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Figure 1. A Town of Chautauqua Mobitrac is pictured with a full rake of plants. An Alliance-monitored Lowrance sonar and GPS unit can be seen mounted center frame.

‘Are We There Yet?’

GPS Helps Give Directions For Chautauqua Lake

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Like many of my generation, I’m pretty useless with a paper map or directions. If I need to get from point A to point B without the GPS in my phone, I’m going to end up on the back of a milk carton. But not long ago, in what seems like a bygone era, things were different.

The Global Positioning System, or GPS, has been around since the late 1970s, when the first military satellites were deployed to track objects from space. However, it’s only been a few decades since that system started helping us drive to Rhode Island or find a nearby restaurant. It took time and cost reductions for the tech to trickle down from the defense department and into our smartphones. The good news is that a lot of other capabilities have come along for the ride as GPS has gotten cheaper

and become widely available. It is a key component of the broader technical field known as geographical information systems or GIS. Today there are free GIS software mapping programs that can be run on any laptop, and these tools play important roles in everything from tracking hurricanes to lake management.

The concept is straightforward. GIS tech allows us to combine precise geolocation (where something is) with other sets of data to produce digital maps of all different kinds. These maps might use data from cars to show you where there is a traffic jam, or show you where a hiking trail is, or even tell you something interesting about Chautauqua Lake and its watershed. The power of GIS comes from its ability to incorporate location data with other sets of information, opening the door to advanced visual comparison and new analysis. In the case of a waterbody, like a lake, this could include many different variables.

Today, GIS is used on the lake to help monitor plants, mechanical equipment, currents, nutrients, invasive species, geography, weather, harmful algal blooms, and more. In 2020 the Alliance initiated a relatively low cost pilot project called the Chautauqua Lake Aquatic Data (CLAD) Mapping Program. Using consumer-grade sonar technology and a small inflatable boat, our staff conducts surveys of underwater plant biovolume (how tall and dense plants are in the water), and the shape of the lake bottom. Field data are fed into a software program called BioBase that allows us to archive and create maps of lake conditions. This information can help us better understand the growth and distribution of plants throughout each season and over several years. GIS also provides a platform for tracking the growth of individual plant species, giving us a clearer picture of what is growing where and to what extent. Researchers from Racine-Johnson Aquatic Ecologists and North Carolina State University have collected this information over the years, and share it with other stakeholders for analysis and discussion. Today, GIS is also used to monitor plant management equipment and herbicide treatments. By tracking maintenance activity over time along with lake conditions we seek to better align resources with needs.

GIS is also used at larger scales through the iMap Invasive Species program and the New York Harmful Algal Bloom System, where professionals and the public can report sightings of problematic plants and algae using a laptop or a phone. Reports are made and then uploaded to a database where the information is shared with the public. At the state level, administrators also catalogue information gathered by watercraft stewards on the movements of boaters to keep an eye on the spread of invasive species. Knowing where a boat is entering the water, and where it was last deployed, the state can create maps of the most commonly traveled routes between different waterbodies. This program is the lake management version of public health contact tracing, where invasive plant and animal species take the place of contagious diseases.

If we look at how some of these data sets were organized in the past, we pick up on an advantage of GIS. We interact with and process information in different ways. You can imagine a standard chart that records the location of plant species using latitude and longitude. Ingesting this information would mean reading dozens and dozens of columns and individual numbers and trying to work out the relationships in your head. We could take the representation of these data one step further, perhaps plotting the individual points on an accurate map or using some type of graph. Using GIS software to represent the information advances it further still. Once the data include precise geolocations they can be easily shared with others, overlaid with related information, and studied for patterns over time.

We all live with the convenience of GIS tech every day, and now this powerful tool is being brought to bear on many of the challenges we see in the lake and watershed. As more advancements are made and more data are collected and combined, we can use this information to help guide and plan our management efforts. Today there are researchers from world-class institutions studying the plants, animals, algae, water quality, weather, and currents of the lake. GIS provides these scientists with a common platform to catalogue, share, and compare their findings. These tools aren't going to hold our hand all the way to our destination, but they can tell us a lot about where we have been and where we are heading.