

**Join us each Monday as the Clean Water Team shares information and resources on water quality monitoring. This Monday is about monitoring snow.**

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You may have already heard the song [White Christmas](#) more than a few times this month. Whether you happen to be having a white Christmas or not, let's discuss the importance of [snow and monitoring snowpack](#).

Much of California's precious precipitation falls as snow over the Sierra Nevada. This snowpack acts as a reservoir. As this reservoir melts, it slowly releases water for the needs of forests and agriculture, industry, households, and endangered species, and it provides the source of energy for hydroelectric power.

How "wet" or "dry" a year is predicted to be has many impacts. Public utilities need to determine what percentage of their electric energy generation will be hydro power. Good water years enable the utilities to use more hydro power and, consequently, save oil. Conversely, in a dry year, the utilities must depend more on steam generation and therefore use more oil, coal, and atomic fuel. Agricultural interest uses the information to determine crop planting patterns, ground water pumping needs, and irrigation schedules. Operators of flood control projects determine how much water can safely be stored in a reservoir while reserving space for predicted inflows. Municipalities use the information to evaluate their water supply and determine whether (in a dry year) water rationing may be needed.

[California's climate is changing](#). As the climate warms, less precipitation falls as snow, and more snow melts during the winter. That decreases snowpack—the amount of snow that accumulates over the winter. Since the 1950s, the snowpack has declined in California and the nearby states that drain into the Colorado River. This lack of snowpack storage, or a shift in timing of snowmelt from that reservoir, can be a challenge for drought planning.

[Snow drought](#) is a period of abnormally little snowpack for the time of year. [Recent research](#) shows that the western U.S. has emerged as a global snow drought "hotspot," where snow droughts became more prevalent, intensified, and lengthened in the second half of the period 1980 to 2018.

Diminishing snowpack can also shorten the season for skiing and other forms of winter tourism and recreation. The tree line may shift, as mountain hemlock and other high-altitude trees become able to grow at higher elevations. A higher tree line would decrease the extent of alpine tundra ecosystems, which could threaten some species.

Snow surveying in the United States began on [Mount Rose](#), a 10,800' mountain in Nevada overlooking Reno on one side and Lake Tahoe on the other. Mt. Rose was used as an "outdoor laboratory" by [Dr. James E. Church, Jr.](#) in his study of snow in all its phases.

In the early 1900's, as an offshoot of his original work, Dr. Church devised a method of measuring depth and water content of snow. The first practical application of this method ended the so-called "[Tahoe Water War](#)." Through the use of Dr. Church's data, a good correlation was found between water content of the snow on Mt. Rose and the spring rise of the Lake. Thus, releases could be regulated to prevent both flooding and waste of water -- putting an end to battles between local landowners and downstream users.

As the successful use of snow surveys in the forecasting of runoff became known, several water agencies began independent snow survey programs. After a few years, these agencies, and the State of California, recognized both the inherent value that such information could have for water users throughout the State and the need for centralized coordination of the snow survey program. The Legislature, after consultation with major water interests, determined that the Division of Water Resources (now the Department of Water Resources) would be the coordinator of the "California Cooperative Snow Surveys Program" and so directed in Section 228 of the Water Code.

Established in 1929 by the California Legislature, the [California Cooperative Snow Surveys \(CCSS\) program](#) is a partnership of more than 50 state, federal, and private agencies. The cooperating agencies not only share a pool of expert staff but share in funding the program, which collects, analyzes and disseminates snow data from more than 265 snow courses and 130 snow sensors located throughout the Sierra Nevada and Shasta-Trinity mountains.

California is the only western state to perform this function on its own. In the other western states, snow surveys are done by the federally funded [Natural Resources Conservation Service](#), which began its program in the mid-1930s. Both programs are similar, and there is a high degree of cooperation between the two entities. DWR is the lead agency in coordinating the CCSS program. Also in California are more than 50 state, national, and private agencies pool their efforts in collecting snow data. Over three hundred [snow courses](#) are sampled each winter with some of the original courses, established more than 60 years ago by Dr. Church, still in use.

Citizen scientists can also monitor snowpack and share their data. The [Community Collaborative Rain, Hail and Snow Network](#) (CoCoRaHS). This unique, non-profit, community-based network of volunteers of all ages and backgrounds working together to measure and map precipitation (rain, hail, and snow). By using low-cost measurement tools, stressing training and education, and utilizing an interactive Website, their aim is to provide the highest quality data for natural resource, education and research applications.

Who uses CoCoRaHS data? [The National Operational Hydrological Remote Sensing Center](#) accesses CoCoRaHS snow reports all winter to help in the assessment of snow cover and snow water content across the entire U.S. They particularly appreciate the observers who make the extra effort to report the total water content of snow on the ground each day in the winter. That is important stuff.

CoCoRaHS is also used by many other organizations and individuals. The National Weather Service, other meteorologists, hydrologists, emergency managers, city utilities (water supply, water conservation, storm water), insurance adjusters, USDA, engineers, mosquito control, ranchers and farmers, outdoor & recreation interests, teachers, students, and neighbors in the community are just some examples of those who visit our Web site and use our CoCoRaHS's data.

Just [click here to sign up](#) as a CoCoRaHS Volunteer Observer or [download a .pdf version](#) of the application and return it as soon as possible.

- [CoCoRaHS Tutorial: How to measure snowfall.](#) (4:49)
- [Measuring Snow](#) (23:00)
- [Alternative Methods For Making CoCoRaHS Snow Water Content Measurements](#) (PDF)

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#### **MORE SNOW INFO & FUN:**

[Do Inuits really have 50 words for snow?](#)

[The 21 Funniest, Snowiest Winter Jokes for Kids and Chill Adults](#)


[Make a Virtual Snowman](#)

[California Snow Report](#) (Resorts/Recreation)

[California Snow Depth and Snow Accumulation](#)

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