SNOW WATER EQUIVALENT

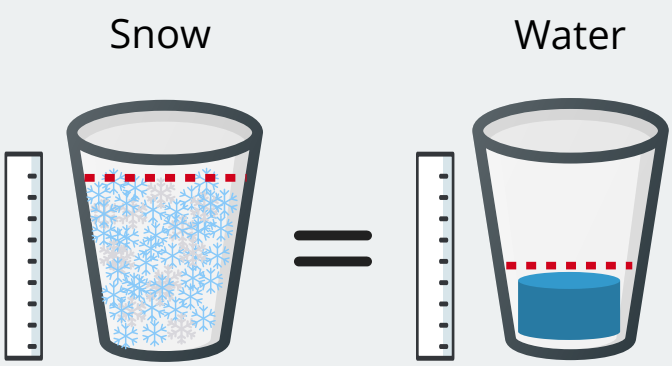
Snow and climate change

For most places in Oregon, Washington, and Idaho, **the peak of snowpack** is happening **1-3 weeks earlier** in the year. In Alaska, the length of the snow season is **decreasing** because of a later onset and earlier melting of snow. These changes in snowpack have implications for plants and animals that rely on the timing of snowmelt and length of the snow season.

Snowpack has been decreasing in many areas of the West, including parts of Idaho, Oregon, Washington, and coastal Alaska, but scientists have also documented increases in certain areas in the Northwest and interior northern Alaska. Decreases in snowpack are partly because of more precipitation **falling as rain rather than snow and higher wintertime temperatures.**

Snow-dominated ecosystems are expected to see **more variability within year** (e.g., lower summertime and higher wintertime streamflows) **and between years** (e.g., flooding one year followed by drought the next).

In a warming climate, as snowmelt shifts earlier in the year, the **biggest impacts will be on streamflow**. This will have widespread impacts on humans, including **decreased agricultural production, more flooding, increased erosion, and degraded infrastructure**. Plants and animals will feel the effects too. **Salmon** that rely on year-round, clean, cool water will be **stressed by higher stream temperatures** and may **have difficulty finding suitable habitat.**



Snow Water Equivalent, often called **SWE**, is a **measurement of how much water is in melted snow**. Because one inch of precipitation can produce between two inches of sleet to 50 or more inches of snow, depending on how cold the air is, SWE is a more reliable way to measure water supplies. It is used by hydrologists and water managers to plan for water use.

Keeping track of SWE

To measure and monitor SWE, hydrologists typically use three metrics. These metrics can help show how snow is changing in real-time, how it compares to historical conditions, and what impacts climate change is having on snowpack in this region. These tools are not the only tools hydroligists use, but they are some of the more common ones.

Percent of normal

"Normal" is a measure of what is typical for a basin on the day the statistic is reported. For Natural Resource Conservation Service (NRCS) SNOTEL and SNOLITE (Snow Telemetry and Snow Telemetry Lite) measurements, normal is calculated as the median of the last 30-year period.

Basins are compared to this historical mean using "percent of normal." *When this measurement is equal to 100% of normal*, that means that the *snowpack is the same as the median*. If it is *higher than 100%*, it is *higher than normal*. If *lower than 100%*, it is *lower than normal*.

This metric shows how current snow conditions compare to historical conditions for a particular day.

Water year graphs

In the Northwest, we get both rain and snow. Water graphs show both forms of precipitation for each SNOTEL site. As more snow starts to fall as rain with climate change, water-year graphs allow us to compare both forms of precipitation. Graphs are updated daily.

The water year goes from October 1 to September 30 of the following year and is labeled by the year in which the measurements end (e.g., October 1, 2021 – September 30, 2022 is water year 2022).

This metric helps show how current snow conditions compare to historical conditions and total precipitation. It can help determine snow drought.

30-year normals

These graphs **show annual observations for the previous 30-year period, allowing users to compare historical observations with current and previous years**. These graphs, which are updated every 10 years, quantify how SWE compares with previous 30-year periods.

New normals are calculated every decade and we compare snow levels to data from the previous 30 years. For example, between the years of 2021 and 2030, we consider “normal” for each SNOTEL site to be the median of snowpack from the previous 30-year period, 1991-2020. This means that as regional snowpack has decreased with climate change, so has what is considered “normal.”

For more information visit the USDA Northwest Climate Hub's page on Snow Water Equivalent (SWE)

https://www.climatehubs.usda.gov/hubs/northwest/topic/snow-water-equivalent-swe-its-importance-northwest