

Toxic Algae in Nebraska Lakes

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History of Toxic Algae in Nebraska:

Over the past two decades, occasional pet, livestock and wildlife deaths, and human skin rashes and gastrointestinal illnesses have been reported at lakes and ponds in Nebraska, but rarely were cyanobacteria (toxic algae) blooms suspected as the cause. That all changed in 2004.

- **May 4, 2004** when two dogs died after drinking water from a lake in Eastern Nebraska lake agencies began to actively address toxic algae issues for the first time. Water sample and autopsy on one dog revealed that the dog deaths were due to high concentrations of the cyanobacteria toxin Microcystin. The dog deaths were reported to the national news and investigated by the Federal Center for Disease Control and Prevention. During this same timeframe, three more dog deaths were reported at two other lakes with toxic algae blooms. Meetings were held between the Nebraska Department of Environmental Quality (NDEQ), Nebraska Health and Human Services System (NHHSS), Nebraska Game and Parks Commission (NGPC) and the University of Nebraska-Lincoln (UNL). Excellent cooperation and quick action was demonstrated by these agencies in developing joint strategies for cyanobacteria monitoring and public notification within two weeks of the dog deaths.
- **May 17, 2004** NDEQ initiated a weekly microcystin monitoring program to respond to citizen complaints on public waters. University of Nebraska-Lincoln coordinated a volunteer monitoring program for private lake owners.
- **July 12, 2004 – Pawnee Lake, Emerald, NE.** Microcystin levels exceeded health alert levels. Local authorities were asked to post signage at the boat ramp and both beaches for the upcoming weekend July 17-18. Unfortunately only one sign was posted. Heavy use of the beaches took place that weekend, and more than 50 calls were received from the public complaining of symptoms such as vomiting, headaches, diarrhea after swimming or skiing in Pawnee Lake. Although unfortunate, this incident provided evidence that the initial health alert action level adopted in Nebraska was protective, and that toxic algae is a real concern within the state of Nebraska.
- **During 2004** there were five reported dog deaths, the human health incident at Pawnee lake, and several livestock and wildlife deaths and additional complaints of skin rashes and gastrointestinal illness as a result of toxic algae at other lakes.



What is algae?

Algae are defined as simple rootless plants that grow in bodies of water relative to amount of nutrients available.

What is toxic algae?

Although toxic algae is technically is not a true algae what is commonly referred to as **toxic blue-green algae** refers to certain strains of **cyanobacteria** that produce toxins. These toxins have been found in a number of Nebraska lakes since sampling began in 2004.

Toxic algae can dominate the algal population of a lake under the right combinations of water temperature, cloud cover, low water depths, and **nutrients** (such as, the nitrogen and phosphorus from wastewater discharges and runoff from agricultural land and communities.)



Sampling efforts:

2004:

- Approximately 700 samples were analyzed for toxins in 2004
- 34 public lakes were sampled
- Health alerts/lake closures were issued for 17 lakes (50% of lakes sampled)
- 25% of private lakes sampled by concerned citizens had a very high biomass of toxic producing algae

2005:

- 34 public lakes sampled
- Health alerts/lake closures were issued for 12 lakes (35% of lakes sampled)

2006:

- More than 1000 samples analyzed for toxins
- 50 public lakes were sampled
- Health alerts/lake closures were issued for six lakes (12% of lakes sampled)

2007 and beyond:

- Continued monitoring of public and private waters

In 2005 an interagency workgroup was formed to discuss recommended solutions for reducing toxic algae blooms in Nebraska lakes. Preliminary recommendations include reducing nutrient inputs, installing watershed treatments to reduce nutrient runoff, dredging to remove in-lake sediments, and nutrients and increasing depth, controlling rough fish populations, applying aluminum sulfate to inactivate **phosphorus**, and applying algacides. The effectiveness and cost of these options is limited by factors such as lake size, watershed size, outlet structure, and sources of water.

At the present time and into the future, the University of Nebraska-Lincoln will continue to conduct statewide research projects to identify areas of the state where toxic algae concerns are greatest. These research results allow UNL to focus on equipping the states lake owners, users and managers with the most effective and cutting edge management techniques available to control toxic algae.