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Figure 1. Engineers from Stantec hit the waters of Chautauqua Lake this fall to collect water samples as part of ongoing research by The Jefferson Project.

Figure 2. Patrick Suter of Stantec pulls a water sample from Chautauqua Lake.

PROGRAM PROGRESS

The Jefferson Project Expands Lake Research

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The waters of Chautauqua Lake continued to serve as an important hub of environmental research in 2022, thanks in large part to the expanded research efforts of The Jefferson Project at Lake George. Over the past three years the group has implemented a range of water quality and ecological monitoring programs on the lake, working as a collaborative with Rensselaer Polytechnic Institute, IBM Research, and the Lake George Association while partnering with Chautauqua Institution and Chautauqua County. The scale of those programs has grown considerably since The Jefferson Project first installed vertical profilers in the North and South basins of the lake in 2020, and is expected to increase further this coming year.

Advanced vertical profilers, essentially floating supercomputers, were first installed on Lake George in 2013, in the hopes of better understanding freshwater threats like harmful algal blooms, nutrient loading, and invasive species. The first piece of a much larger research effort, these sensors track data from the water column in real time including temperature, pH, and chlorophyll. Over time, The Jefferson Project and its partners have added new pieces to the system in place on Lake George, increasing the size of their data sets while also adding research initiatives like direct water quality sampling. The group has followed a similar approach to its multistage rollout of science on Chautauqua, which has been made possible thanks to significant in-kind support from partners and approximately $2 million in initial funding provided by the Institution and the County.

“This past year was the first year that we had a concerted sampling program,” said Toby Shepherd, Chautauqua Lake Project Manager for the Institution. “We’re trying to ramp up the system. If you think about The Jefferson Project as a system of monitoring the lake, the VPs (vertical profilers) are one component of that system. The different sampling sites are another component of that system.” Stantec, an engineering partner, conducted bi-weekly sampling at dozens of locations around the lake throughout 2022, which after laboratory analysis help provide new water quality data to complement the sensor network. As an example, water samples underwent gene testing to help tell researchers new information about the exact types of algae that are living in the lake. These genomic studies can play a role similar to medical blood tests for infection, potentially identifying algae species that may be more likely to form harmful blooms and produce toxins. Moving forward, the lake will also have the benefit of a dedicated phycologist (algae scientist), who was added to the project team this past year courtesy of Rensselaer. “I think that is a huge win for the community,” Shepherd said.

Having established two main components of the research system, vertical profilers and water sampling, tributary monitoring is an important third goal. Six major tributaries of the lake, as well as the Chadakoin outlet, are slated to receive new monitoring systems in 2023. This third pillar of research will help fill in the gaps of nutrient loading, and tell researchers more about the streams feeding the lake. “The idea is, with these stations, that we want to know where nutrients are coming from, when they are coming, but also to get a sense of what the sort of peak load is and when that is in each of the micro-watersheds of these creeks,” said Shepherd. “The suspicion is that when we get these big pulse rains from big storms—that is when the majority of nutrients are going in.” While stream monitoring has

been performed in the watershed before, it can be a real challenge to gather frequent data over time as flows rapidly increase or decrease with weather. Flow rates into the lake can change quickly during heavy rains as stream levels rise and fall. Tributary monitoring stations, as opposed to traditional grab sampling by scientists, are one way to improve the consistency of measurements during these times.

As it has done on Lake George, The Jefferson Project is eyeing improvements and expansions of the system in place on Chautauqua in the years to come. These include possibly adding new instruments to the vertical profilers to improve the accuracy of nutrient budgets, or the construction of weather stations to better inform ecological models of the environment. Shepherd noted that the team is in contact with researchers from Bowling Green State University about the potential use of their nutrient sensors, which were first brought to the lake in 2019 with support from the Chautauqua Lake Partnership. As is the case with all research programs, these expansions depend upon available funding, feasibility, and continued collaboration between partners.

Data gathered during the 2022 field season is expected to be shared among project partners sometime early in 2023, and plans are also underway for public presentation of recent findings. Engineers and scientists working on these issues day-to-day most recently shared their work with the public at the Institution's Chautauqua Lake Water Quality Conference on June 18, 2022 which can be found at https://porch.chq.org/re/event/635/. Ultimately, the team at The Jefferson Project and the many other research groups working around the area each year are seeking to provide stakeholders with new data to better inform management decisions that can positively impact the lake and its users. Also working towards this shared goal are Bowling Green, the State University of New York at Fredonia, SUNY Oneonta, the SUNY College of Environmental Science and Forestry, North Carolina State University, and others. For more information on The Jefferson Project visit https://jeffersonproject.rpi.edu/.