

## Utah HAB Guidance Summary

### **Harmful Algal Bloom (HAB) Basics**

HABs occur when naturally occurring cyanobacteria, also known as blue-green algae, quickly multiply to high densities and form visible water discoloration, scums, and/or mats. They can occur year round, but are most common in the summer when abundant sunlight and warm, stagnant water combine with high nutrient levels.

They are known as harmful algal blooms since many species of cyanobacteria can produce cyanotoxins that can harm people, pets, livestock, and wildlife. Freshwater cyanotoxins include microcystins, cylindrospermopsin, and anatoxin-a. While no human deaths are known to have been caused by cyanotoxins in the U.S., they have been known to kill pets and wildlife. Exposure to the cells themselves can result in less serious health effects, even when no toxins are present.

### **HAB Identification**

HABs can occur in a variety of colors, including bright blue, green, white, brown, and red. More than one color may be present. HABs often (but not always) form scums or mats, and may look like thick paint floating on the water. They may also give off a foul odor. There is no way to determine if a suspected bloom is toxic by looking at it.

However, it is also easy to mistake growths of green algae or duckweed (both non-harmful) for HABs. Large accumulations of pollen can also look similar. UDOH maintains a webpage with photographs to aid identification ([health.utah.gov/enviroepi/appletree/HAB/identify.html](http://health.utah.gov/enviroepi/appletree/HAB/identify.html)).

### **Public Health Advisories for HABs**

UDOH and UDEQ have developed a three tier approach to public health advisories for HABs. These advisories incorporate a variety of measures, but primarily rely on microcystin concentration and cyanobacterial cell density. Typically, the highest level of advisory indicated by any of the measures is recommended to be protective of public health.

**Table 1** summarizes the recommended public health advisory tiers. Example advisory signs can be found at [habs.utah.gov](http://habs.utah.gov). Once an advisory is issued, at least two weeks of data indicating that the hazard has passed are recommended before removing the advisory.

### **Authority**

In Utah, the authority to post health advisories and close water bodies lies with the local health departments. As always, UDOH and UDEQ stand ready to support their local partners.

- A local health department may:
  - Prepare, publish, and disseminate information necessary to inform and advise the public concerning the health and wellness of the population, specific hazards, and risk factors. - [Utah Code 26A-1-114 \(1\)\(i\)](#)
  - Close theatres, schools, and other public places and prohibit gatherings of people when necessary to protect public health. - [Utah Code 26A-1-114 \(1\)\(e\)](#)

### **Exposure Routes**

People can be exposed to cyanotoxins and cyanobacteria while recreating by incidental ingestion, skin contact, and inhalation of contaminated aerosols. Studies of toxin characteristics and human behavior indicate that oral ingestion is the largest source of recreational exposure to cyanotoxins. Ingestion and skin contact are likely to be important routes of exposure to cyanobacterial cells.

As with most environmental exposures, children are likely to be at greater risk than adults. Children have smaller body mass, spend more time in contact with the water, and typically swallow more water while recreating. Children's bodies are also still developing and may be more sensitive to the effects of exposure.

## **Adverse Health Effects**

Exposure to HABs can cause a variety of health effects, from relatively mild to potentially serious. Symptoms depend on many factors, including the amount of toxins and/or cyanobacteria, the type of toxin and/or cyanobacteria, and the route and length of exposure.

Individuals who believe they may be experiencing symptoms of exposure should contact the Utah Poison Control Center: 1-800-222-1222. We ask that information about HAB-related illness in humans and animals be reported to the UPCC. These data are relayed to the CDC and help expand our knowledge about HABs.

### ***Human Symptoms***

#### **Ingestion**

- Vomiting
- Diarrhea
- Abdominal pain
- Weakness
- Headache
- Tingling sensation
- Muscle cramps
- Dizziness
- Trouble breathing

#### **Skin Contact**

- Eye irritation
- Rash
- Hives
- Blisters or sores

#### **Inhalation**

- Nose irritation
- Sore throat
- Coughing
- Wheezing
- Asthma-like symptoms
- Difficulty breathing

### ***Animal Symptoms***

Symptoms include weakness, fatigue, excessive salivation or drooling, staggering, difficulty breathing, vomiting, convulsions, liver damage or failure, and death.

## **Sampling Procedures**

Collecting water samples:

- [deq.utah.gov/Divisions/dwq/health-advisory/harmful-algal-blooms/docs/SOP-HAB-Phytoplankton-Samples-2016.pdf](http://deq.utah.gov/Divisions/dwq/health-advisory/harmful-algal-blooms/docs/SOP-HAB-Phytoplankton-Samples-2016.pdf)

Collecting fish and wildlife samples from mortality events:

- [deq.utah.gov/Divisions/dwq/health-advisory/harmful-algal-blooms/docs/HAB-Carcass-Collection-SOP.pdf](http://deq.utah.gov/Divisions/dwq/health-advisory/harmful-algal-blooms/docs/HAB-Carcass-Collection-SOP.pdf)

## **Cyanotoxins and Fish**

Cyanotoxins can accumulate in fish in waters with high toxin levels. The highest concentrations are in the organs (particularly the liver) and fat deposits; muscle tissue typically has lower toxin levels. Fish taken from waters with intermittent blooms (as in Utah) are unlikely to have toxin levels in muscle that present a health concern. However, there is considerable uncertainty.

For fish caught in waters during an algal bloom, UDOH and UDEQ recommend discarding the guts and skin, eating only the fillets, and rinsing them with clean water (e.g., tap or bottled).

## **Cyanotoxins, Crop Irrigation, and Livestock Watering**

Contact the Utah Department of Agriculture for guidance: [ag.utah.gov](http://ag.utah.gov); (801) 538-7100.

## **Cyanotoxins and Secondary Water Use**

Very little information is available. Contact UDEQ, UDOH, and the secondary water provider for consultation.

## **HAB Contacts**

**Report a Bloom:** UDEQ 24-hour Spill Hotline: (801) 536-4123

**Immediate Health Concerns:** Utah Poison Control Center: 1-800-222-1222

**Human & Animal Illness Info:**

**UDEQ:** Ben Holcomb; (801) 536-4300; [bholcomb@utah.gov](mailto:bholcomb@utah.gov)

**UDOH:** Nathan LaCross; (801) 538-6191; [nlacross@utah.gov](mailto:nlacross@utah.gov)

**Table 1:** UDOH/UDEQ HAB public health advisory tiers

	<b>Tier 1: None</b>	<b>Tier 2: Warning</b>	<b>Tier 3: Danger</b>
<b>Relative Probability of Acute Health Risk</b> <sup>1</sup>	Low	Moderate	High
<b>Cyanobacterial Cell Density (cells/mL)</b> <sup>1</sup>	< 20,000	20,000 - 10,000,000	> 10,000,000
<b>Microcystins (µg/L)</b> <sup>1,2</sup>	< 4	4 - 2,000	> 2,000
<b>Cylindrospermopsin (µg/L)</b> <sup>2</sup>	< 8	> 8 *	
<b>Anatoxin-a (µg/L)</b> <sup>3</sup>	Non-detect	Detection - 90	> 90
<b>Additional Factors</b>	None	Reports of animal illness or death	Reports of human illness
<b>Health Risks</b> <sup>1</sup>	Negligible	Potential for long-term illness  Short-term effects (e.g., skin and eye irritation, nausea, vomiting, diarrhea)	Potential for acute poisoning  Potential for long-term illness  Short-term effects (e.g., skin and eye irritation, nausea, vomiting, diarrhea)
<b>Recommended Actions</b>	None	Issue <b>WARNING</b> advisory  Post <b>WARNING</b> signs  Sampling recommended at least weekly	Issue <b>DANGER</b> advisory  Post <b>DANGER</b> signs  Consider <b>CLOSURE</b>  Sampling recommended at least weekly

**Guidance sources**

<sup>1</sup> WHO, 2003. Guidelines for safe recreational water environments, Volume 1, Chapter 8: Algae and cyanobacteria in fresh water.

<sup>2</sup> EPA, 2016. Human health recreational ambient water quality criteria or swimming advisories for microcystins and cylindrospermopsin (Draft).

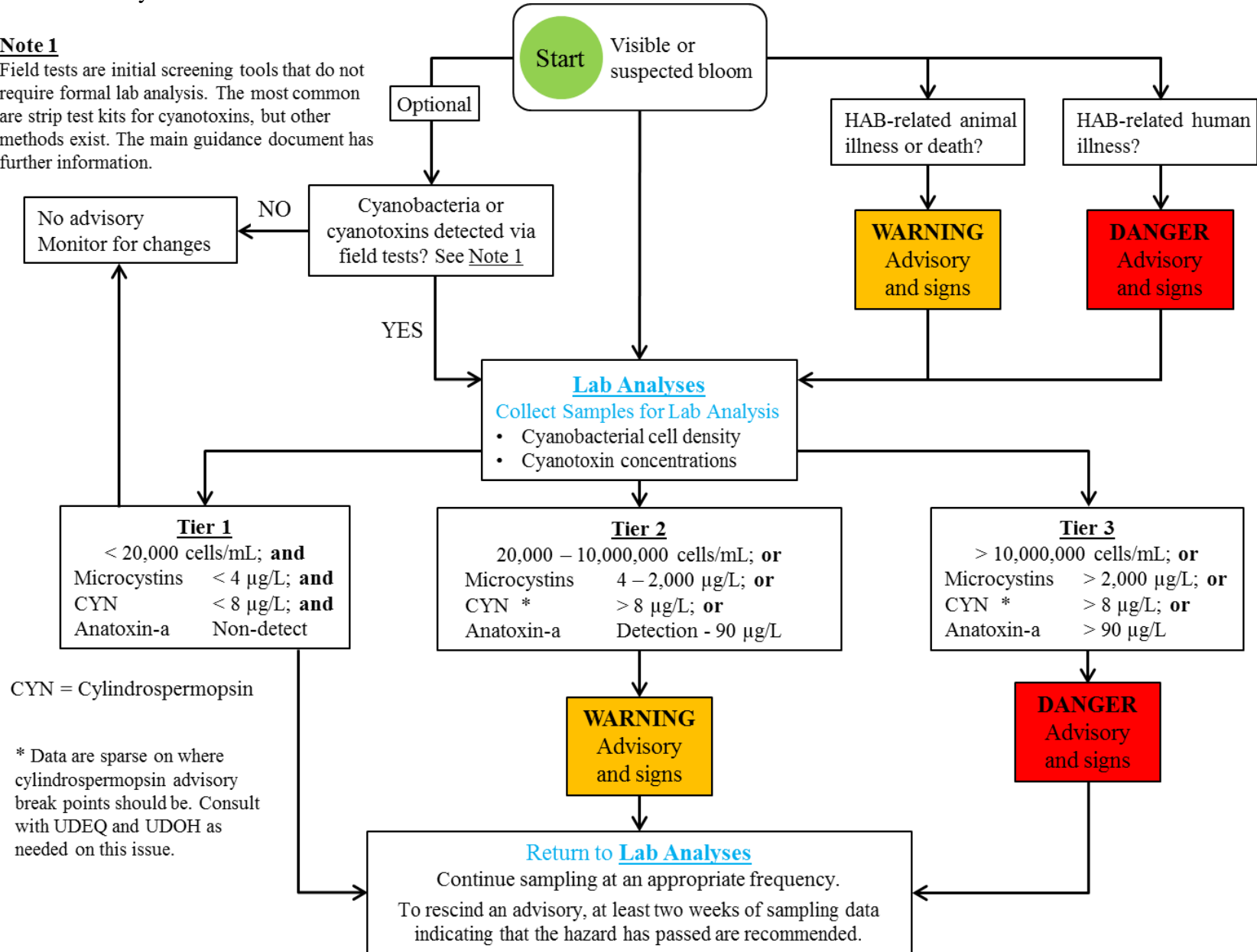
<sup>3</sup> CSWB, 2016. California State Water Board: Cyanobacteria guidance for recreational and related water uses (2016 updates).

\* Data are sparse on where cylindrospermopsin advisory break points should be. Consult with UDEQ and UDOH as needed on this issue.

**Figure 1: Health advisory flow chart**

**Note 1**

Field tests are initial screening tools that do not require formal lab analysis. The most common are strip test kits for cyanotoxins, but other methods exist. The main guidance document has further information.



CYN = Cylindrospermopsin

\* Data are sparse on where cylindrospermopsin advisory break points should be. Consult with UDEQ and UDOH as needed on this issue.

## References

- CSWB, 2016. California State Water Board. Cyanobacteria guidance for recreational and related water uses (2016 updates). Available online at: [www.mywaterquality.ca.gov/habs/resources](http://www.mywaterquality.ca.gov/habs/resources)
- EPA, 2016. U.S. Environmental Protection Agency. Human health recreational ambient water quality criteria or swimming advisories for microcystins and cylindrospermopsin (Draft). Available online at: [www.epa.gov/wqc/draft-human-health-recreational-ambient-water-quality-criteria-andor-swimming-advisories](http://www.epa.gov/wqc/draft-human-health-recreational-ambient-water-quality-criteria-andor-swimming-advisories)
- WHO, 1999. World Health Organization. Toxic cyanobacteria in water. Available online at: [www.who.int/water\\_sanitation\\_health/publications/toxicyanobact/en](http://www.who.int/water_sanitation_health/publications/toxicyanobact/en)
- WHO, 2003. World Health Organization. Guidelines for safe recreational water environments, Volume 1, Chapter 8: Algae and cyanobacteria in fresh water. Available online at: [www.who.int/water\\_sanitation\\_health/publications/srwe1/en](http://www.who.int/water_sanitation_health/publications/srwe1/en)