Autumn Lake Foam Phenomenon

During late summer and autumn months, lake foam can accumulate along the shorelines of the Finger Lakes, and meander on the water surface in long "streaks" that move in sync with wind and wave currents. On any given autumn day, across the 11 square miles of surface area of Owasco Lake, miles of white streaks and sudsy windrows can be seen in the lake and along the respective 22 miles of shoreline. Similar to plant foliage, Owasco Lake can display symptoms of health through a variety of seasonal indicators, such as an abundance of cyanobacteria during warm temperatures, and presence of lake foam during the transition into autumn.

Concerns about lake foam on Owasco Lake are often expressed by vigilant residents. At first glance, the foam appears to be identical to detergent or soap suds, which can lead to the suspicion that the source may be a nearby car wash, laundromat, business, farm, or residential septic system, discharging cleaning products into the lake. However, a closer inspection of the lake foam often reveals distinct differences in composition from synthetic foams, predominantly odor and feel. Natural foams emit an "earthy" scent and are not filmy, while synthetic detergents are typically injected with, and smell of, perfumes and are filmy to the touch.

The autumn foam phenomenon is certainly not unique to Owasco Lake. The Finger Lakes, including Canandaigua Lake, experience similar occurrences and subsequent public concerns. In late 2019, the Canandaigua Lake Watershed Association (CLWA) embarked on a mission to address concerns and determine the source of the foam. CLWA contracted with Global Aquatic Research (GAR), and initiated a robust, phased effort to draw foam samples from the lake and analyze chemical characteristics through advanced laboratory techniques.

The results of this initial analysis by GAR were released earlier this year, and provided analysis of lake foam composition including the ingredients and conditions necessary for its development. According to the GAR analysis, the chemical "signatures" in the Canandaigua Lake foam suggest the origin is from within the lake itself and has direct and indirect relationships to water quality. Foam occurs naturally in lakes when the top layer of water is stirred by wind and waves, which mixes air and "foaming agents." The foaming agents are primarily "chains" of organic sugars or carbohydrates, known as polysaccharides, as well as oils or surfactants, from decomposing plants. These compounds are not very water soluble and tend to ride along the water's surface. Depending on wind direction and wave action, streaks of foam can form into long windrows, thanks to a phenomenon known as Langmuir Circulation, or will migrate to the shoreline where they can accumulate into larger areas of dense surface foam.

So, why are areas and streaks of foam larger in some lakes and locations than in others? The GAR research on Canandaigua Lake determined a plausible explanation for this question, which may also provide an indicator of lake health and changes that occur throughout Canandaigua Lake, as well as other Finger Lakes. Through their micro analysis, GAR has identified phytoplankton, including cyanobacteria (also known as Harmful Algal Blooms, or HABs), as a direct source of foam-creating polysaccharides found in Canandaigua Lake. They concluded "cyanobacteria release polysaccharides outside of their cells in order to create large colonies and to regulate their environment.

These exopolysaccharides, or EPSs, are produced in large quantities during phytoplankton blooms and change the chemistry of the surface of the lake." Their analysis indicates a correlation between cyanobacteria and lake foam. From these results, parallels can be drawn that would suggest that ingredients that create foam on Canandaigua Lake closely resemble those in other Finger Lakes, like our own Owasco Lake. If cyanobacteria blooms can clue us in to high nutrient levels within the water column, then lake foam may be our late season "foliage" indicator.

A continuation and increase in efforts to reduce nutrient migration from the landscape to nearby waters will help our lakes see reductions in harmful algal blooms and lake foam. Conscious efforts to use less commercial lawn fertilizers, to plant trees and shrubs along the shoreline and streams to capture nutrient runoff and shade the water, to expand the use of best practices in all corners of the landscape, and to stabilize soils, will achieve and preserve high levels of water quality for drinking water and recreation in Owasco Lake.