Algae Monitoring in Roseland Lake, Woodstock, CT

After several years of researching water quality issues in Roseland Lake, ECCD published the Roseland Lake Management Plan in March 2018 http://www.conservect.org/wp-content/uploads/2018/03/ECCD-RoselandLakeManagementPlan_-final.pdf. One of the recommendations in the Plan was to learn more about the types of algae in the lake and which types are dominant under different conditions. For example, many types of cyanobacteria (sometimes referred to as blue-green algae) thrive when the water temperature is above 25°C (77°F). Some kinds of cyanobacteria can also "fix" nitrogen from the air when the dissolved nutrients in the water are used up, just like the soil bacteria that helps peas and beans grow in your garden. Cyanobacteria have an advantage in warm water over other algae types. Knowing the conditions in the lake before a bloom occurs may allow the lake managers to treat the lake to prevent a bloom from occurring.

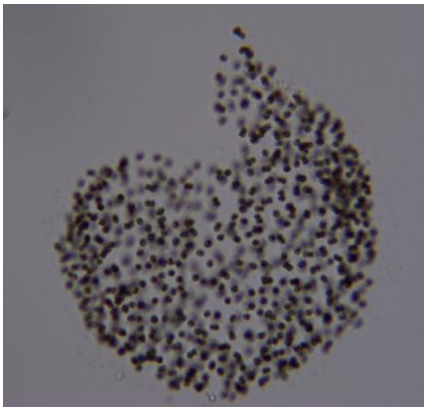
Cyanobacteria are tiny photosynthetic organisms that can be found in diverse places, including fresh water. Under the right conditions, cyanobacteria can form "blooms". These blooms can be a problem because many types of cyanobacteria produce toxins which are dangerous to humans and wildlife. These cyanobacteria and their toxins can be found in the water as well as in the air nearby. Impacts of cyanobacteria blooms may include skin irritations, illness, loss of plant and animal life, loss of aesthetic appeal, loss of recreational opportunities, and reduction in property values. (https://cyanos.org/)

Under the ECCD Cooperative Agreement with The Last Green Valley (TLGV), Jean Pillo, ECCD Watershed Conservation Project Manager began a new water quality monitoring project in 2018. This pilot project of TLGV's Water Quality Monitoring Program is being funded in part by a Watershed Assistance Small Grant (WASGP). This WASGP grant is funded in part by the Connecticut Department of Energy and Environmental Protection through a United States Environmental Protection Agency Clean Water Act Section 319 Nonpoint Source Grant, and administered by Rivers Alliance of Connecticut.

In the summer of 2018, Jean, with the assistance of TLGV volunteers, has been sampling and analyzing water from Roseland Lake every 2 weeks. Samples collected with a plankton net are being reviewed using a digital microscope. Images of the algae are being uploaded to a special i-Naturalist website and identified by a team of experts organized by the US EPA. Other samples, collected using a 3 meter long tube sampler, are being processed and analyzed using a fluorimeter. A fluorimeter passes light beams through a water sample to measure the relative concentration of two types of plant pigments. These pigments are chlorophyll, which is found in all types of plants and algae, and phycocyanin, a pigment unique to cyanobacteria. With this information, we will learn what types of cyanobacteria are in the lake, and their relative abundance compared to other algae types. In addition to these samples being collected every 2 weeks from May – September, the team is collecting other data, including water temperature, dissolved oxygen concentration, pH, conductivity and turbidity using other TLGV equipment. This data is being collected at 0.5 meter intervals over the deepest part of the lake. It will show if the lake is divided into temperature layers and if there is oxygen in the lowest layer of the lake. A secchi disk is also being used to measure water clarity. Water temperature data in the lake surface layer and the tributaries and outlet of the lake is being collected every hour using temperature data loggers, also purchased with funding from the WASGP grant. During the previous TLGV/ECCD study of Roseland Lake, we learned that when the lake sets up distinct temperature layers, all the dissolved oxygen in the bottom layer is used up. Under those anoxic conditions, the phosphorus stored in the lake sediment is released into that bottom layer of water. Cyanobacteria are different from other types of

algae because they can migrate up and down in the water using gas pockets inside their cells. This allows them to access the phosphorus from the bottom of the lake, then float up to the surface where the sun fuels photosynthesis and their explosive reproduction into an algae bloom. The results of this project are being shared with the Putnam Water Pollution Control Authority who manage Roseland Lake, the Cyanobacteria Monitoring Collaborative, CT DEEP, CT Department of Public Health Drinking Water Division and US EPA. Updates on this project are being posted periodically on the Roseland Lake Facebook page.

A close-up look of a floating algae mat in Roseland Lake



A type of phytoplankton from the water column

A plankton net is used to collect algae samples from the lake.