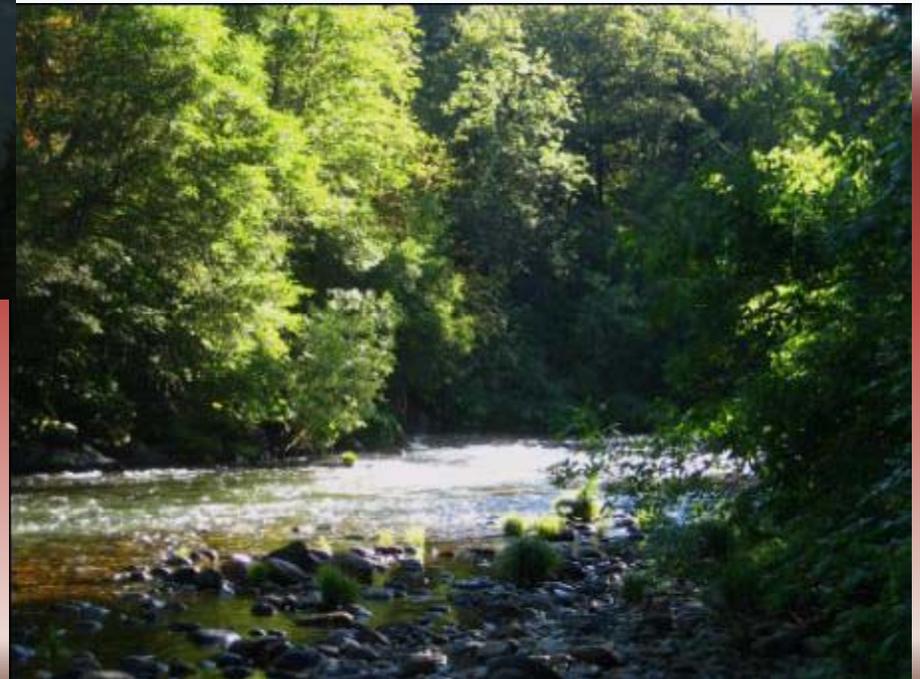


Hydrology Branch / Snow Surveys Program Updates



Enough Snow Already!

Snow Surveys Staff Activities and Projects Highlights 2010-2011

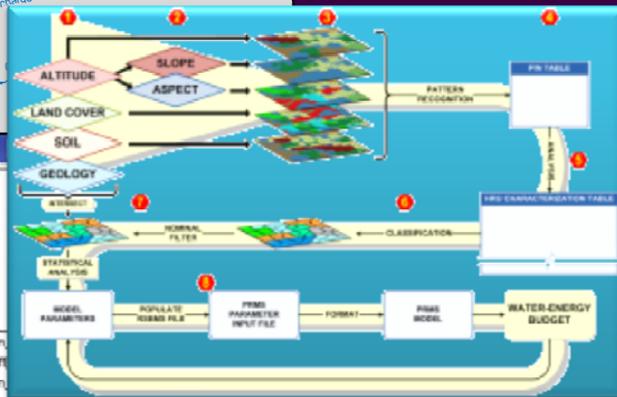
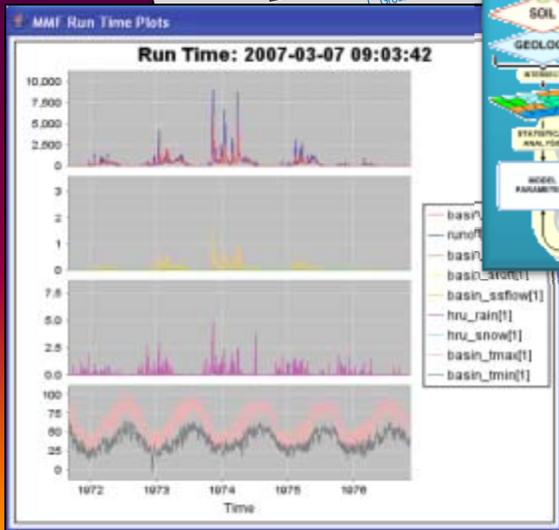
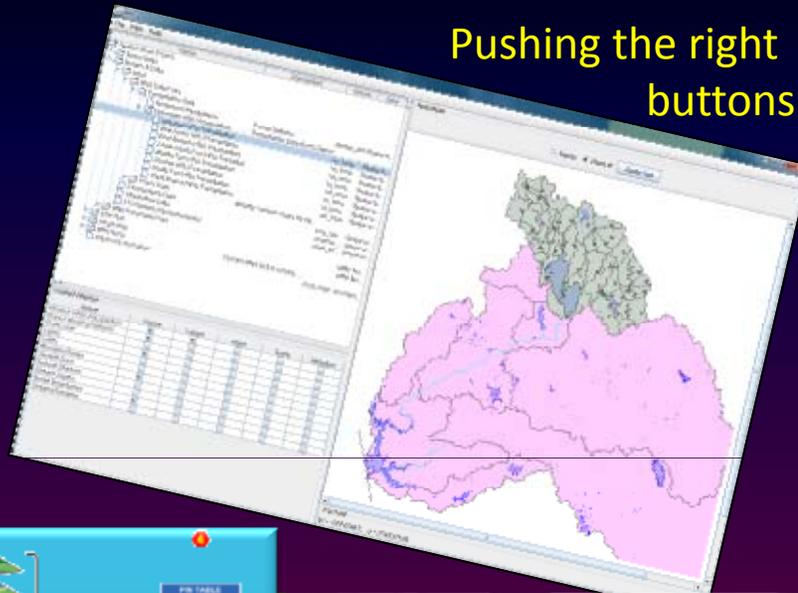
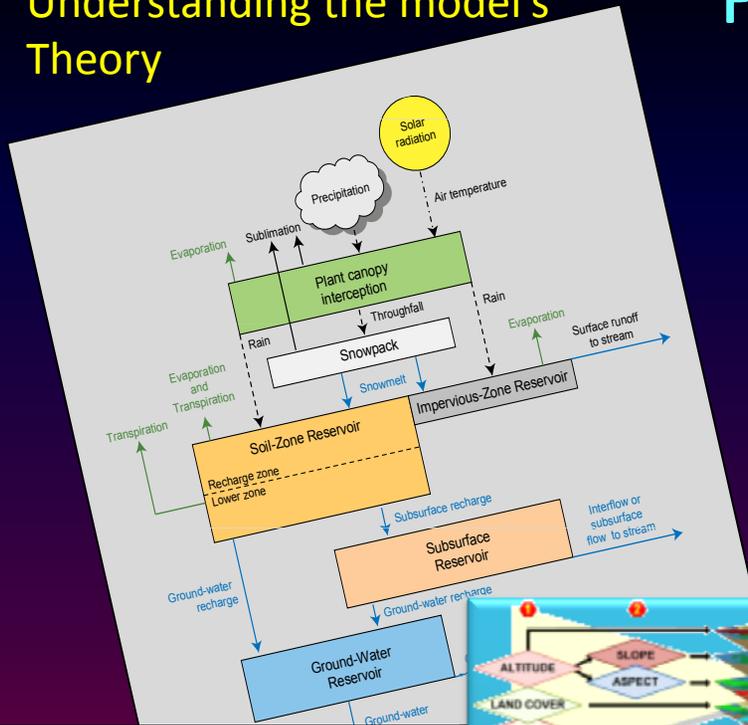
Hiring Richard Mora to augment our gage installation and maintenance program

- Hired in January 2011 (Previously 20+ years field and gage network experience with DWR)
- Immediately began to monitor snow pillow data – was independently making adjustments to raw data by April
- accompanied Matt McPheeters (PG&E) on snow surveys
- by late June was trying to access low elevation gages for maintenance
- July to October – serviced approximately 40 gage/course locations
- “learning the ropes” of coordination, partnering, wilderness access

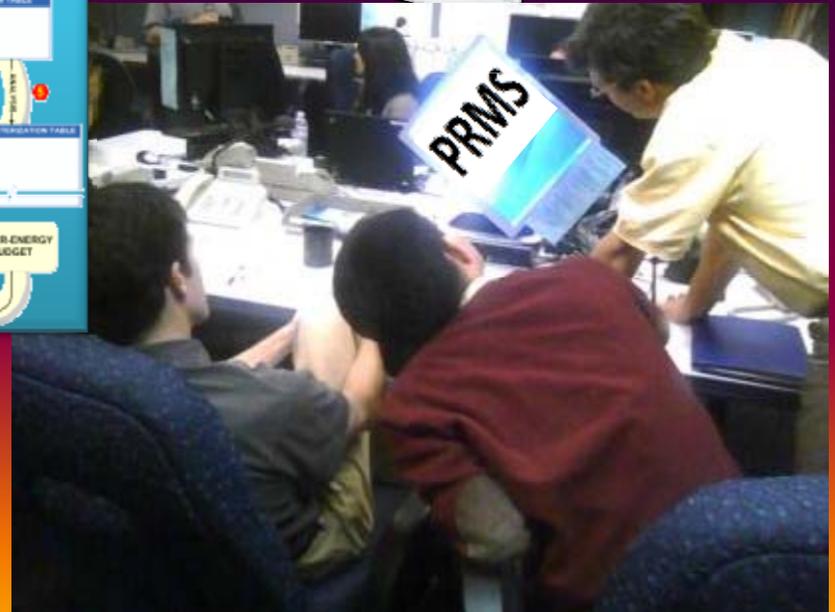
Understanding the model's Theory

PRMS: Training

Pushing the right buttons



Trying to Understand this!



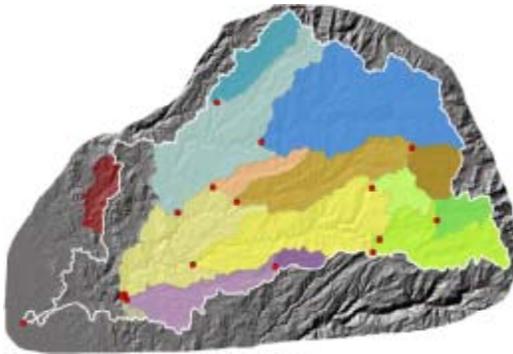
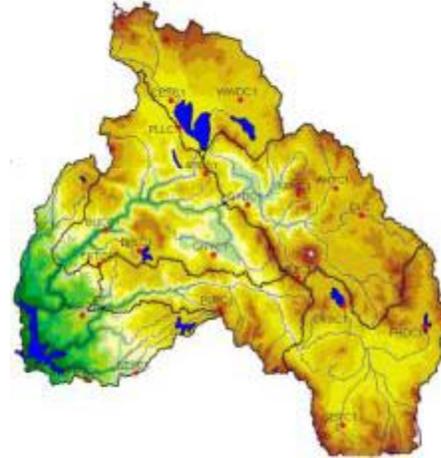
Understanding the results

Understanding A Different Perspective on Forecasting

PRMS Model Updates

Feather:

- Updating period of record from 1998 to present
- Expanding climate stations used in model
- Partnering with PG&E
- Creating a more fine scaled model
- Updating calibration



Yuba:

- Finalizing calibration
- PRMS-4 (latest version – documentation soon)
- 23 flow nodes available for forecasting
- enhanced output/model interpretation modes

Merced:

- In development
- HRU Breakout/Uniqueness of geography /geology
- PRMS-4
- October 2012 final release (?)





Future PRMS Work



2011

- Finalize Feather, Yuba, and Merced
- **Staff GIS and PRMS training classes and exercises**
- Explore PRMS model development collaboration with CCSS partners

2012

- Integrate Feather, Yuba, and Merced models into forecasting procedures
- Yuba and Merced Climate Studies
- Kings River model contract and data collection

2013

- Kings calibration
- Contract with USGS for next basin (San Joaquin River?)
- Data collection and QC for San Joaquin River (or?)

2014

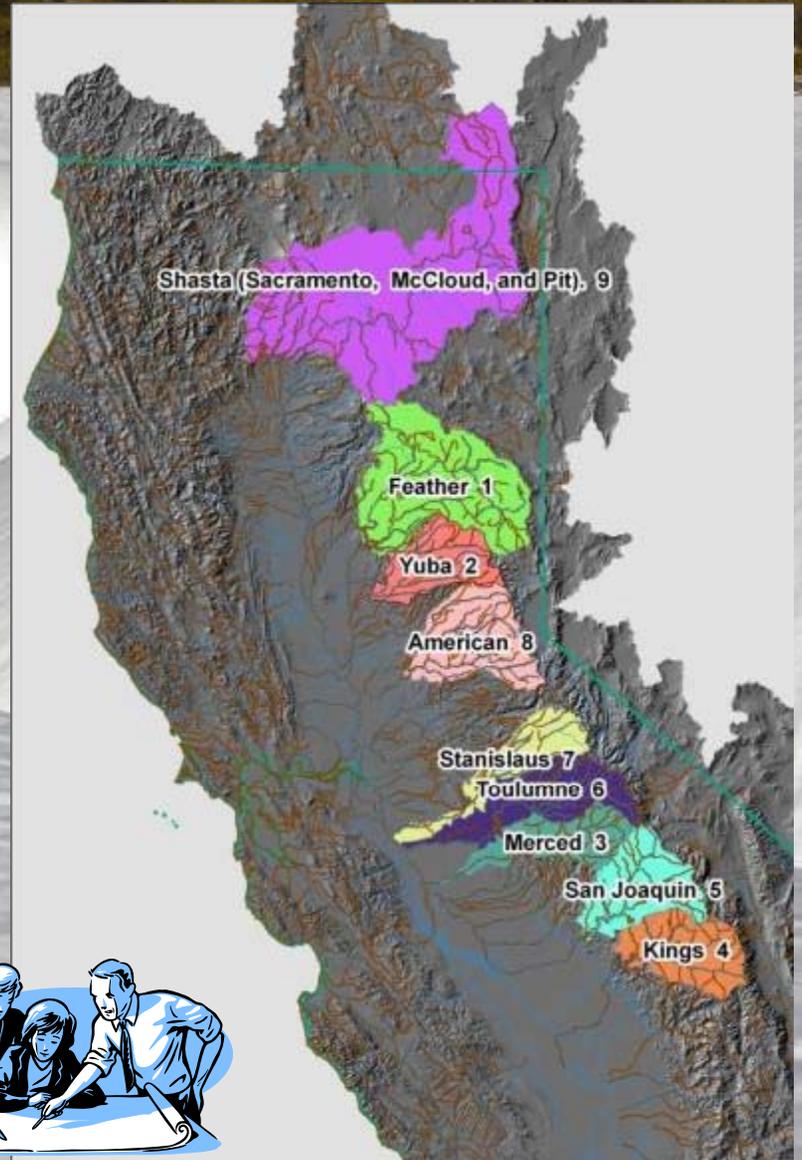
- Integrate Kings River PRMS model into forecasting procedures
- Kings River climate study
- Calibration for San Joaquin River model

2015

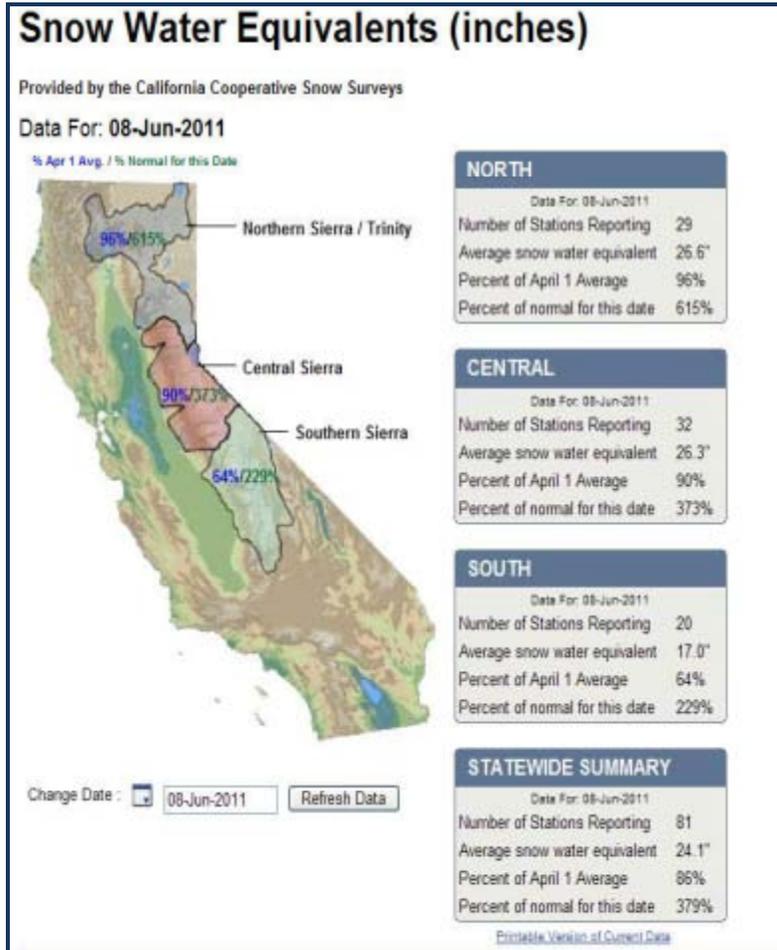
- Wrap up San Joaquin PRMS model calibration
- Embark on Tuolumne or Stanislaus model

2016 and beyond

- Finalize Central Sierra Nevada Rivers
- Expand PRMS modeling to Shasta and American River basin



It Was An Interesting Year



News | Mount Shasta Area Newspapers March 30, 2011



Photo by Gene Eagle

Damage was done to the roof of the Calvary Christian Center Church in McCloud due to the enormous weight of the recent snowfall.

God is great, and snow is heavy

By Gene Eagle

The awesome power of a snowload moving down the roof of the Calvary Christian Center Church on Colombero Avenue was evi-

very dangerous problem to the structure.

The hotwires broke in two and the pole which tumbled downward was also broken in two.

and a costly repair bill

In addition, several metal roof top metal stovepipes were forced from brick chimneys around town. Other stove



Forecasting in 2011

The Runoff that Wouldn't Peak

STATE OF CALIFORNIA DEPARTMENT OF WATER RESOURCES CALIFORNIA COOPERATIVE SNOW SURVEYS WATER SUPPLY FORECAST UPDATE 2011 April-July Unimpaired Runoff (1,000 Acre-feet)

THE RESOURCES AGENCY

Runoff forecasts are unimpaired (full natural) flows which represent the natural water production of the river basin, unaffected by upstream diversions, storage, or export or import of water to or from other watersheds. The median (50%) forecast assumes normal conditions after the date of forecast. Runoff exceedance levels are derived from historical data. The 90 percent exceedance level and the 10 percent exceedance level together comprise a range about the median forecast in which the actual runoff should fall 9 times out of 10. Forecasts are stated in 1,000's of acre-feet and percent of (50-year) average. The averages are for the period 1956 to 2005. This product is available on the internet at <http://cdwr.water.ca.gov/water-supply/foia1200>

	May 31 %Avg	Jun 7 %Avg	Jun 14 %Avg	Jun 21 %Avg	Jun 29 %Avg
Shasta Lake Total Inflow					average = 1815
50% Exceedance	2430 134%	2450 137%	2480 136%	2470 136%	2450 137%
50% Exceedance	2600 143%	2650 146%	2630 145%	2610 143%	2620 144%
10% Exceedance	2630 156%	2860 157%	2820 156%	2790 153%	2790 153%
Sacramento River above Reed Bridge (near Reed 84/9)					average = 2614
50% Exceedance	3330 134%	3430 136%	3430 136%	3430 137%	3400 134%
50% Exceedance	3560 143%	3650 146%	3630 146%	3610 145%	3630 146%
10% Exceedance	3680 156%	3940 158%	3890 156%	3850 154%	3840 154%
Feather River at Oroville					average = 1782
50% Exceedance	3060 173%	3160 177%	3160 177%	3150 177%	3170 180%
50% Exceedance	3250 182%	3320 186%	3320 186%	3300 185%	3260 188%
10% Exceedance	3460 194%	3510 193%	3490 196%	3450 194%	3480 195%
Yuba River near Smartsville					average = 1006
50% Exceedance	1800 179%	1870 186%	1870 186%	1860 185%	1860 181%
50% Exceedance	1870 186%	1940 193%	1920 192%	1920 191%	1930 192%
10% Exceedance	1950 194%	2010 200%	2000 199%	1980 197%	1980 193%
American River below Folsom Lake					average = 1240
50% Exceedance	2130 172%	2240 181%	2240 181%	2240 181%	2200 182%
50% Exceedance	2210 178%	2320 187%	2310 186%	2310 185%	2320 187%
10% Exceedance	2300 185%	2400 194%	2390 193%	2380 192%	2380 192%
Mokelumne River Inflow to Paradise Reservoir					average = 461
50% Exceedance	730 158%	760 165%	760 165%	760 165%	820 179%
50% Exceedance	750 163%	780 169%	780 169%	780 169%	840 182%
10% Exceedance	790 171%	810 176%	810 176%	810 176%	860 187%
Starvation River below Goodwin Res. (aka New Mokelumne)					average = 202
50% Exceedance	1130 161%	1170 167%	1170 167%	1170 167%	1210 172%
50% Exceedance	1170 167%	1200 171%	1200 171%	1200 171%	1240 177%
10% Exceedance	1220 174%	1240 177%	1240 177%	1230 175%	1270 181%
Tuolumne River below La Grange Res. (aka Don Pedro)					average = 1220
50% Exceedance	2010 165%	2080 171%	2070 170%	2050 168%	2090 169%
50% Exceedance	2070 170%	2130 175%	2120 174%	2100 172%	2100 172%
10% Exceedance	2170 178%	2220 182%	2200 180%	2170 178%	2160 177%

- Forecasts into Mid-July
- Beyond the B120 methods were required
- Troubles with measurements → troublesome data → forecast error
- late start to maintenance season

June 29, 2011 Water Supply Forecast Discussion

We've finished the last Bulletin 120 Update for Water Year 2011. It is posted at <http://cdwr.water.ca.gov/water-supply/foia1200> and includes observed conditions through the morning of Wednesday June 29, 2011. Therefore, it includes all available precipitation data associated with the system that moved through the state on Tuesday.

Forecast Summary

The projected median April-July runoff now ranges from 144 percent (Shasta Lake, Total Inflow) to 195 percent (Kern River). The changes to the forecast from last week were made due to the precipitation AND continuing analysis of flows to date relative to historic patterns. The precipitation and varying temperatures in June have increased the challenge of estimating a recurrence rate.

Runoff

For all forecasted rivers, the June flow rates through the 28th are greater than 150 percent of average for June.

- All rivers from the Feather through the Yuba are flowing at a rate greater than 200 percent of average.
- All rivers from the Feather through the Mokelumne are flowing at a rate greater than 250 percent of average.
- The Yuba River is flowing at a rate greater than 280 percent of average.

Precipitation

Since June 21, 2011 there has been significant precipitation amounts measured over the central and northern Sierra. At least an inch of precipitation fell over these regions during the last several days. Consequently, the seasonal total is now about 73 inches (144 percent of an average water year) for the Northern Sierra 8-Station Index and 63.8 inches (116 percent of an average water year) for the San Joaquin 5-Station Index. For some basins, the precipitation amounts were large enough to produce noticeable jumps in the flow rates.

Snowpack

In all regions of the Sierra (north, central, south) the average SWC has continued to decrease despite the recent precipitation event. As of today, June 30, the statewide SWC is 4 inches, which is a decrease of one inch compared to June 27 (before the precipitation). This year, as in other wet years, the mystery persists concerning the water content remaining above the highest sensor.

Weather and Climate Outlooks

The weather forecast for the next six days indicates NO precipitation anywhere in the state. During this period, over the northern Sierra, the freezing levels are expected to vary between 15000 and 17000 feet (the highest level is forecast to be on Saturday). Over the central and southern Sierra, the freezing levels are expected to vary between 16000 and 17000 feet. Consequently, continued melt will exist at all elevations of even the highest basins.

The Climate Prediction Center's (CPC) six to ten day outlook (7/5/11-7/9/11) indicates an increased chance of above normal temperatures for all of the state. The same forecast indicates dry weather for the period.

Snow Surveying Training

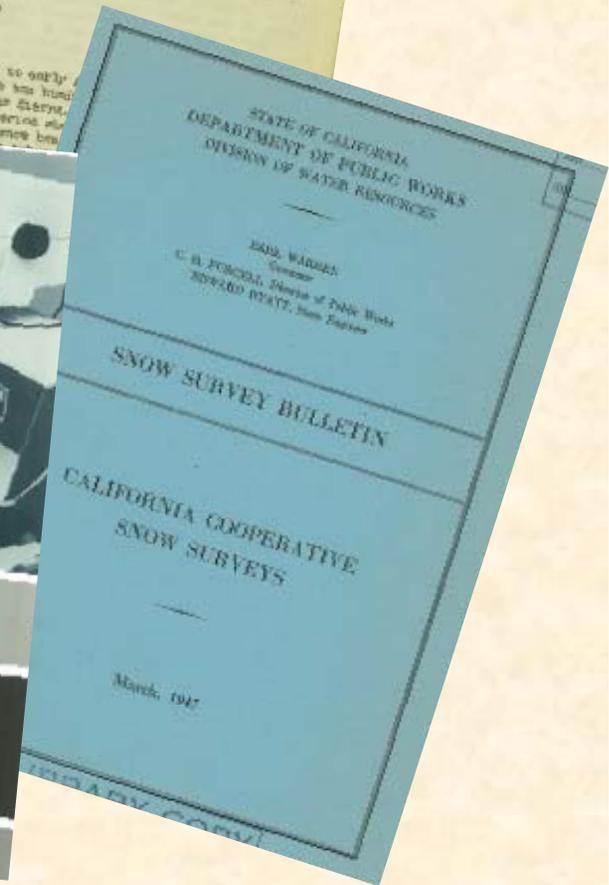
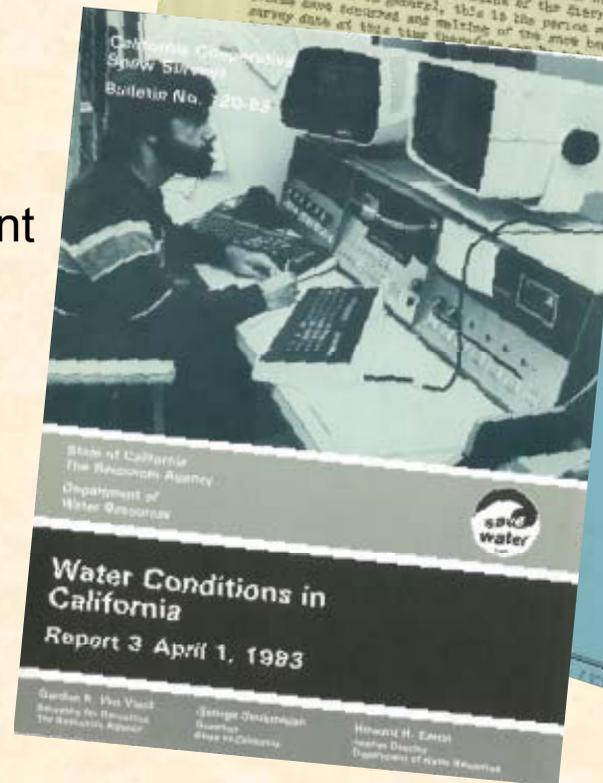
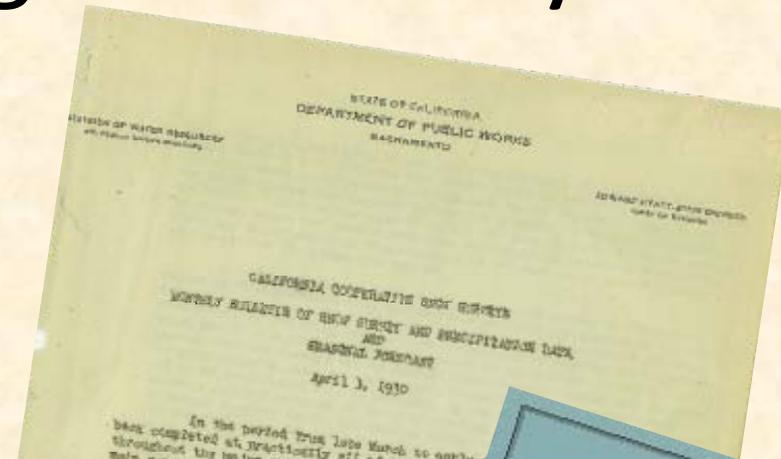
- Based on review of snow course data, training needs were evident
- DWR Snow Surveys Crew re-established snow surveying training in 2011
 - Developing more robust training program including on sight training
 - John and Rick will discuss more on Friday morning



Preserving our History



- Ongoing Archiving Project
- All historic B120s have been scanned – April 1930 to present
- Available on CDEC or disk (take a copy home! Great for holiday greeting cards)



Preserving our History

Snow Note Archiving is Ongoing

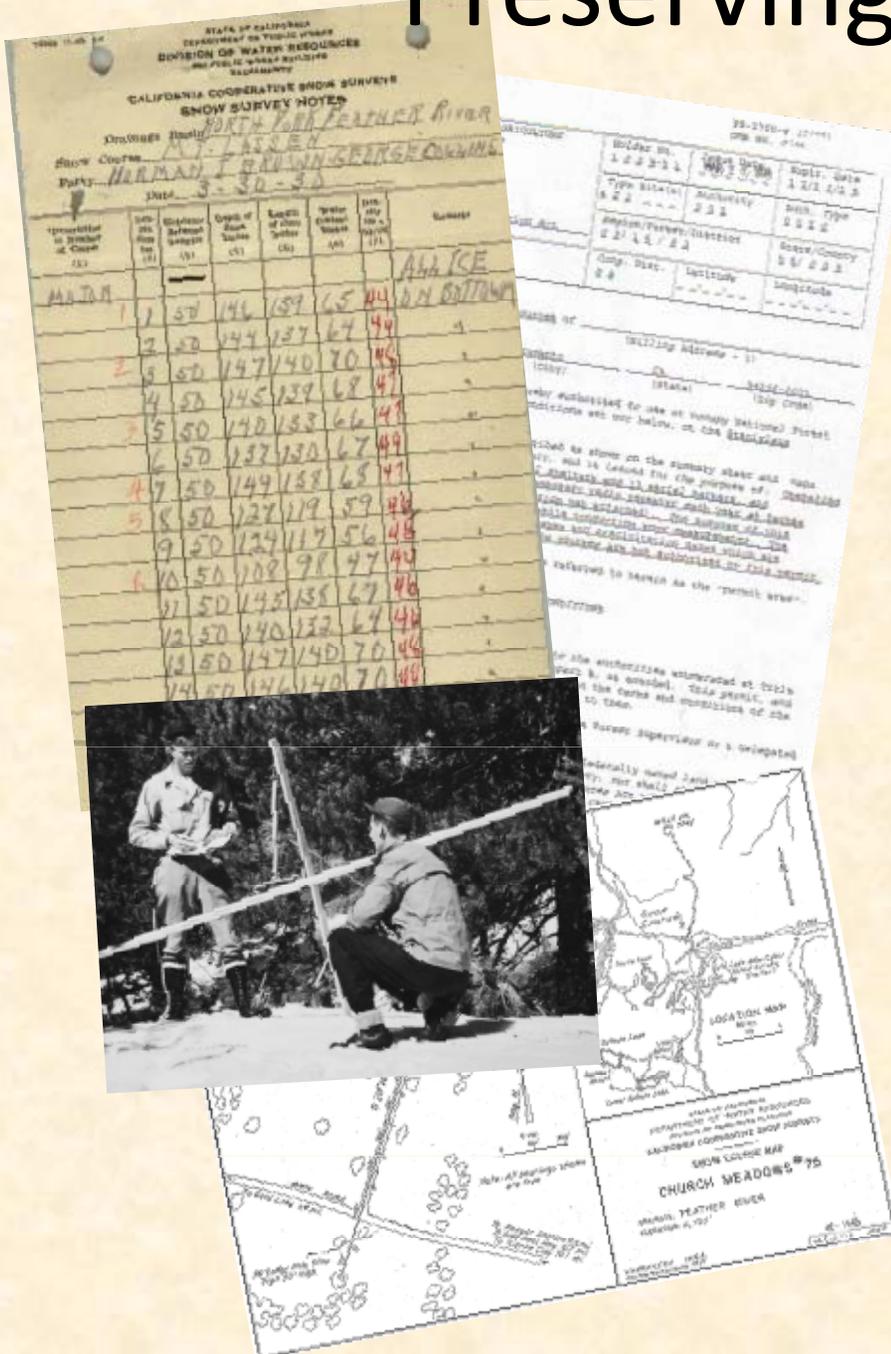
- The complete collection of snow notes for nearly 80 snow courses has been completed
- Over 250 active courses / 400+ courses in all (including inactive)
- Notes will be made available on CDEC someday

Course Maps

- All course maps have been scanned and are available – not yet on CDEC.

Next Phase: Other Historic/Important Records

- Special Use Permits
- Cabin records and permits
- Cabin log books (please help!)
- Historic photos (please help!)
- Any other historic documentation
- Oral history



Hydrology Branch

More to come...

Snow Surveys Safety Program

- Full Review of current Safety Program – Summer 2011
- Draft Report – Sept 2011: Recommendations
- Researching classes (Wilderness First Responder, Avalanche, West-Wide Snow Survey School, etc)
- Want to work with Snow Surveys partners
- More discussion Friday

Watershed Model “Olympics”

- Lots of models
- Lots of possibilities
- Which does what best?

Other Projects of interest

- update of Bulletin 195 – Depth Duration Frequency
- Update of Tide stage forecast model
- PMF/PMP Studies for various reservoirs
- Central Valley Hydrology Studies
- Flood roster update & lessons learned from Golden Guardian 2011

Flood ER Information System (FERIS)

November 2011
CCSS 57th Annual Meeting

FERIS

- A web-enabled GIS tool used in compiling and integrating snow and climate information

Provides access to

- Real-time and historic hydrologic data from CDEC and CCSSP stations
- Tools and models used by F-CO and Snow Surveys
- Snow Survey library of documents and photographs

FERIS features

- Web-based user interface
- Access with varying levels of security
- Information storage and exchange system
- Web-browser based
- Access to a variety of GIS Tools and file transfer tools
- Access to data analysis tools

Schedule of Snow Survey FERIS Development

- Continued development through December 2012
- Public Launch – Spring 2013