

Hydrologists in Tuolumne River: Late 1880s vs Now

Hydrologists study water and of its forms. With this knowledge, they provide guidance for the management of water resources. Since the 1880s, hydrologists have been measuring the water flow in the Tuolumne River. Over the years, the instruments they use have been modified, but the basic principle is still the same. Hydrologists measure the stream profile (essentially stream depth and width), water velocity and calculate the flow from those measurements.

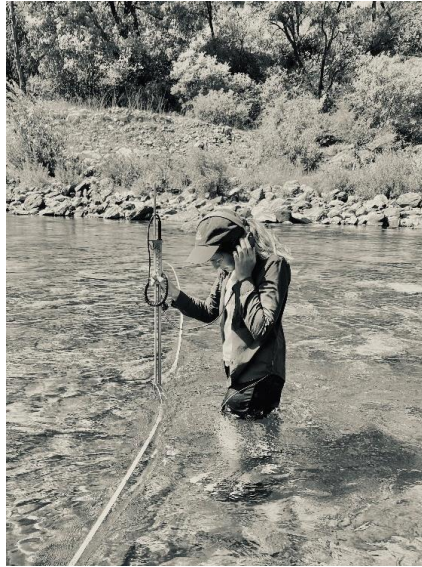


Figure: CASA ELE participant measuring stream flow using early devices



Back in 1882, William Gunn Price designed a water current meter that had a wheel with five conical buckets (as you see in the picture) which

would rotate once placed in the water.¹ With headphones, hydrologists could listen to ticking sounds which would indicate the number of bucket rotations. It was difficult to listen during higher flows when the buckets would rotate at a higher speed.

These days, to measure the flow of water, hydrologists prefer a more sophisticated method that is easier to use and more accurate. The widely used device



these days is the Acoustic Doppler Current Profiler (ADCP). The ADCP measures water currents with sound, using a principle of sound waves called the Doppler effect.² By mounting the ADCP into a small watercraft (as shown in the picture), acoustic beams are directed into the water from the water surface. This device takes continuous measurements of depth and velocity. From those measurements, we can calculate the amount of water flowing through the river.³ Instead of doing it manually, the data can be sent automatically to the computer that is connected to the ADCP.

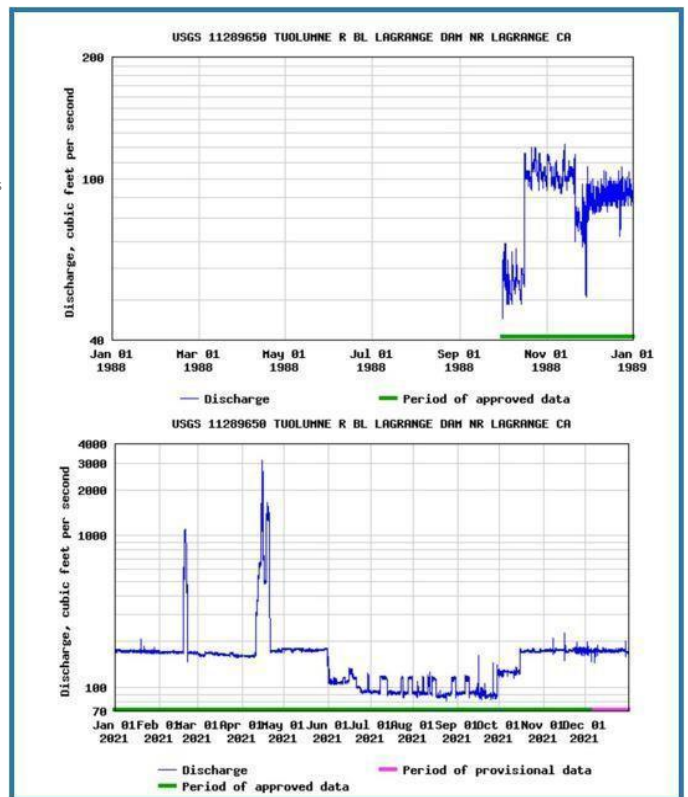


Figure: Streamflow recording(Late 1980s vs Current) (source: USGS)

The landscape around the Tuolumne River changed after O'Shaughnessy Dam was built in early 1900 over Hetch Hetchy Valley of Yosemite National Park (Null & Lund, 2006). This dam has created water storage in the valley. As the hydrology of the river changed, so did the advancement of equipment and resources. Over the years modified instruments made measurement more accurate and easier for hydrologists working not only in the Tuolumne River but everywhere in the world.

Reference

Null, S. E., & Lund, J. R. (2006). Reassembling Hetch Hetchy: Water supply without O'Shaughnessy Dam. *Journal of the American Water Resources Association*, 42(2), 395–408. <https://doi.org/10.1111/j.1752-1688.2006.tb03846.x>

¹https://americanhistory.si.edu/collections/search/object/nmah_1434218

²<https://www.whoi.edu/what-we-do/explore/instruments/instruments-sensors-samplers/acoustic-doppler-current-profiler-adcp/>

³<https://www.usgs.gov/special-topics/water-science-school/science/how-streamflow-measure>