Montana's State HAB Program

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DEQ
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*Much of this material drew from DEQ presentations provided by Melissa Schaar and Mike Suplee

Overview

* Things You Should Know About HABs
* Montana's Newish HAB Program
* 2018 HAB Recap
* Looking to 2019

9 Things You Should Know About Harmful Algal Blooms (HABs)

1. **A HAB IS A MASS OF CYANBACTERIA**

   Not truly algae but rather **blue-green algae**, subset of phytoplankton, a single-celled algae.

2. **CYANOBACTERIA ARE COMMON**

   Native constituents of freshwater, estuarine and marine environments

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9 Things You Should Know About Harmful Algal Blooms (HABs) cont.

3. CYANOBACTERIA CAN BE TOXIC

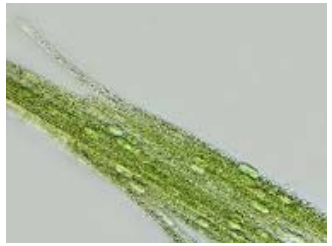
* Liver, nerve, or skin toxins (cyanotoxins)
* Toxins are selectively produced by many genera—but not very predictable
* Widely distributed but not often at acutely toxic levels
* Analyses are available for some *but not all* of these toxins
* Exposure routes include ingestion, inhalation, and skin contact

Anabaena or Dolichospermum

- microcystins (liver)
- Anatoxin-a/a(s) (nerve)
- Saxitoxins (nerve)

Microcystis

- Microcystin (liver)
- Toxin is most common and easily measured



Aphanizomenon

- Anatoxin-a (nerve)
- Cylindrospermopsins (liver)
- Saxitoxins (nerve)

9 Things You Should Know About Harmful Algal Blooms (HABs) cont.

4. **CLIMATE CHANGE EFFECTS HAB GROWTH**
   * HABs have been observed with increasing frequency and in more locations in US
   * Warmer waters results in more extensive HABs lasting into the early winter months

5. **HUMAN ACTIVITIES RESPONSIBLE FOR INCREASE**

   Increased nitrogen and phosphorus from sewage treatment plants, animal feeding operations, runoff from agricultural fields, roads and stormwater

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9 Things You Should Know About Harmful Algal Blooms (HABs) cont

6. NO EPA *STANDARDS* FOR CYANOTOXINS

No Cyanotoxin Standards or Monitoring Procedures For Montana

EPA DRINKING WATER GUIDANCE

Cyanotoxin	Drinking Water Health Advisory (10-day)	
	Bottle-fed infants and pre-school children	School-age children and adults
Microsystins	0.3 µg/L	1.6 µg/L
Cylindrospermopsin	0.7 µg/L	3 µg/L

EPA RECREATIONAL GUIDANCE

Microcystins	Cylindrospermopsin
4 µg/L	8 µg/L

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9 Things You Should Know About Harmful Algal Blooms (HABs) cont.

7. YOU CAN'T TELL TOXICITY BY JUST LOOKING

* Samples must be collected for toxicity
* Toxins can remain up to a month after bloom dissipates.

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9 Things You Should Know About Harmful Algal Blooms (HABs) cont.

7. YOU CAN'T TELL TOXICITY BY JUST LOOKING

Blooms can be deceiving

July 28, 2015*

Algae accumulation near boat ramp

Microcystin= 82 ug/L

No widespread bloom

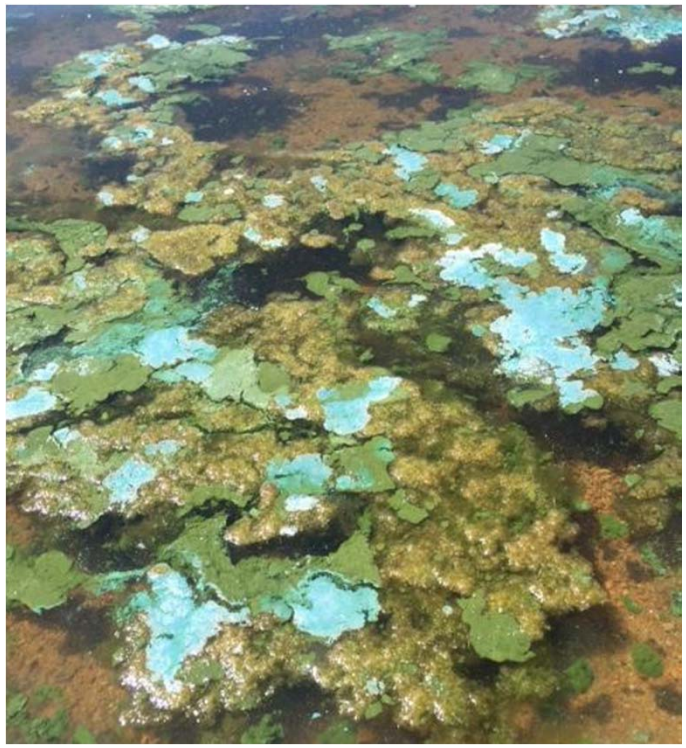
*Cherry Creek Reservoir, Colorado

9 Things You Should Know About Harmful Algal Blooms (HABs) cont.

7. YOU CAN'T TELL TOXICITY BY JUST LOOKING

Blooms can be deceiving

- Aug 13, 2015*
- Widespread algae bloom reported by EPA
- Looks terrible! But…
- Microcystin<0.175 ug/L



*DeWeese Reservoir, Colorado

9 Things You Should Know About Harmful Algal Blooms (HABs) cont.

7. YOU CAN'T TELL TOXICITY BY JUST LOOKING

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* Toxins can remain up to a month after bloom dissipates.

8. NO HUMAN DEATHS IN UNITED STATES

Pets, livestock, and wildlife deaths reported

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9 Things You Should Know About Harmful Algal Blooms (HABs) cont.

9. **STAY AWAY FROM ALGAL BLOOMS**
   - Do not drink, swim, touch or inhale water affected by cyanobacteria
   - If you or your pets do go in water that has an algal bloom, wash yourself or your pets off immediately afterwards with tap water

HAB.MT.GOV

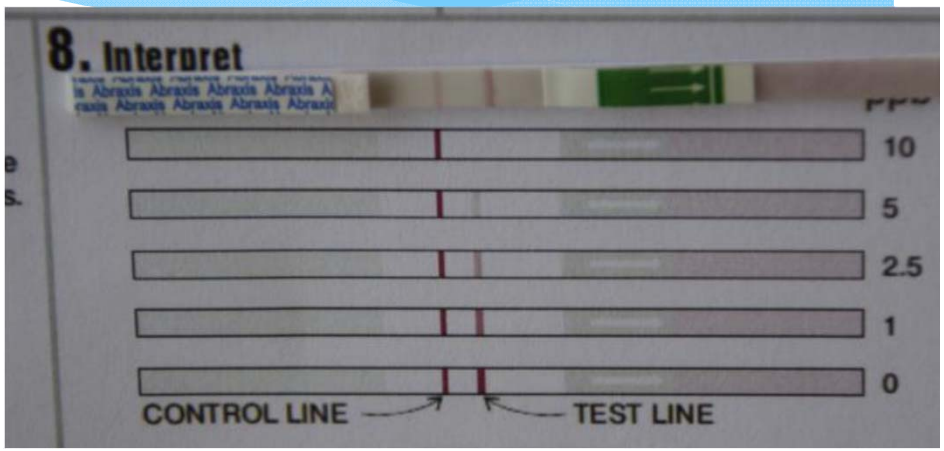
* Coordination between DPHHS, DEQ, and FWP
* Launched July 2017- Online HAB reporting system
* Public participation in reporting HABs through visual identification
* Developing **effective communication** with Federal, County, and City Agencies

Managing Jurisdictions

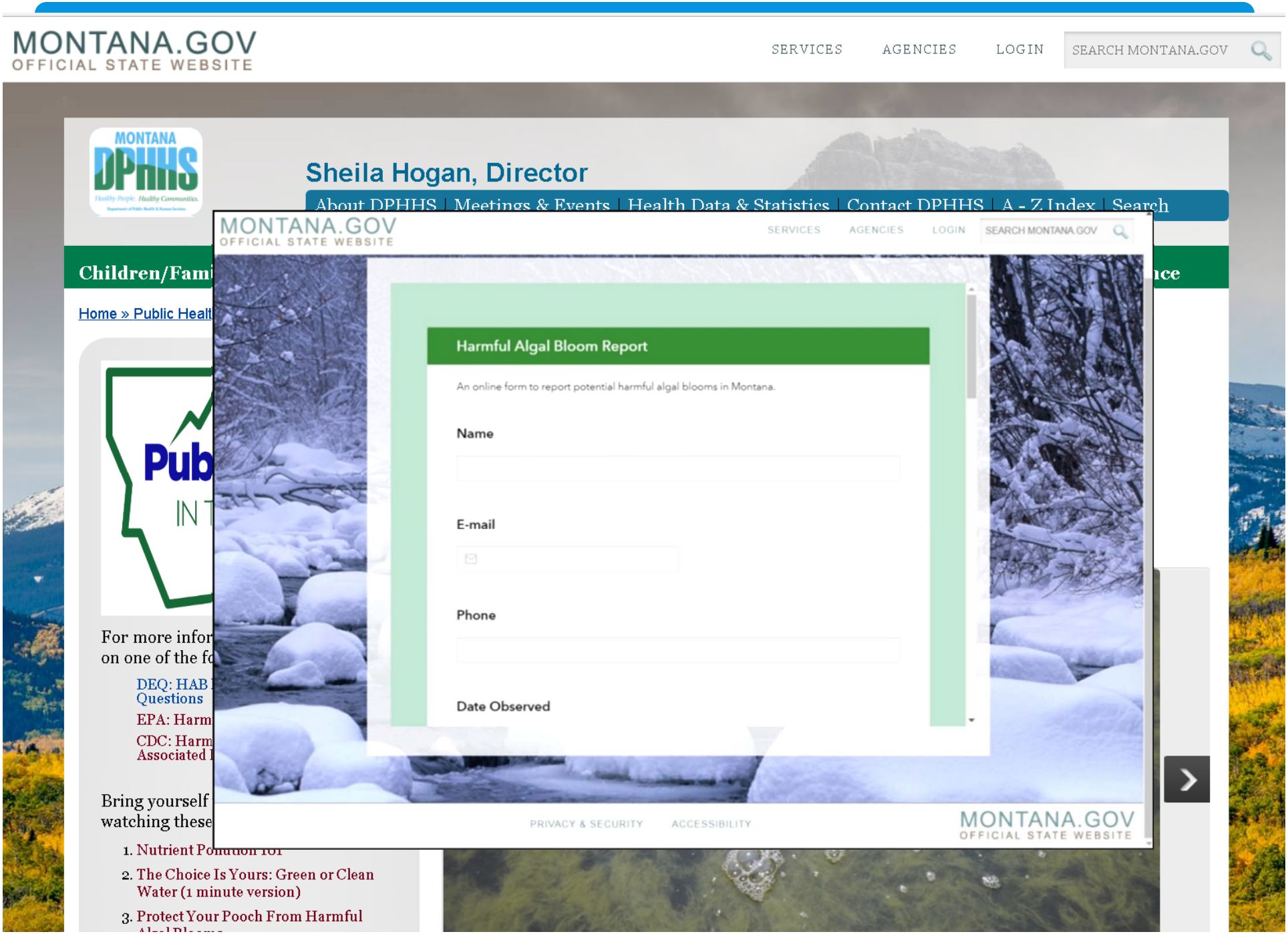
* Can be local Health Boards, local water user organizations, state and federal agencies, and private landowners
* Passively monitor ("eyes on the ground" monitoring approach) for HABs within jurisdictions and report to HAB.MT.gov
* Responsible to monitor, test, issue advisories, and notify media
* Extensive blooms affecting multiple jurisdictions should coordinate with the State HAB Team to issue a unified message

Monitoring and Testing

* Not mandated but recommended
* Monitoring
  * Visual
  * Field Test Strips
  * Laboratory Analysis (EPA)



* Monitoring, sampling, and testing outlined in guidance
* Test kits and laboratory assistance is available at no cost on a limited basis
* All monitoring and testing results report to the state HAB team: HAB@mt.gov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DEQ: HAB
Questions
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CDC: Harm
Associated
Bring yourself
watching these
1. Nutrient Pollution 101
2. The Choice Is Yours: Green or Clean Water (1 minute version)
3. Protect Your Pooch From Harmful
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Harmful Algal Bloom Report
An online form to report potential harmful algal blooms in Montana.
Name
E-mail
Phone
Date Observed
PRIVACY & SECURITY
ACCESSIBILITY
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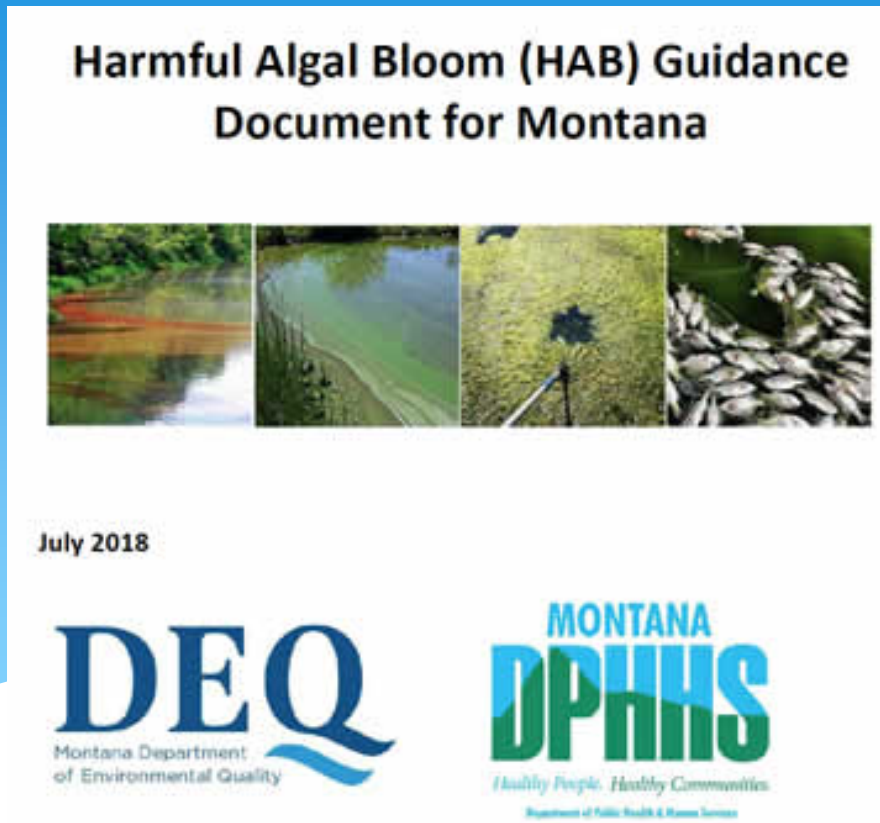
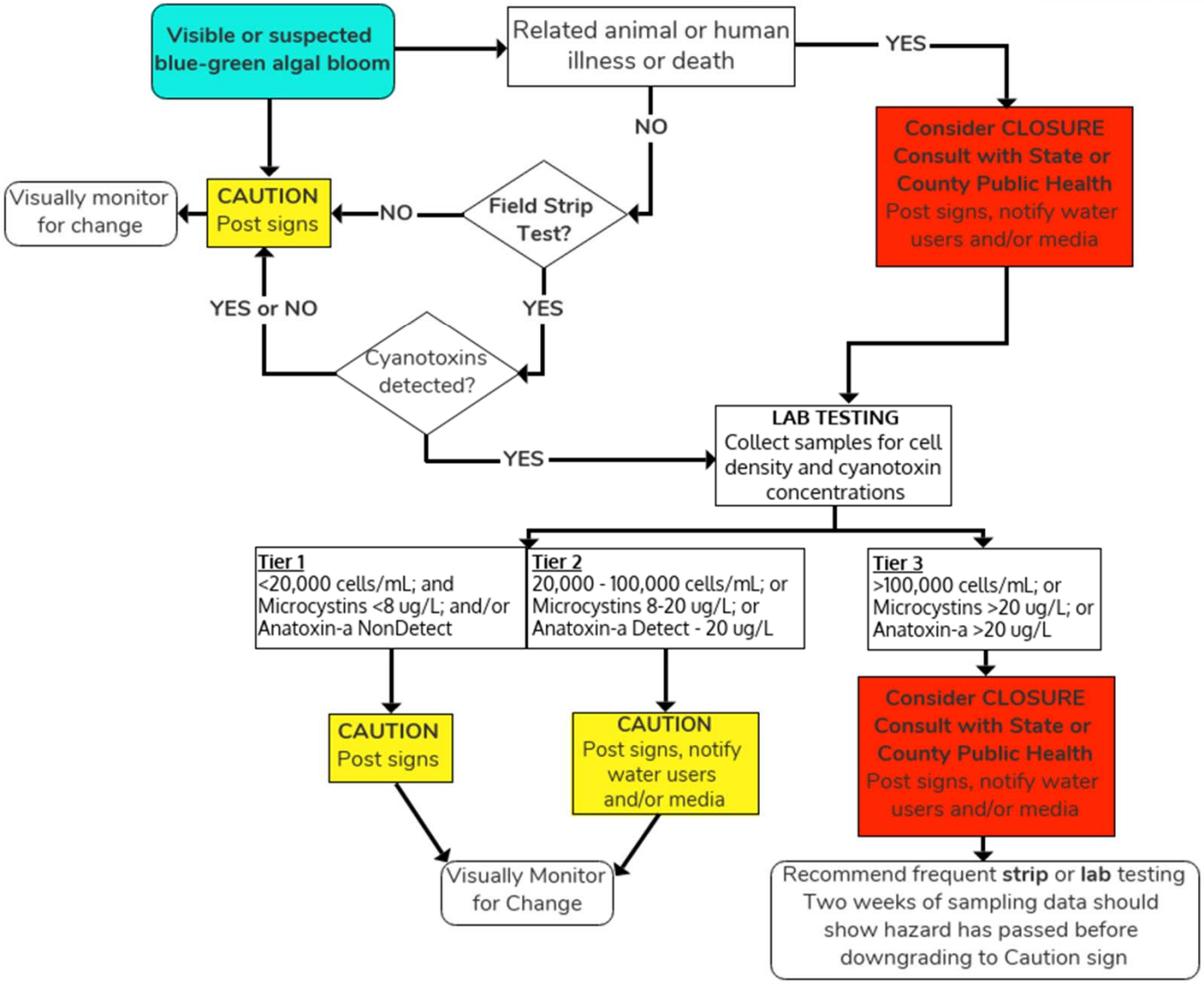


HAB Guidance

HAB.MT.gov

Decision Flow Chart for HABs in Recreational Water

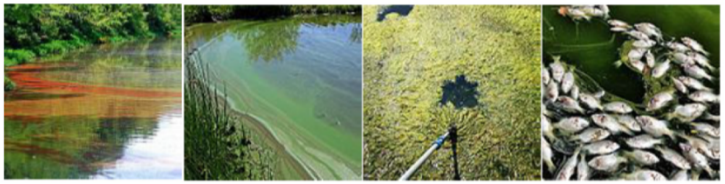


CAUTION

TOXIC ALGAE MAY BE PRESENT

Water may be unsafe for people and pets

If blue-green algae is present:



DO NOT swim or recreate in areas with blue-green algae

DO NOT drink water

Keep all pets, livestock, and horses away from blue-green algae

Clean fish well and discard guts

Avoid areas with blue-green algae when boating

Call your doctor or veterinarian immediately if you or your animals have sudden or unexplained sickness or signs of poisoning

Report new algae blooms to: hab.mt.gov or 1-888-849-2938

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Sign posted by: _____

MONTANA DPHHS

CLOSURE

TOXIC ALGAE PRESENT

Lake is CLOSED

Until further notice:

DO NOT swim or recreate in water

DO NOT water ski, jet ski, or paddle board

DO NOT drink water

Keep all pets, livestock, and horses away from water

Fishing not advised

Boating not advised

Call your doctor or veterinarian immediately if you or your animals have sudden or unexplained sickness or signs of poisoning

Report new algae blooms to: hab.mt.gov or 1-888-849-2938

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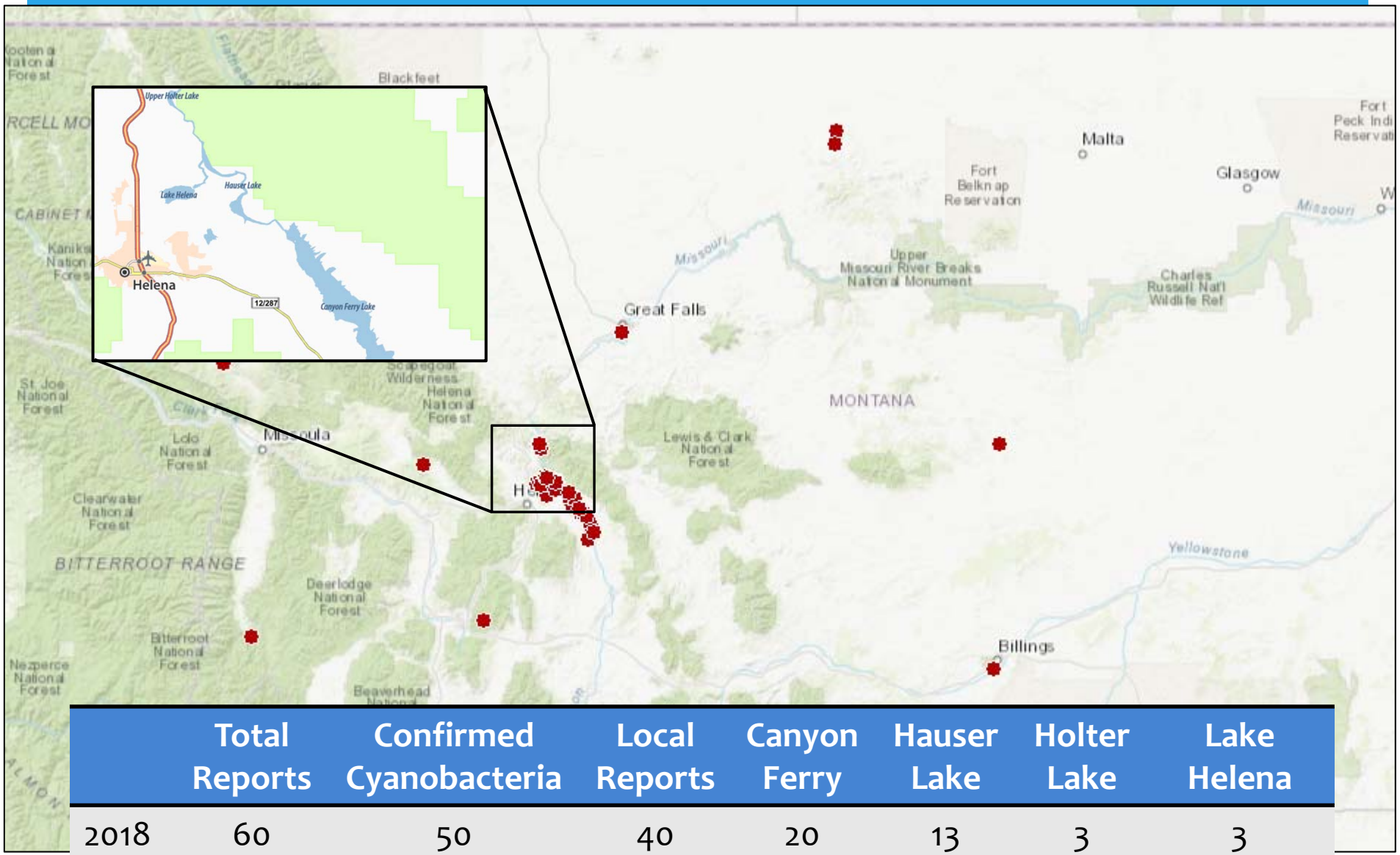
MONTANA DPHHS

2018 HAB Season Recap



	Total Reports	Confirmed Cyanobacteria	Local Reports	Canyon Ferry	Hauser Lake	Holter Lake	Lake Helena
2018	60	50	40	20	13	3	3
2017	46	Unknown	18	5	6	6	1

Canyon Ferry Reservoir

2018 Challenges

* Staying up-to-date on toxin levels requires frequent and large scale quantitative testing
* Communicating to the public without creating a big scare
* Acting quickly
* Who is responsible?

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Next Steps

* Continual public outreach
* Posting signs early at known HAB locations
* Continue to refine public map of verified HAB locations
* Nutrient criteria and monitoring

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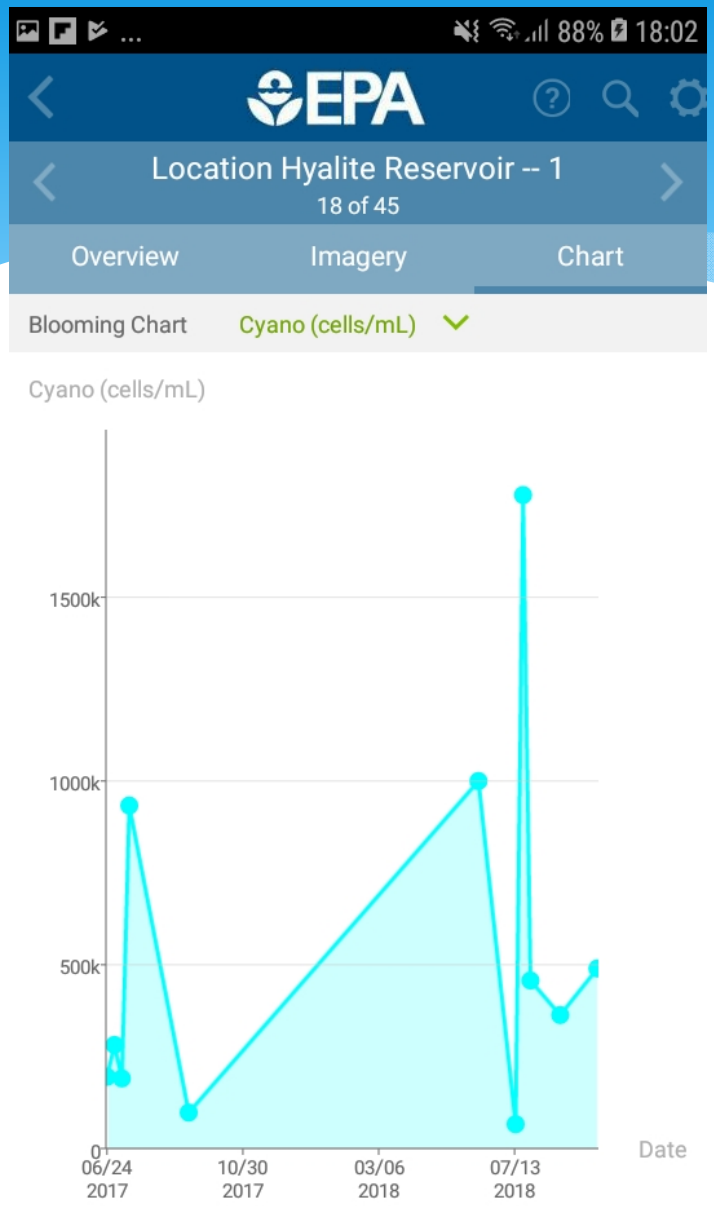
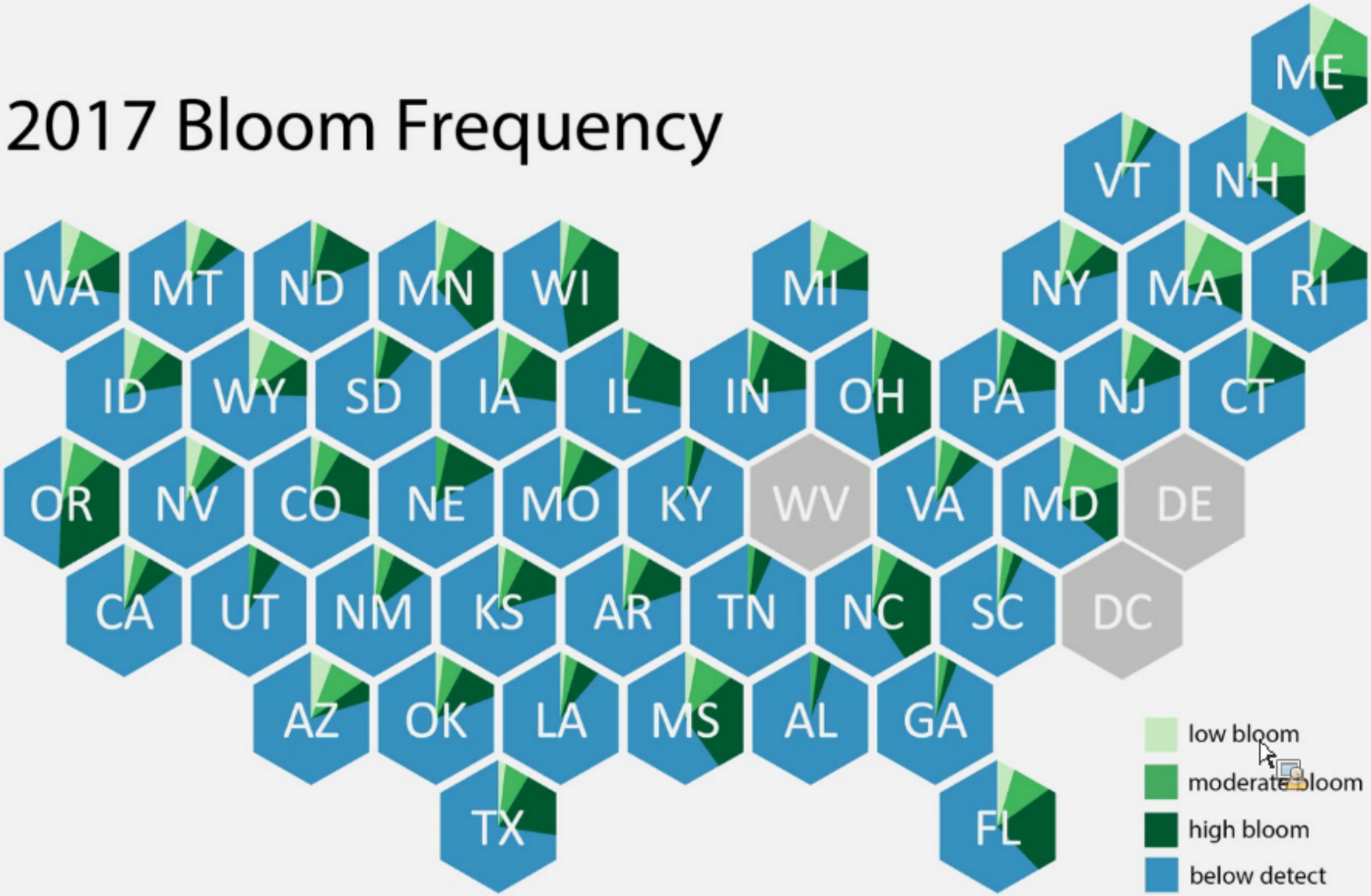


CyAN

* Tool produced in partnership with EPA, NOAA, USGS, and NASA
* Uses spectral signatures from satellite imagery to quantify max cyanobacterial cell densities
  * ~1 measurement/day
* Data available through:
  * Android App
  * SeaDAS, a desktop software
  * RSTools, a GIS Plug-in

EPA
United States
Environmental Protection
Agency

2017 Bloom Frequency



Source: Clark et al. 2017. Ecological Indicators. 80:94-95.

Basic Question:

In Canyon Ferry Lake, what are the highest concentrations of phosphorus and/or nitrogen that will not cause algal blooms to reach nuisance levels?

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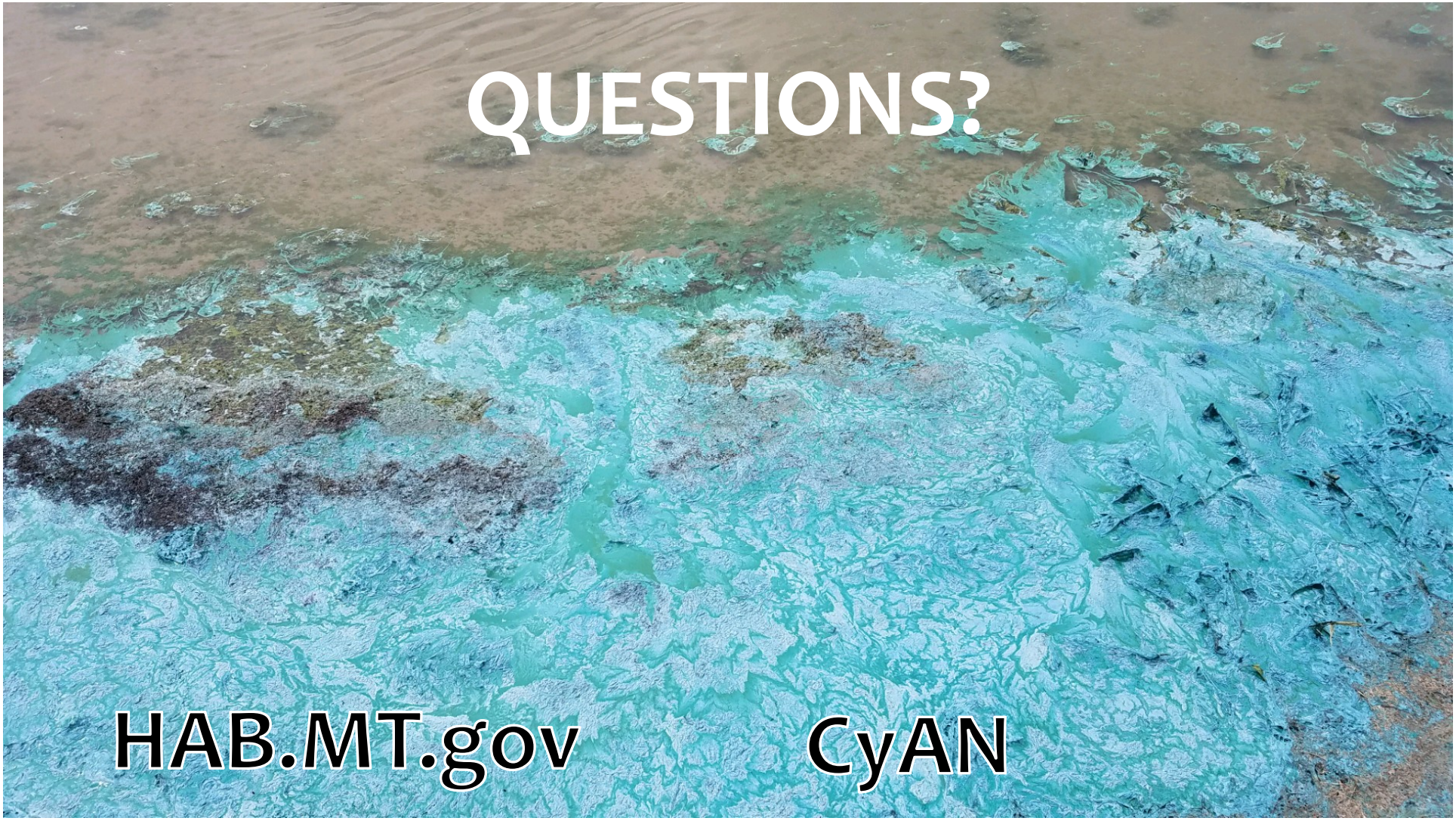

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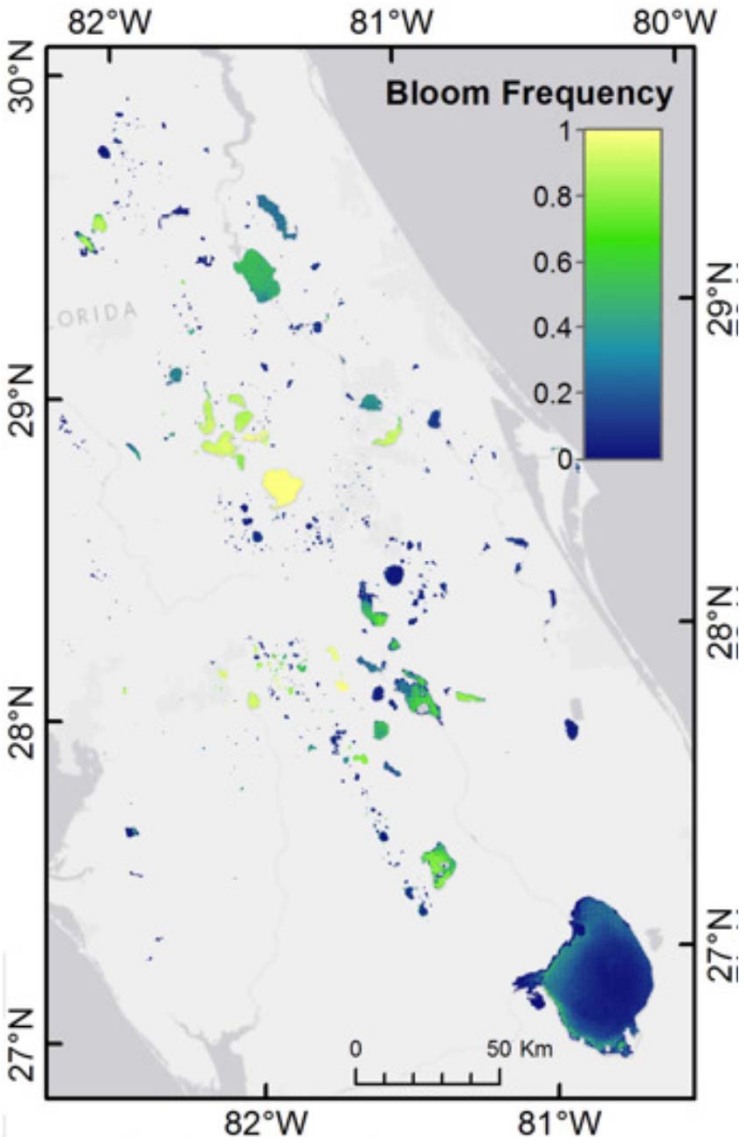
Montana HAB Public Health Advisory Tiers for Recreational Waters

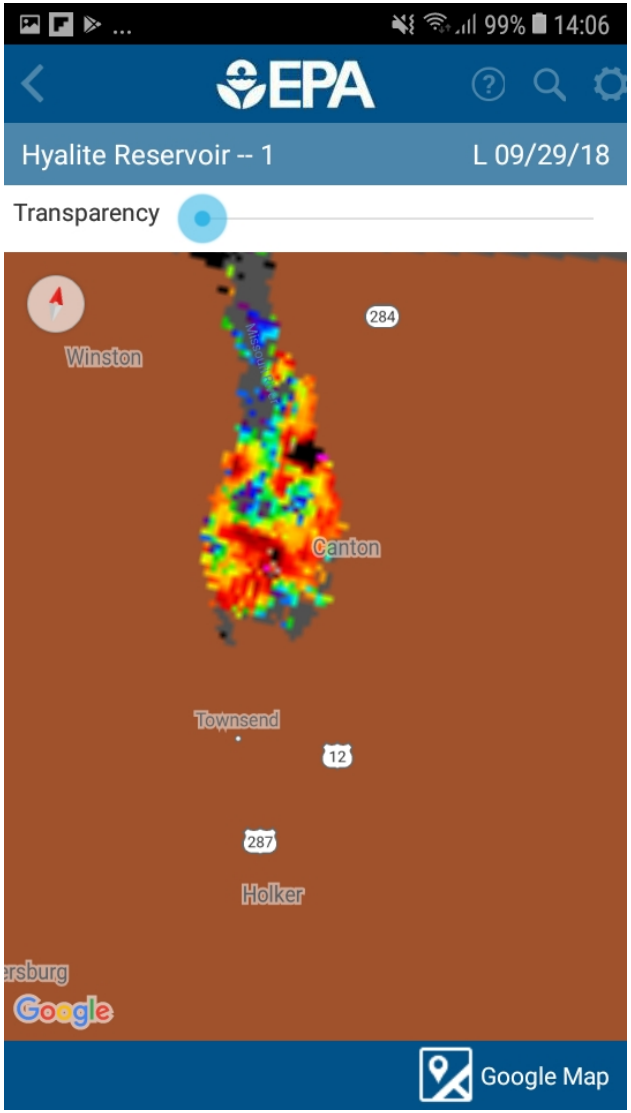
	Tier 1: Caution	Tier 2: Danger	Tier 3: Closure
Relative Probability of Acute Health Effects[1]	Low	Moderate	High
Cyanobaceterial Cell Density (cells/mL)[1]	<20,000	20,000 – 100,000	>100,000
Microcystins (ug/L)[1,2]	<4	4 – 20	>20
Anatoxin-a[3]	Non-Detect	Detect – 20	> 20
Additional Factors	Visual presence but no reported illness	Reports of animal illness or death	Reports of human illness
Health Risks[1]	Negligible	Short-term effects such as skin irritation nausea, vomiting, diarrhea. Potential for long-term effects.	Short-term effects such as skin irritation nausea, vomiting, diarrhea. Potential for long-term effects and acute poisoning.
Recommended Actions	Post caution signs, visually monitor for changes	Post danger signs, notify private water users and media with advisory	Post closure signs, notify private water users and media with advisory, closures

[1]WHO, 203, [2]EPA, 2016, [3]CSWB, 2016

CyAN—Known Limitations

* Can not distinguish land from lakes.
  * Pixels near shorelines may display erroneous measurements
  * Cannot account for change in lake size, e.g., due to drought
* Pixels at a resolution of 300 m x 300 m—not a great tool for small lakes
* Ice, thin clouds may register high cyanobacteria concentrations
* ~30% error rate

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