



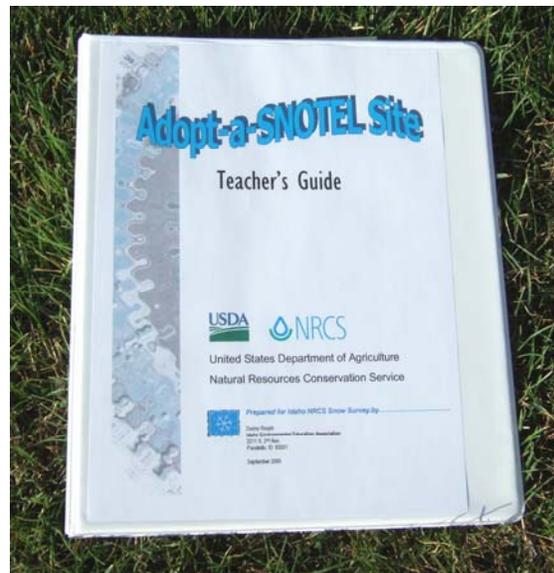
"Adopt-a-SNOTEL Site" Program Teaches the Next Generation of Snow Surveyors

Students across the nation rise early when the snow is blowing to tune their radio or TV to the school closure information in hopes of a "snow day". Since 1989 the NRCS has been offering students and teachers another type of snow day through "Adopt-a-SNOTEL Site". The program was developed after teachers at three National Science Teachers Association conventions enthusiastically responded to a proposal. The goals of the program are to:

- Improve awareness, among teachers and students, of SNOTEL data collection and analysis by the NRCS.
- Encourage a strong conservation ethic with respect to soil, water, and other environmental resources.
- Inspire students to explore careers in natural resources conservation.
- Promote expanded use of data and information collected by NRCS.

The program offers students in the western states the opportunity of monitoring conditions at a remote SNOTEL site. Real-time data is available on the internet and can be used by students as they learn math, hydrology, water quality, environmental science, and conservation. When proper access is available NRCS staff can join the class for a site visit and help students make their own snow measurements.

In 2005 the Adopt-a-SNOTEL Site Teacher's Guide was revised by Donny Roush, of the Idaho Environmental Education Association. The teacher's guide contains background information and lessons that can be adapted to various grades from elementary through high school. Donny also correlated each lesson to Idaho State Educational Standards and in the future hopes to tie the lessons to National Guidelines for Excellence in Environmental Education. This is an important step because more and more, teachers need such documentation to show administrators that their lessons are standards-based. Donny is hopeful that funds will become available to do teacher workshops to better spread the curriculum



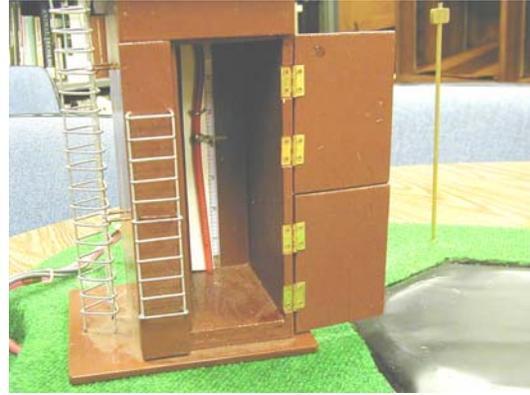
Adopt-a-SNOTEL Teachers Manual

throughout Idaho and the rest of the western US.

Adopt-A-SNOTEL Site is open to any class or school in the 12 western states where NRCS has a water supply forecasting program: Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming. The request to adopt a site is sent to the NRCS State Conservationist in your state. A brief "adoption request" form is sent to the school for completion. When the form is returned to the State Conservationist, an appropriate site is selected by the state, and an adoption certificate and a Teacher's Guide are issued. Several teachers outside this area including ones in Canada and other parts of the U.S. are using and reviewing the revised manual.



SNOTEL model complete with tower, shelter, snow pillow, ground truth poles and precipitation gage



Close-up of shelter interior showing manometer tube mounted on back wall

Good examples of Adopt-a-SNOTEL Site exist in Idaho. In addition to the revised Teacher's Guide, teachers can borrow a SNOTEL model, complete with a functioning mini-snow pillow and manometer. This helps students visualize the basic components of a SNOTEL site and how it measure snow water.

A number of schools are actively participating in the program across the state. Third through fifth graders at Teton Valley Community School in Driggs join Friends of the Teton River's Education Director Anna Lindstedt in the field to measure water quality and quantity on a monthly basis throughout the school year. The school's theme for 2006 is "Healthy Systems Thrive" and many connections to water quality education have been made. During the winter months, the class joins NRCS surveyor Katie Oliphant to snowshoe into Pine Creek Pass SNOTEL site. Using snow tubes, students take the depth and weight of the snow and calculate the water content. Once back in the classroom students use the internet to determine that their measurements match the current values being reported at the SNOTEL site. The same procedure was used by data collection offices in earlier days to verify SNOTEL values. Students were then able to calculate how much snow was



3rd-5th graders from Driggs, ID measure snow at Pine Creek Pass SNOTEL

needed over the winter season to sustain Teton River flows and irrigation demands. On another day Anna led the students in digging snow pits and describing the snow profile layer by layer. Students investigated the hardness, temperature, crystalline structure and density of each layer, as well as the pH of snow that falls. Below there are pictures from Pine Creek Pass SNOTEL, as well as, student data sheets and essays that summarize the experience.

3rd-5th graders from Teton Valley Community School in Driggs, ID measure snow with NRCS snow surveyor Katie Oliphant at Pine Creek Pass SNOTEL.



Examples of 3rd-5th grade student work from Teton Community School in Driggs, ID.

SNOTEL data for Pine Creek Pass as measured by Teton Valley Community School Students

Date of Visit: Jan/23/06

Depth of Snow:

Sample #	Depth
<u>1</u>	<u>58</u>
<u>2</u>	<u>57</u>
<u>3</u>	<u>59</u>
<u>4</u>	<u>58</u>
—	—
—	+ —
—	—

(with a calculator, add all depths then divide by the # of depths)

$$\begin{array}{r}
 3 \\
 58 \\
 58 \\
 59 \\
 58 \\
 +57 \\
 \hline
 232
 \end{array}$$

Average Depth: 58

Snow – Water Density Percent:

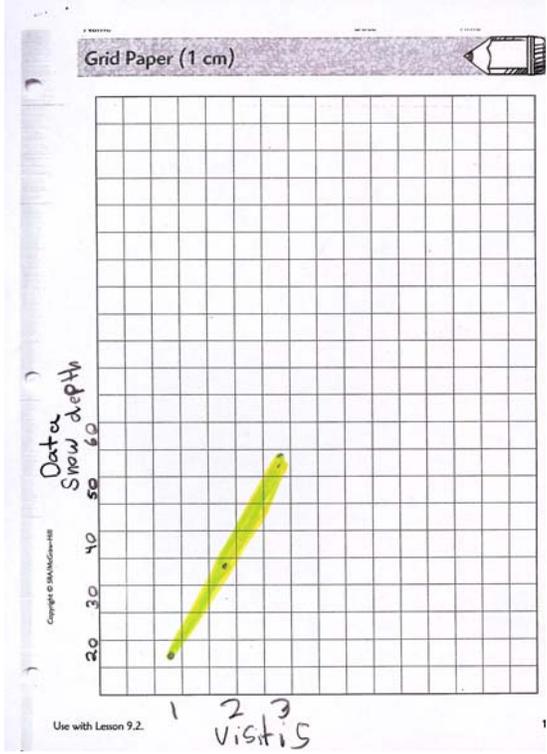
Sample #	Length of Core Inches(L)	Water Content Inches (W)	Density % W/L
<u>1</u>	<u>52</u>	—	—
<u>2</u>	<u>50</u>	<u>24</u>	<u>48</u>
<u>3</u>	<u>53</u>	<u>23</u>	<u>43</u>
<u>4</u>	<u>55</u>	<u>22</u>	<u>40</u>
—	—	—	—
—	—	—	+ —
—	—	—	<u>1.31</u>

Find the average density percent per visit. 43.66

Record the averages for each visit:

	12/15/05	1/19/06	2/23/06
Snow Depth	<u>20</u>	<u>38</u>	<u>58</u>
Water Density	<u>45.5</u>	<u>24</u>	<u>43.66</u>

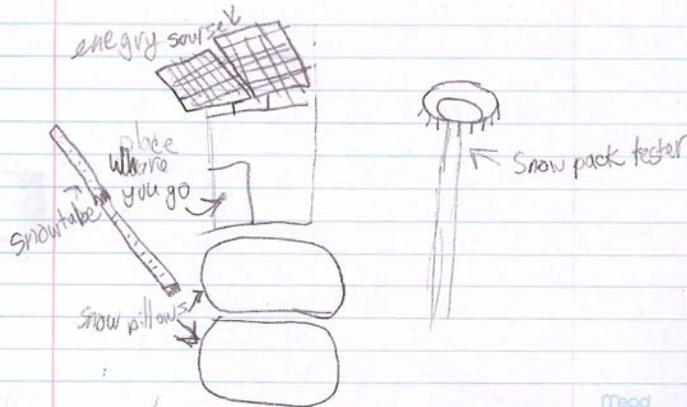
Make one line graph for either the average snow depth or water density % per visit.



Sno-tel

Sam
2/27/06

What I learned was that there are over 500 sites in the west part of North America! My favorite part of snotel was trying to get the snow out of the tube. The small sites look like this



Snotel

2/27/06

Sara

I learned a lot at snotel! I learned about the snow pillows, the density, and the depth. The increase in the depth and all the main snowfakes! Talking with Ron and Katie! I really learned a lot! I think my favorite part was going to the snotel site! This is a lot of fun!

Sara Dery ☺

Sally 2/27/06

I learned a lot about snotel. One thing was the different snowflake types. There is stellar, needle, columns, plates, capped columns, groppel, irregulars, and many more.

I thought it was really cool that we got to visit a snotel sight.

Also I ~~really~~ thought we were really lucky to be able to use all of the special tools.

Through their lessons the students became aware that Friends of the Teton River and the NRCS are partnering with Grand Targhee Resort in an effort to raise funds for a new SNOTEL site located at the ski area. Currently there is no site on the western slope of the Tetons, and a new station at Grand Targhee would provide more accurate flow predictions for the upper Teton Basin. Applying their knowledge students worked together to write this letter to the editor of the Teton Valley News explaining the reasons for a SNOTEL site at Grand Targhee Resort and asking for funds for the site's installation.

Right: April 20, 2006 letter to the Editor of the Teton Valley News from 3rd-5th graders at Teton Valley Community School in Driggs, Idaho.

How you can help...
 4-28
 Did you know that Friends of the Teton River and the Natural Resources Conservation Service is proposing to build a Sno-tel site at Grand Targhee? The reasons for Sno-tel sites are: If you want to go skiing you would know the conditions of the snow; the water content, snow depth and risks of avalanche; it's important to students to be able to learn how to use the equipment and how the Sno-tel site works; for water prediction in the spring.

If we want to have this site, we must help the NRCS and FTR to raise money to build a site at Grand Targhee.

**Teton Valley
 Community School
 Third through fifth graders**

On the other side of the Tetons in Wyoming several school districts have been using the Adopt program for years. One high school was even trying to forecast the streamflow for their river, similar to how the NRCS does. Another success story in Idaho comes from Pocatello Community Charter School. Amy Pike's students measured snow and discussed water supply, but the light really came on afterwards when the students visited a local wildlife refuge and connected how the Sandhill Crane population is dependent on snow water recharging the marsh.

In Boise, Capital High School Teacher Sheryl Howe incorporated the Adopt program in her Advanced Placement Environmental Science lessons. On a snowy morning in March the class joined NRCS Hydrologist Jeff Anderson at Mores Creek Summit SNOTEL. Students enjoyed snowshoeing to the site through 2 feet of powder and learning how the site works and how the data is used. Students worked hard in teams of two using snow tubes to measure the 115 inch snowpack. After much grunting and multiple attempts results showed 40 inches of water content existed in the deep snowpack. All the students seemed to have a good time and some commented it was their "best field trip ever". Other students were interested in summer hire employment while in college snow tubes to measure the 115 inch snowpack. After much grunting and multiple attempts results showed 40 inches of water content existed in the deep snowpack. All the students seemed to have a good time and some commented it was their "best field trip ever". Other students were interested in summer hire employment while in college.

For more information about Adopt-a-SNOTEL Site please contact: Ron Abramovich at 208-378-5741 or ron.abramovich@id.usda.gov or Jeff Anderson at 208-378-5740 or jeff.anderson@id.usda.gov.



Capital High School's Advanced Placement Environmental Science class at Mores Creek Summit SNOTEL.



Article submitted by Jeff Anderson, Hydrologist, in Boise, Idaho.