



River Hydrology Monitoring: Water Year 2018

The Sierra Nevada Network (SIEN) River Hydrology Monitoring Protocol reports on 14 stations located throughout Devils Postpile National Monument (DEPO), and Sequoia (SEQU), Kings Canyon (KICA), and Yosemite (YOSE) national parks (Figure 1). The purpose of this resource brief is to disseminate information on this data collection and the dataset access for the three SIEN-managed sites for water year 2018 (October 2017 - September 2018).

Streamflow Connections

Streamflow data can be used along with SIEN lakes and wetlands data to understand and monitor interconnected components of the big-picture systems throughout the region.

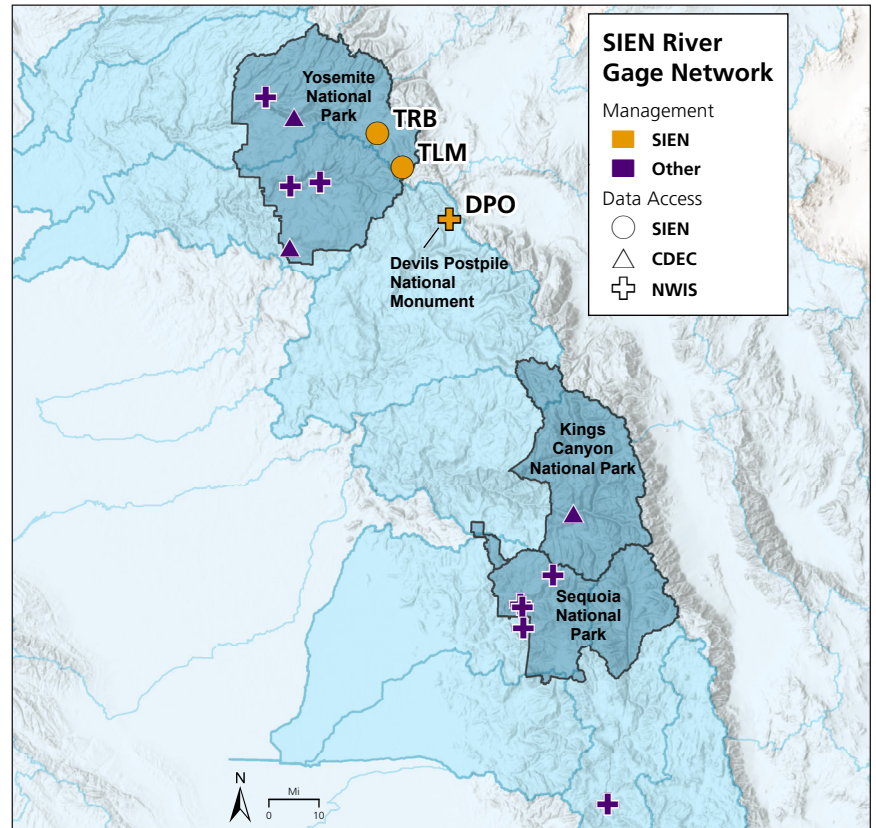
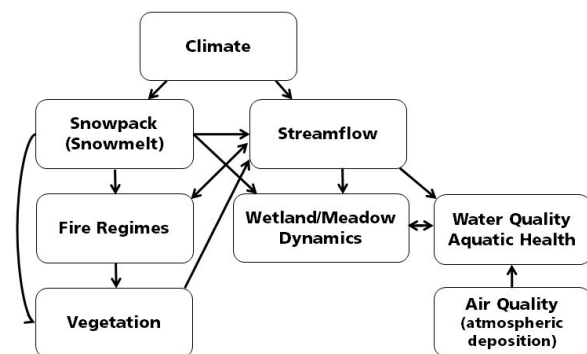


Figure 1. Gages included in the SIEN rivers monitoring protocol. Orange-colored symbols indicate the SIEN-managed gages (TRB and TLM in Yosemite and DPO in Devils Postpile) that are reported on in this brief. Data access is available from SIEN, the California Data Exchange Center (CDEC), or the USGS National Water Information System (NWIS), depending on who manages the gage. Map by: K. Bessem and A. Eddy.

Measuring a River's Vital Signs



Scientists taking a cross-section streamflow measurement for the Devils Postpile Gage. Photo by: Alice Chung-MacCoubrey.

A river acts as a living entity, with a pulse, temperature, and flow. The SIEN rivers protocol uses the surface water dynamics vital sign to measure these qualities. The primary goal of the project is to monitor long-term trends in surface water hydrology and water temperature so managers can better understand how aquatic resources are changing, especially in the face of climate change, and use this information to inform planning and management decisions.

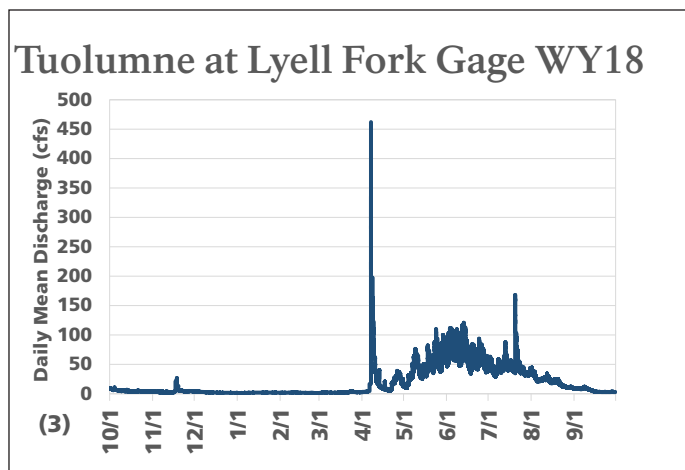
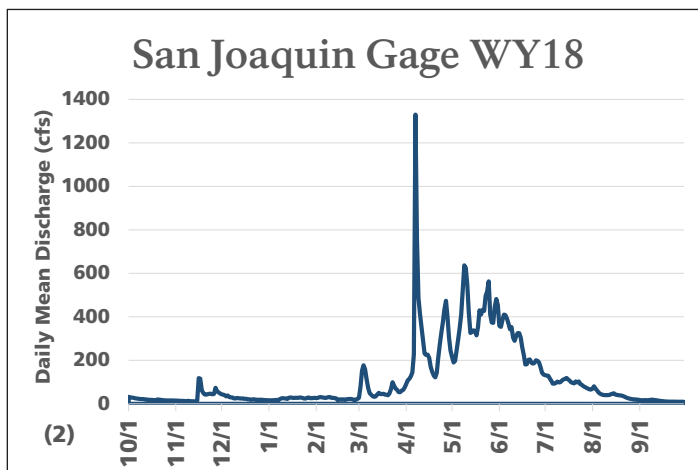
Information collected can address a wide range of questions related to surface water dynamics, including:

- How are climatic trends affecting regional water and fire regimes?

- How are stream and river discharge rates, and the timing and magnitude of peak flows changing?
- How are water dynamics changing in response to climate change and fire regimes?

Measurements for timing and volume of streamflow are taken by fixed, continuous, water stage recording stations and accompanying continuous temperature loggers. To capture large-scale patterns, gages were selected across varied elevations within the different SIEN watersheds. The SIEN protocol leverages a network of existing stream gages and associated long-term records, which range from 3 to 104 years in length.

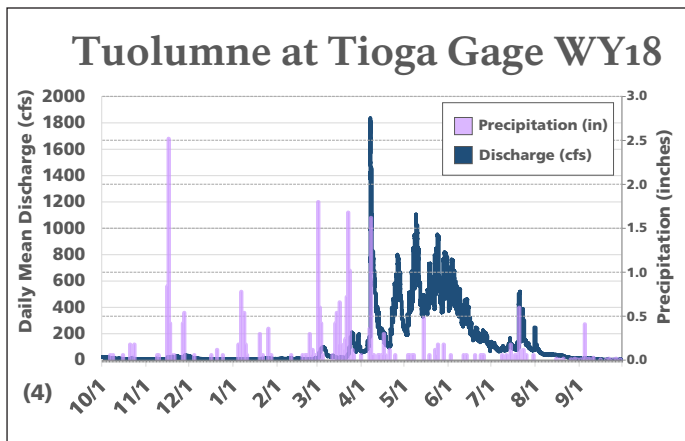
What did Rivers Look Like This Water Year?



Figures 2-4. Mean discharge in cubic feet per second for the three protocol SIEN river gage stations during the 2018 water year. Figure 4 (right) shows both discharge (blue/solid) and precipitation (purple/dashed) for the Tioga Gage.

Highlights for Water Year 2018

Across the Sierra Nevada, there was a very large early-season rainstorm that translated to the rivers and is notable in all three hydrographs (Figures 2-4). Typical snowmelt runoff patterns were seen after that, though the snow year was lower than the average. Statewide surveys showed snow water equivalent (SWE) to be around 58% of the April 1st average, representative of the Sierra region average (CA Dept. of Water Resources, 2018).



An NPS Field scientist collects rivers data at Devils Postpile National Monument. Photo by: Monica Buhler.

Planned Data Collaboration

This winter 2019-20 season Andi Heard (SIEN) and Rachel Hallnan (YOSE) will be collaborating with Jessica Lundquist (University of Washington) to apply an improved rating curve method for the Yosemite stations. These efforts will facilitate a standardized dataset that will benefit academic researchers, state and federal agencies, the city of San Francisco, and other cooperators.

Improved data and analyses will advance understanding of how precipitation dynamics are changing in the Sierra Nevada region. This will help both managers and researchers manage rivers-based ecosystems going forward. This winter SIEN will also seek feedback from park staff on river reporting, particularly interest in and best approaches for disseminating data and results from the additional 11 gages managed by others outside SIEN.

Contact Information and Gage Data Access

Contact Andi Heard (andi_heard@nps.gov), Physical Scientist, Sierra Nevada Network, for more information. Some of the data are available by request only and some are publicly available online.

[Sierra Nevada Network Inventory & Monitoring Program website](#)

Skancke J and Others. 2017. [Sierra Nevada Network river hydrology monitoring protocol: Narrative version 1.0](#). National Park Service. Fort Collins, Colorado.

Lyell Fork of the Tuolumne River: Contact Andi Heard for datasets.

Tuolumne River at Tioga Road Bridge: [California Data Exchange Center \(CDEC\)](#), 'Tuolumne Meadows' site (note: these online data are not QA/QC checked, please contact Andi Heard for final dataset).

Devils Postpile: [USGS National Water Information System \(NWIS\)](#), station id 'USGS 11224000 MF SAN JOAQUIN R NR MAMMOTH LAKESCA'.

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