

Building Climate Monitoring Infrastructure in Nevada: Field science meets cyberinfrastructure along high elevational transects

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...and a cast of many more...

EPSCoR

Experimental Program to Stimulate Competitive Research



N

UNLV
UNIVERSITY OF NEVADA LAS VEGAS

eDRI
Desert Research Institute



NSF-EPSCoR: Research Grant

- \$15 million 5-year award (FY 2009 – FY 2013)

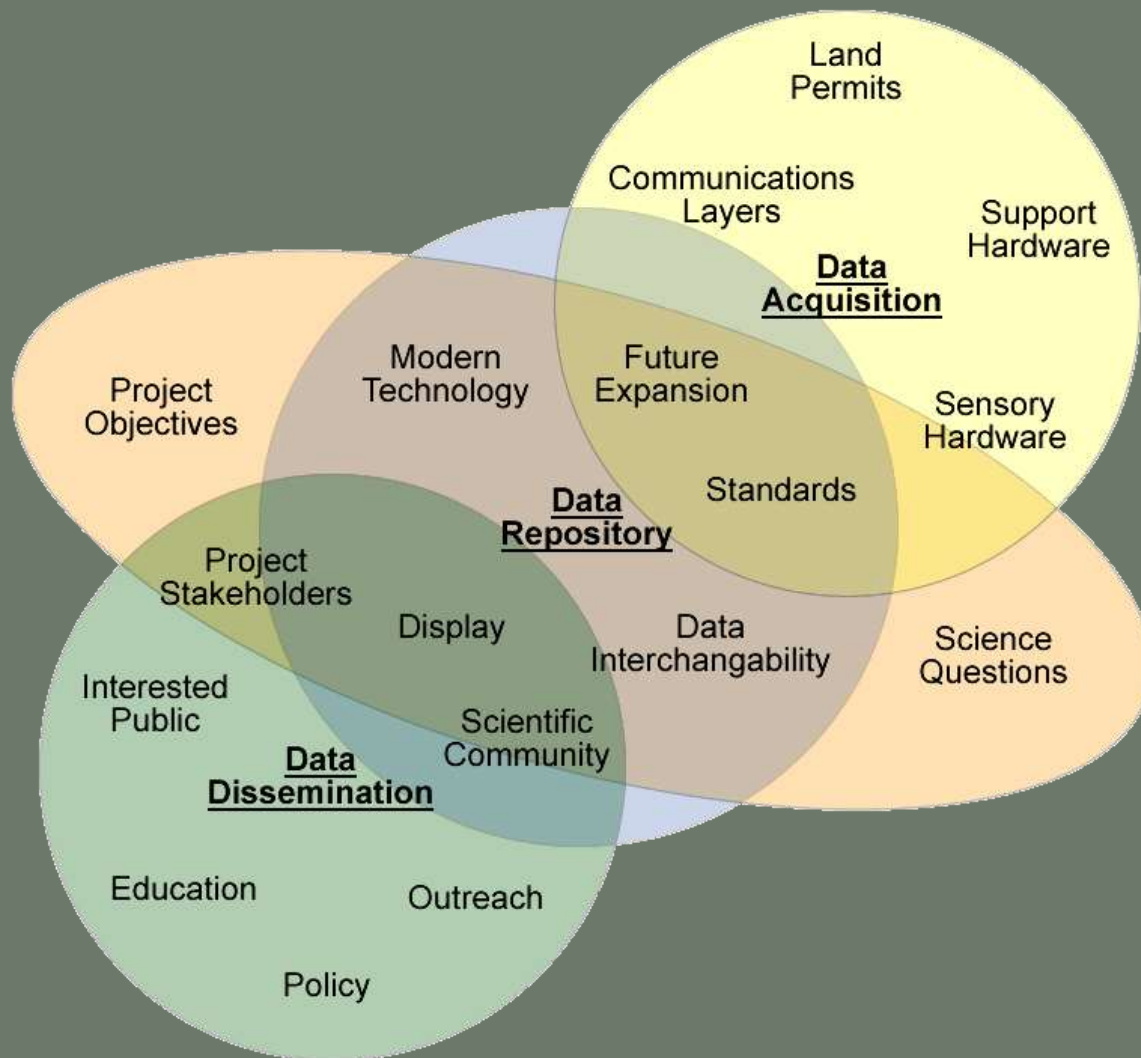
- Administered by UNR, UNLV, and DRI

“The project will create a statewide interdisciplinary program that will stimulate transformative research, education, and outreach on the effects of regional climate change on ecosystem services (especially water resources) and support use of this knowledge by policy makers and stakeholders.”

- Science, education, and outreach infrastructure

- Getting cutting-edge environmental research into Nevada and the Great Basin – not easy!

Translated: a broad mission!





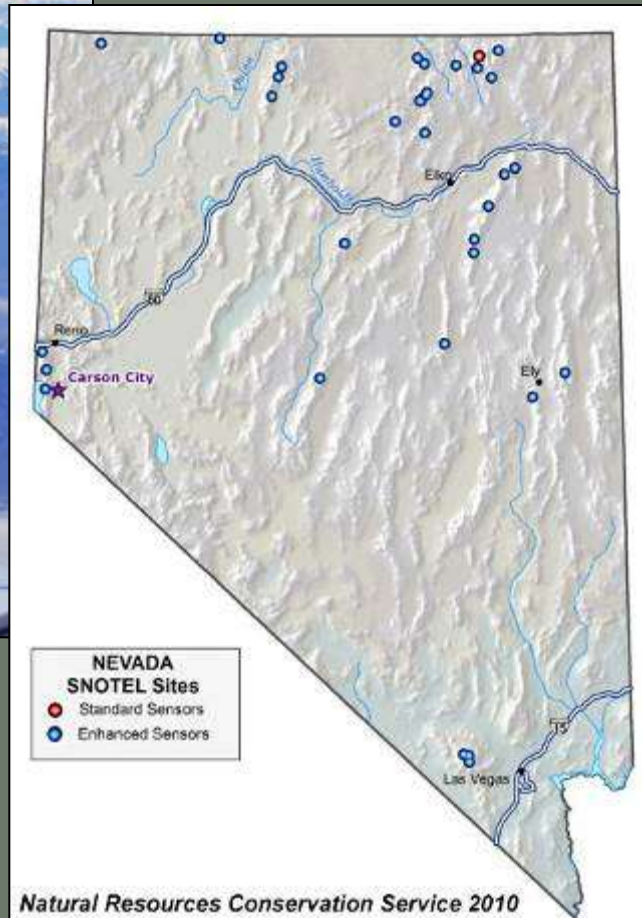
Primary Considerations

- Compatibility with historical climate data at minimum
 - Sensor deployment
 - Capture intervals
 - Datalogger programming, measurement units
- Robust and independent basic observations with expanded services
 - Discrete power/storage for 1hr Met averages
 - 1min & 10min intervals still have 400+ days of local storage
 - Large solar/battery arrays for expanded services
- High speed TCP/IP communications network
 - Supports real-time observation via PTZ cameras
 - Allows transmission of numerous or high-frequency variables
 - Enables 2-way comms for remote troubleshooting and control
 - Attractive to a wide audience of long-term collaborators
- Centralized access and management (Cyberinfrastructure)
 - Supports asset management/tracking system
 - Allows development of hardware management protocols

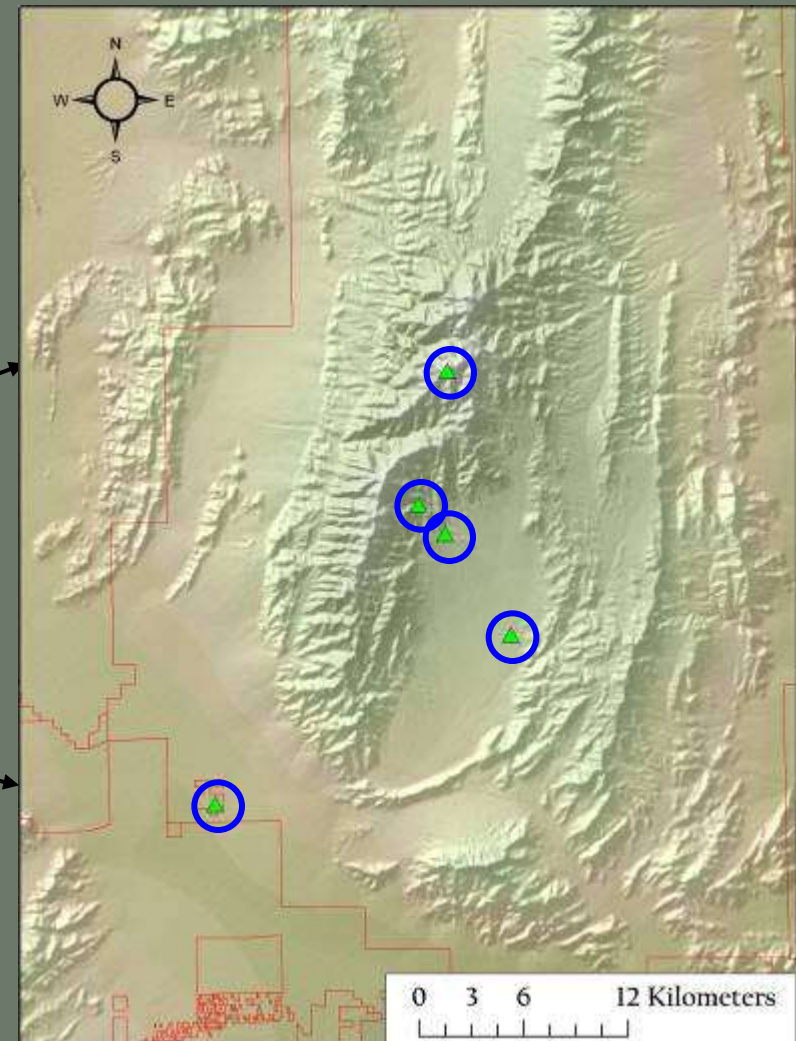
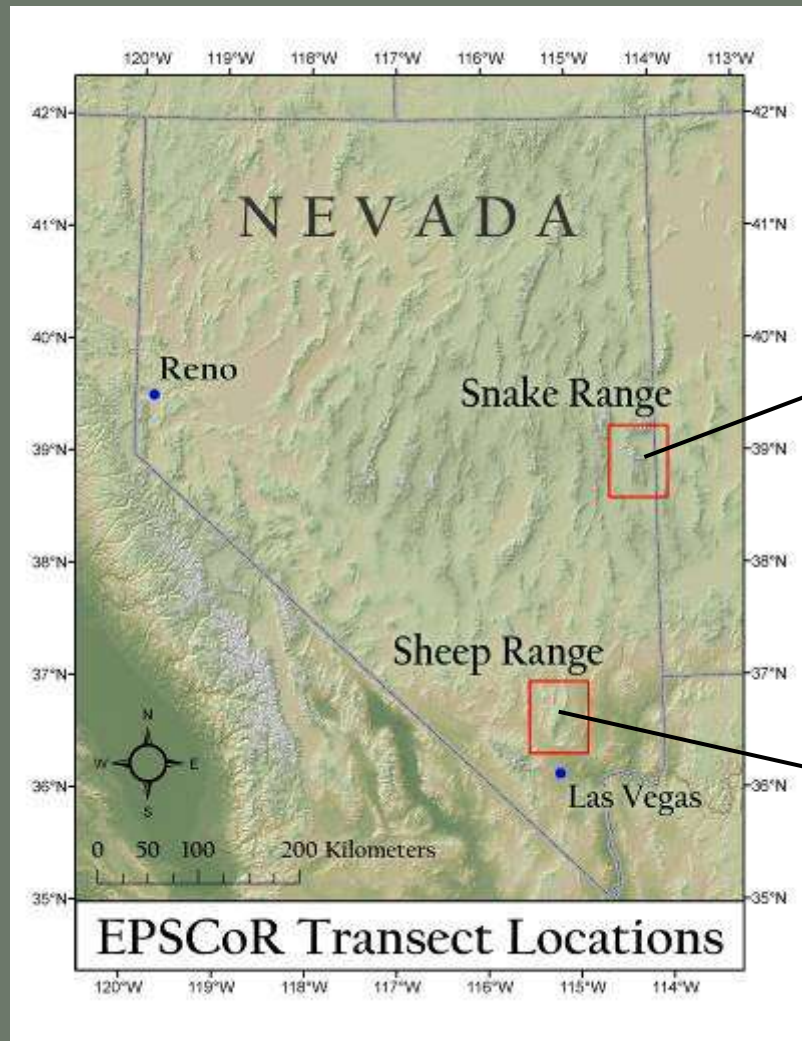
Importance of Elevation in Nevada



- Snowpack reservoir
- Groundwater recharge
- Basin/Range ecology



Nevada Monitoring Transects



Snake Range West Transect

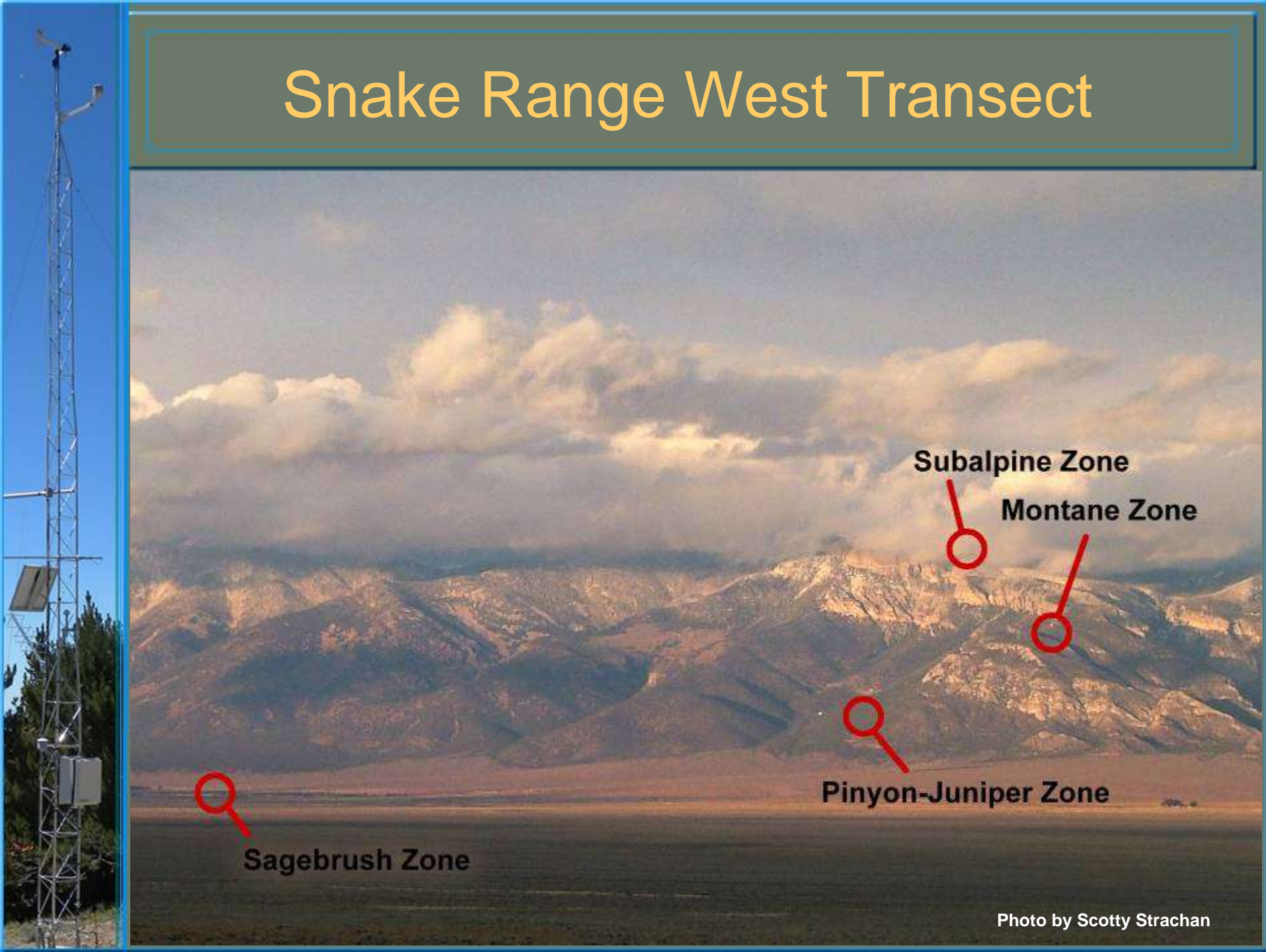
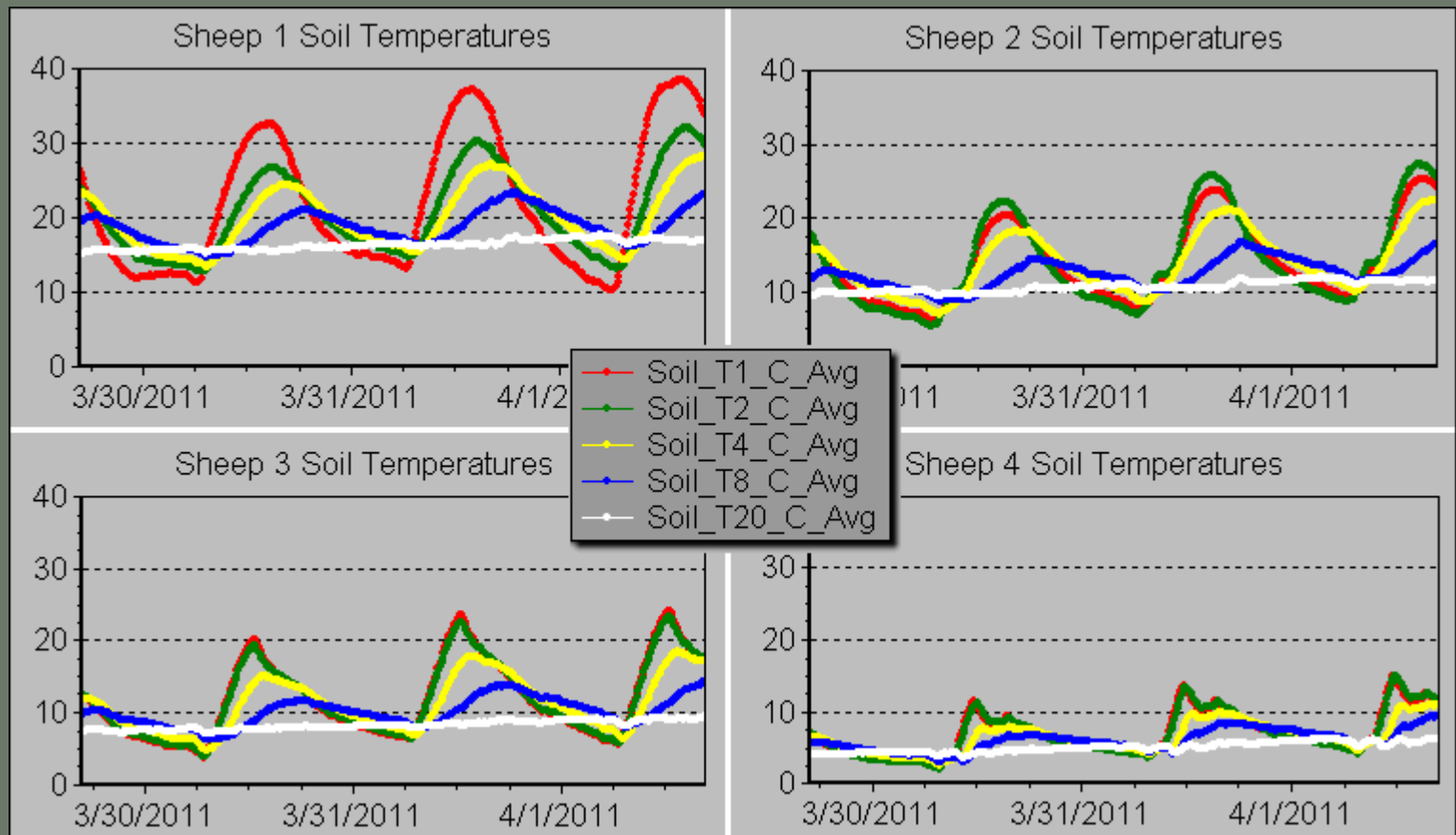


Photo by Scotty Strachan

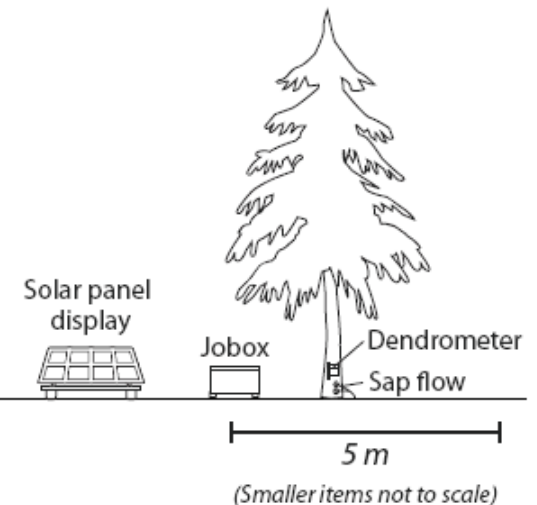
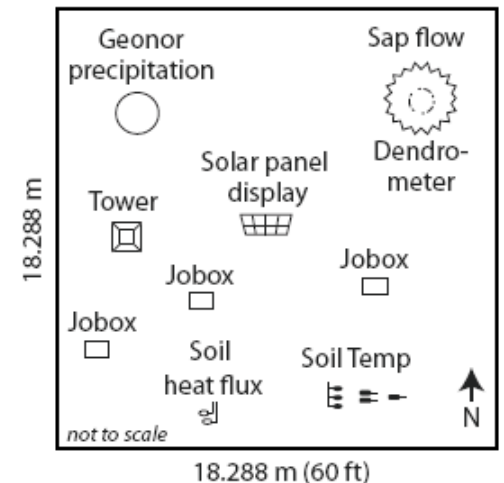
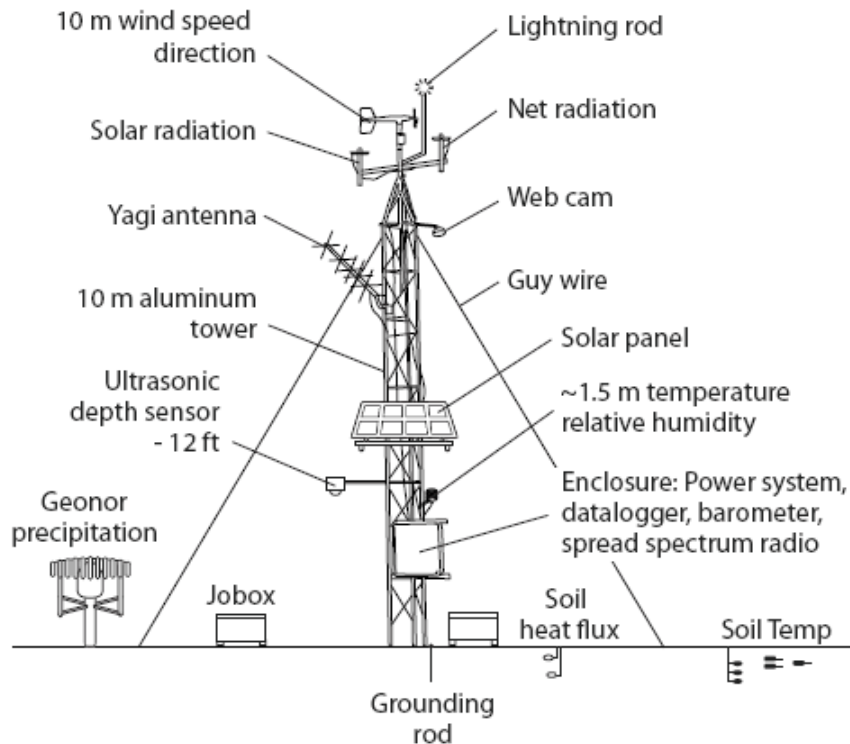
Data Across the Gradient



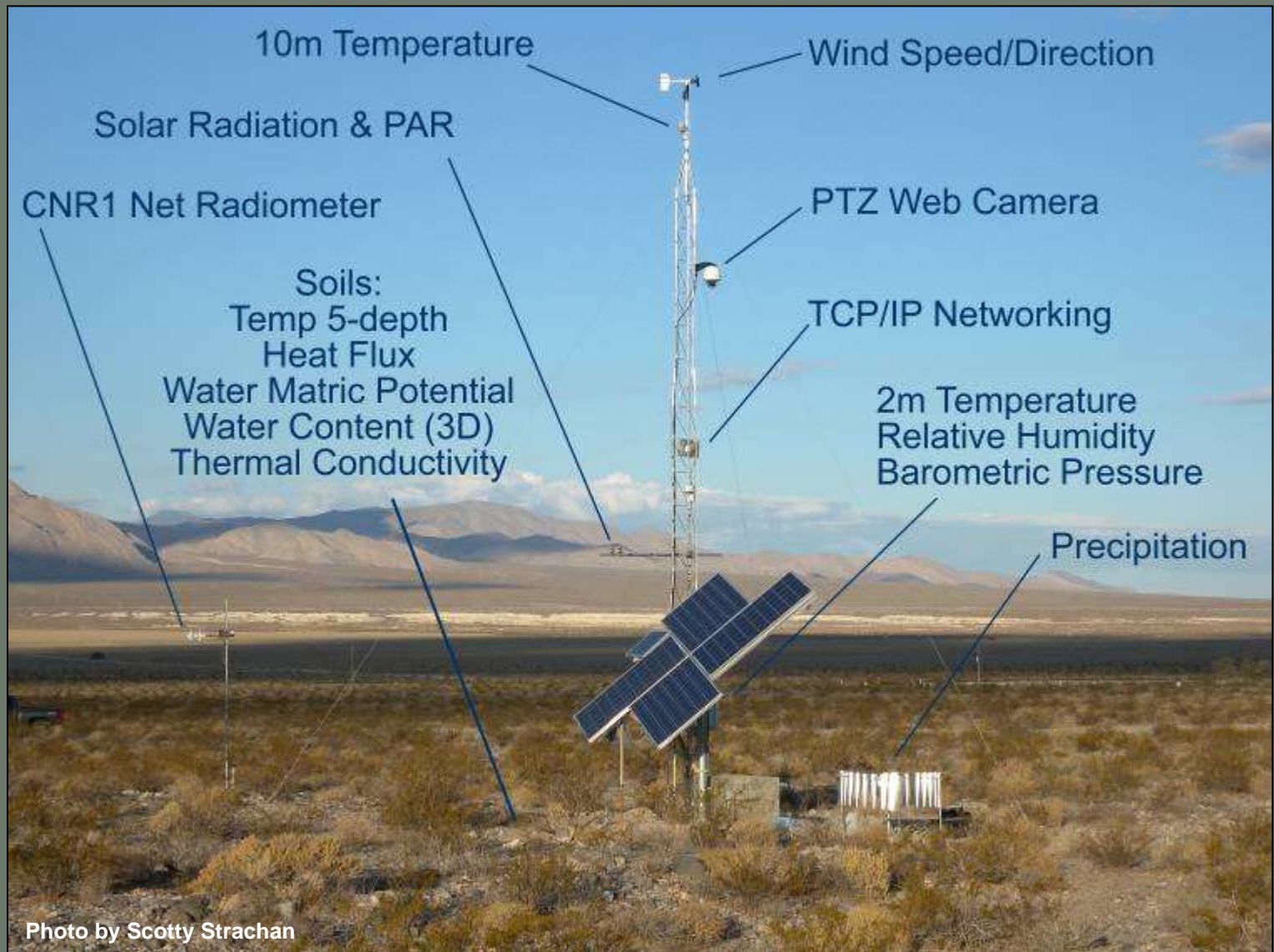
Basic Station Concept

- Baseline atmospheric, ecological, and hydrological monitoring
- Provide power generation and communications capability
- Plan for future experiments and monitoring additions

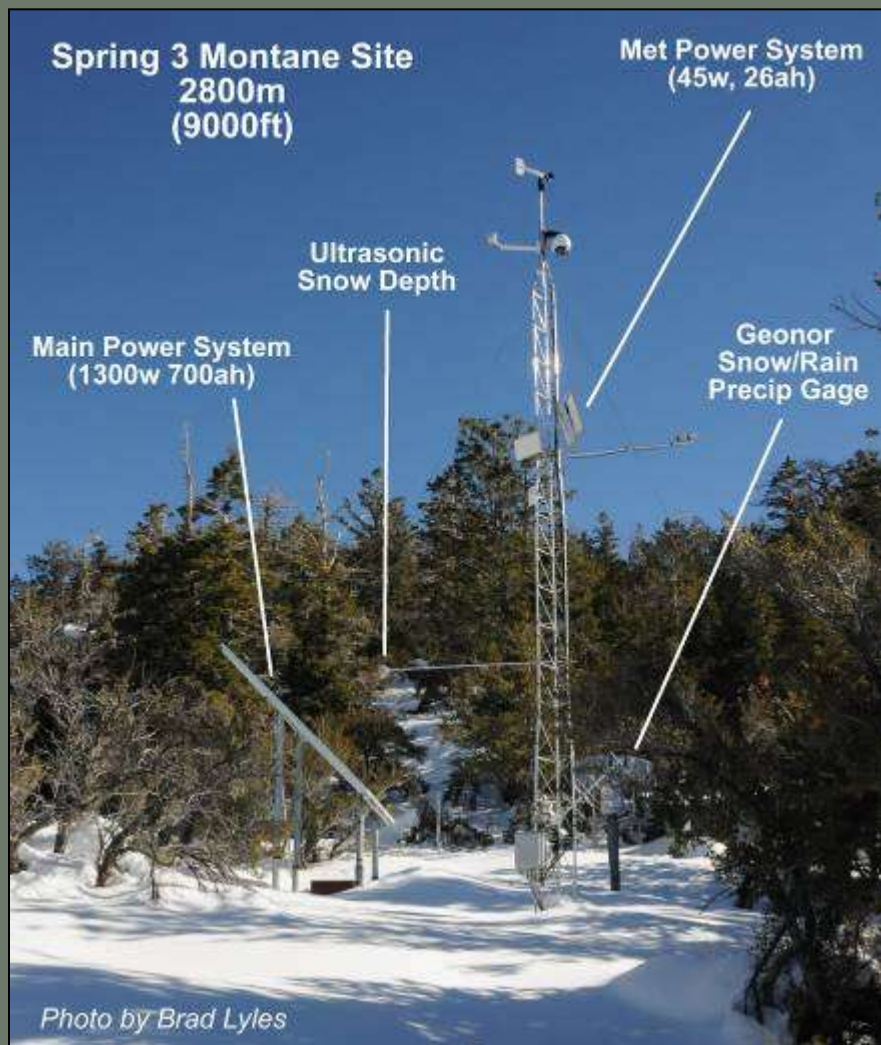
Concept graphic by L. Wable, J. Arnone, and D. Simeral



Basic Station Implementation



Basic Station Implementation



Webcam Photos, 4-07-2011, 11am local



Equipment



Photo by Scotty Strachan

Geonor Precipitation Gage



Photo by Scotty Strachan

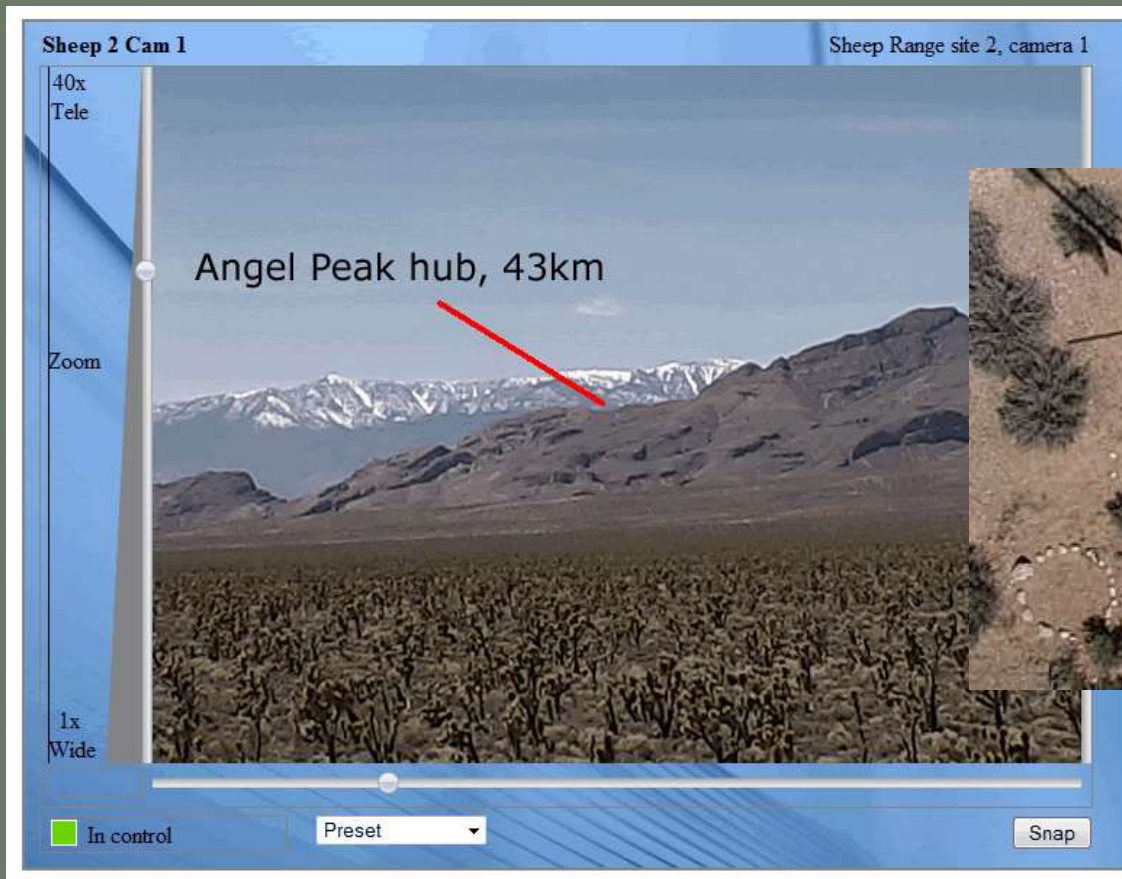
Equipment Enclosures



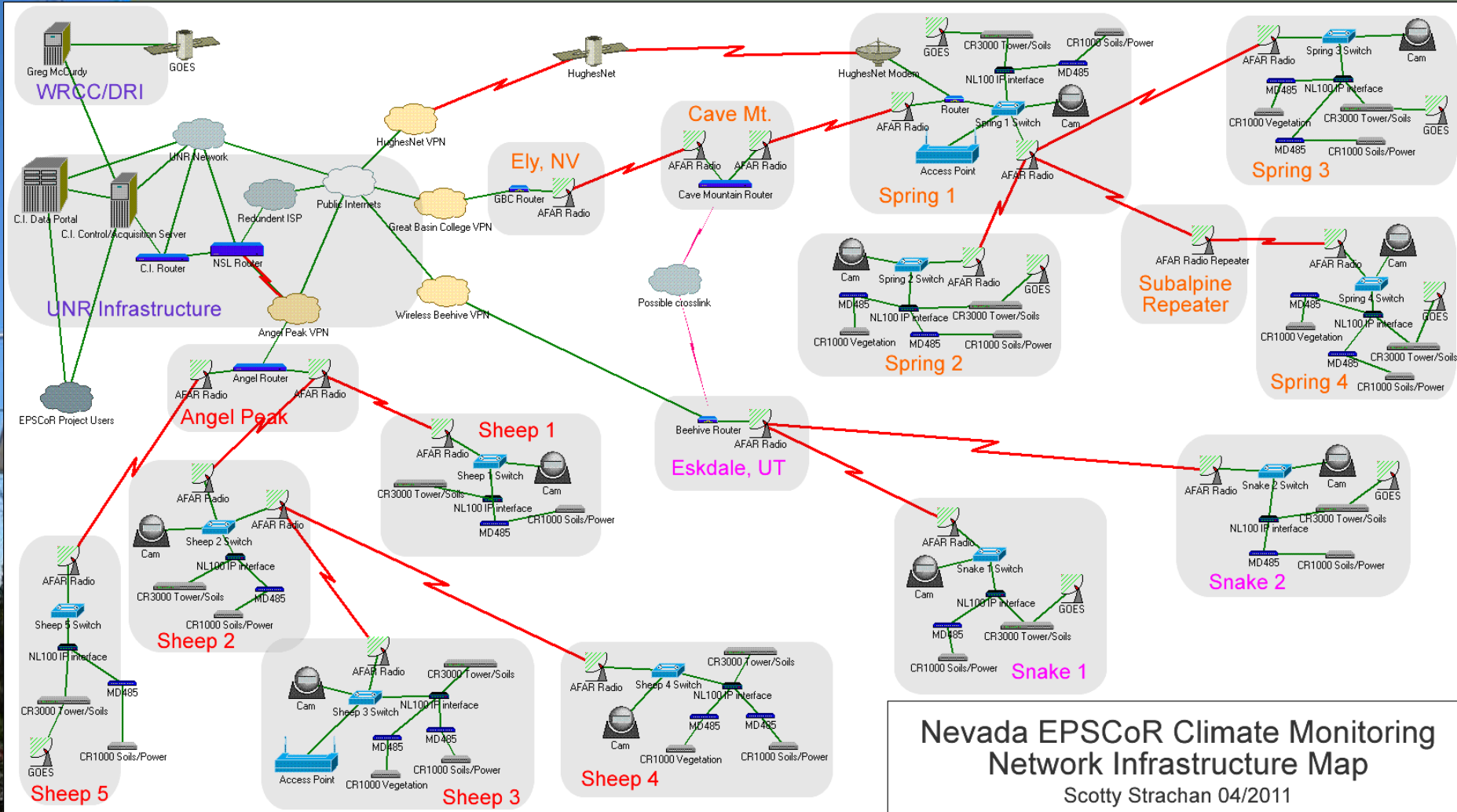
Photos by Scotty Strachan

Communications

- Full TCP/IP (Transmission Control Protocol / Internet Protocol) networking
- Managed subnets from the UNR campus
- AFAR Communications, Inc. field radios (11Mbps long range 2.4ghz)
- Mikrotik VPN routers w/mini-PCI AP card capability



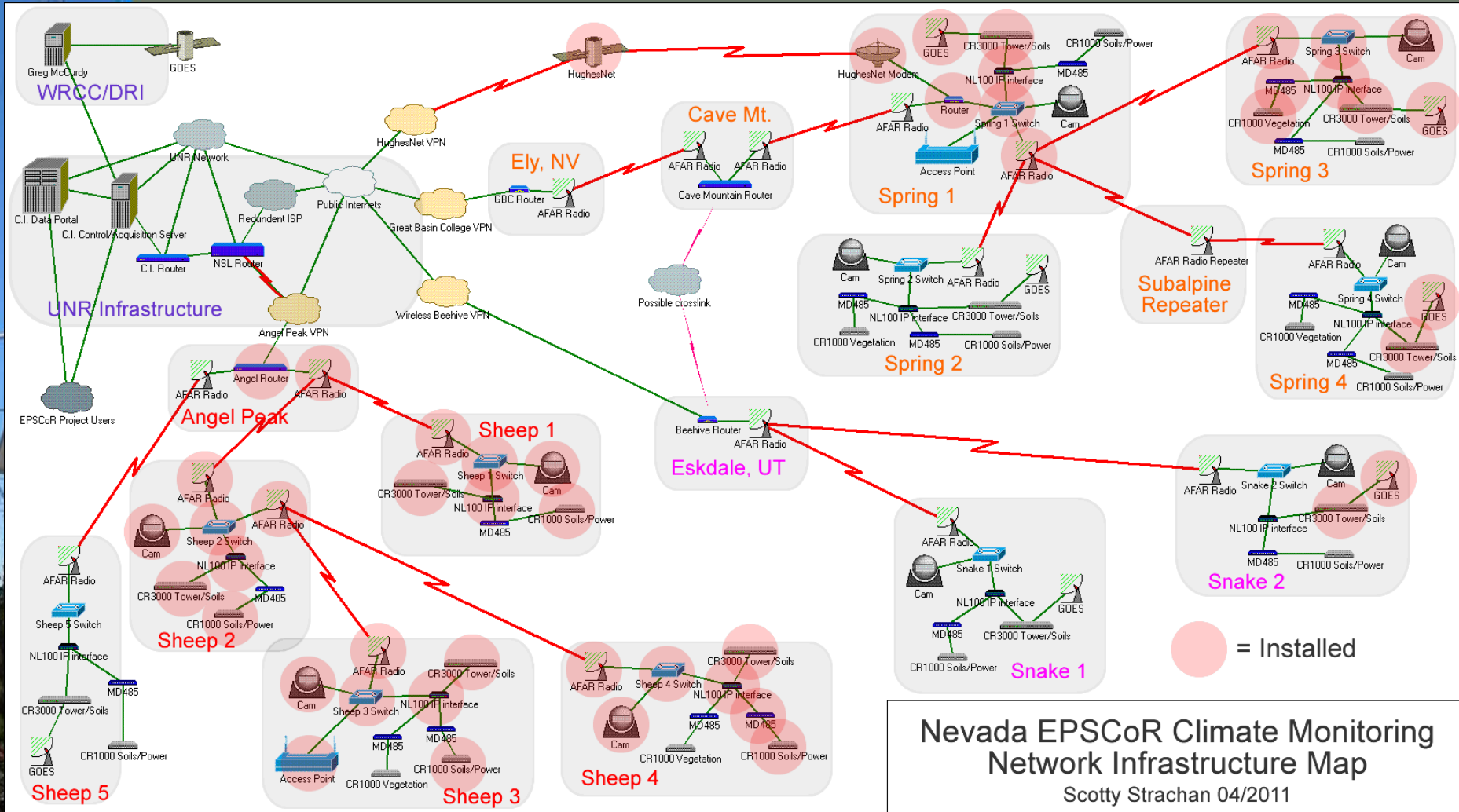
Networking Infrastructure Plan



Nevada EPSCoR Climate Monitoring
Network Infrastructure Map

Scotty Strachan 04/2011

Networking Infrastructure Installed



Nevada EPSCoR Climate Monitoring
Network Infrastructure Map

Scotty Strachan 04/2011

Cameras



Cameras: Seasonal Conditions



Cameras: Daily Conditions



Cameras: Equipment Monitoring



Snowpole



Scale

Taken Live
4/16/11
11:20am
Pacific



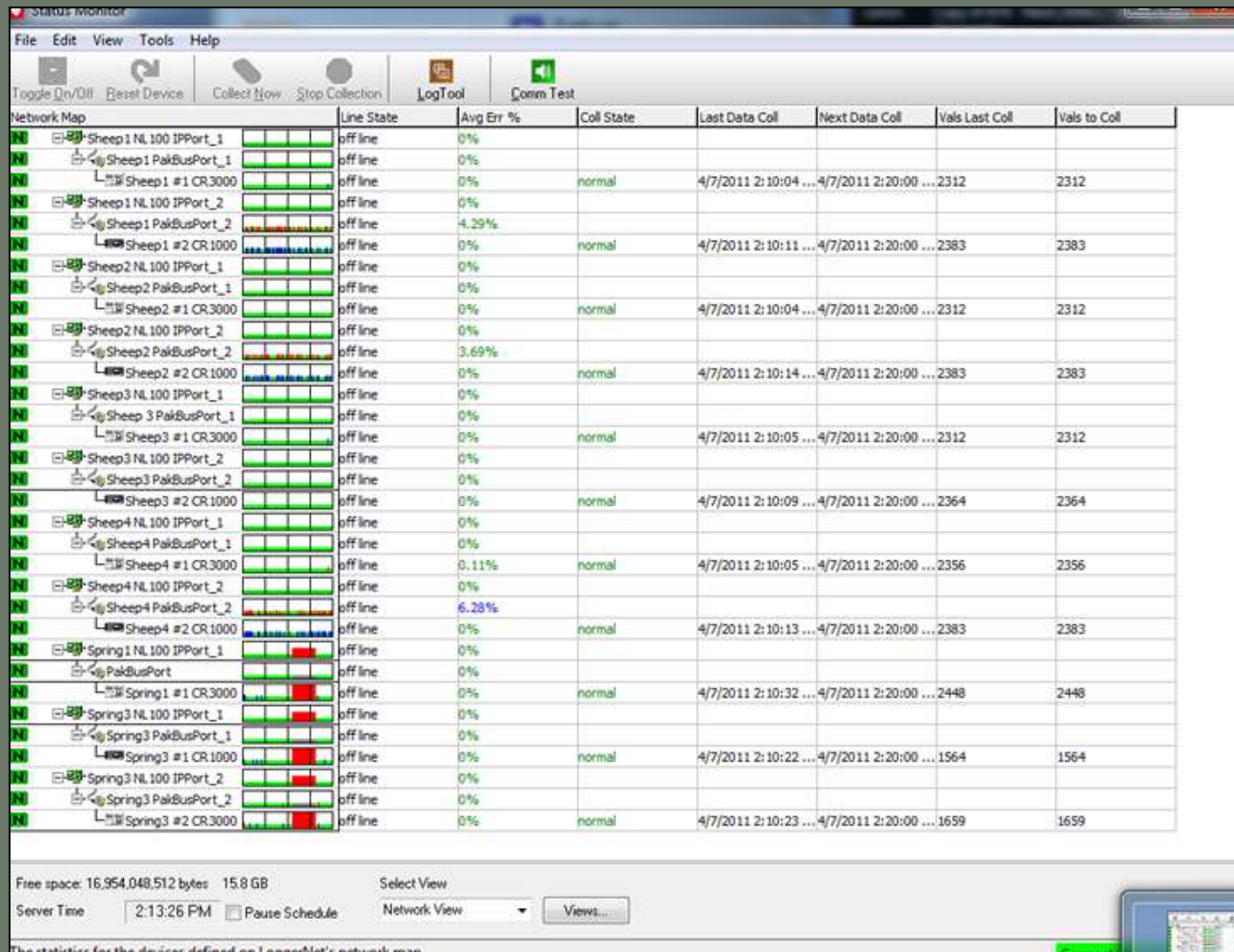
Rain
Gage
orifice



Radiation
Sensors



Live Control



Live Control



Questions?

Acknowledgements

Transect Partners & Landowners:

- Nevada Seismological Laboratory
- Long Now Foundation
- Great Basin College, Ely Campus
- Nevada Land Conservancy
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- Bureau of Land Management

Project P.I.'s:

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Ecology & Water Components Leadership:

Franco Biondi, Lynn Fenstermaker, Sergiu Dascalu, Dale Devitt, Jay Arnone, Laurel Saito, Michael Young, Fred Harris, Brett Riddle

Significant Transect Personnel and Assistants:

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