

Key Points

- Lake Erie is one of the world's largest and most productive freshwater natural resources
- Millions of people each year enjoy Lake Erie's waters for swimming, fishing, boating, etc.
- Algae are natural components of marine and freshwater ecosystems and form the foundation of most aquatic food chains
 - Algae is the base of the food chain present in all bodies of water
 - It is only when nutrients are in excess, and the temperature of the water is elevated enough that potentially-harmful cyanobacteria algal bloom can occur

Additional Information

- **What is cyanobacteria?**
 - Cyanobacteria are microscopic algae-like bacteria found naturally in surface water
 - Cyanobacteria are naturally-occurring and are found in both salt water and fresh water systems
 - Cyanobacteria are important to marine and freshwater ecosystems
 - Cyanobacteria make oxygen as a by-product of photosynthesis
 - Cyanobacteria are also a food source for other organisms
- **What are harmful algal blooms (HABs)?**
 - When high levels of nutrients (phosphorus and nitrogen) combine with the right conditions of warm and still waters, naturally-occurring cyanobacteria can grow in excess to form a harmful algal bloom
 - Phosphorus is limiting nutrient that drives the bloom
 - Nitrogen aids in bloom formation and can also determine its toxicity
- **How do cyanobacteria blooms occur?**
 - Cyanobacteria blooms occur when too many nutrients enter water bodies
 - Too many nutrients in the water is called nutrient pollution and eutrophication
 - On Lake Erie, the primary sources of nutrient pollution are runoff of fertilizers and manure, failing septic tanks, and sewage treatment plant overflows during major storm events
 - Heavy rains from March through July can create a larger bloom
 - When a lot of rain falls in a short period of time, the soil cannot absorb the large amount of water
 - The extra rainwater carries the excess nutrients and flows off the land into rivers, creeks and streams that then flow to Lake Erie
 - For a healthy ecosystems, the water needs a chance to soak into the soil
 - This allows the nutrients to attach to soil particles and those soil to stay on the land
 - Nutrients and water in the soil grow healthy plants on land
 - When too many nutrients flow into water bodies, the nutrients grow unwanted blooms of cyanobacteria algae in the water
- **Where do cyanobacteria blooms occur?**
 - Cyanobacteria algal blooms appear on bodies of water throughout the world and are not unique to Lake Erie

- On large bodies of water, cyanobacteria blooms begin in small pockets where there are extra nutrients
 - On Lake Erie, during certain warm-water months, if levels of nutrients (phosphorus and nitrogen) in the water get too high, cyanobacteria can multiply quickly and form pockets of blooms
 - Phosphorus (P) is the nutrient that triggers cyanobacteria blooms; too much P in the water can lead to a bloom
 - Scientists believe the type and amount of nitrogen (N) in the water can determine if the cyanobacteria will create toxins
 - Blooms of algae do not cover the whole Lake – they grow in pockets which vary in size, location and density based on water conditions including wind, waves and currents
 - A beach may have an algal bloom in the morning that blows offshore by mid-day or vice-versa.
 - Public access sites/places to recreate that are very close to each other along the shore may have very different water conditions
 - Cyanobacteria float in the water column
 - On very, very calm water days, the cyanobacteria will float to the surface and collect in patches
 - If the wind blows gently on a bloom patch, it will move
 - Depending on the direction of the wind, a small patch may be blown to shore and cling along a shore structure; however, there will be no bloom in the water 50-feet away
 - As summer progresses, the more nutrients that have entered the water, the higher the chance that the pockets of blooms will grow
 - Scientists believe that the amount and type of nitrogen in the water will determine if a patch of cyanobacteria will be able to create toxins
 - If the cyanobacteria has produced toxins, it is believed that toxins are released when the cyanobacteria begins to die
 - Scientists are still studying this issue
- **What is being done to help prevent cyanobacteria blooms**
 - Many projects are being implemented to keep nutrients in the soil instead of allowing them to flow into the water
 - Ohio (Senate Bill 150) is focusing on teaching and enforcing the 4Rs of nutrient stewardship – ensuring that only the right source of nutrients are used at the right rate, at the right time and with the right placement
 - This is helping and will reduce nutrient runoff
 - <http://www.nutrientstewardship.com/what-are-4rs>
 - Ohio is helping communities and residents served by septic systems to understand the importance of system maintenance and correct failing systems
 - Ohio communities are installing green infrastructure projects such as rain gardens and urban wetlands to slow down the flow of water and let it soak into the soil
 - Ohio communities are improving wastewater treatment plants and developing systems that store combined sewer overflow (CSO) water in underground chambers till it can be treated, instead of releasing it untreated during storm events
 - Ohio is a partner in various international agreements to reduce the amount of phosphorus flowing into the western Lake Erie basin by 40% by 2025

- A 40% reduction in phosphorus from 2008 levels is the target amount referenced in numerous scientific reports by organizations who are working to create a healthy Lake Erie
 - Groups involved include: International Joint Commission, Great Lakes Water Quality Agreement Annex 4 (nutrients), Lake Erie Nutrient Targets Working Group, Great Lakes Commission, Conference of Great Lakes and St. Lawrence Governors and Premiers, Western Basin of Lake Erie Collaborative Agreement Partners, Ohio Lake Erie Phosphorus Task Force II, state of Ohio agencies including Ohio EPA, Ohio Department of Natural Resources, Ohio Department of Agriculture, the Ohio Lake Erie Commission, USDA NRCS, Ohio Sea Grant, OSU Stone Lab, Ohio Department of Higher Education and more
- **What can I do to help?**
 - Support legislation to increase monitoring of phosphorus levels in Lake Erie and its tributaries
 - Support the creation of funding mechanisms to both research the problem and implement solutions
 - Use no-phosphorus fertilizer on lawns and gardens
 - Look for the package formula of nitrate-phosphorus-potassium, such as 22-0-15
 - The middle number, representing phosphorus, should be 0
 - Avoid using products with a lot of phosphorus and nitrogen at home and at work
 - Plant deep-rooted native plants along streams, lakes and exposed dirt areas to filter runoff and reduce erosion
 - Avoid blowing leaves and grass clippings into streets or hard surfaces where they will be swept into the water
 - Dead plants can use up the oxygen in the water during decomposition
 - Plants/cyanobacteria also release phosphorus into the water when they decompose
 - In most communities, the storm drains in streets drain water directly to a river, creek, stream or pipe that flows into Lake Erie
 - Create a raingarden to catch rooftop runoff
 - Native plants will attract birds and butterflies.
 - Test your soil at least every three to five years
 - Only apply nutrients (fertilizer or manure) if needed
 - If you fertilize your yard, ensure you stop and turn prior to reaching the sidewalk
 - Fertilizer on the sidewalk flows straight down to storm drains and into Lake Erie
 - Regularly check and maintain septic systems

Additional Notes

- Just because algae is found in one area of Lake Erie, it doesn't mean that the whole lake is experiencing a bloom
- Isolated rain activity, water depth, wave action and wind can all be factors as to where and when algae may show up
- The same factors that are at play for where and when algae may show up also can quickly disperse algae from an area
- The western basin of Lake Erie turns over every 30-45 days, so the water can "heal" fairly quickly