

**WEATHER STATION DATA**

# NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION: A HISTORY



- NOAA was originally formed in 1970 alongside the creation of the Environmental Protection Agency, as part of the U.S. Department of Commerce.
- These agencies making up NOAA include: the U.S. Coast and Geodetic Survey formed in 1807, The Weather Bureau 1870, and the Bureau of Commercial Fisheries 1871.

“Specifically, NOAA is a science-based agency which has the responsibility to predict changes in the oceanic and atmospheric environments and living marine resources, and to provide related data, information, and services to the public, industry, the research community, and other government agencies.”

# NOAA'S WEATHER SERVICES: THE NATIONAL WEATHER SERVICE

- The first weather radars systems are a byproduct of radar technology developed for WWII. Now,
- NWS uses radar, satellite, snow cover, marine and buoy reports and more as tools for

Website to see all weather forecasts in the United States: <http://www.weather.gov/>

The screenshot shows the National Weather Service website interface. At the top, there are logos for NOAA and the National Weather Service, along with the text "NATIONAL WEATHER SERVICE" and "NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION". Below this is a navigation menu with links for HOME, FORECAST, PAST WEATHER, WEATHER SAFETY, INFORMATION CENTER, NEWS, SEARCH, and ABOUT.

The main content area features a "Local forecast by 'City, ST' or ZIP code" section with an input field for "Enter location ..." and a "Go" button. Below this is a "Location Help" link. To the right, there is a headline "Major Winter Storm Continues Across Central U.S." followed by a paragraph: "A major winter storm will continue across much of the central U.S. on Thursday. Snow, heavy at times, will fall over much of the central Plains, with accumulations of more than a foot expected in some locations. Meanwhile, sleet and freezing rain are likely across parts of the Mississippi and Ohio Valleys. Farther to the south, the system will bring the threat of severe weather to the Gulf Coast." Below the paragraph is a "Read More..." link.

Below the main content area is a secondary navigation menu with links for ACTIVE ALERTS, FORECAST MAPS, RADAR, RIVERS, LAKES, RAINFALL, AIR QUALITY, SATELLITE, and PAST WEATHER. Below this is a large map of the United States titled "Created: 02/21/13 at 18:38 UTC". The map shows various weather hazards across the country, with colors indicating different types of hazards. A sidebar on the left of the map area contains a "Customize Your Weather.gov" section with a "City, ST" input field, a "Get Weather" button, and a "Privacy Policy" link. Below this is a "Winter Hazards Simplification" section with a small image of a car in the snow and the text "Confused by winter".

# WHEN DID WEATHER OBSERVATIONS START?

- The Weather Bureau started taking weather observations in 1870.
- Some historical records existed from early settlers for example, Thomas Jefferson participated in taking the first known regular weather observations from 1772-78.
- In 1849 150 volunteers throughout the U.S. reported weather observations regularly, and ten years later weather reports via telegraphs were being published in the Washington Evening Star newspaper.
- In 1870 a resolution was passed requiring the Secretary of War to take meteorological observations at various military stations.

National Oceanic & Atmospheric Administration Central Library. *Evolution to the Signal Service Years (1600-1891)*. 2006.

# SNOTEL SITE HISTORY

- SNOTEL (SNOWpack TELEmetry) sites were originally developed with the intention of measuring snow-water equivalent in mountainous regions.
- This technology was developed by Dr. James Church in 1906.
- In 1980 the U.S. Department of Agriculture (USDA) added an array of weather sensors, data loggers, and telemetry systems which they called SNOTEL.
- The USDA manages over 730 SNOTEL stations at high-elevation sites in the western United States and Alaska and the hourly data is displayed in the internet for every station.
- The importance of snow-water equivalent is the “amount of water contained within a core of snowpack” in which the same amounts of snow can yield different water amounts based on temperature and precipitation amounts.

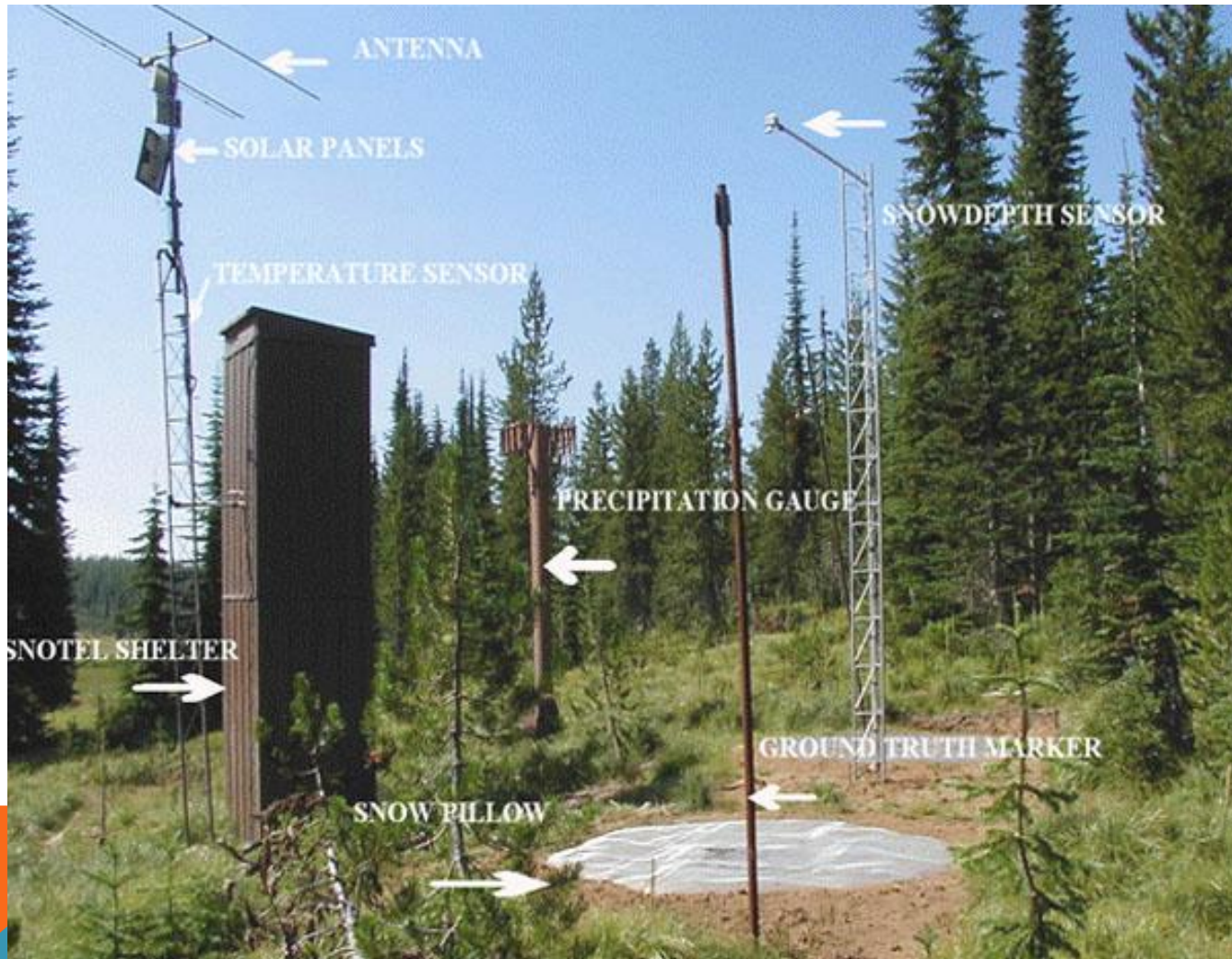
Bellingham, Keith. Stevens Water Monitoring Systems, Inc. *What You Don't Know About Snow: The USDA's SNOTEL Network is Playing a Critical Role in Protecting Water Resources in the Western United States.*

Natural Resource Conservation Service. *SNOTEL Data Collection Factsheet.* 2013.

# WHO USES SNOTEL DATA?

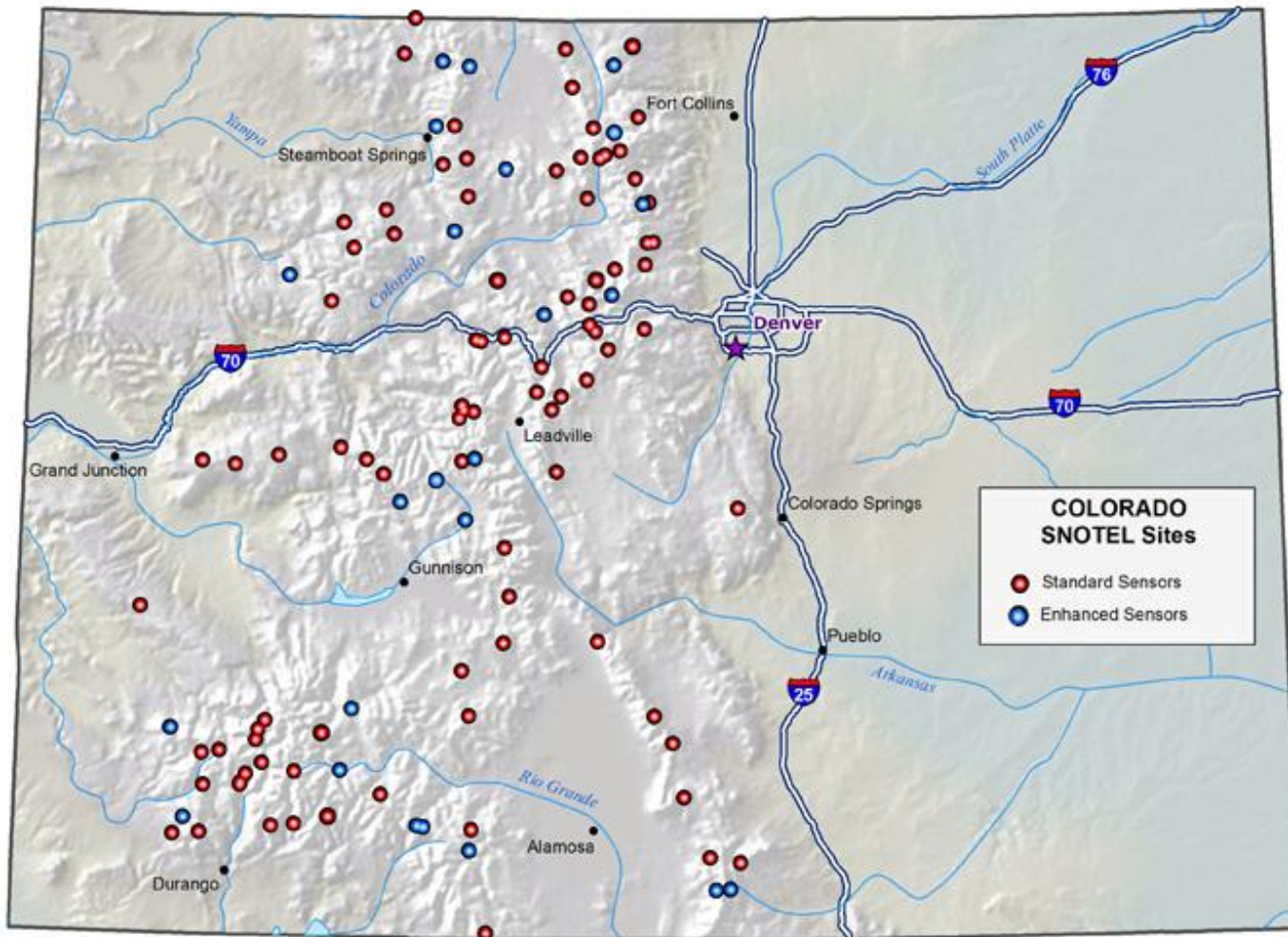
- SNOTEL data is useful to
  - Researchers
  - Water Managers
  - Emergency Managers
  - Recreationalists

## SNOTEL Site Components



<http://www.stevenswater.com/articles/snotel.aspx>





Predict which stations could be useful in in making stream flow predictions. For the Animas River in Durango.

<http://www.wcc.nrcs.usda.gov/snotel/Colorado/colorado.html>





**Search**  
 NWCC  
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**Climate Monitoring**

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**SNOTEL Site:** Molas Lake  
**State:** Colorado  
**Site Number:** 632  
**County:** San Juan  
**Latitude:** 37 deg; 45 min N  
**Longitude:** 107 deg; 41 min W  
**Elevation:** 10500 feet  
**Reporting since:** 1985-10-01



[Questions about this site.](#)

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**Site notes:**

- **Data is provisional and subject to revision.**
- [More site notes.](#)
- Site photo not available - typical SNOTEL site is shown.
- *2013-February-21 National Water and Climate Center*
- **To Obtain the Daily Normals for the Period 1981-2010:**
- [Daily Snow Water Equivalent Medians](#)
- [Daily Accumulated Precipitation Averages](#)

**Site Reports:**

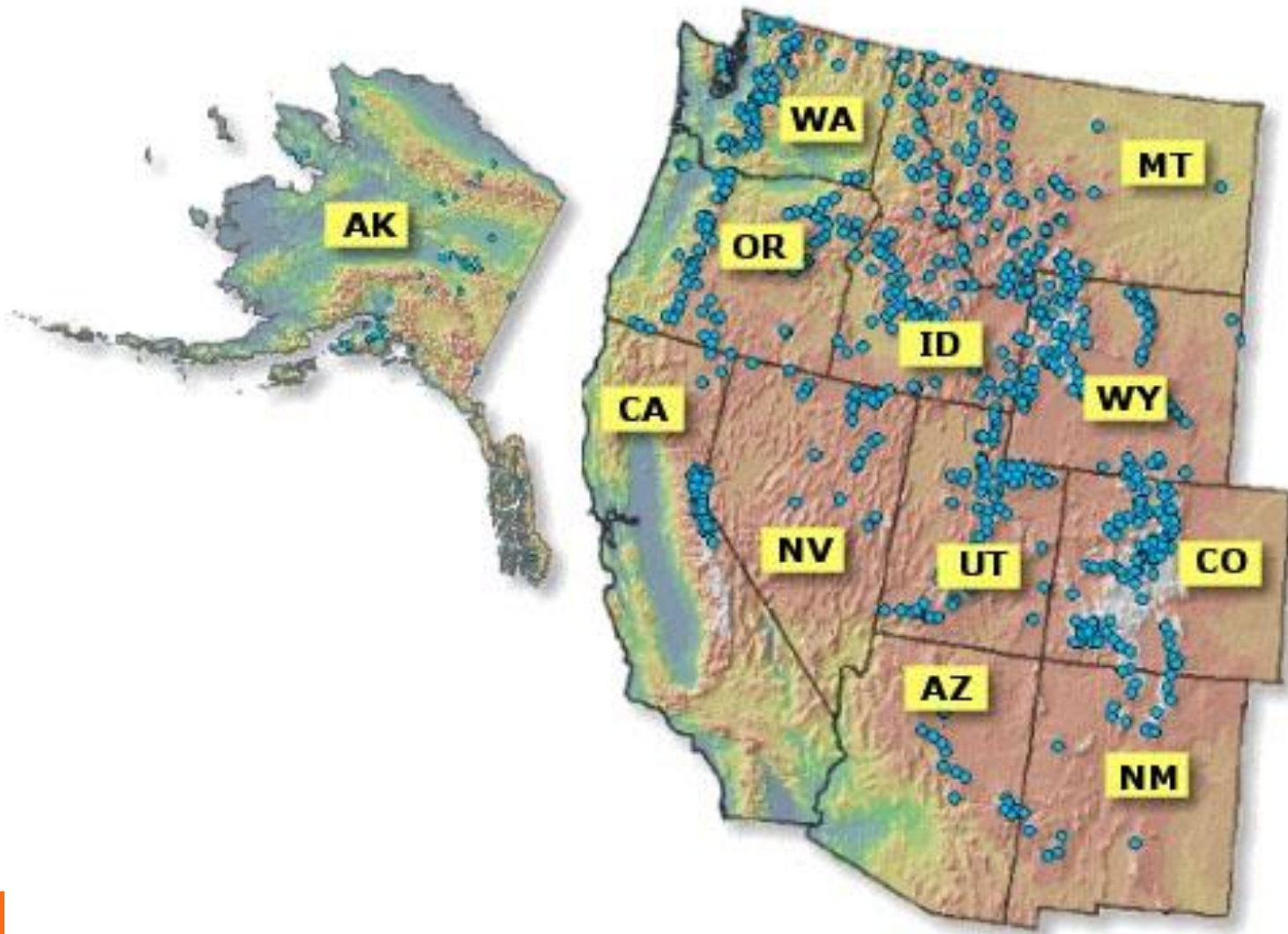
Report Type	Daily	Current Water Year*	Historical	Hourly
<b>Standard Sensors<sup>†</sup></b> ( <i>Most Current Data</i> )	<a href="#">Last 7 Days</a>	<a href="#">Daily Readings</a>	<a href="#">Daily (Tab Formatted)</a>	<a href="#">Last 7 Days</a>
<b>Precipitation, Accumulated</b>	<a href="#">Last 7 Days</a>	<a href="#">Daily Table</a>	<a href="#">Daily Table</a>	<a href="#">Last 7 Days</a>
<b>Snow Depth</b>	<a href="#">Last 7 Days</a>	<a href="#">Daily Readings</a>		<a href="#">Last 7 Days</a>
<b>Snow Water Equivalent</b>	<a href="#">Last 7 Days</a>	<a href="#">Daily Table</a> • <a href="#">Daily Graph</a>	<a href="#">Daily</a> • <a href="#">Monthly</a>	<a href="#">Last 7 Days</a>
<b>Temperature</b>	<a href="#">Last 7 Days</a>	<a href="#">Max</a> • <a href="#">Min</a> • <a href="#">Avg</a>	<a href="#">Max</a> • <a href="#">Min</a> • <a href="#">Avg</a>	<a href="#">Last 7 Days</a>

**Element Reports:**

Check to view temperatures in degrees Fahrenheit. Default is degrees Celcius.

Select Report Content	Select Time Series	Select Format	<input type="button" value="View Current"/>	<input type="button" value="View Historic"/>
<b>Standard SNOTEL (1985-10-01)</b>	<b>Daily</b>	<b>table</b>	<b>Last 30 days</b>	<b>1986</b> ▲ <b>January</b> ▲ <b>All days</b> ▲
All Sensors (no chart)	Hourly	csv	Last 7 days	1987 February 01
Accumulated Precipitation (1985-10-01)	12 AM	chart	Last 24 hours	1988 March 02
Accumulated Precipitation & Snow (1985-10-01)	3 AM		Water Year	1989 April 03
===Individual elements===	6 AM		Calendar Year	1990 May 04
Air Temperature (1985-10-01)	9 AM			1991 June 05
Precipitation Accumulation (1985-10-01)	12 PM			1992 July 06
Snow Depth (2005-08-12)	3 PM			1993 August 07
Snow Water Equivalent (1985-10-01)	6 PM			1994 September 08

SNOTEL site at Molas Lake, San Juan County, CO. information



SNOTEL site Network across the western U.S. and Alaska  
<http://www.stevenswater.com/articles/snotel.aspx>

# HOW IS HISTORICAL WEATHER DATA FOUND?

Proxy data: Data that is gathered from natural recorders of climate variability through tree rings, ice cores, fossil pollen, ocean sediments, coral and historical data.

Paleoclimatology: The study of past climates in times prior to weather instruments.

Historical data: Historical documents, and observations can be found in farmers logs, diaries, old newspapers, and other written records. These sources can be compared and analyzed to provide a good resource for historical data.

Fossil Pollen: Each species of plant has pollen grains with distinct shapes which can be used to identify the type of plant from which they came. Pollen is well preserved in the sediment in the bottom of bodies of water, and can be used to tell what plants grew at the time the sediment was deposited.

Corals: Coral contains oxygen and trace metals that can determine the temperature of water when the coral grew, which can be used to construct climate during the period that the coral lived.

Ocean Sediments: Cores from sediment on the ocean floor consist of material that was at one time either on land or produced in the lake and ocean (fossils and chemicals) that can be used to interpret past climates.

NOAA. *A Paleo Perspective on Global Warming*. Proxy Data. 2008.  
<http://www.ncdc.noaa.gov/paleo/globalwarming/proxydata.html>

# ICE CORES AND TREE RINGS

Ice cores and tree rings are the two most useful proxy data sources in mountainous regions to determine past climates.

Ice cores are located in mountains glaciers, and deep polar ice caps with deep snow that have accumulated over centuries. Cores can be drilled out and contain dust, air bubbles, and oxygen that can be used to interpret past climates through the range of the core sample.

**Tree rings:** Trees are influenced by climactic conditions such as drought, and can be a great source for interpreting climate. Trees produce at least one ring a year, and the width of each ring can infer the amount of precipitation, and isotopic compositions.

A local study in the San Juan Mountains:

[http://www.mountainstudies.org/sites/default/files/pdf/education/Animas\\_treering\\_brochure\\_RevC.pdf](http://www.mountainstudies.org/sites/default/files/pdf/education/Animas_treering_brochure_RevC.pdf)

