Compiled by Bob Crossen

Green in the Lakes

Tim Davis, Ph.D., is a molecular ecologist for the National Oceanic and Atmospheric Administration (NOAA) who conducts research in the Great Lakes Environmental Research Laboratory. Davis recently spoke about the effects "green water" has on the environment (and on beer) at the Great Lakes Water Conservation Conference. WQP Associate Editor Bob Crossen spoke to him about his presentation.

BOB CROSSEN: ***What is green water and how does it get that way?***
TIM DAVIS: The green water in the Great Lakes region is generally caused by the overgrowth of cyanobacteria, also known as blue-green algae, referred to as cyanobacterial harmful algal blooms (CHABs). These types of events are a visual manifestation of degrading water quality from nutrient (nitrogen and phosphorus) pollution. The blooms look green because the cyanobacteria, like all organisms that photosynthesize, have a common pigment known as chlorophyll. The "blue" in their name comes from the accessory pigment known as phycocyanin, which they use in conjunction with chlorophyll to harvest light for photosynthesis.

CROSSEN: ***What effect does this water have on the environment?***
DAVIS: These events can have significant environmental effects such as limiting light penetration through the water column and causing important species of benthic aquatic plants to die because they cannot photosynthesize. They can cause significant changes in the food web that could have impacts on commercially and recreationally important fish populations. Also, when these very dense blooms die and are decomposed by other bacteria, that can cause low-oxygen events leading to fish kills in certain systems. Finally, they produce toxic compounds that can threaten the health of pets, livestock, wildlife and humans.

CROSSEN: ***For what purposes can this water be used?***
DAVIS: When a bloom is occurring, people still boat and fish, although swimming in the bloom is not recommended and some states have guidelines or "no contact" warnings. Basically, you would not want to accidentally swallow any water, and there have been occurrences of skin rashes after people have come in contact with bloom water. Obviously, some water treatment plants (e.g., Toledo, Ohio) pull their raw water directly from bloom-impacted waters and—it must be stated—these plants are well equipped to deal with cleaning the water of these toxins, but there are a handful of incidences when toxins slip through.


Tim Davis

CROSSEN: ***What effect does it have on brewing and beer?***
DAVIS: Further degrading water quality may have an end product of increased cost of water treatment, which could impact beer price. If there is another incident where toxins are detected in finished drinking water and water supply is disrupted, it could impact the smooth supply of this socially critical product. Also, this could financially impact smaller brewers as they would have to waste all of the beer potentially contaminated with these toxins, and this may be devastating for some companies.

CROSSEN: ***What should the general public know about this water?***
DAVIS: CHABs occur throughout the Great Lakes basin, not just Lake Erie, but also Saginaw Bay and Green Bay, along with other smaller embayments and inland lakes. If a person comes across a lake that may be suffering from CHABs, contact the local environmental monitoring department and ask. Do not let kids or pets play in green water.

CROSSEN: ***How does your research relate to green water?***
DAVIS: NOAA conducts multi-disciplinary research into CHABs. We forecast bloom size seasonally. We produce HAB information products, including the Experimental Lake Erie HAB Bulletin and Lake Erie Experimental HAB Tracker, and we conduct weekly sampling for toxins and other important bloom ecology parameters. We collaborate with university partners to conduct experiments to see how the blooms may be impacted by increases in nutrient pollution, climate change and the interaction between the two. This is important information to help develop comprehensive management strategies that will [lead to] long-lasting improvement in overall water quality and a reduction in CHAB occurrence, intensity and toxicity. **WQP**

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