Teton River Runoff Forecast

April 1, 2023

Snowpack Conditions

Click figures to link to plots

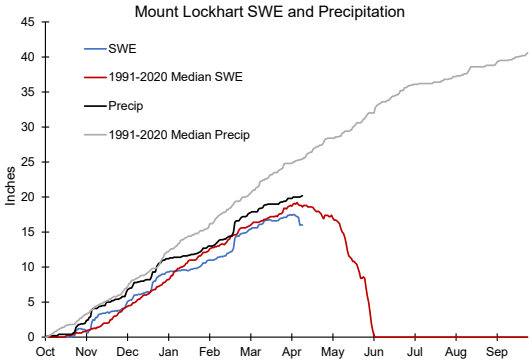


Figure 1: Mt. Lockhart (Elev. at 6400 ft) SWE and precipitation.

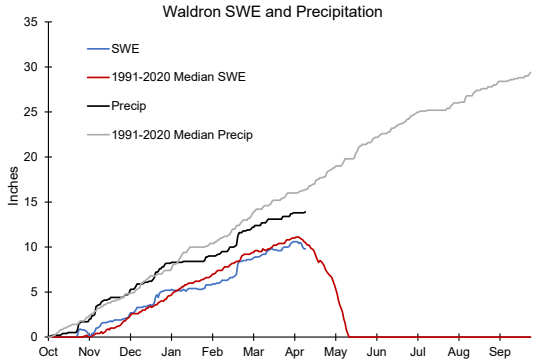


Figure 2: Waldron (Elev. at 5600 ft) SWE and precipitation.

– Snowpack conditions (Snow Water Equivalent or SWE) at the Natural Resource Conservation Service (NRCS) Mt. Lockhart and Waldron SNOTEL sites are **trending below normal** as of April 1. **Mt. Lockhart is at 86% of the median** (Figure 1) and **Waldron is at 93% of the median** (Figure 2). SWE started normal to above normal in the fall showing sharp increases with storm events through the start of 2023. There was little precipitation during January and most of February until more storm cycles delivered snow at the end of February and through March. Precipitation has shown a nearly identical. Based on snowpack and precipitation so far, conditions are looking favorable for normal to above normal water supply. As of April 1, the mountains should have accumulated almost all (90-95%) of total snow.

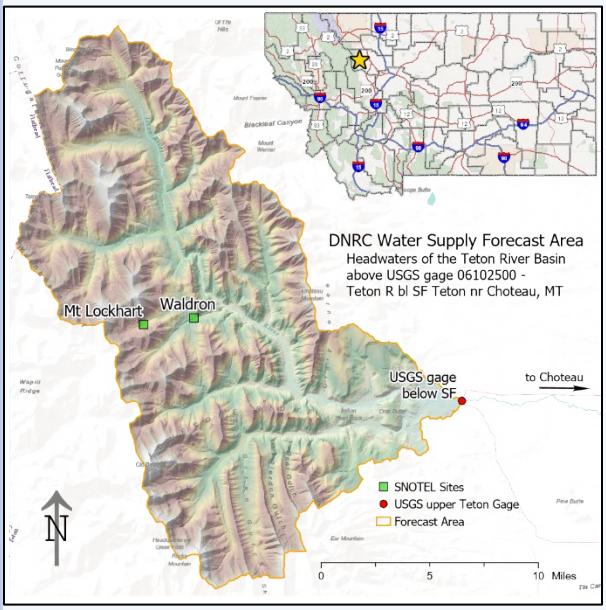
Streamflow Conditions

– The United States Geological Survey (USGS) gage 06102500 Teton River Below South Fork near Choteau (TRSF) was started on April 4, 2023. The gage is currently reading approximately normal flow for this time of year at 62 cfs.

Weather Outlook

– The National Weather Service (NWS) **one-month outlook indicates normal precipitation and normal temperatures** for Central Montana. The El Niño Southern Oscillation (ENSO) index, is a measure of whether equatorial Pacific Ocean conditions known as El Niño (warm and dry for Montana) or La Niña (cold and wet) could develop and influence weather along the Rocky Mountain Front. Currently, La Niña conditions exist with colder sea surface temperatures, but they are warming. La Niña has contributed to the colder conditions this year and is projected (~62% chance) to transition to El Niño in May to July, meaning **La Niña will likely not continue to influence Montana weather over the summer**.

Forecast Area



Forecast Period is April 1 – July 31

All predicted and displayed values are calculated for this period.

On a **normal year, 49,908 acre-feet of water** flows by the TRSF gage from April 1 – July 31 (based on the median of the total annual flow from 1999 to 2021). **Approximately 36,660 acre-feet (or 73%) of this flow is from snowmelt** built up at high elevations during the winter and spring. The remainder of flow is from rain events between April 1 and July 31. The normal rainfall in the forecast area during this period is 7.6 inches but can vary considerably. **The median rainfall (7.7 in) produces about 13,359 acre-feet of runoff based on DNRC rainfall runoff model estimates.**

Runoff Forecast

DNRC's April 1 runoff forecast predicts an **above normal volume of 48,835 acre-feet** (Figure 3) of water from snowmelt, or 133% of normal. ***This is the estimated flow only from snowmelt***. Current information indicates that the 2023 runoff from accumulated snowpack is predicted to be like conditions observed in 2020. The uncertainty in the April forecast is still high because the peak snowpack has still not occurred. Based on the uncertainty of the prediction, there is a **90% chance snowmelt runoff will exceed 39,773 acre-feet (108% of normal)** and only a **10% chance snowmelt runoff will exceed 63,474 acre-feet (173% of normal).**

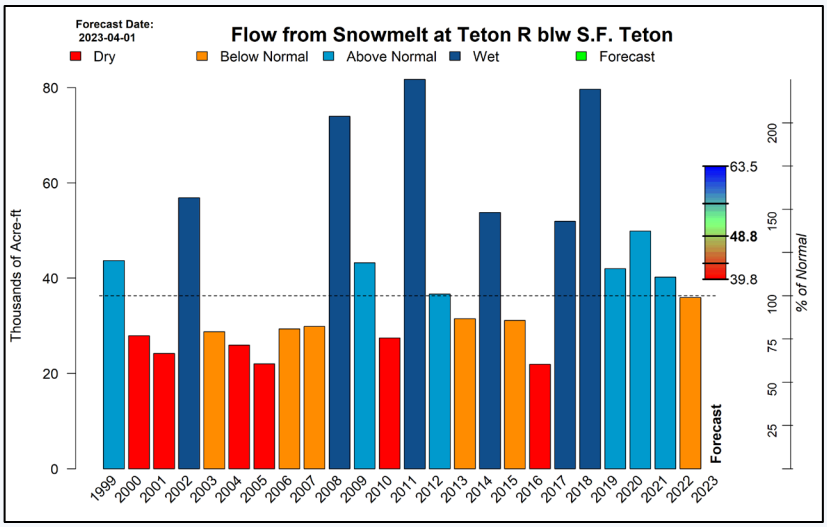


Figure 3: Historical snowmelt runoff and 2023 prediction.

If there is a normal amount (7.7 inches) of rain from April 1 – July 31, the total runoff is predicted to be 62,194 acre-feet. This is **12,286 acre-feet more than normal.** Any excess rain (more than 7.6 inches) could increase the volume substantially (Figure 4). If it rains 11.5 or more inches from April 1 to July 31, 2023 could be a wetter year than 2019 or 2020. For reference, both 2019 and 2020 had more than 12 inches of rain from April 1 – July 31. The **effects of excess rain are visualized in Figure 4** as inches above normal.

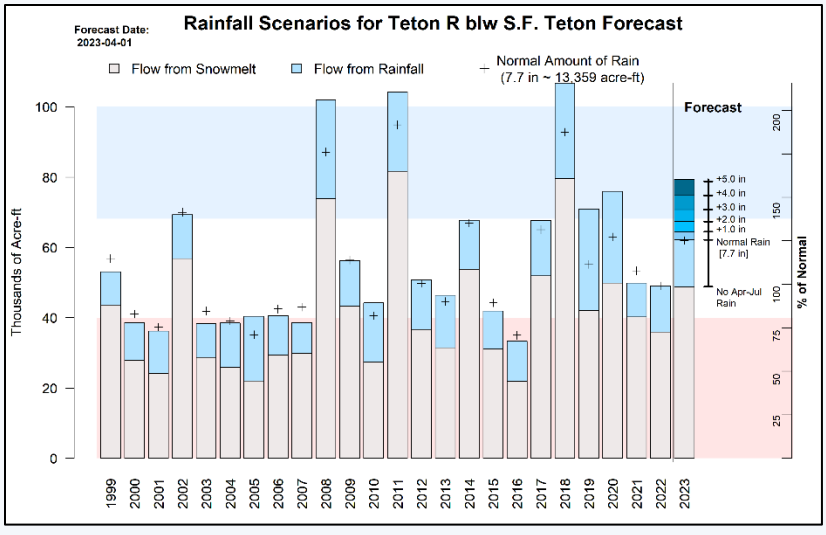


Figure 4: Proportion of flow from snowmelt vs. rain and the effects of April 1 – July 31 rain on predicted flow.

Disclaimer: The DNRC snowmelt runoff forecast follows NRCS methodology using statistical best practices and professional judgment. Like any forecast it contains uncertainty. Please consider the stated error and documentation associated with each model when using the predicted flow in your decision-making process.

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