Harmful Algal Blooms (HABs)

Cyanobacteria, also known as blue-green algae, are found in freshwater lakes, ponds, and river embayments and are an emerging public health threat. Some blooms can be toxic, and people can be exposed through playing, wading, swimming, or water skiing in lakes with toxic blue-green algae blooms.

Health effects from exposure to toxic blue-green algae may include skin rashes and lesions, vomiting, gastroenteritis, and headaches, as well as eye, ear, and throat irritations. Exposure to neurotoxins can result in more severe symptoms.

Algae Programs
The Office of Shellfish and Water Protection is working with many partners on this emerging threat. Programs and partnerships include:

Freshwater Algae Control Program
The Washington State Legislature funded Washington State Department of Ecology’s Freshwater Algae Control Program in 2005. The program funds a laboratory to conduct toxicity tests for microcystins (liver toxins) and anatoxin-a (nerve toxin) in lake samples. Department of Health (DOH) works with local health jurisdictions to determine what actions, if any, need to be taken based on toxicity results.

DOH staff has developed and provided:

- Recreational guidance levels for microcystins, anatoxin-a, cylindrospermopsin and saxitoxins. These guidance levels help local health authorities decide when actions need to be made to protect public health and what to do in waterbodies experiencing toxic algae blooms.
- A three-tiered lake management protocol for local health jurisdictions to use as a guideline for managing a toxic bloom. Actions range from no action to posting advisories and waterbody closures. Signs were created for each tier indicating risk: CAUTION, WARNING, or DANGER.
- Ongoing scientific support to local health jurisdictions.
- A website and education materials to answer questions about symptoms and toxicity.

Harmful Algal Bloom-Related Illness Surveillance System
Last year DOH finished a five-year cooperative agreement with the Center for Disease Control and Prevention (CDC) as part of the Harmful Algal Bloom-Related Illness Surveillance System (HABISS). The goal of this project was to investigate human and animal incidents associated with exposure to toxic blooms. For three years DOH worked with partners in Puget Sound to sample 30 lakes for biotoxins (microcystins, anatoxin-a, cylindrospermopsin, and saxitoxins). Results showed that microcystins, liver toxins, were the most common type of cyanotoxins produced in Puget Sound lowland lakes and that levels became progressively higher in late summer and fall.
Anatoxin-a, a nerve toxin, was the second most detected cyanotoxin – it has been detected in fourteen state lakes to date. The other two cyanotoxins have been detected in only a few lakes in the state.

**Anatoxin-a**
Anatoxin-a is one of three neurotoxic alkaloids that has been isolated from cyanobacteria. It is produced by various species of cyanobacteria including *Anabaena, Planktothrix (Oscillatoria)*, *Aphanizomenon, Cylindrospermum*, and *Microcystis* spp. Anatoxin-a was first detected in Canada in the 1960s. Since then cattle, elk, cat and dog poisonings have been reported.

Anatoxin degrades readily to nontoxic products in sunlight and at a high pH. In natural blooms in eutrophic lakes, anatoxin-a half-life is typically less than 24 hours.

Anatoxin-a is largely retained within cells when conditions for growth are favorable. But toxins will be liberated in the gastrointestinal tract if water containing toxic cells is consumed. Therefore pets that collect scum on their fur then ingest it by licking are at highest risk from anatoxin-a exposure. Ingestion of a sub-lethal dose of these neurotoxins leaves no chronic effects and recovery appears to be complete with no ongoing injury.

**Ongoing Algae Work**
**Potential Exposures from Eating Fish**
Studies from Ecology show that microcystins bioaccumulate in fish muscle tissue. Preliminary results indicate that levels in muscle tissue are not high enough to limit fish consumption; however, anglers should clean fish and discard guts.

**Links to Climate Change**
The Environmental Health Tracking Program at CDC is interested in using harmful algae bloom toxicity data linked to health outcomes as an indicator for climate change.

**Anatoxin-a in Lake Anderson, Jefferson County**
Using genetic tools, researchers are investigating why *Anabaena*, a cyanobacteria, produces such high levels of anatoxin-a in this lake.

**Did you know . . .**
- In 2013, 6 Washington lakes had anatoxin-a blooms above the state’s guidance value of 1 ug/L and 22 had microcystin blooms above the guidance value of 6 ug/L.
- 2008 anatoxin-a levels in Anderson Lake, Jefferson County, may have been the highest measured in the world.