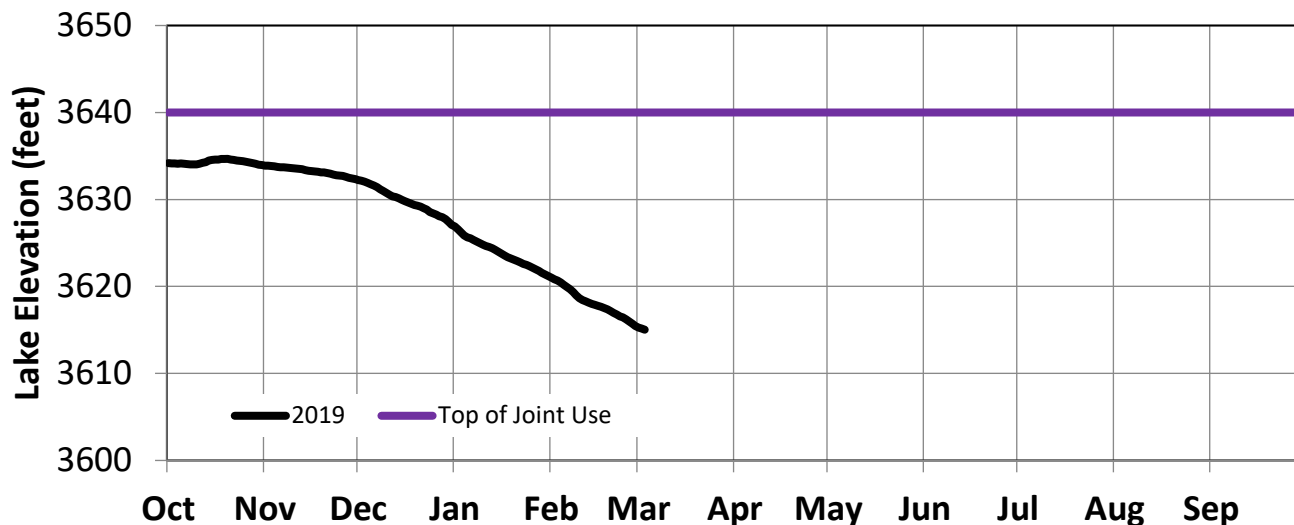
Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th Percentiles  
Normal ('81-'10) – Official median calculated from 1981-2010 data  
Normal (POR) – Unofficial mean calculated from Period of Record data



# OPERATIONS REVIEW

Releases were kept at 2,900 cfs through the month of February. February inflows and February end of month elevation were lower than what was forecasted under median inflow conditions.

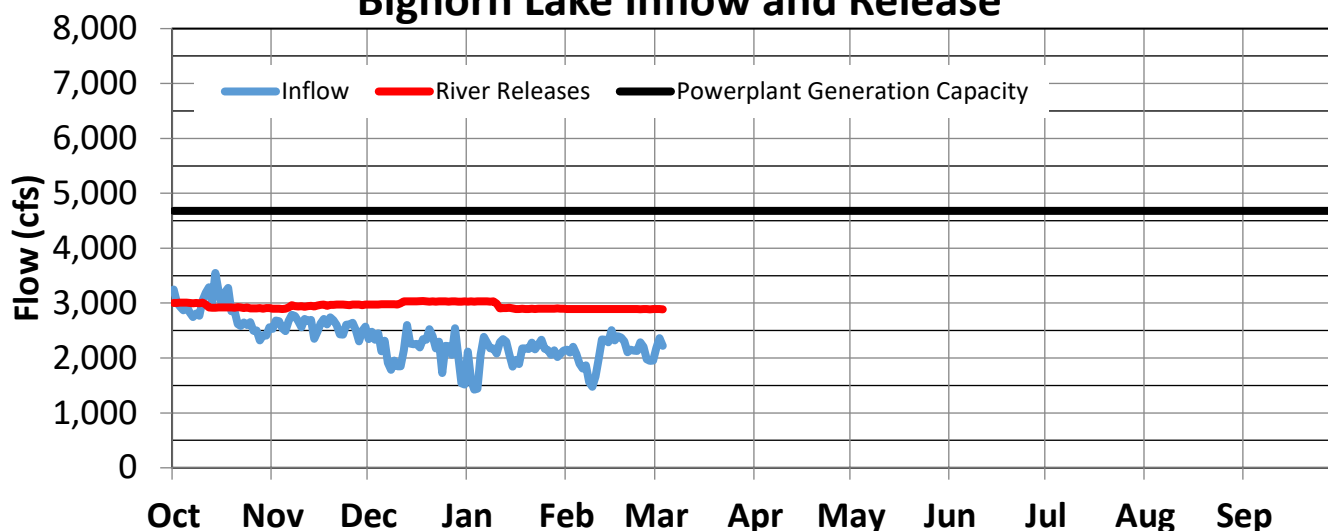
## Bighorn Lake Operations Water Year 2019



### March 1 Storage Conditions

	Elevation Feet	Storage acre-feet	Percent of Average	Percent Full
Bighorn Lake	3615.5	797,544	102	78
Buffalo Bill	5366.5	443,408	106	69
Boysen	4715.6	574,523	107	77

## Bighorn Lake Inflow and Release



### Average February Release

	Monthly Avg cfs	Percent of Average
Bighorn River	2,890	115
Buffalo Bill River Release	355	122
Boysen Release	1,000	134

### Average February Inflow

	Monthly Avg cfs	Percent of Average
Bighorn Lake	2,090	107
Buffalo Bill	235	100
Boysen	675	99

# OPERATING OUTLOOK

Releases may increase from 2,900 cfs to more than 3,000 cfs in March if releases are increased as expected from Buffalo Bill Reservoir. Increases are dependent upon downstream ice conditions. Bighorn Lake is expected to fill to normal full pool, 3640.0 feet, under median and maximum inflow conditions.

## Median Inflow Conditions (April through July Inflow 1,176 kaf)

	Mar	April	May	June	July	Aug	Sep
Boysen Release (cfs)	1,000	1,000	2,038	2,039	2,038	1,628	1,178
Buffalo Bill Release (cfs)	644	1,462	2,522	2,644	2,719	1,888	1,694
Tributary Gain (cfs)	1,179	657	1,075	2,267	-1,010	-794	287
Monthly Inflow (cfs)	2,823	3,119	5,635	6,949	3,747	2,723	3,159
Monthly Inflow (kaf)	173.6	185.6	346.5	413.5	230.4	167.4	188.0
Monthly Release (kaf)	177.1	194.8	308.9	257.7	203	204.2	188.9
Afterbay Release (cfs)	2,950	3,344	5,094	4,401	3,371	3,391	3,245
River Release (cfs)	2,950	3,322	4,900	4,018	2,952	2,952	2,951
End-of-Month Content (kaf)	794	784.8	822.4	978.2	1,005.6	968.8	967.9
End-of-Month Elevation (feet)	3614.9	3613.5	3619.1	3636.5	3638.8	3635.6	3635.6

## Minimum Inflow Conditions (April through July Inflow 685 kaf)

	Mar	April	May	June	July	Aug	Sep
Boysen Release (cfs)	1,000	1,000	1,174	1,200	1,199	1,200	1,150
Buffalo Bill Release (cfs)	545	862	1,838	1,958	1,934	1,818	1,707
Tributary Gain (cfs)	1,039	439	434	778	-1,472	-1,088	61
Monthly Inflow (cfs)	2,584	2,301	3,446	3,936	1,660	1,930	2,917
Monthly Inflow (kaf)	158.9	136.9	211.9	234.2	102.1	118.7	173.6
Monthly Release (kaf)	174.0	131.5	133.2	140.1	147.1	148.3	135.2
Afterbay Release (cfs)	2,900	2,281	2,236	2,425	2,462	2,482	2,343
River Release (cfs)	2,900	2,250	2,043	2,042	2,043	2,043	2,042
End-of-Month Content (kaf)	782.4	787.8	866.5	960.6	915.6	886	924.4
End-of-Month Elevation (feet)	3613.1	3613.9	3624.8	3634.9	3630.5	3627.2	3631.4

## Maximum Inflow Conditions (April through July Inflow 1,859 kaf)

	Mar	April	May	June	July	Aug	Sep
Boysen Release (cfs)	1,000	2,149	2,148	3,563	3,563	2,150	1,707
Buffalo Bill Release (cfs)	644	1,462	3,653	3,773	3,846	2,103	1,795
Tributary Gain (cfs)	1,355	1,072	2,217	3,433	-145	-281	671
Monthly Inflow (cfs)	2,999	4,684	8,018	10,769	7,265	3,972	4,173
Monthly Inflow (kaf)	184.4	278.7	493	640.8	446.7	244.2	248.3
Monthly Release (kaf)	195.5	314.7	499.8	421.9	388.6	268.7	234.4
Afterbay Release (cfs)	3,249	5,359	8,198	7,161	6,390	4,440	4,010
River Release (cfs)	3,249	5,359	8,101	6,914	5,970	4,001	3,749
End-of-Month Content (kaf)	786.4	750.4	743.6	962.5	1020.6	996.1	1010
End-of-Month Elevation (feet)	3613.7	3607.6	3606.4	3635.1	3640.0	3638.0	3639.2

# OPERATING OUTLOOK

Irrigation diversions are expected to start in April.

## Irrigation Demand Outlook

### Bighorn Canal (cfs)

	Mar	April	May	June	July	Aug	Sep
Median Forecast	0	22	194	383	420	439	294
Minimum Forecast	0	30	194	383	420	439	301
Maximum Forecast	0	0	0	98	247	420	

## Power Generation Outlook

Current Number of Units Available: 3

Approximate Yellowtail Powerplant Turbine Capacity (cfs): 6,150 cfs

Approximate Yellowtail Powerplant Generation Limit (cfs): 4,680 cfs

### Yellowtail Powerplant Release (cfs)

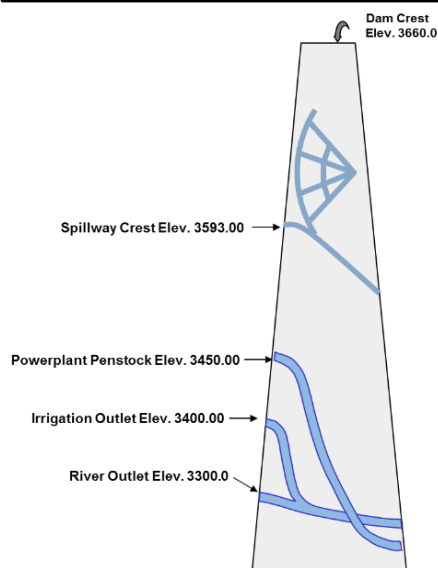
	Mar	April	May	June	July	Aug	Sep
Median Forecast	2,880	3,274	4,752	4,080	3,301	3,321	3,175
Minimum Forecast	2,830	2,210	2,243	2,432	2,470	2,490	2,349
Maximum Forecast	3,180	4,753	4,752	4,080	4,752	4,370	3,939

### Yellowtail Powerplant Generation (gwh)

	Mar	April	May	June	July	Aug	Sep
Median Forecast	66.5	73.8	119.3	99.1	81.9	81.9	75.0
Minimum Forecast	64.9	46.7	50.6	54.8	57.4	57.4	52.0
Maximum Forecast	74.2	115.5	119.3	99.1	119.3	110.4	95.9

### Yellowtail Spill (cfs)

	Mar	April	May	June	July	Aug	Sep
Median Forecast	0	0	281	242	0	0	0
Minimum Forecast	0	0	0	0	0	0	0
Maximum Forecast	0	536	3,376	3,010	1,568	0	0



## Release Outlook by Outlet

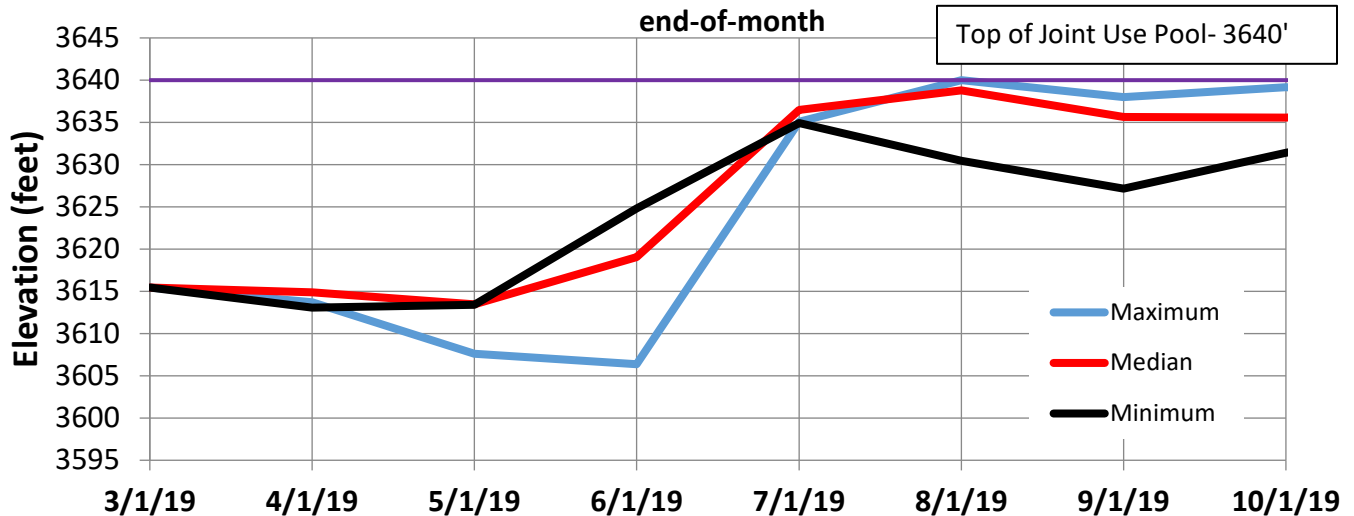
Releases through either the spillway or river outlet works are likely during May and June under medium inflow conditions. There may be spill during April through July under maximum inflow conditions.

# OPERATING OUTLOOK

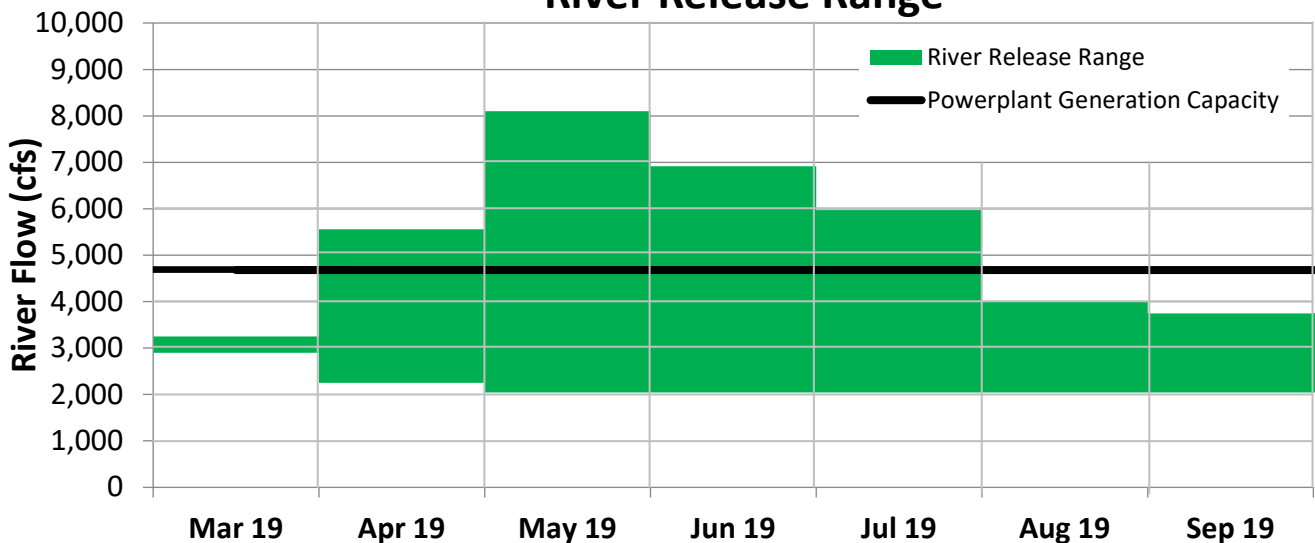
Projected elevations and the range of river releases are based on the median, minimum, and maximum inflow forecasts. End of month elevations and river releases vary based on the difference between forecasted inflow scenarios. The monthly average river releases during April through July range between 2,045 and 8,100 cfs.

The current median April-July inflow forecast calls for a drawdown to 3613.0 feet and under the maximum inflow forecast a drawdown to 3603.4 feet. The rule curves do not apply to the minimum inflow forecast because the volume, 685,000 acre-feet, is under the minimum reservoir fill volume of 727,000 acre-feet.

## Bighorn Lake Elevation



## River Release Range



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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](https://www.usbr.gov/gp/lakes_reservoirs/warepts/main_menu.html)