GREGG LAKE ALGAE

Joan Gorga

This summer, several people mentioned to me that they had never before seen quite so much algae growing in Gregg Lake. We all wondered what was causing the algae bloom and whether there was anything we could do to prevent it from happening again or possibly getting worse. I decided a little sleuthing was called for before taking the matter to the experts.

Many forms of algae are natural parts of an ecosystem. The patchy green clouds under the water surface in Gregg Lake this year looked like filamentous green algae to me, although I didn't think of collecting a sample and sending it off to the NH Department of Environmental Services (NHDES) until it was too late. More worrisome than green algae are blue-green algae, whose blooms tend to look more like a green surface scum. Blue-green algae, more correctly called cyanobacteria, can produce toxins that cause skin irritation, rashes, gastrointestinal distress and sometimes liver or neurological damage.

Algae grow rapidly if nutrients are available. When they die, the decay process depletes the water of oxygen, and fish and other aquatic animals and plants can die off. Jerry Schultz sent me some Wikipedia articles describing fertilizers and household cleaning products as common sources of phosphates, which can act as a nutrient source for freshwater algal blooms. Excess carbon and nitrogen from decaying organic material are also suspected to be nutrient sources.

In mid-September, I paddled slowly around the circumference of the lake to see whether there were spots where the algae growth was especially thick. It seemed to be scattered pretty evenly in the shallower waters all around the lake. I found a few spots where runoff is carrying sediment into the lake, especially off of Brimstone Corner Road, but there was no single spot that called out, "Here's the nutrient source flowing into the lake!"

I spoke with residents in various locations around the shore. Many had noticed the increase in algae, and all denied using fertilizers on their lawns. Jeanne Baker and Carol Carnes said they had measured the water temperature at their float to be above 80°F every day from early July well into September, a much longer span of time than they've seen in other years. Along those same lines, but less scientifically, I had observed that the lake was comfortably swimmable starting on May 9 this year, and remained so into October. (There are those, especially my husband, who disagree with my definition of "comfortable;" however it was still warm remarkably early and late.) I noticed that the algae rapidly disappeared as the water temperature began to drop in late September.

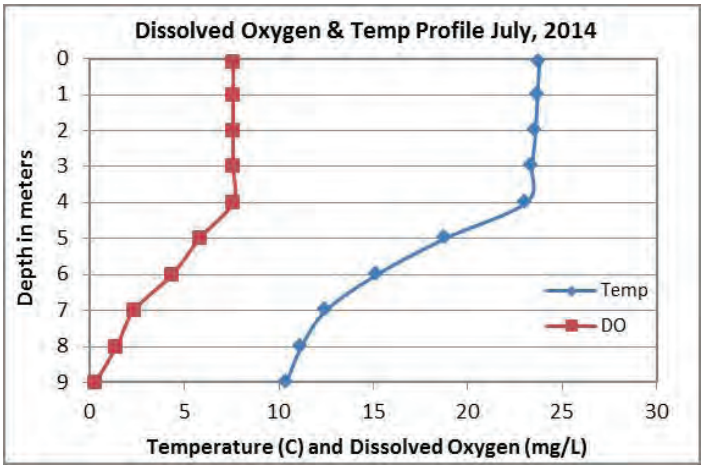
This was also an unusual year with regard to rainfall. We had a long dry stretch in the spring, followed by several inches of heavy rain at the end of June, and then relatively sparse rain for most of the summer, with sporadic downpours. Could this have had an effect on algae levels in the lake?

Armed with information about different kinds of algae, nutrient sources and unusual weather effects, I figured it was time to go to the pros with some questions. 1) Was this an unusually bad year for algal blooms in NH lakes? 2) Could high temperatures alone be responsible for the green algal blooms? 3) Should we search harder for nutrient sources feeding into Gregg Lake? 4) Could a combination of events, such as lumbering upstream in the Gregg Lake watershed, along with a heavy late-June rain after a dry spring, be responsible for more nutrient load than usual? 5) Should we head into next spring with an action plan?

Amy Smagula, who is the Exotic Species Program Coordinator for NHDES, and our contact for the Lake Host and Weed Watcher programs, referred me to Sonya Carlson, who, as the Beach Programs Coordinator at NHDES, tracks algal blooms in New Hampshire water bodies. First of all, Sonya assured me that there is no record of a toxic cyanobacteria bloom at Gregg Lake. She sent me several reports of water testing records for Gregg Lake and also referred me to Sara Steiner, the Volunteer Lake Assessment Program Coordinator at NHDES.

✍——continued on page 14

Gregg Lake is ranked as an oligotrophic lake, which means that it is still young in the lifespan of a lake. In the summer, oligotrophic lakes tend to have three water layers. The upper layer, where the water mixes and is warmed by the air, is a constant, relatively warm temperature. In the middle layer, where there is less mixing, you find a steep temperature gradient from warm to cold. And the bottom layer is a constant cold temperature. The results of testing performed by Bob Southall for Gregg Lake in July of 2014 bear this out. The temperature was a constant 24°C (75°F) down to 4 meters (13 feet), dropped rapidly to 12°C (54°F) over the next 3 meters (10 feet), and then began to level out at about 10°C (50°F) over the last 2 meters (6 feet) to the bottom. The dissolved oxygen levels for 2014 were not too bad in the upper layer, but it is somewhat worrisome that they decreased in the lower layers, as they indicate that decay of organic matter in the lower layers is depleting oxygen that might otherwise support desirable plant and animal life.



2014 NHDES VLAP Individual Lake Report for Gregg Lake

Measured phosphorus levels were low in the upper two layers, but slightly elevated in the bottom layer, which suggests that phosphorus may be accumulating in the sediment at the bottom. Phosphorus levels were also slightly elevated at the lake inlet.

Sonya Carlson said it is unlikely that elevated temperatures alone triggered this summer's algal bloom, although they would have encouraged it. She said it makes more sense that there was some sort of increase in nutrients, as well, and suggested that perhaps the bottom layer of water mixed in more phosphorus this spring than in past years, prompting more growth.

Sara Steiner agreed with Sonya's assessment, and added that she received "numerous observations by volunteers of above average filamentous green algal growth this summer, as well as above average Bladderwort growth. In recent years, the filamentous algal growth observations have increased. Filamentous algae like warmer water and sunlight and may take advantage of groundwater inputs for nutrients as it congregates along the shallows of lakes and ponds. With a dry summer like 2015, I suspect there was more groundwater influence rather than surface flow from tributaries. This could contribute additional nutrients to feed algal growth, particularly if the groundwater is influenced by septic systems. However…it is difficult to pinpoint exact causes of shoreline algal growth."

While we don't yet have all the answers, perhaps we can draw a few conclusions about this summer's algal bloom in Gregg Lake. It was a particularly bad year for algal blooms in New Hampshire lakes. The long period of warm sunny weather heated the water up early and kept it warm for a prolonged period of time. The dry summer meant the lake was disproportionately fed by groundwater, which may carry more nutrients that would allow algae to proliferate. The dry summer also may have led to more mixing of the bottom water layer, which has higher measured levels of phosphorus, with upper layers, again favoring algae growth.

Is there anything we can do? We should redouble our efforts to limit the flow of nutrients into the lake, either from surface flow or from groundwater, as it does seem that nutrients are accumulating in the bottom water layer, and dissolved oxygen levels are moving in the wrong direction. All of us who live in the Gregg Lake watershed, especially those in the immediate vicinity of the lake, should make sure that we do not allow fertilizers or animal wastes to be carried into the lake from our yards. We should also ensure that our septic systems are working as designed, and not allow greywater or large amounts of storm drainage to flow unchecked into the lake. We might try to perform multiple water tests next summer to try to get a clearer picture of the overall condition of the lake. The Gregg Lake Association and the White Birch Point Association currently alternate years in paying for the testing. We may want to seek additional funding sources for water testing. If you have other thoughts regarding how to care for one of Antrim's precious natural resources over the long term, please share them. ☆