Harmful Algal Blooms in PA:

Pennsylvania’s Interagency HABs Task Force

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Overview

Who/What is the PA HABs Task Force

HABs resources in PA

HAB Monitoring Efforts
  • Recreational use
  • Drinking Water sources

Cyanotoxin analysis for water supplies
  • Analytical methods
  • Key considerations and lessons learned
PA Interagency HAB Task Force

Interagency Approach

Coordinating Efforts Across Agencies

- **Awareness**: fact sheets, FAQs, website content, blogs, social media, videos, briefings...
- **Monitoring**: sample collection protocols, data management/communication systems...
- **Response**: advisory thresholds for various uses (e.g., recreation, drinking water)...
- **Prevention**: integrating several existing programs to address HABs...
Agency Authority / Role

PA Department of Environmental Protection (DEP):
Monitoring water quality, development and implementation of water quality standards, support and oversight of public drinking water systems, addressing nutrient loading (Clean Water Act, Safe Drinking Water Act)

PA Department of Health (DOH):
General authority for the protection of public health, mitigating risk & exposure and regulating public swimming beaches (Public Bathing Law)

PA Department of Conservation and Natural Resources (DCNR):
Monitors and manages swimming beaches at State Parks and improves water quality through land protection and ecological restoration efforts
Pennsylvania Department of Agriculture (PDA):
Nutrient management on ag lands, oversees animal health

PA Game Commission (PGC):
Oversees management of State Game Lands, protects game species and a touch point for recreators

PA Fish and Boat Commission (PFBC):
Protects aquatic species, works to ensure healthy aquatic ecosystems, touch point for water-based recreational users

Pennsylvania Emergency Management Agency (PEMA):
Responds to public health and environmental emergencies and assists with communities' recovery
Harmful Algal Blooms

A harmful algal bloom (HAB) occurs when certain kinds of microscopic organisms multiply and produce toxins in a waterbody or waterway. The microscopic organisms that most commonly cause HABs in Pennsylvania’s fresh and brackish waters are cyanobacteria, or blue-green algae. While cyanobacteria are a natural part of many aquatic ecosystems, under certain conditions, like high nutrients and warm temperatures, some kinds of cyanobacteria can produce cyanotoxins. HABs can form at any time but most often in late summer or early fall.

People and animals can encounter HABs that are in the environment by physically touching, ingesting, and inhaling cyanobacteria and/or cyanobacteria toxins while swimming and boating; eating fish caught in contaminated water; using contaminated water to prepare food; or drinking contaminated water. For dogs and livestock, eating scum or algae and licking fur after swimming in contaminated water could be HABs exposures.

DOH is working closely with many other state entities, including the Department of Environmental Protection, the Department of Conservation and Natural Resources, the Fish and Boat Commission, and the Game Commission, to understand and prevent HABs from affecting Pennsylvania residents.
If you have any health-related questions about HABs, contact us at env.health.concern@pa.gov. For other inquiries about HABs or to report a HAB, contact HABs@pa.gov.

**Pennsylvania Harmful Algal Blooms (HABs) Dashboard**: This interactive dashboard displays HAB-related water sampling data from 2018 – present. The dashboard integrates field and laboratory data to increase public awareness of HABs and assist individuals in making decisions to prevent/minimize HAB exposures from recreational waterbodies. The [Harmful Algal Blooms (HABs) Dashboard User Guide](https://www.health.pa.gov/topics/envirohealth/Pages/HABs.aspx) provides information on the data used to create the dashboard and delivers guidance on how to use the dashboard.

**Harmful Algal Blooms (HABs) in PA training**: This course describes harmful algal blooms (HABs) and explores the response strategies that have been employed by agencies in the Commonwealth of Pennsylvania. The learner will discover the coordination and implementation of response activities among Commonwealth agencies to minimize the public's exposure to HABs and reduce negative impact of HABs.

- HABs Training Summary Document
- HABs Fact Sheet
- HABs Fact Sheet for Health Professionals
- HABs Frequently Asked Questions
PA DOH HABs Dashboard

https://www.health.pa.gov/topics/envirohealth/Pages/HABs.aspx
What are HABs?

A Harmful Algal Bloom (HAB) occurs when certain kinds of microscopic organisms in a waterbody or waterway produce toxins or other chemical compounds in concentrations that can harm people, pets, or other animals. The microscopic organisms that most commonly cause HABs in Pennsylvania are known as cyanobacteria or blue-green algae.

Cyanobacteria are a natural part of many aquatic ecosystems, but some kinds of cyanobacteria can produce toxins known as cyanotoxins. In high enough concentrations, cyanotoxins can be harmful to people, pets, fish, shellfish, and other animals that come in contact with or ingest the toxins.

Let's break it down:
Primary Contact Recreation Threshold Guidance

<table>
<thead>
<tr>
<th>Response Level</th>
<th>Microcystins (ppb)</th>
<th>Anatoxin-a (ppb)</th>
<th>Cylindrospermopsin (ppb)</th>
<th>Saxitoxins (ppb)</th>
<th>Colony Count (colonies/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advisory</td>
<td>8.0</td>
<td>80</td>
<td>15</td>
<td>0.8</td>
<td>300</td>
</tr>
<tr>
<td>Avoid Contact Warning</td>
<td>20</td>
<td>300</td>
<td>20</td>
<td>3.0</td>
<td>1500</td>
</tr>
</tbody>
</table>

Used at locations during time periods when conditions exist that make a cyanobacteria bloom more likely, leading to a sense that conditions at the site make it susceptible to HAB development.

Convey that certain conditions exist that require that special considerations should be taken before using the water for certain activities and some activities should be limited.

Convey that certain conditions exist that limit the permissible activities.
What To Do If You Suspect a HAB

If a HAB is suspected or confirmed to be occurring in a body of water, it is strongly recommended for people and pets to follow safe water recreation practices to limit exposure:

- Wash your hands after contact with untreated water
- Shower or bathe people and pets immediately after participating in water-based recreation activities
- Avoid swallowing and inhaling untreated water during recreational activities
- Avoid contact with water that has foam, scum, or discoloration
- Seek and follow any waterbody advisories or closures

If you or your pet becomes ill or shows signs of poisoning after being in or around a waterbody with a suspected or confirmed HAB, call your doctor, veterinarian, or the poison control center: Poison Control Center 800-222-1222; Animal Poison Control Center 888-426-4435.

If you have any health-related questions about HABs, please contact the Division of Environmental Health Epidemiology at the Pennsylvania Department of Health at env.health.concern@pa.gov. To report a suspected HAB, or for other inquiries about HABs, contact the Pennsylvania HABs Task Force at HABs@pa.gov.
The United States Environmental Protection Agency (US EPA) has also issued the following 10-day drinking water health advisories for two cyanotoxins.

<table>
<thead>
<tr>
<th>Health Advisory</th>
<th>Microcystins</th>
<th>Cylindrospermopsin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bottle-fed infants and pre-school children</td>
<td>0.3*</td>
<td>0.7*</td>
</tr>
<tr>
<td>School-age children and adults</td>
<td>1.6*</td>
<td>3.0*</td>
</tr>
</tbody>
</table>

* recommended values from US EPA

Here are some additional resources on what you can do if you encounter a suspected or confirmed HAB.

**Recreational use resources**

- US EPA: Protect Your Pooch
- US EPA: Tools for Waterbody Managers to Monitor for and Respond to HABs

**Drinking water resources**

- US EPA: Managing Cyanotoxins in Public Drinking Water Systems
- US EPA: Drinking Water Health Advisories for Cyanotoxins
- Ohio EPA: Public Water System Harmful Algal Bloom Response Strategy
Goal: Build Public Awareness

Cyanobacteria and HABs

What are Cyanobacteria?

Harmful Algae Blooms (HABs)

Harmful Algae Blooms (HABs) occur when certain kinds of microscopic organisms, called phytoplankton, grow in water bodies to form a bloom. These blooms can cause problems for humans and animals. HABs can be dangerous to people and pets. HABs are a concern in Pennsylvania because they can cause skin irritation, respiratory problems, and even death. HABs can also harm wildlife, including fish and other animals. HABs can be especially dangerous for children and pets, who may be more susceptible to their harmful effects. It is important to monitor water bodies for signs of HABs and take steps to prevent them from occurring.

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Certification Needed

To re-stock trout, make sure you have the proper certification. Certification is required to ensure that the fish you are releasing are healthy and able to survive in the wild. Certification is available from your local Department of Environmental Protection office. It is important to have certification to ensure that the fish you are releasing are healthy and able to survive in the wild.

Harmful Algal Blooms Threaten People and Pets

Harmful Algal Blooms (HABs) occur each year in Pennsylvania and can cause health problems for people and pets. HABs are a concern in Pennsylvania because they can cause skin irritation, respiratory problems, and even death. HABs can also harm wildlife, including fish and other animals. HABs can be especially dangerous for children and pets, who may be more susceptible to their harmful effects. It is important to monitor water bodies for signs of HABs and take steps to prevent them from occurring.

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So what exactly are HABs and what should you do about them?

Pennsylvania Fishing Summary/Boating Handbook

2021 Pennsylvania Fishing Summary/Boating Handbook

August 21 at 10:00 PM

Visitors to Lake Walsupack this weekend should be on the lookout for Harmful Algal Blooms, and avoid swimming, fishing, and letting pets play in affected areas. To report a possible Harmful Algal Bloom, please contact HABs@doa.pa.gov. More information about Harmful Algal Blooms and how they form can be found here.

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So what exactly are HABs and what should you do about them?
How are HABs Monitored?

• Unaided visual observation
• Grab samples
  • Microscopy
  • Measurement of cyanotoxins
  • Measurable chemical factors
• Satellite/aerial imagery
• Reported/documented illness or death
• Historic evidence
2021 HAB Data ALL
(Waterbodies = 34, Sites = 94)

Colony Count results by BOL
>300 colonies/mL → Toxin Testing
>300 colonies/mL → Watch
Cyanobacteria blooms are made up of bacteria that can also produce cyanotoxins:

- Microcystins
- Cylindrospermopsin
- Anatoxin
- Saxitoxin

**EPA Ten-Day Health Advisory Levels (HALs) in Finished Water**

<table>
<thead>
<tr>
<th></th>
<th>Total Microcystins</th>
<th>Cylindrospermopsin</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Children Under 6, incl. bottle-fed infants</strong></td>
<td>0.3 µg/L</td>
<td>0.7 µg/L</td>
</tr>
<tr>
<td><strong>Children 6 and Older, and Adults</strong></td>
<td>1.6 µg/L</td>
<td>3.0 µg/L</td>
</tr>
</tbody>
</table>
“We’ve identified a harmful algal bloom”
- How? What specific algae or cyanobacteria?
- Is it affecting the PWS source or entering the treatment plant?

“Toxin producing algae were detected”
- Where, relative to the PWS intake?
- Have actual toxins been detected, and at what levels?

“Cyanotoxins are present at low levels”
- Which cyanotoxins, and what methods were used for analysis?
- Relative to 10-day drinking water HAL or recreational levels?
BSDW Cyanotoxin Screening – Purpose and Goals

- Identification of high-risk PWS sources for cyanotoxin sampling, regardless of bloom conditions
- Monitoring at sources that may not have been historically targeted for monitoring
- Obtain cyanotoxin data for sources not historically monitored or prioritized
- Evaluate whether additional monitoring should occur at high-risk sources
- Does a lack of a visually observable CyanoHAB appear to correlate with low or no risk of toxins, even in high-risk sources?
EPA Method 545:
Determination of Cylindrospermopsin and Anatoxin-a in Drinking Water by Liquid Chromatography Electrospray Ionization Tandem Mass Spectrometry (LC/ESI-MS/MS)

EPA Method 546:
Determination of Total Microcystins and Nodularins in Drinking Water and Ambient Water by Adda Enzyme-Linked Immunosorbent Assay (ELISA)
When requesting analysis for cyanotoxins

• Carefully consider sampling location and number of samples needed for representative sampling
  – Finished water only?  – Within treatment plant?
  – Raw source water?  – Upstream of intake?

• Total toxin analysis (intracellular plus extracellular) or differentiated toxin analysis (intracellular v. extracellular)?

• Which method(s) are needed?  545?  546?

• What is the turn around time needed for results?

• What sampling supplies are needed?
Laboratories for Cyanotoxin Analysis

Laboratory selection

- No PA accreditation program, so no PA-accredited labs
- NELAP accreditation is available, but very few NELAP labs
- UCMR 4 approval, but no ongoing oversight

- Follow approved methods with no deviations?
- Follow all QA/QC and acceptance criteria?
- Reporting limits?
- Performance testing?
Summary

• Interagency HAB Task Force created to coordinate awareness, monitoring, response, and prevention strategies
• Monitoring efforts with different priorities and goals can complicate response
  – EPA drinking water HALs
  – Recreational thresholds
• Communication between and among agencies is key
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