ALGAL BLOOM (CYANOBACTERIA) RESPONSE PLAN

The Utah Department of Agriculture and Food (UDAF) developed this response plan to inform, educate, and engage with agricultural producers when water quality issues arise from Harmful Algal Blooms. UDAF does not have the statutory authority to regulate or enforce Water Quality Standards or Human Health Standards. That authority resides with the Utah Department of Environmental Quality (DEQ) and the Local Health Departments respectively. This provides guidance to UDAF staff on response when cyanotoxins are found in Utah water bodies. Responding quickly and notifying farmers and ranchers of possible harmful effects will help them make critical decisions regarding water use during periods of elevated toxin levels.

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Introduction

Harmful algal blooms (HAB) are the result of a rapid increase or accumulation of cyanobacteria in a water body. Cyanobacteria, sometimes known as blue-green algae, can cause blooms in waterbodies when nutrients, sunlight, pH, salinity, temperatures, and other environmental factors are optimum for their growth. Some types of cyanobacteria can produce cyanotoxins which can harm the liver or nervous system of humans and animals when exposed to or ingested. In the past, some animals which have consumed water or algae mats with harmful toxins have died.

The Utah Department of Agriculture and Food (UDAF) has developed this response plan to inform, educate, and engage with agricultural producers when water quality issues arise from cyanobacteria. It also provides guidance to UDAF staff in how and when to respond when harmful cyanotoxins are found in Utah water bodies. When water sources have elevated cyanotoxin levels, harmful effects can occur in a short period of time. Responding quickly with sampling data and notifying farmers, ranchers, and landowners of possible harmful effects will help them make critical decisions regarding water use during periods of elevated toxin levels.

The question is often asked; “How can I tell if the cyanotoxin levels in the water is a problem?” You can’t know for certain unless you have the water tested. However, look for these differences between cyanobacteria and non-toxic green algae:

- Cyanobacteria looks like pea soup, an oil slick, or like someone placed dye in the water
- Filamentous (non-toxic) green algae often look like a mass of green hair on the water

Testing for cyanotoxins in the water is complex. By the time samples have been taken, shipped and analyzed and results obtained the lab reports may be quite different than the current toxicity. For this reason UDAF has looked at ways to streamline the testing process and to understand the possible harmful results of the cyanotoxins when certain environmental conditions exist.

We will identify conditions and procedures to be followed when toxicity has been identified and how to respond in the best possible way. This will provide decision making

tools to farmers, ranchers, irrigation companies, and other landowners as they decide how to use and deliver water.

Bacterial cell counts may not directly correspond to cyanotoxin levels. Since cell counts are quicker and easier to measure, DEQ and local health departments use these to issue precausionary warnings. UDAF will concentrate on monitoring cyanotoxin levels that may affect agriculture.

Once sampling data has been gathered, the decision about what message should be crafted is the most critical part of the decision we make. We are sending a message that says we have an opinion based on the best available scientific data.

- If that message is over cautious it could cause panic to consumers and uncertainty for food product safety.
- If the message does not capture the true threat we could have a health issue which could have been prevented with the proper message.
- What coordination will we have? What if our conclusion is different than another entity?

Personnel

UDAF HAB Team

Thayne Mickelson – Homeland Security and Risk Management -Team Coordination
Jay Olsen – Water Quality –UDAF – (DEQ interface)
Chelsea Crawford – Assistant State Veterinarian
Bracken Davis – Plant Industry Representative
Mark Quilter and Jay Olsen – Sampling and Field Staff Coordination
Weston Judd, Sushma Karna, Mohammed Sharaf – Chemistry Lab
Anne Johnson – GIS mapping
Anna Marie Forest – Fish
Melissa Ure and Peter Gessel – Water Policy
Larry Lewis – Public Information Officer

Interagency Coordination

Utah Department of Environmental Quality (DEQ)
Division of Water Quality (DWQ)
http://deq.utah.gov/Divisions/dwq/health-advisory/harmful-algablooms/guidance.htm
Benjamin Holcomb - bholcomb@utah.gov - 801-536-4373
Jodi Gardberg - jgardberg@utah.gov - 801 536-4372
Division of Drinking Water - DEQ Spill (HAB) Hotline 801-536-4123

Utah Department of Health
County Health Departments http://www.ualhd.org/index.html

Utah Department of Natural Resources (DNR)
Division of Water Rights – Kent Jones and Boyd Clayton
Division of Wildlife Resources – Drew Cushing
Division of Water Resources– Todd Adams

Utah Division of Emergency Management (DEM)
Bob Carey - bcarey@utah.gov
Sheila Curtis - smcurtis@utah.gov
County Emergency Managers (Attachment B)

Farm Bureau – Matt Hargreaves
Email: matt.hargreaves@fbfs.com
Phone: 801-233-3003

Subject Matter Coordination Contacts

Dr. Hall – Utah State University – DVM – Toxicologist
Phone: 435-770-6774

Theron Miller – POTW Representative -435-604-3772

Christine Cline – USF&WS Toxicology
https://deq.utah.gov/Divisions/dwq/health-advisory/harmful-algal-blooms/docs/HAB-Carcass-Collection-SOP.pdf

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Utah Department of Agriculture and Food
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jayolsen@utah.gov

Marisa Van Dyke, M.S. | Environmental Scientist
Co-Lead of Freshwater HAB Program
Surface Water Ambient Monitoring Program (SWAMP)
CA Environmental Protection Agency
CA State Water Resources Control Board
1001 I Street, MS 19B
Sacramento, California 95814
Phone: (916) 322-8431

Michelle Deras – Weber Basin Water Conservancy District – 801-771-1677

Rushforth Phycology
Sam Rushforth - Sam@rushforthphycology.com
Sarah Jane Rushforth - Sarah@rushforthphycology.com - 801-376-3516

Potential Dangers of HABs

Harmful Effects

There are potential health impacts, some of them serious or lethal, to people and animals that come in contact with cyanotoxins. Cyanobacteria can disperse throughout or concentrate within the waterbody. Therefore, when a problem is present caution should be used throughout the entire water body and distribution of water sources.

Common Routes of Exposure and Symptoms

Humans

- Skin contact with scum or water containing cyanobacteria cells or cyanotoxins
  - Symptoms may include eye irritation, rash, and blistering.
- Inhalation of tiny droplets of water containing cyanotoxins or cells during recreational activities or during sprinkler irrigation
  - Symptoms may include sore throat, congestion, cough, wheezing, and headache.
- Ingesting water containing cyanotoxins
  - Symptoms may include abdominal pain, vomiting, and diarrhea. Long-term effects may damage the liver and nervous system.

Animals

- Ingesting water with cyanotoxins or mats of cyanobacteria cells
  - Symptoms may include vomiting, lethargy, diarrhea, convulsions, difficulty breathing, and general weakness. There have been livestock deaths from toxic algae exposures and water consumption.

- **In some cases, animals may choose a cyanobacteria source over clean water, even if a clean water source is available. Animals may eat mats of cyanobacteria slime. Therefore, animals should be restricted from cyanobacterica sources and be provided a clean source of drinking water.**

Fish

- Research has shown that cyanotoxins can bio-accumulate in tissue of aquatic organisms. The amount of bioaccumulation will depend on the cyanotoxins

present, toxin concentrations, exposure length, fish species, as well as other variables.

- UDAF does not have jurisdiction over aquatic wildlife in public waters. Wildlife within this state, including aquatic wildlife, falls within the jurisdiction of the Division of Wildlife Resources.
- UDAF licenses private aquaculture facilities and fee fishing facilities. If a HAB occurs at an aquaculture facility or fee fishing facility, UDAF could confirm the presence of a HAB, and supply guidance on managing the HAB.

Plants

- Limited research is available and data is inconclusive on cyanotoxin uptake in plant tissue.
- Studies have shown that some plants can accumulate cyanotoxins.
- Cyanotoxin uptake in plant tissue are more likely to accumulate with extended exposure. This is dependent on plant type, watering procedures, and length of exposure and whether the plants are grown hydroponically or in the soil

Water Bodies of Concern

All agricultural water sources can develop HABs depending on environmental conditions including lakes, reservoirs, rivers, canals, and stock ponds. The following water bodies have had HAB blooms in the past:

Deer Creek Reservoir – Heber City
Gunlock Reservoir – St. George
Mantua Reservoir – Box Elder County
Matt Warner Reservoir – Uintah County
Payson Lakes – Big East Lake – Payson
Sand Hollow Reservoir – Hurricane
Scofield drainage and distribution
Upper Box Creek – Monroe - Richfield
Utah Lake, Jordan River and their irrigation distribution

This is not a complete list and any source of water may be suceptible to HABs.

HAB Response

Guiding Principles

When possible toxicity has been identified we should keep in mind that those indicators may be from testing concentrations of cyanobacterial blooms along shorelines. Therefore, the toxicity may be very different as water enters a canal distribution system or mixes with additional sources of water.

We will gather information, interact with local, state, and federal water quality entities, sample and verify data, provide information to the public, and coordinate available resources for agricultural producers.

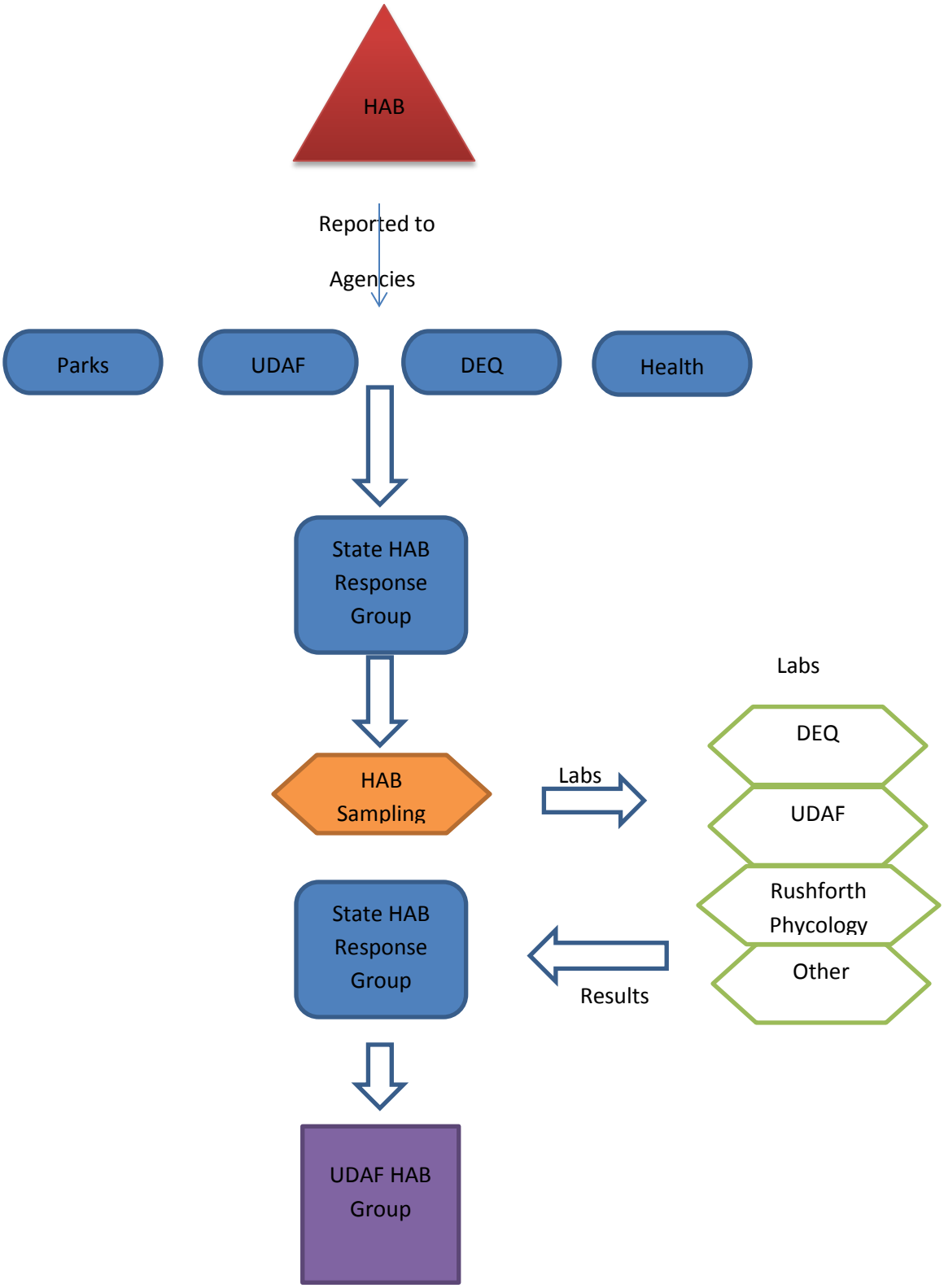
We have developed flowcharts (see below) to visually guide our response plan.

- UDAF will coordinate with DWQ and local health departments to evaluate reports of cyanobacteria concerns.
- UDAF will focus on water used by farms, ranches, and irrigation distribution systems.
- When elevated cell counts indicate possible toxicity, additional testing will determine if cyanotoxins are present in livestock drinking water sources and irrigation water.
- UDAF will test for cyanotoxins in agricultural water sources.

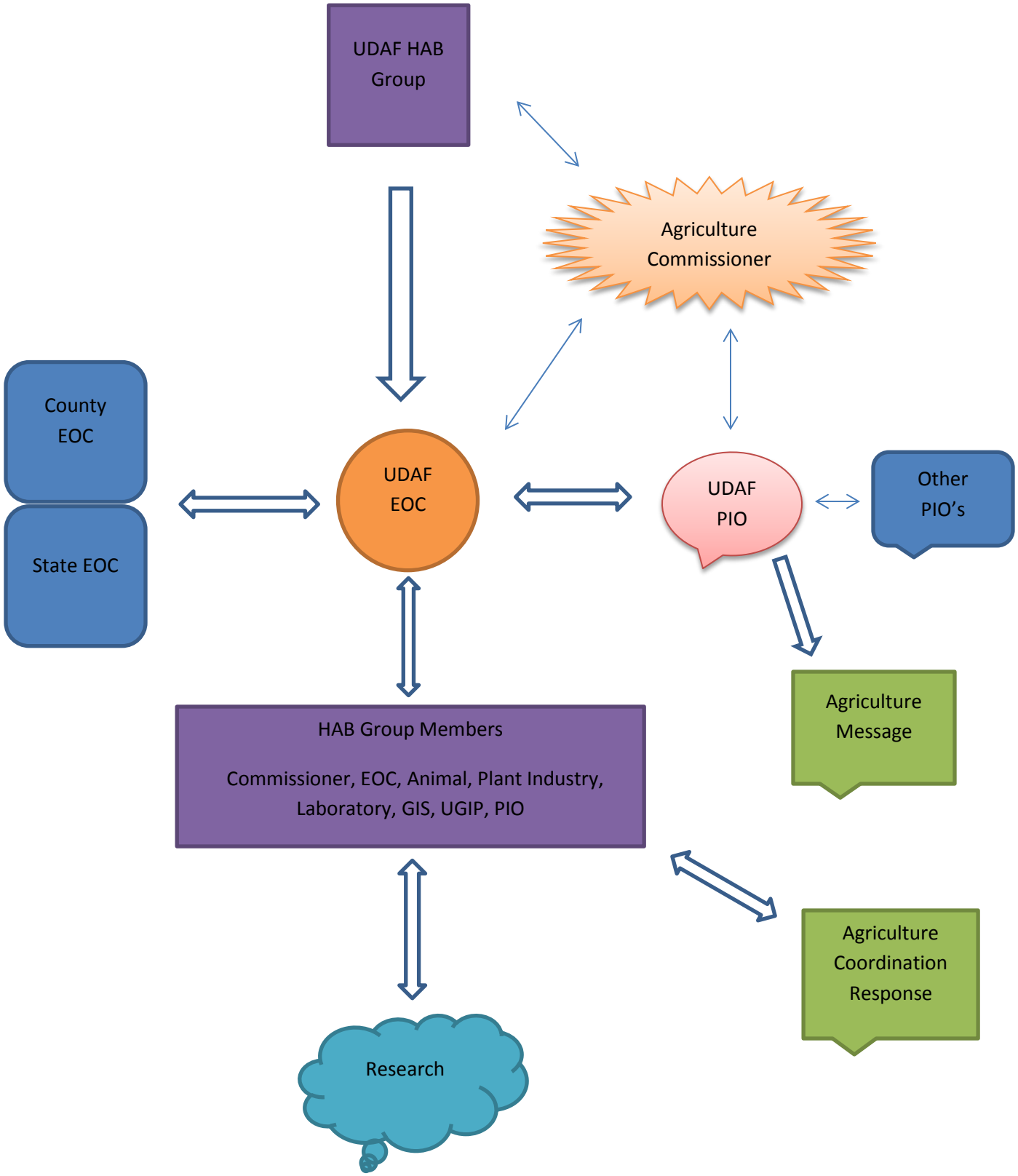
Once UDAF has been notified of potential cyanotoxin presence, we will proceed as follows:

1. Verify concern and source of information
2. Initiate a review of available data
3. Provide an initial statement
4. Continue a more rigorous testing to substantiate the assumption or the lack of harmful cyanotoxins
5. Provide data and prepare an updated statement

State HAB Response



UDAF HAB Response



Process and Outreach

We have developed this plan to efficiently gather and present data which can be used by agricultural producers, irrigation water managers, and canal companies to make proper decisions during times when water may contain cyanotoxins.

When cyanotoxins have been identified in water bodies, we will use the following process to ensure data is gathered and presented to aid agricultural water users.

Awareness

Historically, higher accumulations of cyanobacteria have been present during late summer and fall. While this is typical, there are cases when cyanobacteria have been present during times of colder temperatures. It is important to understand environmental conditions that trigger the release of cyanotoxins. Factors such as: nutrients, water level/depth, air ambient temperature, water temperature, sunlight, and lack of wind or air movement all contribute to increased growth of cyanobacteria and risk of the release of cyanotoxins.

Notification of concerns of HABs:

- Agricultural producer, UDAF staff, or conservation district official
- General public
- DEQ, DNR, other state or federal agencies
- Health department – local or state
- Utah Water Watch

Types of initial notification:

- Visual – possible HAB (pea green soup look) Algae bloom mats are evident
- Sick or dead animals – report of possible concern or loss relating to cyanobacteria
- Cyanobacteria cell counts – increased cell counts or other indicators
- Cyanotoxin detection – test strip or other testing mechanisms

Coordination of verification with DEQ/LHDs:

- Who collects sampling and in what locations
- Who will confirm cyanotoxin level testing – UDAF, DEQ, Outsourced
- Determine agricultural uses
    - IF YES – UDAF initiate sampling protocol
    - IF NO – continue limited tracking to see if sampling needs to be initiated.

Sampling

Focus

The DEQ collects samples from waterbodies to determine cyanobacteria or cyanotoxins exposure risks. Initial sampling of cell counts using the ELISA method is commonly conducted through the open water recreation season.

Once elevated cell counts have been identified through testing; or reports of concerns have been received, UDAF will sample for cyanotoxins usingand provide data related to water used for agricultural purposes. The UDAF will focus on livestock watering sources and the distribution of irrigation water.

Procedures

When deciding how to determine sampling procedures, we need to understand the agricultural risks. In a lake, reservoir, or stock pond cattle may have access to the shoreline or the entire water profile if the waterbody is shallow. Rivers, streams, and canals are also often used as livestock drinking water sources.

What are we sampling for? - Cyanotoxins

Where are we sampling? - When concerns of cyanotoxins have been identified an evaluation will be made to determine sampling locations. Samples should address all possible agricultural impacts including irrigation water, livestock and crops. Knowing possible animal access, additional water inputs, and water distributions are important factors when deciding where samples need to be taken.

- Lakes, streams and stock ponds based on livestock access
- Irrigation distribution systems

When are we taking samples? -Sampling begins once a notice has been verified of potential harm from cyanotoxins. Notifications may come from testing data of high cell counts or reports of animal sickness or loss which may be linked to cyanotoxins.

Who will take the samples? – UDAF staff including

1. UDAF Water Quality Staff
2. Watershed Coordinators
3. Zone Coordinators and Planners
4. Conservation District Supervisors
5. Utah Water Watch

What is the protocol for collecting and handling samples?

- Handling Samples
  - Fill out sample data label (Attachment H) and correspond with bottle

    - Store on ice
    - Deliver within 24 hours to a specified lab

- Water Grab Samples – Identification with GPS points, STORET sites and photo point, water body name
    - Surface
    - Integrated – (Water Column)
    - Monitoring of temperature and DO, weather conditions to provide indicators
- Strip Test for cyanotoxins (Abraxis test kits)
- Toxicology sample testing of deceased animals

At what frequency are we sampling?

- Weekly during HAB Blooms?

Sample and Data Analysis

The UDAF will use industry standard proceedures to analyze samples of all monitored data. The following labs may be used to perform testing:

- UDAF
- DEQ
- Utah Department of Health
- Out of State testing facilities (Green Water Labs in Florida) (EPA – Region 8) (NOAA)

GIS Mapping (updating and ongoing updates)

- Map showing confirmed cyanotoxin events
- Canal distribution systems
- Cyanotoxin flow modeling
- Secondary watering systems
- Sampling points with test results
- Link: DEQ HAB https://deq.utah.gov/Divisions/dwq/health-advisory/harmful-algal-blooms/bloom-2016/index.htm

Animal Drinking Water Response

Once the testing is complete and the data has been analyzed, UDAF will make a response based on cyanotoxin levels. UDAF will use the same three tier advisory as DEQ to maintain consistency in messaging to the public.

DEQ three tiers of ADVISORIES

- CAUTION-- cyanobacteria is present; avoid areas of accumulation
- WARNING-- toxin/cyano cell count thresholds exceeded

- DANGER -- CONSIDER CLOSURE-- very high levels of toxins/cyano cell counts

Irrigation Water Response

- Once the testing is complete and the data hasve been recieved and analyzed, UDAF will make a response based on cyanotoxin levels.
- Cyanotoxin levels will be provided to irrigation water users.
- There are no current threshold numbers to advise for restrictive water use in irrigation.
    - Remind the public of proper food handling proceedures of fruits and vegitables. Refer to the USDA website. (insert Website link)

Public Information Outreach and Resources Needs Support (EOC - ESF #11 Support)

HAB will respond to the general public. (Collaborated messaging with DEQ and LHD's) UDAF will work with local, county, and state emergency managers to coordinate stock water for livestock during times of concern.

- County Emergency Managers **– Attachment B**
- Farm Bureau – contact Matt Hargreaves
- Producer Groups
- Canal Companies
- Conservation Districts – UDAF staff - local outreach

Message Map
Public – Harmful Algae Bloom

Scenario: A large bloom of toxic algae has been found in Utah Lake
Health department closes the lake

Stakeholder: GROWERS & PUBLIC

Question: **Is water safe to use on fruit and vegetable gardens**?

Key Message 1

The discovery of cyanotoxins in (name of waterbody here) does not necessarily impact fruits and vegetables irrigated with that water downstream.

In conjunction with DEQ, UDAF is collecting and testing irrigation water samples from nearby canals and will provide updated information as it becomes available.

Based on the best science available, there is limited potential for plant uptake of cyanotoxins. Currently we are unable to confirm that crops have come in contact with the cyanotoxins or that the crops pose a threat to consumers.

We emphasize that consumers should continue to exercise standard food safety practices by thoroughly washing fruits and vegetables before consuming them.

We will continue to closely monitor test results and update our guidance as needed.
Visit this USDA site for food handling tips: http://bit.ly/2prpv1M

Message Map
Livestock Owners – Harmful Algae Bloom

Scenario: A large bloom of cyanotoxins has been found in Utah Lake
Health department closes lake

Stakeholder: Livestock owners

Question: **Is the water safe for my animals to drink?**

Key Message 1
(Name of waterbody) contains elevated cyanotixins levels that may be unsafe for livestock.
Animals that consume the water could be a risk.
Livestock owners are advised to restrict livestock access to the water and seek alternative sources of water.

Key Message 2
Livestock owners are being advised to seek alternative sources of water for their animals.
Alternative water sources are available at (add source name and location)
We advise agricultural producers who notice algal blooms in stock water ponds to have the water tested because not all algal blooms produce cyanotoxins.

Key Message 3
Every effort is being made to pinpoint the extent and size of the bloom
The UDAF is collecting and testing water samples at its Taylorsville laboratory
Up to date test results will be made public using social media, our website and news releases

Message Map

Livestock Owners – Harmful Algae Bloom – No action for livestock owners

Scenario: A large bloom of cyanotoxins has been found in Utah Lake
Health department (does NOT close lake, but issues caution to public)

Stakeholder: Livestock owners

Question: **Is the water safe for my animals**?

Message 1
Based on the most recent test results, the level of cyanotoxins in (name the waterbody) is NOT considered a health threat to livestock.

Message 2
The UDAF advises livestock owners may choose to locate an alternative source of water should cyanotoxins rise to unhealthy levels in the future.

Message 3
In some cases, animals may choose a cyanobacteria source over clean water even if a clean water source is available. Animals may eat mats of cyanobacteria slime. Therefore, animals should be restricted from cyanobacterica sources and be provided a clean source of drinking water.

Research Cited and Reviewed

There are several sources of research that provide information to help us determine how to respond to possible toxic HAB's. There is limited research on the affect Algae toxicity has on plant tissue

- May 2012 - TOXICOLOGICAL SUMMARY AND SUGGESTED ACTIONLEVELS TO REDUCE POTENTIAL ADVERSE HEALTH EFFECTS OF SIX CYANOTOXINS. Office of Environmental Health Hazard Assessment California Environmental Protection Agency

- "Inland HAB Webinar February 14, 2017" https://www.epa.gov/nutrient-policy-data/inland-hab-webinar-february-14-2017

- Retention of Microcystis aeruginosa and microcystin by salad lettuce (Lactuca sative) after spray irrigation with water containing cyanobacteria. By Geoffrey A. Codd, James S. Metcalf, Kenneth A. Beattie – Department of Biologial Sciences, University of Dundee, Dundee DDI 4HN, UK

- Effect of Irrigation with lake water containing microcystins on cicrocyctin content and growth of rygrass, clover, rape, and lettuce. J.R. Crush, L.R. Briggs, J.M.Sprosen, S.N. Nichols – AgResearch Centre, Private Bag 3123. Hamilton, New Zealand

- CyanoHAB Occurance and Water Irrigation Cyanotoxin Contamination: Ecological Impacts and Potential Health Risks. Sana Saqrane, Brahim Oudra www.mdpi.com/journal/toxins

- Cyanobacterial Harmful Algal Blooms and USGS Science Capabilities. Jenifer L. Graham, Neil M. Dubrovsky, Sandra M. Eberts.

- California SPATT Testing http://www.sciencedirect.com/science/article/pii/S1568988311000916

Attachments and Contacts

A. Potential Crop and Livestock Losses from HAB's

B. County Emergency Contacts

C. Cell Count Thresholds

D. Crisis Communication Plan

E. Sampling Labels

F. DEQ Three-Tier Advisory (yet to be added)

List of contacts and outreach

Water Rights list of irrigation companies
https://www.waterrights.utah.gov/canalinfo/canal_owners.asp

- County Emergency Managers **– Attachment B (see below)**
- Farm Bureau
- Producer Groups
- Canal Companies
- Conservation Districts – UDAF staff - local outreach

Attachment A: Potential crop and livestock losses from HABs

The following list represents items noted as the most likely anticipated losses and may not be all inclusive. A landowner must be an agricultural farming business recognized by the Greenbelt Laws identified by each county to be eligible for crop loss benefits through federal disaster loss declarations. All losses must be properly documented.

Crop Loss – Agricultural sales and receipts lost from a result directly related to harmful cyanotoxin levels or perceived harmful effects of the same.

Agricultural Market Loss – Diminished sales due to public perception of harmful results of eating agricultural products not suited for consumer consumption. Expenses may also be incurred for marketing campaigns to educate the public.

Water Costs – Expenses due to using water from culinary sources verses secondary water at a higher cost.

Water Hauling Costs – Expenses incurred to the agricultural producer to deliver water for irrigation or livestock water. These costs may include additional hauling costs, filtering, equipment, labor, and management expenses.

Animal Mortality Loss – Animals that have died that can be linked and documented as a result of poor water quality relating to the increased toxins in the water.

Animal Sickness – Supplies and veterinary expenses of animal that can be linked and documented as a result of poor water quality relating to the increased toxins in the water.

Human Health Issues – Farmers and laborers with health related expenses resulting from harm from high cyanotoxins in the water. It is expected that these cost would covered through employee insurance plans such as the Workers Compensation Fund.

Sampling and Testing Costs – Sampling and testing costs incurred used as quality control to ensure the safety of food produced for human consumption or for crops grown for animals.

Disposal Fees – Costs of disposing of unsalable crops – landfill fees, hauling expenses, additional labor costs, training, and personal safety gear.

Attachment B:
County Emergency Contacts

Region 1 Contacts

State Liaison: Kimberly Giles (801) 209-7542
kgiles@utah.gov

Box Elder County

Emergency Manager: Mark Millett
e-mail : mmillett@boxeldercounty.org Office – 435.734.3813 Cell:435-452-1772
SAT Phones: Sheriff: 254-387-6841 Fire Marshall: 254-387-6840

Cache County

Emergency Manager: Rick Williams
e-mail: rwilliams@cachesheriff.com Office: (435) 755-1059 Cell: (435) 994-1415

Davis County

Emergency Manager: Jason Sorensen
e-mail: jsorense@co.davis.ut.us Office: (801) 451-4129 Cell: (801) 867-2852
Dispatch SAT: 254-377-8686 SAT Phones: 254-377-7505 / 254-377-7492 / (MCC) 877-598-6396

Morgan County

Emergency Manager: Ian Nelson
e-mail: inelson @morga n-county.net Office : (801) 845-4048 Cell: (385) 626-5455

Rich County

Emergency Manager: Bryce Nielson
e-mail: cisco@cut.net Office: (435) 994-1649
Assistant Emergency Manager : Mike Walburg
email: gardencityfiredistrict@gmail.com Office/Cell: 435-881-6313

Weber County

Emergency Manager: Lance Peterson
e-mail: lpeterso@co.weber.ut.us Office: (801) 778-6682 Cell: (801) 940-7255

Region 2 Contacts

State Liaison: Tara Behunin 801.783.9284
tarabehunin@utah.gov

Tooele County

Emergency Manager: Bucky Whitehouse
e-mail: bwhitehouse@tcem.org Office: 435.833.8121

Utah County

Emergency Manager: Peter Quittner SGT.
e-mail: peterq@utahcounty.gov Office: 801.851.4134 Cell: 801.404.6050

Summit County

Emergency Manager: Chris Crowley
e-mail: ccrowley@summitcounty.org Office: 801.718.4628

Wasatch County

Emergency Manager: Sgt. Jeremy Hales
email: jhales@wasatch.utah.gov , Office: 435.657.3560 Cell: 435.671.6025

Tribal

Goshute Tribe: Shandin Webster sdiin4@gmail.com
Office: 435-234-1157 Cell: 435-255-5093 P.O. Box 6104 Ibapah, UT. 84034

Salt Lake County

Emergency Manager: UFA Clint Mecham BC, EM

Region 3 Contacts

State Liaison: Jeff Gallacher (801) 209-5236
email: jgallacher@utah.gov

Juab County

Emergency Manager: Brent Pulver
e-mail: bpulver@juab.utah.gov Office: (435) 623-7425 ext. 4004 Cell: (801) 372-8009

Millard County

Emergency Manager: Jeff Gehre
email: jgehre@co.millard.ut.us Office: 435-743-5302 Cell: 435-253-0721c

Piute County

Emergency Manager: Matt Whittaker
e-mail: whittmatt@hotmail.com Office: (435) 577-2893 cell: (435) 231-1585

Sanpete County

Emergency Manager: Jayson Albee
e-mail: jaysonalbee@ gmail.com Office: (435) 835-2197 Cell: (435) 851-3672

Sevier County

Emergency Manager: Cody Barton
e-mail: cbarton@sevier.utah.gov Office: (435) 896-2600 Cell: (435) 893-1103

Wayne County

Emergency Manager: Jeri Johnson
e-mail jeri3287@gmail.com Office: (435) 836-1319 Cell: (435) 691-0436

Snow College

Emergency Manager: Bob Wright
email: robert.wright@snow.edu Office: (435) 283-7170 Cell: (435) 610-6202
Emergency Manager: Derek Walk
email: derek.walk@snow.edu Office. (435) 283-7170 Cell: (435) 340-1311

Region 4 Contacts

State Liaison: Scott Alvord (801) 703-1924
e-mail: salvord@utah.gov

Beaver County

Emergency Manager: Les Whitney
e-mail: lwhitney@beaver.utah.gov Office: (435) 387-2620 Cell: (435) 691-2381

Garfield County

Emergency Manager: Denise Dastrup
e-mail: denisedastrup@gmail.com Office: (435) 676-1126 Cell 435-690-1279

Iron County* new 2015

Emergency Manager: John Higley
jhigley@ironcounty.net office (435)865-5332 cell (435)592-9516
Cedar City : Mike Shurtz
mshurtz.fire@cedarcity.org office 435-586-2964 Cell 435-592-5265

Kane County

Emergency Manager: Alan Alldredge
e-mail: aalldredgekcso@kane.utah.gov Office: (435) 644-4916 Cell: (435) 689-0143

Washington County

Emergency Manager: Peter Kuhlman
e-mail: peter.kuhlmann@washco.utah.gov Office: (435) 634-5734 Cell (435) 467-1497
St. George: Darren Imlay
darren.imlay@sgcity.org cell 435-703-1432 work 435-627-4150

Region 5 Contacts

State Liaison: Mechelle Miller (801) 707-1631
email: mmiller@utah.gov

Daggett County

Emergency Manager: Travis Dupaix
e-mail: tdupaix@daggettcounty.org Office: (435) 784-3255 Cell: 435-659-0195

Duchesne County

Emergency Manager: Mike Lefler
e-mail: mlefler@duchesne.utah.gov Office: (435) 738-1181 Cell: (435) 822-2417

Uintah County

Emergency Manager: Tal Ehlers
e-mail: tehlers@uintah.utah.gov Office: 435-781-5466 Cell : 435-828-5088

UTE TRIBE

Emergency Manager : Felecia Cuch
email: Feleciac@utetribe.com Office: 435-725-4891

Region 6 Contacts

State Liaison: Angelia Crowther (801) 664-5861
email: acrowther@utah.gov

Carbon County

Emergency Manager : Justin Needles
e-mail: Justin.Needles@carbon.utah.gov Office: (435) 636-3742 Cell: (435) 630-4338

Emery County

Emergency Manager: Kyle Ekker (Capt.)
e-mail: kyle.ekker@esco.utah.gov Office: (435) 381-2404 Cell: (435) 749-2105

Region 7 Contacts

State Liaison: Angelia Crowther

Grand County

Emergency Manager: Rick Bailey
e-mail: rbailey@grandcountysheriff.org Office: (435) 259-8115 ext.1310 Cell: (435) 459-0766 (voice) (435) 459-0768 (text)

San Juan County

Emergency Manager: Kelly Pehrson
e-mail: kpehrson@sanjuancounty.org Office: (435) 587-3225 Cell: 435-459-0587

Utah Navajo Nation Tribe

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Attachment C: Cell Count Thresholds

Table A-1. Comparison of Cell Counts to Other Measurements of Harmful Algal Blooms from WHO (1999).

Relative Probability of Acute	Toxin Producing Blue-green	Microcystin Concentrations (µg/L)	Anatoxin-A[1] (µg/L)	Chlorophyll *a* (µg/L)	Health Risks	Action Recommended
Low	<20,000	< 4	< 2	< 1	Negligible	None
Low to Moderate	20,000-100,000	4-20	NA	10-50	Short-term effects e.g. skin irritation, gastrointestinal illness	Issue caution advisory; Post **CAUTION** sign; Weekly sampling recommended
Moderate to High	100,000 – 10,000,00 Or Reports of animal illnesses or death	20-2,000	NA	50-5,000	As above for low risk, and potential for long-term illness	Issue warning advisory; Post **WARNING** sign; Weekly sampling recommended
High	>10,000,000 or Visible scum layer or Reports of human illness	>2,000	> 20	>5,000	As above for moderate risk, and potential for acute poisoning	Issue Danger Advisory; Post **DANGER** sign; Weekly sampling recommended Consider **Closure**

Notes:
[1] From Oregon Public Health Advisory Guidelines
NA = None available

Attachment D- Crisis Communication Plan

Step **1:** Verify the Situation

- Determine the magnitude of the event as quickly as possible.

Key Checkpoints

1. Get the facts.
2. How many sources did the information come from.
3. Check the information's origin and source for credibility.
4. Check to ensure the information is consistent with other sources?
5. Check to ensure if the characterization of the event is plausible.
6. Can the information be clarified through a subject information expert?

Step 2: Conduct Notifications

- Contact and brief those within and outside your organization who need to know.

Key Checkpoints

1. Notifications/contact the appropriate persons in the organization- include all key personnel.
2. Brief the core team and communication team.
3. Notified the senior management group.
4. Notify the elected officials at all levels.
5. Notify the appropriate local and county agencies.
6. Notify the appropriate state and federal agencies.
7. Notify other groups (stakeholders), including translators for message delivery and surrounding states if appropriate.

Step 3: Assess level of crisis

- Determine the degree and intensity of the event to determine the communication response.
- The public's perception of the level of a crisis and the actual threat to public health are sometimes not in sync. Assess the actual public health risk and the level of communication response needed.

Key Checkpoints

1. Identify crisis level and establish communication sources :
    a. Will just media releases be appropriate?
    b. Does a PIO need to be at the Incident to work under the ICS system- see "PIO Guidelines for Incident Command?"
    c. Does a Joint Information Center need to be established so

coordinated messages from various agencies are distributed- see "PIO Guidelines for JIC Operations."

2. Establish the hours of operation for the communication team.
3. Establish 24/7 Hotline for public inquiries.
4. Establish jurisdiction over information.
5. Address specific audience concerns.
6. Who will release information -local, state or federal?

Step 4: Organize Assignments

- Alert the leadership of each communication team.
- Make clear assignments.
- Choose proper spokespersons.

Key Checkpoints

1. Activate functional teams.
2. Choose and activate spokespeople.
3. Operations- ICS, JIC activation.
4. Give specific assignments to each team or function.
5. Make sure all those involved know their role and their immediate tasks.

Step 5: Prepare Information and Obtain Approvals

- Get agreement on information content, develop it, and get it approved for release.

Key Checkpoints

1. Plan for a timely release.
2. Check the accuracy of all information.
3. Ensure that the message shows compassion.
4. Address the specific audience concerns.
5. The message should meet the criteria of good message development.
6. Translate materials into appropriate languages and message styles.
7. Anticipate media questions and developed answers.
8. Clear the message for release.

Step 6: Release information to the public.

- Decide on the frequency of information release, how it will be done and who will speak.

Attachment E:

Algal Bloom Sample Labels

Algal Bloom Phytoplankton Sample Agency:________________
Waterbody Name:____
Site Description: ____
Sample Type (surface/integrated): ____________________________
MLID: _______________ Bloom Observed?____________________
Samplers: _______________Date:___________Time:_____________

Algal Bloom Phytoplankton Sample Agency:________________
Waterbody Name:____
Site Description: ____
Sample Type (surface/integrated): ____________________________
MLID: _______________ Bloom Observed?____________________
Samplers: _______________Date:___________Time:_____________

Algal Bloom Phytoplankton Sample Agency:________________
Waterbody Name:____
Site Description: ____
Sample Type (surface/integrated): ____________________________
MLID: _______________ Bloom Observed?____________________
Samplers: _______________Date:___________Time:_____________

Algal Bloom Phytoplankton Sample Agency:________________
Waterbody Name:____
Site Description: ____
Sample Type (surface/integrated): ____________________________
MLID: _______________ Bloom Observed?____________________
Samplers: _______________Date:___________Time:_____________

Algal Bloom Phytoplankton Sample Agency:________________
Waterbody Name:____
Site Description: ____
Sample Type (surface/integrated): ____________________________
MLID: _______________ Bloom Observed?____________________
Samplers: _______________Date:___________Time:_____________

RECOMMENDED STANDARD PROCEDURES FOR PHYTOPLANKTON COLLECTION TO DETECT HARMFUL ALGAL BLOOMS State of Utah Department of Environmental Quality Division of Water Quality Revision 3 Effective May 3, 2016