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A vertical profiler deployed to the lake by The Jefferson Project at Lake George is pictured on the grounds of Chautauqua Institution.

School's In For Summer

Research Kicks Off On Lake

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As activity begins to ramp up on Chautauqua Lake, scientists and engineers are among those returning to the water to resume their work. These are the people running data collection and research programs to gather the information needed to improve our understanding of the lake and its many different features. There is a rich history of these types of programs on the lake, and there is a lot to be excited about as the past several years have seen a rapid expansion of the techniques, tools and partnerships being put to use towards a common goal. As the season of field work resumes, now is a fitting time to review some of the research expected to take place this year, and the goals of this work.

If we take the lake as a complete system, there are many individual parts that all interact with each other. You have the creeks and streams that supply the lake with water and also move sediment and nutrients. You have the diverse species of plants, animals and algae that call the lake home. You have the physical and chemical conditions of the lake water itself. You have weather, currents, geology and geography—and you have people. Individual groups work in coordination and in parallel to study some of these specific areas, leveraging their own areas of research interest and expertise. The hope is that by collecting new sets of data and integrating those with historic information we can gain new insight into the overall system.

Underwater plants are a key part of the ecosystem and draw plenty of attention from stakeholders. As a result, systematically recording and cataloguing plant conditions on a regular basis is a main research goal. Racine-Johnson Aquatic Ecologists have surveyed plants growing in the lake for years, often via contract with the Chautauqua Lake Association, and began building a long-term dataset in 2002. Recent surveys catalogue plant species present in both the spring and fall in order to provide researchers with a more complete picture of what is growing where, and to what extent. Racine-Johnson is expected to continue their work in 2022, as are researchers from North Carolina State University. NC State staff have been conducting research on the lake since 2020 in cooperation with the Chautauqua Lake Partnership. Traditional plant survey methods are complemented by sonar surveys which quickly measure the total plant growth in the water. Alliance staff are also continuing related work in 2022, conducting sonar surveys of select high-use areas throughout the summer as well as gathering underwater imagery. These programs provide us with multiple lines of evidence which we can use to get a clearer picture of plant growth over different timescales and in specific areas.

Plants and algae are one piece of the puzzle, and the water they live in is another. There are many different types of monitoring that can provide us with useful information about the water in the lake, and plenty of dedicated people gather those data each year. Bowling Green State University has deployed nutrient sensors since 2019 in cooperation with CLP. These machines record information every few hours on the levels of nutrients that can impact plant and algae growth—nitrogen and phosphorus. Similarly, The Jefferson Project at Lake George, now working in partnership with Chautauqua Institution, has deployed specialized monitoring platforms called vertical profilers in both basins of the lake since 2020. These collect data on water conditions from the surface to the bottom, water circulation patterns, and weather conditions. Jefferson Project sensor data are integrated with survey data, including water chemistry and algae data. These are collected for advanced analysis of the physical, chemical, and biological features of the lake and their potential effect on harmful algal blooms (HABs). A range of lake information is also collected by the Citizens Statewide Lake Assessment Program, coordinated by the New York State Department of Environmental Conservation and made possible by the dedication of local volunteers. CSLAP has been at work for over 30 years and provides us with valuable long-term data sets.

In order to supplement this in-lake research, teams also collect data from the creeks that feed the lake. Researchers from Bowling Green as well as the State University of New York at Fredonia have been actively collecting water samples from tributaries for several years, and are expected to resume their work this summer. These data can help identify specific areas of the watershed that may be contributing to lake issues like nutrient loading and sediment runoff. Collecting long-term data sets related to lake and tributary water quality is important if we want to know more about algae growth. The presence of HABs themselves is another area of focus. Since 2021, researchers from SUNY Oneonta have been at work in the lake studying the toxins that are produced by HABs and potential health concerns. Similarly, a partnership between SUNY Fredonia and other organizations is conducting research to monitor HAB signatures using specially-designed cameras mounted on drones. It would be difficult to discuss each of these initiatives in detail here, but for the past two years many of these engineers and scientists have presented to the public at the Chautauqua Lake Water Quality Research Panel. That open dialogue and collaborative spirit is expected to continue this year as Chautauqua Institution hosts the 2022 Chautauqua Lake Water Quality Conference on June 18. More information can be found at www.chq.org/event/chautauqua-lake-water-quality-conference/, and links to past research panels can be found at www.chautauquaalliance.org/category/news/events/.

As these different parties resume their individual areas of research, they are helping to chip away at the uncertainty and unpredictability that is built into every large natural system. Each program is working to fill in a blind spot so that we may see the total picture a little better, and use the clarity to improve our decision making. These programs are not all going to arrive at the same place at the same time, but they are all heading in the same direction. Their specific methods and objectives may seem distanced from each other at times, but that is only a reflection of the impressive scale of the work being done.