

## Evolution of Water Quality in The Lower Esopus Creek Flowing Through the Hudson Valley Farm Hub (2008-2023)

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### **Introduction**

Since 2017, students at SUNY New Paltz have been monitoring the water quality of the lower Esopus Creek in Ulster County, NY. This creek flows through lands owned and operated by both the Hudson Valley Farm Hub (HVFH) and the municipality of Kingston, both of which are believed to impact the creek's water quality negatively. Monitoring efforts have been conducted at 19 designated stops along the Esopus (see the location map below), with students collecting water samples and total dissolved solids (TDS), dissolved oxygen (DO), pH and temperature measurements manually at each stop. Additionally, an Ion Chromatograph (IC) was employed to process samples and record various ion concentrations, including nitrate, phosphate, chloride, sulfate, sodium, magnesium, and calcium concentrations. Over the past 7 years, data collection at these 18-19 stops has been consistent, typically occurring once a month, with additional collections during certain months, particularly June, which marks the peak growing season at HVFH.



*Sample location map with insert in upper left corner displaying sample site 19 (Hurley, New York)*

## **Results and Discussion:**

To discern fluctuations in water quality, ion and TDS concentrations measured during each sampling date in 2023 were graphed together (Figure 1-5). As an example, data from Site 8 is presented, with graphs from the other 187 sites available upon request.

Next, nitrate and TDS concentrations from each year's June data were graphed to highlight water conditions during the peak growing season at HVFH (Figure 2). Stops 12, 18, and 19, located outside HVFH property, were omitted from these graphs.

Overall, a distinct trend in concentrations over each month does not seem to exist, though some fluctuations are evident. Peak concentrations occur at different times of the year for each site, suggesting that concentrations may not be closely linked to HVFH activity. Notably, most sites reach their lowest concentrations in August, particularly those directly on HVFH, which may be influenced by weather conditions.

Comparing average TDS and nitrate concentrations at each site to previous years' June data, concentrations measured in 2023 appear consistent with past years. Minor differences compared to 2022's data suggest that water quality on HVFH land remains stable and consistent with previous years (please see figures 1-5).

Nitrogen isotope data collected from 2021-2023 indicates that the source of nitrate within the HVFH is relatively different from non-HVFH locations. The HVFH  $\delta^{15}\text{N}_{\text{Air}}$  and nitrate concentration standard deviation is the lowest of all groups meaning that the values do not highly change between each of the sample sites. This is because no excessive amount of nitrate from a singular source is being added at any location along the HVFH.

In conclusion, water quality in the Esopus Creek on HVFH land does not appear to be worsening, and it remains consistent with historical data.

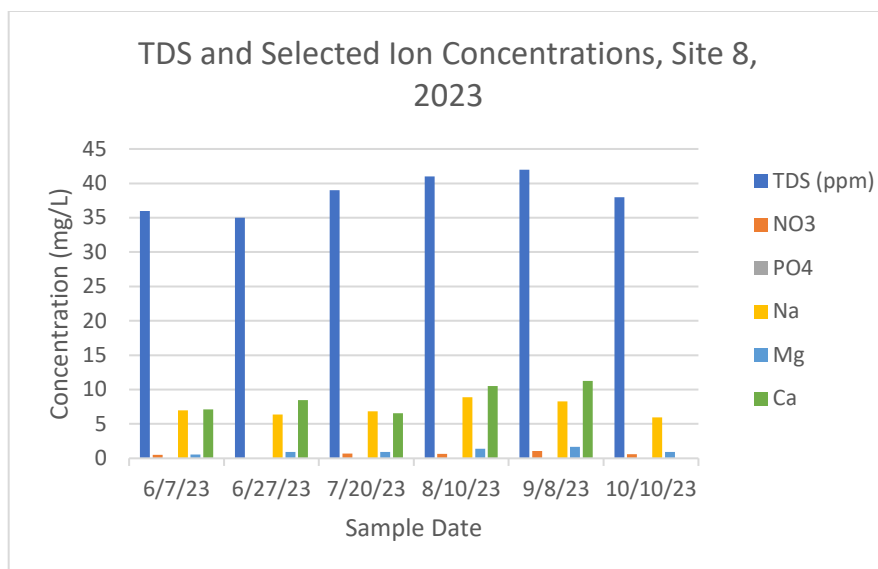


Figure 1

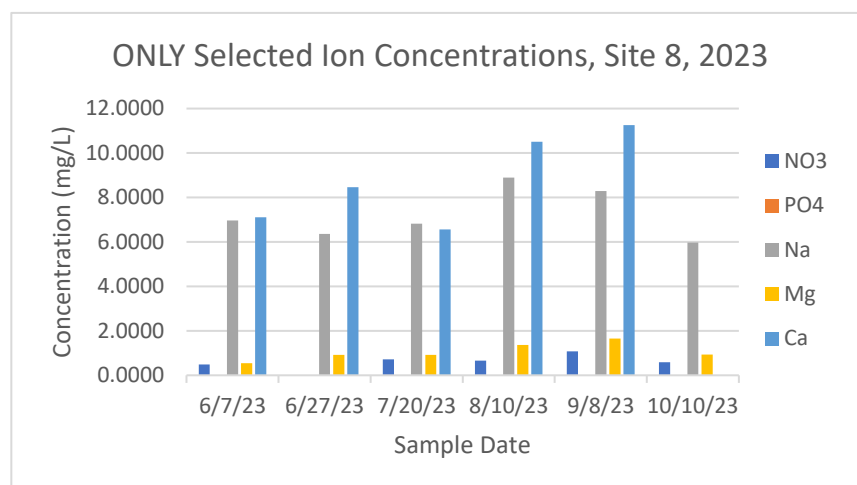


Figure 2

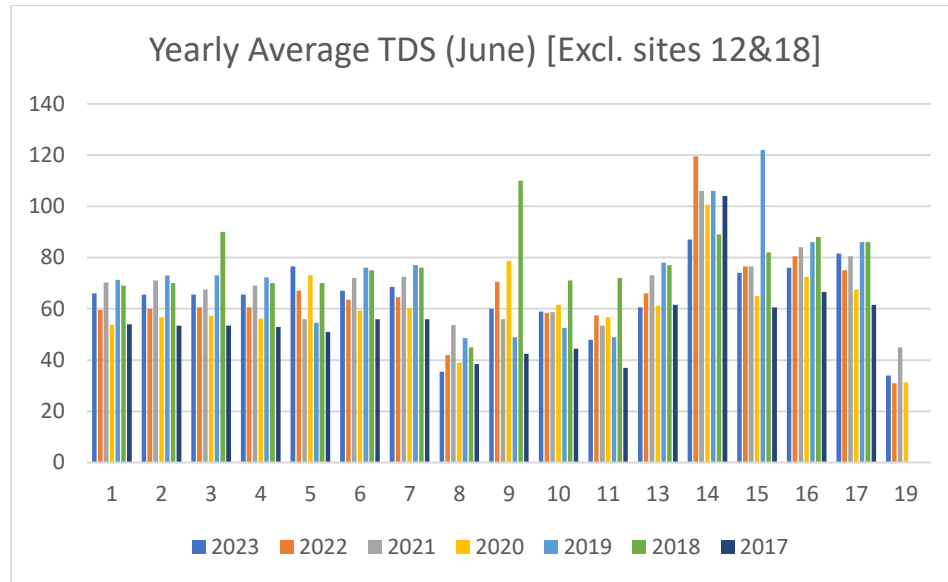


Figure 3

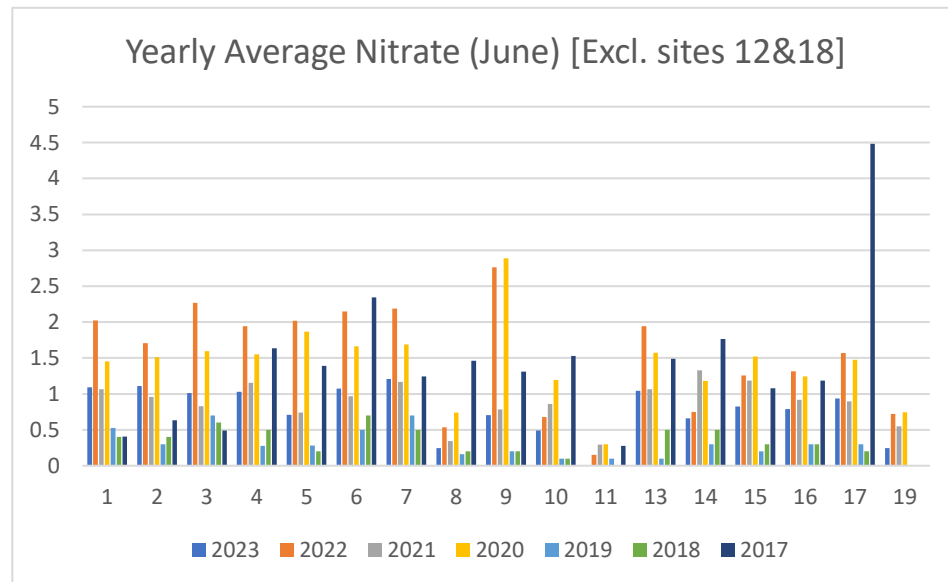


Figure 4

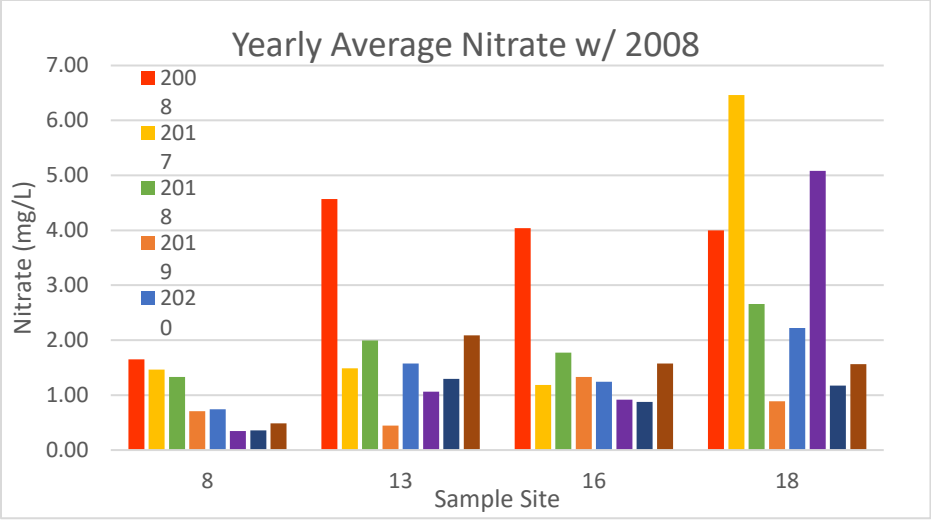


Figure 5