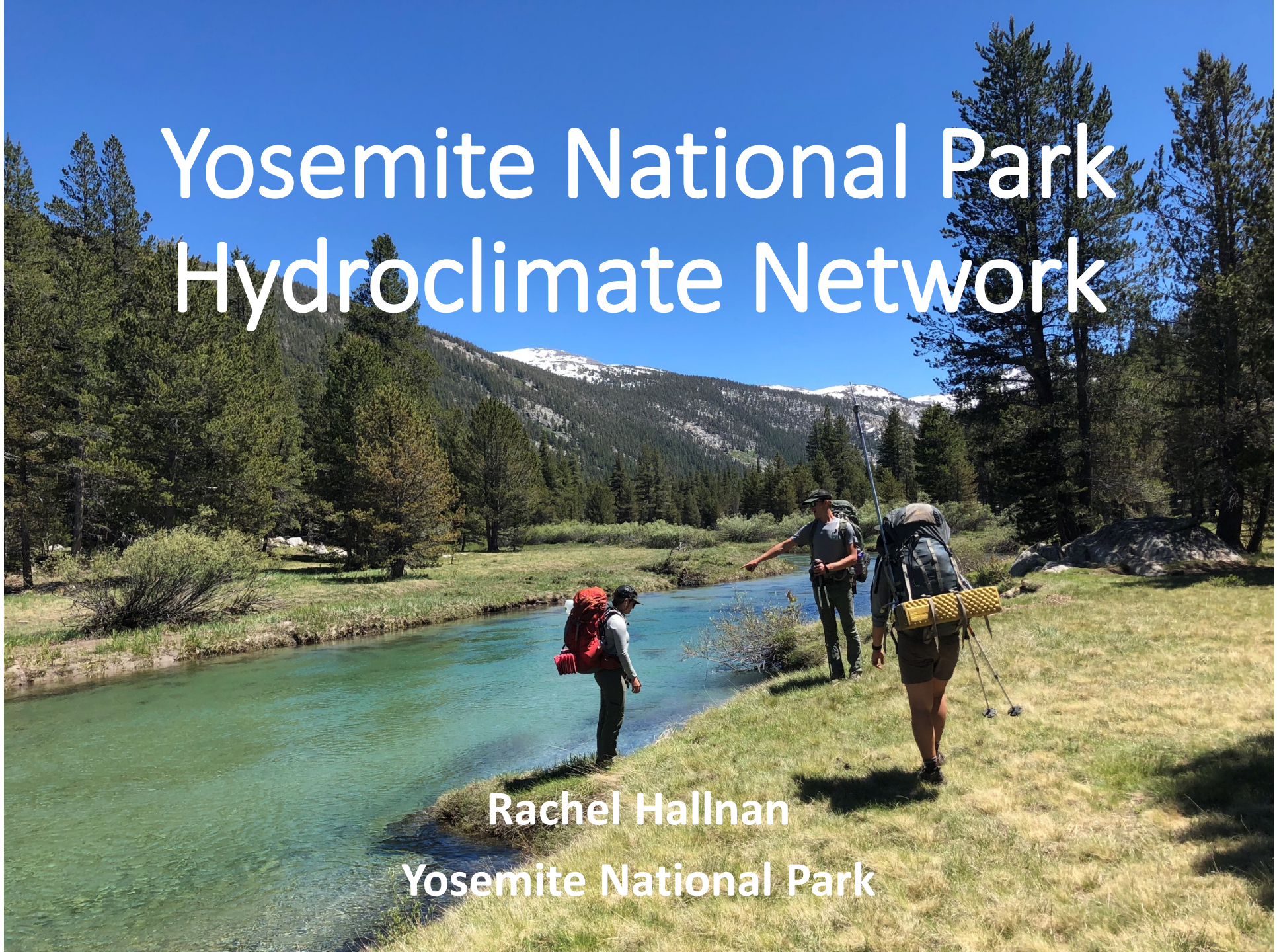
Yosemite National Park Hydroclimate Network



Rachel Hallnan

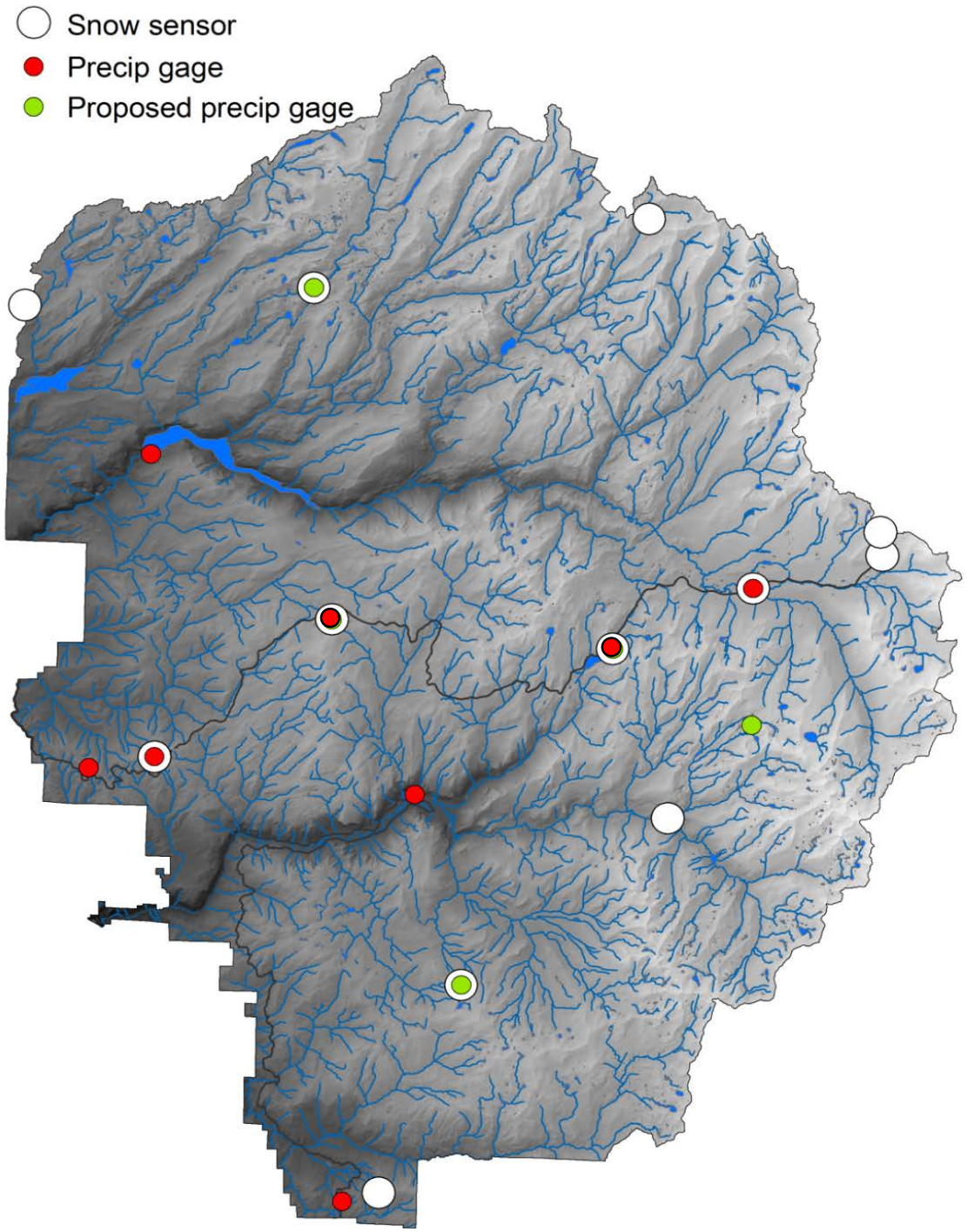
Yosemite National Park

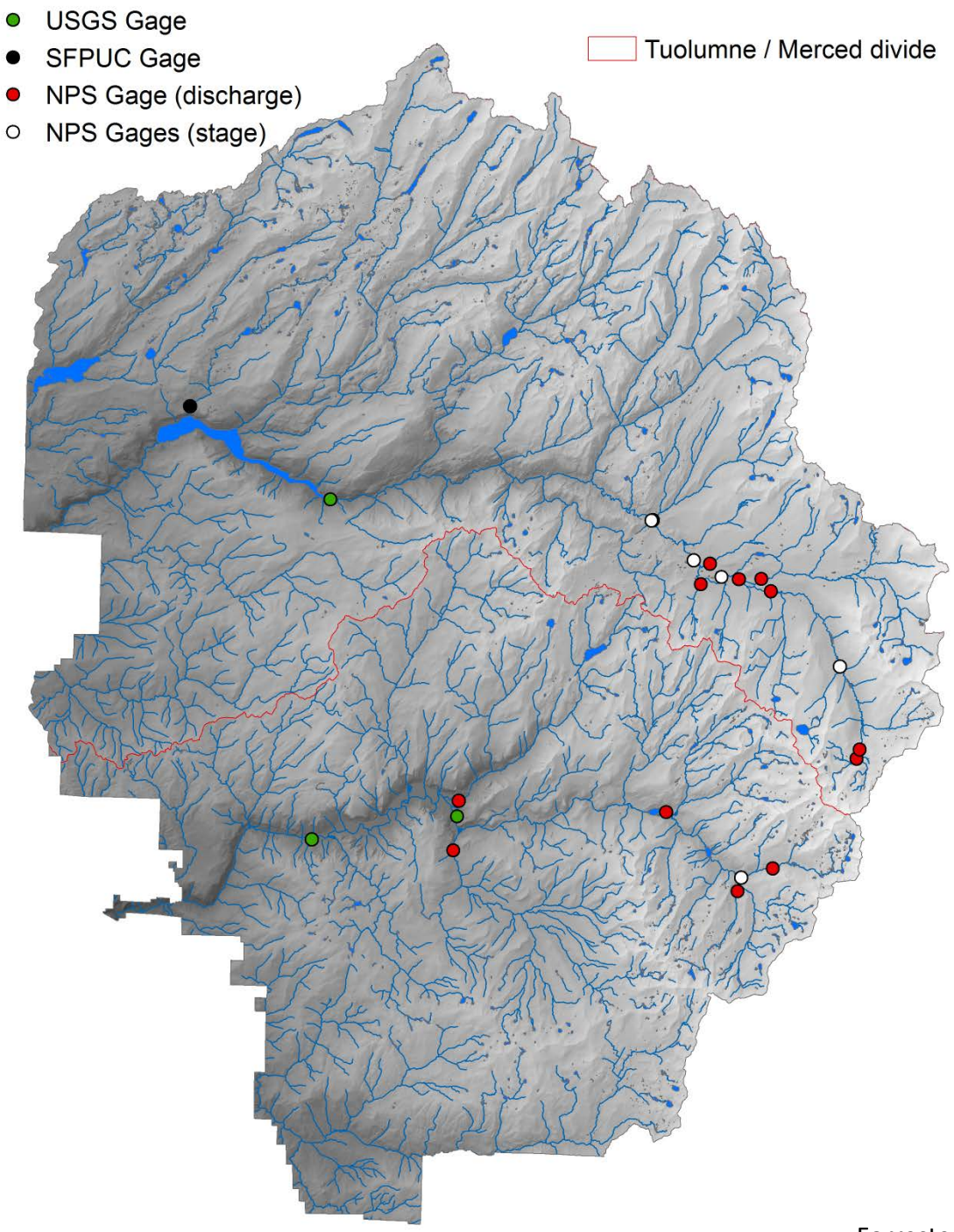
History of Hydrology in Yosemite National Park

- 1915 – Happy Isles Gage
- 1930's Snow Survey Program
- 1980's Snow Towers
- Early 2000's – Distributed Stream Gaging
- 2010's – Snow Sensor Modernization

Happy Isles Gage – Merced River

https://nwis.waterdata.usgs.gov/ca/nwis/



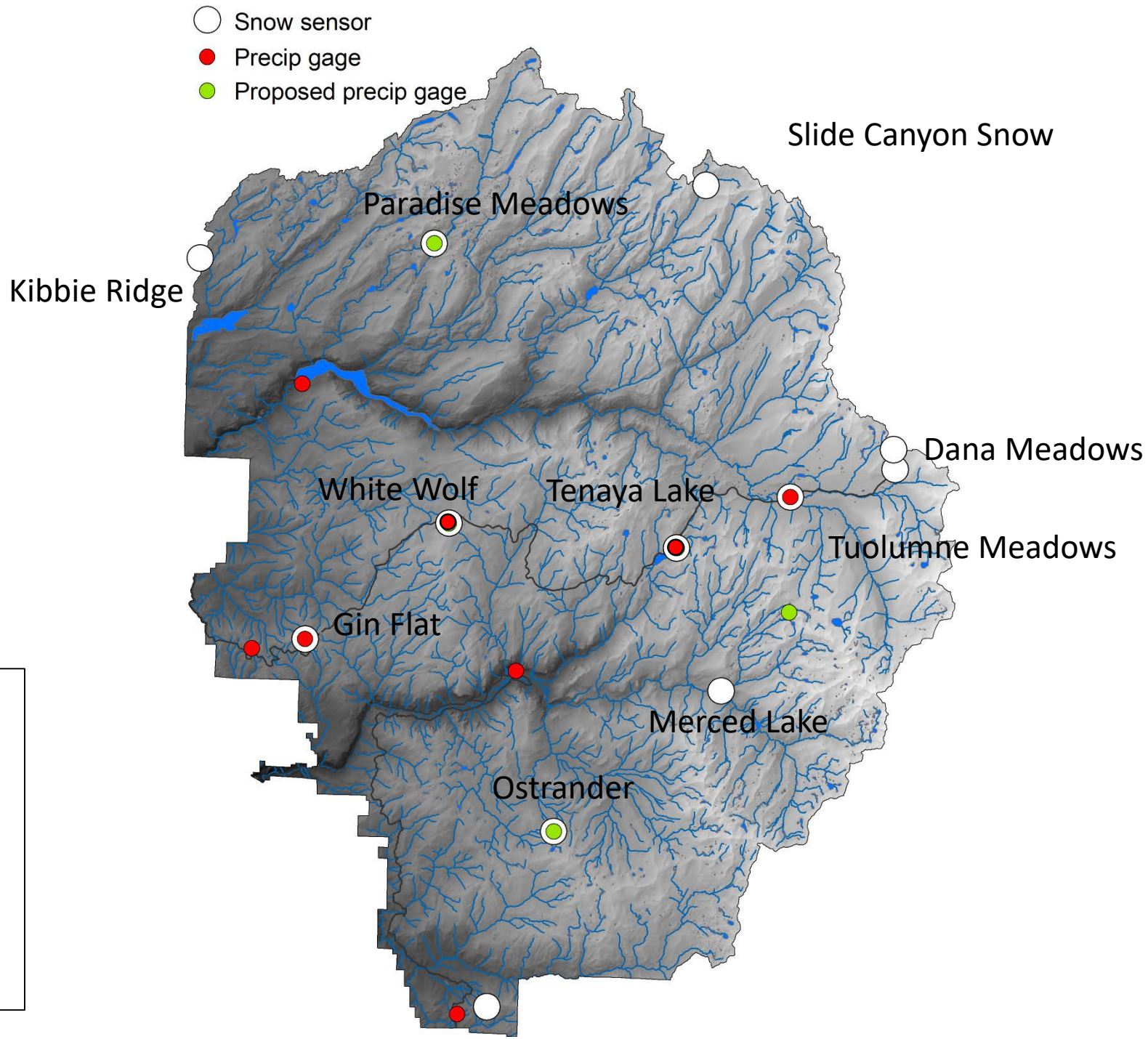


Forrester, 2018

Snow Network

9 in Tuolumne,
4 in Merced,
<u>9 of 13 in designated wilderness</u>

Standardized Installations: Snow Sensor Modernization



Slide Canyon (9199 ft)

Instrumentation:

- Snow Pillow – CS 456
- Temperature/Relative Humidity: CS215
- Soil Moisture Probes – CS650
  - 5cm, 10cm, and 15cm
- Datalogger – CR1000
- Snow Depth - Judd
- Wind – Vaisala 2D Anemometer WAS425A
- Net Radiometer - NRLite
- Pyranometer – Li 200

Solar system:

- 20Watt Solar Panel
- 55 AmpHr Battery
- Ch200 Solar controller

Ostrander Lake (8199 ft)

Instrumentation:

- Snow Pillow – CS 456
- Temperature/Relative Humidity: CS215
- Soil Moisture Probes – CS650
- 5cm, 10cm, and 15cm
- Datalogger – CR1000
- Snow Depth - Judd
- Wind – Vaisala 2D Anemometer WAS425A
- Net Radiometer - NRLite
- Pyranometer – Li 200
- Tipping Bucket Precipitation – TR525

Solar system:

- 20Watt Solar Panal
- 104 AmpHr Battery

Gaylor Pit (9200 ft)

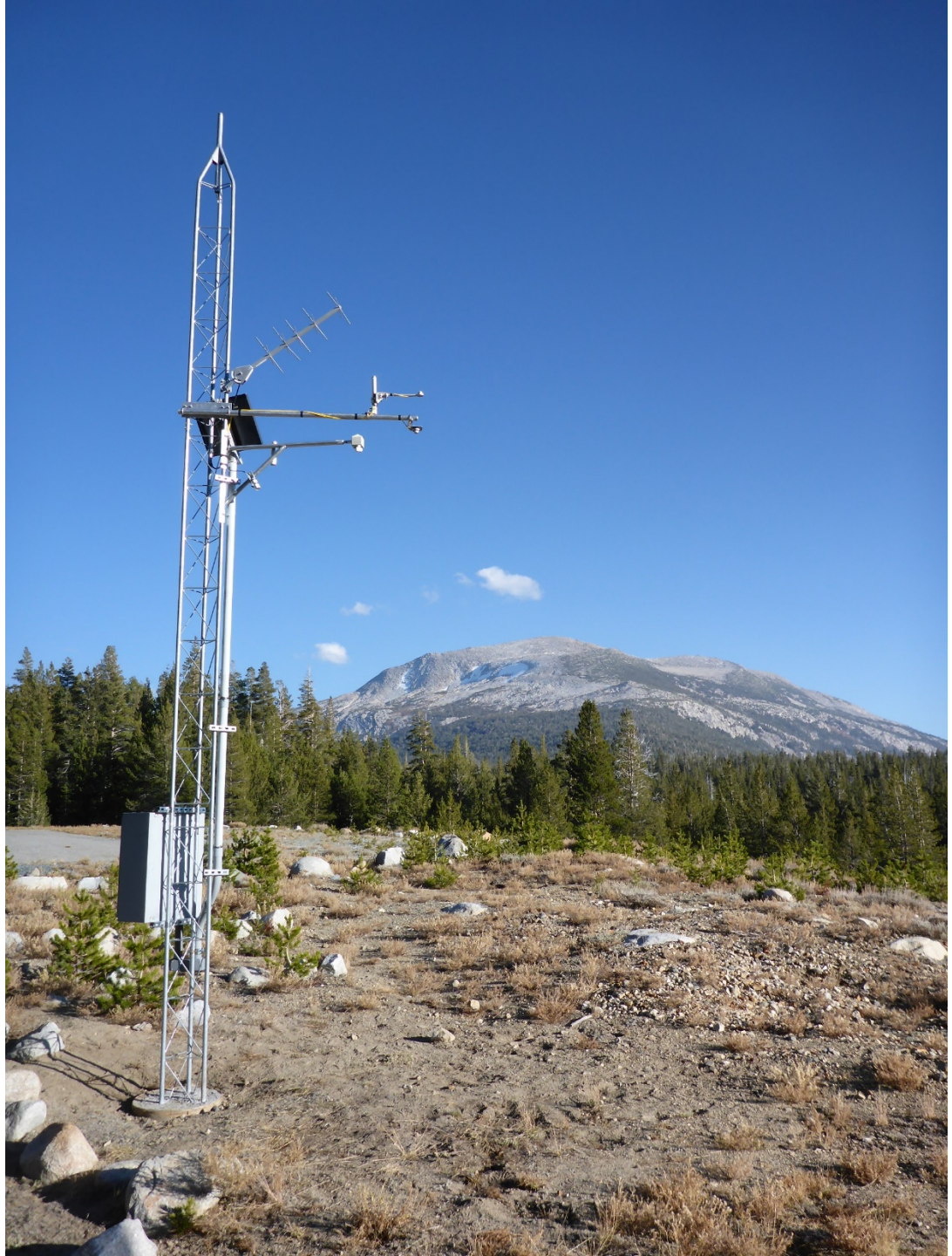
Instrumentation:

- Datalogger – CR1000
- Snow Depth - Judd
- Wind – Vaisala 2D Anemometer
- **Apogee Infared Temperature**
- **Pyranometer (upward and downward facing) – Li 200**

Solar system:

- 30Watt Solar Panal
- 55 AmpHr Battery

Now Online on CDEC: Site Code GYP



Tuolumne Meadows (8600ft)

Instrumentation:

- Snow Pillow – CS 456
- Temperature/Relative Humidity: CS215
- Soil Moisture Probes – CS650
  - 5cm, 10cm, and 15cm
- Datalogger – CR1000
- Snow Depth - Judd
- Wind – Vaisala 2D Sonic Anemometer
- Net Radiometer - NRLite
- Pyranometer – LI-COR 200
- **Apogee Infrared Temperature**
- **Total Accumulation / Bulk Precipitation**
- Tipping Bucket Precipitation – TR525

Solar system:

- 50 Watt Solar Panal
- 120 AmpHr Battery

Tenaya Lake (8,150 ft)

Instrumentation:

- Snow Pillow – CS 456
- Temperature/Relative Humidity: CS215
- Soil Moisture Probes – CS650
  - 5cm, 10cm, and 15cm
- Datalogger – CR1000
- **Total Accumulation / Bulk Precipitation**
- Snow Depth - Judd
- Wind – Vaisala 2D Sonic Anemometer
- Net Radiometer - NRLite
- Pyranometer – LI-COR 200

Solar system:

- 50Watt Solar Panal
- 55 AmpHr Battery
- Ch200 Solar controller

White Wolf (8,025 ft)

RAWS Site :

Instrumentation:

Snow Pillow – CS 456

- Temperature/Relative Humidity: THS-3
- **HOBO Pendant Temp/Light**
- Datalogger – FTS Axiam
- Snow Depth - Judd
- Pyranometer – SDI-SR-PYR
- **Total Accumulation / Bulk Precipitation**
- Tipping Bucket Precipitation – RG-T

Solar system:

- 20Watt Solar Panals
- 100AmpHr Battery

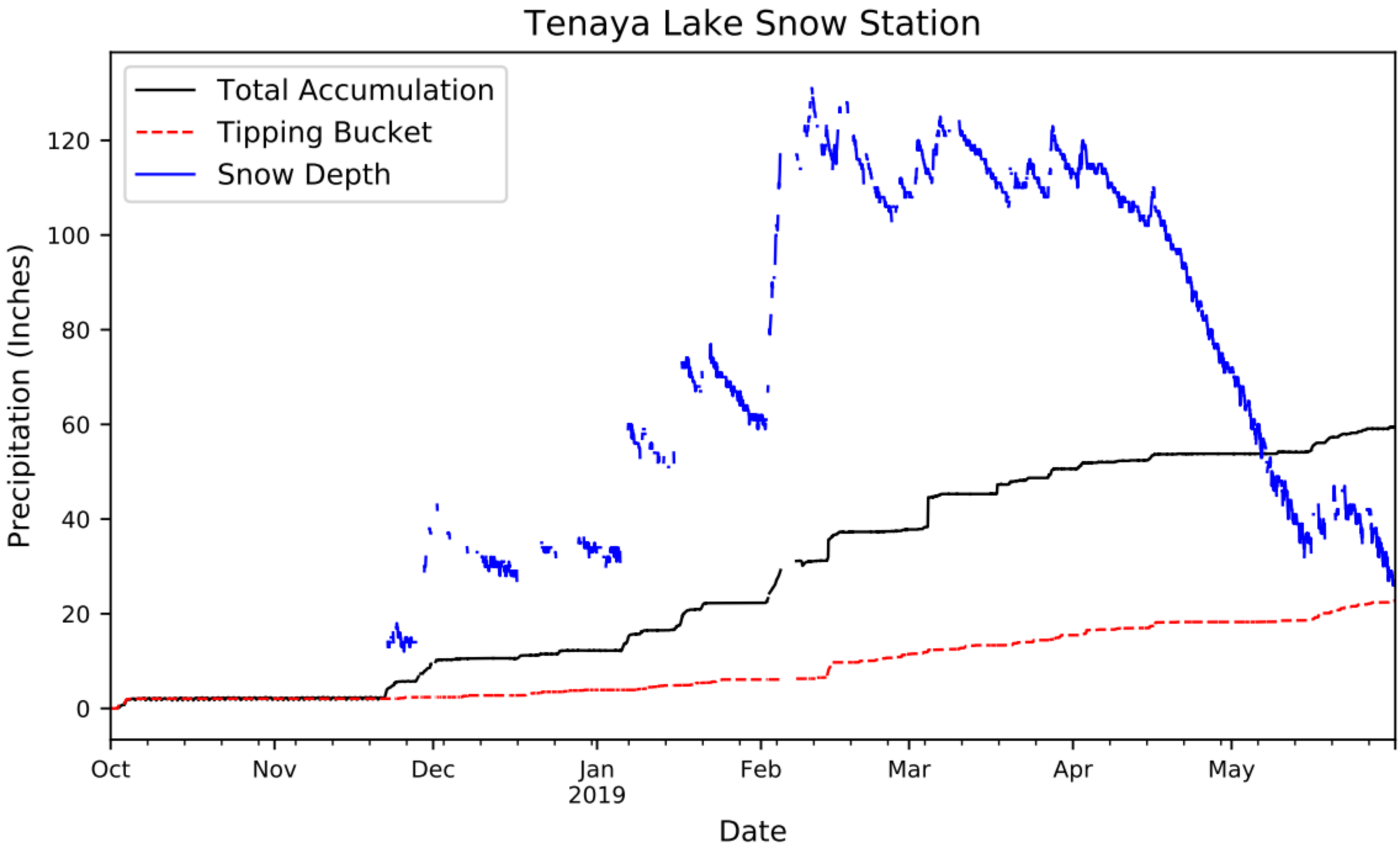
Total Accumulation Gages: 1 Year Later

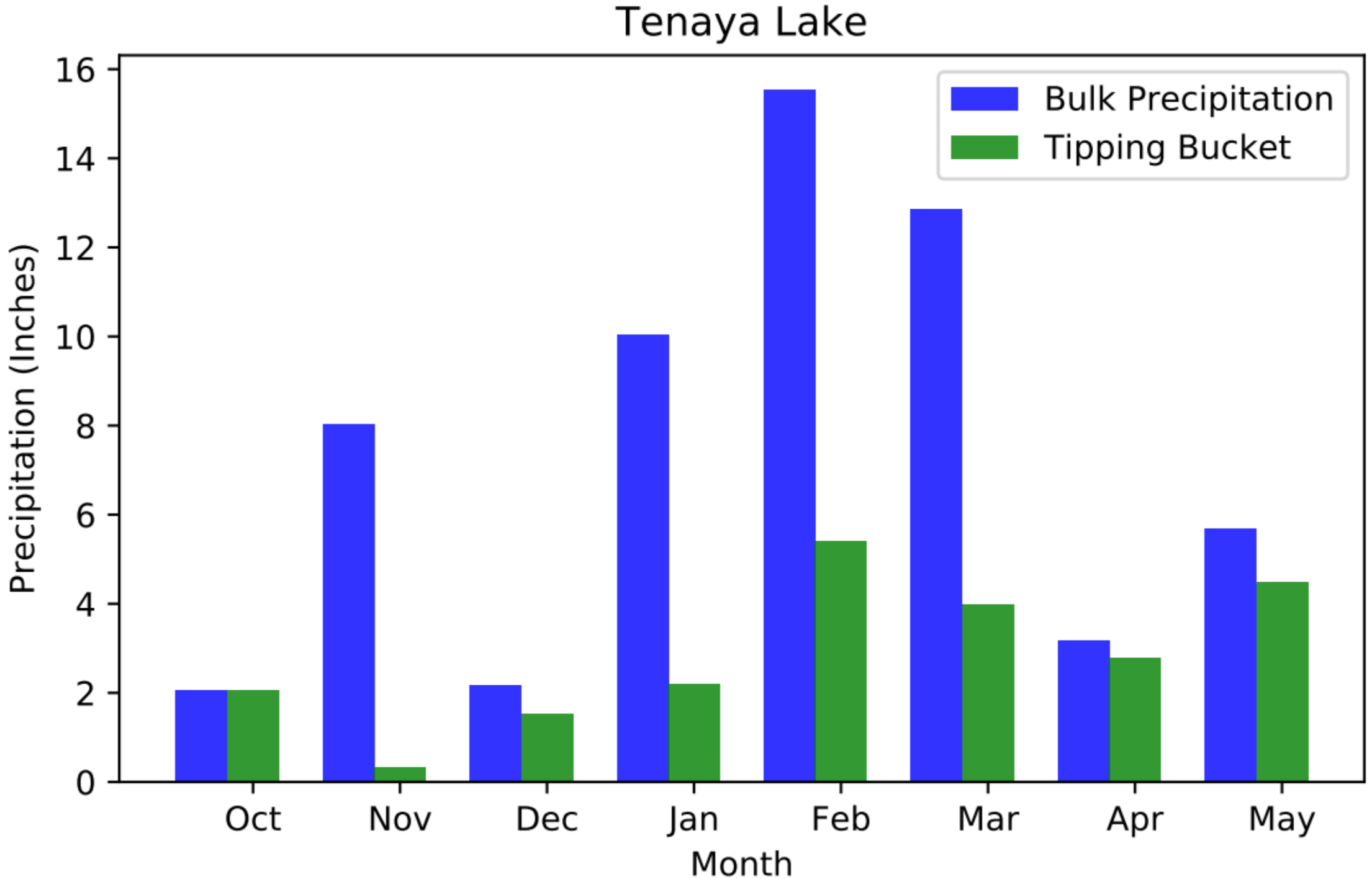
White Wolf Total Accumulation Gage

Tenaya Lake Total Accumulation Gage

Tenaya Lake

White Wolf


Tenaya Lake Snow Station
Total Accumulation
Tipping Bucket
Snow Depth
Precipitation (Inches)
120
100
80
60
40
20
0
Oct
Nov
Dec
Jan
2019
Feb
Mar
Apr
May
Date

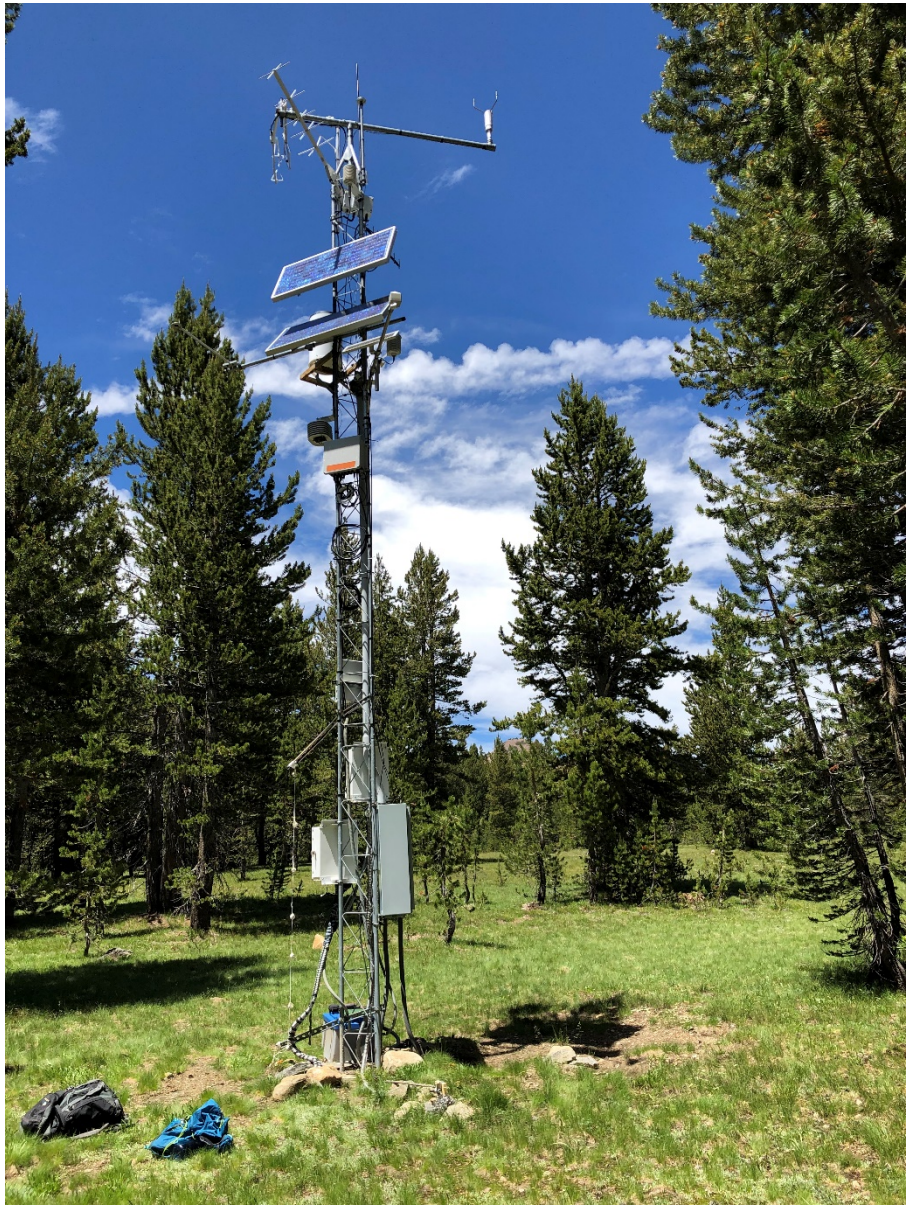

Tenaya Lake
Bulk Precipitation
Tipping Bucket
Precipitation (Inches)
0
2
4
6
8
10
12
14
16
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Month

Dana Meadows (9,800ft)

<u>Current Instrumentation Suite:</u>

- CR1000 datalogger
- TX320 GOES transmitter
- Snow Pillow (x4)
- CS 456 Pressure Transducer
- **SMH30 Laser Depth Sensor**
- Vaisala 2D Sonic Wind
- Li200 Pyranometer
- **Apogee Thermal Infrared Radiometer**
- Nova Lynx Tipping Bucket
- CS 655 Soil Moisture and Temperature sensors at:
    - 5cm
    - 10cm
    - 25cm

Dana Meadows Tower Relocation – Summer 2019



Dana Meadows Tower Relocation

Dana Meadows Tower Finished

<u>Many Thanks to:</u>

PSLE Crew

SFPUC collaborators

RMS Aquatics Team

DWR Collaborators

Tuolumne BG&E

Jessica Lundquist

USGS collaborators

Scripps Collaborators

Snow Sensor Network – Other Sites

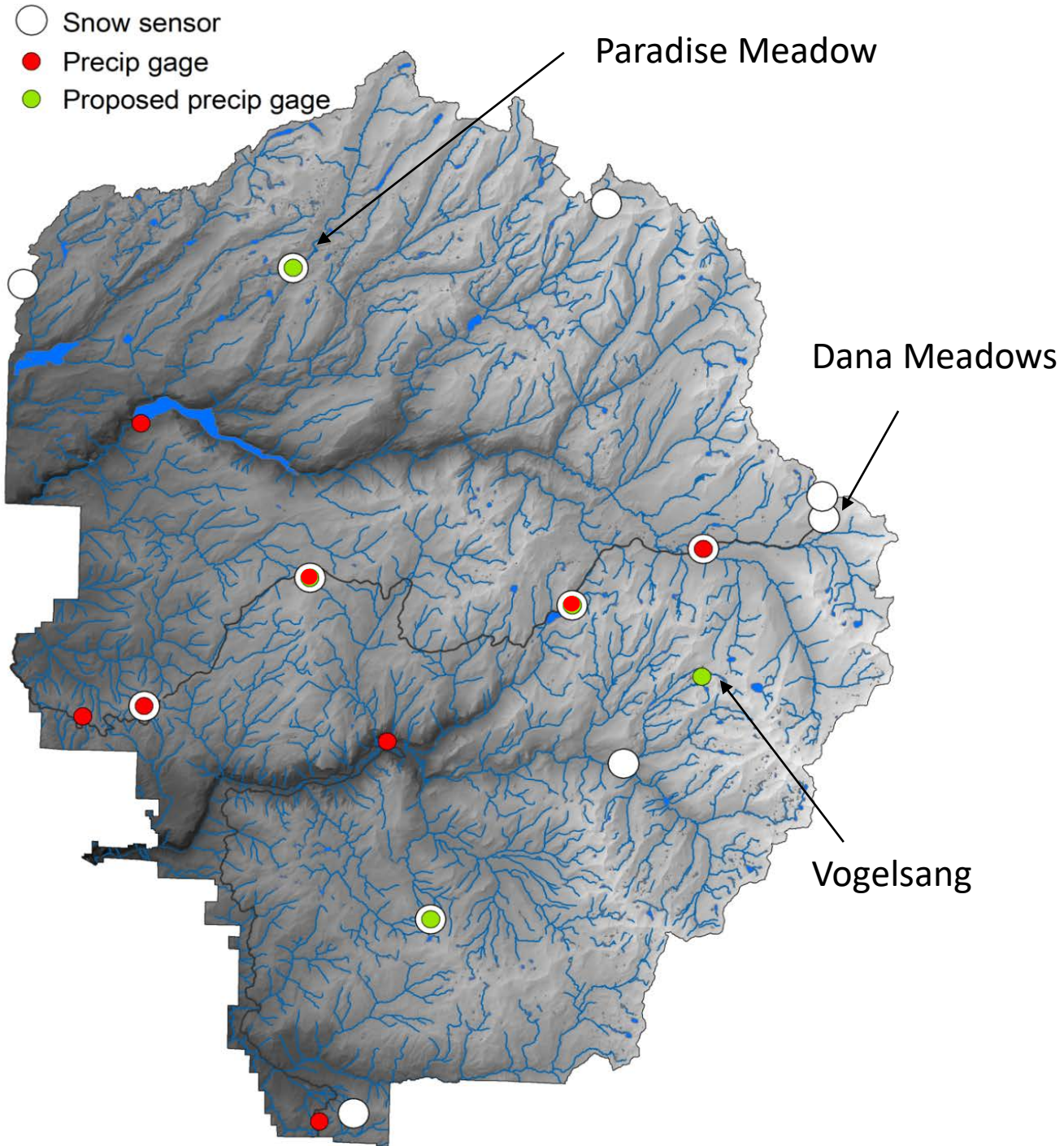
- Tioga Pass
- Merced Lake
- Paradise Meadows
- Lower Kibbie Ridge

Future Work - 2020

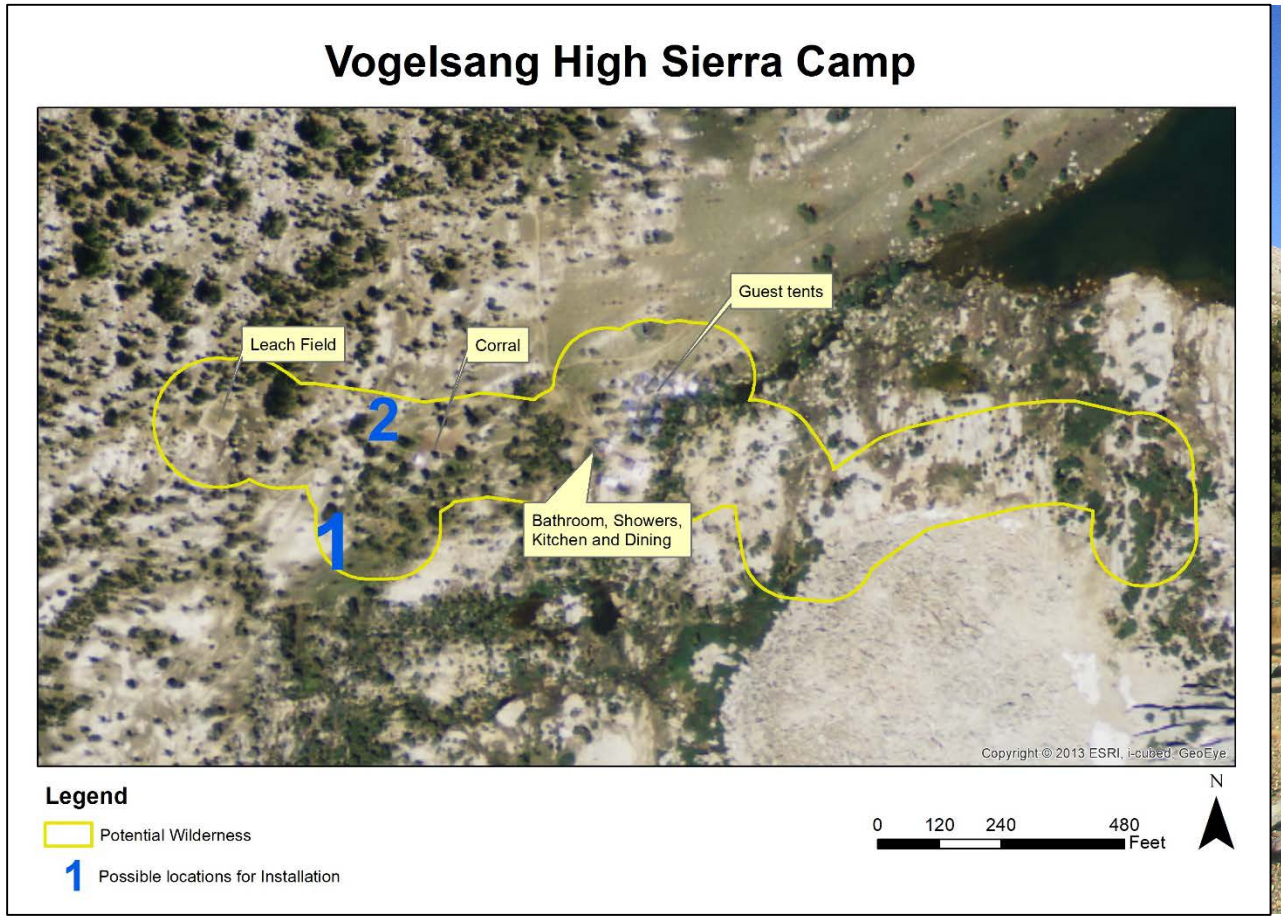
1) Dana Meadows
   - Previous tower removal
2) Vogelsang
   - New Site installation
     - Rohn Tower with snow pillow, accumulation precip gage, and standard instrumentation suite

Future Work - 2021

1) Paradise Meadow
   - Site Relocation



Vogelsang Site at 10,125ft



Thank You! Questions?