Investigation ID/Name: _____   County/Location: _____   Date: _____

OHHABS (Animal Cases)—Public Health Assessment Considerations Tool

Table 1. One Health Harmful Algal Bloom System (OHHABS) definition of an animal HAB-associated case

Definition	Criteria							
Animal HAB-associated Case	Exposure[1]	Signs[2]	Public health assessment[3]	Professional medical diagnosis[4]	Other causes of illness ruled out[5]	Observational or environmental data[6]	Laboratory-based HAB data[7]	Clinical data[8]
1. Suspect	Required	Required	Required					
2. Probable	Required	Required	Required			Required to have 1		
3. Probable	Required	Required	Required	Required	+/-	+/-	+/-	
4. Confirmed	Required	Required	Required	Required to have 1		+/-	+/-	Required
5. Confirmed	Required	Required	Required	Required	Required		Required	

[1]Exposure (i.e. physical contact, inhalation, ingestion) to water, algae or other dietary HAB sources. This includes undocumented exposures that are suspected based on temporal or spatial factors (e.g., proximity of carcass to a body of water that is experiencing a bloom) or an animal's opportunity for exposure due to biological, behavioral, or other relevant factors (e.g., natural habitat of the animal is near or in the body of water, penned livestock's only source of drinking water, etc.).

[2]Reported signs after exposure, including the outcome of death prior to discovery.

[3]Public health assessment is defined as the action of compiling all data available and deciding that the illness in question is likely HAB-related. Assessments may also be completed by qualified non-public health entities (e.g., fish and wildlife staff, university researchers) that have been identified by State or Federal agency partners.

[4]Professional medical diagnosis being provided by a medical practitioner (e.g., veterinarian) based on his or her medical assessment of the animal(s)'s signs, medical history, likelihood of exposure, etc.

[5]Other more likely causes of illness ruled out based on case data from the investigation (e.g., professional medical assessment, clinical testing, other health and exposure data

[6]Observational (e.g., scum, algae, water color change, sheen, photographic evidence, satellite data) or environmental (e.g., pH, chlorophyll, nutrient levels) data from a water body to identify an algal bloom

[7]Laboratory detection of cyanobacteria or other potentially toxin-producing algae, (e.g., microscopic confirmation or DNA analyses) or algal/cyanobacterial toxins (e.g., bioassay, HPLC) in a water body, finished drinking water supply, seafood or animal dietary sources

[8]Laboratory documentation of cyanobacteria, other potentially toxin-producing algae, or algal/cyanobacterial toxins in a clinical specimen.

Blue shaded cells: you must have at least one of the criteria described in the shaded cell.
Pink shaded cells: you must have the criterion described in the shaded cell.
+/-: indicates that the criterion is optional and while it strengthens the case, it does not change case classification (e.g., suspect to probable, probable to confirmed).

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Table 2. A public health assessment is defined as the action of compiling all data available and deciding that the illness in question is likely HAB-related. Public health assessment processes and standards may vary by jurisdiction. The following list of considerations, developed with state health department and federal agency input, is a resource that may be referenced by states and territories when formulating or conducting a public health assessment for a case of HAB-associated animal illness. Some considerations may require or benefit from veterinary (v), laboratory (l), or toxicology (t) expertise. The results from this checklist may be summarized in Table 3 to support decision-making about case reporting and case classification. However, please note that this list many need to be adjusted to reflect the public health assessment needs of each state/territory.

Case Classification Criteria	State Considerations	Comments	Were state/territorial reporting standards met?
Exposure: Was the animal likely exposed to a HAB via physical contact, ingestion, or inhalation?	What was the animal's exposure activity?		
	What was the route of exposure?		
	Was the exposure observed or documented?		
	Did the exposure occur during a HAB advisory/warning?		
	Did the exposure occur in a location with a recorded elevated HAB cell or toxin level?		
	What was the animal's physical proximity to the bloom/water?		
	Was the exposure in a single animal or a group of animals?		
	What was the category (e.g., livestock) and type (e.g., cattle) of the animal(s)?		
	What was the estimated size/weight of the animal(s)?		
	What was the species/breed of the animal(s)?		
	If ingestion was the reported route of exposure, did the animal ingest a substance that may have contained HAB cells or toxins?		
	If the exposure was undocumented, does the animal have any discoloration, algal scum on their fur, or algal biomass in the gastrointestinal (GI) tract?		
	Did the animal(s) have access to any outdoor water body up to 48 hours prior to onset of symptoms?		
	What condition was the animal found in (i.e. alive, fresh, decomposed, scavenged, unknown)?		
	If the animal was found dead, was the carcass found near a body of water that was currently or recently known to be experiencing a bloom?		
	If penned livestock were affected, did they have more than one source of drinking water?		
	Did illness reports indicate that animals from multiple households had a common exposure (e.g., all swam at same beach)?		
Signs: Were the signs that were reported associated with the exposure?	Were the signs reported by an individual who observed the animal's illness firsthand?		
	What were the signs reported?		
	Were the signs consistent with what is known about the type(s) of algae/toxin and the route of exposure? (v/t)		
	What was the timing of the signs relative to the exposure?		
	Was the time to illness onset consistent with what is known about the type(s) of algae/toxin and the route of exposure? (v/t)		
	Does the severity of the signs seem consistent with the amount (e.g., time, number of visits, amount consumed) of exposure? (v)		

Case Classification Criteria	State Considerations	Comments	Were state/territorial reporting standards met?
	Does the severity of the signs seem consistent with the animal's size/species (e.g., monogastric animals are less sensitive than ruminants and birds)? (v)		
	What was the duration of the signs?		
	Was the duration of signs consistent with what is known about the type(s) of algae or toxin? (v/t)		
Professional medical diagnosis: Was the animal diagnosed with a HAB-associated illness by a medical practitioner (e.g., veterinarian) based on his or her assessment of the animal's signs, medical history, likelihood of exposure, etc.)	Has the animal been evaluated by a veterinarian?		
	Did the animal receive one or multiple diagnoses from a veterinarian? If yes, what were they?		
	Is the veterinarian knowledgeable/experienced with HAB- associated illnesses?		
	If not diagnosed as a HAB-associated illness, did the veterinarian consider algal toxins when making their differential diagnosis?		
	Was the animal's owner asked about potential algal bloom exposure during assessment?		
Other causes of illness ruled out: Were other more likely causes of illness (e.g., infectious disease, other environmental cause, exacerbation of preexisting condition) ruled out based on case data from the investigation (e.g., professional medical assessment, clinical testing, other health and exposure data)?	Were other more likely causes of illness considered? If yes, what were they?		
	Were other more likely causes of illness ruled out? If yes, how were they ruled out?		
	Were environmental samples (e.g., mushrooms) tested to rule out other possible causes?		
	Did the property owner recently treat the yard/water body with pesticides (i.e., suggesting pesticide poisoning)?		
	Did other animals without exposure become ill with the same symptoms (i.e., suggesting infectious etiology)?		
	If the animal was taken to a veterinarian, was the animal diagnosed with a different condition by physical exam, clinical laboratory testing, imaging, or other diagnostic test?		
	Did the animal(s) have any pre-existing medical conditions or disabilities that may present with similar signs? (v)		
	Did the animal(s) receive any medications in the month before illness onset that may induce similar signs of illness? (v)		
Observational data: Do observational data	Were observational data documented? If yes, what type(s) of observational data were documented?		
	Was there a HAB-related advisory (e.g., related to recreational water use, drinking water use, food harvesting) associated with the implicated water body in question?		

Case Classification Criteria	State Considerations	Comments	Were state/territorial reporting standards met?
(e.g., scum, algae, water color change, sheen, photographic evidence, satellite data) support the presence of a HAB?	What was the location of the observation(s) relative to where the case was exposed?		
	Were data collected multiple times? If yes, what was the consistency/comparability of the results?		
	What was the timing of the observation(s) relative to when the case was exposed?		
	Did water appearance (e.g., scum, algae, water-color change, sheen) support the presence of a HAB?		
	Were water conditions impacted by rainfall events, runoff, flooding, storms, high winds, ongoing drought, or other natural events before the data were collected?		
	Who documented the observational data?		
	Did photographic evidence suggest the presence of cyanobacteria and not something else, such as duckweed, pollen, or filamentous green algae?		
	In the absence of a bloom, did observational evidence indicate the presence of benthic algae (e.g., algae on the rocks or on the bottom sediments of waterbody) or algae that stay in the water column below the water surface?		
Environmental data: Do environmental data (e.g., pH, chlorophyll, nutrient levels) support the presence of a HAB?	Were environmental data documented?		
	How were the environmental data collected?		
	What type(s) of environmental data were documented?		
	Were the environmental data collected as part of routine monitoring or in response to a HAB event?		
	What was the timing of environmental data collection relative to when the case was exposed (e.g., exposure date(s) and testing dates(s))?		
	Were data collected multiple times? If yes, what was the consistency/comparability of the environmental data collected?		
	What was the location of the environmental data collection relative to where the case was exposed?		
	Were water conditions impacted by rainfall events, runoff, flooding, storms, high winds, ongoing drought, or other natural events before the data were collected?		
	Who documented the environmental data?		
	Were environmental data such as chlorophyll levels, Secchi depth, and trophic index supportive of a bloom?		
Laboratory-based HAB data: Were cyanobacteria or other potentially toxin-producing algae, (e.g., microscopic confirmation or DNA analyses) or	Do historical environmental data (e.g., nutrient levels) indicate that the water body is susceptible to HABs?		
	Do historical algae or algal toxin testing data indicate that the water body is susceptible to HABs?		
	Did sampling and laboratory testing occur?		
	What type of sample(s) was collected (e.g., water body, seafood, or dietary supplement)?		
	Were water conditions impacted by rainfall events, storms, high winds, ongoing drought, or other natural events before the sample was collected?		
	What was the timing of the sample collection relative to when the case was exposed (e.g., exposure date(s) and sample collection date(s))?		

Case Classification Criteria	State Considerations	Comments	Were state/territorial reporting standards met?
algal/cyanobacterial toxins (e.g., bioassay, HPLC) detected in a water body, finished drinking water supply, seafood or dietary supplements?	What was the location of sample collection relative to where the case was exposed?		
	Was the sample collected according to protocol? Was the person who collected the sample familiar with the protocol?		
	Was the sample handled properly (e.g., was the cold chain preserved)?		
	Did the laboratory report any issues with the sample?		
	What algae or toxins were the samples tested for?		
	How were the samples analyzed?		
	What was the timing of sample testing relative to when the case was exposed and the sample was collected (e.g., exposure date(s), sample collection date(s), and sample testing date(s))?		
	What species was detected? Is it known to produce toxins or otherwise be able to cause symptoms in animals?		
	What was the detected cell concentration? Toxin concentration?		
	Are measured cell concentrations, toxin concentrations, and species detected capable/sufficient to cause disease (observed signs) in this animal?		
	Were there environmental factors that would affect sample result interpretation (e.g., presence of benthic cyanobacterial mats)?		
Clinical Data: Was there laboratory detection/identification of cyanobacteria, other potentially toxin-producing algae, or algal/cyanobacterial toxins in a clinical specimen (e.g., stomach contents, feces, vomitus)?	Was a clinical specimen tested? If yes, what was it tested for?		
	Did the test identify the presence of cyanobacteria, other potentially toxin-producing algae, and/or cyanotoxins in blood, stomach content, or other source?		
	Is the type of algae (if identified) known to produce toxins?		
	Is the species or toxin (if identified) known to cause illness in animals?		
	Were any antidotes or medical treatments administered that may have interfered with results?		
	Was the clinical specimen tested of appropriate quality and condition for the test? (l/t)		
	What was the timing of clinical testing relative to when the case was exposed and the specimen was collected? (l/t)		
	Were any antidotes or medical treatments administered that may have interfered with the results of clinical testing? (v/t)		
	Was the test used to diagnose the poisoning validated or approved for this use? (v/t)		
	Was the test performed at a laboratory with experience running this type of test? (l)		
	Did clinical laboratory testing results support toxic effects of cyanotoxins (e.g., abnormal liver function test after exposure to microcystin)? (v)		

(v) Input from veterinary colleagues may be necessary or beneficial
(l) Input from laboratory colleagues may be necessary or beneficial
(t) Input from toxicology colleagues may be necessary or beneficial

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Table 3. Use this table to summarize the findings from your public health assessment. The results may be used to evaluate whether or not to report the case. This table may also serve as a reference when classifying a HAB-associated illness as suspect, probable, or confirmed.

Criteria Consideration	Criteria							
	Exposure	Signs/ symptoms	Professional medical diagnosis	Other causes of illness ruled out	Observational data	Environmental data	Laboratory-based HAB data	Clinical data
Was the animal likely exposed to a HAB via physical contact, ingestion, or inhalation?								
Were the signs that were reported associated with the exposure?								
Was the animal diagnosed with a HAB-associated illness (e.g., algal toxin poisoning) by a medical practitioner (e.g., veterinarian) based on his or her assessment of the animal's signs, medical history, likelihood of exposure, etc.?								
Were other more likely causes of illness (e.g., infectious disease, other environmental cause, exacerbation of preexisting condition) ruled out based on case data from the investigation (e.g., professional medical assessment, clinical testing, other health and exposure data)?								
Do observational data (e.g., scum, algae, water color change, sheen, photographic evidence, satellite data) support the presence of a HAB?								
Do environmental data (e.g., pH, chlorophyll, nutrient levels) support the presence of a HAB?								
Were cyanobacteria or other potentially toxin-producing algae, (e.g., microscopic confirmation or DNA analyses) or algal/cyanobacterial toxins (e.g., bioassay, HPLC) detected in a water body, finished drinking water supply, seafood or dietary supplements?								
Was there laboratory detection/identification of cyanobacteria, other potentially toxin-producing algae, or algal/cyanobacterial toxins in a clinical specimen (e.g., stomach contents, feces, vomitus)?								