

Together we can protect our lakes, divided we all lose

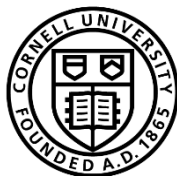
**Karl Czymmek, Quirine Ketterings, Thomas Overton
Cornell University College of Agriculture and Life Sciences**

Every bit of land surface, dairy farm fields, crop, vegetable and fruit farm fields of all types, sizes and production systems, schoolyards and sport fields, lawns, abandoned lots, roads, parking lots, stream banks, and forests, contributes non-point source nutrient runoff to water in streams and lakes. Even without any farms, our watersheds shed nutrients. Some watersheds are mostly wooded or abandoned fields, others have a high proportion of cultivated land, but both types have had problems in recent years. And then some lakes, like Skaneateles, with mixed watershed use and with low nutrient levels (considered to be very clean), experienced harmful algal blooms (HABs) in 2017 and 2018.

The HAB situation in NYS, in other states, and around the world is a growing problem that is incredibly complex and requires a multi-faceted approach to solve. While improved practices have been and continue to be implemented across watersheds, more information is needed to better understand the causes of HABs in each waterbody, as efforts to address the issues are watershed specific. Researchers and extension personnel at Cornell University and many other institutions have been and continue to be committed to developing a better understanding of the drivers for HABs and sharing the knowledge needed to address this pressing problem.

Cyanobacteria, also known as blue-green algae, have traits of both plants and animals- they can fix energy from the sun and have limited mobility. They have been on earth for a few billion years and they have survived incredible variations in living conditions making them highly adaptive and opportunistic. There are five basic needs: the organisms need to be present in a waterbody, they need light, the right temperature range, calm conditions, and nutrients. There are several key species of cyanobacteria in our lakes that can cause HABs. They have likely been there for hundreds, perhaps thousands of years. The sun provides light, and with changing weather patterns, air and water temperatures are rising as well. When we experience long spells of hot, calm weather, these conditions allow cyanobacteria to move up and down in the water column to find the right light conditions for optimal growth and reproduction. Changing weather patterns and weather extremes are being studied as a key contributor to the recent HABs. Nutrients are added to our lakes on a daily basis with stream flow, runoff, and other sources. Phosphorus has long been considered to be the limiting nutrient in fresh water lakes but the role of nitrogen is now being evaluated as well. No one knows for sure why some blooms occur and turn toxic, or what determines the level of toxicity, but the example of the HAB in Skaneateles Lake in 2017 shows that it is not just a phosphorus issue: the lake has among the lowest phosphorus levels of all of the Finger Lakes.

The NYS Concentrated Animal Feeding Operation (CAFO) Program is criticized from many corners. NYS CAFO regulations are among the toughest in the US. NYS started requiring CAFO Permits for dairy farms with more than 200 mature cows in 1999. Since there were few other examples to follow



at the time, NYS developed a unique and robust process that exceeds the US Environmental Protection Agency (USEPA) requirements in several important respects. For example, while EPA rules allow for individual farm owners to prepare a nutrient management plan (NMP), NYS requires a credentialed and continuously trained third-party, state-certified, planner to develop the NMP for the permitted farms. Planners must certify that the NMP complies with CAFO Permit requirements and their planning work is subject to periodic quality assurance/quality control review by qualified NYS Department of Agriculture (NYSDAM) staff. Further, implementation of the NMPs by farmers is inspected by NYSDEC staff. Though also not required by EPA, plans must be developed in accordance with USDA-Natural Resources Conservation Service (NRCS) conservation practice standards, and include development of the NMP in accordance with Land Grant University guidelines (in the case of NYS, Cornell University). NRCS standards and Cornell guidelines are regularly evaluated and, where needed, updated. Cornell faculty have been integrally involved with the development of the technical elements of the NYS CAFO permits and their implementation as key partners with state and federal agencies since the 1990's resulting in a number of guidance documents designed to reduce the risk of nutrient loss to the environment. The NYS CAFO system provides numerous checks and balances and involves a number of important features not required, nor provided for by EPA rules. CAFO regulated farms already perform these key nutrient management and soil conservation practices that are critical parts of watershed-wide improvement efforts, and have been doing so for nearly 20 years. Adding to the progress, thousands of non-CAFO farms continue to make significant investment and effort to implement such conservation practices on a voluntary basis.

Cornell faculty and staff are committed to helping farmers to continuously improve and to protect our lakes. Each watershed is truly unique and the specific solutions are not one-size-fits-all. We agree with NYS officials that watershed wide plans are necessary. To us, this means that all sources of nutrients need to be addressed. Most importantly, it may be that addressing all sources of nutrients is the ONLY way to achieve the changes needed to protect the waters that all residents, including farmers, rely on. If every business, municipality or family, farmer and non-farmer alike, would look for ways to reduce nutrient losses from the land and structures and actions they control, together we can have an impact. We realize that it will take time for each sector to continue to advance its management of nutrients and sediment, so we also need to maintain our watershed plans and then support each other in their implementation. Where practical, every farm and non-farm user of fertilizer should have a plan for managing those nutrients in order to reduce the use of nutrients in each watershed. All municipalities should have a plan for managing roadside ditches and culverts to slow the flow of water speeding to our lakes and reduce the delivery of nutrient laden water and related soil loss. Every municipal treatment facility should have flow meters to accurately monitor discharges of untreated sewage that often happen with heavy rains or snowmelt and to look for ways to reduce such losses. Every fertilizer application to lawns, gardens, athletic fields or farm fields should be based on soil tests and plant needs, and not simply be based on habit. Every manure or compost pile, or unmanaged livestock barnyard, whether from two horses, two goats, 50 cows or 500 cows should be either eliminated, carefully located away from surface and groundwater resources, or further addressed with conservation practices to collect the manure and recycle the nutrients as fertilizer for crop fields and pastures. Residues from these locations should not be allowed to decompose for years but be cleaned up. Household pet waste should be picked up and disposed of properly as well. All septic inspection programs should be evaluated for effectiveness, and every septic system close to a shoreline should be upgraded to modern standards. These are but a few important measures that need consideration.

Pointing fingers only at farmers does everyone a great disservice and is not constructive: the problem belongs to all of us.