Wyoming Basin & Water Supply Outlook Report
March 1, 2022

Photo courtesy of Wyoming Snow Survey
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.

Note: The median is the official normal for snowpack (SWE), precipitation, reservoir storage, and streamflow calculations. Please refer to the Appendix of this report for more detailed information.
Summary

- Wyoming snowpack and/or snow water equivalents (SWEs) were below median by March 1st.
- Precipitation totals across Wyoming for February were well below median. Water year precipitation totals are near median.
- Overall reservoir storages for late February continue to be below median.
- Stream flow snowmelt volumes during April through July across Wyoming are forecasted to be generally below median.

Snowpack/SWEs

Snow water equivalents (SWEs) across Wyoming for March 1st were around 80% of median. SWEs in the Laramie and Tongue Watersheds were the highest at near 95% of median, while SWEs in the Belle Fourche and Cheyenne River Basins were the lowest at near 60% of median. Last year, SWEs across the state were 87% of median. (For complete tabular data, see attachment to report)

Precipitation

Basin precipitation across Wyoming was near 60% of median during February. The Laramie and Lower North Platte and Tongue River Watersheds had the highest precipitation totals for the month at 105% of median. The Upper Green and Upper Bear River Basins had the lowest precipitation amounts at near 20% of median. Water year precipitation (October – February) is currently about 96% of median. (For complete tabular data, see attachment to report)

Map 2. Current monthly precipitation by basin.

Map 3. Water year to date precipitation by basin.
Reservoirs

Reservoirs across Wyoming were averaging near 62% of capacity—down from 72% of capacity last year. Overall reservoir storages for late February are below median at 88% (101% last year). The Wind River Basin had reservoir storages at 106% of median, while the Snake River Basin had reservoir storages at 28% of median. (For complete tabular data, see attachment to report)
Stream Flows

Snowmelt runoff stream flow volumes across the state are expected to be below median at around 85%. The highest forecasted stream flows due to snowmelt are across the Wind and Laramie Basins at between 95 to 105% of median. The lowest snowmelt runoff volumes are expected across the Powder, Upper Green, and Cheyenne Drainages between 65% and 75% of median. (For complete tabular data, see attachment to report)

![Chart 2. Percent of Median (50% exceedance) for major forecast points.](chart2.png)
Snake River Basin

- The overall Snake River Basin SWE is near 80% of median.
- Last month’s precipitation for the Snake River Basin was near 30% of median. Water-year-to-date precipitation is near 90% of median.
- Current reservoir storage is near 30% of median for the two main reservoirs in the basin.
- The streamflow forecasts for April through July are below median (80%) for this basin. Jackson Lake inflows are to be 90% of median.
Madison Headwaters Basin

- The overall basin SWE is around 80% of median.
- Last month’s precipitation for the basin was near 35% of median. Water-year-to-date precipitation is around 90% of median.

No reservoir data for the basin.

There are no streamflow forecast points for the basin.
Yellowstone River Basin

- The overall Yellowstone River Basin SWE is near 85% of median.
- Last month’s precipitation for the Yellowstone River Basin was near 60% of median. Water-year-to-date precipitation is near 90% of median.
- The 50% exceedance forecasts for April through July are below median (85%) for this basin. Clarks Fork near Belfry is forecasted to have flows at 85% of median.

No reservoir data for the basin.
The overall Wind River Basin SWE is near 90% of median.

Last month’s precipitation for the Wind River Basin was near 60% of median. Water-year-to-date precipitation is around 105% of median.

Current reservoir storage is around 105% of median for three main reservoirs in the basin.

The streamflow forecasts for April through July are above median (103%) for this basin. Boysen Reservoir inflows are expected to be 101% of median.
The overall Bighorn River Basin SWE is near 85% of median.

Last month’s precipitation for the Bighorn River Basin was near 95% of median. Water-year-to-date precipitation is also about 95% of median.

Current reservoir storage is near 95% of median for one main reservoir in the basin.

The 50% exceedance forecasts for April through July are below median (94%) for this basin.
The overall Shoshone River Basin SWE is around 85% of median.

Last month’s precipitation for the Shoshone River Basin was close to 65% of median. Water-year-to-date precipitation is around 90% of median.

Current reservoir storage is near 85% of median for one main reservoir in the basin.

Streamflow forecasts for April through July are below median (90%) for this basin. Buffalo Bill Reservoir inflows are expected to be 90% of median.
Powder River Basin

- The overall Powder River Basin SWE is near 85% of median.
- Last month’s precipitation for the Powder River Basin was near 95% of median. Water-year-to-date precipitation is near 100% of median.
- The 50% exceedance forecasts for April through July are below median (70%) for this basin.

No reservoir data for the basin.
The overall Tongue River Basin SWE is near 95% of median.

Last month’s precipitation for the Tongue River Basin was at 105% of median. Water-year-to-date precipitation is also at 105% of median.

Current reservoir storage is near 105% of median for one main reservoir in the basin.

The 50% exceedance forecasts for April through July are below median (84%) for this basin. Tongue River Reservoir is forecasted to have inflows at 79% of median.
Belle Fourche River Basin

- The overall Belle Fourche River Basin SWE is close to 60% of median.
- Last month’s precipitation for the Belle Fourche River Basin was near 75% of median. Water-year-to-date precipitation is around 85% of median.
- Current reservoir storage is near 95% of median for three main reservoirs in the basin.

There are no streamflow forecast points for the basin.
The overall Cheyenne River Basin SWE is near 70% of median.

Last month’s precipitation for the Cheyenne River Basin was near 85% of median. Water-year-to-date precipitation is around 75% of median.

Current reservoir storage is near 90% of median for three main reservoirs in the basin.

The 50% exceedance forecasts for April through July are below median (68%) for this basin. Pactola Reservoir inflows are forecasted to be only 58% of median.
The overall Upper North Platte River Basin SWE is around 90% of median.

Last month’s precipitation for the Upper North Platte River Basin was near 45% of median. Water-year-to-date precipitation is around 100% of median.

Current reservoir storage is near 80% of median for two main reservoirs in the basin.

Streamflow forecasts for April through July are near median (97%) for this basin. Seminole Reservoir inflows are forecasted to be 98% of median.
The overall Lower North Platte River Basin SWE is near 85% of median.

Last month’s precipitation for the Lower North Platte River Basin was near 105% of median. Water-year-to-date precipitation is around 115% of median.

Current reservoir storage is near 95% of median for three main reservoirs in the basin.

The 50% exceedance forecasts for April through July are below median (92%) for this basin. La Prele Creek near Douglas is forecasted to have flows at 86% of median.
The overall Laramie River Basin SWE is around 95% of median.

Last month’s precipitation for the Laramie River Basin was at 55% of median. Water-year-to-date precipitation is at 100% of median.

Current reservoir storage is around 80% of median for one main reservoir in the basin.

Streamflow forecasts for April through July are near median (99%) for this basin. Little Laramie River near Filmore is expected to have flows at 94% of median.
Sweetwater River Basin

- The overall Sweetwater River Basin SWE is close to 75% of median.
- Last month’s precipitation for the Sweetwater River Basin was close to 40% of median. Water-year-to-date precipitation is at 90% of median.
- Streamflow forecasts for April through July are below median (89%) for this basin.

No reservoir data for the basin.
South Platte River Basin (WY)

- The overall South Platte River Basin SWE is around 85% of median.
- Last month’s precipitation for the South Platte River Basin was near 95% of median. Water-year-to-date precipitation is close to 95% of median.

**South Platte River Basin Snow Water Equivalent**

![Graph showing snow water equivalent over time](image)

**South Platte River Basin Precipitation**

![Graph showing precipitation over time](image)

No reservoir data for the basin.

There are no streamflow forecast points for the basin.
The overall Little Snake River Basin SWE is near 85% of median.

Last month’s precipitation for the Little Snake River Basin was near 45% of median. Water-year-to-date precipitation is about 95% of median.

Current reservoir storage is near 50% of median for one main reservoir in the basin.

The 50% exceedance forecasts for April through July are below median (83%) for this basin.
Upper Green River Basin

- The overall Upper Green River Basin SWE is near 80% of median.
- Last month’s precipitation for the Upper Green River Basin was near 20% of median. Water-year-to-date precipitation is around 95% of median.
- Current reservoir storage is close to 110% of median for two main reservoirs in the basin.
- Streamflow forecasts for April through July are below median (74%) for this basin. Fontenelle Reservoir inflows are expected to be 67% of median.
Lower Green River Basin

- The overall Lower Green River Basin SWE is near 85% of median.
- Last month’s precipitation for the Lower Green River Basin was near 35% of median. Water-year-to-date precipitation is around 100% of median.
- Current reservoir storage is 90 to 95% of median for four main reservoirs in the basin.
- Streamflow forecasts for April through July are below median (65%) for this basin. Flaming Gorge Reservoir inflows are forecasted to be 56% of median.
The overall Upper Bear River Basin SWE is close to 80% of median.

Last month’s precipitation for the Upper Bear River Basin was near 20% of median. Water-year-to-date precipitation is around 100% of median.

Current reservoir storage is near 35% of median for two main reservoirs in the basin.

The 50% exceedance forecasts for April through July are below median (81%) for this basin. Bear River above Woodruff Narrows Reservoir is expected to have flows at 85% of median.
MEDIAN INFORMATION


Starting January 2022, the NRCS will use the 30-year median as the official normal for snowpack (SWE), precipitation, reservoir storage, and streamflow calculations. The National Water and Climate Center (NWCC) will continue to publish and distribute 30-year averages for alternate normal calculations.

The 30-yr reference period for median and normal calculations has also been recently updated from 1981-2010 to 1991-2020.

Please refer to this NWCC website or more information about the significant changes in data and forecast computations:

https://www.nrcs.usda.gov/wps/portal/wcc/home/snowClimateMonitoring/30YearNormals/

Topics include:

- 1991 – 2020 Median/Averages Overview
- Calculation Methods
- Differences Between 1991-2020 and Previous Normals
- Median vs. Average
- Retrieving 1991-2020 Normals

For specific seasonal streamflow normal comparisons for NRCS forecasted stations, please refer to:

https://www.wcc.nrcs.usda.gov/ftpref/support/srvo_norms_comps/
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:
  
  http://www.wrds.uwyo.edu/

**USGS WaterWatch**
- Tools and products to monitor streamflow, runoff, drought, and floods:
  
Wyoming Basin Outlook Report
National Resources Conservation Service
Casper, Wyoming

Issued by:
Terry Cosby (Chief)
U.S.D.A.
Natural Resources Conservation Service
Washington D.C.

Released by:
James Bauchert
Acting State Conservationist
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