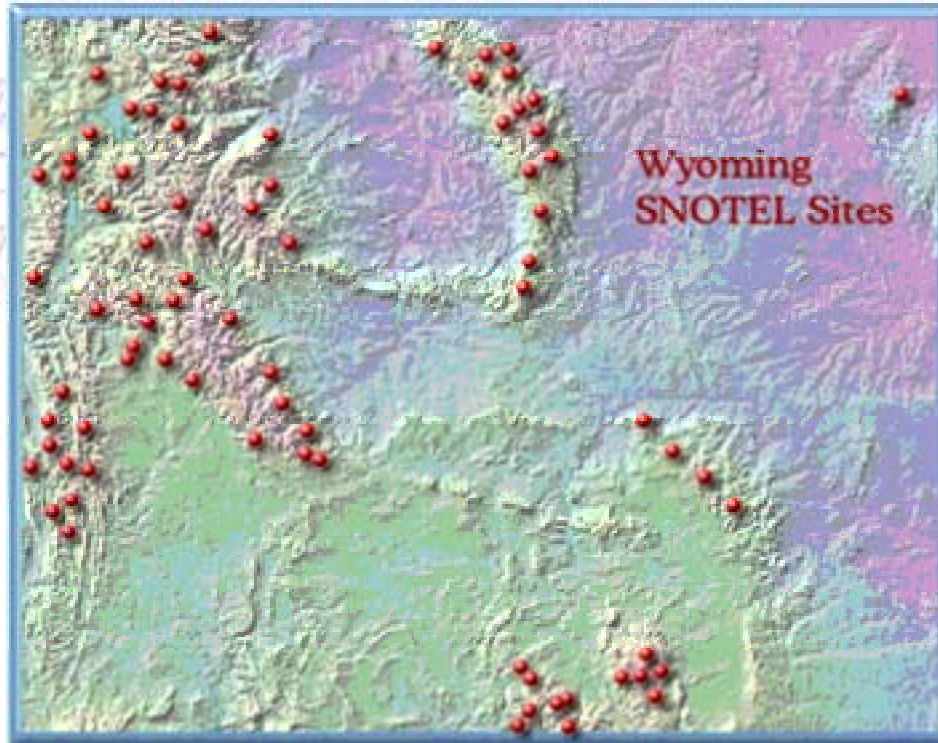


Wyoming Cooperative Snow Survey Program



South Dakota SNOTEL Sites

This figure shows a topographic map of South Dakota with several red circular markers indicating the locations of SNOTEL sites. The text "South Dakota SNOTEL Sites" is printed in green on the map.

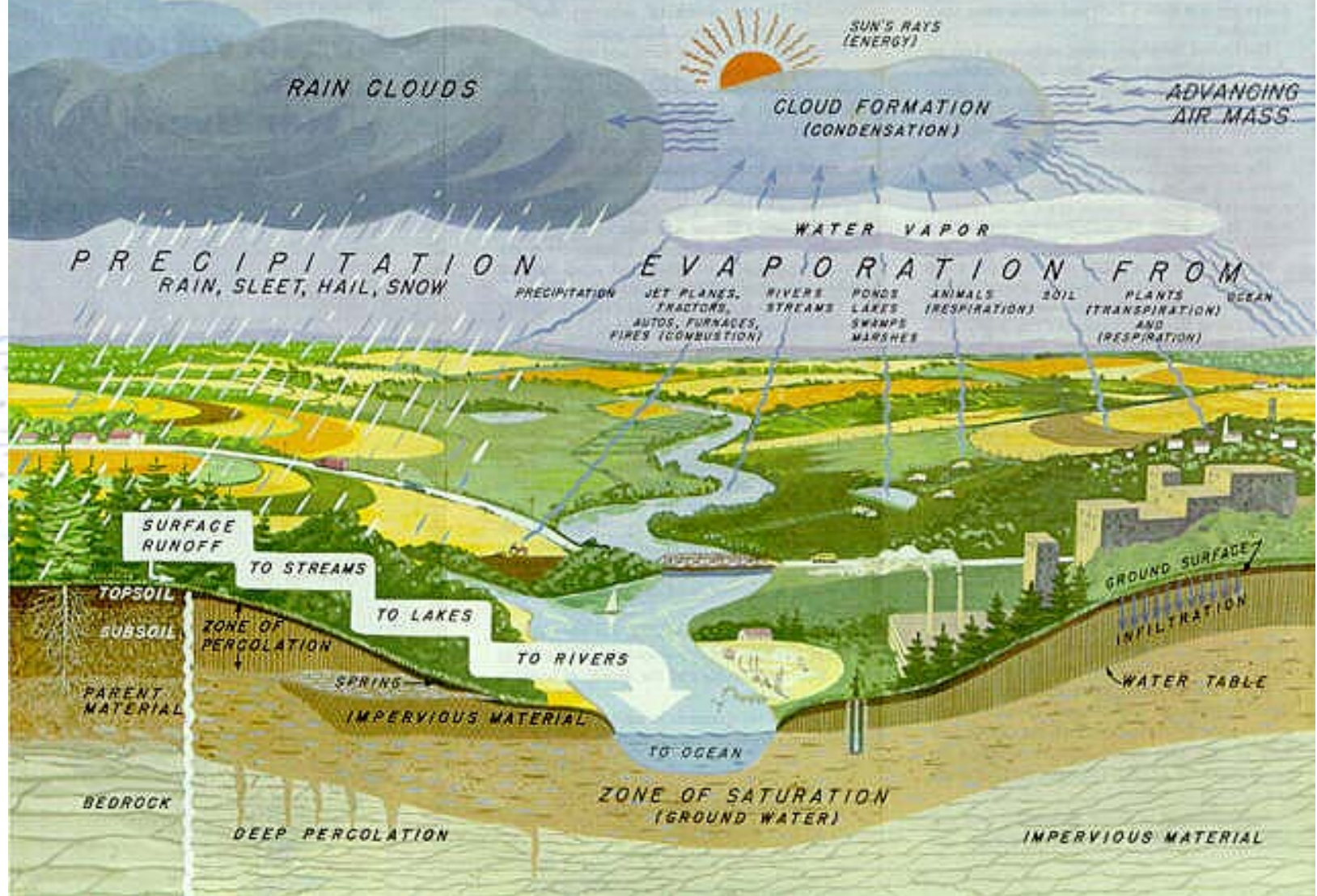
United States Department of Agriculture

Cooperative Snow Survey Program

- Several entities cooperate in the program
 - SEO helps with the actual measurement at manual courses
 - SWCD and snow mobile clubs have installed snow depth sensors
 - Cities and wildlife clubs have installed sites.
 - Sahara club
 - Cheyenne
 - Rawlins

CONSERVATION AND THE WATER CYCLE

HOW HYDROLOGIC PROCESSES AFFECT THE EARTH AND ITS INHABITANTS



United States Department of Agriculture



- **How many gallons of water does it take for 1 serving???**

- Corn – 61
- Lettuce – 6
- Apple – 16
- Tomato – 3
- Orange – 22
- Watermelon – 100
- Potato – 65
- Wheat bread – 15
- Milk – 65
- Cola – 10
- Steak – 2607
- Pork – 408
- Chicken – 408
- Eggs – 136
- Breakfast – 209
- Lunch – 1427
- Dinner – 2897
- An average family of 5 requires about 1 acre foot of water per year or about 326,000 gallons.

Cooperative Snow Survey Program

- The first snow survey was conducted in 1906.
Started by Dr. Church in the Lake Tahoe Area.
- Congressionally mandated in the 1930s.

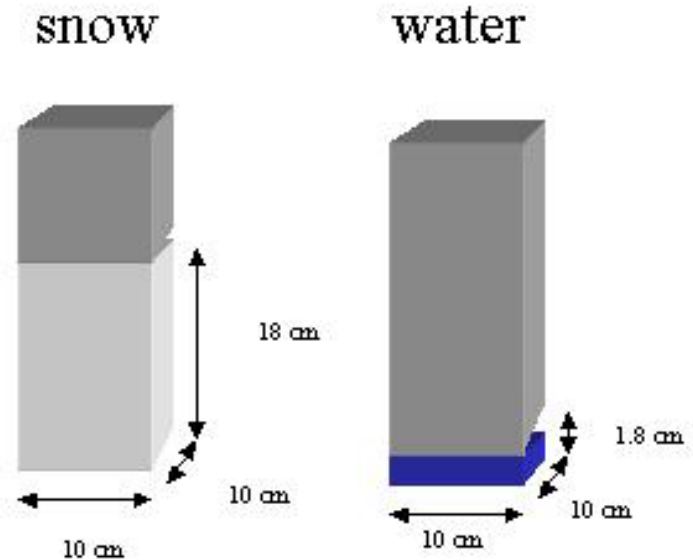


Cooperative Snow Survey Program

- Two methods for measuring snow used by NRCS
 - Manual measurement – Actual trip site and snow measured with snow sampler
 - Automated measurement – All data is collected by automated equipment. No visit to the site is required.
- Data collection sites are selected where the data best represents large surface area.
- Several parameters measured

Cooperative Snow Survey Program

- Snow Water Equivalent (SWE) is the depth of water that results when a block of snow melts.



Cooperative Snow Survey Program

- Manual Measurement
 - Snow depth measured with snow sampler
 - Core taken
 - SWE determined by weighing core.



Cooperative Snow Survey Program

- Knowing the tube diameter, and weight, the snow weight is easily converted to Snow Water Equivalent (SWE)
- Tube is sized such that one ounce of snow equals one inch of water.



Cooperative Snow Survey Program

- The Natural Resources Conservation Service (NRCS) installs, operates, and maintains an extensive, automated system to collect snowpack and related climatic data in the Western United States called SNOTEL (for SNOwpack TELEmetry).



Cooperative Snow Survey Program



- There are about 700 SNOTEL sites in the 10 western states and Alaska.
- Wyoming has 83 SNOTEL sites and 65 manually read snow courses.

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Cooperative Snow Survey Program



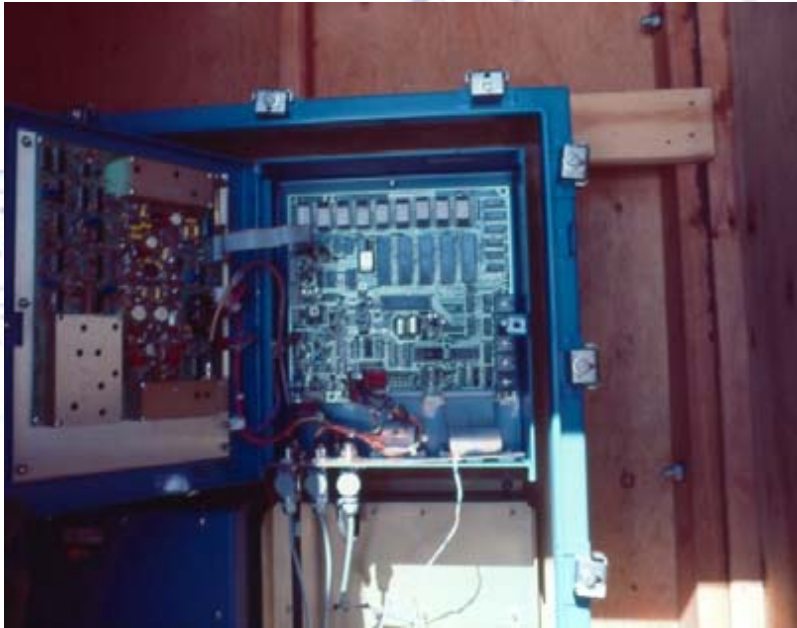
The Wyoming office is also responsible for 2 SNOTEL sites in the Black Hills region of South Dakota, along with 2 manual snow courses.

Cooperative Snow Survey Program

- SNOTEL sites are designed to operate unattended and without maintenance for a year. They are battery powered with solar cell to recharge the battery.



Cooperative Snow Survey Program



- The condition of each site is monitored daily.
- Serious problems or deteriorating performance trigger a response from the NRCS electronic technicians

Cooperative Snow Survey Program



- Standard site
 - Shelter for electronics
 - snow pillow
 - storage precipitation gauge
 - snow depth sensor
 - temperature sensor.

Cooperative Snow Survey Program



- Other sensors
 - Solar Radiation
 - Relative Humidity
 - Wind speed
 - Wind direction
 - Soil Moisture
 - Tipping Bucket Rain Gage

United States Department of Agriculture

Cooperative Snow Survey Program

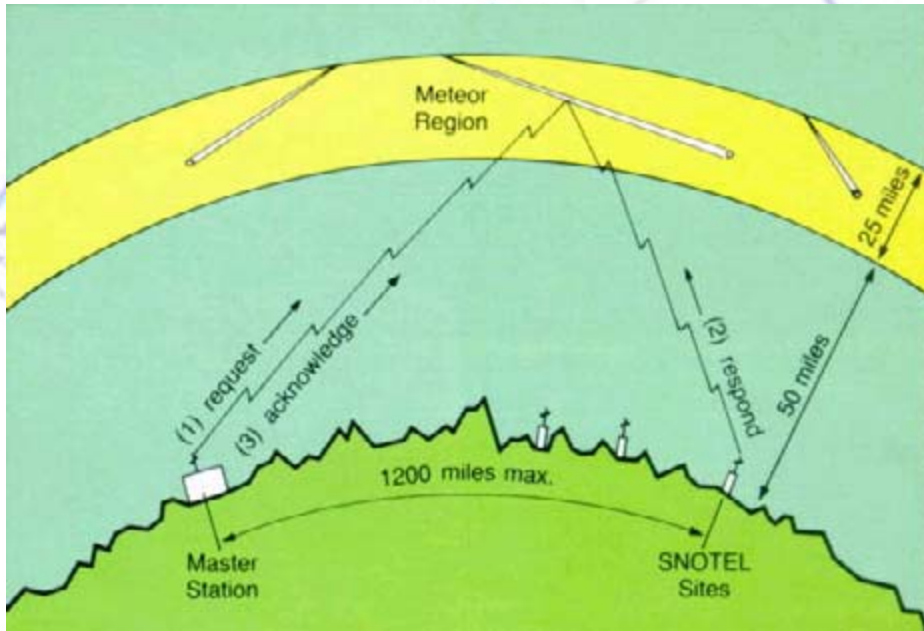


Snow Pillow

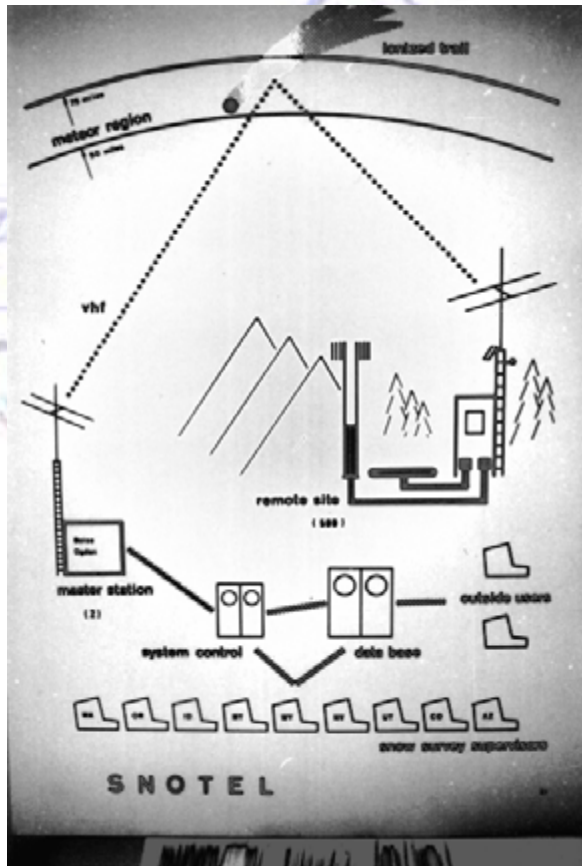
- The hexagon shaped snow pillow is an envelope of synthetic rubber, fit into a 10 feet diameter area.
- Pillow contains an antifreeze solution.
- Attached to transducer to measure pressure

Cooperative Snow Survey Program

- Data transmission
 - VHF radio signals are reflected at a steep angle off the ever present band of ionized meteorites existing from about 50 to 75 miles above the earth.
 - NRCS uses meteor burst technology



Cooperative Snow Survey Program



- Two Base stations
 - cover 10 western states
- Data transmitted by telephone line to Portland.
- Sites can be queried hourly.
 - Some Wyoming sites are hourly
 - Others twice a day.
 - Most are 8 times a day

Cooperative Snow Survey Program

• **Web Based Access**

- Data and various reports can be accessed from several sites. Commonly used URLs for Wyoming are:
 - <http://www.wrds.uwyo.edu/wrds/nrcs/nrcs.html>.
 - <http://www.wcc.nrcs.usda.gov>
 - <http://www.wcc.nrcs.usda.gov/snotel/Wyoming/wyoming.html>

Cooperative Snow Survey Program



Wyoming Water Supply Outlook Report

June 1, 2002



- Basin Outlook Report
 - Prepared January through June
 - 13 basins
 - 63 forecast points

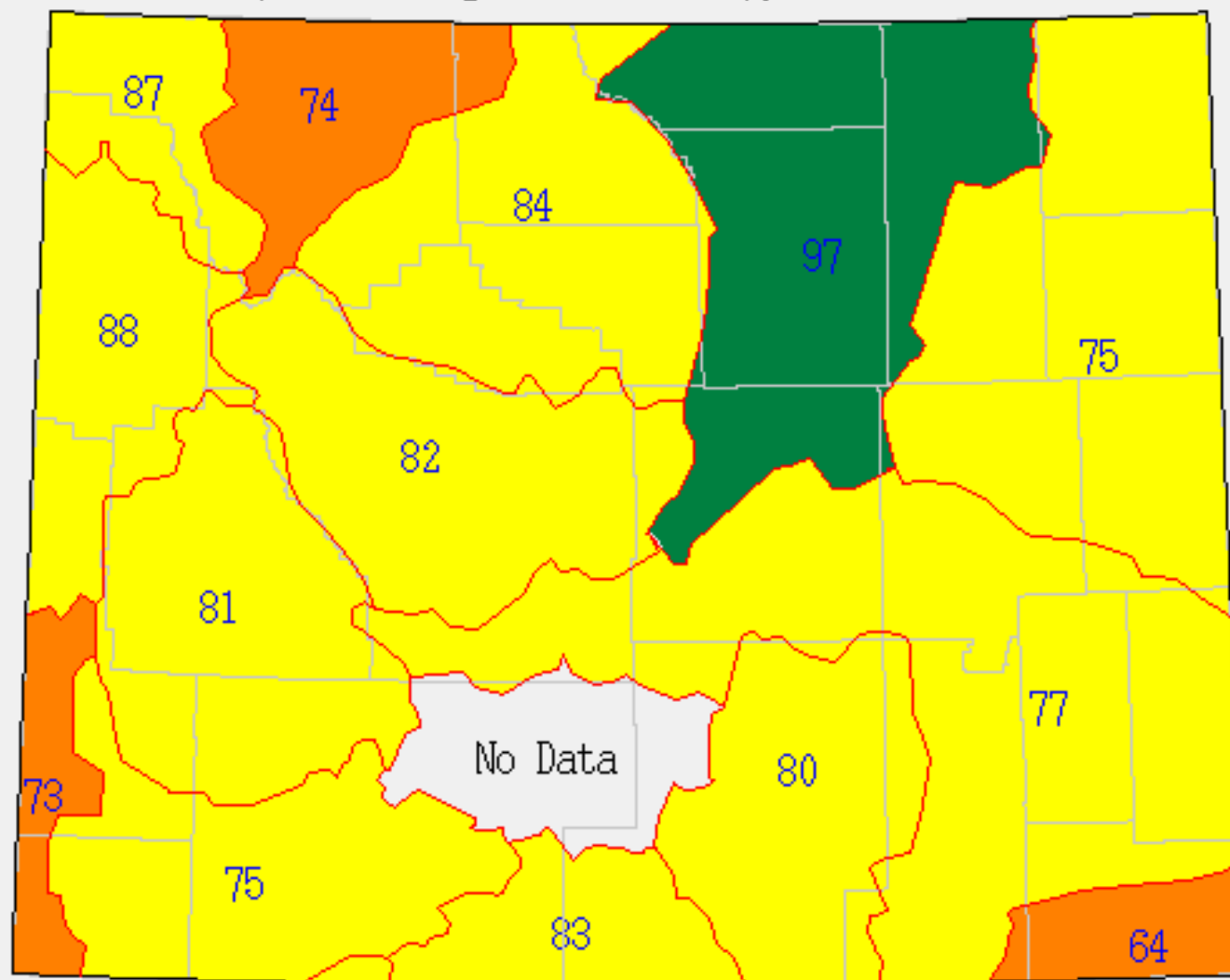
United States Department of Agriculture



Update Report

•	BASIN	ELEV.	SNOW WATER EQUIVALENT			TOTAL PRECIPITATION			
	Data Site Name	(Ft)	Current	Average	% Avg	Current	Average	% Avg	
•	UPPER N. PLATTE RIVER								
•	BASIN	ELEV.	SNOW WATER EQUIVALENT			TOTAL PRECIPITATION			
	Data Site Name	(Ft)	Current	Average	% Avg	Current	Average	% Avg	
•	COLUMBINE	9400	3.9	3	130	6.2	4.7	132	
•	DIVIDE PEAK	8800	2.9	3.6	81	5.2	4.7	111	
•	ELK RIVER	8700	2.5	1.9	132	4.8	3.9	123	
•	JOE WRIGHT	10120	4.7	4.8	98	6.5	5.9	110	
•	NORTH FRENCH CREEK	10100	4.7	5.8	81	6.3	5.8	109	
•	OLD BATTLE	10000	5.2	6.3	83	8	6.9	116	
•	SAGE CREEK BASIN	7850	1.9	2.1	90	4		*	
•	SOUTH BRUSH CREEK	8400	2.4	1.9	126	4.2	4.1	102	
•	TOWER	10500	10	8.6	116	10.9	7.8	140	
•	WEBBER SPRINGS	9200	3.7	4.5	82	5.4	5.8	93	
•	WILLOW CREEK PASS	9540	5	2.6	192	4.6	3.4	135	
•				----			----		
•	Basin wide percent of average					104			117

SWE % of Average as of Sunday, 21 March 2004



Percent of Average

- > 200
- 175 to 200
- 150 to 175
- 125 to 150
- 110 to 125
- 90 to 110
- 75 to 90
- 50 to 75
- 25 to 50
- < 25

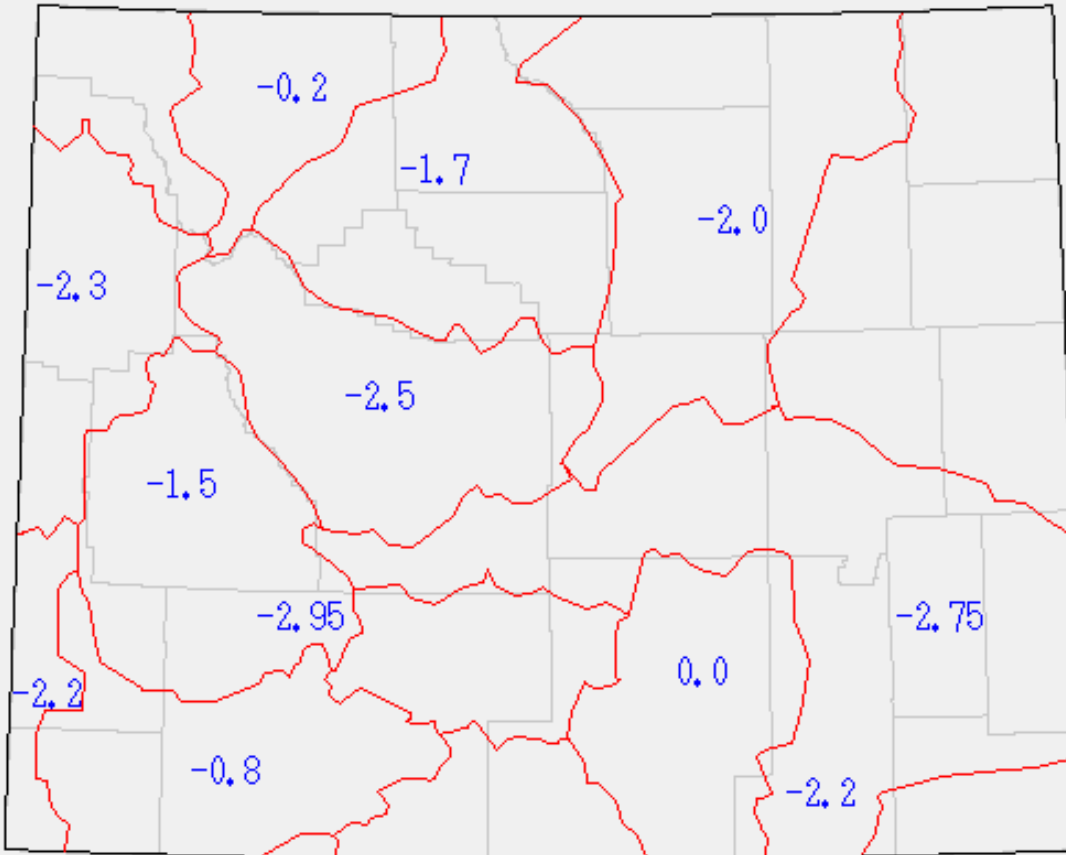
* = Data may not provide a valid measure of conditions

United States Department of Agriculture



Surface Water Supply Index

February 2004 SWSI Values



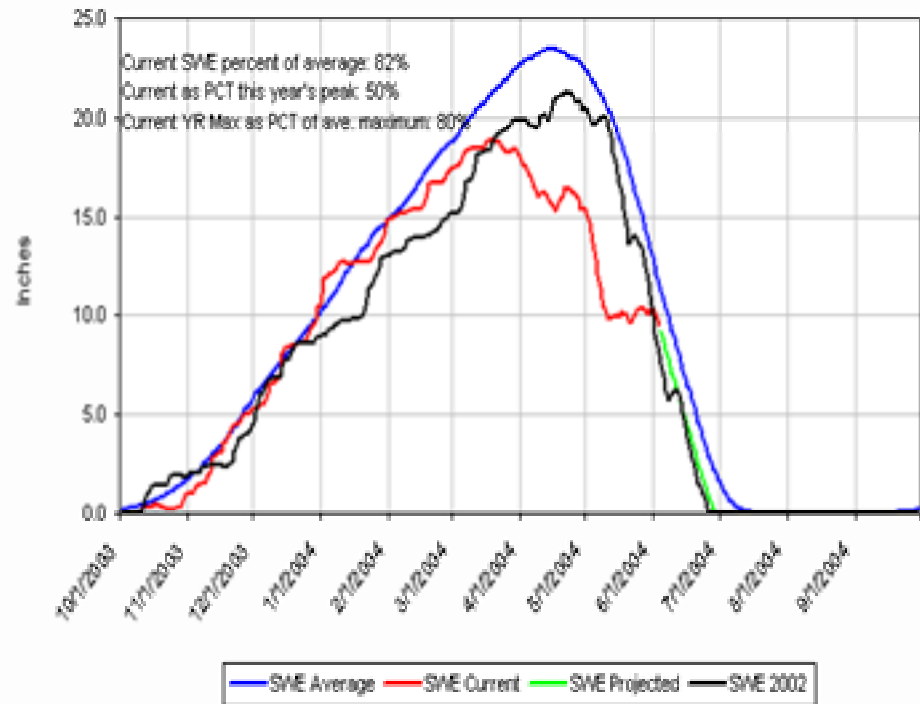
SWSI Classification System

- >4.0 Extremely Wet
- 3.0 Very Wet
- 2.0 Moderately Wet
- 1.0 Slightly Wet
- 0.5 Incipient Wet Spell
- 0.0 Near Normal
- 0.5 Incipient Dry Spell
- 1.0 Mild Drought
- 2.0 Moderate Drought
- 3.0 Severe Drought
- <-4.0 Extreme Drought

Snake River Drainage

- On March 1, the April through September runoff is forecast to be about 85% of average.
- On March 22, the basin was short 3.0 inches SWE from normal

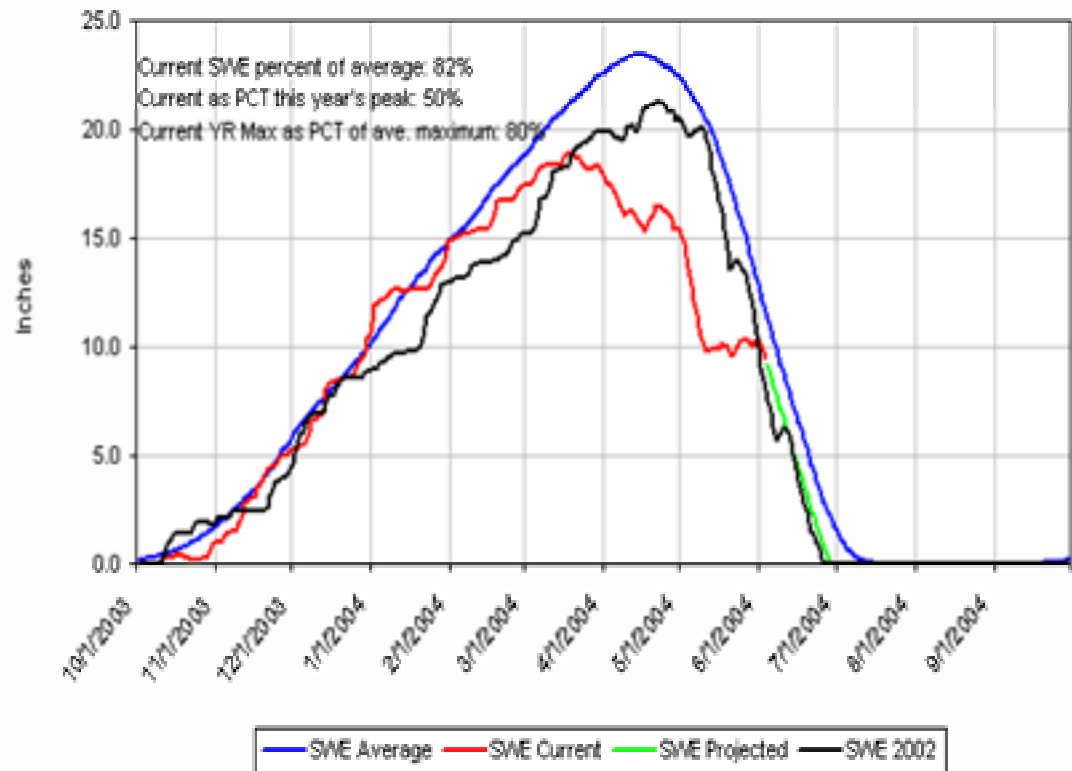
Snake River drainage Water Year SNOTEL Graph (13 Sites)
6/3/2004



Upper Yellowstone and Madison River

- On March 1, the April through September runoff is forecast to be about 97% of average.
- On March 22, the basin was short 2.9 inches SWE from normal

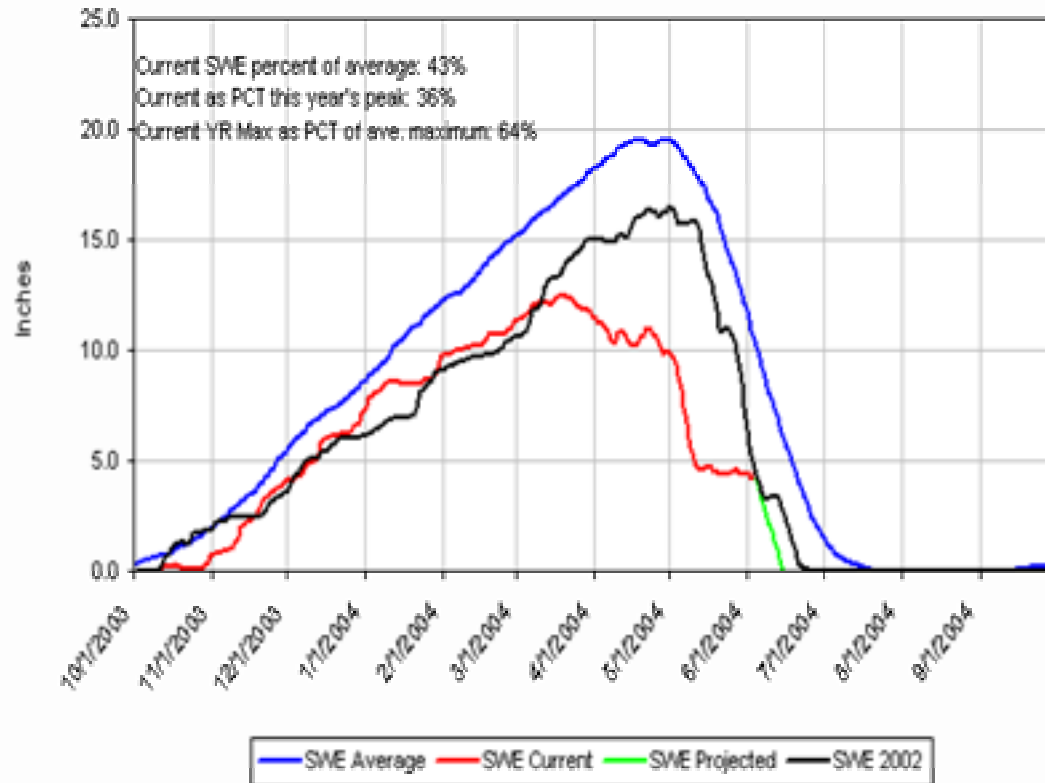
Upper Yellowstone River Water Year SNOTEL Graph (13 Sites)
6/3/2004



Shoshone and Clarks Fork

- On March 1, the April through September runoff is forecast to be about 80% of average.
- On March 22, the basin was short 4.7 inches SWE from normal
-

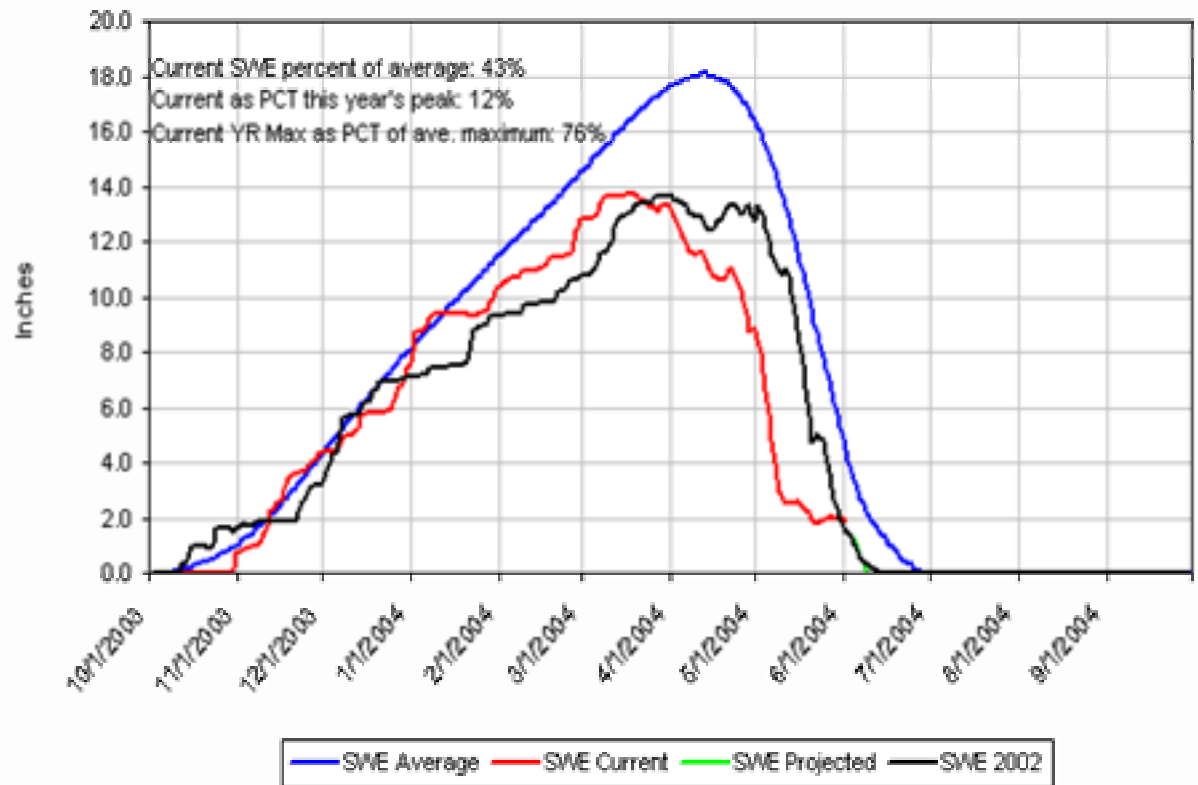
Shoshone River Basin Water Year SNOTEL Graph (7 Sites)
6/3/2004



Upper Green River

Upper Green River Basin Water Year SNOTEL Graph (11 Sites)
6/3/2004

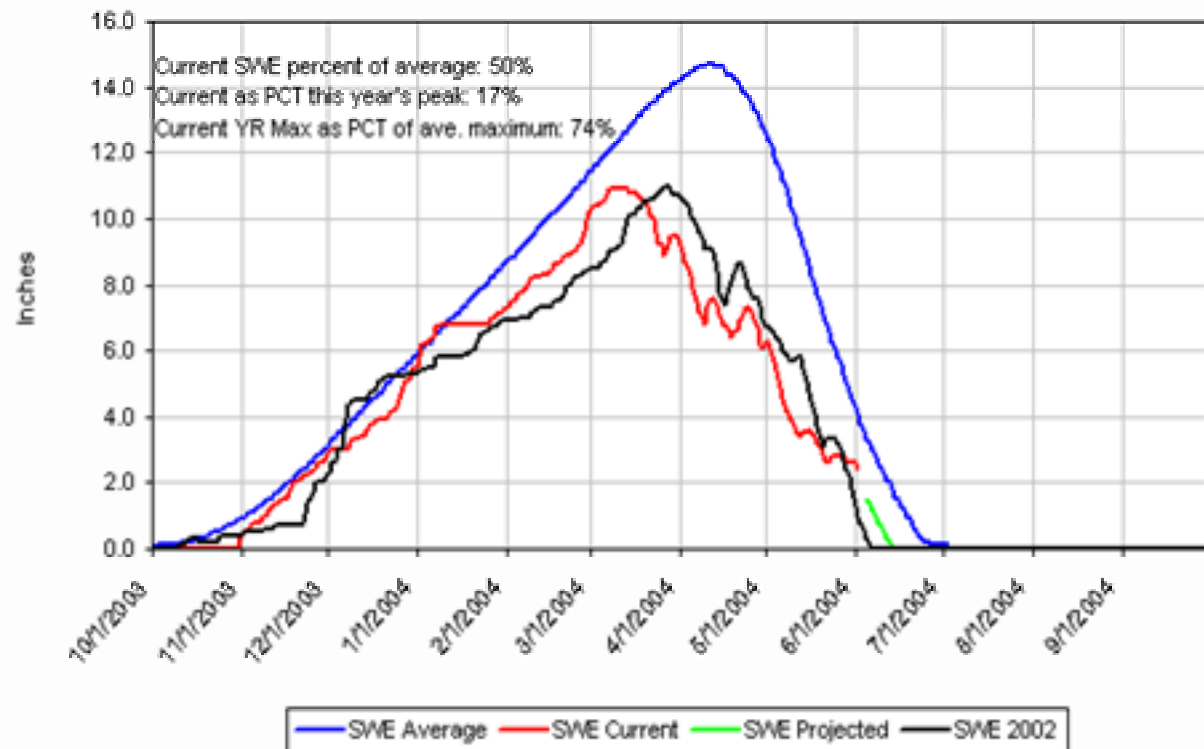
- On March 1, the April through September runoff is forecast to be about 79% of average.
- On March 22, the basin was short 3.4 inches SWE from normal



Lower Green River

- On March 1, the April through September runoff is forecast to be about 73% of average.
- On March 22, the basin was short 3.5 inches SWE from normal

Lower Green River Basin Water Year SNOTEL Graph (7 Sites)
6/3/2004



Bear River

- On March 1, the April through September runoff is forecast to be about 65% of average.
- On March 22, the basin was short 5.2 inches SWE from normal

Bear River Basin Water Year SNOTEL Graph (7 Sites)
6/3/2004

