Harmful Algal Blooms (HABs) in the Great Lakes

Harmful algal blooms threaten public health and recreation

Harmful algal blooms (HABs) in the Great Lakes occur when algae grow rapidly, forming dense scums and water discoloration. Some blooms can produce neurotoxins, liver toxins, and/or skin irritants. The toxins can contaminate drinking water, harm swimmers and pets in areas where toxins concentrate, and pose a severe nuisance to recreational and commercial boating and fishing.

What causes the blooms?

Blooms are caused by excess nutrients entering the lake. Heavy rains wash soil and fertilizer containing phosphorus and nitrogen into rivers and streams that flow into lakes. Additional nutrient sources include sewage treatment plants, combined sewer overflows, water treatment plants, cleaning products, faulty septic tanks, and residential lawn fertilizers.

What happens if there is a big bloom?

The impact of the bloom depends on its toxicity, location, size, and duration. In the western and central Lake Erie basins, the NOAA-supported Lake Erie HAB Forecast and Lake Erie HAB Data Share provide information about the current location of the bloom and predict its location over the next few days. This helps stakeholders target their response to minimize impacts. Through the use of this information:

- Water treatment managers can chemically treat the water, or some plants use a temporary alternative source including a second intake or reservoir.
- State agencies can guide toxin sampling efforts and close beaches where toxins exceed recreational swimming standards as well as issue warnings for pets.
- Commercial and recreational boaters can plan activities that are outside of the bloom.

The 2014 Toledo bloom

In 2014, Toledo, Ohio officials issued a two-day ban on drinking and cooking with tap water for more than 400,000 residents due to toxins concentrations that exceeded the World Health Organizations guideline level for safe drinking water. These toxins were a result of an algal bloom that was occurring in western Lake Erie. The economic impact of the 2014 bloom has been estimated at $65 million. This event served as a wake-up call that HABs can be incredibly costly, have serious economic impacts, and can pose serious threats to human health, drinking water safety, and water-dependent businesses and activities. As such, this event underscored the importance of HABs monitoring, forecasting, and research.

Sampling a harmful algal bloom in western Lake Erie near the Toledo water intake on August 4, 2014. For more on tracking toxicity of Lake Erie Algal Blooms, watch a video, produced by the University of Michigan, here: bit.ly/1OwuQHM.
NOAA monitors and forecasts HABs for Lake Erie’s drinking water and recreational managers.

**MONITORING**

NOAA monitors harmful algal blooms in parts of Lake Erie and Lake Huron in partnership with state agencies, universities, water treatment facilities, and a citizen monitoring network. In addition to weekly sampling, robots, buoys, and sensors are deployed during the bloom season to measure toxins, nutrients, and algal pigments (chlorophyll). An Environmental Sample Processor (ESP) network provides near real-time toxin monitoring in two locations, neighboring the Toledo, Ohio water intake and Monroe, Michigan.

**FORECASTING**

HAB forecasts allow managers to prepare for and respond to blooms. NOAA starts estimating bloom severity in early May to guide water treatment facility managers in ordering the right amount of chemicals to keep tap water safe. In July, NOAA issues a Seasonal Lake Erie HAB Forecast of bloom severity—similar to NOAA’s seasonal hurricane and tornado forecasts. Throughout the bloom season (July-October), the Lake Erie HAB Forecast is updated twice-weekly and provides information on current extent and trajectory of HABs as they form.

**RESEARCH**

NOAA research priorities include predicting toxicity, improving toxin detection, and understanding health and economic impacts of algal blooms. Research efforts by NOAA scientists are complemented by research grants funded by NOAA, EPA-Great Lakes Restoration Initiative, and the National Science Foundation. The State of Ohio is contributing $9.3 million to better track blooms, study health impacts, inform water treatment, reduce nutrients and engage citizens.