Natural Resources Conservation Service
National Water & Climate Center
Snow Survey & Water Supply Forecasting Program

SnowNews

Summer 2015

Volume 4, Issue 3

Eastern SCAN sites convert to cellular technology

Del Gist
Information Systems Team

The Soil Climate Analysis Network (SCAN) is introducing cellular technology into its data collection network. The manufacturer of NRCS data loggers has worked with a wireless provider and cellular modem manufacturer to create a stable, robust cellular network. The goal is to replace portions of the current meteor burst communication system with cellular technology.

Background

In early 2014, **Tony Tolsdorf**, Water and Climate Monitoring Team Leader, learned that the Bureau of Reclamation (BOR) had developed a large cellular network using a cellular modem and remote client-server software.

So Tony began investigating cellular technology for use in the SCAN data collection network, with the possibility of extending it into the SNOTEL Snow Survey and Water Supply Forecasting Program.

The ease of setup and the ability of the software to communicate directly with the SCAN data logger made the idea of converting to cellular attractive. In addition, contracts were in place at USDA to purchase the cellular technology, and the Oregon and Colorado Data Collection Offices (DCOs) had already procured some cellular modems.

Adding to the appeal of this technology, cellular coverage is at least 90% across the eastern and Great Plains states and is one-fifth the cost of operating the three, high-maintenance meteor burst SCAN master stations in those parts of the country. Other positive benefits from this transition would include fewer land leases and less power consumption.

In August 2014, Tony, hydrologist **Deb Harms**, Electronics Maintenance Facility (EMF) lead technician **John Weeks** and Information Systems Team members **Laurel Grimsted**, **Maggie Dunklee** and **Del Gist** met with several equipment vendors to formulate a plan to convert eastern SCAN sites from meteor burst to cellular communications.

continued pg. 2

Contractor Don Huffman installing a new cellular modem at the Bragg Farm SCAN site in Alabama

Inside this issue:

Eastern SCAN sites convert to cellular

continued from pg. 1

Cellular modems provide good coverage in the East, are much lower in cost, and make the network easier to maintain and operate.

Tony and John then set up a test SCAN site at EMF with the cellular modem connected to a data logger. Remote communications software was installed on the client side, and the server software was installed and configured on a Linux test server.

By December of last year, Del finished the requirements specification needed for the automatic conversion of cellular data to meteor burst format, allowing data to be stored to the SNOTEL database. Maggie completed her programming, and testing began with several data loggers and modems in January 2015.

Soon the cellular data were being stored to the SNOTEL database on an hourly basis.

The system was moved from the test environment to a production environment in February 2015.

Fast forward to field season May 2015. John installed the first cellular modem at the Molly Caren SCAN site while on his way to repair the Mt. Gilead and Tipton master stations.

Hard on John's heels, contractors **Garry Schaefer** and **Austin Beard** flew east to install the first 10 cellular modems in Florida, Alabama, South Carolina, Kentucky, and Georgia.

Other field folks, including **Don Huffman**, **Joel Parker** and **Johnathan Tenney**, headed north to convert sites in Minnesota, Missouri, Illinois, and Tennessee.

In addition to installing the modems, the technicians removed the meteor burst radios and antenna from each site.

At first, there were some issues with the remote communications software not collecting data from some sites.

Two of those sites turned out to have poor cell reception. One site was decommissioned and the other converted to the Geostationary Operational Environmental Satellite (GOES) system.

The team also discovered through discussions with the BOR and the vendor how to calibrate settings for the remote server and PC client to make the system stable.

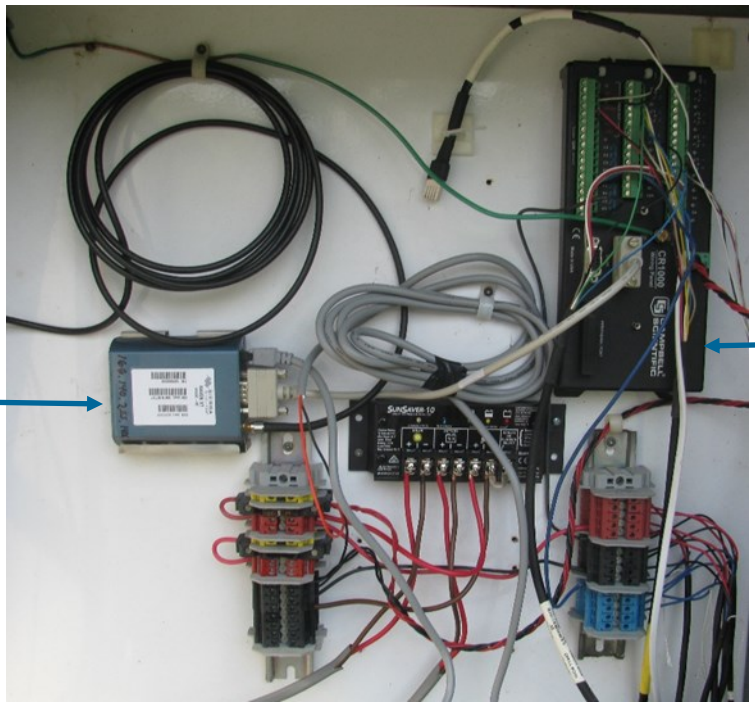
At this time, there are 62 active cellular SCAN sites and 2 SNOTEL test sites (Miller Woods and EMF) on the cellular network.

Over the rest of the summer the remaining eastern SCAN sites in states ranging from Pennsylvania to Vermont and New Hampshire to Texas to Hawaii will be converted to cellular, eliminating the need for the master stations in Mississippi, Missouri and Ohio.

When all the sites are converted to cellular, the eastern master stations will be decommissioned.

Good coverage, much lower cost, and easier to maintain and operate. The future looks bright for this technology within the Snow Survey and Water Supply Forecasting Program.

For more information, contact Tony Tolsdorf, 503-414-3006.



Inside the electronics enclosure at the Suddith Farms SCAN site. The cellular modem and data logger are highlighted.

“Fluidless“ snow scale testing continues

Scott Pattee
Washington Water Supply Specialist

Although the winter of 2014-2015 wasn’t the best year for snow in the West, testing of “fluidless” snow scales continued at several SNOTEL sites in Washington, Idaho and Oregon.

As background, the Snow Survey and Water Supply Forecasting Program has traditionally used polyethylene snow pillows filled with fluid to measure the water equivalent of snowpack based on the weight of the overlying snow.

As snow settles on the surface of the pillow, the weight of the water in the snow displaces the fluid.

A pressure transducer measures the displacement and then converts the data to a signal for transmission.

Snow pillows are functional, however they are difficult to maintain.

Transporting large amounts of fluids into isolated areas is costly and time-consuming.

And, fluid-filled pillows are susceptible to damage and leaks. In many areas, data collection offices have had to construct special ways to barricade the snow pillows from predators.

So, in 2011 members of the Water and Climate Monitoring team installed three fluidless snow scales at the Santiam Junction SNOTEL site in Oregon.

Rather than pressure transducers, the snow scales use load cells, similar to those seen in truck weigh stations, to measure the weight of the snow.

Right off the bat, the snow scales proved to be quicker and easier to install than snow pillows. In fact, it took less than two hours to install each scale, far less time than traditional snow pillows.

The ability to complete the installation without the need for additional fluids was also a big plus.

Since the original snow scale installation, other states have begun their own evaluation of the snow scales.

In Washington, the Stevens Pass SNOTEL site has a snow scale installed next to a traditional snow pillow (see photo).

continued pg. 4

Rather than pressure transducers, the snow scales use load cells, similar to those seen in truck weigh stations, to measure the weight of the snow.

Early season time lapse photo from the Stevens Pass SNOTEL site in Washington. The snow scale is on the far left and the snow pillow is to the right.

“Fluidless“ snow scale testing

continued from page 3

According to Scott Pattee, Washington Water Supply Specialist, “The snow started late at Stevens Pass and left a month early, with many rain on snow events throughout the season. Regardless, the two pillows seemed to mostly work in unison, going back and forth as to which one was over or under reading the other.”

Scott went on to say, “Both units seemed to capture the ups and downs of the season quite well. The snow did seem to linger on the scale longer at melt out which could be attributed to the aluminum compared to the black rubber.”

Scott pointed out that three ground truth measurements were taken throughout the winter, with the snow scale consistently outweighing the pillow by an average of 0.5 inches.

However the manual samples also outweighed both sensors by over an inch at each survey.

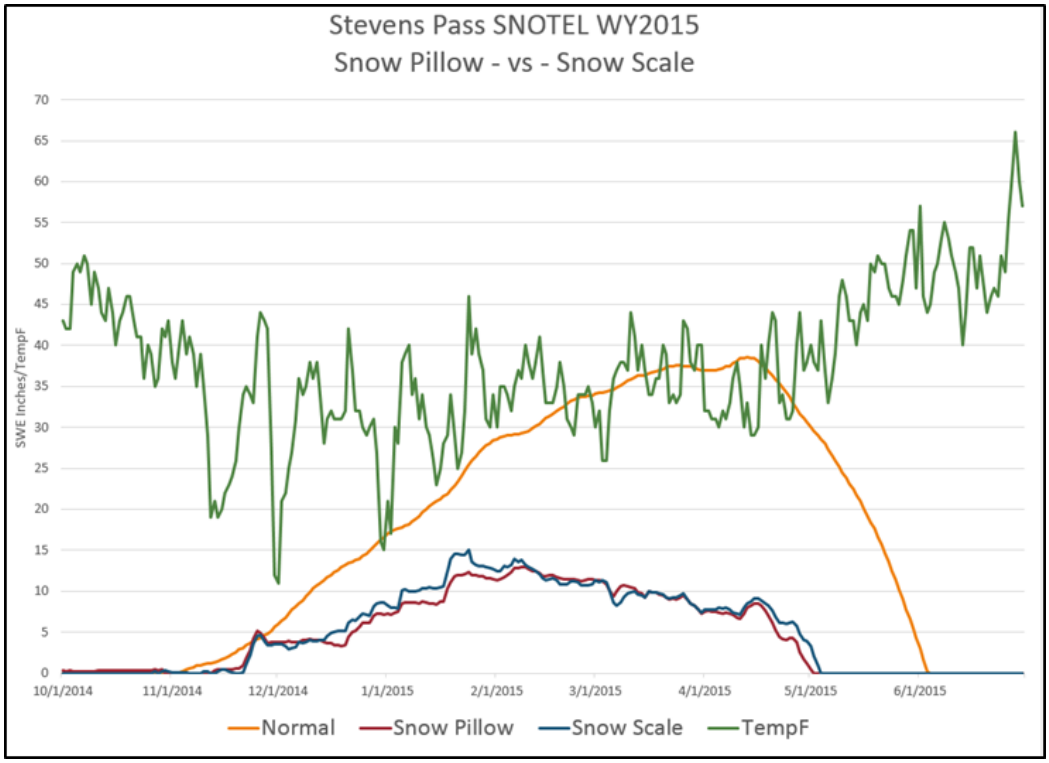
The chart below shows how closely the snow scale and snow pillow tracked at Stevens Pass during Water Year 2015.

Note, too, how well below normal the snowpack was for this year.

In the next issue of ***SnowNews,*** we’ll follow-up on the testing of snow scales at the Idaho Data Collection Office.

All in all, the recent testing at sites across the West shows promise for use of snow scales as a replacements for our current fluid-based systems.

For more information, contact Scott Pattee, 360-428-7684 or Tony Tolsdorf, 503-414-3006.



Snow water equivalent (SWE) data for the snow scale (blue) and the snow pillow (red) at the Stevens Pass SNOTEL site in Washington. Normal SWE is plotted in orange and temperature is shown in green.

Deputy Chief Smith tours EMF and SNOTEL site

Dave Smith, NRCS Deputy Chief for Soil Science and Resource Assessment, visited the Portland area July 8-9, and met with members of the National Water and Climate Center (NWCC) and the Oregon Data Collection Office (DCO).

This was Dave's first visit to the Portland office. He set aside a full day to visit with the staff in a personal and open forum in which he provided background about himself and the agency overall.

He offered personal assistance for some of the more urgent concerns and needs of the Center, including staffing, reorganization and funding.

Dave also met separately with each team at the Center, where he listened to employee concerns and offered insight and advice.

After a classic Oregon lunch at Burgerville for a burger and fresh raspberry milkshake, Dave's visit was highlighted by a tour of the Electronics Maintenance Facility (EMF) followed by a field trip to the Clear Lake SNOTEL site near Mt Hood. While there, the Oregon DCO provided an excellent demonstration of a working SNOTEL station.

The next day, Dave visited the West National Technical Center and the Remote Sensing Laboratory, also located in the Portland NRCS office.

For the staff at the NWCC, Dave's visit was constructive toward building a great relationship with our leadership at National Headquarters.

For Dave, we hope the visit was informative and valuable to him in understanding the function and needs of the Snow Survey and Water Supply Forecasting Program.

We appreciated Dave taking time to visit the Center, enjoyed working with him, and look forward to having him return to the Center soon.

NWCC Director Mike Strobel, Hydrologist Deb Harms, Oregon DCO Supervisor Scott Oviatt, Assistant DCO Supervisor Melissa Webb, and NRCS Deputy Chief Dave Smith at the Clear Lake SNOTEL site in Oregon. *Photo by Tony Tolsdorf*

BlueSky predicts wildfire smoke concentration

The U.S. Forest Service AirFire Research Team recently introduced an experimental tool which models the concentration and movement of wildfire smoke.

Known as **BlueSky**, the tool can let people know what their exposure to smoke might be. It can also help firefighters time their back-burn and airlift operations.

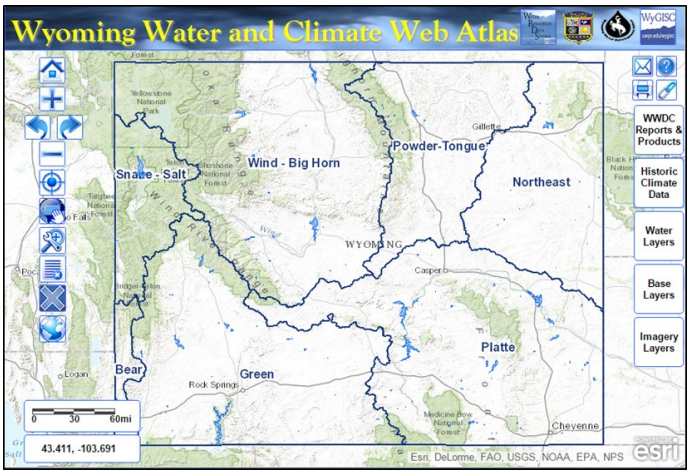
The tool shows the location of active wildfires and how the smoke from each fire will travel in the atmosphere. Users can choose from several predefined regions and time sequences.

Click here to open the BlueSky tool with a view to fire and smoke conditions in the Pacific Northwest.

BlueSky experimental tool showing fire and smoke conditions in the Pacific Northwest.

Wyoming Water and Climate Atlas

The Water Resources Data System (WRDS) at the University of Wyoming recently introduced the Wyoming Water and Climate Web Atlas.



The tool delivers climate, weather, snowpack, streamflow and Wyoming state water development information. Using customized ArcGIS Server maps, the atlas allows users to visualize different water and climate data resources in specific geographic regions, and then retrieve information related to that area.

For example, if a water user is interested in applying for funding for a water development project from the Wyoming Water Development Commission, they can zoom-in to their area of interest, click on the map and find out what reports, studies, or construction projects have been done in the vicinity. They can also find information related to area water rates, well depths and yields, stream gages, and where the nearest National Weather Service stations are located to get information about the region's precipitation.

The goal of the mapping portal is to allow Wyoming's water users and managers to find as much information they can, in one spot, on one of the state's most precious resources.

WRDS welcomes your comments on this application. Send email to: wrds@uwyo.edu.

Spotlight on ... Deb Harms

Never one to shy away from a story, Deb told a group of us recently, “I was born in a car wreck.” When I asked for details, she explained that, while in labor and on the way to the hospital, her parents were involved in an accident and Deb arrived on the floorboard of the family pickup.

After that abrupt introduction to the world, Deb grew up with her brother and sister on the family farm in central Nebraska.

While in school, she earned spending money raising and showing cattle. And, like all good farm youngsters during that era, she was a member of the local 4H Club. Deb even won a blue ribbon at the Nebraska State Fair for her meat loaf. (She still can’t stand the sight of the stuff.)

After high school, Deb moved to Montana to work with her grandfather in his cabinetry shop. After a few years of woodworking, Deb decided to further her education. She attended Montana State University in Bozeman, graduating with a degree in Soil Science.

Deb’s first job after college was as a soil scientist with the Bureau of Reclamation (BOR), working throughout the upper Missouri states.

A reduction in force at the BOR allowed Deb to move to the Bureau of Land Management (BLM) in Salem, Oregon. In this role as a forest soils scientist, she performed timber site selection throughout the state.

After about a year with the BLM, Deb accepted a position with the Soil Conservation Service (now the NRCS). She worked at the National Cooperative Soil Survey Center in Lincoln, Nebraska, serving in many capacities.

In 1991, in her role as soil scientist with the Soil Survey Center, Deb participated in the development and installation of the first soil moisture/soil temperature monitoring sites within the agency. That effort resulted in the creation of the Soil Climate Analysis Network (SCAN) pilot project, a collaborative project between the Soil Survey Center and the National Water and Climate Center which remains intact today.

In 1999, Deb participated in a climate change initiative with the University of Waikato in New Zealand. In this project nine long-term soil-climate stations were installed in the Ross Island Region of Antarctica to study the effects of latitude, elevation, and soil age.

For the first six years of the project, Deb travelled to Antarctica each January to perform maintenance and download data from the study. Sixteen years later, the project is ongoing, with data being processed and made available to the public and researchers all over the world.

continued pg. 8

Deb constructing a snow cave during Snow School. Beginning next year, Deb will be the coordinator and instructor for the annual training exercise.

Spotlight on... Deb Harms

continued from pg. 7

After 25 years at the Soil Survey Center, Deb joined the National Water and Climate Center Water and Climate Monitoring (WCM) team a little over a year ago. In her role as hydrologist, she supports both the Snow Telemetry (SNOTEL) and SCAN programs.

She is often in the field installing new sites or performing maintenance at existing sites throughout the U.S.

In addition, in 2016 Deb will be assuming responsibility for coordinating and instructing at the annual Snow Survey Training School.

In her spare time, Deb enjoys music and plays several instruments. In her own words, "I play bad guitar, mediocre ukulele, and classical trumpet."

Participating in this year's tower climbing and safety training. Left to right: Lucas Zukiewicz, Deb Harms, Dan Tappa.

She is also an avid outdoors person, including fly fishing and tournament Walleye fishing. (She's no slouch, having won a boat in one tournament.)

In addition to fishing, Deb also likes to hike, bicycle, and kayak local waterways.

Custom bike construction is another pastime. Deb estimates there are about 32 custom-made bicycles in her home right now.

So, there you have it. She's an accomplished soil scientist/ hydrologist, makes blue-ribbon meat loaf, plays classical trumpet, wins fishing tournaments, and builds custom bikes.

*Check out the next issue of **SnowNews** where we'll put another employee "In the Spotlight."*

Sometimes field work can be frustrating. Here Deb installs equipment at a SCAN site.

Tower Climbing Training welcomes new instructors

Tower Climbing and Rescue Training is an annual event for the Snow Survey and Water Supply Forecasting Program.

This training is required for personnel who must work on SNOTEL tower installations. It emphasizes techniques for properly working on and around towers, including ascending, descending and rescue procedures.

For the last decade, **Tony Tolsdorf** and **Rashawn Tama** from the National Water and Climate Center have served as able instructors for the training.

However, beginning this year, Tony and Rashawn have passed the responsibility for this important training to **Lucas Zukiewicz**, Water Supply Specialist, and **Eric Larson**, Hydrologist, from the Montana Data Collection Office.

Lucas is OSHA-certified to conduct the training, which consists of lectures, demonstrations and field exercises.

After passing a written exam, participants use field exercises to practice their skills.

This year's training was conducted from the 40-foot receive tower at the Boise Master Station.

As part of the training, a simulated rescue was performed at a height of about 20 feet — the same height as most SNOTEL towers.

For more information on the next Tower Climbing and Rescue Training, contact Lucas Zukiewicz, 406-587-6843

Dan Tappa, Tony DeMarco and Lucas Zukiewicz practice a tower rescue from the Boise Master Station receive tower.

Lucas Zukiewicz (left) and Eric Larson (right) are the new instructors for the Tower Climbing and Rescue Training. Lucas is an OSHA-certified safety instructor.

Snow Survey and Water Supply Forecasting Program

Resource Locator

Here's a handy reference for finding resources in the Snow Survey and Water Supply Forecasting Program.

Where	What	Who How
Alaska	Forecast Hydrologist	Jolyne Lea 503-414-3040 jolyne.lea@por.usda.gov
	Data Collection Office Supervisor	Daniel Fisher 907-671-7746 daniel.fisher@ak.usda.gov
Arizona	Forecast Hydrologist	Gus Goodbody 503-414-3033 angus.goodbody@por.usda.gov
	Water Supply Specialist	Dino De Simone 602-280-8786 dino.desimone@az.usda.gov
California	Forecast Hydrologist	Jolyne Lea 503-414-3040 jolyne.lea@por.usda.gov
	Water Supply Specialist	Greg Norris 530-792-5609 greg.norris@ca.usda.gov
Colorado	Forecast Hydrologist	Cara McCarthy 503-414-3088 cara.s.mccarthy@por.usda.gov
	Hydrologist	Vacant
	Data Collection Office Supervisor	Brian Domonkos 720-544-2852 brian.domonkos@co.usda.gov
Idaho	Data Collection Officer	Phil Morrisey 208-685-6983 phil.morrisey@id.usda.gov
	Forecast Hydrologist	Rashawn Tama 503-414-3010 rashawn.tama@por.usda.gov
	Water Supply Specialist	Ron Abramovich 208-378-5741 ron.abramovich@id.usda.gov
Montana	Data Collection Office Supervisor	Mage Hultstrand 406-587-6844 mage.hultstrand@mt.usda.gov
	Forecast Hydrologist	Cara McCarthy 503-414-3088 cara.s.mccarthy@por.usda.gov
	Water Supply Specialist	Lucas Zukiewicz 406-587-6843 lucas.zukiewicz@mt.usda.gov
Nevada	Forecast Hydrologist	Jolyne Lea 503-414-3040 jolyne.lea@por.usda.gov
	Water Supply Specialist	Jeff Anderson 775-857-8500 x152 jeff.anderson@nv.usda.gov
New Mexico	Forecast Hydrologist	Gus Goodbody 503-414-3033 angus.goodbody@por.usda.gov
	Water Supply Specialist	Chris Romero 520-292-2999 x107 chris.romero@nm.usda.gov
Oregon	Forecast Hydrologist	Rashawn Tama 503-414-3010 rashawn.tama@por.usda.gov
	Hydrologist	Melissa Webb 503-414-3270 melissa.webb@or.usda.gov
	Data Collection Officer Supervisor	Scott Oviatt 503-414-3271 scott.oviatt@or.usda.gov
Utah	Forecast Hydrologist	Gus Goodbody 503-414-3033 angus.goodbody@por.usda.gov
	Snow Survey Supervisor	Randy Julander 801-524-5213 randy.julander@ut.usda.gov
Washington	Forecast Hydrologist	Rashawn Tama 503-414-3010 rashawn.tama@por.usda.gov
	Water Supply Specialist	Scott Pattee 360-428-7684 scott.pattee@wa.usda.gov
Wyoming	Forecast Hydrologist	Cara McCarthy 503-414-3088 cara.s.mccarthy@por.usda.gov
	Water Supply Specialist	Lee Hackleman 307-233-6744 lee.hackleman@wy.usda.gov
All States	Center Director/Program Manager	Mike Strobel 503-414-3055 michael.strobel@por.usda.gov
	Information Systems Team Lead	Laurel Grimsted 503-414-3053 l aurel.grimsted@por.usda.gov
	Water & Climate Monitoring Team Lead	Tony Tolsdorf 503-414-3006 tony.tolsdorf@por.usda.gov
	Water & Climate Services Team Lead	Cara McCarthy 503-414-3088 cara.s.mccarthy@por.usda.gov
	Database Manager	Maggie Dunklee 503-414-3049 maggie.dunklee@por.usda.gov
	Database Manager	Del Gist 503-414-3007 del.gist@por.usda.gov
	Hydrologist (Water & Climate Monitoring)	Deb Harms 503-414-3050 deb.harms@por.usda.gov
	Modeling Hydrologist	David Garen 503-414-3021 david.garen@por.usda.gov
	Operations Specialist (SNOTEL/SCAN)	Vacant
	Resource Conservationist	Vacant
	Statistical Assistant/SCAN QC	Denice Schilling 406-727-7580 denice.schilling@mt.usda.gov

New! Contact Help Center

There's a new online tool to help locate resources within the Snow Survey and Water Supply Forecasting Program.

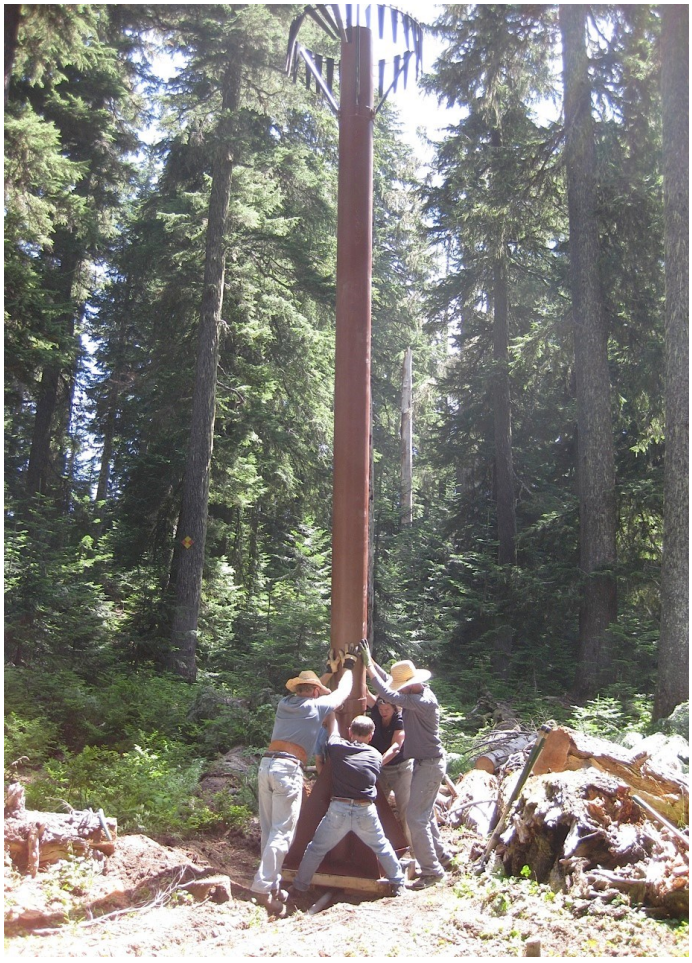
Click here to open the **Contact Help Center**. Don't forget to bookmark the url.

GeoMAC Wildland Fire Support mapping application

The U.S. Geological Survey has a new web application, called GeoMAC, which gives fire managers near real-time fire data based on input from incident intelligence sources, GPS data, and infrared imagery.

The GeoMAC web site lets users change map displays, zoom to various scales and create hard copy images. The fire maps are supported by a relational database, allowing display of information on individual fires such as name, acreage affected and current status. Launch the GeoMAC Viewer.

Photos of the month: “Raising the can“ at Lone Pine SNOTEL



Summer maintenance sometimes requires replacing aging precipitation gauges. In July, several members of the NWCC Water and Climate Services team assisted the Oregon Data Collection Office (DCO) as they installed a new 24-foot gauge at the Lone Pine SNOTEL site in central Oregon.

In the top left photo, Melissa Webb, Gus Goodbody, Dan Fries, and Rashawn Tama hoist the gauge out of the truck. In the next photo, Dave Garen joins the team as they begin to raise the gauge into position on a concrete slab. The bottom two photos show the group getting the gauge into its final position.

Photos by Cara McCarthy

NRCS *Helping People Help the Land.*

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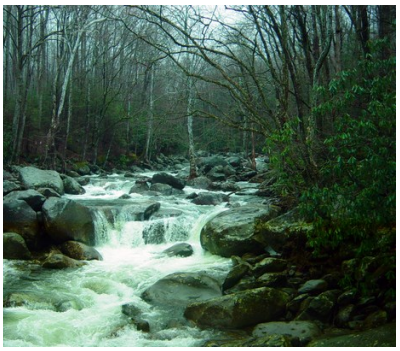
For issues of ***SnowNews*** go to:
www.wcc.nrcs.usda.gov/SnowNews/SnowNews_landing.htm

Our mission is: *"To lead the development and transfer of water and climate information and technology which support natural resource conservation."*

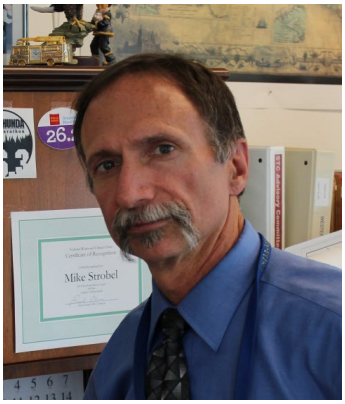


With a vision of the future as:

"A globally-recognized source for a top quality spatial snow, water, climate, and hydrologic network of information and technology."

From the Director's desk

New technology to better serve the public



In this issue of ***SnowNews***, there are articles about new technology being used by the Snow Survey and Water Supply Forecasting Program and the Soil Climate Analysis Network, including conversion of stations to cellular telemetry and fluidless snow pillows. These types of new technology can save time and money, and therefore represent positive changes to our programs.

We continue to look for ways to improve data collection and water supply forecasting while reducing costs and increasing efficiencies. One aspect of data collection at SNOTEL sites that we would like to change is the large precipitation gages used at each site (see the story in this issue on installing a precipitation gage).

These gages are difficult to transport, contain fluids that need maintenance each year (which often involves the removal and deposition of the fluids), and increase the cost of installing and maintaining SNOTEL stations. We hope new technology can offer other solutions to making precipitation measurements in these remote, high-altitude and cold conditions.

And not all changes are welcomed with open arms. For example, the conversion of manual snow courses to SNOTEL sites, which we have been doing since the late 1970s, has been a major improvement in the frequency of measurements at a site, the number of additional climatic parameters measured, and the reduction of safety concerns with sending teams out during winter months to make snow course measurements.

However, many people oppose the discontinuation of manual snow courses due to concerns of losing the continuous climate record from long-term snow course measurements.

Likewise, changing sensor types at stations or altering sensor locations to improve data accuracy, such as moving temperature sensors from the sides of shelters to the instrument towers, can result in a change in the data record. This is why it is so critical to maintain and utilize metadata at each site so that any shift or change in data trends related to technology is identified and documented.

With these concerns in mind, we will continue to bring in new technology to our programs and improve how we collect and analyze data.

The benefits of reducing costs, maximizing efficiency, increasing safety, and improving data are huge and help us serve the public better.

Our programs will continue to evolve with the application of new and better technology, while striving to maintain the long-term records that are critical for assessing climate trends.

Mike

USDA