



# Harmful Algal Blooms

**KDHE Agency Response Plan – 2020**

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## KDHE Agency Response Plan

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Cover photo:

*South Lake, Johnson County, KS, September 2018, courtesy of Regina Klepikow*

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## SECTION 1. PURPOSE

This plan is to provide guidance for Kansas Department of Health and Environment's (KDHE) response to reduce the risk of exposure to humans, pets, and livestock from blue-green algal toxins.

Cyanobacterial toxins (also known as blue-green algal toxins) in freshwaters have been implicated in human and animal illness in at least 38 states in the United States<sup>1</sup>. In Kansas, blue-green algae are naturally present at low densities in most surface waters. When certain conditions develop, such as high nutrient and abundant light levels, these organisms can reproduce rapidly. This dense growth of algae is called a bloom and can sometimes lead to a harmful algal bloom (HAB). These conditions tend to occur in the warmer summer months, after spring rainfalls wash accumulated high nutrient loads into surface waters, derived from animal waste, agricultural fertilizers, sewage effluent, and urban stormwater runoff. Subsequent summer conditions improve water clarity, allowing light to penetrate deeper into waters, fueling primary productivity where nutrients are plentiful. Dry summer conditions can increase the impact of wastewater effluent on lakes and streams, when lower water levels condense nutrients. Blooms can also occur in winter months, although winter dominant algal species have been found to be different from those of spring and summer. Organisms most frequently responsible for HAB outbreaks in both fresh and marine waters include cyanobacteria and dinoflagellates. In Kansas, HABs are most commonly associated with the cyanobacterial genera *Microcystis*, *Dolichospermum* (formerly in the genus *Anabaena*), and *Aphanizomenon*, with some other taxa such as *Cylindrospermopsis* and *Oscillatoria* appearing at times.

Freshwater cyanobacteria under bloom conditions are capable of producing potent toxins that can cause damage to the liver, skin and nervous system.<sup>2</sup> HABs can vary in toxicity and may pose a direct threat to human and animal health. Exposure to cyanobacterial toxins can result in adverse human health effects such as: hay fever-like symptoms, respiratory distress, skin rashes, vomiting, and diarrhea.<sup>3</sup> These toxins have also been identified as the cause of multiple animal deaths in the US.<sup>4</sup> Exposure to these toxins most commonly occurs when persons or animals come in contact with, ingest, or inhale contaminated water.<sup>3</sup> There are no known antidotes to algal toxins, so preventing exposure is imperative.

## SECTION 2. OVERVIEW

This plan outlines the interaction, responsibilities, and activities of KDHE and coordination with other stakeholders, to ensure that HAB investigations are conducted in a rapid and effective manner and founded on the principles outlined below.<sup>5</sup> KDHE reserves the right to use best professional judgement in making decisions beyond or on occasion contrary to this plan and its protocols, when unusual or unpredicted circumstances occur.

- A. Potential HAB events will be treated as harmful until proven otherwise.
- B. Response to HABs will be limited to “Public Waters of the State” only. If a waterbody is not accessible to the public and does not serve as a public drinking water source, its owners/managers who request assistance with HABs will be referred to the Kansas State Veterinary Diagnostic Laboratory in Manhattan, Kansas, which has the capacity to ascertain the presence or absence of cyanobacteria in a water sample.

1. In Kansas, for the KDHE Harmful Algal Bloom response plan, “Public waters” and “Private water bodies” are defined as:

**a. Public waters:** Those waters that are referred to as reservoirs, community lakes, or state fishing lakes and/or are waters managed or owned by federal, state, county, or municipal authorities, as well as all privately owned lakes that serve as public drinking water supplies (PWS) or that are open to the public for primary or secondary contact recreation. *Note: Primary contact recreation includes those activities where the body is immersed to the extent that some inadvertent ingestion of water is probable. This use shall include activities such as: boating, mussel harvesting, swimming, skin diving, waterskiing, and windsurfing. Secondary contact recreation includes any activity in which the ingestion of surface waters is not probable. These uses shall include activities such as wading, fishing, trapping, and hunting. K.A.R. 28-16-28b and 28-16-28d through 28-16-28h, Kansas Surface Water Quality Standards.*

**b. Private water bodies:** Any freshwater reservoir or pond that is both located on and completely bordered by land under common private ownership or is not freely accessible to the public (*i.e.*, access by the public is controlled or restricted in some manner).

**c. Rivers and streams.** Only classified rivers and streams that are listed in the Kansas Surface Water Register will be investigated, and these will be subject to the same criteria for eligibility as described above for lakes and ponds.

- C.** Response should be as rapid as practicable considering the resources available.
- D.** Response to HAB events and all advice provided will be consistent across all bureaus and responding agencies.
- E.** KDHE will be the primary responder unless multi-agency response is requested.
- F.** The response will include: photo documentation, toxin analysis, and, where warranted and possible, the identification and enumeration of cyanobacteria. All available information will be used to determine the public health advisories.
- G.** Training for all responding agencies for HAB events will be conducted by KDHE to ensure the effective coordination and consistency of response amongst agencies.
- H.** The KDHE Harmful Algal Bloom Response Plan is a dynamic document that is to be reviewed and maintained annually by KDHE.

## SECTION 3. KDHE RESPONSIBILITY

### **Bureau of Water, Watershed Planning, Monitoring, and Assessment Section (BOW-WPMAS) – responsibilities shall include:**

- A.** Host and attend the annual Harmful Algal Bloom stakeholder meetings;
- B.** Collect and validate incoming requests for the investigation of blue-green algae blooms to initiate sampling activities; complaints may arrive via the HAB website, HAB telephone hotline, or other forms of communication;
- C.** As needed, collect incoming reports of illness related to Blue-Green Algae (BGA) from the public and forward the information to Bureau of Epidemiology and Public Health Informatics (BEPHI). BOW-WPMAS will forward all requests relating to Protected Health Information to the Epidemiology Hotline (EpiHotline);
- D.** Identify sample type, location(s), and number of samples to be collected for recreational waters. For Public Water Supply lakes where associated PWS systems are not participating in the voluntary PWS monitoring program, coordinate with BOW-PWSS to obtain samples at BA or BB sites as required, as proxies for raw water intake samples;
- E.** Analyze recreational water samples to determine the type of algae present and the level of microcystin toxins as needed. Optional analysis includes detailed identification and cell counts of BGA and other algae and analysis of other toxins;
- F.** Coordinate other analytical needs with Kansas Health and Environmental Laboratories (KHEL), as needed;
- G.** Review the results of water sample analyses, determining the appropriate health advisory as outlined by agency policy;
- H.** Enter the results into the in-house Oracle Algae database;
- I.** Host weekly (typically Thursday afternoon) meeting and telephone conference with relevant lake managers and stakeholders to review the current week's data results and to advise recommended lake status;
- J.** Advise lake managers and stakeholders, when appropriate. The appropriate office for notifying stakeholders shall be determined during the initial response, depending on the waterbody and the agencies involved, and shall continue until the conclusion of the

response; see BEFS Responsibilities section for other communications. BOW-WPMAS central office shall be responsible for all communications regarding large reservoirs, public waters owned by other state and/or federal agencies, public waters with more than one stakeholder, or waterbodies that serve as sources for public water supply systems. Responsibility for communications with managers of other public waterbodies, such as county or city lakes, shall be decided on a case by case basis in collaboration with BEFS. Federal and State agencies with which KDHE will communicate may include:

- a. *Kansas Department of Wildlife, Parks and Tourism (KDWPT, [www.ksoutdoors.com](http://www.ksoutdoors.com))*, which is responsible for management of many recreational areas around Federal reservoirs, state fishing lakes, and other waterbodies, as well as regulation of hunting and fishing in the state;
- b. *U.S. Army Corps of Engineers (USACE, [www.usace.army.mil](http://www.usace.army.mil))*, with district offices in Tulsa, OK and Kansas City, MO, which are responsible for management of many major reservoirs;
- c. *U.S. Department of Interior, Bureau of Reclamation (USBR, [www.usbr.gov](http://www.usbr.gov))*; with area offices in McCook, NE and Austin, TX, which are responsible for management of seven reservoirs in Kansas.
- d. *U.S. Environmental Protection Agency (USEPA, [www.epa.gov](http://www.epa.gov))*, with Region 7 Headquarters in Lenexa, KS
- e. *Kansas Department of Agriculture-Division of Animal Health (KDAH, <https://agriculture.ks.gov/divisions-programs/division-of-animal-health>)* – KDAH is the office of the state Animal Health Commissioner and may be a point of contact for the public and veterinarians regarding health effects of cyanobacteria on pets and other animals. KDAH communicates with a network of Kansas veterinarians through Flash Reports as well as through publication of a newsletter. Although HAB related animal health reporting is not mandatory in Kansas, KDAH may also report relevant animal health data back to the State Public Health Veterinarian at KDHE-BEPHI. The KDAH number is 785-564-6601.

- f. *Kansas State Veterinary Diagnostic Laboratory (KSVDL, [http://www.ksvdl.org/resources/news/diagnostic\\_insights/january2018/en\\_sley.html](http://www.ksvdl.org/resources/news/diagnostic_insights/january2018/en_sley.html))*. KSVDL serves two very different functions: (1) They can assist private citizens with low cost fee-for-service analysis of water samples, to evaluate for the presence of cyanobacteria and/or cyanotoxins; (2) The pathologists and toxicologists perform animal necropsies and serve a support function for the state in cases of difficult animal health investigations. The phone number for KSVDL is 785-532-5650; email is [clientcare@vet.k-state.edu](mailto:clientcare@vet.k-state.edu).
- K.** Communicate, via consistent messaging and public health advisory information, with lake managers, stakeholders, and users of state managed waters through various means including but not limited to:
- a. weekly stakeholder meetings,
  - b. prepared signage,
  - c. website updates, and
  - d. KDHE HAB Hotline;
- L.** Coordinate with the KDHE Public Information Officer (PIO) for the preparation and release of official KDHE Public Health Advisories/News Releases, as warranted;
- M.** Provide technical assistance for water quality questions and interpretation of laboratory analytical results relative to initial and follow-up water samples, as needed;
- N.** Assist the KDHE PIO in responding to public requests for information that require technical or scientific responses;
- O.** Train KDHE and non-KDHE staff concerning sampling methods, sample submission, and chain-of-custody requirements;
- P.** In collaboration with KDHE-Office of Information and Technology, review annually, the Apex Blue-Green Algae Data Management System and associated ORACLE and ESRI applications and databases;
- Q.** Maintain and update content for the HAB website that is associated with and available through the KDHE public website. On this website, all information provided by the Bureau of Water (BOW), Bureau of Environmental Field Services (BEFS), and Bureau of Epidemiology and Public Health Informatics (BEPHI) (except for Protected Health

Information) shall be made available to the public. Such information shall include, but is not limited to: lists and maps of affected waterbodies, general blue-green algae information, photos of HABs, analytical results, public health notices, and warning signs for the public;

- R. Retain a database of photographic records and scientific data relative to water sampling, and share such data when requested;
- S. Maintain a database of HAB data over time for each affected body of water for future trend tracking and geospatial analysis;
- T. Provide technical expertise related to water quality and watershed management and technical assistance for water quality questions;
- U. Assist lake owners in identifying possible WRAPS projects, when requested; and
- V. Oversee and manage contractors and work with collaborators to plan effective HAB monitoring, control, and mitigation pilot projects, where resources allow.

**Bureau of Water, Public Water Supply Section (BOW-PWSS) – responsibilities shall include:**

- A. Attend annual stakeholder meetings;
- B. Coordinate with BOW-WPMAS, where needed, to identify BA and BB ambient sample sites to serve as proxies for raw water intakes;
- C. Schedule with the Kansas Health & Environmental Laboratories (KHEL) to ship sample bottles, prior to May 1 of each year, to PWS systems that are participating in the voluntary Public Water Supply Harmful Algal Bloom Monitoring;
- D. Provide technical assistance to public water supply systems when BGA affected lakes are their main source for drinking water;
- E. In the event that finished drinking water testing indicates cyanobacterial toxins in excess of the 2015 Health Advisory levels developed by USEPA, work with the PWS and KDHE Public Information Officer (PIO) to issue an immediate Tier 1 public Advisory (24-hour notification) informing all affected customers of the situation. A public notice template will be provided by KDHE containing the appropriate health effects language and use restrictions; and

- F. Encourage public water systems to work with KDHE, their local emergency management agency, and local health departments to develop a coordinated response to cyanotoxin detections in finished water above EPA designated health advisory levels.

**Bureau of Environmental Field Services (BEFS) and its district offices – responsibilities shall include:**

- A. Attend annual stakeholder meetings;
- B. Provide or coordinate field staff for water sample collection and, when needed, photographic field documentation;
- C. Collect water samples or recruit qualified non-KDHE staff to do so;
- D. Transport samples in good condition to BOW-WPMAS, or coordinate transportation by qualified individuals, as needed;
- E. Maintain chain of custody from waterbody sampling to delivery of samples for analysis;
- F. BEFS district offices shall work with BOW-WPMAS to determine on a case by case basis who will be responsible for communications with impacted communities and managers of smaller public waterbodies, county, city, and privately owned public use lakes.
- G. Assist the PIO in responding to requests for information that require technical or scientific responses from agency stakeholders.

**Bureau of Epidemiology and Public Health Informatics (BEPHI) – responsibilities shall include:**

- A. Attend annual stakeholder meetings;
- B. Maintain, as part of the KDHE Harmful Algal Bloom public website, the Human Illness Report Form and Animal Illness Report Form, which serve to collect information on HAB-related illness or death from health care providers, veterinarians, and the public;
- C. Answer all health-related questions through the EpiHotline;

- D. Complete the “Algae Bloom Reporting Form” when they receive reports of human or animal health related incidents attributed to BGA exposure, to notify BOW-WPMAS that a response needs to be initiated;
- E. Provide epidemiological investigation of human and animal illness related to harmful algal blooms;
- F. Provide technical advice on the public health aspects of HABs and coordinate the KDHE public health response;
- G. Analyze data and provide reports of epidemiological investigations of human and animal illness/deaths,
- H. Communicate, as needed, with both Federal and county/local health agencies:
  - a. In addition to compiling data at the state level, BEPHI contributes both animal health and human health HAB reports to the “One Health Harmful Algal Bloom System” (OHHABS) surveillance database, operated by US Centers for Disease Control and Prevention (CDC).
  - b. BEPHI communicates regularly with the network of County Health Departments and similar local entities and health care providers across the state; this network may be used to provide educational materials, solicit data, or issue alerts.
  - c. BEPHI reserves the option to use the Kansas Health Alert Network (KS-HAN, [http://www.kdheks.gov/it\\_systems/ks-han.htm](http://www.kdheks.gov/it_systems/ks-han.htm)), in case of a statewide HAB-related emergency. This state emergency alert network includes county/local health departments as well as hospitals, emergency response personnel, any interested health care providers, and many more.

**KDHE Office of Communications (OC) – responsibilities shall include:**

- A. Prepare and release the official KDHE Public Health Advisories/News Releases (See Appendix G).
- B. Advise BOW and BEFS when media requests for information are received that require technical or scientific responses from agency stakeholders; and

- C. Coordinate any public forum events that may be required from time to time, (*i.e.* press conferences, public meetings), during which KDHE representatives may be required to address issues related to HABs.

## SECTION 4. ADVISORIES

### 4.1 Criteria for Public Health Protection Levels

KDHE has established three levels of public health protection recommendations, “Harmful Algal Bloom (HAB) Watch,” “Harmful Algal Bloom (HAB) Warning,” and “Harmful Algal Bloom (HAB) Hazard.” These advisory notification levels are determined by the concentration of harmful toxin level(s) and/or the concentration of cyanobacteria cell counts, as well as verified visual data; see **Table 1**. When appropriate, KDHE will recommend the following actions for:

- A. Harmful Algal Bloom (HAB) **Watch** – serves as an advisory to notify the public that **unsafe conditions are possible** or present. A Watch is issued based on microcystin toxin concentrations, cyanobacterial cell counts, and/or visual confirmation of a bloom. Visual confirmation is determined by qualified KDHE staff working with lake managers and/or managing agencies using jar tests, photographs, and site visits. A Watch is issued if it has been analytically determined that the *microcystin toxin concentration* in the water is **greater than 4 µg/L but less than or equal to 8 µg/L**<sup>6,7</sup> and/or *cyanobacterial cell counts* are **greater than 80,000 cells/mL but less than or equal to 250,000 cells/mL**. Persons should use caution when in contact with lake water and avoid areas of algae accumulation.
  1. The appropriate HAB Watch signage (See
  2. **Appendix B**) should be posted at all primary public access locations such as beaches, marinas, boat ramps, and other main points of entry to the body of the water. If the provided signage is not used, then sign information must include:
    - a. blue-green algae are present, and the body of water **may** be unsafe for people and animals;
    - b. persons should use caution when contacting lake water and wash with clean water afterward;
    - c. contact information for the posting authority;

- d. the date of the posting;
- e. the symptoms of cyanobacterial exposure;
- f. what to do in case of contact with the water; and
- g. whom to call in case of illness potentially associated with exposure.

The signage should also:

- a. discourage people from having contact with the water near visible blooms (e.g., no swimming, waterskiing);
- b. discourage allowing pets or livestock to drink or swim in the water. If animals do come in contact with the water, then they should be rinsed off with clean water immediately. They should not be allowed to lick the algae off of their fur or consume dried algae on shorelines, as algal toxins will remain toxic even in dry form;
- c. permit boating and fishing, although boaters should be aware of the possible inhalation of harmful spray; and
- d. indicate that if fish are caught, the fish should be properly cleaned and rinsed with clean potable water, and all internal organs removed, with only the fillets retained for human consumption;

**B. Harmful Algal Bloom (HAB) Warning** serves as an advisory to notify the public that **conditions are** expected to be **unsafe** for human exposure. A warning will be issued if it has been analytically determined that the *microcystin toxin concentrations* are **greater than 8 µg/L but less than or equal to 2,000 µg/L** and/or *cyanobacterial cell counts* are **greater than 250,000 cells/mL but less than or equal to 10,000,000 cells/mL**. If there is verification of significant cyanobacterial surface scum present,<sup>7</sup> a “Warning” may be issued based on visual confirmation of significant cyanobacterial scum. It is recommended that action be taken over and above those listed in the “HAB Watch,” restricting or prohibiting public exposure.

1. The appropriate HAB Warning signage (See
2. Appendix B) should be posted at all primary public access locations such as beaches, marinas, boat ramps, and other main points of entry to the body of water. If the provided signage is not used, then sign information must include:

- a. that blue-green algae are present and that the body of water is unsafe for people and animals;
- b. contact information for the posting authority;
- c. the symptoms of cyanobacterial exposure;
- d. what to do in case of contact with the water; and
- e. whom to call in case of illness potentially associated with exposure.

The signage should also:

- a. restrict swimming, water skiing, boating or other activities that would involve direct contact with the affected water;
- b. warn that all contact with water should be avoided;
- c. warn owners not to allow pets to drink or swim in the water. If pets do come in contact with the water, then they should be rinsed off with clean water immediately. They should not be allowed to lick the algae (and toxins) off of their fur or consume dried algae on shorelines, as algal toxins will remain toxic even in dry form;
- d. warn that if fish are caught, the fish should be properly cleaned and rinsed with clean potable water, all internal organs removed, consuming only the fillets;

**C. Harmful Algal Bloom (HAB) Hazard** notifies the public that **extreme conditions** exist. At this level, it has been analytically determined that the *microcystin toxin concentration* is **greater than 2,000 µg/L** and/or *cyanobacterial cell count* is **greater than 10,000,000 cells/mL**. It is recommended that either a portion of the lake, entire lake, or zone, be closed and in some cases the adjacent land (*e.g.*, approximately 100 ft. from the shoreline) be closed to the public. Actual setback distances will be determined on a site specific basis, if necessary. If a Hazard status applies only to a somewhat isolated beach, cove or inlet, the remaining lake or zone area could be covered by a Warning. Such a distinction will be coordinated between KDHE and the lake manager.

**D. Zoned Lakes:** Zoned lakes are impoundments considered large enough in size and with shorelines structured in such a manner that they could shelter localized algae blooms, resulting in a combination of conditions that can limit specific portions of the

lake to public use. Zoned lakes are differentiated by both size and shape and are limited to those waterbodies with a surface area over 10,000 acres and with a shoreline sinuosity index greater than 4. Only three separate lakes in Kansas meet these criteria: Milford, Perry, and Tuttle Creek Lakes. Exact zone lines were drawn based on visible landmarks for lake users. Each zone's public health protection level is based on the highest sample result collected within a zone. Zoning a lake allows for mixed health protection levels and public contact on a lake. The public should be aware that a combination of conditions can exist in the affected lake, and visitors should observe the posted notices for each specific zone. On these lakes, if a lake manager/owner issues a more stringent advisory in a zone (*i.e.*, beach closure based on Hazard level conditions), then KDHE will list the more severe advisory level.

Table 1. Waterbody Status Determination

<p style="text-align: center;"><b>Waterbody Status Determination</b></p> <p style="text-align: center;"><b>Blue-Green Cell Count and Toxin Exposure Levels</b></p>		
Condition of Waterbody	Advisory Level	Recommendations
<p>Microcystin concentration  <math>\leq 4 \mu\text{g/L}</math>  <u>AND</u>            Cell count of  <math>\leq 80,000 \text{ cells/ml}</math></p>	None – Waterbody clear	None
<p>Microcystin concentration  <math>&gt; 4 \mu\text{g/L}</math> to <math>\leq 8 \mu\text{g/L}</math>  <u>OR</u>            Cell count of  <math>&gt; 80,000 \text{ cells/ml}</math> to  <math>\leq 250,000 \text{ cells/ml}</math>  <u>OR</u>            Visual confirmation of bloom</p>	<p style="text-align: center;"><b>Waterbody will be placed on a Public Health WATCH</b></p>	<ul style="list-style-type: none"> <li>» Post signage</li> <li>» Notify health dept., doctors, vets, health providers, etc.</li> <li>» Post on website</li> <li>» Notify public water suppliers</li> </ul>
<p>Microcystin concentration  <math>&gt; 8 \mu\text{g/L}</math> to <math>\leq 2,000 \mu\text{g/L}</math>  <u>OR</u>            Cell count of  <math>&gt; 250,000 \text{ cells/ml}</math> to  <math>\leq 10,000,000 \text{ cells/ml}</math>  <u>OR</u>            Presence of significant            Cyanobacterial surface scum</p>	<p style="text-align: center;"><b>Waterbody will be placed on a Public Health WARNING</b></p>	<ul style="list-style-type: none"> <li>» Post signage</li> <li>» <u>Restrict</u> direct contact with water</li> <li>» Notify health dept., doctors, vets, health providers, etc.</li> <li>» Post on website</li> <li>» Issue media release</li> <li>» Notify public water suppliers</li> </ul>
<p>Microcystin concentration  <math>&gt; 2,000 \mu\text{g/L}</math>  <u>OR</u>            Cell count of  <math>&gt; 10,000,000 \text{ cells/ml}</math></p>	<p style="text-align: center;"><b>Waterbody will be placed on a Public Health HAZARD</b></p>	<ul style="list-style-type: none"> <li>» <u>Recommend</u> that portions of the lake, the entire lake, or zone, be closed. If necessary – close adjacent land up to 100 ft from shoreline.</li> <li>» Post signage</li> <li>» Notify health dept., doctors, vets, health providers, etc.</li> <li>» Post on website</li> <li>» Issue media release</li> <li>» Notify public water suppliers</li> </ul>

## E. Other General Health Information

1. If water from an affected lake is used for irrigation, then people should avoid contact with the spray, due to potential inhalation and illness. Avoid fruits and vegetables that have come into contact with contaminated water until they have been thoroughly washed with clean, potable water. Do not allow livestock to drink affected irrigation water. If water is used to irrigate pastures, livestock owners should be aware that continued application of heavily affected waters can lead to significant toxin accumulation on foliage. Although rare, this residue can affect livestock.
2. Areas of an affected waterbody may contain significantly higher HAB concentrations due to wind effects, increasing the health threats in localized areas.

Further information pertaining to HABs and their effects on health can be found on KDHE's HAB website at [www.kdheks.gov/algae-illness/index.htm](http://www.kdheks.gov/algae-illness/index.htm)

## 4.2 Criteria of Status Change of Advisories

- A. A body of water with a HAB Watch will be sampled based on the resampling frequency discussed in **Section: 5.2 Response** Prioritization. The most recent toxin and cell count values will always determine the HAB advisory status of a lake, except if it is under Warning status due to toxin levels in a given week. In these cases, toxin levels at or below 8 ug/L must occur in two samples taken a week or more apart before a Warning can be lifted.
  1. Exceptions: Mixed status lakes. Lakes that have more than one "zone" will be required to follow the above described procedure for each individual zone.
  2. Exceptions: If cyanobacterial cell counts are not analyzed, the decisions to lift or cancel an advisory will be based on microcystin toxin concentrations.

## SECTION 5. RESPONSE

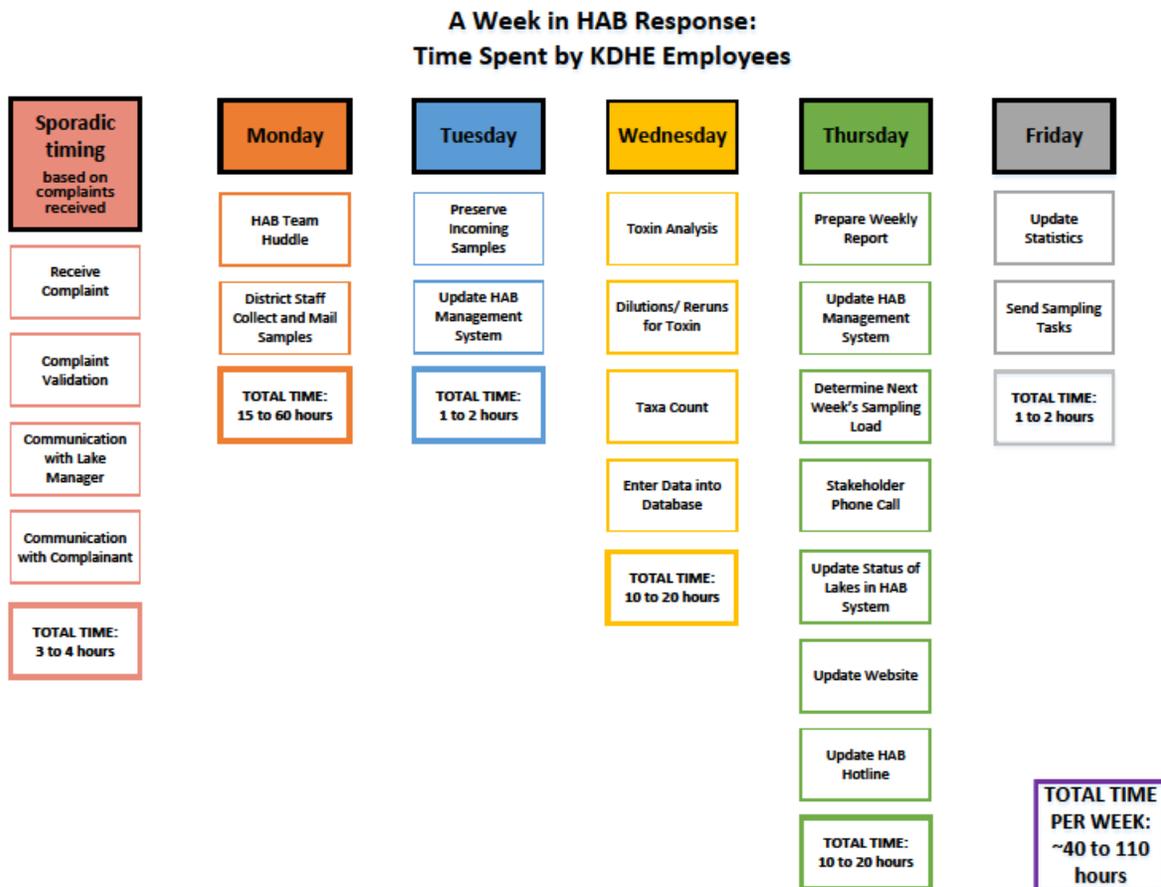
### 5.1 Harmful Algal Bloom Response Procedures

(See

Appendix D)

- A. A complaint is received concerning a potential harmful algal bloom in public waters, and an investigation is requested. Prior to any investigation, the complaint must be documented on the “Algae Bloom Reporting Form” located on the KDHE “Harmful Algal Bloom” website. BEFS/BOW will validate the existence of the bloom and location information. If a BEFS district office receives a complaint, it will collect the location information and complete the reporting form. If BEPHI receives a health-related complaint associated with a HAB, BEPHI will complete the “Algae Bloom Reporting Form.”

Figure 1. HAB Response Timeline



- B. If a complaint is not submitted by trained federal or state staff, unless otherwise determined, then as part of the verification process, a jar test and/or photographic documentation is required (See **Appendix H** for additional information on jar testing):
  - 1. This test must be conducted by the lake management authority/manager at a KDHE designated site(s). (If no sampling sites have been previously designated, then contact BOW-WPMAS for site locations.)
  - 2. Photos of the jar test(s) must be submitted/mailed to BOW-WPMAS for verification, along with any other photo documentation.
- C. BOW-WPMAS will enter the investigation request information into the KDHE HAB Management System for tracking.
- D. BOW-WPMAS will prioritize responses and issue sampling requests.
- E. BEFS District offices will collect samples and ship or transport to KDHE Central Office in Topeka, BOW-WPMAS.
- F. BOW-WPMAS will analyze the recreational samples collected and enter the analytical results into the BOW ORACLE Algae database, which will then migrate into the HAB Management System.
- G. BOW-WPMAS will review the analytical results and, if warranted, a public health recommendation will be issued consistent with KDHE's Harmful Algal Bloom Policy (See **Appendix A**).
- H. All complaint locations will be checked to determine whether the waterbody is a drinking water supply. If so, BOW-PWSS will notify the affected PWS immediately to discuss the status of the source and provide technical assistance when needed. (See BOW-PWSS **Appendix F**).
- I. BOW and BEFS District Offices will contact agencies, municipalities, lake owner/managers, other external stakeholders and, if applicable, the complainant, to provide them with the analysis results and the KDHE public health recommendations.
- J. Lake Managers will post the waterbody with the appropriate signage (See **Appendix B**).
- L. BOW-WPMAS will coordinate any meetings between Bureaus and between KDHE and other state and federal agencies.

- M.** BOW will coordinate memos of recommendation for KDWPT through the Secretary's office, if needed.
- N.** BOW will notify the Secretary's Office/PIO of the status for all affected waterbodies. The Office of Communications will prepare formal agency press releases and coordinate as needed with other stakeholders' Office of Communications. (See **Appendix G**)
- O.** BEPHI will communicate with public health departments and animal health agencies as needed, to deliver public health advisory information.
- P.** BOW-WPMAS will update the HAB Management System.
- Q.** Based upon the HAB status, BOW will prioritize and coordinate proper follow-up testing consistent with the KDHE plan on blue-green algae response (See **Figure 1**).
- R.** BOW will prepare information for updating of the BGA website and send it to the KDHE webmaster.
- S.** BEPHI will conduct investigations of human and animal illness or deaths related to harmful algal blooms.
- T.** BOW will update the HAB Management System contact list as needed.
- U.** BEPHI will analyze data and provide reports of epidemiological investigations and human and animal illness and death.

## 5.2 Response Prioritization

The investigation timeframe and the prioritization of waterbodies shall be determined according to the following parameters, described in detail below and in **Table 2**:

- A.** When there has been a human or animal health report.
- B.** When the complaint concerns a waterbody that is an active public water supply source that is not already actively sampled through the voluntary monitoring program.
- C.** Whether the number of complaints exceeds KDHE's capacity resources, taking into account both sample collection and laboratory analysis.
- D.** When resampling is required.
- E.** When the situation does not reflect the above situations.

Table 2. Priority Response Timeframe

Lake Category	Priority	Response
<p>Lakes that Support:  Public Beach  Public Water Supply  Full Body Contact Activities</p> <p>Lakes where Human or Animal  Illness is Suspected or Confirmed</p>	<b>Priority 1</b>	<p>Samples will be collected within the immediate week if the HAB complaint form was received and verified prior to Wednesday of the sampling week. Sampling will be conducted on the following Monday otherwise.</p> <p>PWSS that are part of the voluntary monitoring program may have prioritization lowered as long as PWS sampling data is up to date.</p> <p>PWSS that test above the HA at the plant intake will be sampled as promptly as possible.</p>
<p>Public lakes that are publicly accessible but have no swimming beach and do not allow full body contact activities.</p>	<b>Priority 2</b>	<p>If resources are available and sampling capacity allows, samples will be collected within the immediate week if the HAB form was received and the complaint verified prior to Tuesday of the sampling week. Otherwise, sampling will be conducted on the following Monday.</p>
<p>Other public lakes that are largely inaccessible to the general public.</p>	<b>Priority 3</b>	<p>Will respond if capacity resources are available. Otherwise, the response will be handled through technical advice utilizing site photography and jar testing. KDHE may issue advisories based on visual evidence. The complainant may be advised to contact their local extension office or the Kansas State Veterinary Diagnostic Laboratory at:</p> <p>KSVDL Client Care  1800 Denison Ave.  Manhattan, KS 66502  785-532-5650  Clientcare@vet.k-state.edu</p>

\* **K.A.R. 28-16-28b** - Kansas Water Quality Standards ...*Public water bodies* - any surface water or surface water segment that supports or, in the absence of artificial sources of pollution, would support one or more of the designated uses of surface water defined in K.A.R. 28-16-28d (b) or K.S.A. 82a-2001(c), and amendments thereto, and that meets the criteria for classification given in K.A.R. 28-16-28d (a).

\*\***K.S.A. 65-171d - (d)** ... If a freshwater reservoir or farm pond is privately owned and where complete ownership of land bordering the reservoir or pond is under common private ownership, such freshwater reservoir or farm pond shall be exempt from water quality standards except as it relates to water discharge or seepage from the reservoir or pond to waters of the state, either surface or groundwater, or as it relates to the public health of persons using the reservoir or pond or waters there from.

#### A. Health Related Reports

1. *Initial Sampling.* When there has been a human or animal illness reported, response will be given a high priority. If district staff are unable to provide a timely response, then staff from the Topeka office will respond to the complaint. If staff at the Topeka office cannot respond, then KDHE may request assistance from the KDWPT or USACE or another partner agency for sample collection.

#### B. Public Drinking Water Source

1. *Initial Sampling.* When the waterbody is a public drinking water source and is not monitored through the PWSS voluntary monitoring program, then sampling will be initiated as promptly as possible.

#### C. Does Not Exceed KDHE Capacity

1. *Initial Sampling.* When the number of complaints does not exceed the agency capacity, then the response will be initiated as promptly as possible. (See **Figure 1** or **Appendix C** for a more complete timeline). To minimize the potential of exceeding staff capacity, KDHE may request assistance from KDWPT or USACE for sample collection.

#### D. Exceeds KDHE Capacity

1. *Initial Sampling.* When the number of complaints exceeds the agency capacity (to include sample collection and laboratory analysis), then response priorities will be determined by pre-set categories. (See **Table 2**).

#### E. Resampling Frequency for Kansas Surface Water Register Waterbodies

1. During confirmed BGA blooms, the resampling frequency for affected surface waters is directly associated with the initial sampling analytical results, the waterbody's "Lake Visitation Potential," and three other potential factors. All water impoundments listed in the Kansas Surface Water Register have been ranked within either the upper 25th percentile for "visitation potential" or in the lower 75th percentile for "visitation potential" (

2.

3.

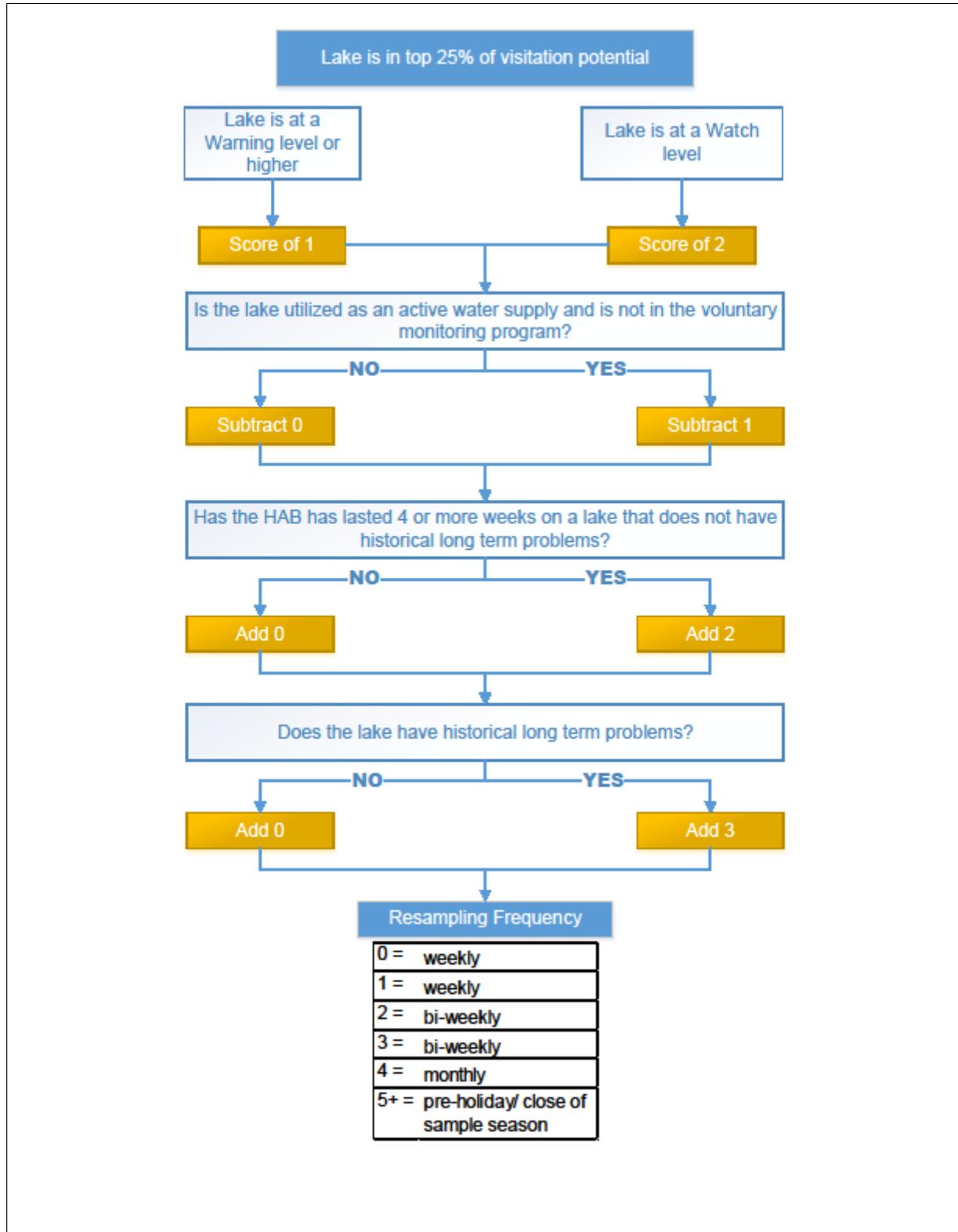
4. Appendix K). Visitation potential is determined using the following formula (**Figure 2**). Using this “score,” BOW-WPMAS staff determine the resampling frequency for continued HAB monitoring.

- a. Determining resampling frequency for top 25% for visitation potential, see **Figure 3**.
- b. Determining resampling frequency for lower 75% for visitation potential, See **Figure 4**.

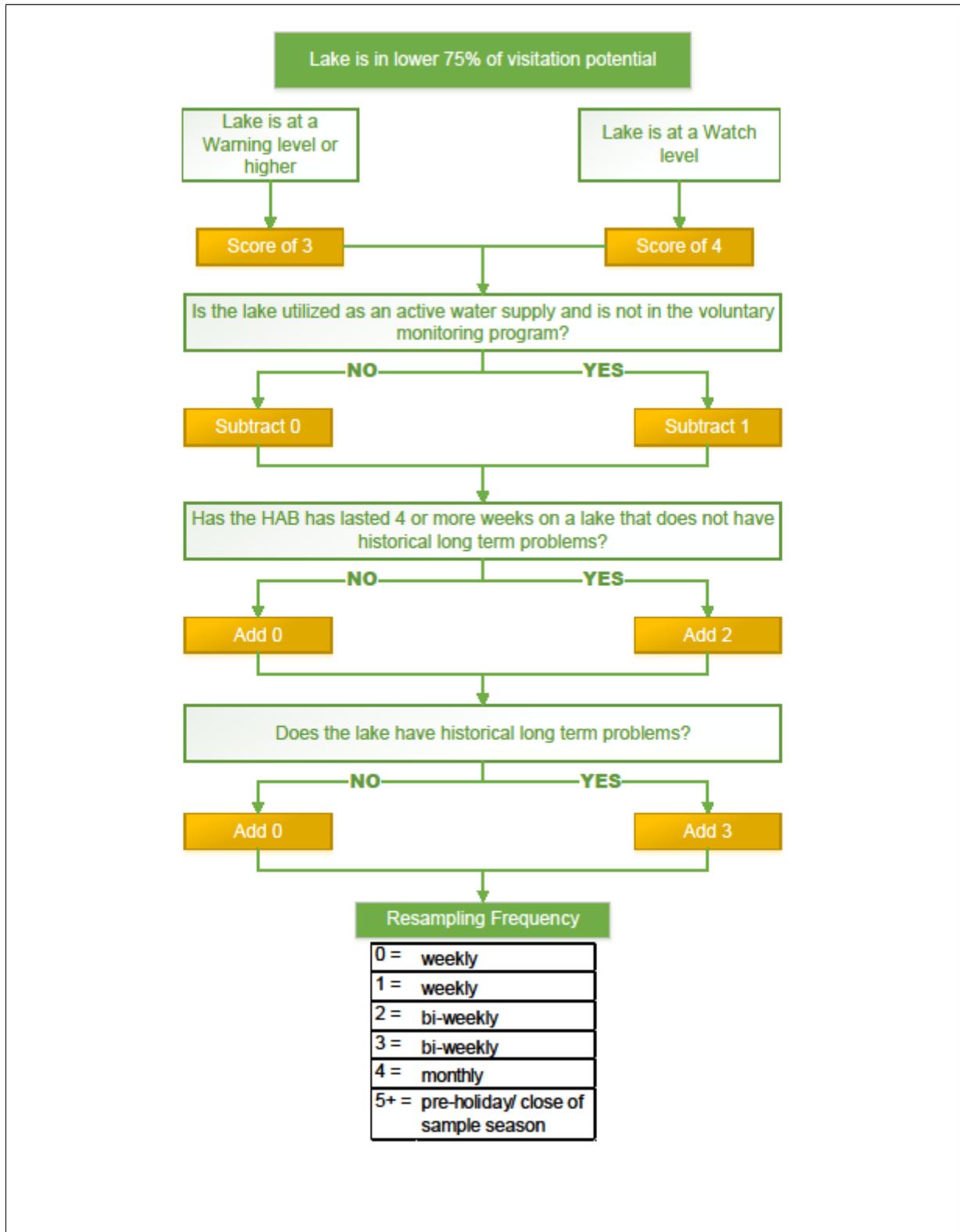
**Figure 2.** Visitation Potential Formula

$$\begin{aligned} &\text{Lake Visitation Potential} = \\ &\text{Population within 30 Miles} \times \text{Lake Size Factor} \times \text{Lake Density Factor} \\ &\times \text{Public Access Factor} \times \text{Contact Recreation Factor} \text{ (Appendix K)} \end{aligned}$$

**Figure 3.** Determining Resampling Frequency for KSWR Lakes with top 25% for Visitation Potential



**Figure 4.** Determining Resampling Frequency for KSWR Lakes with Lower 75% for Visitation Potential



- F. Lakes that do not have a “visitation potential” ranking will be re-sampled monthly or at a frequency determined by the initial response priority and KDHE staff. Priority 1 Response Lakes will be given a higher priority than priority 2 or 3 responses for resampling. Priority 1 responses may be re-sampled more frequently as determined by KDHE. Priority 2 and 3 responses may be sampled less frequently as determined by KDHE.
- G. Sampling Deferment: KDHE may defer weekly sampling for a specific waterbody during prolonged and stable HAB events. Sampling may be deferred until visual conditions are indicative of water quality improvement.
- H. Any situations that occur at surface waters not defined above will be considered on a case-by-case basis.
- I. When the complaint is received for privately owned lakes (single owner shorelines or lakes with restricted access to the general public), the complainant will be advised on how they can screen their waterbody using the “Jar Test” and to contact their local extension office or the Kansas State Veterinary Diagnostic Laboratory at:

KSVDL Client Care  
1800 Denison Ave.  
Manhattan, KS 66502  
785-532-5650  
www.ksvdl.org  
[clientcare@vet.k-state.edu](mailto:clientcare@vet.k-state.edu)

### 5.3 Sampling Season

- A. The HAB sampling season will adopt a sampling duration concurrent with the Kansas Surface Water Quality Standards Primary Contact Recreation season, from April 1 to October 31. New and continued investigations will no longer be conducted after the 31st of October, except in special circumstances. A final sample will be collected at all surface waters that are still under a HAB advisory in the last week of October to document the final analytical results and public health advisory level for the season.
- B. Occasionally, winter blooms of the blue-green species *Planktothrix rubescens* have been reported in Kansas outside the recreation season (appearing as surface scums of purple to red material or observed under thin ice covers). In the event a *Planktothrix rubescens* bloom is suspected, then it will be handled on a case by case basis.

**C. End of Season.** If lakes are still under an HAB Advisory by October 31st, then it is the responsibility of the lake's management authority to conduct observational monitoring and jar testing to assess the condition of the waterbody. BEFS/BOW staff will contact appropriate lake management to assist with the lake assessment. Until KDHE receives evidence of a negative jar test or other compelling observational data that the bloom has expired, the waterbody will remain over the winter at the status that was in effect on October 31. If the jar test or other observational data confirms the lack of a significant blue-green community, then KDHE will lift the end of the season notification.

For further questions regarding sampling of lakes and cyanobacteria, contact KDHE's Bureau of Water/Bureau of Environmental Field Services at the Harmful Algal Bloom Hotline, **785-296-1664**.

For further questions regarding health effects of cyanobacteria on humans, contact KDHE's Bureau of Epidemiology and Public Health Informatics at **877-427-7317**.

For further questions regarding health effects of cyanobacteria on pets and livestock, contact the Kansas Department of Agriculture Division of Animal Health at 785-564-6601 **during normal business hours**. If assistance is needed for an urgent issue after business hours, call the KDHE Epidemiology Hotline at **877-427-7317**.

## SECTION 6. SAMPLING

### 6.1 Sampling Safety

- A. Field staff must exercise caution to protect themselves during HAB sampling events as cyanobacteria can produce toxins that can cause skin irritation, respiratory and/or gastric problems. When sampling from an area that has been reported to have a bloom, the following safety precautions must be followed.
- B. Depending on each sampling location and situation, samplers should wear at a minimum:
  - 1. Gloves, Latex or Nitrile
  - 2. Eye protection such as safety glasses or goggles, depending on the presence of splashing or spray
  - 3. Boots or closed shoes
  - 4. Long pants
- C. If any of the following conditions apply, then additional Personal Protective Equipment (PPE) may be necessary.
  - 1. Conditions include:
    - a. If significant visual bloom or scum is present, and breezy conditions create wave action that may generate spray or aerosolize the water;
    - b. If there is a noticeable odor;
    - c. If prior week's samples indicate toxins are present and at levels greater than or equal to 2,000 µg/L;
  - 2. Additional Personal Protective Equipment includes:
    - a. Elbow length gloves, Nitrile rubber
    - b. Goggles or splash guard
    - c. Waterproof tall boots or hip waders
    - d. For staff who are certified to wear one, half-face respirator fitted with Organic Vapor/HEPA filters. **If sampler is not certified**, then the DEAs/Supervisors may need to send staff who are qualified to wear

respirators or provide photographic evidence of extreme conditions. When conditions are warranted (*i.e.*, evidence of significant cyanobacterial matting), BOW-WPMAS staff may notify District Offices that personnel who are qualified to wear respirators are required to perform the sampling.

**D. General Sampling precautions:**

1. Do not allow the water to come into contact with exposed skin.
2. Do not touch hands to mouth, eyes, or other exposed areas of the body before washing.
3. Hands should be washed thoroughly with soap and clean, fresh/potable water after sampling and before eating, drinking, or smoking.
4. Remove any rings, watches or other jewelry that might have been exposed to algae contaminated water and wash skin surface area and items.
5. All equipment, gloves, and waders should be rinsed with clean water (not lake water) after sampling and before storage.
6. Used disposable gloves should be removed using proper technique to avoid contamination.
7. All wet clothing should be removed and replaced with clean, dry clothing.
8. Wet clothing should be washed separately before next wearing.
9. Do not inhale spray from boats, wind, other water surface disturbances or irrigation water from areas with harmful algal blooms.
10. Do not ingest affected water.
11. Care must be taken to avoid contamination of vehicle and any common use items that may be used with bare hands (e.g., steering wheel, sample cooler, clipboards, markers).

**E.** Different species of algae can produce different toxins such as neurotoxins, liver toxins, and skin irritants. It is important that field staff can recognize exposure indicators associated with algal blooms and report to their supervisors if they begin to experience potential symptoms. Symptoms can occur immediately or within days of exposure. Those symptoms can include:

1. Skin irritation – visible rash, hives, or blisters, especially under clothing, swimsuits, or wetsuit.
  2. Respiratory problems – runny eyes and nose, sore throat, headache, and asthma-like symptoms.
  3. Kidney toxicity – acute, severe gastroenteritis (including diarrhea and vomiting).
  4. Liver toxicity – abdominal pain, diarrhea, and vomiting, may take hours or days for symptoms to appear in humans.
  5. Neurotoxicity – numb lips, tingling fingers and toes, or dizziness, often appear within 15 to 20 minutes of exposure.
- F. Field personnel should be aware that hazardous conditions potentially exist at every waterbody. If unfavorable conditions are present at the time of sampling, including the need to have additional PPE, or if hazardous weather conditions arise, such as lightning or high winds, then personnel should cease sampling, move to a safe place, and contact their DEA/Supervisor. Sampling can be rescheduled for a time when weather conditions have improved, or the appropriate staff with PPE are available.

## 6.2 Sample Collection/Sample Locations

- A. Samples will be collected in accordance with BOW-WPMAS Standard Operating Procedures, SOP HAB-001 (Appendix J).
- B. Sampling stations for toxin or phytoplankton analysis will be selected based on common public access points, which for this particular sampling task are primarily defined as: swimming beaches, boat dock and ramps, marinas, shoreline adjacent to maintained trails and marked fishing areas, and other frequently used areas designated for public access. All sample stations will initially be determined by KDHE's Central Office. Once these stations have been identified, they will then be plotted on maps that will be provided to those conducting the sampling. If it is determined that nutrient samples are needed, they will be collected at a HAB sampling station or near BOW-WPMAS's ambient Lake Program sampling station.

1. If a bloom is observed at other common public access points of the lake that are not designated sampling stations, then all designated stations shall still be sampled, and an additional sample may be collected at the point where the bloom can be readily observed, and the public can readily access the water's edge.
  - a. If there is not an easy and readily available point of public access to collect this optional sample, then no additional sample is required.  
Under these circumstances, a determination of the status may be based on the observation of an obvious bloom and from the results of the samples collected at the designated stations. The status may be set at least at a Watch level, and the waterbody will likely be resampled the following week.
2. If, upon arrival, it appears that the sample collection at the designated stations is unattainable, (due, *e.g.*, to flood waters, drought conditions/no water, impassable roads) then an alternate sample location may be determined by the sampler within proximity of the original station.
3. If public waters are water sources for Public Water Supply Systems (PWS), and the PWS is not participating in the voluntary monitoring program, then:
  - a. When a complaint is validated, the BOW-PWSS will be notified.
  - b. When directed by the Public Water Supply Section, BEFS will collect initial samples at PWS proxy stations as well as "recreation" stations. If there is no established KDHE PWS sample site, then see below.
  - c. As needed, BOW-WPMAS will establish PWS proxy sampling stations relative to raw water intake locations:
    1. Samples will be collected as close to the intake as possible, or
    2. Discharge samples will be collected if a PWS intake is downstream from the impacted lake/reservoir and the outflow from that lake/reservoir comprises a significant proportion of stream flow arriving at the intake of that PWS (as determined by mass balance calculations).

3. KDHE has the discretion to initiate river monitoring at locations above the PWS intakes to confirm the absence/presence/concentration of microcystin toxins, if warranted.
4. If levels are detectable, then KDHE-PWSS will coordinate with the affected system(s) to determine recommended resampling (See **Appendix F**).
  - d. For PWS systems not participating in the voluntary monitoring program it will be recommended to continue to resample at PWS intake as long as the lake has elevated levels impairing recreational status (See **Appendix F**).
4. Other types of sampling may be required to determine background levels or potential contaminant sources, or to determine whether public waters used for livestock watering are impacted.
5. Lakes that have multiple zones may require new sampling locations if persistent ( $\geq 3$  days) winds drive existing blooms into unmonitored areas. During initial response activities, the zone that was subject to the response will be sampled at all established sampling stations. At a minimum, one sample from each other zones will be sampled during the initial response for microcystin toxins. During subsequent sampling activities, KDHE will determine which zones warrant testing.
6. For any newly established sampling locations, a GPS point should be recorded (Datum NAD83), or the location must be marked on a map.

### C. Miscellaneous Waterbody Sampling

#### 1. Streams/Rivers

- a. Only classified rivers/streams listed in the Kansas Surface Water Register will be investigated.
- b. Initial sampling will typically be conducted by BEFS District Office staff or by BOW-WPMAS Central Office staff, depending upon location and resources available.

1. If analysis for toxins are above detection, then BOW-PWSS will notify all Public Water Supply (PWS) systems downstream, and it will be the responsibility of the systems to continue resampling. (See PWS **Appendix F**), or
  2. If analysis indicates that toxin and/or cell count levels are above recreation levels, then resampling and notification will be at the discretion of the agency for livestock watering, irrigation, and recreation uses.
2. Sampling and resampling of other miscellaneous public use waterbodies will be conducted at the discretion of KDHE.

### 6.3 Sample Types/Sample Analysis

There may be three types of samples collected for HAB events: toxin samples, phytoplankton samples, and nutrient samples. Samples will be collected in accordance with BOW-WPMAS HAB-001 and HAB-002 (Appendix J), and analysis will be in accordance with BOW-WPMAS HAB-003 (Appendix J).

#### A. Toxin samples:

1. Toxin samples will always be analyzed for levels of microcystin toxins, using the ELISA Qualitube Kit (EnviroLogix, Portland, ME) or functional equivalent.
2. When cyanobacteria that produce cylindrospermopsin toxin have been identified, then the level of toxin may be determined using Abraxis (Abraxis, Inc, Westminster, PA) test strips or functional equivalent (optional).

#### B. Phytoplankton samples: Depending on the staff and resources available, phytoplankton samples may be analyzed for:

1. Taxon identification, with blue-greens typically to genus;
2. Cell counts and blue-green cell percentage;
  - a. If the analytical lab is at capacity for sample processing, then, for lakes that have more than one station, KDHE has the discretion to determine which sample will have taxonomy and cell counts performed. Typically, the sample with the worst (most green) visual appearance will take

priority. If there is no discernible difference between the worst sample(s), then KDHE will select the sample that is most likely to have a negative impact on health, based on data available. Data informing this decision could include the importance of the sampling stations for human health, wind conditions during sampling, reporting from the field, photographic evidence, jar test results, or previous analysis results (**Appendix I**).

**b.** Those samples not analyzed during the response week should be retained for the duration of the HAB season, at which time KDHE may determine to perform additional analyses or dispose of the sample(s).

**3.** Cell biovolume (at the discretion of analyst).

**C.** Nutrient samples **may** be analyzed for:

1. Nitrate;
2. Nitrite;
3. Kjeldahl nitrogen;
4. Ammonia;
5. Total phosphorus; and
6. Ortho-phosphate;

**D.** Additional field and laboratory measurements and analytes may include:

1. Water Temperature (field);
2. Air Temperature (field);
3. pH (field or lab);
4. Dissolved oxygen (field or lab);
5. Chlorophyll-a; and
6. Liquid Chromatography Mass Spectrometry (LCMS) analyses for microcystin variants and other algal toxins.

Sample analysis will be conducted in accordance with BOW-WPMAS SOP HAB-003 (See Appendix J). Additional analyses may be required and will be based on individual investigation circumstances.

## SECTION 7: ANNUAL PROGRAM MANAGEMENT

The HAB program is busiest during the April to October contact recreation season but has multiple tasks during the off season. The following is a general annual timeline of events, beginning with the first day of the active season.

- **April**
  - All involved staff are informed of any new changes to the KDHE Agency HAB Response Plan as well as any changes to the computer interface side of the HAB program.
  - If no changes have taken place, the staff is still informed/refreshed with current protocols.
  - Stakeholders are sent standing invitations to the weekly HAB Meeting and Conference Call.
  - Once the first complaint comes in, the weekly work cycle is followed, as documented in **Appendix C**. This continues throughout the season.
  
- **September**
  - The process of compiling subjects and inviting speakers and exhibitors for the annual meeting begins, along with identification of possible venues and dates.
  
- **October**
  - All lakes left with advisories will be sampled to determine their season closure status.
  - In this final month of HAB season, during the conference call and in the stakeholder weekly email, KDHE solicits suggestions for changes to the HAB Response Plan.
  
- **November**
  - The BOW-WPMAS response team works with KDHE Office of Information and Technology staff for any modifications to the software or databases that support the HAB response program.
  - At the end of November, the team begins contacting lake managers with the object of closing out as many outstanding advisories as possible.

- The speakers and agenda for the annual meeting are set, and the date and location are finalized.
- Identify and begin completion of all other tasks and arrangements required for the annual meeting. This includes the initiation of any necessary contracts, mechanisms for participant registration, and the like.
- **December**
  - At the end of the month, call and close out as many outstanding advisories as possible, then, at the end of the month, close out in the HAB system any existing lakes on advisories.
- **January**
  - Re-submit any lakes that were not lifted in the previous year into HAB Management System. The closeout and re-submission is done so that the system can generate annual statistics and to track extended HAB problems.
  - Complete all final arrangements and tasks for the annual meeting, including: agendas; name tags; acquisition of equipment, printing of materials, etc.
  - The annual meeting is held.
- **February**
  - A hot wash of the annual meeting takes place to document improvement for the next annual meeting.
  - A conference room for Thursday afternoons from April 1 through the Thursday after the last Monday in October is reserved.
  - All revisions proposed for the response plan are discussed and those deemed necessary are added to the plan.
- **March** – The Response Plan is published for the season ahead

## SECTION 8. DATA MANAGEMENT

Waterbody data, analysis data, advisory status, and tasks are managed through the HAB Data Management System, which includes three components.

- A. The Survey Web Application takes complaints from the public and/or lake managers for possible harmful algal blooms and Human and/or Animal Illness complaints (**Appendix L**, DM-001). This front end is built in ESRI Survey123.
- B. The HAB Tracker, which is built in Apex software environment, manages complaints, field assignments, evaluates the final analytical results, and calculates the health protection level recommendations. In addition, this program has a web presence which shows locations, recommendations and the ability to produce data reports (**Appendix L**, DM-003.)
- C. ORACLE and GIS databases. The data support for the “Harmful Algae Bloom” system consists of two parts: 1) the “Site ID” geospatial database; and 2) the ORACLE ENVI Algae Database (**Appendix L**, DM-002.)
  1. *Site ID* geospatial database contains waterbody map coverages as well as a map of existing sampling stations. New sampling stations can also be added through this application. This system is linked to the HAB Tracker and provides all geospatial data for it.
  2. *Algae Database* contains taxonomy, cell counts, and results of toxin analyses performed at the KDHE central office. This system is linked to the HAB Management System and is required to be completed to provide the HAB Management System with the data needed to evaluate and generate a health protection level recommendation.

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