

Wyoming Basin & Water Supply Outlook Report June 1, 2021



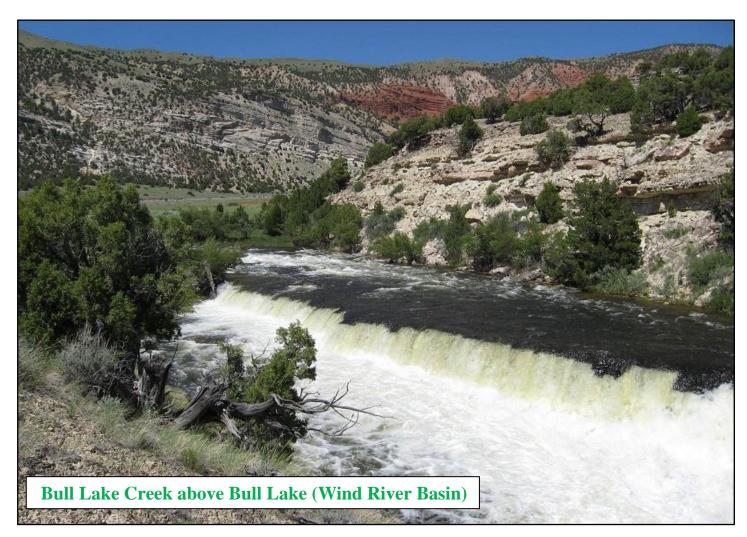


Photo courtesy of Wyoming USGS

Basin Outlook Reports And Federal - State - Private Cooperative Snow Surveys

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How forecasts are made

Most of the annual streamflow in the western United States originates as snowfall that has accumulated in the mountains during the winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Measurements of snow water equivalent at selected manual snow courses and automated SNOTEL sites, along with precipitation, antecedent streamflow, and indices of the El Niño / Southern Oscillation are used in computerized statistical and simulation models to prepare runoff forecasts. Unless otherwise specified, all forecasts are for flows that would occur naturally without any upstream influences.

Forecasts of any kind, of course, are not perfect. Streamflow forecast uncertainty arises from three primary sources: (1) uncertain knowledge of future weather conditions, (2) uncertainty in the forecasting procedure, and (3) errors in the data. The forecast, therefore, must be interpreted not as a single value but rather as a range of values with specific probabilities of occurrence. The middle of the range is expressed by the 50% exceedance probability forecast, for which there is a 50% chance that the actual flow will be above, and a 50% chance that the actual flow will be below, this value. To describe the expected range around this 50% value, four other forecasts are provided, two smaller values (90% and 70% exceedance probability) and two larger values (30%, and 10% exceedance probability). For example, there is a 90% chance that the actual flow will be more than the 90% exceedance probability forecast. The others can be interpreted similarly.

The wider the spread among these values, the more uncertain the forecast. As the season progresses, forecasts become more accurate, primarily because a greater portion of the future weather conditions become known; this is reflected by a narrowing of the range around the 50% exceedance probability forecast. Users should take this uncertainty into consideration when making operational decisions by selecting forecasts corresponding to the level of risk they are willing to assume about the amount of water to be expected. If users anticipate receiving a lesser supply of water, or if they wish to increase their chances of having an adequate supply of water for their operations, they may want to base their decisions on the 90% or 70% exceedance probability forecasts, or something in between. On the other hand, if users are concerned about receiving too much water (for example, threat of flooding), they may want to base their decisions on the 30% or 10% exceedance probability forecasts, or something in between. Regardless of the forecast value users choose for operations, they should be prepared to deal with either more or less water. (Users should remember that even if the 90% exceedance probability forecast is used, there is still a 10% chance of receiving less than this amount.) By using the exceedance probability information, users can easily determine the chances of receiving more or less water.

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Hydrologic Discussion

Snowpack below the 9,000 foot elevation melted out by late May over a majority of basins in Wyoming. Snow water equivalents (SWEs) at the 9,000 to 10,500 foot elevation were near 70% percent of average for early June. Well above average mountain temperatures expected though the first 7 days of June will quickly melt out any remaining snowpack at the 9,000 to 10,500 foot elevation.

Except for the Snake, Wind, and Upper Green Basins--most basins in Wyoming had **below** average precipitation totals during May. Notably, the Little Snake and Lower North Platte Watersheds only recorded **50** to **65** percent of average precipitation during the month. Additionally, current water year precipitation totals are still **below** average for majority of basins in Wyoming-especially along basins in western and southern Wyoming.

Reservoirs across Wyoming continue to average near 78% of capacity. Last year at this time Wyoming reservoirs were around 82% of capacity. Reservoir storages have remained around 105% of average by late May.

Severe to extreme hydrologic drought conditions have <u>decreased</u> in areal coverage across central through eastern Wyoming during the past three months; however, severe hydrologic drought conditions have <u>increased</u> in areal coverage in far western Wyoming during the past two months. The outlook for the summer is for current drought conditions to persist as a result of expected warmer than average as well as drier than average basin conditions.

April and May streamflows across basins in southern Wyoming were **below** to **much below** normal; while basins in central through northwestern Wyoming had <u>near</u> normal streamflows. Peak flows have already occurred along several streams in southwestern to southern Wyoming. Peak flows for all other main stem rivers are expected by the end of the first week of June. Runoff volumes through the end of July are expected to be **below** to **well below** average for many drainages west of the continental divide. The Powder and Tongue Basins are forecasted to have <u>near</u> average flow volumes through the rest of the main runoff period.

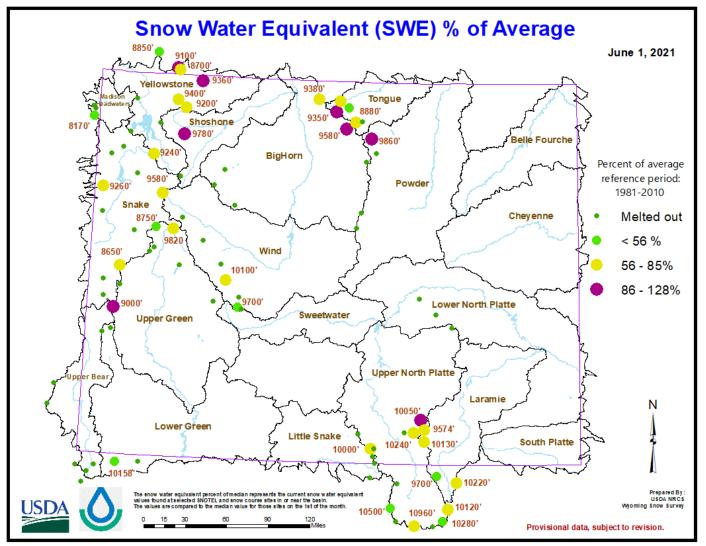
Snowpack trends and basin hydrological conditions for many basins in Wyoming continue to be very similar to what occurred Water Years 2012 and 2013. Runoff volumes during those water years were the lowest in the past decade.

Summary

- Snow Water Equivalents (SWEs) above 9,000 feet were below average (near 70%) by late May.
- Precipitation totals across Wyoming for May were below (about 85%) average. Water year precipitation continues to be below (near 85%) average.
- Reservoirs across Wyoming were averaging near **78**% of capacity with **82**% of capacity reported last year. Overall reservoir storages for late May continue to be **above average**.
- State-wide stream flow snowmelt volumes for June July are forecasted to be generally **below** average at around 70%.

Snowpack/SWEs

Majority of snowpack below 9,000 feet has melted out. Snow water equivalents (SWEs) at elevations of 9,000 feet and above by June 1st were near 70% of average. Last year, SWEs across the state at 9,000 feet and above feet were near 85% of average. (For complete tabular data, see Appendix)

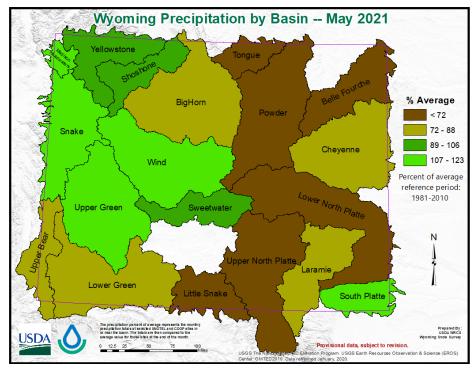


Map 1. Wyoming SWEs—Jun 1, 2021.

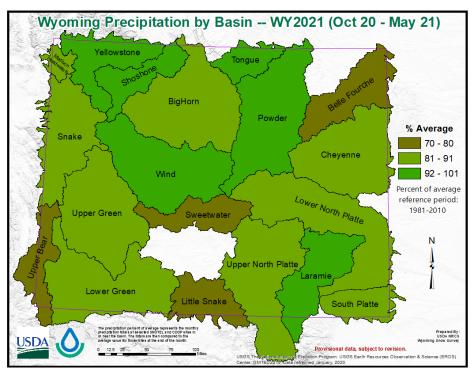
Precipitation

Basin precipitation across Wyoming was near 85% of average during May. The Snake and Madison Headwater River Basins had the <u>highest</u> precipitation totals for the month at 120 to 125% of average. The Little Snake River Basin had the <u>lowest</u> precipitation amount at near 55% of average. Water year precipitation (October - May) is currently about 85% of average.

(See Appendix for complete tabular data.)



Map 2. Current monthly precipitation by basin.



Map 3. Water year to date precipitation by basin.

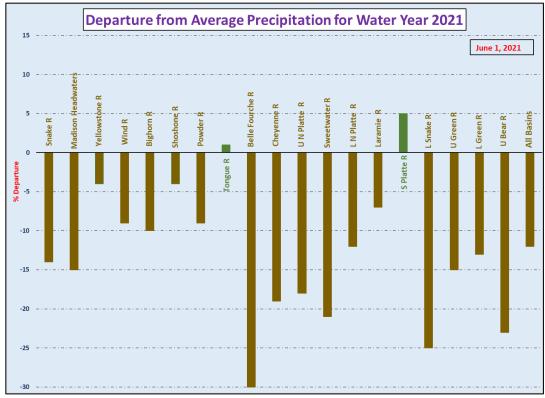
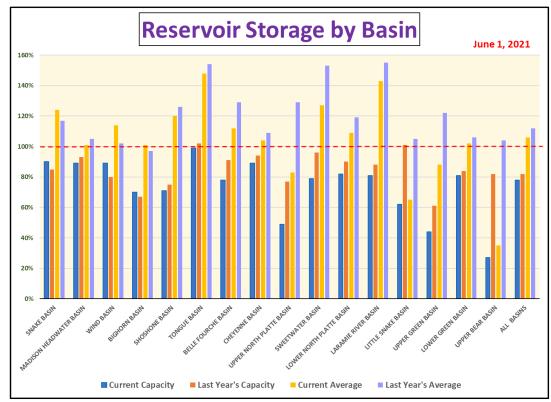


Chart 1. Departure from average precipitation (water year).

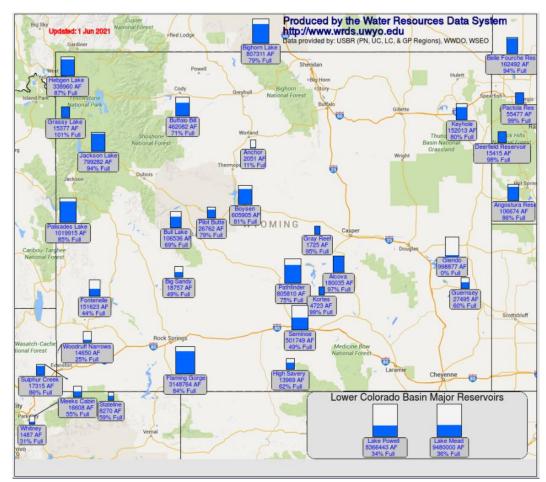
Reservoirs

Reservoirs across Wyoming were averaging near 78% of capacity-down from 82% of capacity <u>last</u> year. Overall reservoir storages for late May continued to be **above** average at 106%(112% last year). The <u>highest</u> average reservoir storage was across the Tongue River Basin at near 148%. The Upper Bear River Basin had the <u>lowest</u> average reservoir storage at near 35%.



(See Appendix for complete tabular data.)

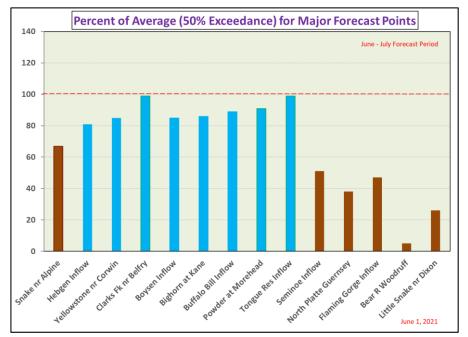
Chart 2. Reservoir storage by basin.



Map 4. Teacup storage diagrams of Wyoming reservoirs. (provided by WRDS)

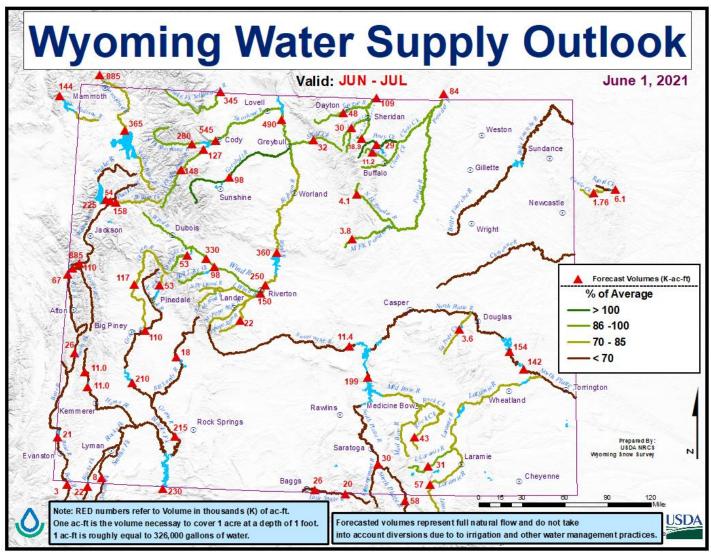
Stream Flows

Snowmelt runoff stream flow volumes for across the state are expected to be **below average** at around 70%. The <u>highest</u> forecasted stream flows due to snowmelt are across the Powder and Tongue Basins at near 100% of normal. The <u>lowest</u> snowmelt runoff volumes are expected across the Little Snake and Upper Bear Drainages at near 30 to 35% of average.

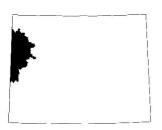


(See Appendix for complete tabular listing of stream flow forecasts.)

Chart 3. 50% exceedance for major forecast points.

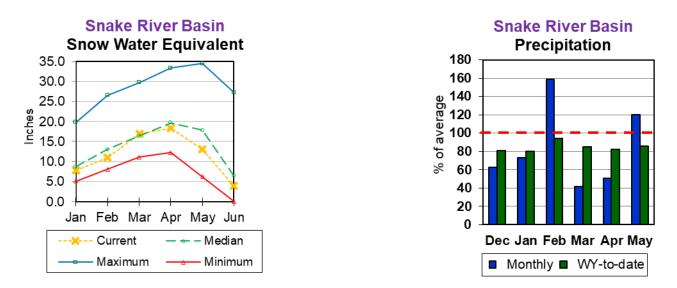


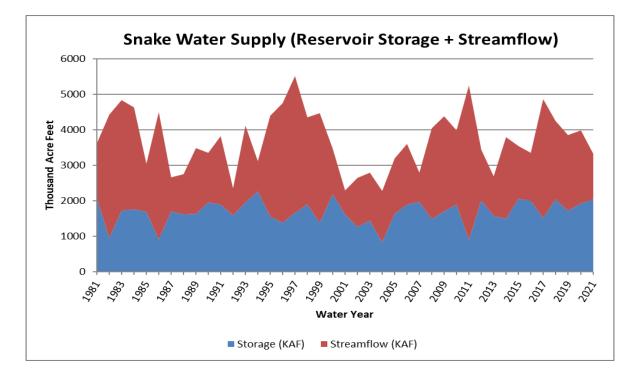
Map 4. Wyoming water supply outlook—June 1, 2021.

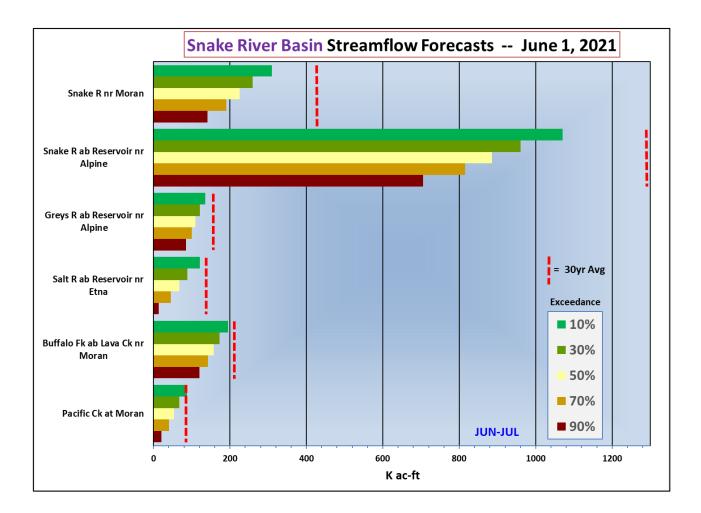


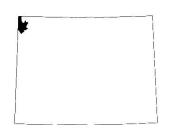
Snake River Basin

- SWEs at 9,000 feet and above are near 75% of average.
- Last month's precipitation for the Snake River Basin was near **120**% of average. Water-year-to-date precipitation is near **85**% of average.
- Current reservoir storage is near **125**% of average for the three main reservoirs in the basin.
- The streamflow forecasts for June through July are **below** average (65%) for this basin.



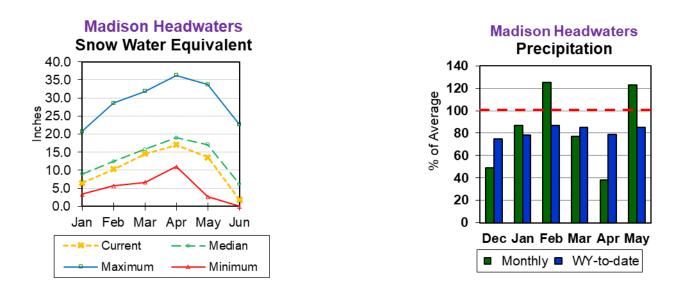


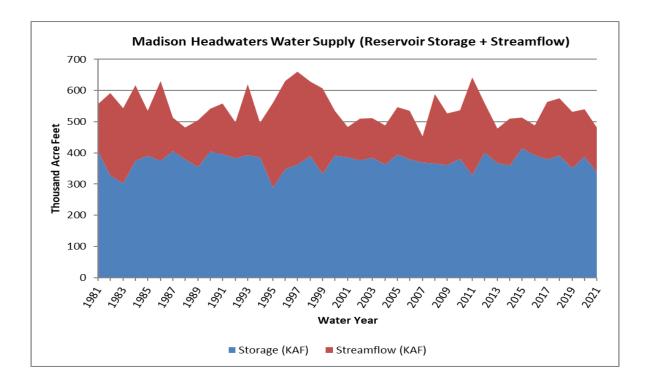


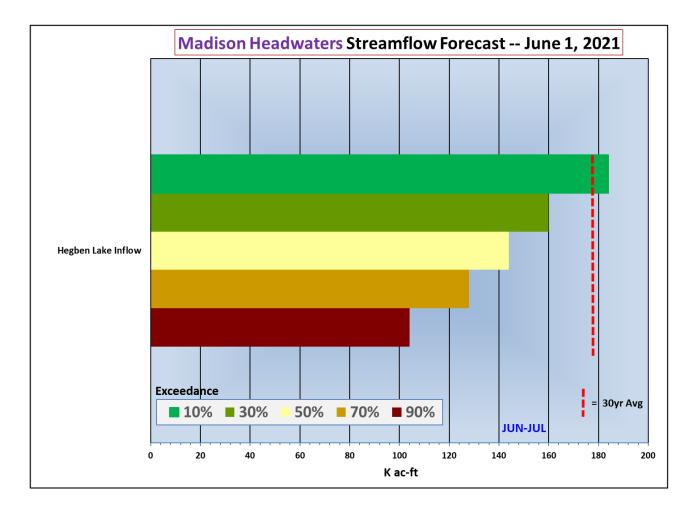


Madison Headwaters Basin

- SWEs at 9,000 feet and above are **39**% of average.
- Last month's precipitation for the Madison Headwaters River Basin was near **125**% of average. Water-year-to-date precipitation is around **85**% of average.
- Current reservoir storage is near **100**% of average for one main reservoir in the basin.
- Hebgen Reservoir inflows (June-July) are forecasted to be **below** average at **80**%.



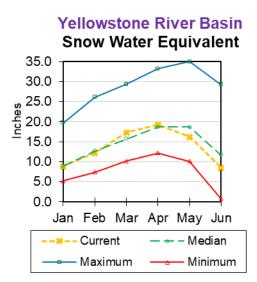


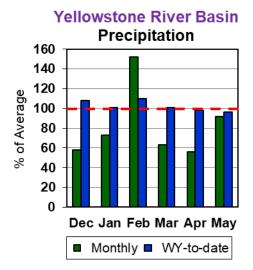




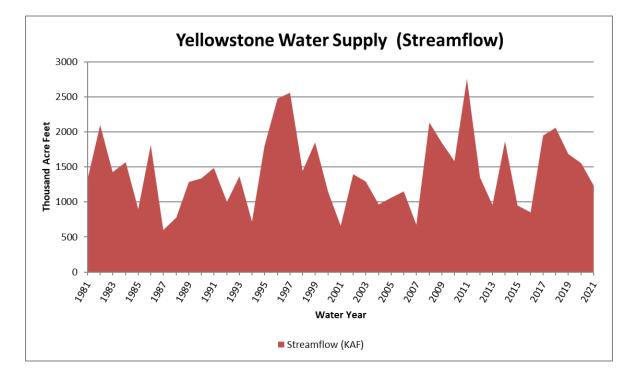
Yellowstone River Basin

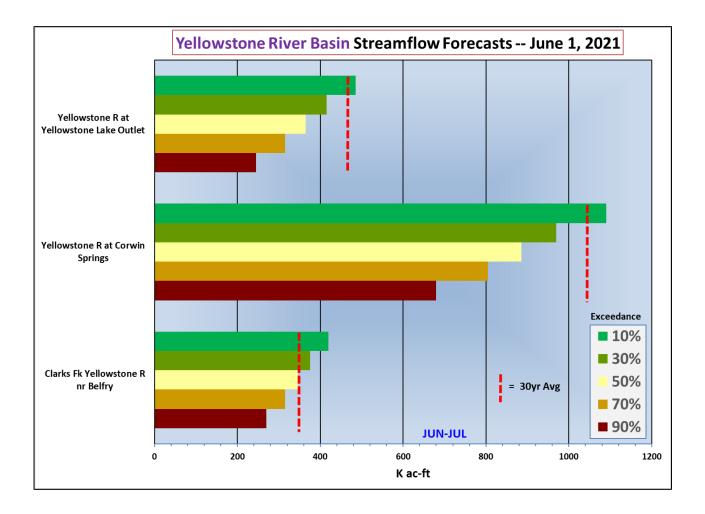
- SWEs at 9,000 feet and above are near 70% of average.
- Last month's precipitation for the Yellowstone River Basin was near **90**% of average. Water-year-to-date precipitation is near **95**% of average.
- The 50% exceedance forecasts for June through July are **below** average (**85**%) for this basin.

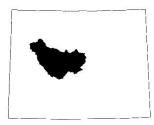




No reservoir data for the basin.

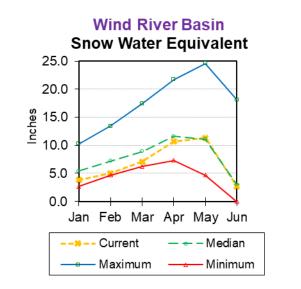


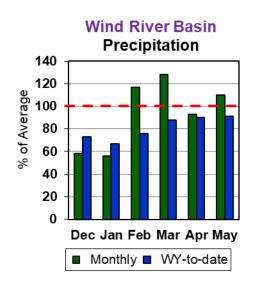


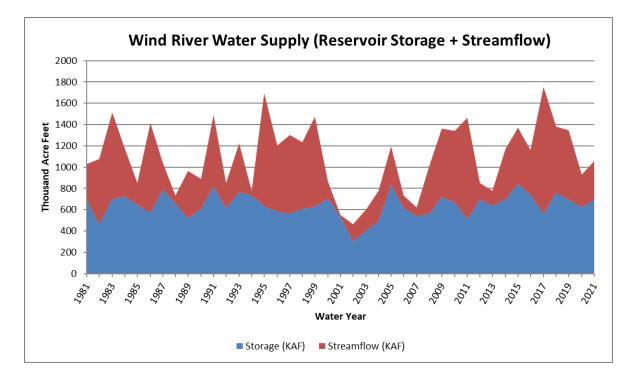


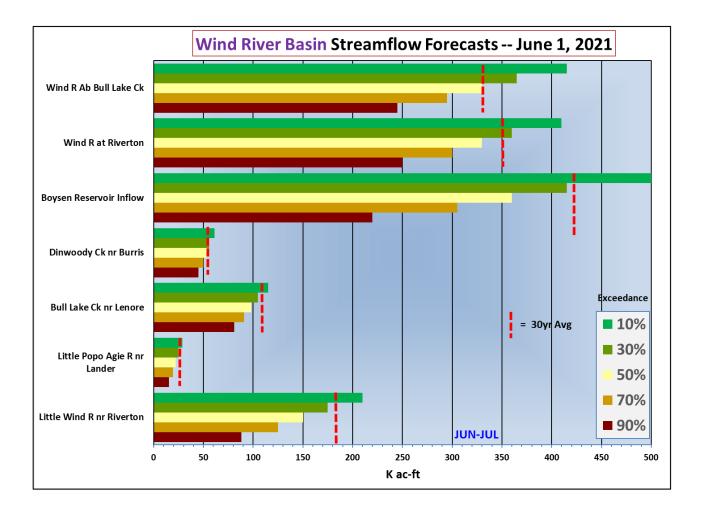
Wind River Basin

- SWEs at 9,000 feet and above are near 40% of average.
- Last month's precipitation for the Wind River Basin was near **110**% of average. Wateryear-to-date precipitation is around **90**% of average.
- Current reservoir storage is near **115**% of average for the three main reservoirs in the basin.
- The streamflow forecasts for June through July are **below** average (**90**%) for this basin.





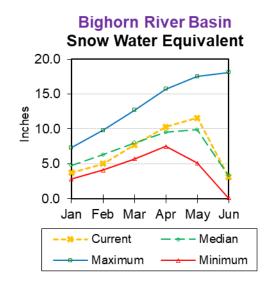


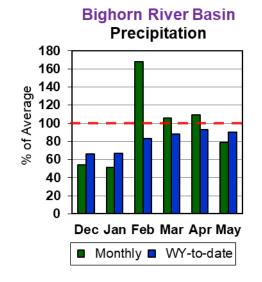


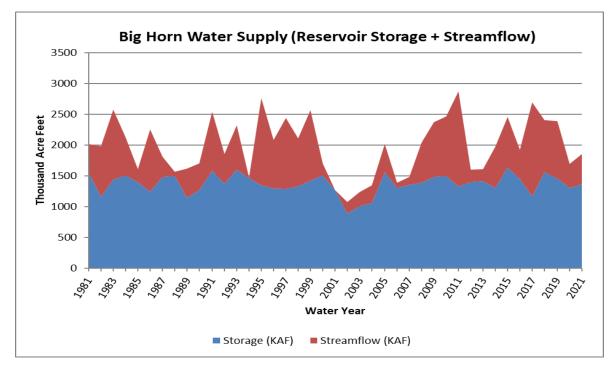


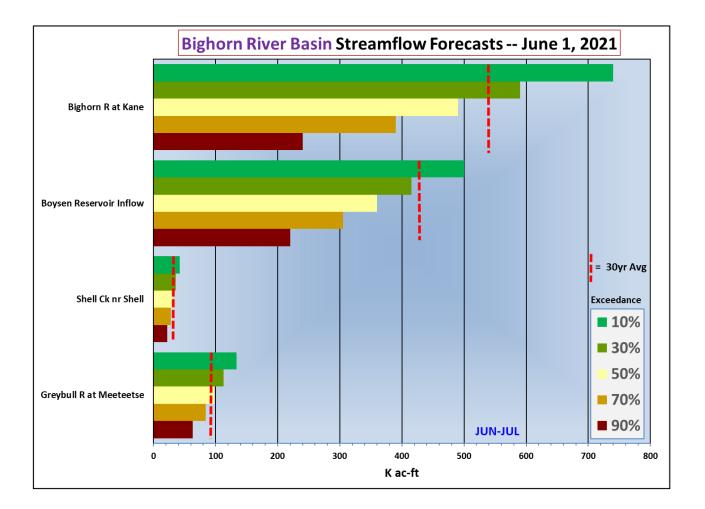
Bighorn River Basin

- SWEs at 9,000 feet and above are close to 50% of average.
- Last month's precipitation for the Bighorn River Basin was near **80**% of average. Water-year-to-date precipitation is close to **90**% of average.
- Current reservoir storage is near 100% of average for the two main reservoirs in the basin.
- The 50% exceedance forecasts for June through July are <u>near</u> average (**95**%) for this basin. Greybull River at Meeteetse is forecasted to have flows at **102**% of average.





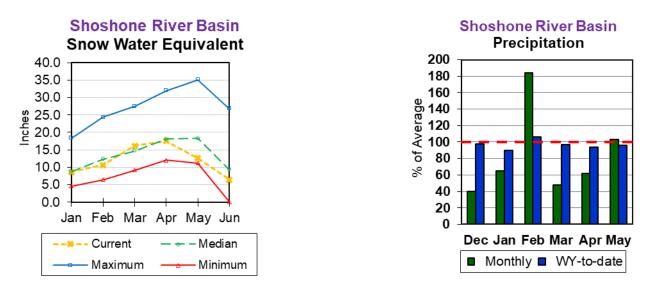


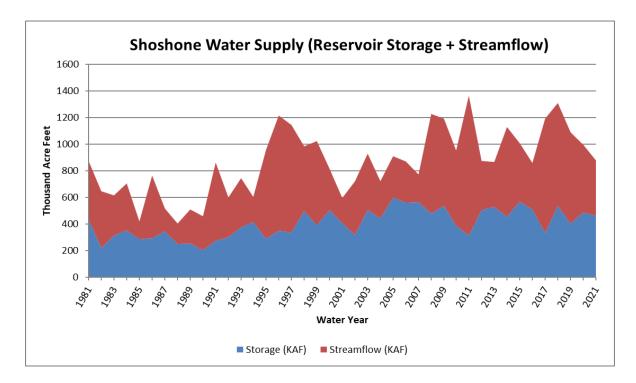


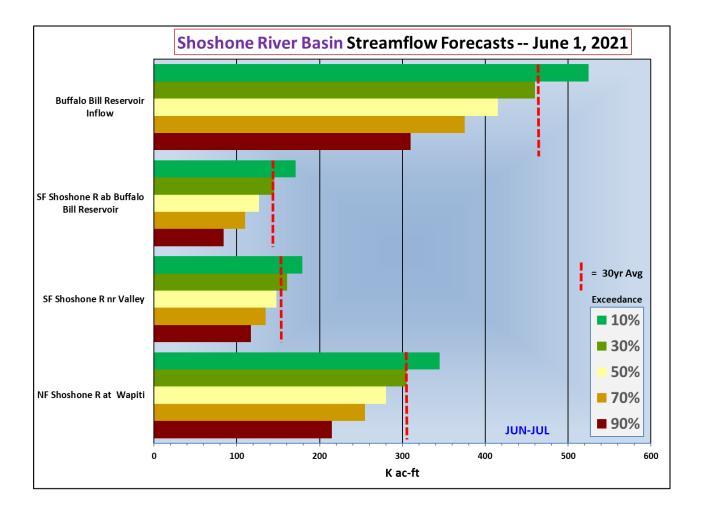


Shoshone River Basin

- SWEs at 9,000 feet and above are near 55% of average.
- Last month's precipitation for the Shoshone River Basin was near 105% of average. Water-year-to-date precipitation is around 95% of average.
- Current reservoir storage is near 120% of average for one main reservoir in the basin.
- Streamflow forecasts for June through July are **below** average (90%) for this basin.



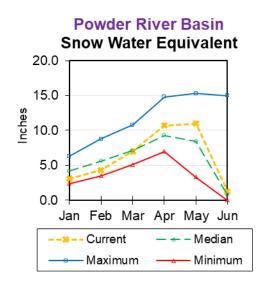


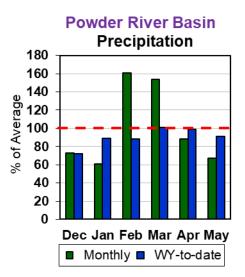




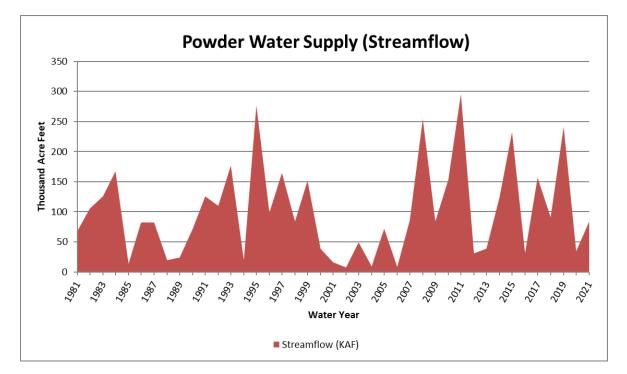
Powder River Basin

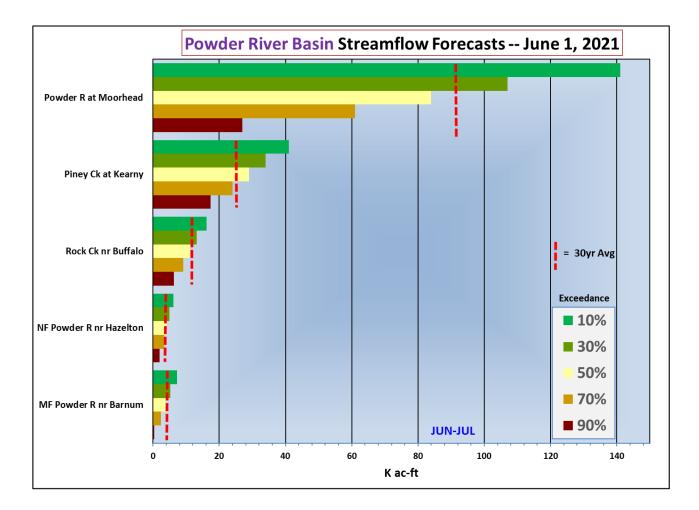
- SWEs at 9,000 feet and above are near 55% of average.
- Last month's precipitation for the Powder River Basin was near 65% of average. Water-year-to-date precipitation is near 90% of average.
- The 50% exceedance forecasts for June through July are <u>near</u> average (**95**%) for this basin. Piney Creek at Kearney is expected to have flows at **115**% of average.





No reservoir data for the basin.

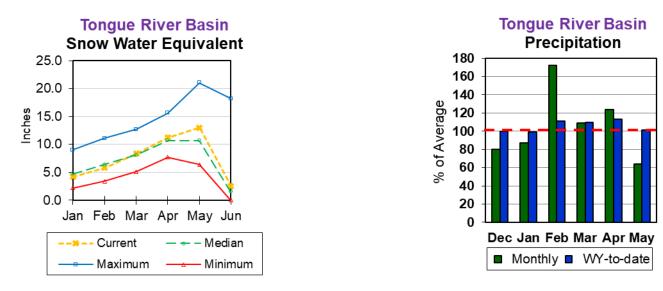


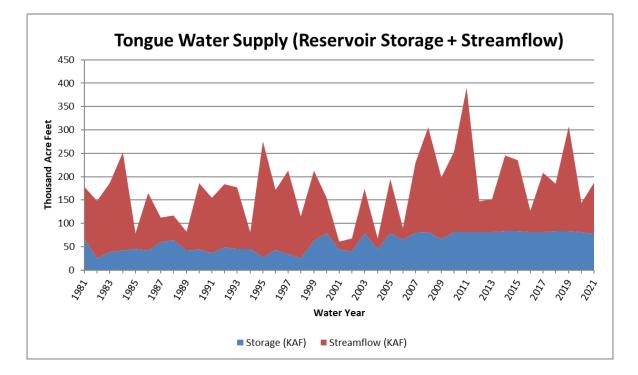


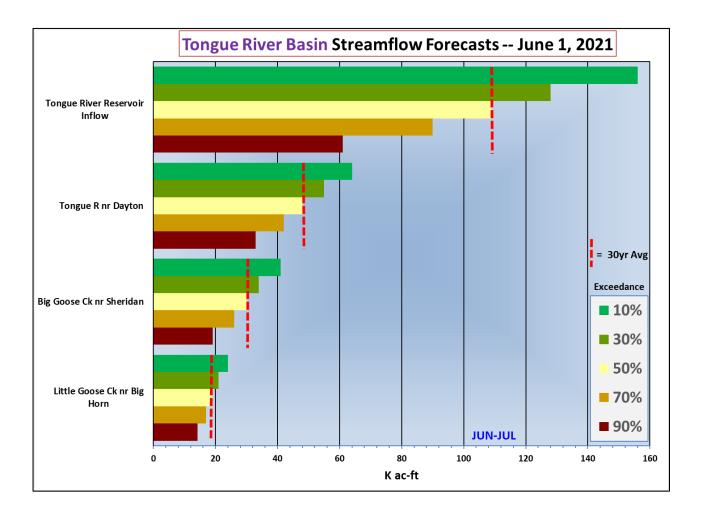


Tongue River Basin

- SWEs at 9,000 feet and above are around 40% of average.
- Last month's precipitation for the Tongue River Basin was near 65% of average. Water-year-to-date precipitation is near 100% of average.
- Current reservoir storage is near 150% of average for one main reservoir in the basin.
- The 50% exceedance forecasts for June through July are <u>near</u> average (98%) for this basin.



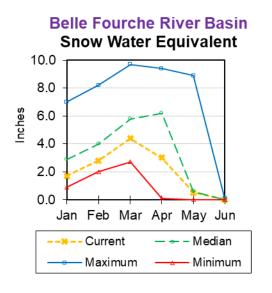


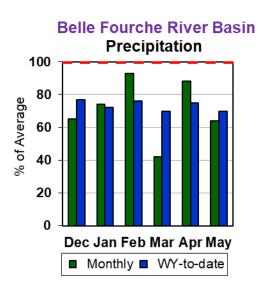


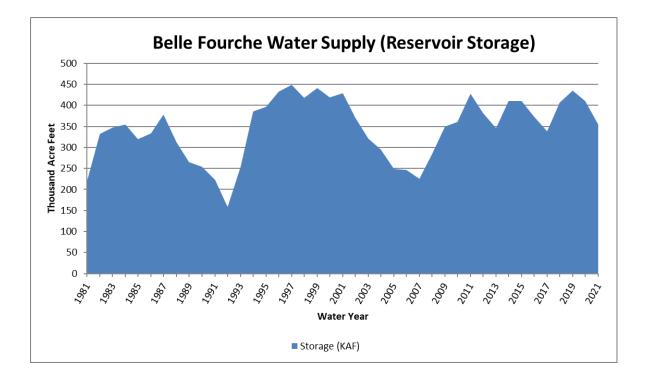


Belle Fourche River Basin

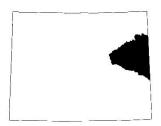
- The Belle Fourche River Basin snowpack has melted out.
- Last month's precipitation for the Belle Fourche River Basin was near 65% of average. Water-year-to-date precipitation is around 70% of average.
- Current reservoir storage is near **110**% of average for three main reservoirs in the basin.





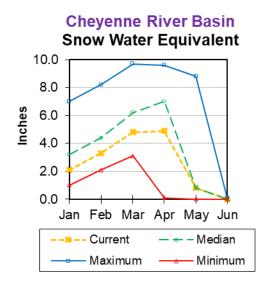


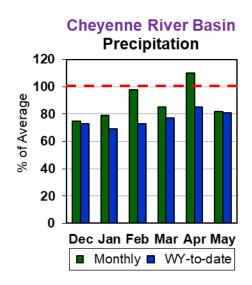
There are no streamflow forecast points for the basin.

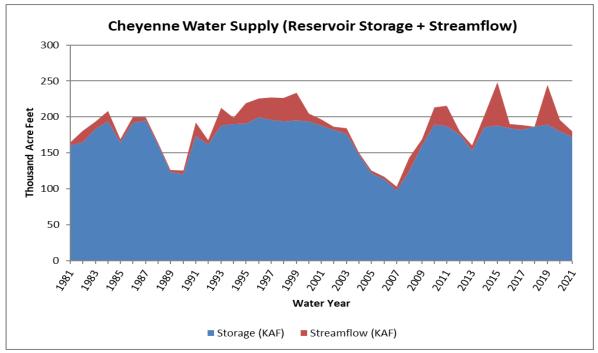


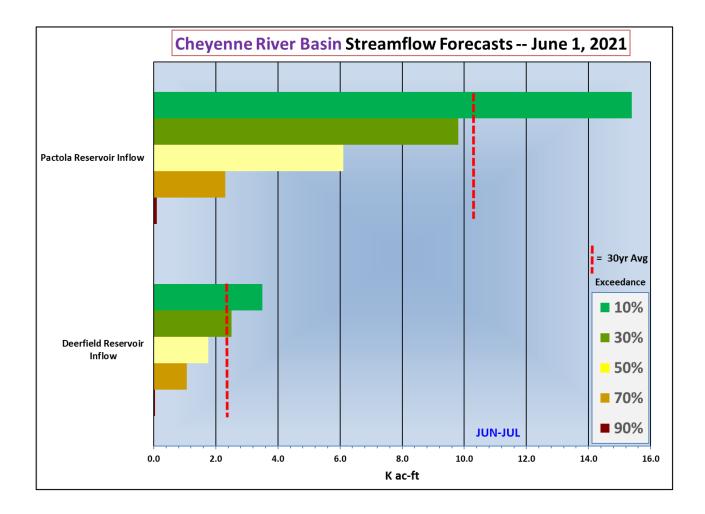
Cheyenne River Basin

- The Cheyenne River Basin snowpack has melted out.
- Last month's precipitation for the Cheyenne River Basin was near **80**% of average. Water-year-to-date precipitation is around **80**% of average.
- Current reservoir storage is near 105% of average for three main reservoirs in the basin.
- The 50% exceedance forecasts for June through July are **below** average (70%) for this basin. Deerfield Reservoir inflows are forecasted to be 77% of average.





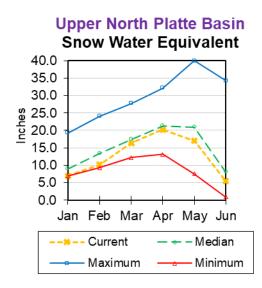


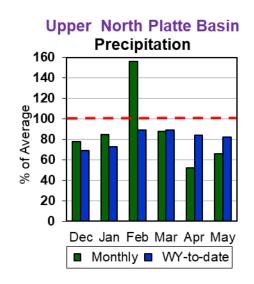


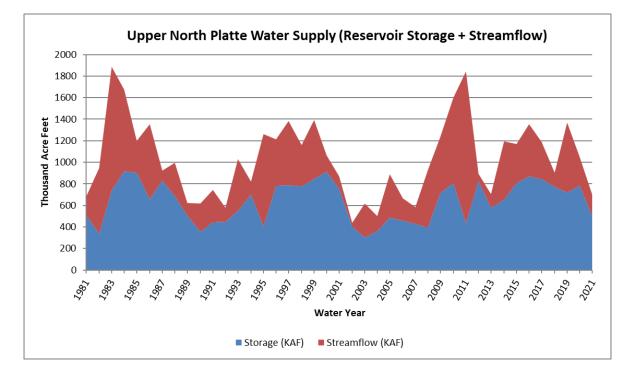


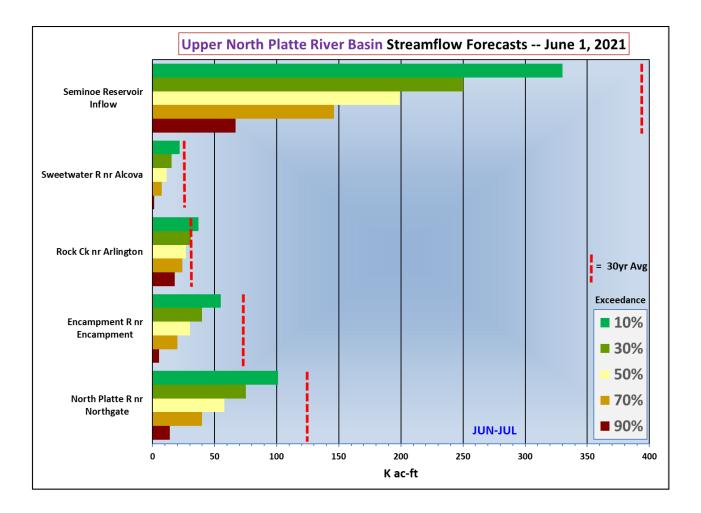
Upper North Platte River Basin

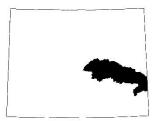
- SWEs at 9,000 feet and above are near $40\,\%$ of average.
- Last month's precipitation for the Upper North Platte River Basin was near 65% of average. Water-year-to-date precipitation is around 80% of average.
- Current reservoir storage is near **85**% of average for one main reservoir in the basin.
- Streamflow forecasts for June through July are **well below** average (55%) for this basin.





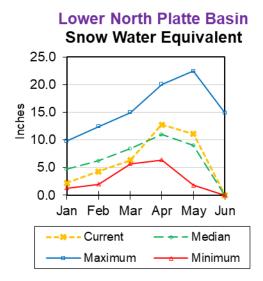


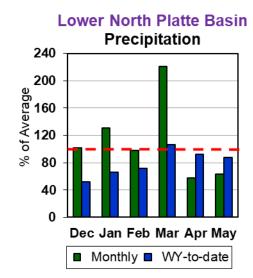


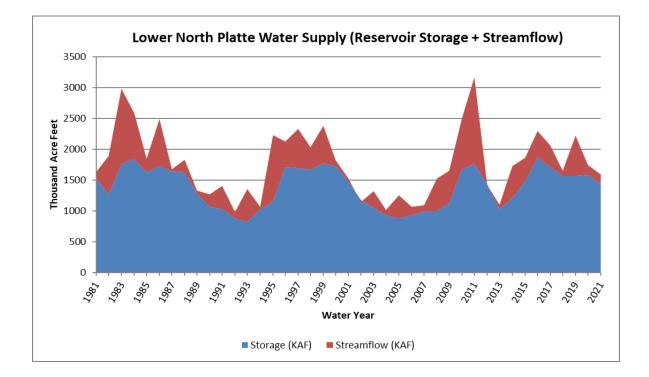


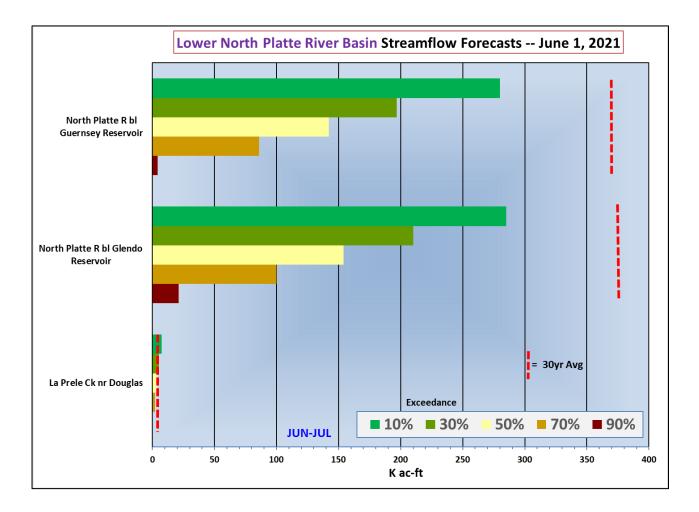
Lower North Platte River Basin

- The Lower North Platte River Basin snowpack has melted out.
- Last month's precipitation for the Lower North Platte River Basin was near 65% of average. Water-year-to-date precipitation is around 90% of average.
- Current reservoir storage is near **110**% of average for four main reservoirs in the basin.
- The 50% exceedance forecasts for June through July are **well below** average (55%) for this basin.





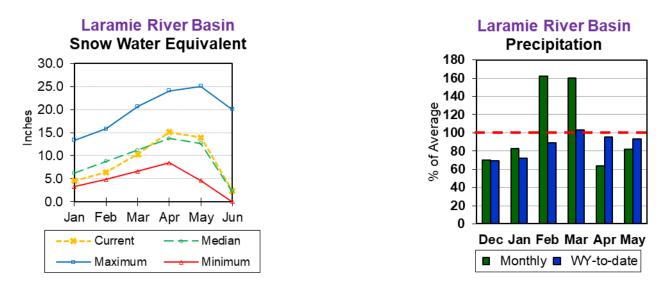


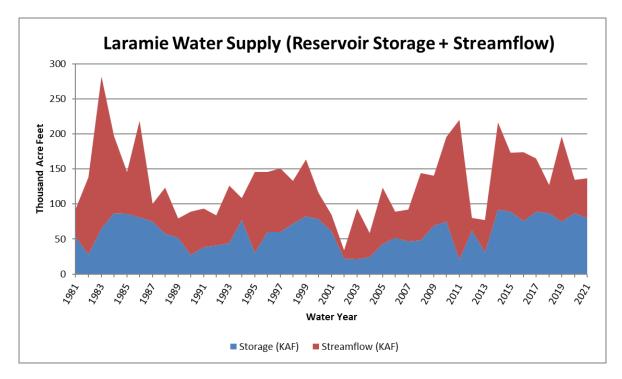


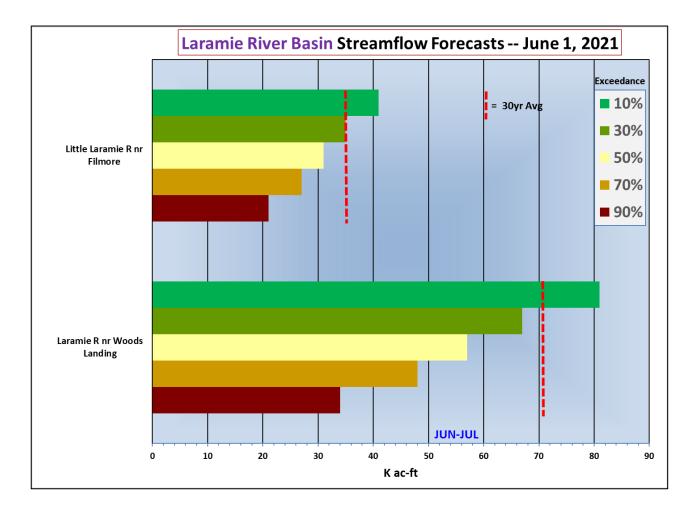


Laramie River Basin

- SWEs at 9,000 feet and above are near 60% of average.
- Last month's precipitation for the Laramie River Basin was around **80**% of average. Water-year-to-date precipitation is near **95**% of average.
- Current reservoir storage is around 145% of average for one main reservoir in the basin.
- Streamflow forecasts for June through July are **below** average (85%) for this basin.



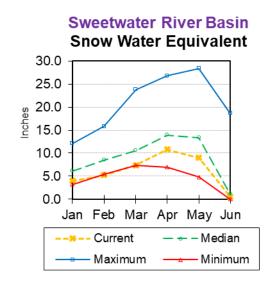


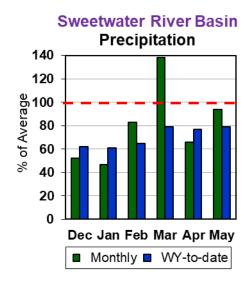


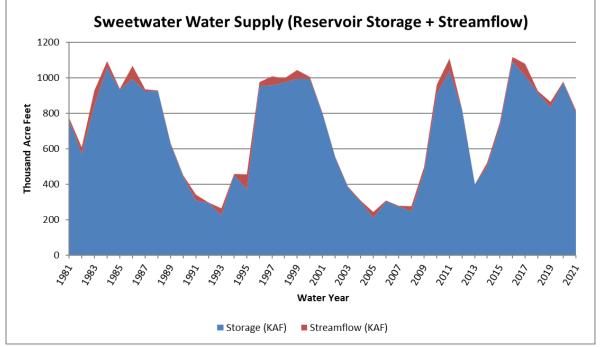


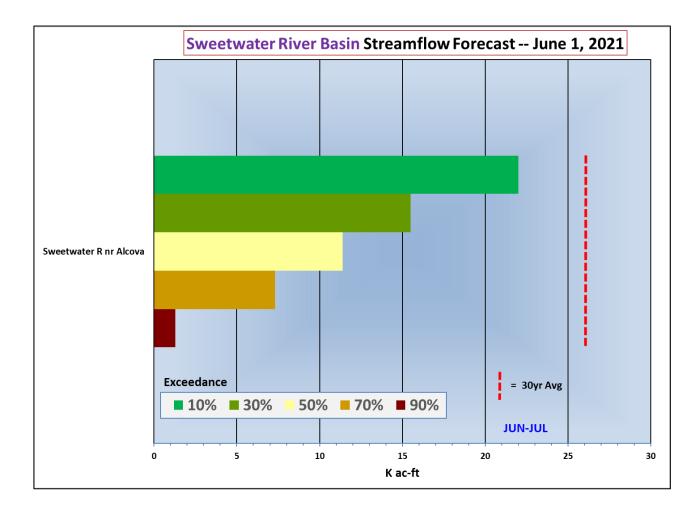
Sweetwater River Basin

- SWEs at 9,000 feet and above are near 25% of average.
- Last month's precipitation for the Sweetwater River Basin was near 95% of average.
 Water-year-to-date precipitation is near 80% of average.
- Current reservoir storage is near **125**% of average for one main reservoir in the basin.
- Streamflow forecast for Sweetwater River near Alcova (June-July) is **well below** average at **45**%.





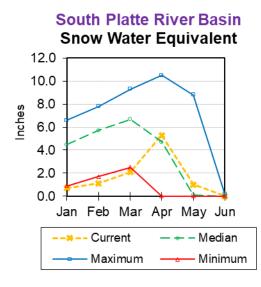


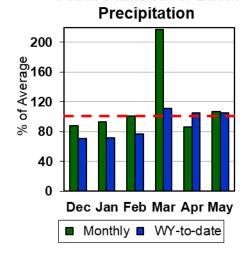




South Platte River Basin (WY)

- The South Platte River Basin snowpack has melted out.
- Last month's precipitation for the South Platte River Basin was near 105% of average. Water-year-to-date precipitation is close to 105% of average.





South Platte River Basin

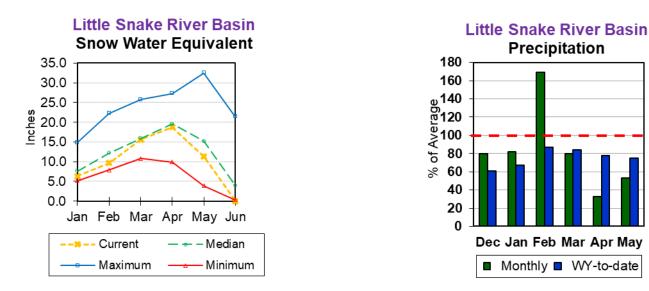
No reservoir data for the basin.

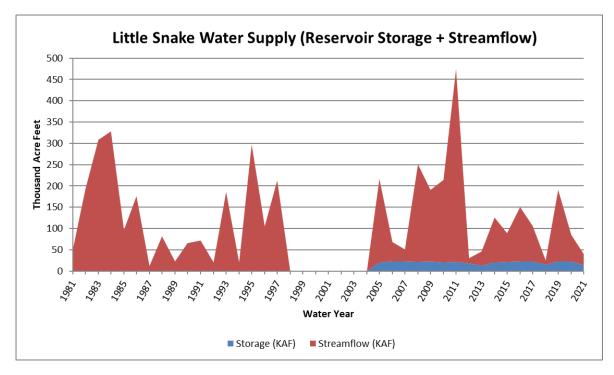
There are <u>no</u> streamflow forecast points for the basin.

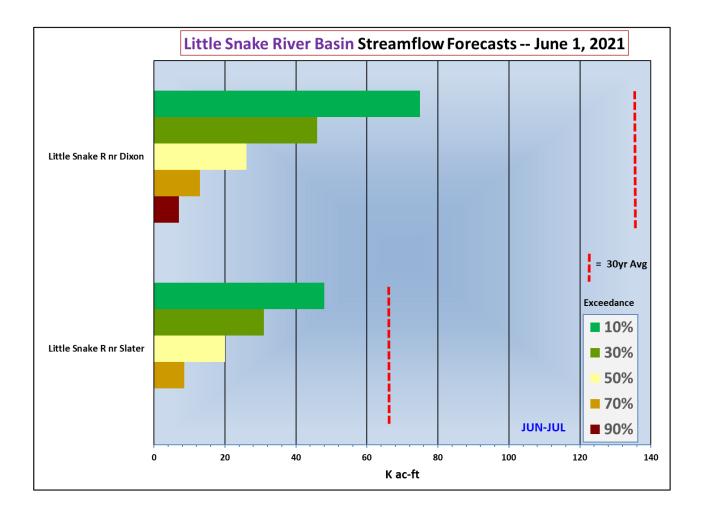


Little Snake River Basin

- SWEs at 9,000 feet and above are near 20% of average.
- Last month's precipitation for the Little Snake River Basin was near 55% of average. Water-year-to-date precipitation is near 75% of average.
- Current reservoir storage is close to **65**% of average for one main reservoir in the basin.
- The 50% exceedance forecasts for June through July are **well below** average (**35**%) for this basin.



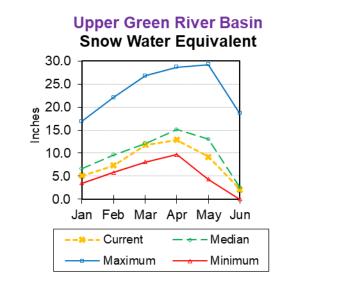


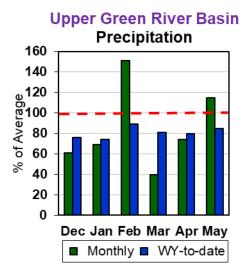


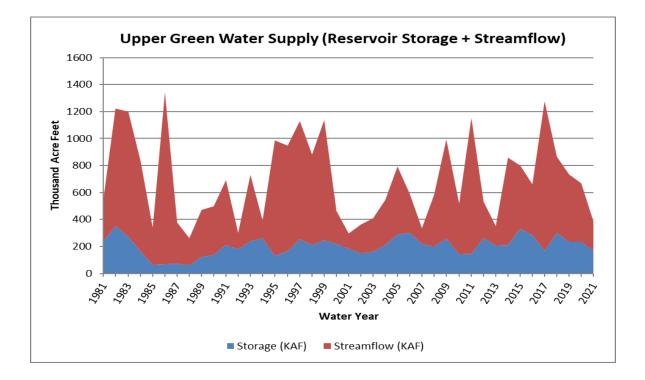


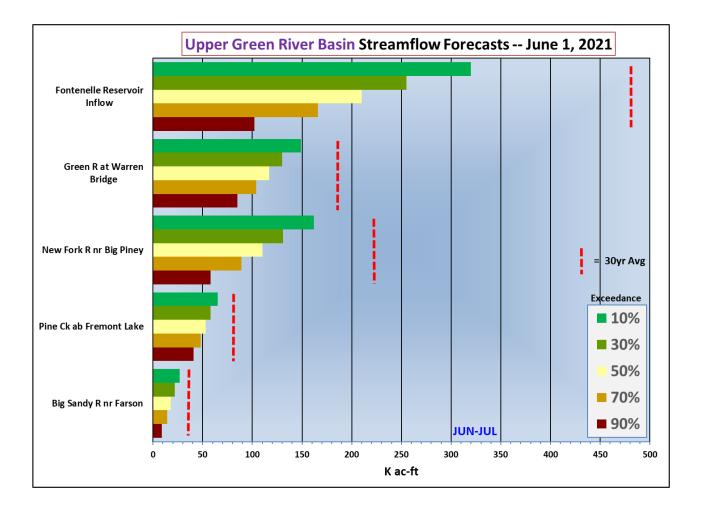
Upper Green River Basin

- SWEs at 9,000 feet and above are near **50**% of average.
- Last month's precipitation for the Upper Green River Basin was near **115**% of average. Water-year-to-date precipitation is around **85**% of average.
- Current reservoir storage is near **90**% of average for two main reservoirs in the basin.
- Streamflow forecasts for June through July are **well below** average (55%) for this basin.





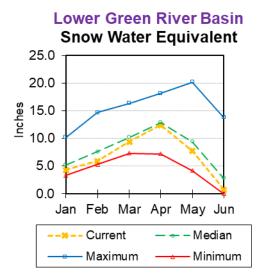


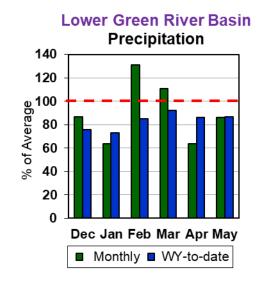


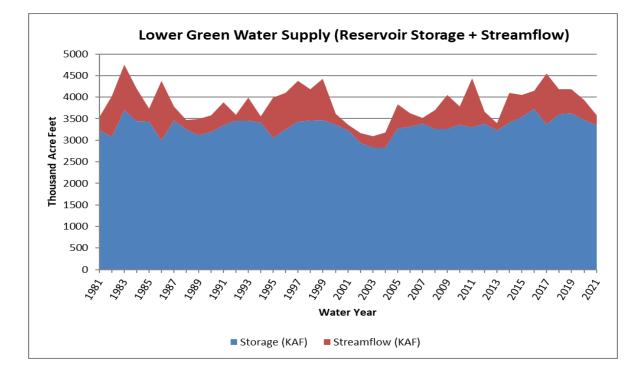


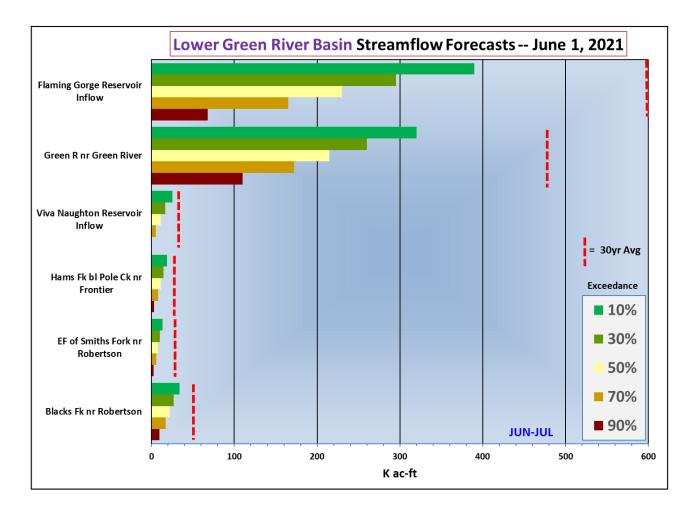
Lower Green River Basin

- Much of the Lower Green Basin's snowpack below 10,000 feet has melted out.
- Last month's precipitation for the Lower Green River Basin was near **85**% of average. Water-year-to-date precipitation is around **85**% of average.
- Current reservoir storage is close to 100% of average for three main reservoirs in the basin.
- Streamflow forecasts for June through July are **well below** average (50%) for this basin.





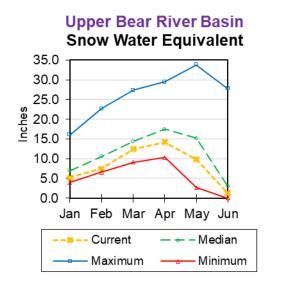


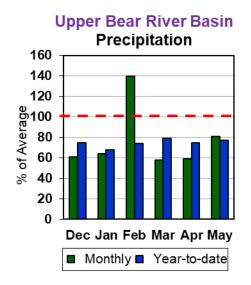


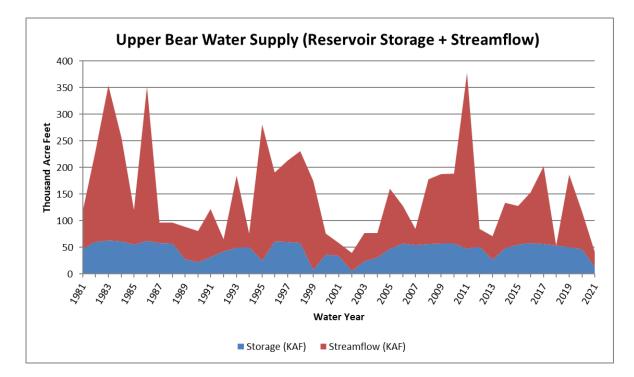


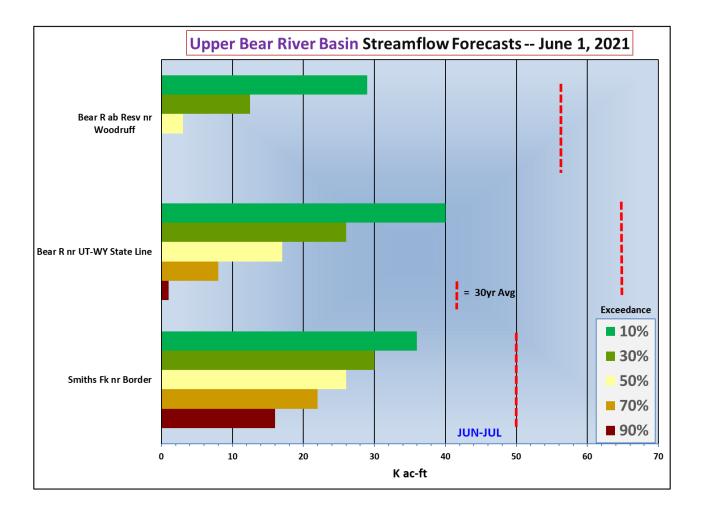
Upper Bear River Basin

- Much of the Upper Bear Basin's snowpack below 10,000 feet has melted out.
- Last month's precipitation for the Upper Bear River Basin was near **80**% of average. Water-year-to-date precipitation is around **75**% of average.
- Current reservoir storage is near 35% of average for one main reservoir in the basin.
- The 50% exceedance forecasts for June through July are **well below** average (**30**%) for this basin.



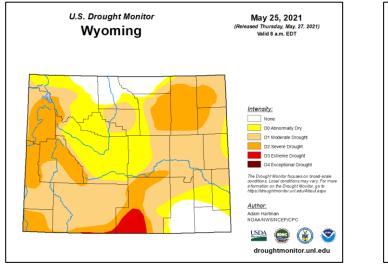


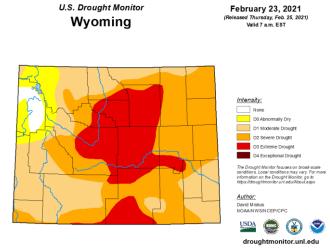




Appendix

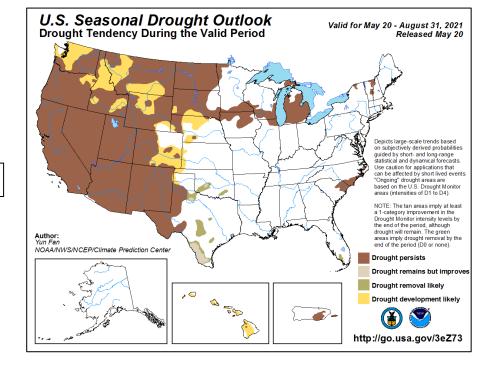
DROUGHT





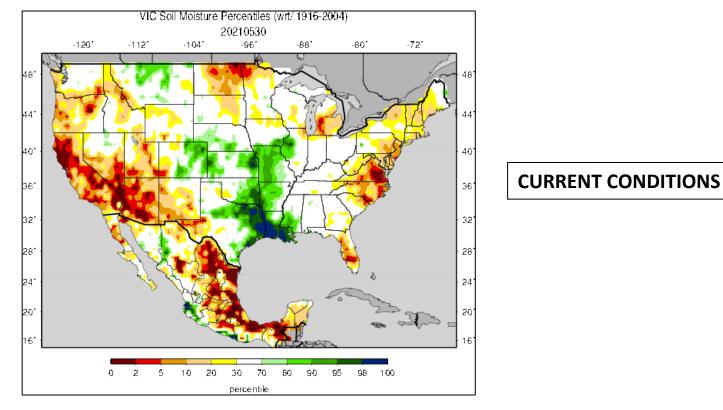
CONDITIONS 3 Months Ago

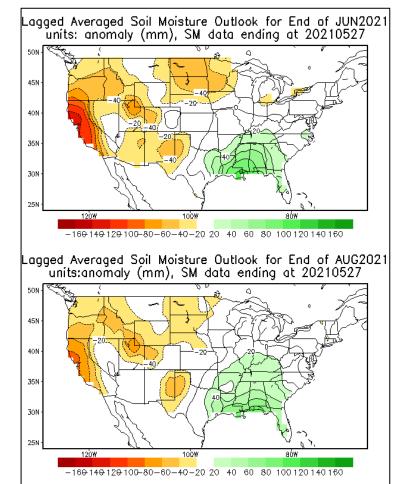
CURRENT CONDITIONS



OUTLOOK through August 31st

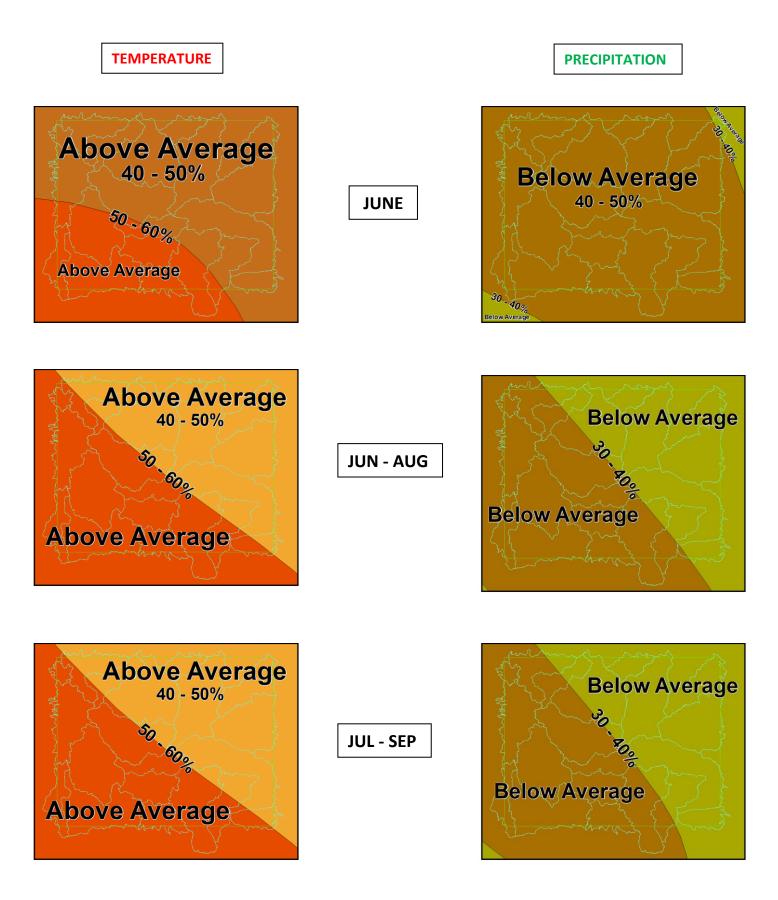
SOIL MOISTURE



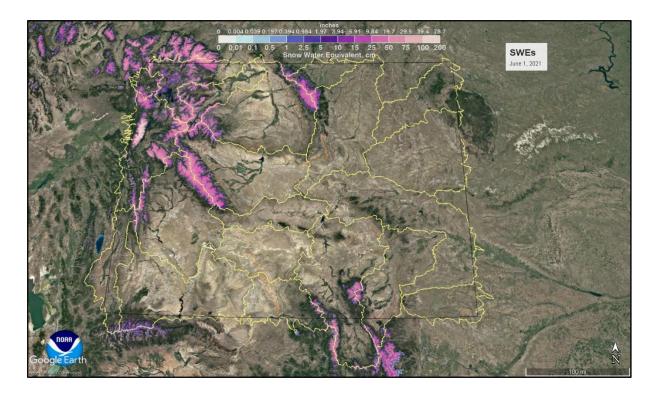


FORECAST through AUGUST

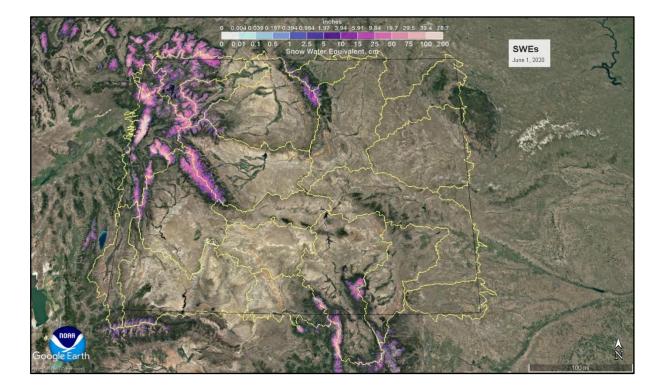
TEMPERATURE/PRECIPITATION OUTLOOKS



SWE ANALYSIS FROM NOHRSC

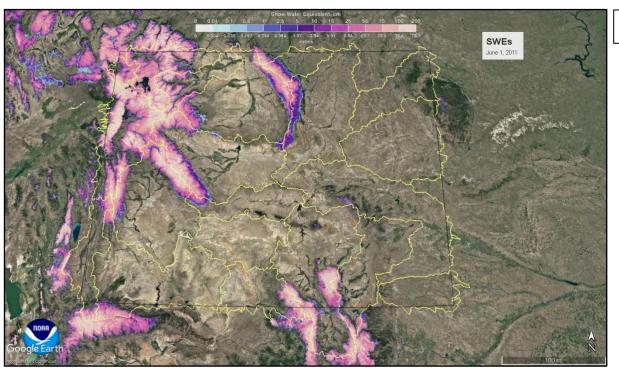


JUNE 1, 2021



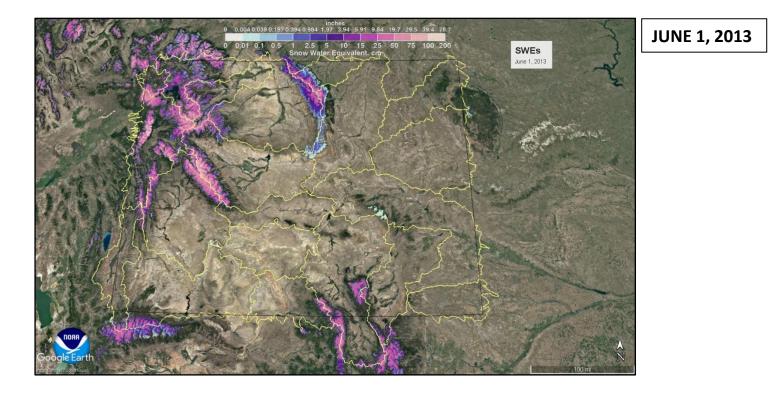
JUNE 1, 2020

Record High Runoff Water Year

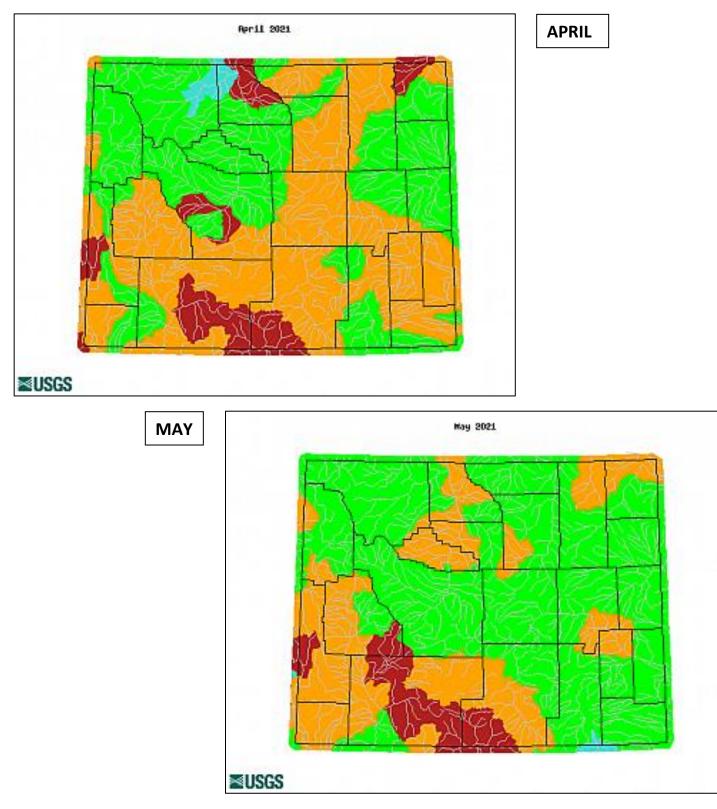


JUNE 1, 2011

Record Low Runoff Water Year



MONTHLY STREAMFLOWS



Explanation - Percentile classes							
Low	<10	10-24	25-75	76-90	>90	High	No Data
	Much below normal	Below normal	Normal	Above normal	Much above normal		

Wyoming Water Supply Outlook Report

TABULAR DATA

Snowpack (SNOTEL/Snow Course) Data

In Word double click the object below to view entire document



Precipitation Data

In Word double click the object below to view entire document

Precip_data_060120 21.pdf

Reservoir Data

In Word double click the object below to view entire document

Reservoir_data_060 12021.pdf

Stream Flow Forecasts

In Word double click the object below to view entire document

Forecasts_06012021 .pdf

LINKS (for more information/graphics)

National Water Climate Center (NWCC)

Interactive maps featuring current conditions of snow, precipitation, reservoir storages:

https://www.nrcs.usda.gov/wps/portal/wcc/home/quicklinks/predefinedMaps/

Water Resources Data System and State Climate Office (WRDS)

Clearinghouse of hydrological and climatological data for the State of Wyoming: <u>http://www.wrds.uwyo.edu/</u>

USGS WaterWatch

> Tools and products to monitor streamflow, runoff, drought, and floods:

https://waterwatch.usgs.gov/index.php

Wyoming Basin Outlook Report National Resources Conservation Service Casper, Wyoming

Issued by:

Released by:

Terry Crosby (Chief) U.S.D.A. Natural Resources Conservation Service Washington D.C. Astrid Martinez State Con. N R C S Casper, Wyoming

The Following Agencies and Organizations Cooperate with the Natural Resources Conservation Service with Snow Surveys and/or with Data:

FEDERAL:

United States Department of the Interior (National Park Service)

United States Department of the Interior (Bureau of Reclamation)

United States Department of Agriculture (Forest Service)

United States Department of Commerce NOAA (National Weather Service)

STATE:

The Wyoming State Engineer's Office

The University of Wyoming

LOCAL:

The City of Cheyenne