

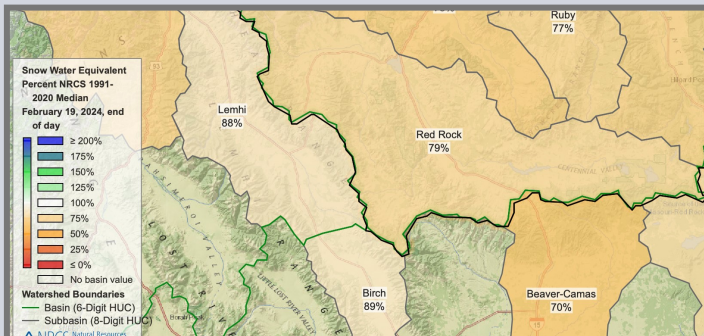


Water Topic February 2024

Snow Drought

This month we'll look at snow drought and its impacts on landscapes and water resources. With this winter's low snow accumulation in the snowpack, this month's topic should be a good reminder of why snowpack is important in the spring and summer months.

Snow drought, is a term used to describe low winter precipitation, or winter precipitation coming in the form of rain rather than snow. Rain can fill reservoirs, but isn't stored on the landscape for long periods of time like snow. This causes water to runoff the landscape faster which will effect groundwater and peak runoff in streams and rivers, as well as influence water availability in the late summer and fall. The benefit of snowpack is that it stores water on the landscape and slowly releases water as temperatures warm in the spring and early summer. This helps maintain streamflow and cool temperatures, which are necessary for water quality, and organisms living in the stream. This also helps water to be in less stressed supply for water users and irrigation.



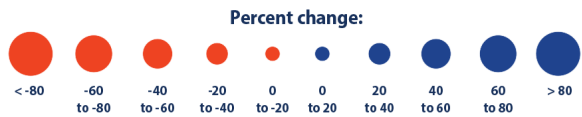
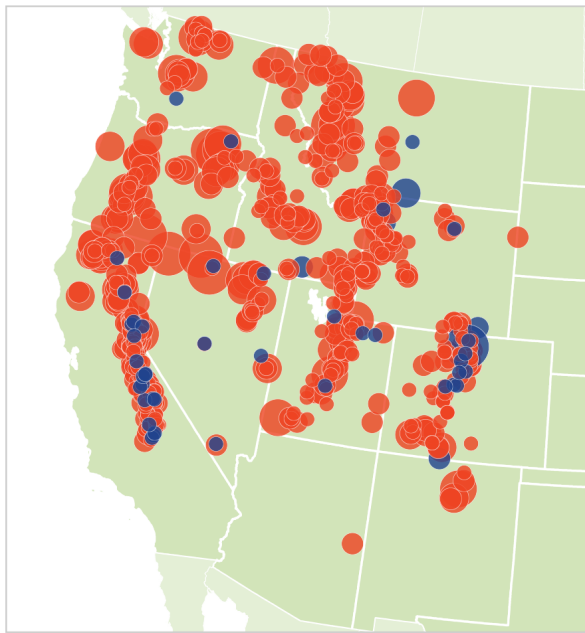
Snow Water Equivalent (SWE), is a term used to describe the amount of water stored in snow, a relevant measurement when discussing snow drought. Heavy, warmer weather snow tends to hold more moisture and have a higher water content than snow from cold weather storms which tends to be lighter and powdery. If you look at the figure to the left, you'll see that mid February SWE levels were 79% of median values. The rest of the state seems to be following this trend of low SWE levels, as well as the majority of the west.

SWE level for Red Rock Basin on February 19th, 79% of median (1991-2020) (NRCS).

Snow drought has a variety of ecological impacts. It can impact soil moisture, leading to drier soils. This can have negative implications to plant health, as soil moisture is a key part to the uptake of nutrients by plants, having impacts on crop production and the amount of forage in our grassland ecosystems. It also effects our rivers and streams, as well as native fish and aquatic species that rely on moving, cold water. In years of drought, warm water and low flows in the late summer and fall can lead to decreased dissolved oxygen levels which negatively impact stream organisms. Snow drought will also impact agriculture by reducing the quality and availability of water for use on working landscapes.

Snow drought has many consequences on ecosystems and resources, similar to our typically envisioned summer drought. However snow has its own unique impacts on water availability. As an MSU professor Eric Sproles stated in a [news article](#) with CBS, "snow is our savings account." Sproles explained that snowpack helps to recharge our streams and groundwater as temperature warms in the summer. Without a proper water storage or "savings" in a years snowpack, water resources will be slim as temperatures warm and the precipitous season changes.





Data source: USDA Natural Resources Conservation Service, 2022. Snow telemetry (SNOTEL) and snow course data and products. Accessed May 2022. www.wcc.nrcs.usda.gov/snow/index.html.

For more information, visit U.S. EPA's "Climate Change Indicators in the United States" at www.epa.gov/climate-indicators.

Spring Snowmelt

Snow drought is an issue globally, and especially in the western United States. Our spring snowpacks are melting faster. There has been a 23% decrease in April snowpack in the West from 1955-2022 and the snowpack season has shortened by 18 days.

The figure to the left displays trends in April snowpack in the western U.S. based on data from 1955-2022. The red dots on the map show percent change of decreasing snowpack levels based on SNOTEL (snow telemetry) and snow course data products. There is an overwhelming number of red dots on the figure, especially in comparison to the blue dots, which represent a positive percent change in snowpack. From 1955-2022, 93% of the sites that were measured showed declining April snowpack.

Let's bring this back home to the Centennial Valley. The local snowpack in the Centennial Mountains and surrounding areas feed the Red Rock River, helping the valley flourish with its copious grazing land and wetland habitats that support agriculture and our native plant, animal, and fish species. The figure to the left depicts that the Centennial Valley, like much of the intermountain west, has seen a significant decline in April snowpack. Near West Yellowstone, there is one blue dot that represents an increase in April snowpack. Maybe there is some hope? Let's keep our fingers and toes crossed!

Source: [The American West's Disappearing Winter Snowpack](#)

Still Curious? Check out the Links Below!

Check out this podcast:

[Life in the Land: Big Hole Rancher, Jim Hagenbarth](#)

This podcast features Jim Hagenbarth, a rancher in the Big Hole Valley and one of the founding members of the Big Hole Watershed Committee. In this episode, Jim discusses how ranchers are stewards of the land and how drought effects ranchers and ecosystems in these large working landscapes.

This episode is part of the [Stories for Action podcast](#). A unique series that sparks conversation and connection around environment and communities.

Check out this scholarly article:

[Global snow drought hot spots and characteristics](#)

This article analyzes snow drought around the world, including areas seeing the greatest decline in snowpack using snow water equivalent deficits. The western United States is among the list of areas experiencing longer, more intense snow droughts.

Resources/Sources:

[Snow Water Equivalence \(SWE\) - Its Importance in the Northwest](#) (Climate Hubs USDA)

[What is Snow Drought?](#) (National Integrated Drought Information System)

[CBS News interviews Montana State expert about 'snow drought' in western U.S.](#) (Montana State University)

[Stories for Action](#) (Stories for Action)

[The Importance of Mountain Snowpack to Water Resources](#) (Water Footprint Calculator)

[The American West's Disappearing Winter Snowpack](#) (National Environmental Education Foundation)

[Global snow drought hot spots and characteristics](#) (Proceedings of the National Academy of Science)

