



CACHE LA POUDBRE RIVER WATER QUALITY NETWORK LARIMER COUNTY

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SCOPE OF PWQN PROJECT

The Cache la Poudre River Quality Network (PWQN) is a collaboration between Colorado State University and the City of Fort Collins to gather reliable water quality data and make it available to the public. This network is comprised of strategically placed water quality devices which measure how water quality changes due to differing environmental stressors such as agricultural runoff and water treatment facilities. While Fort Collins drinking water is largely sourced from the same water the sondes are monitoring, our drinking water is treated to be safe for consumption.

The main role of the PWQN intern position is to help monitor the 11 water quality devices (InSitu brand sondes) that are along the Cache la Poudre River downstream of the Poudre Canyon Narrows (Figure 1). These sondes have 4-6 ports (model dependent) that hold sensors to measure different water quality parameters. Some sensors can measure more than one parameter. This project is measuring FDOM (fluorescent dissolved organic matter), turbidity (clarity of water), dissolved oxygen, pH/ORP, chlorophyll a, conductivity.

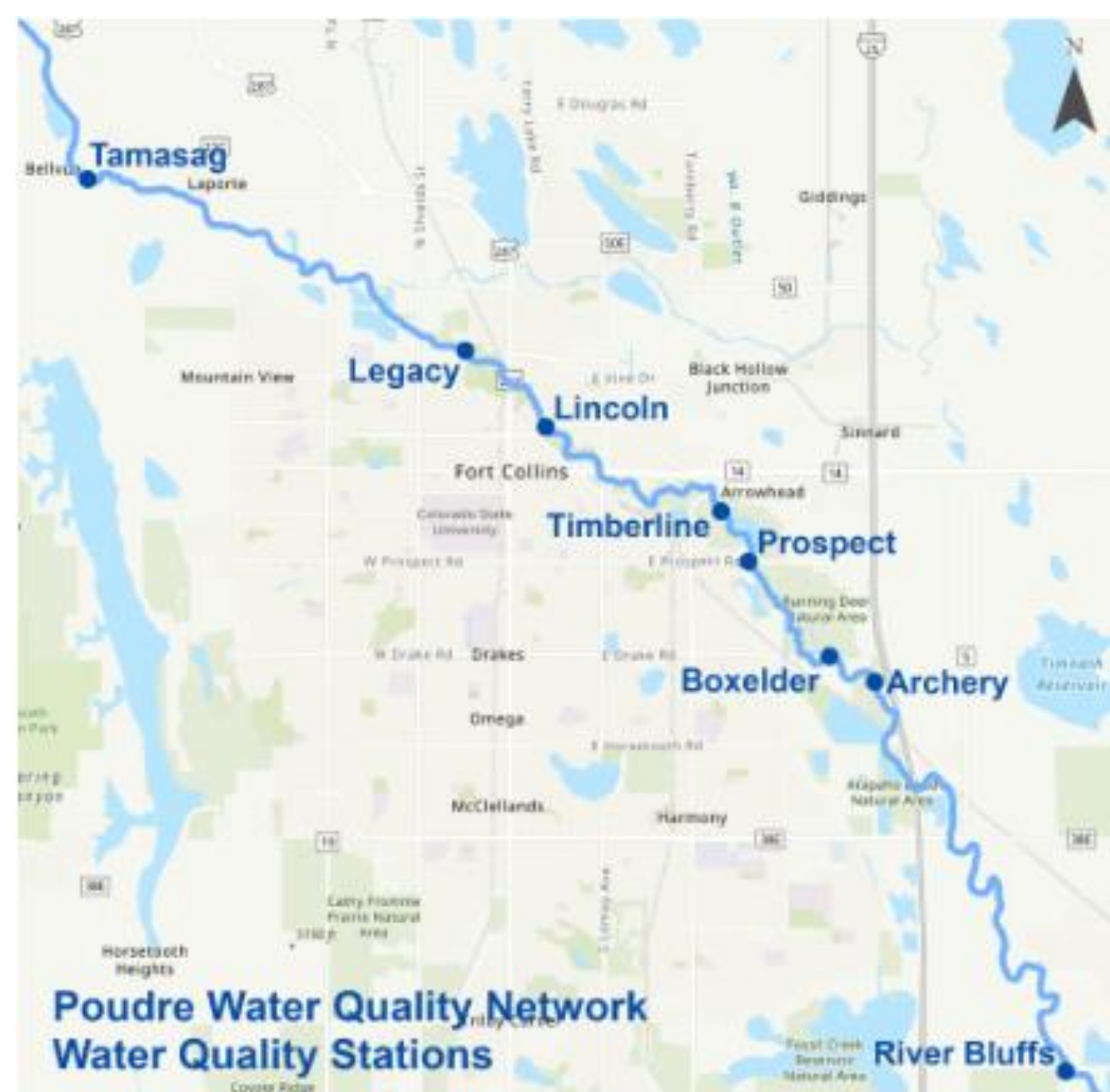


Figure 1: a map of the 2023 ROSSyndicate sonde sites downstream of the Cache la Poudre Canyon mouth.

Out of the Classroom

I am a senior studying Watershed Science and Sustainability with a Watershed Science concentration. I have interests in water resource allocation and science communication with the public. Water quality is in many ways the foundation for many ecological processes and societal functions. Getting firsthand experience working with water quality data throughout two field seasons has been a wonderful opportunity to expand my knowledge on water quality from the classroom into the field.

Further Inquiries

- What are the implications for the Cache la Poudre River during times of extreme reduced flow due to diversions?
- How do macroinvertebrate populations impact river health?
- What poses the biggest threat to Fort Collins water supply quality in the future and how can the public become more involved?

INTERNSHIP TASKS

Each of the 11 sondes in the lower half of our project are calibrated once every three weeks and are additionally checked on when needed. InSitu's user interface, "HydroVu," allows sonde users to see real time data as it is uploaded from the sondes, exposing any sensor malfunctions that may need to be addressed before the triweekly calibration.

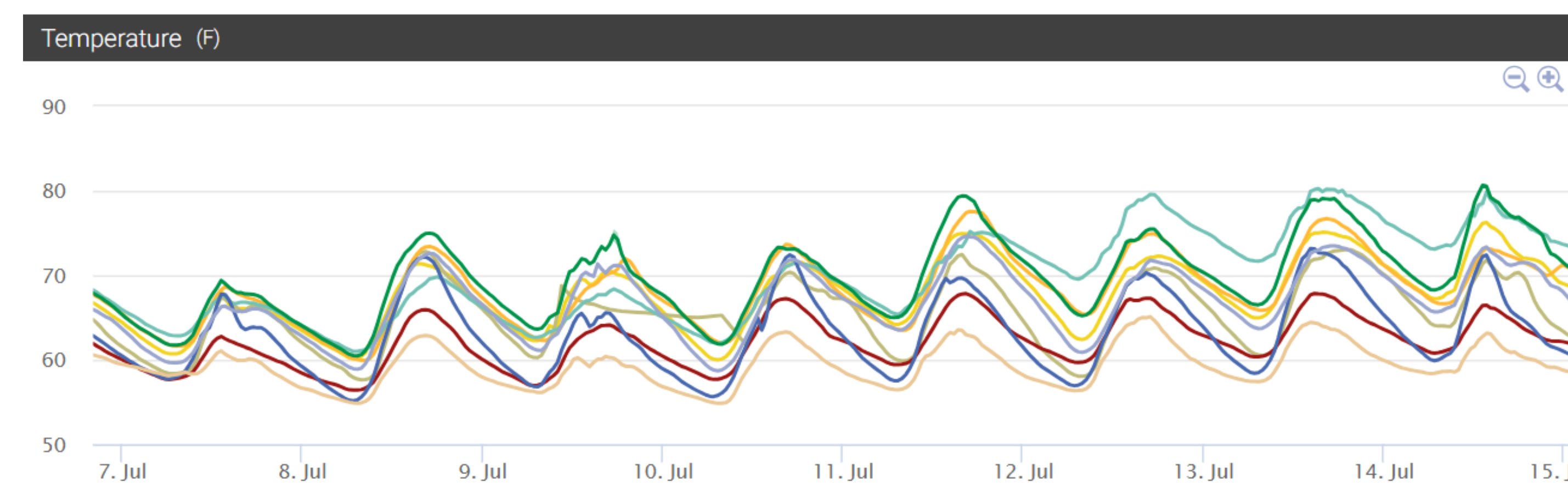


Figure 2: July 7-15, 2024 water temperature data reported from the lower sonde network via HydroVu. Each line is a different site's data plotted. This trend is expected, as temperature in Fort Collins typically increases throughout the day as well as the month of July.

Site Visit Examples

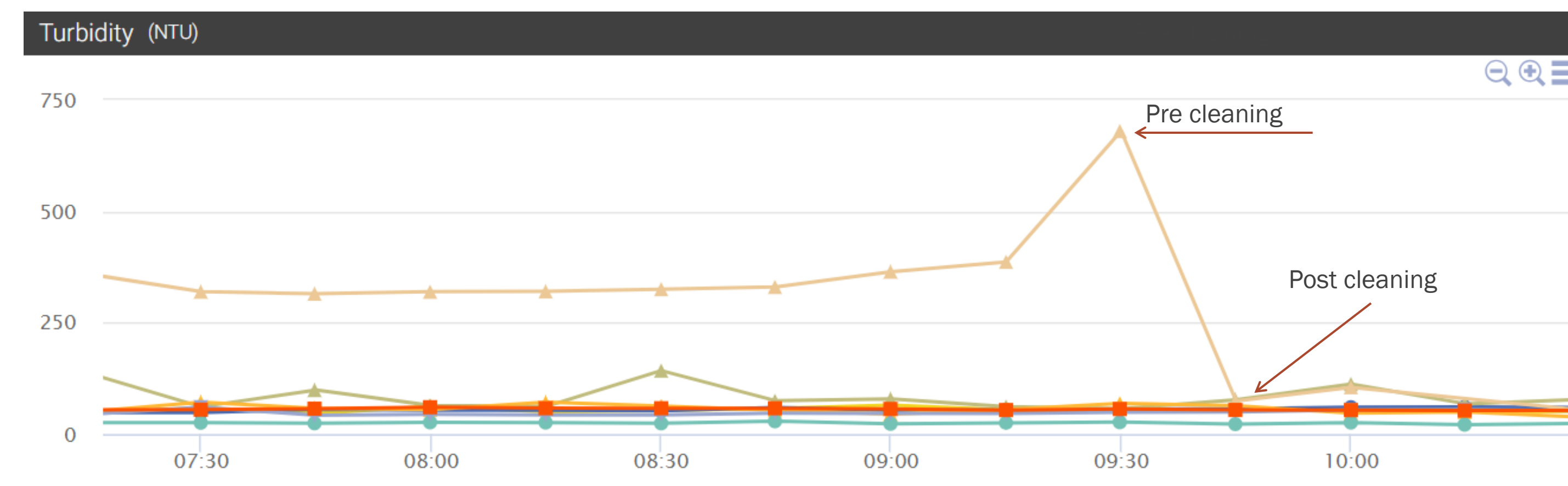


Figure 3: 2024 turbidity data taken from HydroVu capturing a site clean. The beige site reads values over 250NTU which is typically indicative that sediment needs to be cleaned off the sensor. Post cleaning, the data returns to normal levels in reference to the other sites.

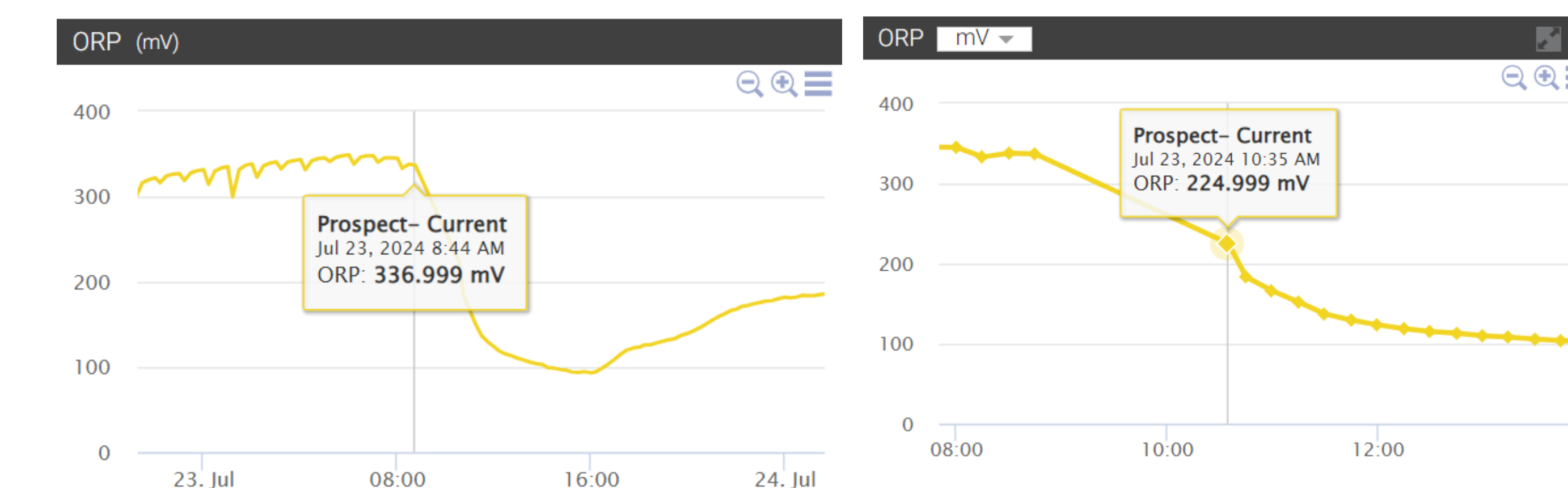


Figure 4: a site calibration window taken from HydroVu. This site was visited for its triweekly calibration at 08:50 and was deployed back in the water at 10:38 the same day. The left graph shows the ORP trend over the course of a day, while the right graph takes a closer look at the site visit. Post calibration, ORP drops significantly and smooths out.

DEVELOPED SKILLS

While each new field season and site visit calls upon previous experience, there are many changing factors that require adaptability. For my second field season as a PWQN intern I have expanded on what I had learned as well as developed new skills:

- Monitored more InSitu sondes with new sensors parameters
- Identified and troubleshot new malfunctions while continuing an ongoing SOP document
- Transferred to a more centralized, consistent data platform for technician field notes

Related Water Monitoring Actions

Hydrographs are a way to visualize discharge over the course of a "water year" (October 1 – September 30 of the following year). Overlaying hydrographs allows for an easy discharge comparison and is often used to analyze discharge differences through time and at different sites. This hydrograph shows one example of how variable just one aspect of river monitoring can be over the span of just 1 year.

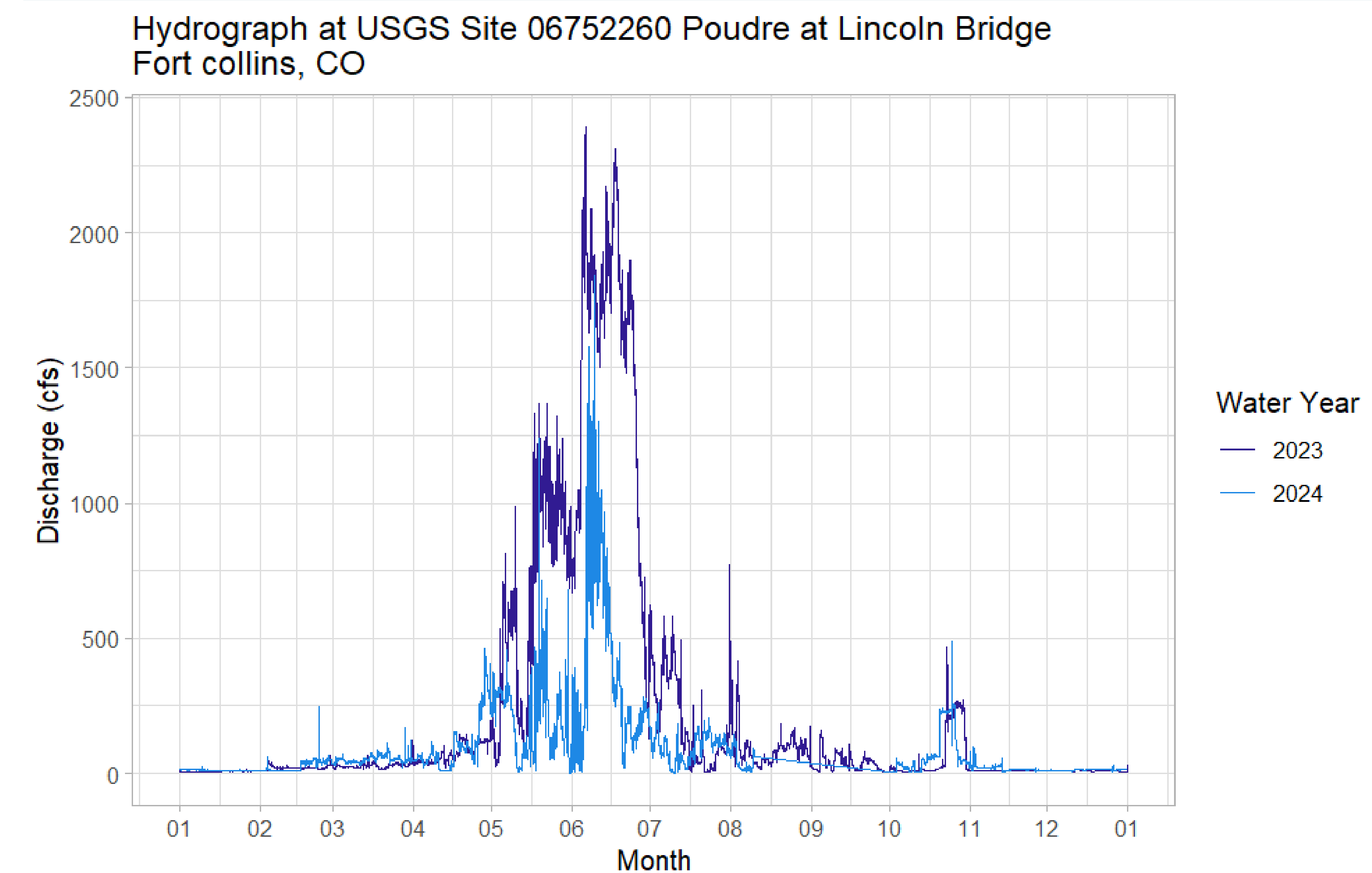


Figure 5: a hydrograph of the 2023 and 2024 (incomplete) water year with data taken from the USGS site 06752260 in Fort Collins, CO. Residents local to the Cache la Poudre River may have noticed changes in rainfall/snowmelt between the two years, explaining significantly higher peak flows in 2023. Changes in Fort Collins discharge has been responsible to higher sediment loads in the Cache la Poudre River, as well as changes in macroinvertebrate populations. This plot was made using the ggplot package in R Studio.