



WYOMING'S WHITE GOLD

and how it's monitored

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High in the mountains of Wyoming is a precious resource replenished each winter – Wyoming's white gold, or more commonly known as snow.

The mountains play a critical role in storing water in Wyoming and other arid states, and hopefully it is released into lakes and streams each spring and summer.

Snowmelt will ideally occur at a manageable rate, which will benefit many users including recreationists, municipalities, and agricultural producers.

The USDA Natural Resources Conservation Service's (NRCS) Snow Survey Program manages a network of snow telemetry (SNOTEL) monitoring sites where data are collected to forecast streamflows for our state's network of rivers. Snow Water Equivalent (SWE) is the vital data needed for this forecast. SWE is the amount of water there would be if the snowpack instantly melted without loss from runoff, evaporation, or soil absorption.

A brief history about SNOTEL

The program started monitoring mountain snowpack and climate variables in 1935 to forecast spring and summer water supplies in the western United States. The first automated SNOTEL stations were installed in the late 1970s. Today, there are over 850 SNOTEL sites in the western U.S., of which 89 are in Wyoming.

How does SNOTEL work?

SNOTEL sites are located throughout the mountains of Wyoming. All sites are equipped with instruments that measure temperature, snow depth, SWE, and precipitation. A third of the sites can measure soil moisture, and it is expected the number of these sites will increase. If you stumble across a SNOTEL site, steer clear or approach by foot to mitigate unintended damage to the instrumentation.

A SNOTEL site includes a snow pillow(s) to measure SWE and a precipitation gauge. Snow or pressure pillows, the primary source of SWE data, are placed directly on the ground and vary in shape, size, and material. Snow pillows in Wyoming are primarily 10 feet in diameter and

made of butyl rubber; however, some sites do have stainless steel pillows.

Snow pillows are filled with a non-toxic antifreeze solution, which makes them ½ to 4 inches thick. The weight of the snow on top of the snow pillow exerts pressure on the pillow, which forces the antifreeze solution through underground copper or plastic piping to a shelter with electronic equipment. The piping is attached to a clear, vertical tube inside the shelter called a manometer. A measuring tape runs parallel to the manometer – indicating the fluid height, which varies based on how much snow is on the pillow.

A transducer measures the fluid pressure, which results in voltage that is converted by an algorithm to a SWE value. The data are then transmitted by VHF radio on an hourly basis using meteor burst technology. In meteor burst, the radio frequency signal is reflected off the ionized trail left behind from the constant influx of meteors entering the earth's atmosphere.

Precipitation gauges, or precip cans, are part of the equation for monitoring SWE. Precip cans are

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made of steel and look like little rockets. They range in size but are typically 8, 12, or 16 feet tall, depending on the expected precipitation at a site. Precip cans collect rain and snow year-round through an opening at the top of the can.

Precip cans have antifreeze inside, which melts snow that falls into the can. A quart of mineral oil is also added – due to its lower density the oil floats to the top of the antifreeze preventing evaporation of the mixture. A wreath-like structure or alter shield is at the top of a precip can to ensure the only snow collected in the can fell from the sky versus being blown into the can.

The data are measured similar to snow pillow data – via a pressure transducer in the shelter. These data are used as a crosscheck for the snow pillow data, or if needed, as a backup should something go wrong with the pillow.

How might you use SNOTEL data?

Many of us unknowingly use SNOTEL data indirectly. Your local municipality, irrigation district, or emergency manager has likely used

Photo by Ken Von Buettner



Summer and winter views at the Grassy Lake SNOTEL site (elevation 7,265) in the Teton Range.

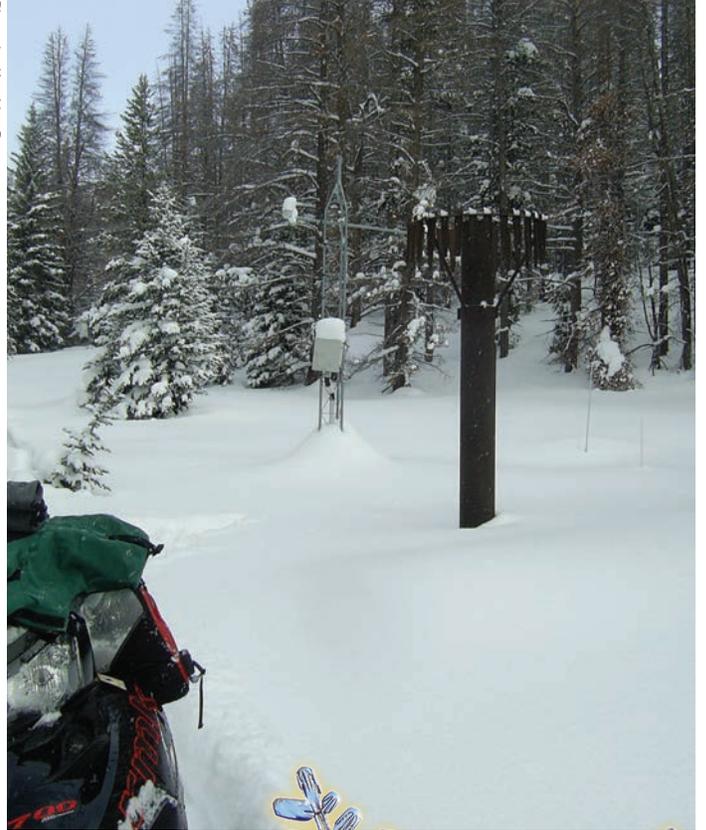
Photo by Ken Von Buettner



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Seasonal scenes of the Whiskey Park SNOTEL site (elevation 8,950 feet) on the Wyoming-Colorado border. Note snow pillows in the photograph on the left.

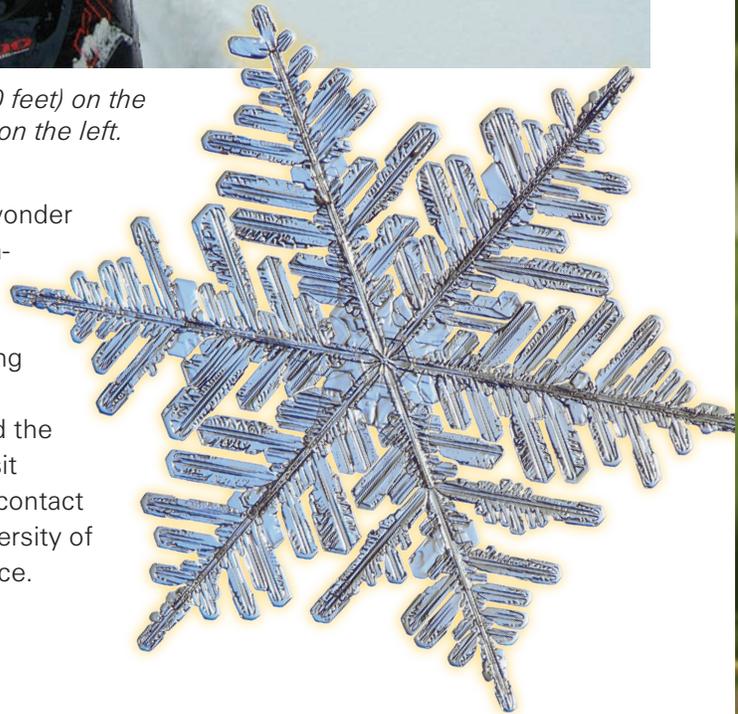
SNOTEL data in decisions that affect you.

You might use SNOTEL data directly for recreation decisions. For example, in the winter you might want to know how many inches of snow fell in an area you enjoy skiing or snowmobiling, and in summer boaters and anglers might want to know when local streams and rivers will be at an ideal level for an activity.

Many crops in Wyoming need irrigation. If you have water rights, you can reference the stream forecasts to gauge when irrigation water might start to flow or end.

The next time you wonder what the fishing or irrigation season might look like – think about what goes into measuring Wyoming’s white gold!

To learn more or find the closest SNOTEL site, visit bit.ly/snotelrightnow or contact your local NRCS or University of Wyoming Extension office.



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