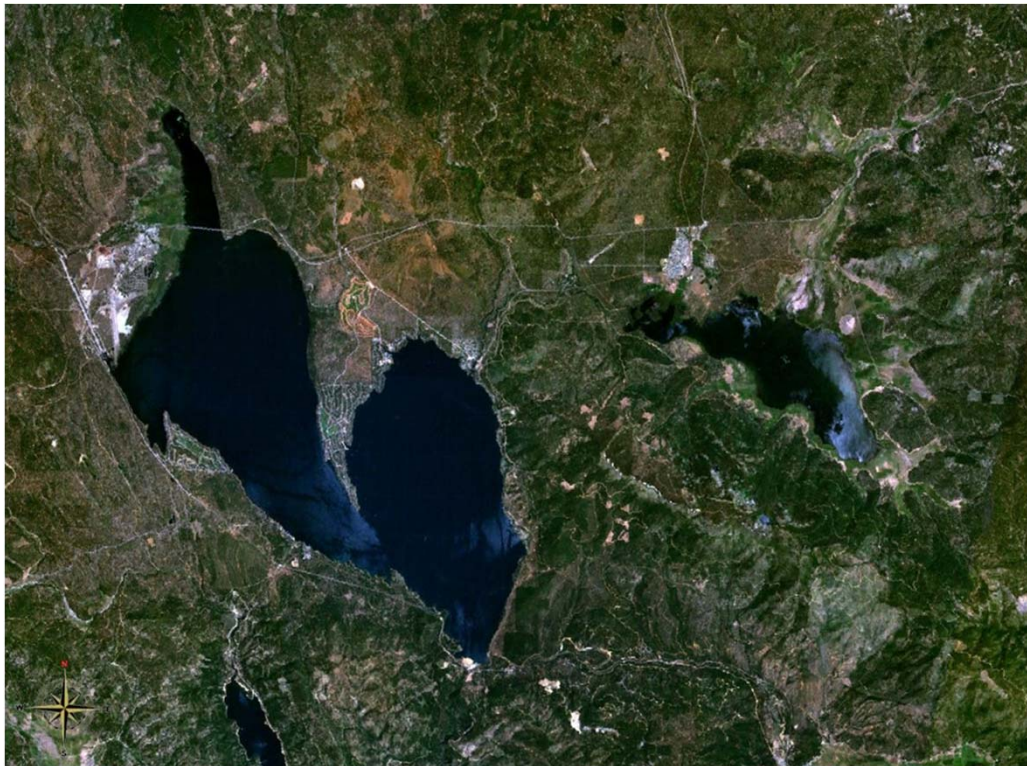


DOCKETED

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TN #:	220881-9
Document Title:	In-situ Measurements and Telemetry of the Snowpack to Improve Hydropower Operations in a Changing Climate
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Filer:	Raquel Kravitz
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	8/25/2017 10:23:20 AM
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In-situ Measurements and Telemetry of the Snowpack to Improve Hydropower Operations in a Changing Climate



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PIs: S. Glaser, R. Bales, & M. Conklin

Team: T. Maurer, S. Malek,
K. Richards et al.

2017 IEPR Joint Agency Workshop on Climate
Adaptation and Resilience for the Energy System
Sacramento, CA; August 29th, 2017



Berkeley
UNIVERSITY OF CALIFORNIA

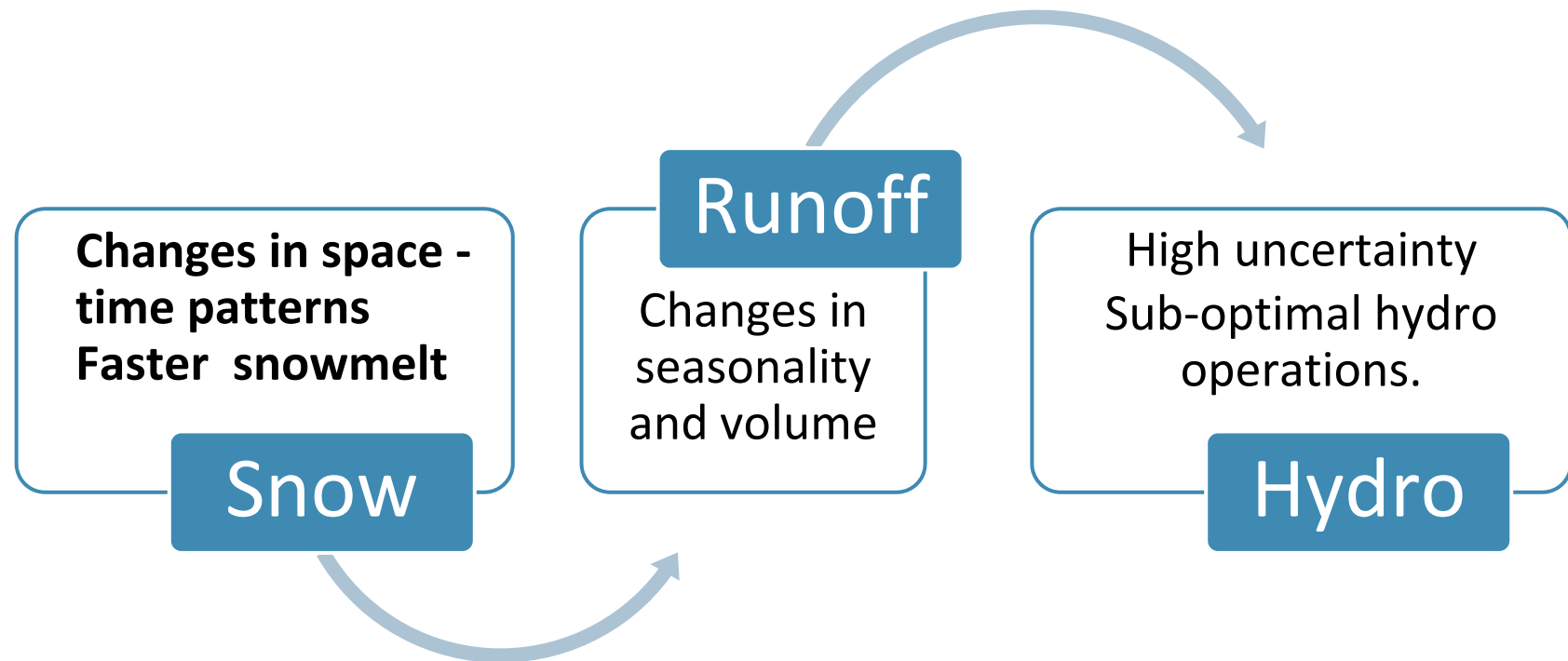


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Project objective

Offset growing **uncertainty in hydropower forecasts** owing to a **changing climate** and growing **demands for better forecasts** to enhance value of hydropower operations.

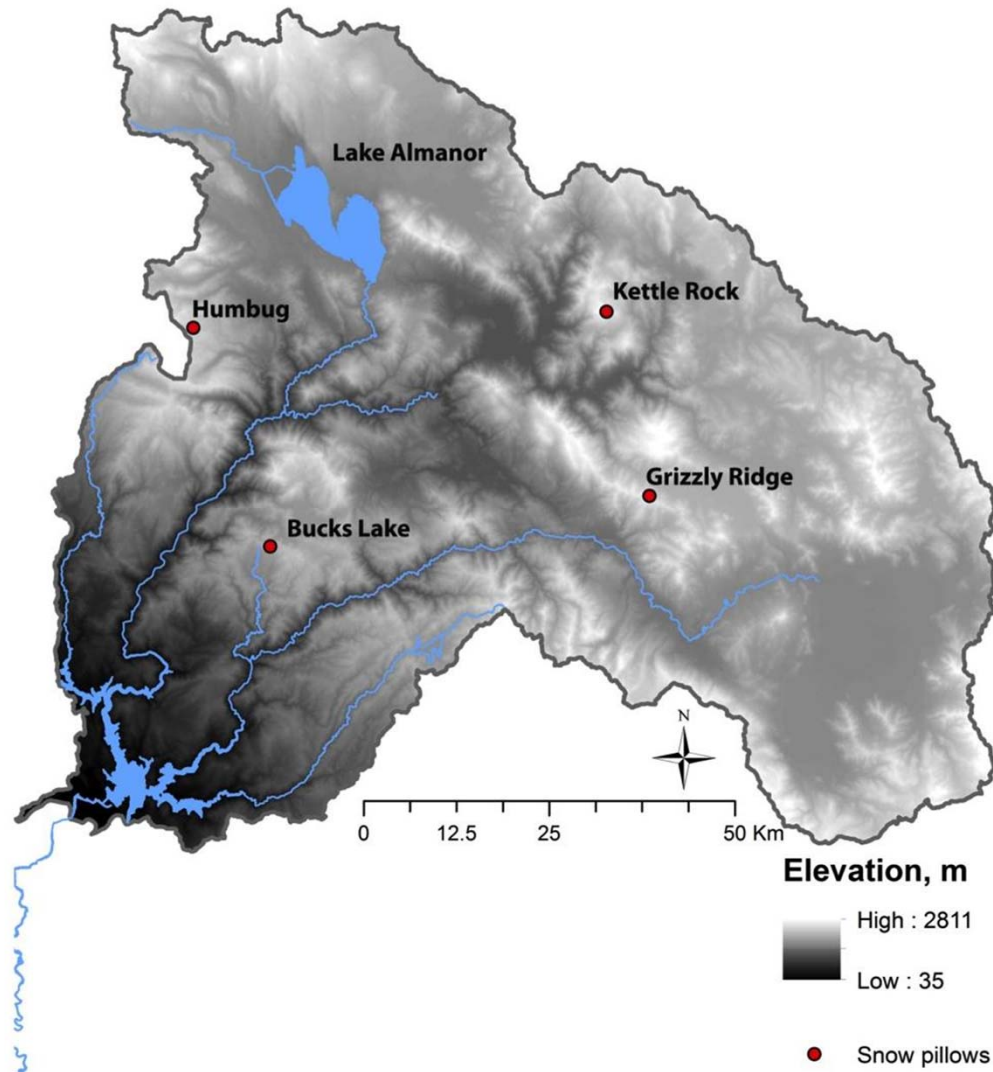


North Fork Feather River

Support **PG&E's**
Hydropower Planning and
Operations

Key priorities:

1. Uncertainty and temporal resolution of forecasts.
2. Spatial resolution of snowpack storage and snowmelt.

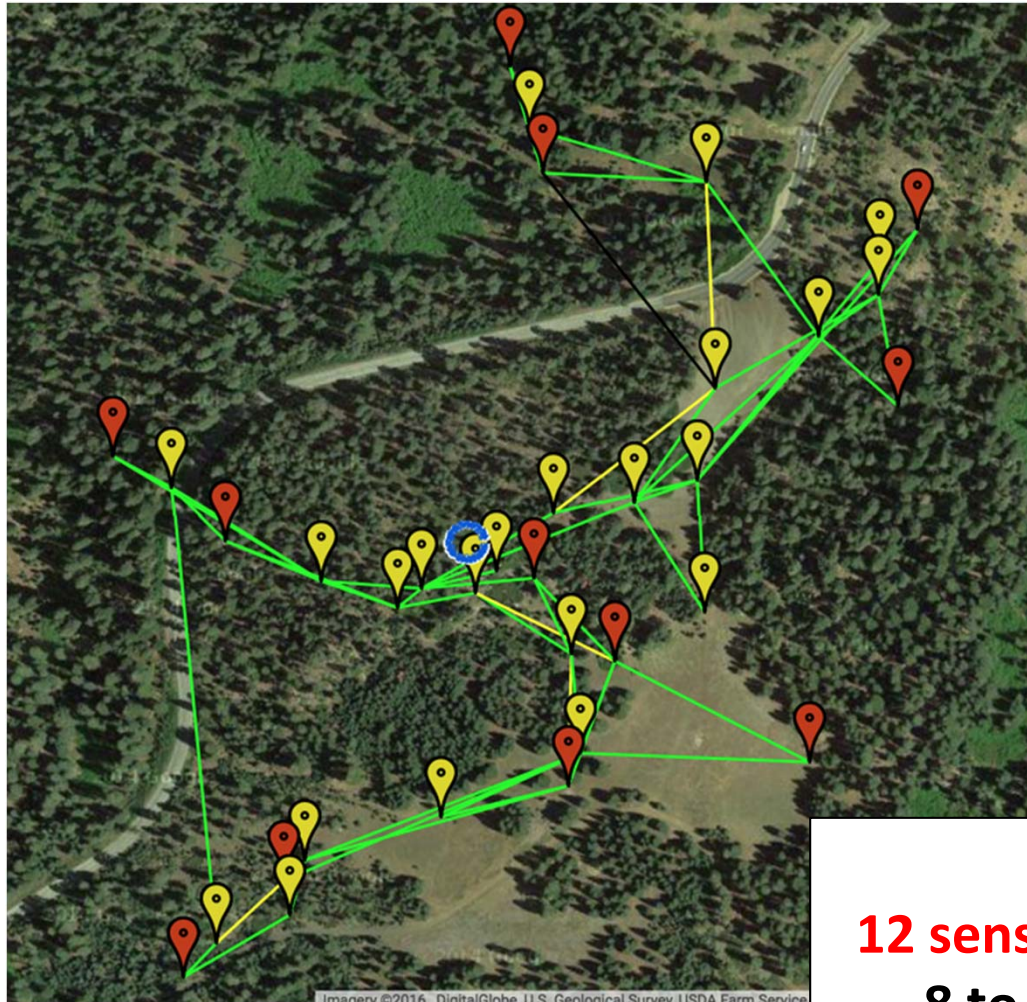


Support PG&E's Hydropower Planning and Operations

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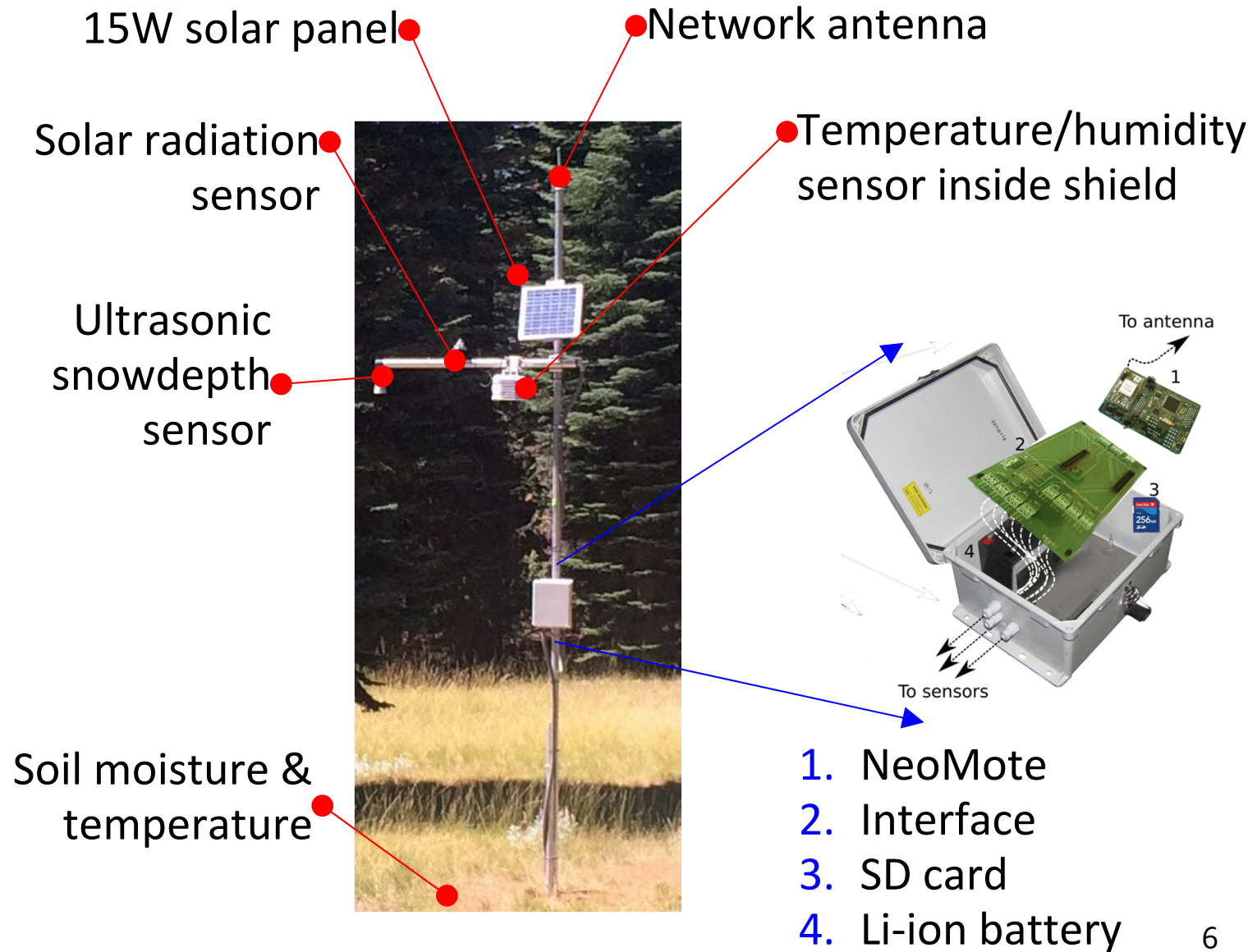
Real-time wireless sensor networks



-  Sensor node
-  Repeater node

Four key locations
12 sensor nodes for each location
8 to 12 Ha spatial resolution
(20 to 30 ac).

Sensor node

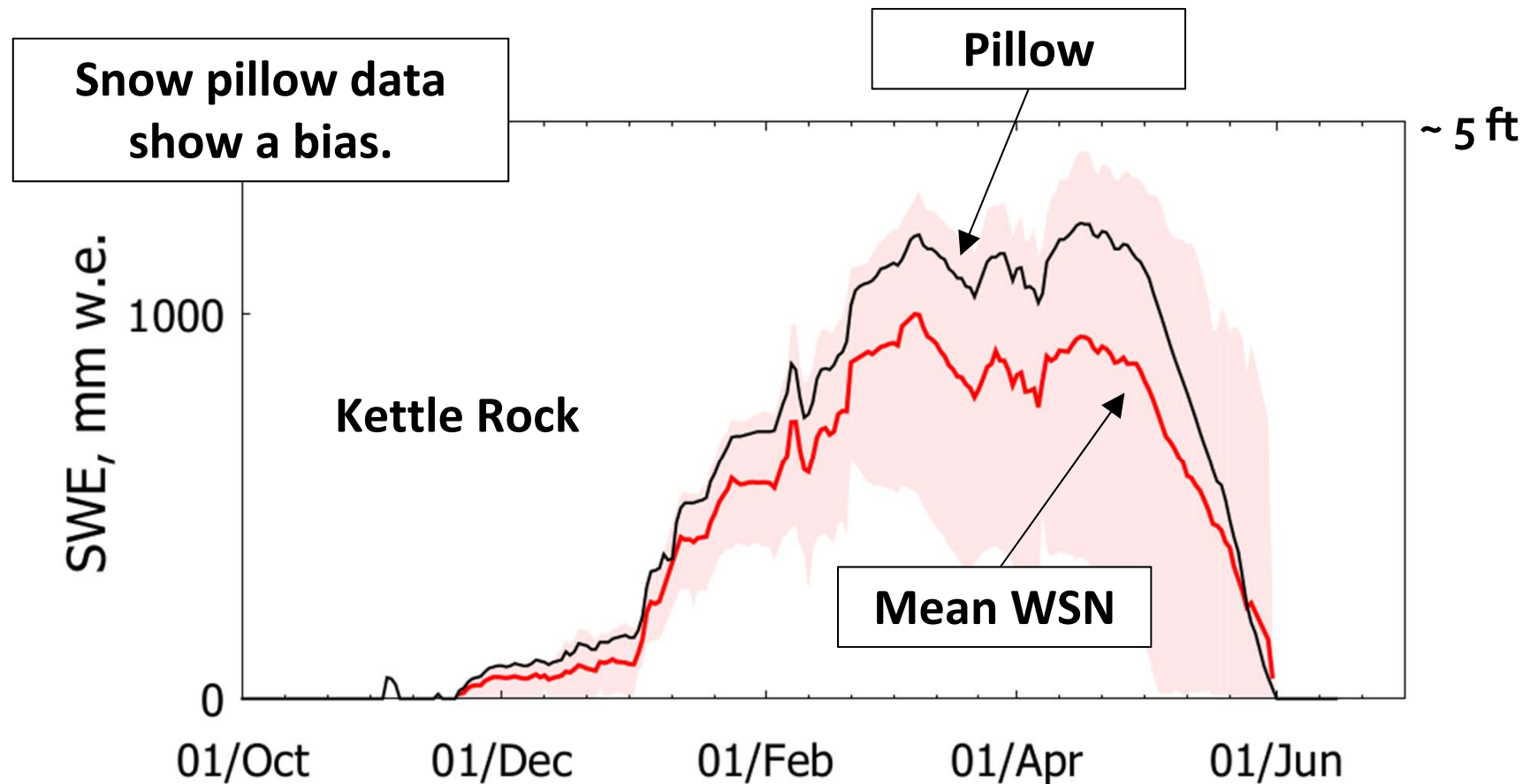




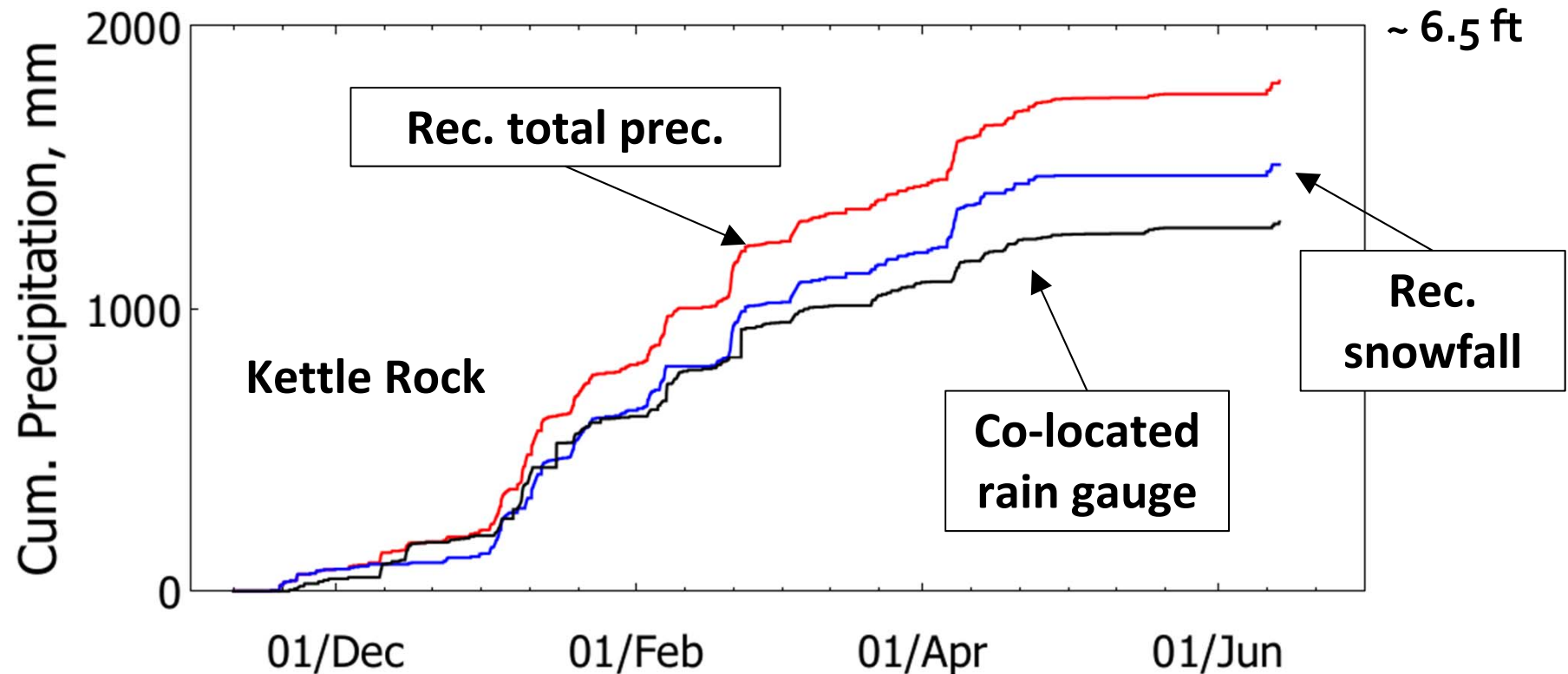
The 2016/17 snow season



Wireless sensor networks track **representative patterns of water content** based on physiographic variables.

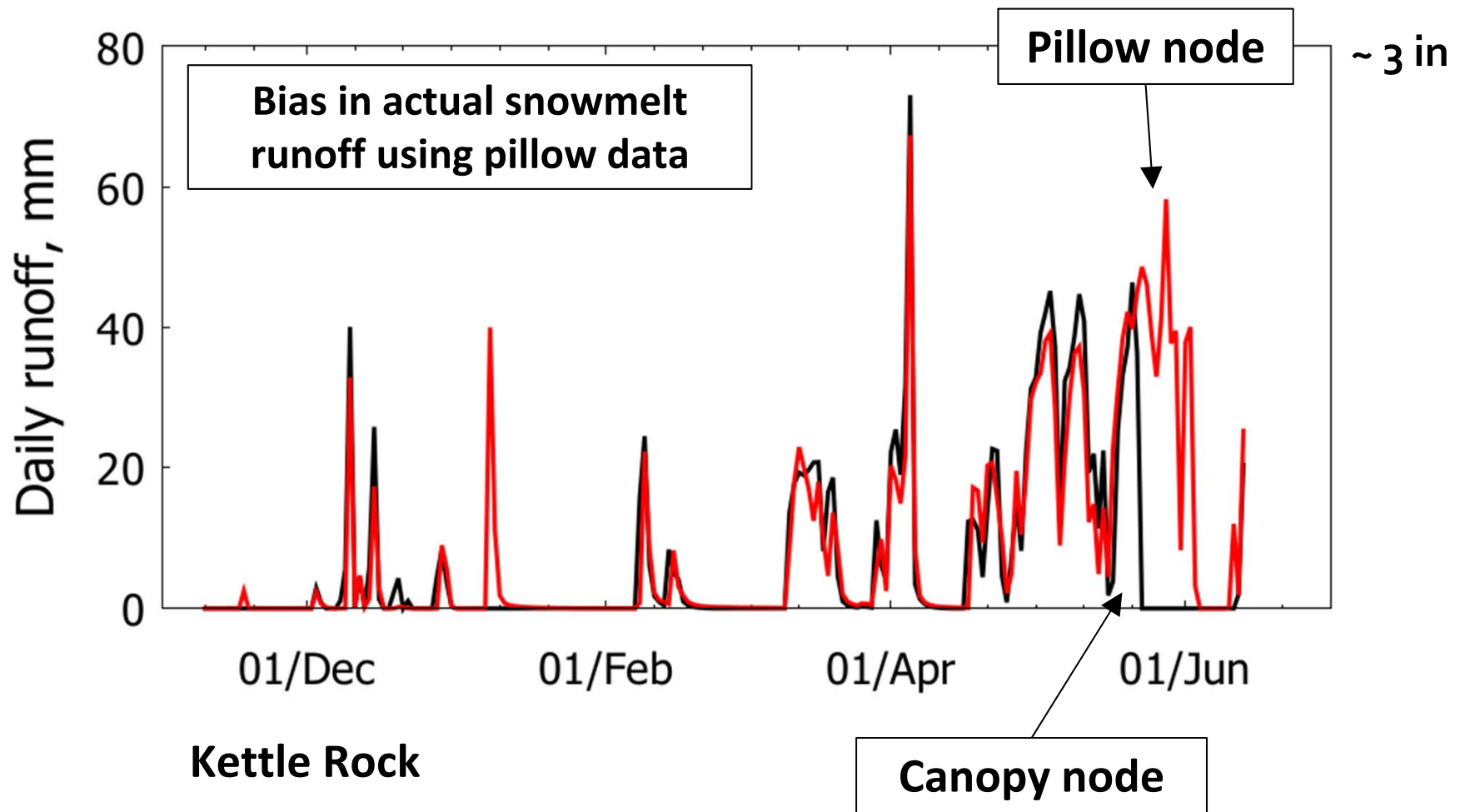


Wireless sensor networks can estimate **undercatch** of rain gauges and **partitioning** between rain and snow.



Snow depth and rain gauge data can be blended to better estimate actual precipitation.

Combined with mass-balance models, the networks reconstruct **snowmelt runoff inputs** to the hydrologic system.



Summary

We are developing core elements of a **next generation hydrographic data network**.

The network can **support hydropower decision makers in real time** with more information about the snowpack state.

The project is successful if the products **enhance hydropower value to utilities and ratepayers** through lower uncertainty