Harmful algal blooms threaten our health, environment, and economy

To protect people and animals, CDC works to detect, investigate, and prevent illnesses caused by harmful algal blooms.

Harmful algal blooms are the rapid growth of algae or cyanobacteria (also called blue-green algae) in water that can harm people, animals, or the local ecology. Warm waters, extreme weather, and high levels of nutrients like nitrogen and phosphorous can increase the geographic range and growth of harmful algae.[1]

These blooms are a growing domestic and global threat. Harmful algal blooms can make people sick, kill animals, damage the environment, and harm local economies dependent on natural water for food, tourism, or transportation.

To prevent illness and protect local communities, public health departments need high-quality data to use and share with partners during responses to harmful algal blooms.

CENTERS FOR DISEASE CONTROL AND PREVENTION

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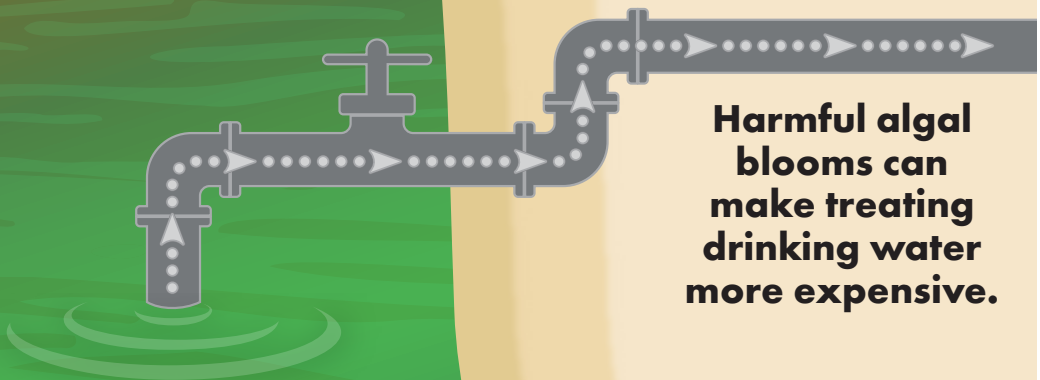
Harmful algal blooms threaten our health, environment, and economy. Blooms in fresh water and coastal waters can have far-reaching effects.

Toxins from harmful algal blooms can make people and animals sick.

Toxins can make seafood unsafe to eat, impacting communities and industries that depend on shellfish and fish.

Closed beaches and visible blooms slow tourism.

Harmful algal blooms damage local ecosystems, killing animals and plants.



Harmful algal blooms can make treating drinking water more expensive.

Harmful algal blooms are costly.

Large blooms in Lake Erie during 2011 and 2014 were estimated to cost communities **at least $65 million** each.

Harmful algal blooms in coastal waters are estimated to cost an average of **$49 million** annually, including **$22 million** in public health costs.

Digestive and respiratory illnesses are estimated to cost **$86–$14,600 per illness.**

Increasing threat

Harmful algal blooms occur in both fresh and marine waters and have impacted all 50 states, Puerto Rico, and the U.S. Virgin Islands.

An Environmental Protection Agency (EPA) review of 30 years of data showed that over time, reservoirs in Indiana, Kentucky, and Ohio got warmer earlier in the year, stayed warm longer, and had more blooms.[2] This is consistent with climate change science, which predicts that when warmer temperatures occur for longer periods of time, they help cyanobacteria (also called blue-green algae) grow and contribute to more severe blooms. Cyanobacteria are the primary cause of blooms in fresh water.

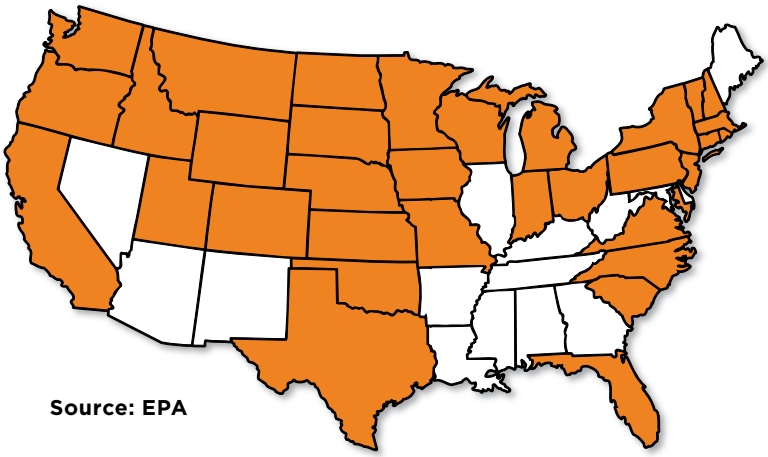
Higher levels of nutrients in water can also make harmful algal blooms occur more often and be more severe.[3] Levels of nutrients can increase when fertilizer, storm water, or sewage wash into water bodies.

Impact

Harmful algal blooms can produce toxins that contaminate seafood, drinking water, and recreational water. People and animals can get sick when they eat contaminated seafood, drink contaminated water, or go in contaminated water. The risk of illness caused by harmful algal blooms can lead to beach and lake closures and restrict the harvesting of shellfish or fish. Shellfish become contaminated when they filter water containing toxins and the toxins build up in their bodies. Fish become contaminated when they eat other animals that have toxins in their bodies.

Harmful algal blooms also damage local ecosystems, killing fish and other animals. Fast-growing blooms can deprive plants and animals in the water of sunlight and oxygen they need to live.

Harmful algal blooms caused beach closures or health advisories in at least 34 states in 2022



Source: EPA

Impact

HEALTH AND ENVIRONMENTAL THREATS FROM HARMFUL ALGAL BLOOMS ARE COSTLY:

- In U.S. states bordering oceans, harmful algal blooms are estimated to cost an average of $49 million annually, including $22 million in public health costs.[4]
- Illnesses caused by eating seafood contaminated with algal toxins—including ciguatera fish poisoning, paralytic shellfish poisoning, and neurotoxic shellfish poisoning—are estimated to cost more than $30 million annually.[5] This estimate does not include the costs of closing seafood harvesting areas during harmful algal blooms to prevent illnesses from contaminated seafood. These closures can cost communities millions of dollars in lost seafood sales and tourism spending.[6,7,8]
- Harmful algal blooms in fresh water can cost millions in lost tourism and recreation, reduced property values, and water treatment. Large blooms in Lake Erie during 2011 and 2014 were estimated to cost at least $65 million each in response and mitigation efforts.[9]
- Digestive and respiratory illnesses caused by harmful algal blooms are estimated to cost $86–$14,600 per illness. This estimate includes treatment costs, income loss, loss of productivity, and quality of life costs.[10]

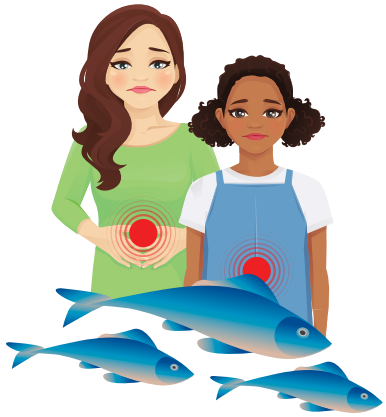
HARMFUL ALGAL BLOOMS AND ASSOCIATED ILLNESSES, 2016–2021

1,272
Harmful algal blooms

666
Human illnesses

4,375+
Animal illnesses & deaths

Data from 25 states reporting to CDC's national harmful algal bloom surveillance system—the One Health Harmful Algal Bloom System



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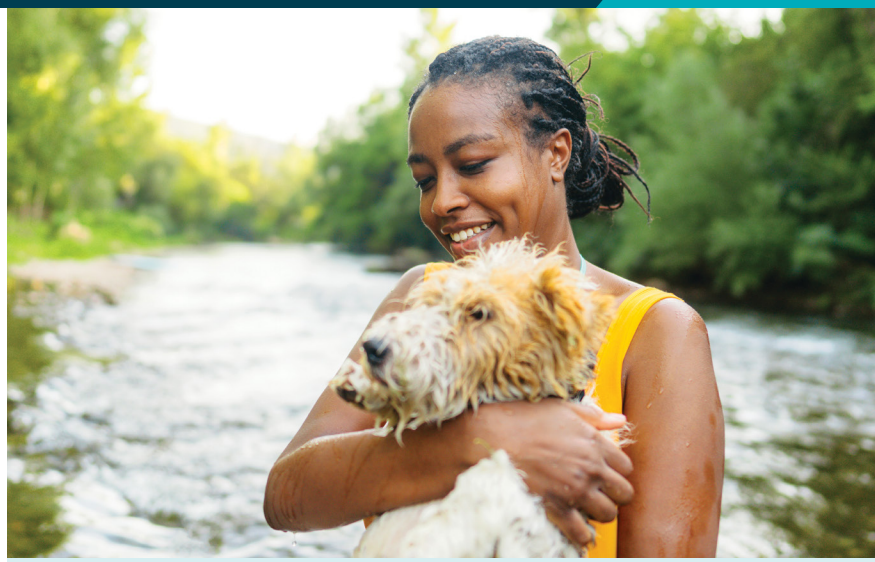
Outbreaks from contaminated seafood

Data from 50 states, Washington D.C., and Puerto Rico reporting to CDC's National Outbreak Reporting System

Addressing harmful algal blooms and their impacts

To better prevent the harmful effects of blooms, it is critical to understand and track when they happen, where they happen, and the illnesses they cause. Harmful algal blooms are an emerging public health issue, so there are limited data on the overall health impact. To address this challenge, CDC studies what happens when people are exposed, develops tests to detect toxins, and established the One Health Harmful Algal Bloom System (OHHABS) to track harmful algal blooms and human and animal illnesses on a national scale.



A One Health approach recognizes that the health of people is connected to the health of animals, plants, and our shared environment. This connection requires many types of partners to work together to effectively address One Health issues, such as harmful algal blooms.

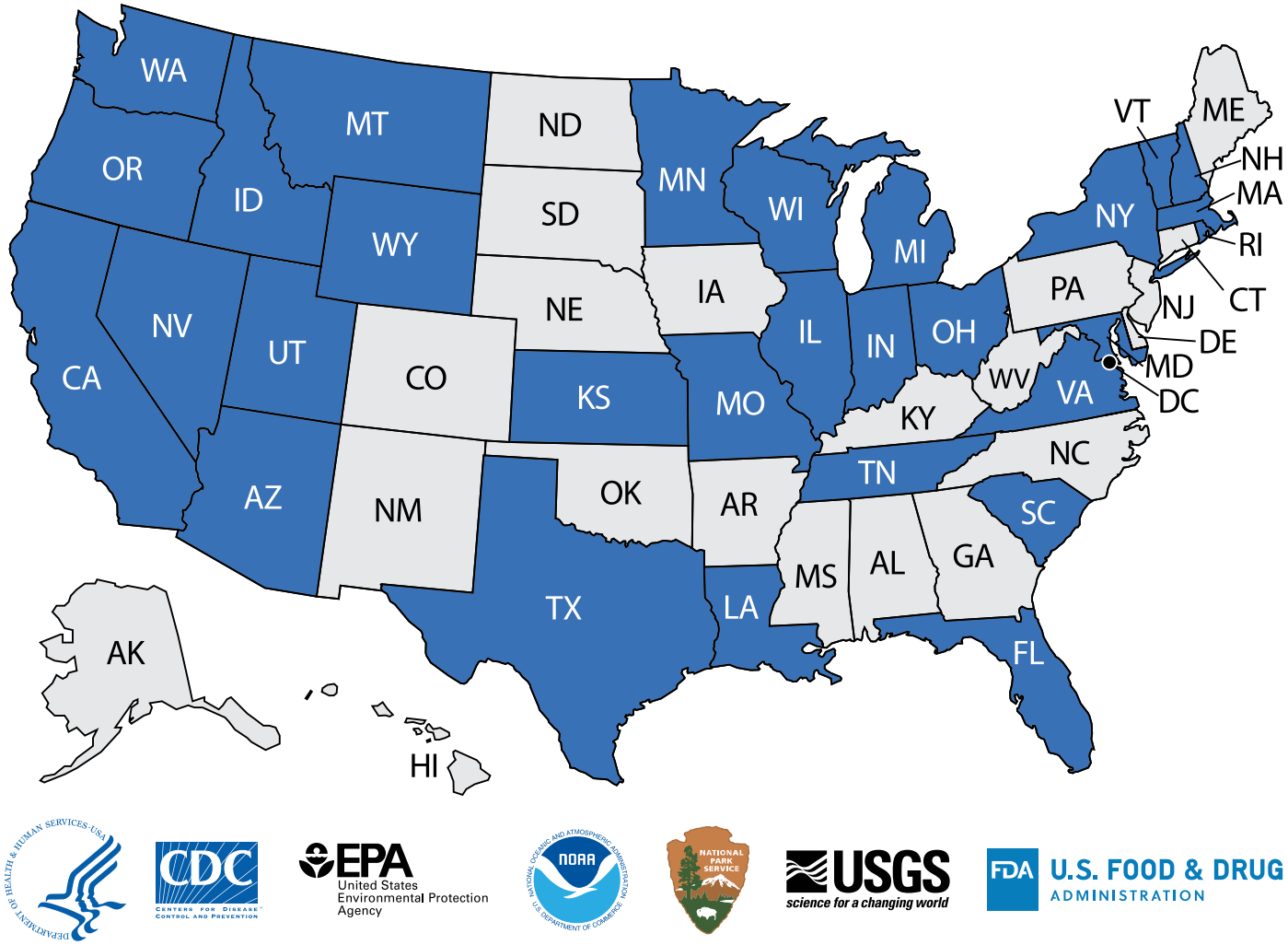
CDC WORKS TO UNDERSTAND HARMFUL ALGAL BLOOMS AND PREVENT ILLNESSES

To protect people and animals, CDC works to detect, investigate, and prevent illnesses caused by harmful algal blooms. CDC is addressing data gaps and improving the public health response to harmful algal blooms by:

- Supporting public health departments and their partners to collect and submit data to CDC's OHHABS.
- Analyzing and sharing data about harmful algal blooms, associated illnesses, and outbreaks through national surveillance systems.
- Providing funding and technical assistance to public health departments to support their work detecting and preventing illnesses caused by harmful algal blooms.
- Partnering with organizations that support local, state, and territorial public health departments to prepare and respond more effectively to harmful algal blooms.
- Researching how exposure to harmful algal blooms affects health.
- Developing laboratory tests to detect toxins in human and animal samples.
- Working with federal partners to share expertise and apply the latest science to harmful algal bloom work.
- Educating the public and healthcare providers about harmful algal blooms and how to prevent human and animal illnesses.

STATES AND FEDERAL AGENCIES PARTICIPATING IN CDC'S ONE HEALTH HARMFUL ALGAL BLOOM COMMUNITY OF PRACTICE, 2023

These partners meet regularly to share knowledge and activities related to surveillance, response, and mitigation of harmful algal bloom-associated illnesses.



WHAT'S NEXT?

Current public health efforts provide the foundation for understanding and improving the public health response to harmful algal blooms. To address the growing negative impacts of these blooms in communities across the United States, CDC and its public health partners need more information on the health outcomes of exposure—including who is at greatest risk—and collaborative efforts to educate the public, prevent illnesses, and reduce algal-bloom-related damage to communities.

References

1. Anderson D, Fensin E, Gobler C, et al. 2021. Marine harmful algal blooms (HABs) in the United States: History, current status and future trends. Harmful Algae. 2021 Feb; 102.
2. Smucker NJ, Beaulieu JJ, Nietch CT, Young JL. Increasingly severe cyanobacterial blooms and deep water hypoxia coincide with warming water temperatures in reservoirs. Global Change Biol 2021;27:2507–2519.
3. Heisler J, Glibert P, Burkholder J, Anderson D, et. al. Eutrophication and harmful algal blooms: a scientific consensus. Harmful Algae. 2008 Dec;8(1):3–13.
4. Anderson DM, Hoagland P, Kaoru Y, White AW. 2000. Estimated Annual Economic Impacts from Harmful Algal Bloom (HABs) in the United States. Technical Report WHOI 2000 to 2011. Woods Hole Oceanographic Institute, Woods Hole, Mass.
5. Ralston EP, Kite-Powell H, Beet A. An estimate of the cost of acute food and water borne health effects from marine pathogens and toxins in the United States. J Water Health. 2011 Dec;9(4):680–94.
6. Dyson K, Huppert DD. 2010. Regional economic impacts of razor clam beach closures due to harmful algal blooms (HABs) on the Pacific coast of Washington. Harmful Algae. 2010 Mar;9(3):264–271.
7. Jin D, Hoagland P. 2008. The value of harmful algal bloom predictions to the nearshore commercial shellfish fishery in the Gulf of Maine. Harmful Algae. 2008 Oct; 7(6):772–781.
8. National Oceanic and Atmospheric Administration (NOAA). 2021. Hitting Us Where it Hurts: The Untold Story of Harmful Algal Blooms.
9. Bingham M., Sinha, S. K., Lupi, F. 2015. Economic Benefits of Reducing Harmful Algal Blooms in Lake Erie. Environmental Consulting & Technology, Inc., Report, 66.
10. Kouakou CRC, Poder TG. Economic impact of harmful algal blooms on human health: a systematic review. J Water Health 2019;17(4):499–516.
11. Centers for Disease Control and Prevention (CDC). National Outbreak Reporting System Dashboard. Atlanta, Georgia: U.S. Department of Health and Human Services, CDC.
12. Centers for Disease Control and Prevention (CDC). One Health Harmful Algal Bloom System. Atlanta, Georgia: U.S. Department of Health and Human Services, CDC.

WWW.CDC.GOV/HABS