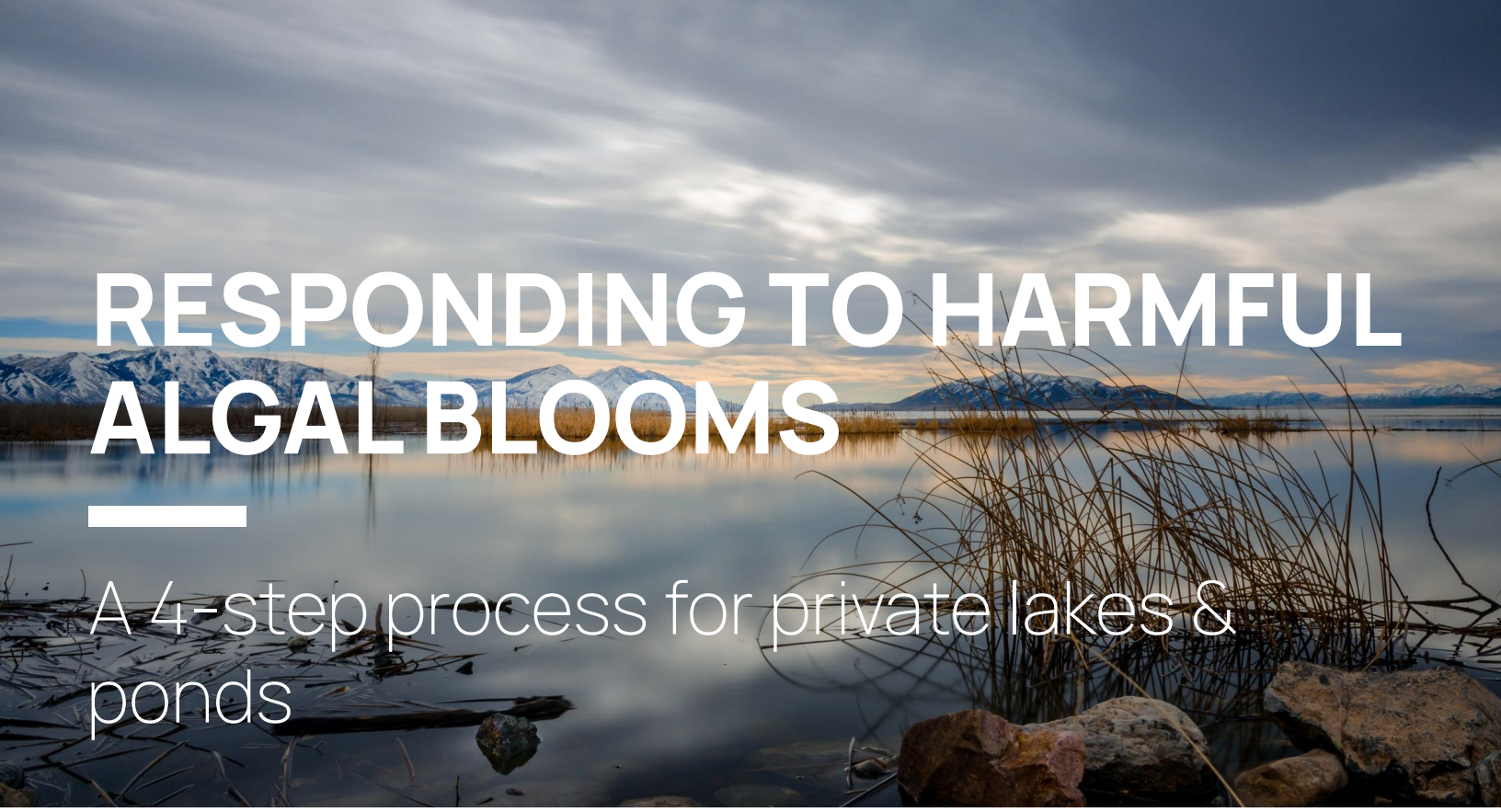

RESPONDING TO HARMFUL ALGAL BLOOMS

A 4-step process for private lakes & ponds

PREPARED BY

Hannah Bonner, PhD
Recreational Water Quality Health Program Coordinator

UTAH DEPARTMENT *of*
ENVIRONMENTAL QUALITY
WATER
QUALITY

This document outlines four key steps in identifying and responding to a harmful algal bloom (HAB) on your private lake or pond. HABs often reoccur at a water body, so you may need to repeat this process as conditions change.

Much of the content in this guide is based on the excellent comprehensive toolkit, "Strategies for Preventing and Managing Harmful Cyanobacterial Blooms (HCB-1)."

1. Identify

Identify whether a harmful algal bloom (HAB) is present

What is a HAB?

A HAB, or harmful algal bloom, occurs when cyanobacteria multiply quickly to form a "bloom" or visible colonies of millions of cells. Cyanobacteria, also known as blue-green algae or harmful algae, aren't actually algae. Rather, they are aquatic organisms that are closely related to bacteria and can photosynthesize like a plant.

Sometimes the cyanobacteria in these blooms can produce toxins which cause illness and can damage the human kidney, liver, or neurologic system. Pets and livestock are more likely to drink water and be hurt by these toxins.

Start out with a visual assessment and a few simple, free tests

A few simple, do-it-yourself tests can help to determine if a bloom is cyanobacteria (blue-green algae) or a less dangerous algae. These include visual assessment, the stick test, and the jar test. **We highly recommend you watch this video about identifying cyanobacteria blooms to learn about these tests** and other free strategies for identifying HABs.

A HAB can be a variety of colors, but is most often green or blue-green in color. A HAB can have many textures: spilled paint, pea soup, grass clippings, floating scum, or floating mats. You can see photos of HABs in Utah here.

If a HAB seems likely, you may choose to confirm your observations using a professional laboratory

If you suspect a HAB is present, you can also work with a professional laboratory to analyze a sample. They can identify the species of cyanobacteria and whether or not it can produce toxins. Two labs who have worked with the state of Utah in the past are:

- Greenwater Labs
- PhycoTech, Inc.

Toxins may be another indicator of a HAB, but are hard to identify

You may also want to check to see if cyanotoxins - poisons produced by HABs - are present in the water. It can be challenging to know what toxins to test for however, because cyanobacteria can produce many different kinds. **Generally it is safest to assume that if a cyanobacteria HAB is present, toxins are being produced.**

- Abraxis makes toxin-specific test strips
- The Utah Department of Agriculture and Food will run precise toxin tests
- List of commonly used monitoring tools and comparison of their pros/cons

My lake or pond *IS* experiencing a HAB. What next?

Identifying the presence of a HAB is the first step to responding. Good job! Continue reading to learn about formulating a response plan.

My lake or pond *IS NOT* experiencing a HAB. What next?

If your water body is not experiencing a HAB and you are otherwise happy with conditions, no further action is needed.

Sometimes algal growth, even if not harmful, can be a nuisance. Non-cyanobacteria blooms can still cause fish kills by removing oxygen from the water and/or cause skin irritation and odor problems. The next steps outlined here will help you formulate a plan for addressing any undesired algal growth.

2. Describe

Describe the characteristics of the pond or lake

Describe the pond or lake

Different response strategies will work better in different types of waterbodies. Take some time to think about your water body.

- Is the surface area small (less than 600 acres) or large (over 600 acres)? If you have a private lake or pond, the surface area is probably considered "small."
- Is the water deep (more than 10 ft) or shallow (less than 10 ft)?
- Is there a lot of plant growth? This indicates high nutrients or an eutrophic water body. Is there very little plant growth? This indicates low nutrients or an oligotrophic water body.

Describe the HAB

Different response strategies will work better at different stages of a HAB. Take some time to think about the bloom you observe.

- Does the bloom cover more than 10% of the waterbody? If so, you will need to consider **intervention** strategies.
- Does the bloom cover less than 10% of the waterbody? If so, you may still be able to consider **prevention** strategies.

Consider what might be causing the HAB

Small amounts of cyanobacteria occur naturally in every water body. Explosive growth into **a HAB, however, is often triggered by too many nutrients in the water.** Take some time to think about nutrient inputs (specifically nitrogen and phosphorus) to your lake or pond. Explore common sources of nutrients.

3. Plan

Research options and make a response plan

For many water bodies, nutrient reduction is the best *prevention* strategy

Extra nutrients in the water are what feed a HAB event. Many of the best prevention plans are based on reducing nutrient input to the water and/or nutrient amount in the water.

Well established methods for nutrient reduction include:

- Eliminating runoff or discharge from recognized nutrient-rich sources.
- Keeping the lake or pond well mixed using artificial circulation/mixing. This prevents nutrient accumulation.
- Dredging to remove the nutrient-rich upper layer of the lake or pond bottom.

Barley straw: another easy *prevention* strategy

Barley straw is a simple, cost-efficient method for preventing HAB development. Bales of barley straw are placed into the water. As they decompose they release compounds that prevent cyanobacteria growth. This method must be used at least a month prior to an expected HAB.

To address an ongoing HAB, use an *intervention* strategy

If a HAB is currently occuring at your lake or pond, you may need to use an intervention strategy to remove the bloom.

Well-established methods for HAB intervention include:

- Flocculation binds and sinks harmful cyanobacteria and may also lock up nutrients

- Copper-based algaecides kill cyanobacterial cells and can stop a bloom. Chelated copper is recommended

- Peroxide-based algaecides also kill cyanobacteria cells and can stop a bloom. Peroxide algaecide is less likely to bioaccumulate in aquatic life with repeated treatments than copper-based algaecide.

A permit is required to apply any chemical treatment if your lake or pond has any outflow (e.g., stream, irrigation canal, etc.) that leaves your property.

Summary of prevention and intervention methods

This table is adapted from HCB-1. Visit their website for an interactive tool and more details on each of these strategies.

STRATEGY	TYPE	COST	WATERBODY	DESCRIPTION
Artificial Circulation and Mechanical Mixing	Prevention	$$$	Deep lake/reservoir	De-stratifying a water body to reduce limiting nutrient concentrations in the bottom layer of water and avoid sudden delivery of nutrient-rich bottom waters into the surface layer
Barley and Rice Straw	Prevention	$	Lake/reservoir	Placing barley straw bales or bags in the shore zone of a water body 1–1.5 months prior to expected bloom
Clay and Surfactant Flocculation	Intervention	$$–$$$	Any	Mixing a slightly acidified solution of clay and surfactant and dispersing it over a bloom; sand may be added to cap the settled material
Copper Compounds	Intervention and prevention	$	Any	Controlling algae in water bodies (registered by USEPA but prohibited in some states from use). Copper algaecides interfere with the ability of algal cells to respire, photosynthesize, and, at some concentrations, maintain cell integrity.
Dredging	Prevention	$$$	Small, shallow lake/reservoir	Physically removing the upper, nutrient-rich layer of bottom sediments to reduce internal nutrient loads and limit cyanobacterial growth

STRATEGY	TYPE	COST	WATERBODY	DESCRIPTION
Phosphorus-binding Compounds	Prevention	$$$	Large lake/reservoir	Adding lanthanum-substituted bentonite or aluminum-containing materials (e.g., alum) to bind phosphorus and limit internal phosphorus sources
Peroxide	Intervention	$$	Small, shallow lake/reservoir	Applying granular or liquid peroxide compounds to HCB to levels approximating 3–7 mg/L to lyse cyanobacteria

4. Act

Contact vendors and act on your plan

Determine what supplies and resources you need to move forward with your plan

Research options and products carefully. Choose prevention/intervention strategies that have an established track record of success, such as those listed in this document.

Carry out your prevention/intervention plan and continue to repeat step 1 to monitor for HABs. This monitoring will help you determine if the plan is effective. If the plan does not work, or the HAB comes back, consider alternatives and repeat these steps.

Once a pond or lake has had a HAB there is a good chance it will have another one. **Prevention is often cheaper, easier, and more efficient than intervention.**

Want professional help? Consider hiring a consulting company to look at your lake or pond

A number of specialized pond, lake, and stream consulting services are available. These companies can carry out specific assessments on your waterbody and provide site-specific recommendations.

When selecting a consulting or treatment company, make sure:

- They will help you look at the whole picture. They should help you look at nutrient input, water quality parameters (dissolved oxygen, pH, temperature, etc.), fish and aquatic life, water source, etc.
- They should offer you solutions for both intervention and prevention.
- Any application of algaecides should be according to the product label.
- They should be open and transparent about their products and methods.