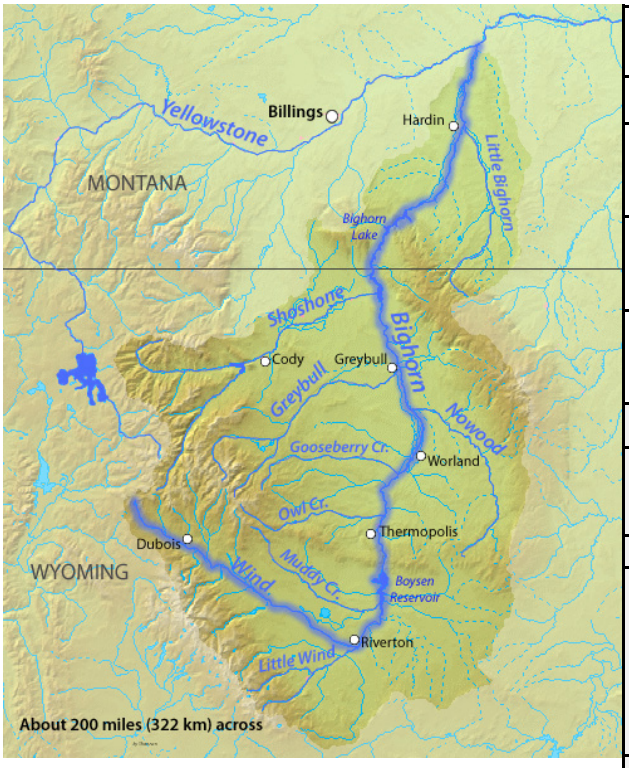
# Yellowtail Dam Water Supply and Projected Operations

BUREAU OF RECLAMATION

**July 2020**




Bighorn River Basin Map Source: DEMIS Mapserver

| July Operating Range | | | |
|---|---|---|---|
| **Forecast** | **Minimum** | **Median** | **Maximum** |
| **Monthly Average Inflow (cfs)** | 2,310 | 3,120 | 3,590 |
| **Monthly Average River Release (cfs)** | 2,875 | 3,035 | 3,265 |
| **End of July Elevation (feet)** | 3633.2 | 3636.8 | 3638.3 |

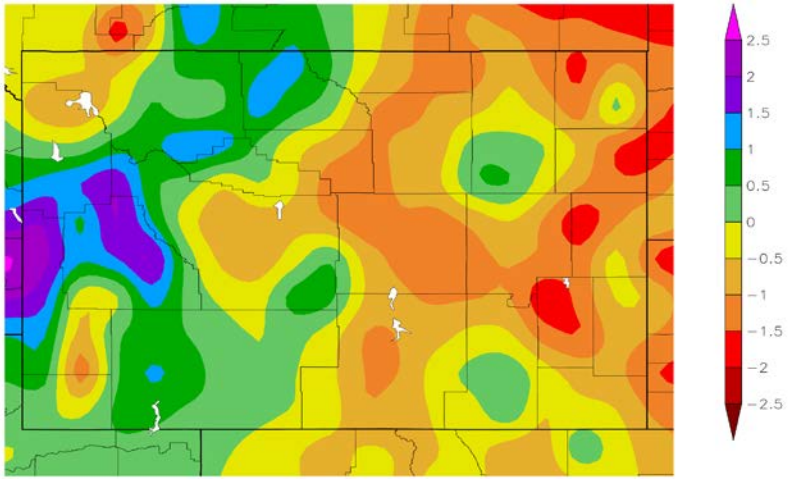
| July 2020 Inflow Forecast | | |
|---|---|---|
| July Volume | | 192 |
| Percent of Average | | 68 |
| **Water Year** | **Historic Inflow (kaf)** | **Rank** |
| **2019** | 461 | 11 |
| **2018** | 373 | 17 |
| **2017** | 616 | 6 |
| **2016** | 129 | 40 |
| **30 Year Average** | 284 | |

## Climate Departure from Normal

June 1 through June 30, 2020

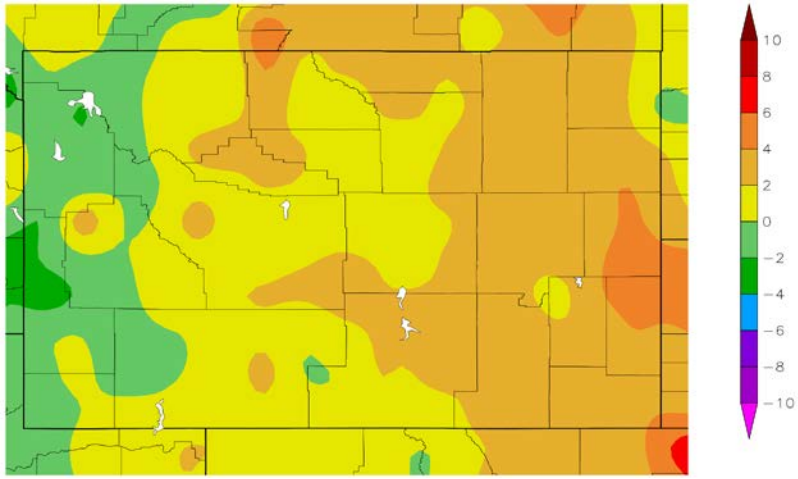
### Precipitation

Departure from Normal (inches)




### Temperature

Departure from Normal (°F)




HPRCC using provisional data NOAA Regional Climate Centers

# CLIMATE SUMMARY

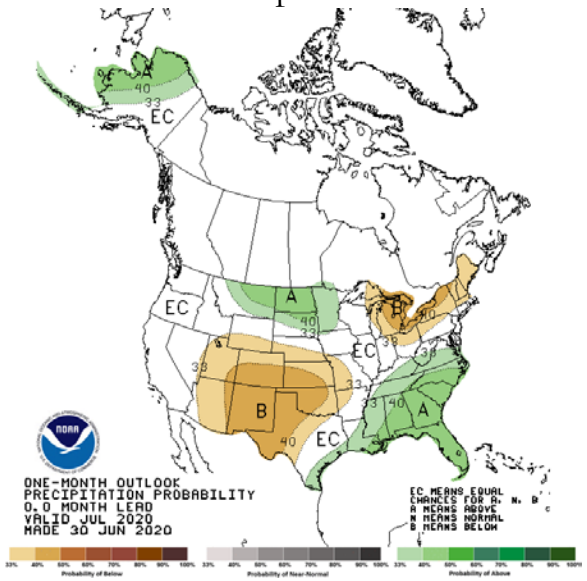
The climate in the Bighorn Basin above Yellowtail Dam was mixed. Generally, the western portion of the basin was wetter than average while the eastern area was drier than average. Temperatures were near normal.

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

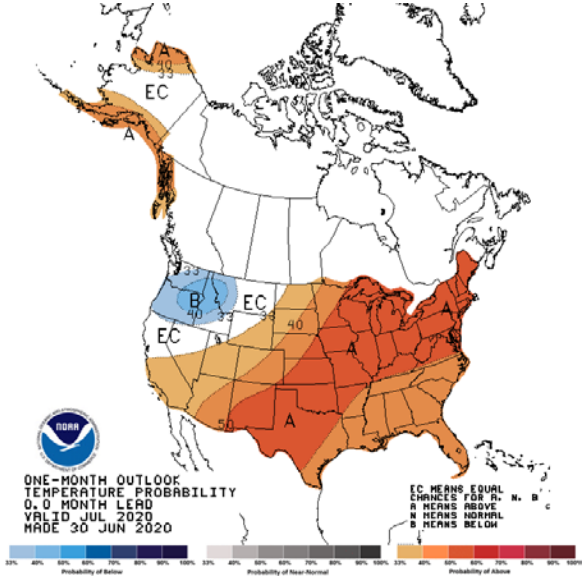
The climate outlook for July shows there is an equal chance precipitation will be above average, below average or average for most of the Bighorn Basin. There is also an equal chance temperatures will be either above average, below average or average for most of the Basin.

## July Climate Outlook

### Precipitation



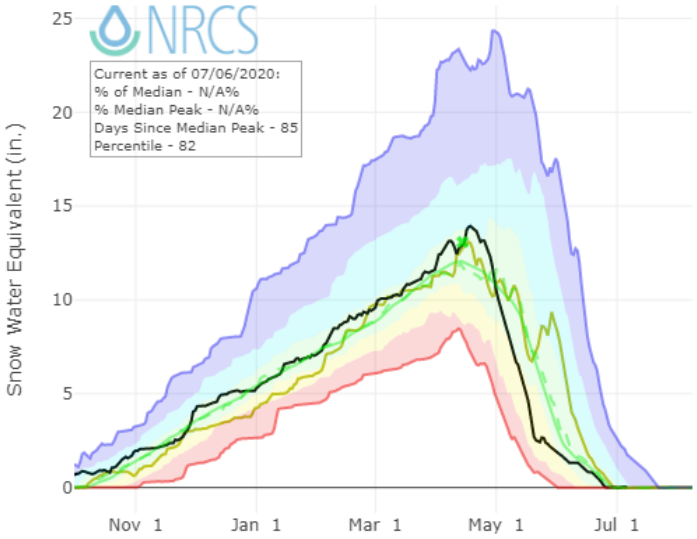

### Temperature

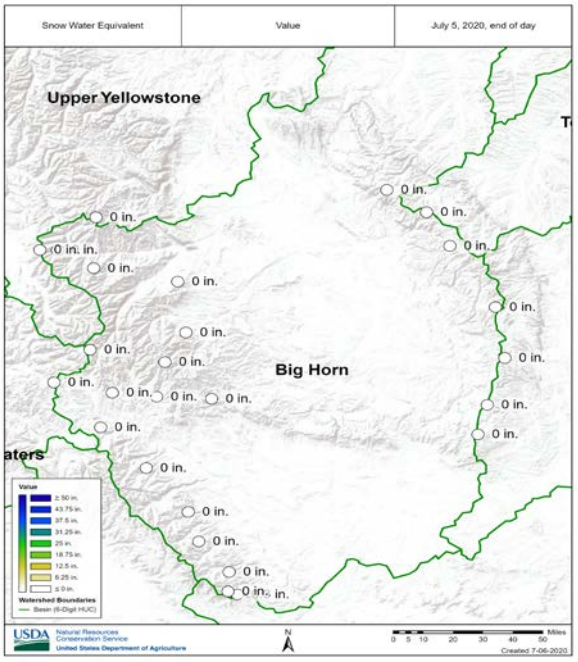


# SNOWPACK SUMMARY

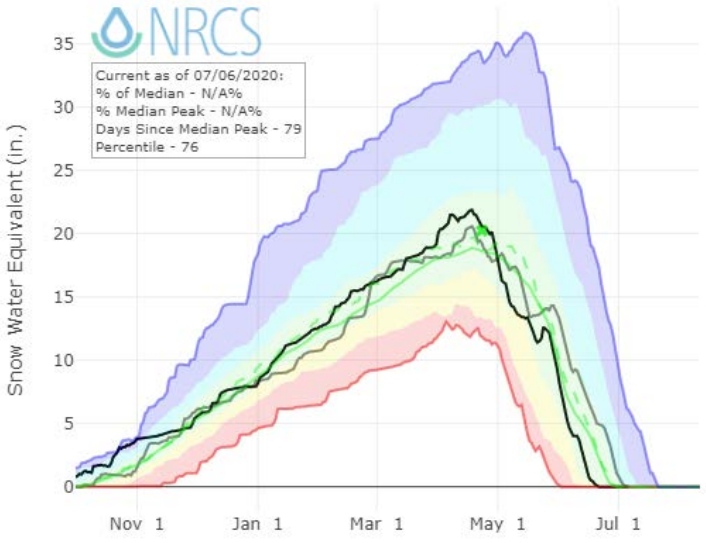
The snow water equivalent (SWE) graphs are a composite of SNOTEL sites within the Bighorn River Basin managed by the Department of Natural Resources Conservation Service (NRCS).

## Wind River

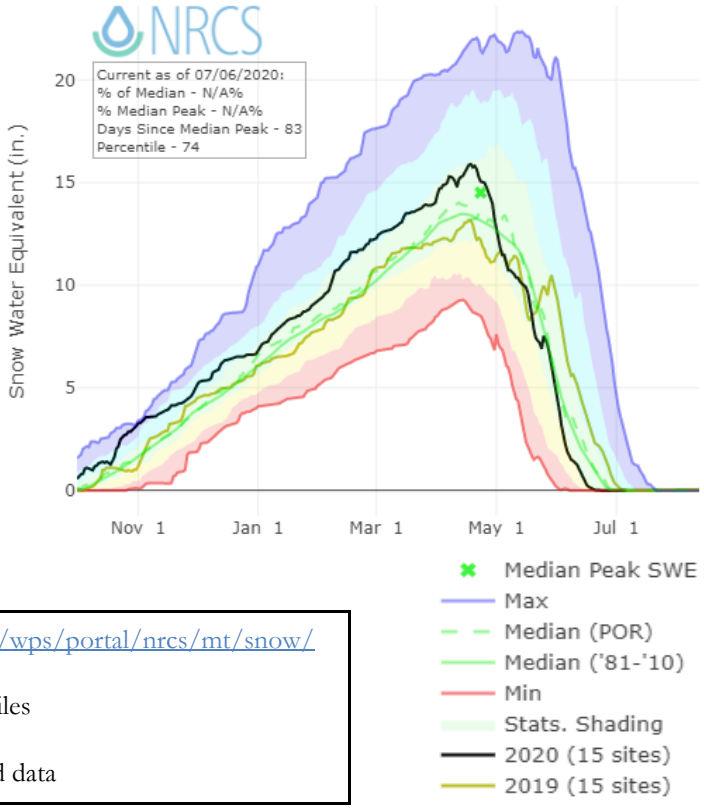



## Shoshone River




## Bighorn River




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

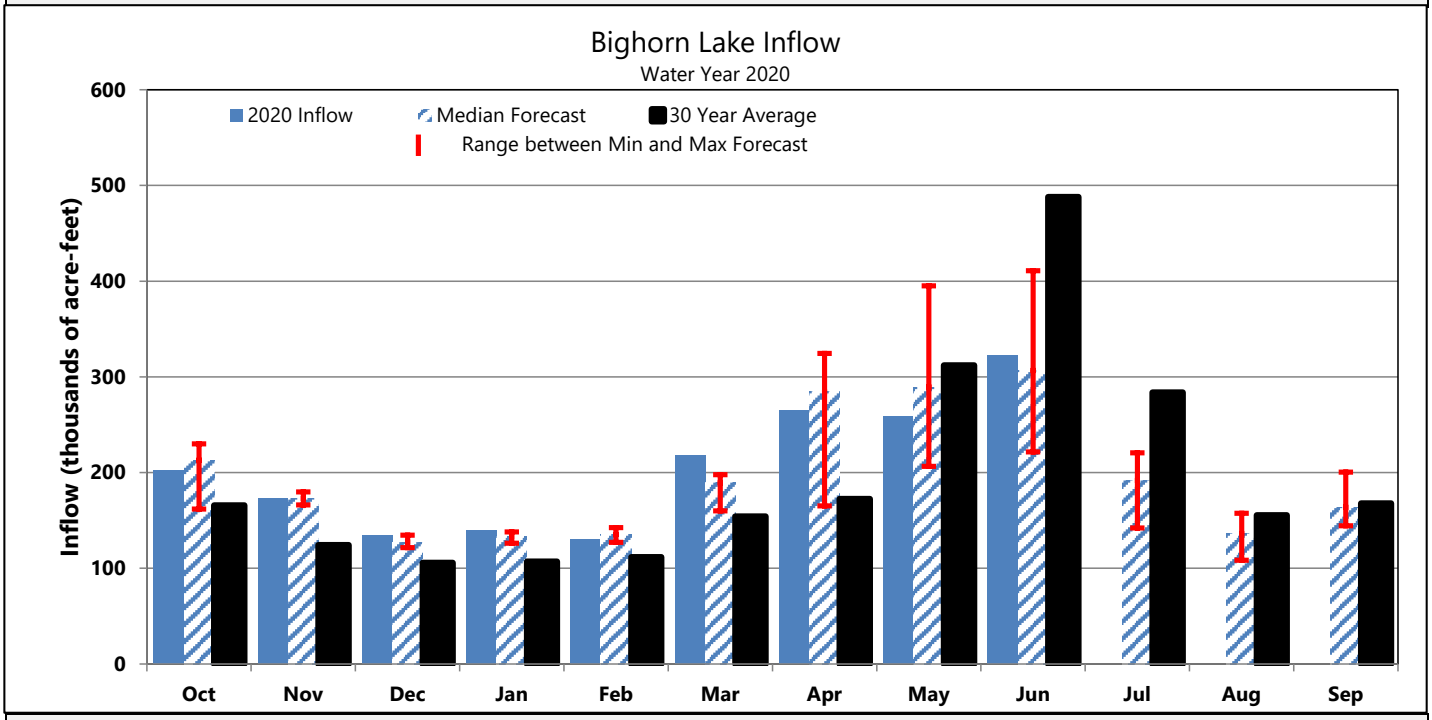
Statistical shading breaks at 10th, 30th,50th, 70th, and 90th Percentiles
Normal ('81-'10) – Official median calculated from 1981-2010 data
Normal (POR) – Unofficial mean calculated from Period of Record data

# 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**

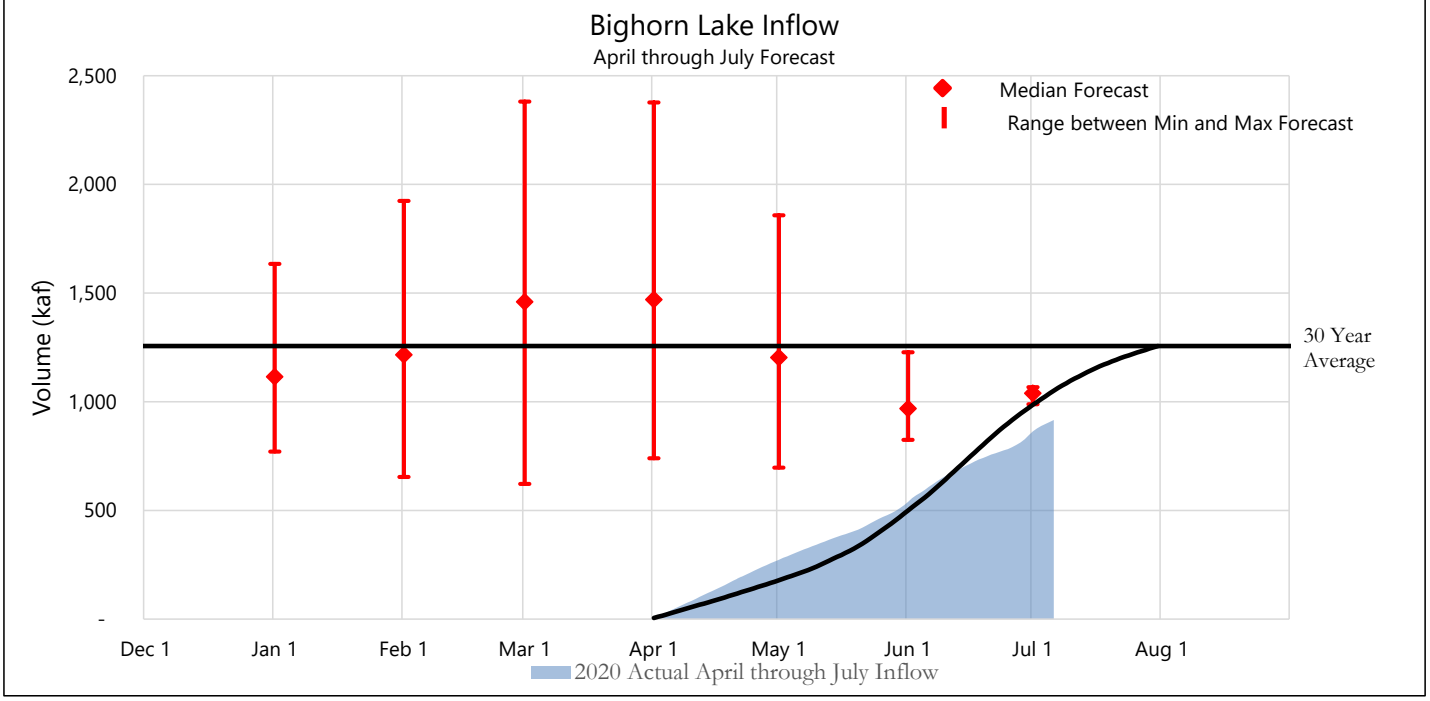
| | Median Forecast (kaf) | Actual (kaf) | Difference (kaf) | Actual (% of Avg) |
|---|---|---|---|---|
| **June Inflow** | 306.6 | 322.5 | 15.9 | 66 |




**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 Averag** | 1,256.4 kaf |

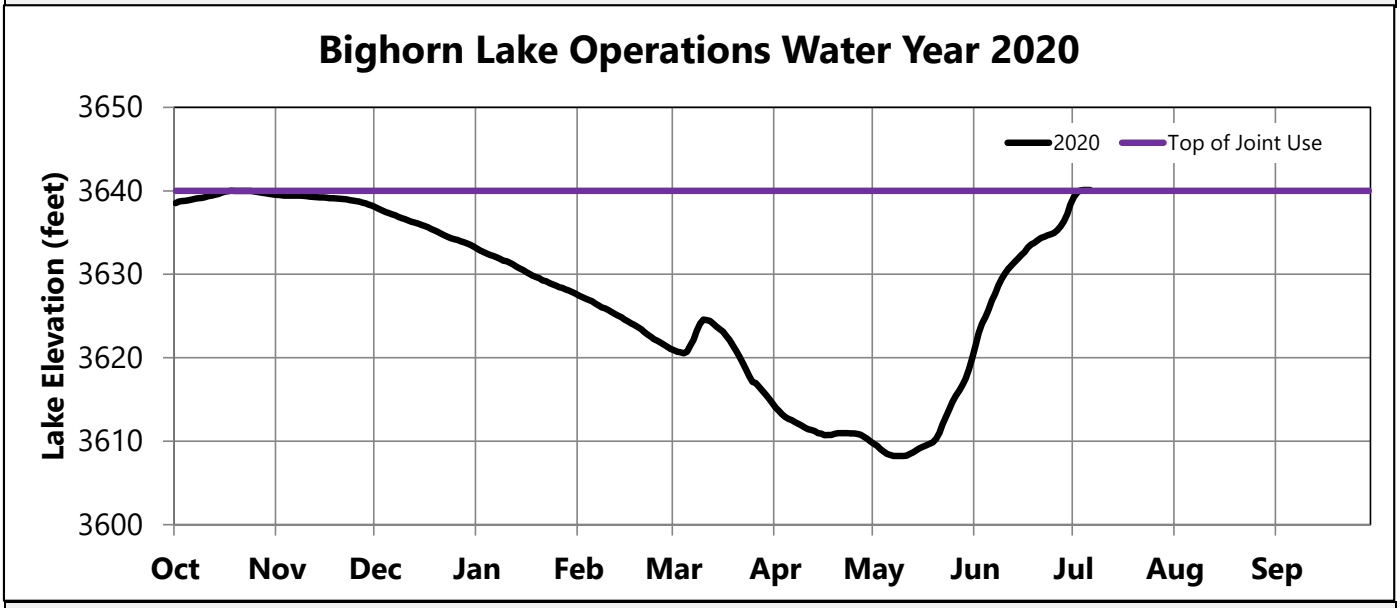


# OPERATIONS REVIEW (October 1 through July 1)

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 |

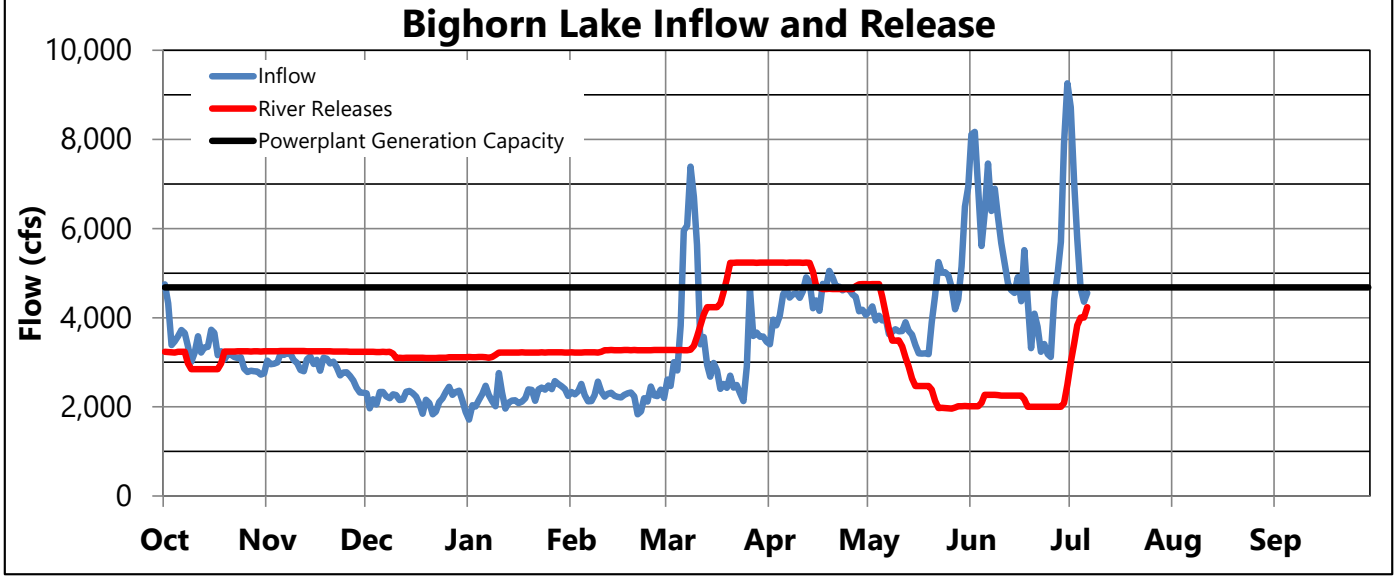



**Average June Release**

| | Monthly Avg cfs | Percent of Average |
|---|---|---|
| **Bighorn River** | 2,135 | 38 |
| **Buffalo Bill Total Release** | 3,505 | 105 |
| **Boysen Release** | 1,430 | 44 |

**Average June Inflow**

| | Monthly Avg cfs | Percent of Average |
|---|---|---|
| **Bighorn Lake** | 5,420 | 66 |
| **Buffalo Bill** | 6,040 | 108 |
| **Boysen** | 3,340 | 69 |



# 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)**

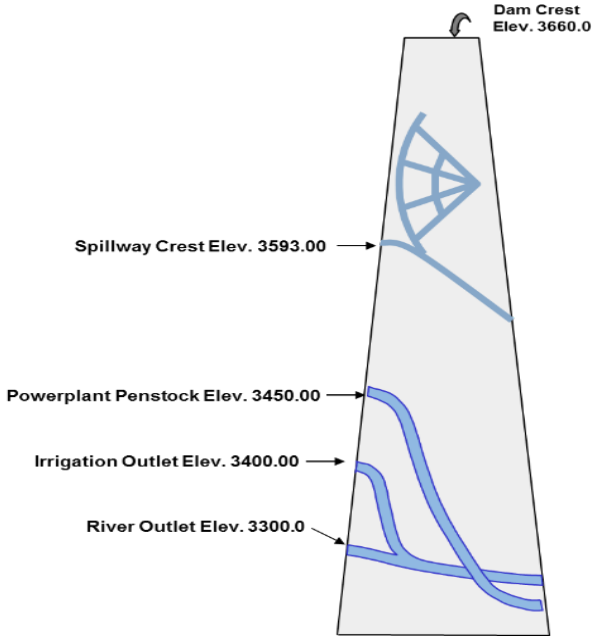
| | Jul | Aug | Sep | Oct | Nov |
|---|---|---|---|---|---|
| **Median Forecast** | 3,312 | 2,869 | 2,615 | 2,279 | 2,157 |
| **Minimum Forecast** | 3,152 | 2,430 | 2,280 | 2,029 | 1,954 |
| **Maximum Forecast** | 3,485 | 3,280 | 3,040 | 2,880 | 2,749 |

**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 |

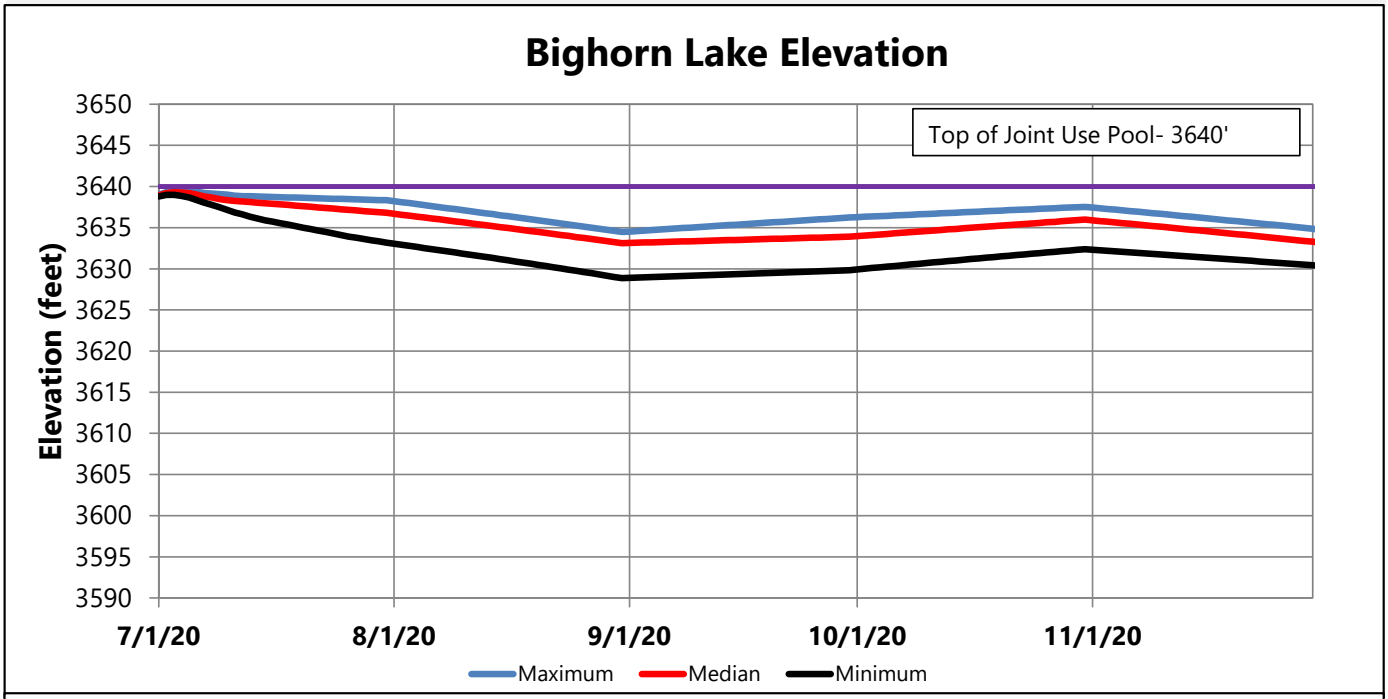


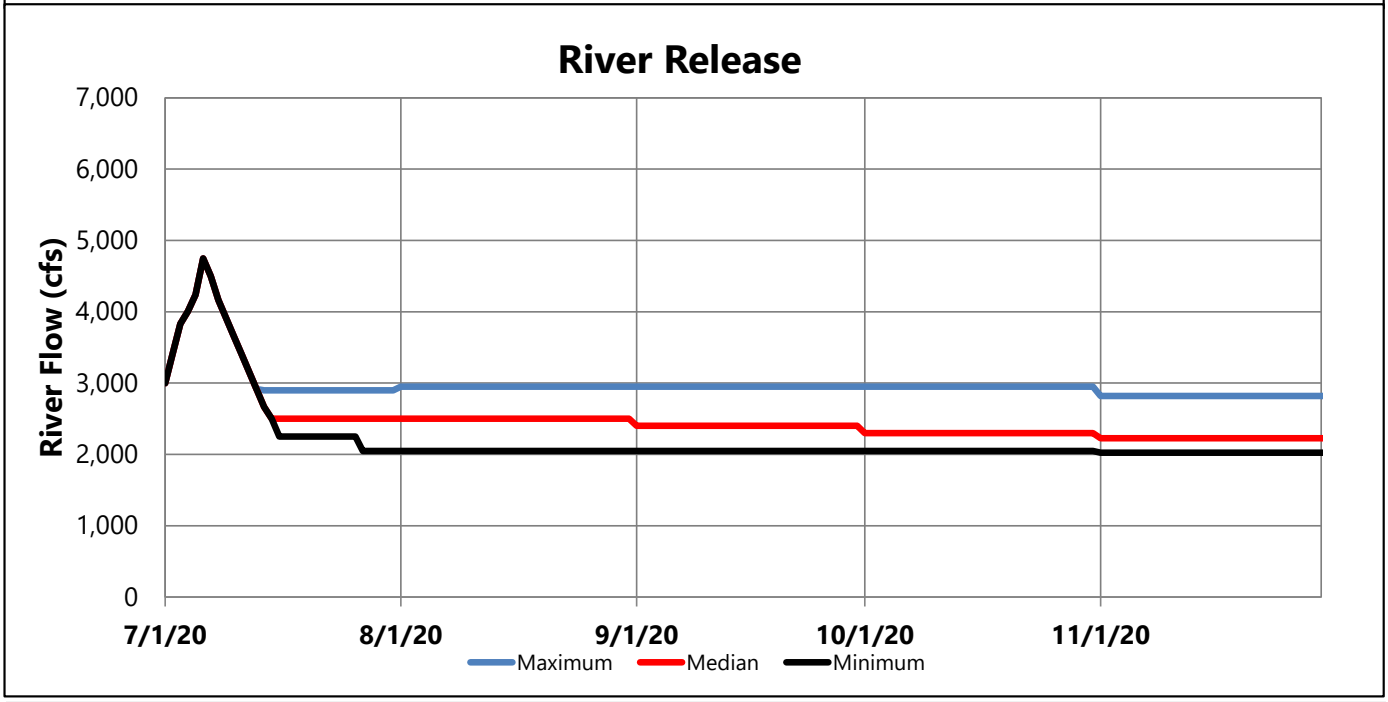

## Release Outlook by Outlet

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.

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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