CA COOPERATIVE SNOW SURVEYS PROGRAM MEETING: DATA ACQUISITION ROUND TABLE (DART) UPDATES

FALL 2019

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Sacramento District, US Army Corps of Engineers

7 NOVEMBER 2019

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Outline

- Brief overview of USACE gauges
- Station hardening/rebuild efforts
- New sensors
- Updated data visualization
- Data QC efforts/goals

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- **Brief overview of USACE gauges**
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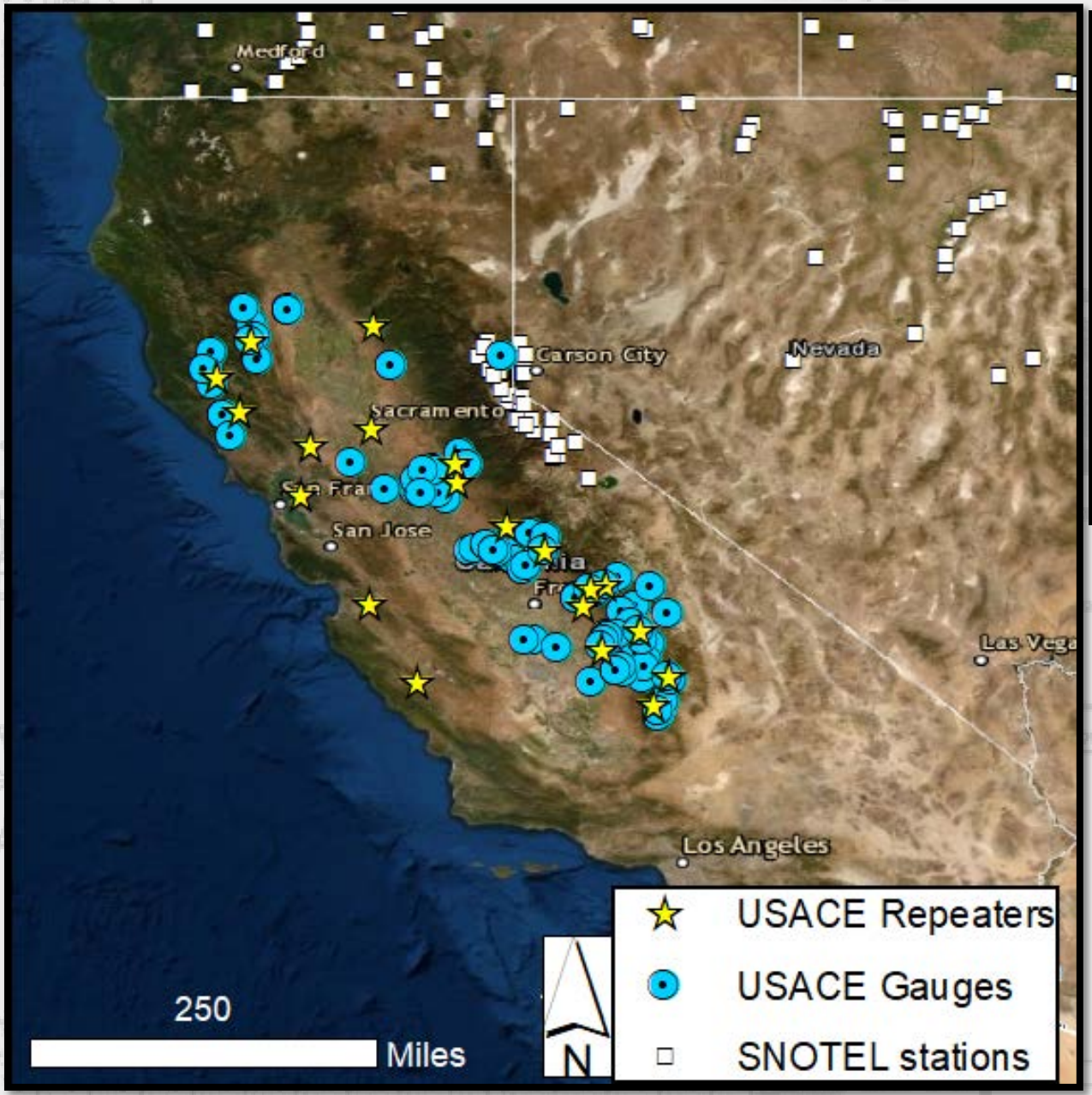
Overview of USACE Gauges



- Total # gauges = 120
- Lake/Pool gauges = 19
- Precipitation = 19
- Radio repeaters = 7
- Streamflow gauges = 55
- Snow Depth/SWE = 8
- Weather stations = 11

USACE Gauges

- **We Measure:**
  - Air Temperature
  - Relative Humidity
  - Incoming Radiation
  - Net Radiation
  - Precipitation
  - Lake Elevation
  - Stream Stage
  - Soil Moisture
  - Wind Speed
  - Wind Direction

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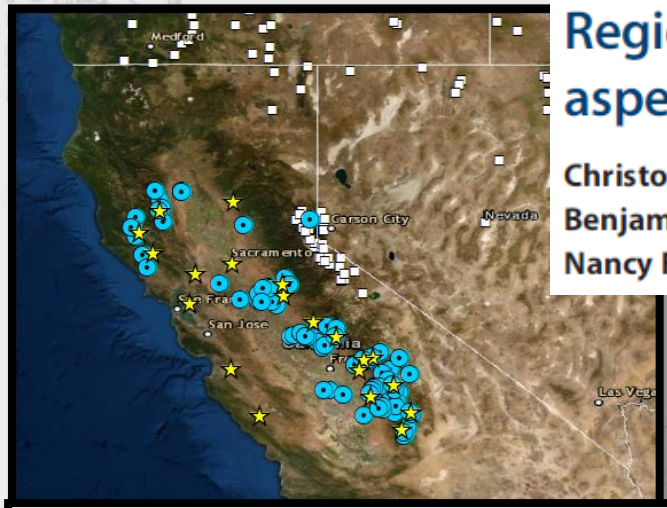
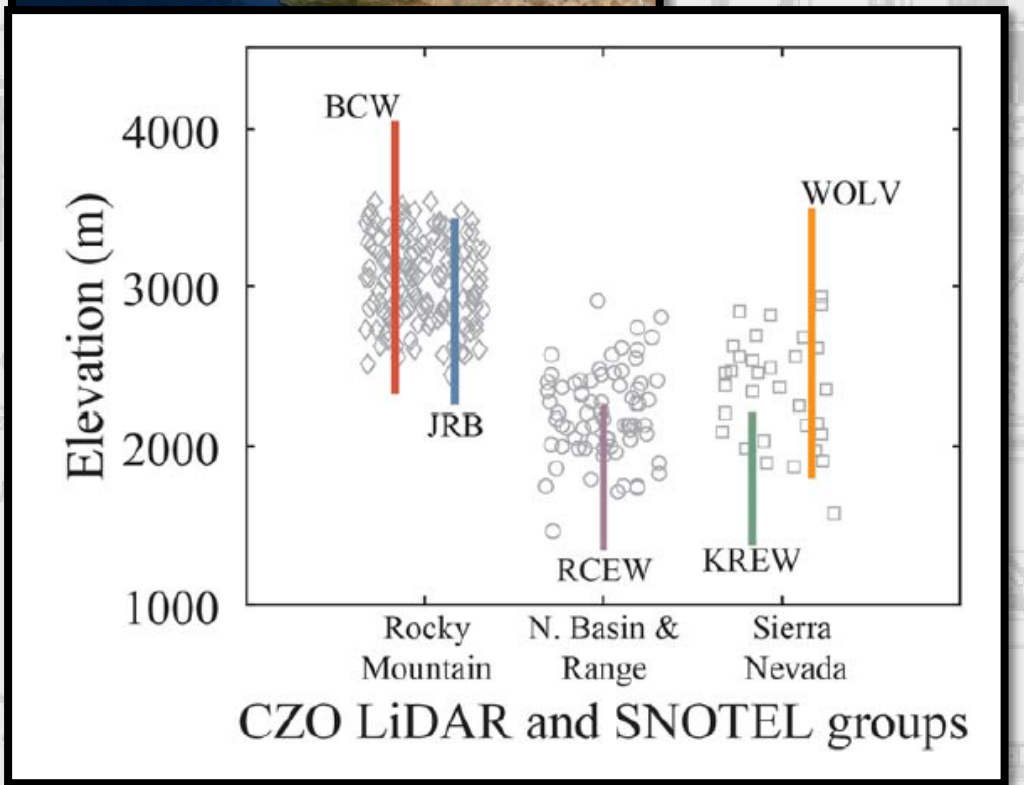
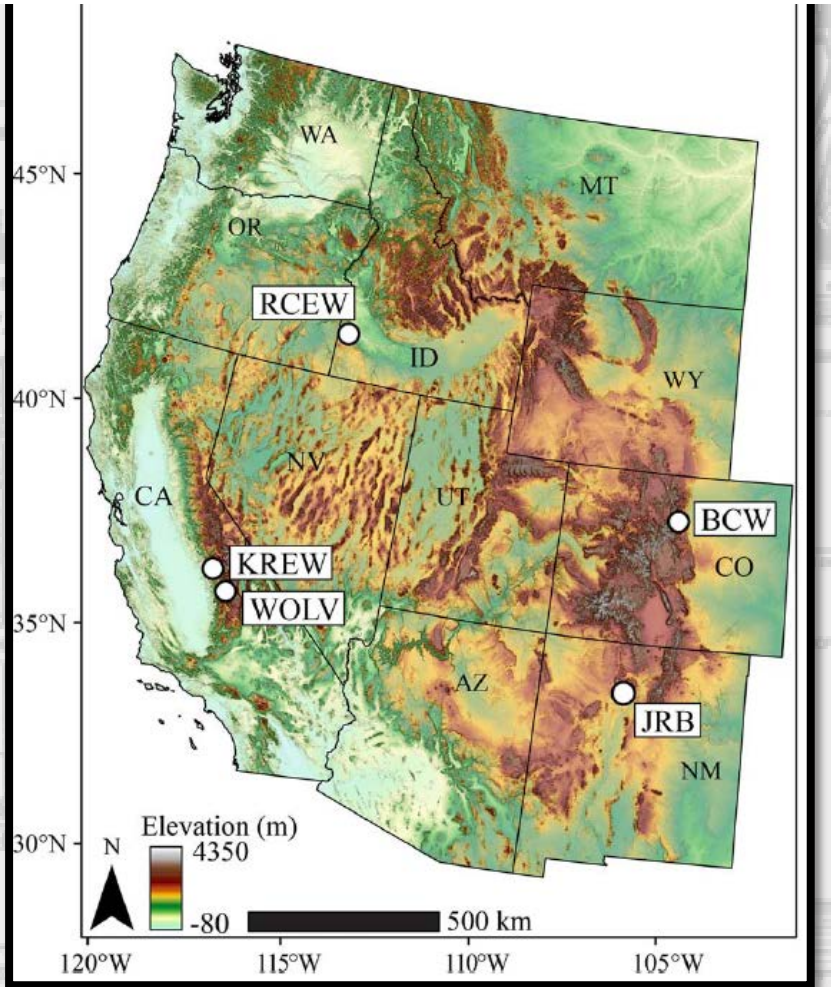
Instrumental coverage – good enough?



Regional sensitivities of seasonal snowpack to elevation, aspect, and vegetation cover in western North America

Christopher J. Tennant[1], Adrian A. Harpold[2], Kathleen Ann Lohse[3], Sarah E. Godsey[3], Benjamin T. Crosby[3], Laurel G. Larsen[1], Paul D. Brooks[4], Robert W. Van Kirk[5,6], and Nancy F. Glenn[7]





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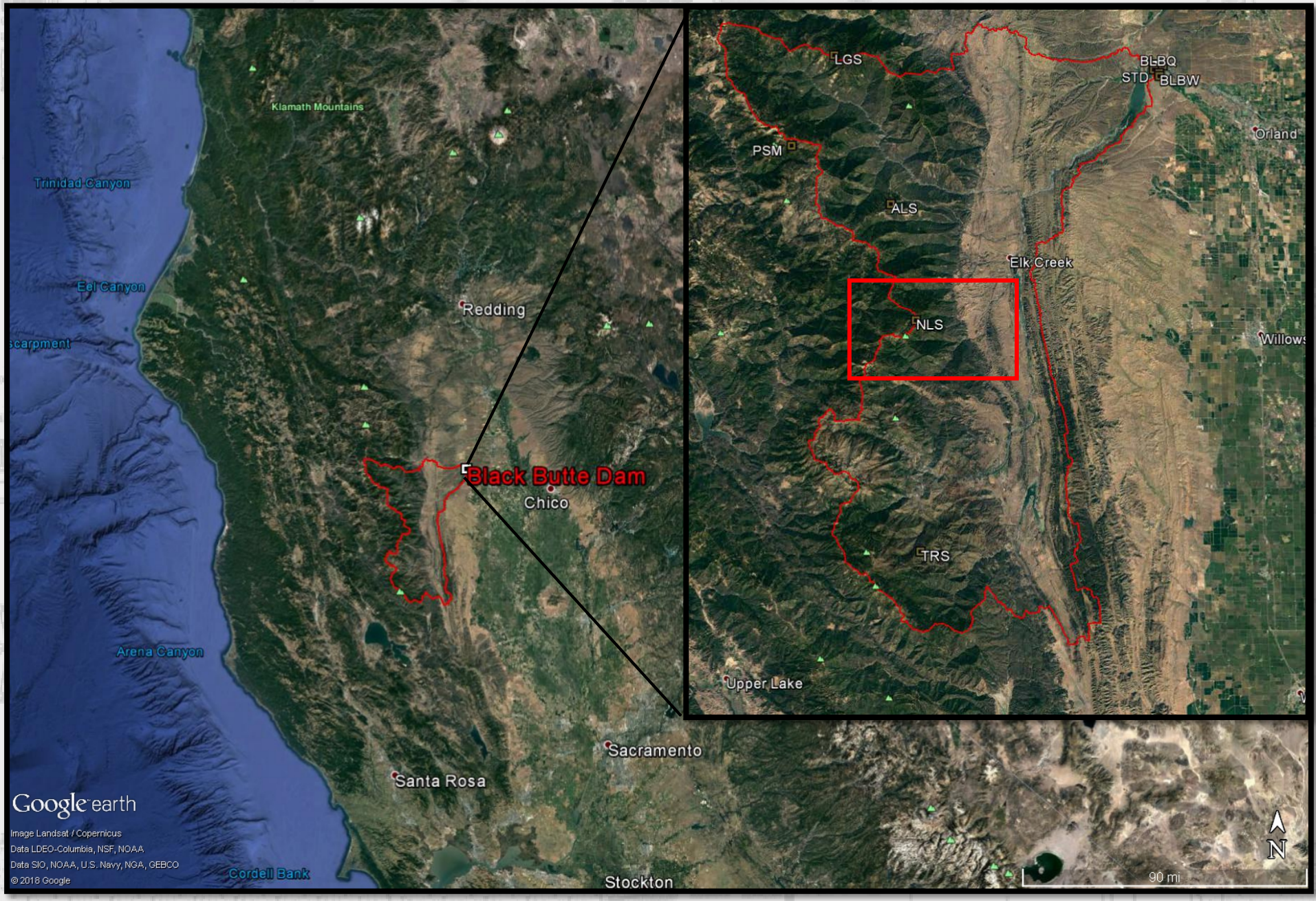
Black Butte Dam & Lake/Stony Cr. Basin: Noel Springs (NLS) Station



Station Hardening/Rebuilds

SIERRA HYDROGRAPHICS

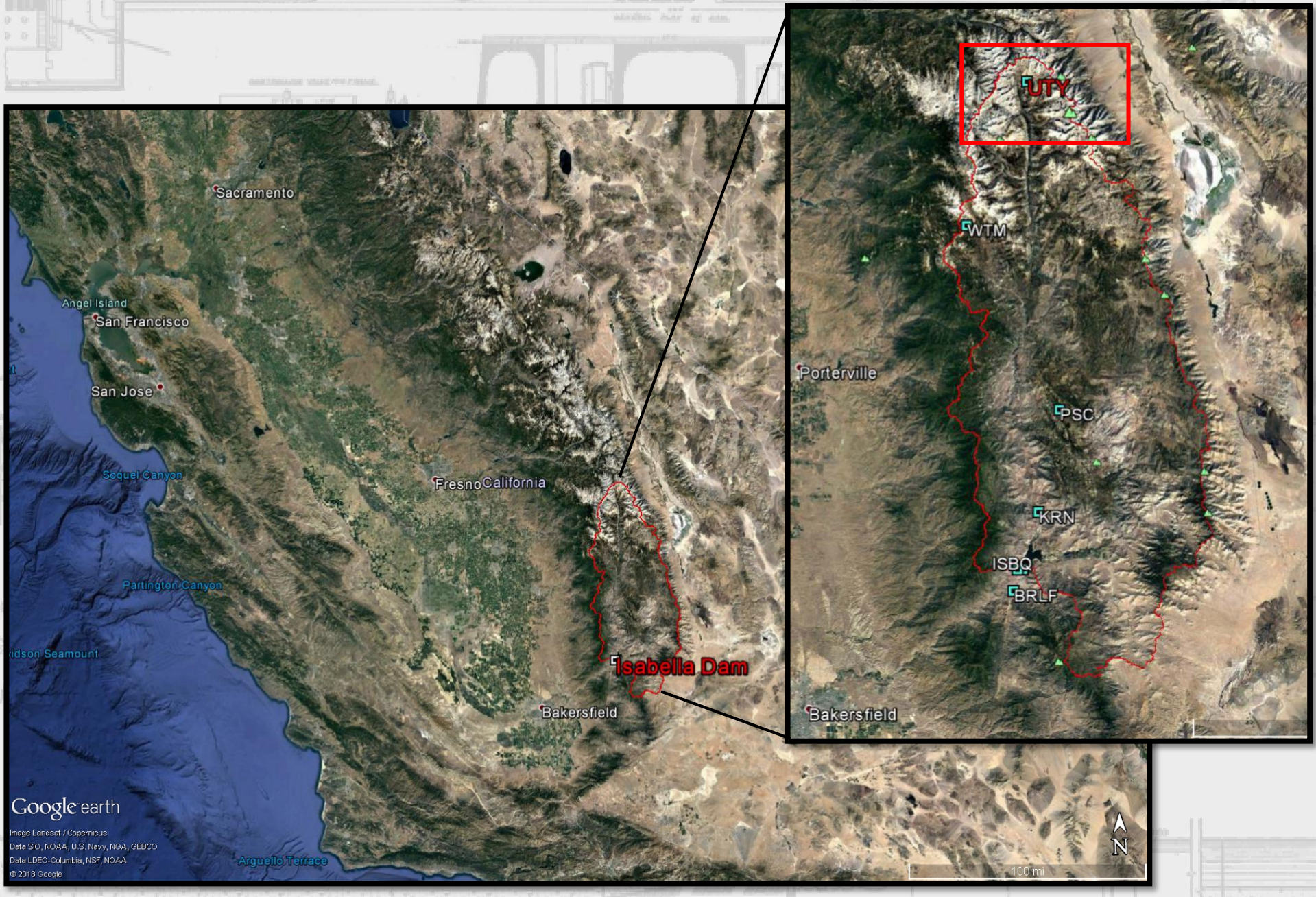
Bear damage to precip hydraulic line.

Concrete poured. Good job Steve.

Slight leak on hose.

Conduit connections to nema box.

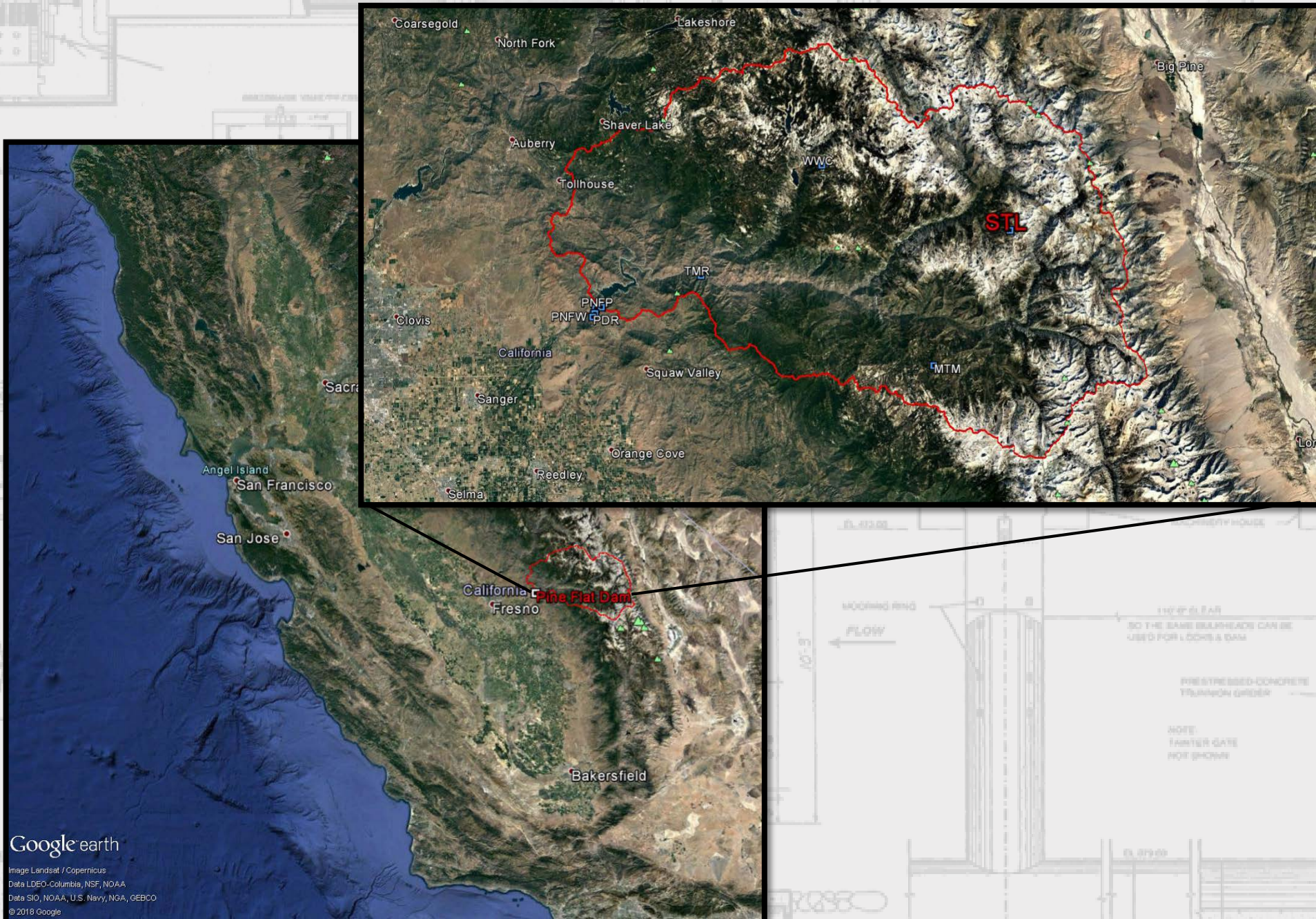
Isabella Dam & Lake/Kern R Basin: Upper Tyndall (UTY) Station



Future Station Rebuilds

SIERRA HYDROGRAPHICS

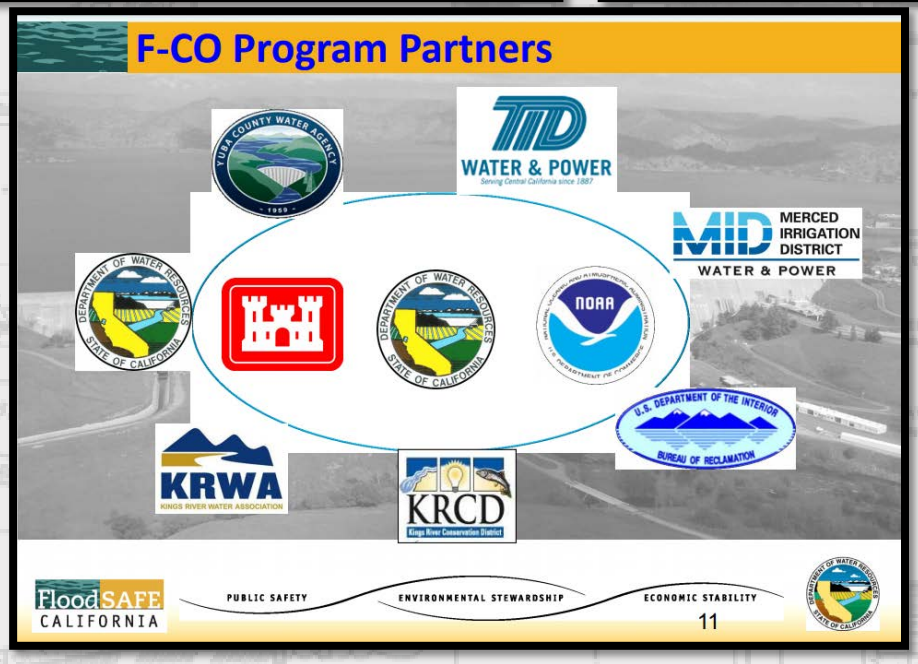
Pine Flat Dam & Lake/Kings R Basin: State Lakes (STL) Station



Future Station Rebuilds

IMG 3: Current lean angle of STL Tower. Measured between 10-11°.

SIERRA HYDROGRAPHICS



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Soil Moisture

Geophysical Research Letters

Research Letter

Subsurface Water Dominates Sierra Nevada Seasonal Hydrologic Storage

Thomas L. Enzminger, Eric E. Small, Adrian A. Borsa

First published: 16 October 2019 | https://doi.org/10.1029/2019GL084589

We find that underground storage makes up the majority (70%) of total stored water. Furthermore, the amount of water estimated by GPS is larger than independent estimates of total precipitation (rain + snow). This suggests that more precipitation falls in the Sierra Nevada than has previously been thought, and this precipitation is mainly stored underground.

Fig. 5- Soil Moisutre sensors

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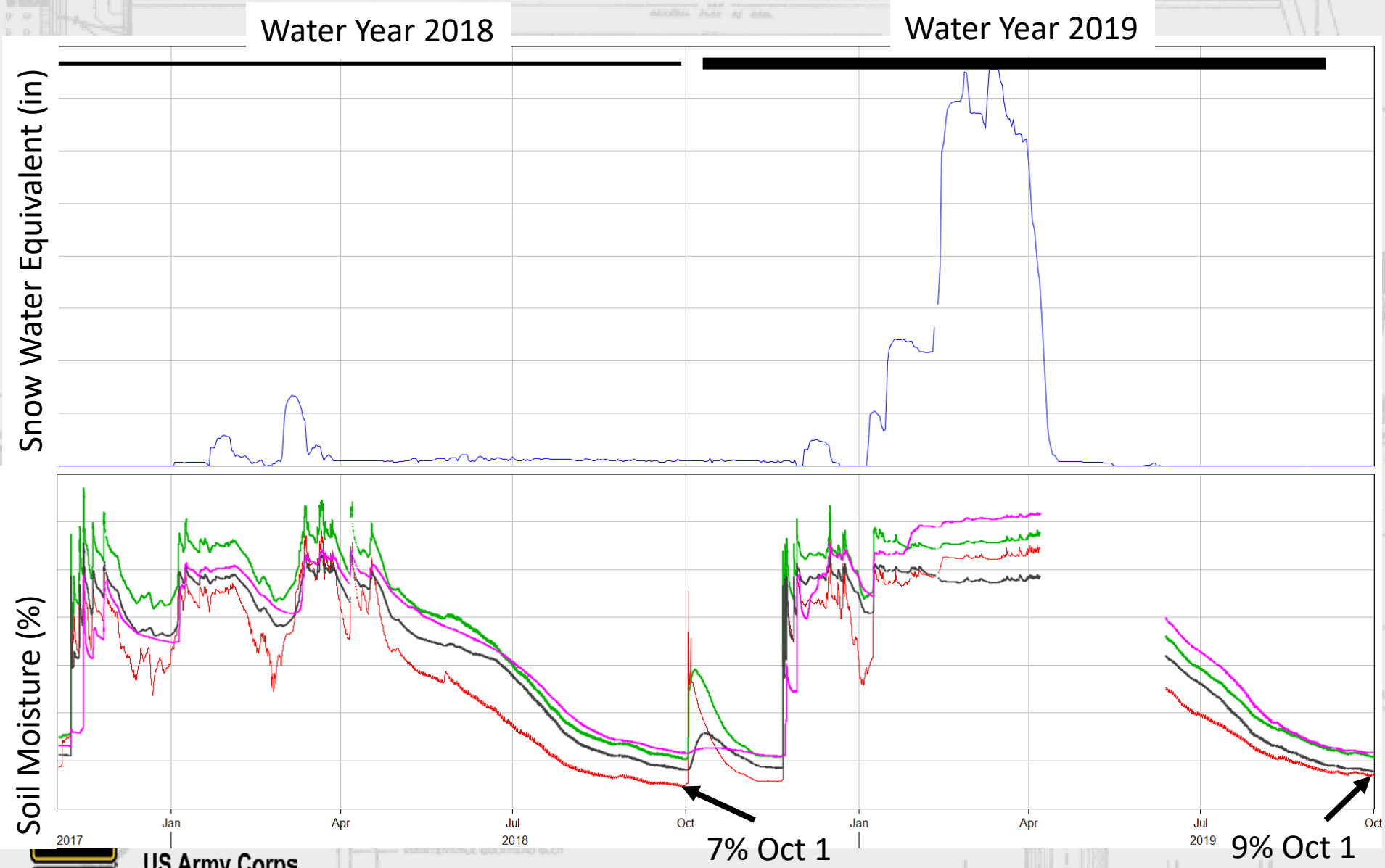
Soil Moisture



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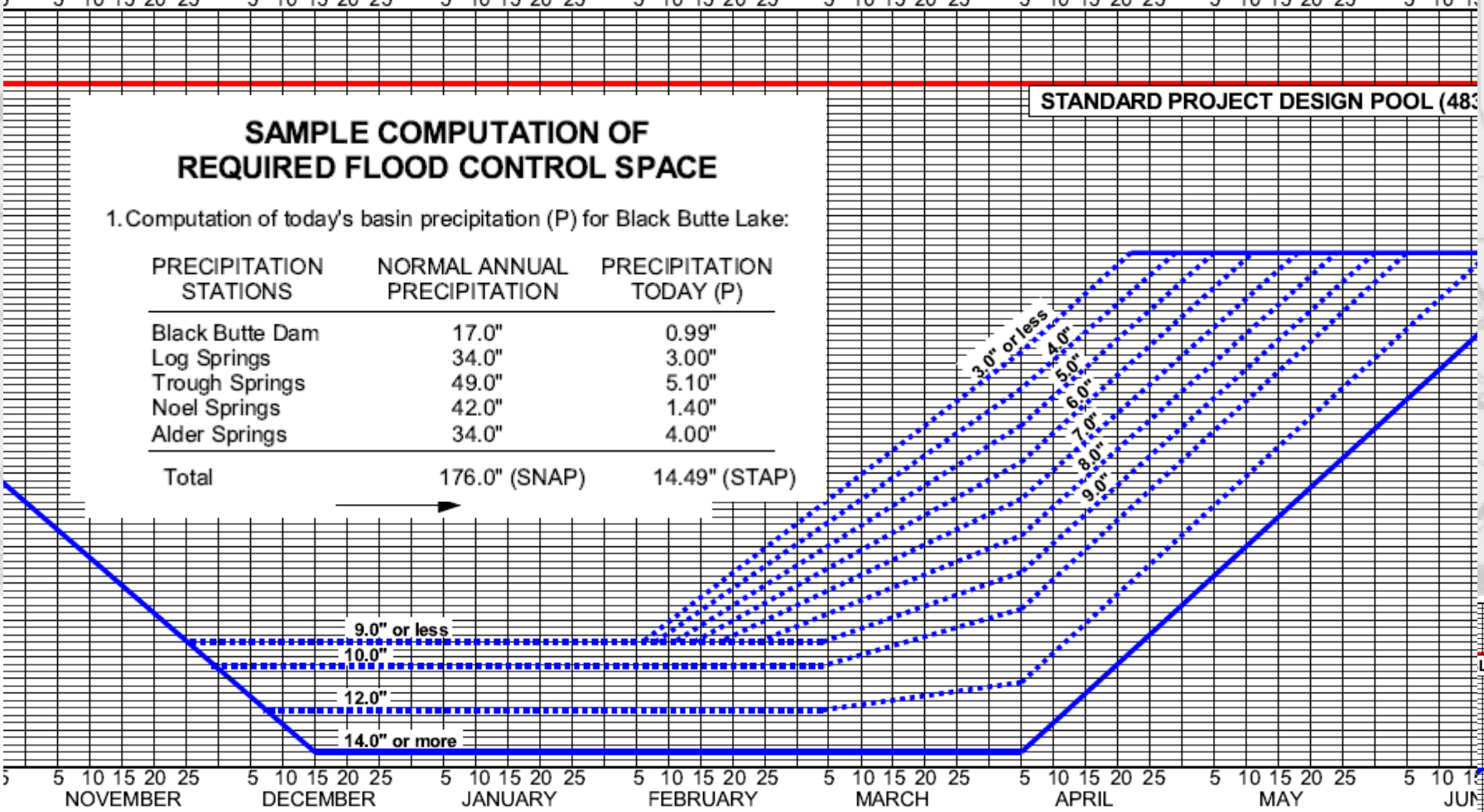
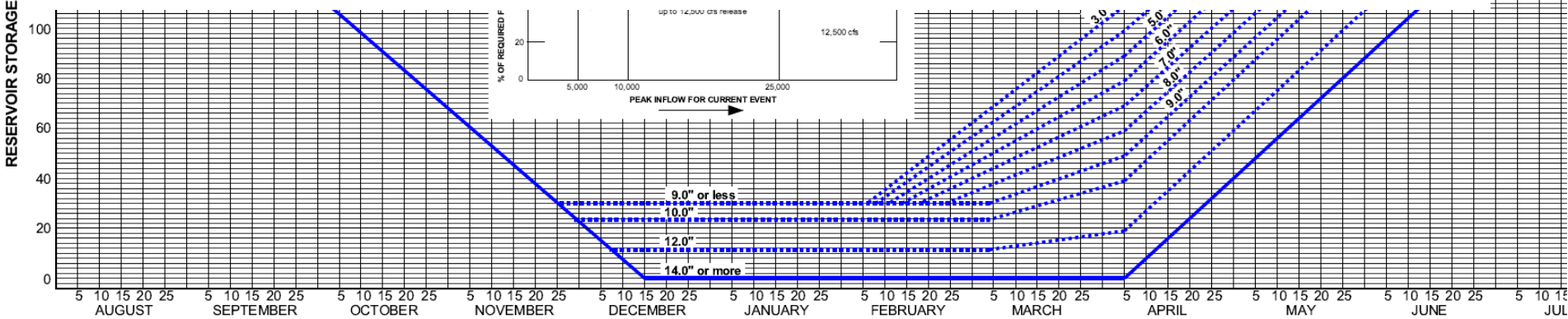
SAMPLE COMPUTATION OF REQUIRED FLOOD CONTROL SPACE

1. Computation of today's basin precipitation (P) for Black Butte Lake:

PRECIPITATION STATIONS	NORMAL ANNUAL PRECIPITATION	PRECIPITATION TODAY (P)
Black Butte Dam	17.0"	0.99"
Log Springs	34.0"	3.00"
Trough Springs	49.0"	5.10"
Noel Springs	42.0"	1.40"
Alder Springs	34.0"	4.00"
Total	176.0" (SNAP)	14.49" (STAP)





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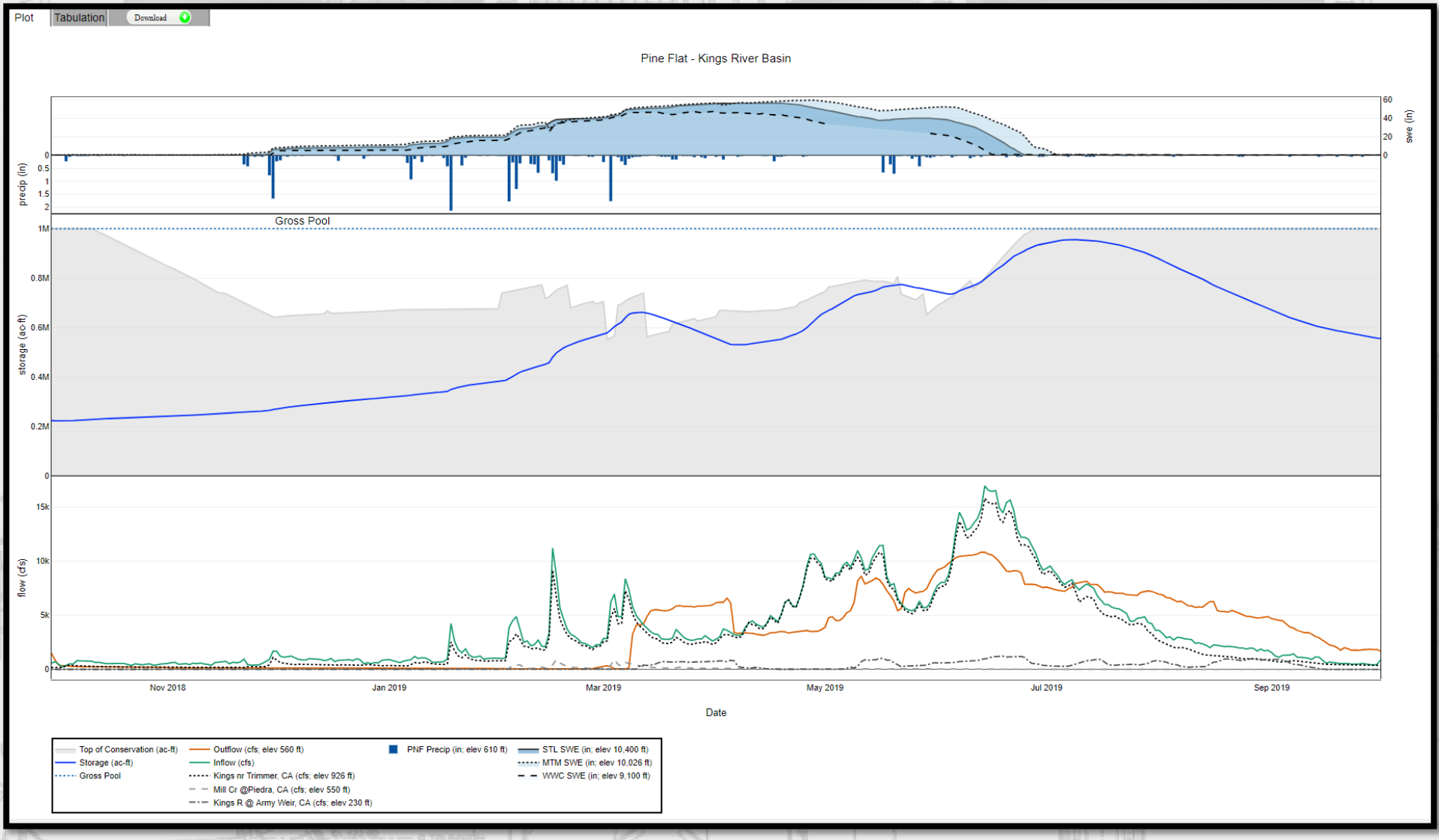

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http://www.spk-wc.usace.army.mil/

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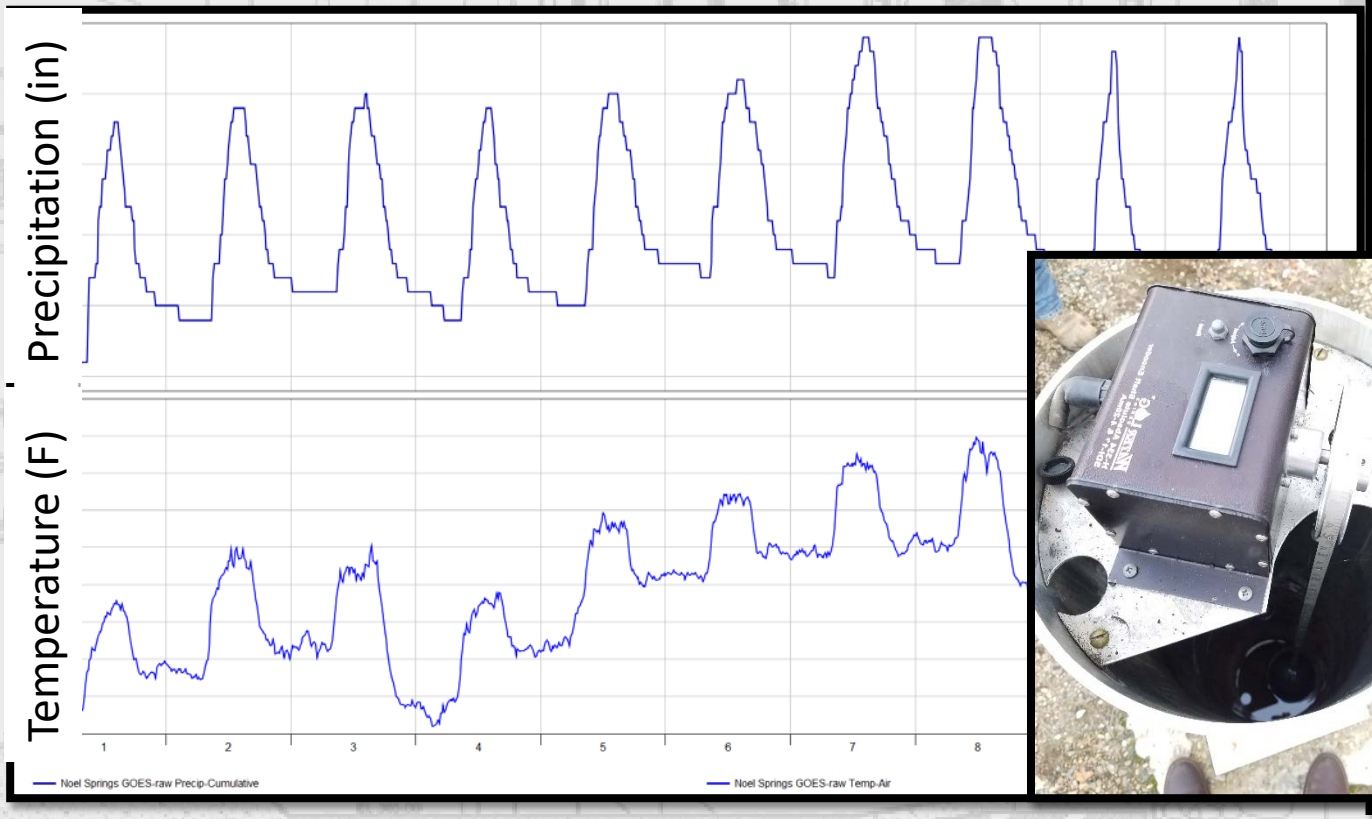
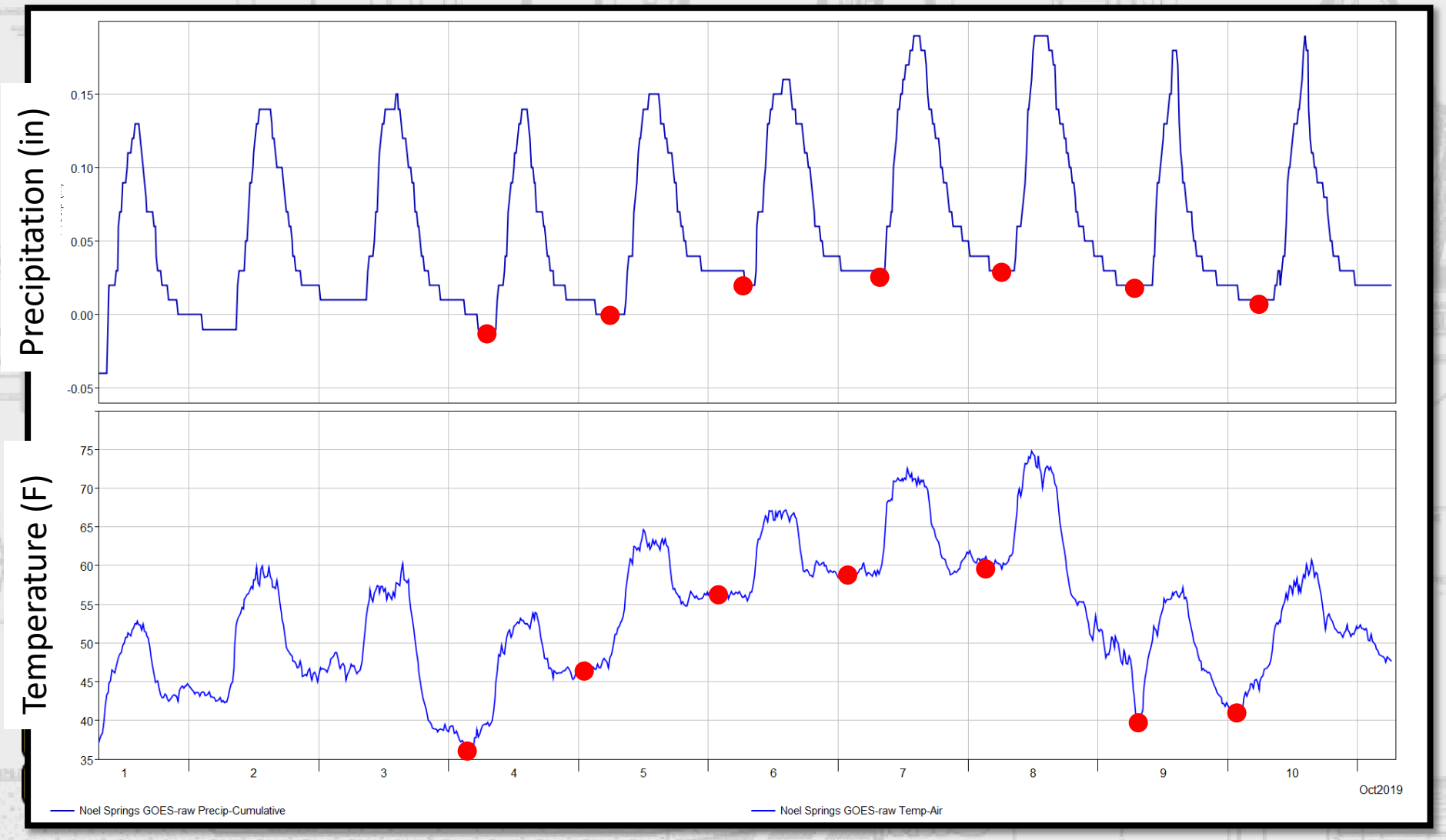
Removing Diurnal Precipitation Fluctuations



Removing Diurnal Precipitation Fluctuations



Summary

- Rebuild/refurbish mountain meteorological stations.
  - If you have $$$ and want continued data please help!!!
- New Sensors
  - Increasing soil moisture observations will improve flood forecasts, flood operations, and water resource management
- New data visualization
- Working to improve data quality control and provide historical quality controlled data

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