

Cyanotoxins

Idaho DEQ's Drinking Water Program Preparedness Activities

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SWP Workshop – Cyanotoxins in Drinking Water
November 28 & 29, 2018



Overview



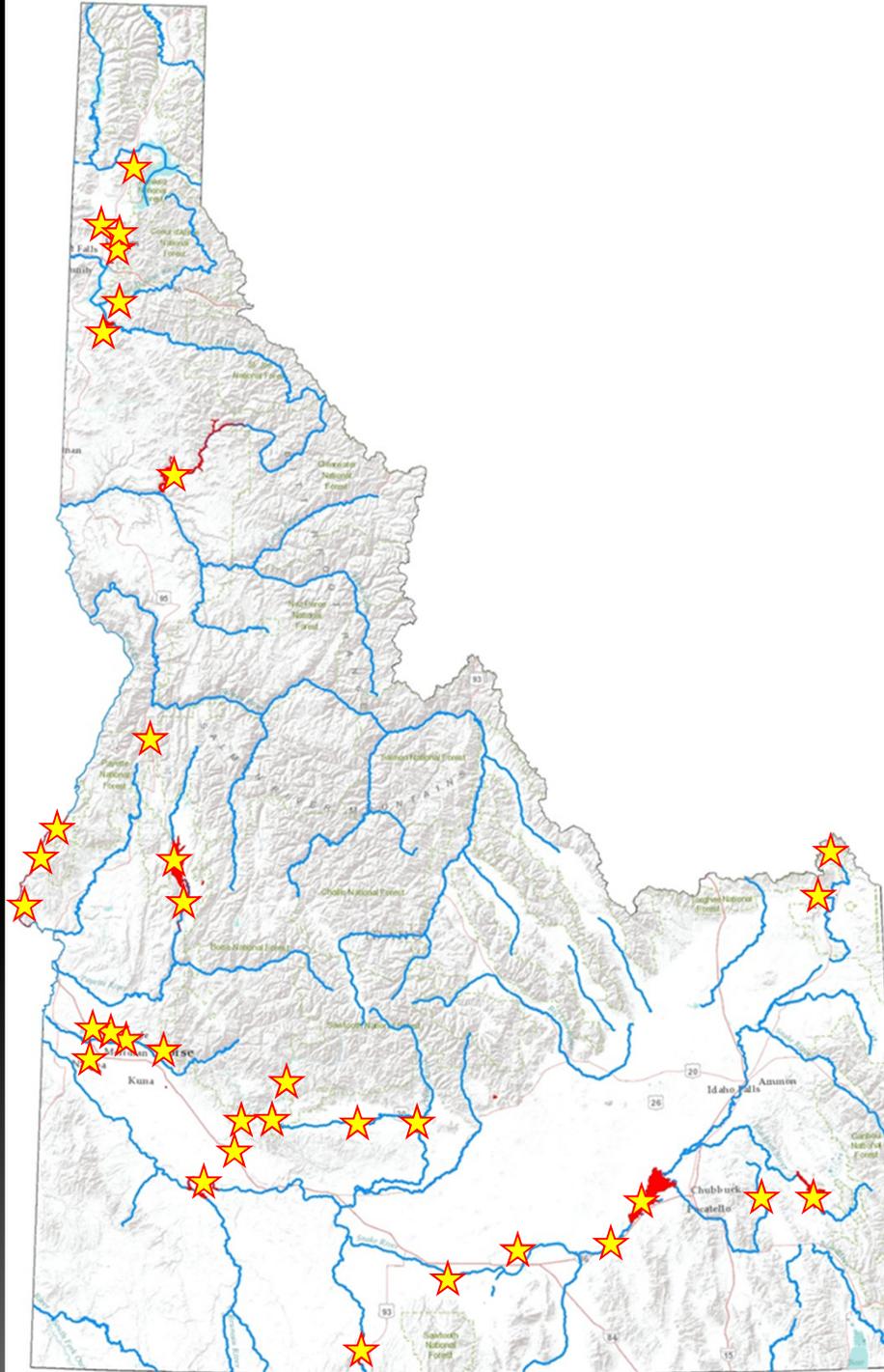
- Background
- Surface Water PWSs in Idaho
- What we are doing
- Cyanotoxins in Drinking Water Pilot
- Tools & Resources
- Next Steps

Why?



- Lake Erie August 2014
- Cyanotoxins (Microcystins) in Toledo's (Lucas County) drinking water
- 400,000+ without water for 2 days
- Treatment approach increased toxicity, lysed cells
- Land alterations contribute to issue

1. Avondale Lake
2. Black Lake
3. Fernan Lake
4. Hayden Lake
5. Cocolalla Lake
6. Chatcolet Res.
7. Dworshak Res.
8. Brownlee Res.
9. Hells Canyon Res.
10. Oxbow Res.
11. Horsethief Res.
12. Cascade Res.
13. NF Payette River
14. Lake Lowell
15. Blacks Creek Res.
16. Little Camas Res.
17. Mountain Home Res.
18. Salmon Falls Creek Res.
19. Long Tom Res.
20. C.J. Strike Res.
21. Snake River (mult)



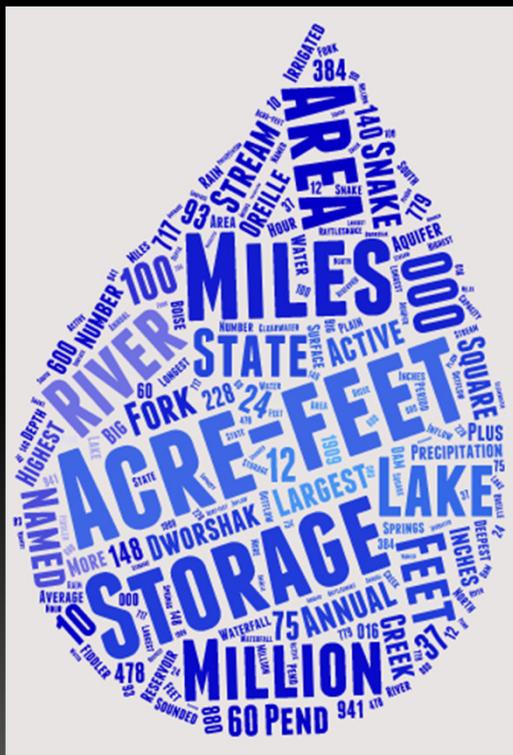
22. Private property (mult)
23. Murtaugh Lake
24. American Falls Res.
25. Island Park Res.
26. Henry's Lake
27. Henry's Fork
28. Magic Res.
29. Mormon Res.
30. Chesterfield Res.
31. Fish Creek Res.
32. Blackfoot Res.
33. Lost Valley Res.
34. Eagle Island State Park
35. Anderson Ranch



Cyanotoxins in Public Drinking Water

Coordination and assistance for operators

Idaho's Public Water Systems



- ~1,960 public water systems (PWS)
- 95% Groundwater
- 5% Surface Water (~70 PWSs, includes GWUDI)
 - CRO, LRO, BRO
 - A few in Pocatello & ID Falls Region; none in Twin Falls Region
 - Nearly 300,000 total served from over 50 different surface waters
 - Recreational use allowed

Status



- Cyanotoxins are not regulated
- Health advisories (HA) established by EPA but are non-regulatory
- UCMR4 is underway by EPA (10 cyanotoxins)
- Sampling Pilot with PWSs
- Education
- Preparations...

EPA Health Advisories (HA) (non-regulatory)

EPA's 2015 drinking water health advisories

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

EPA's draft 2016 recreational ambient water quality criteria

Table 1. Draft Recreational AWQC for Cyanotoxins

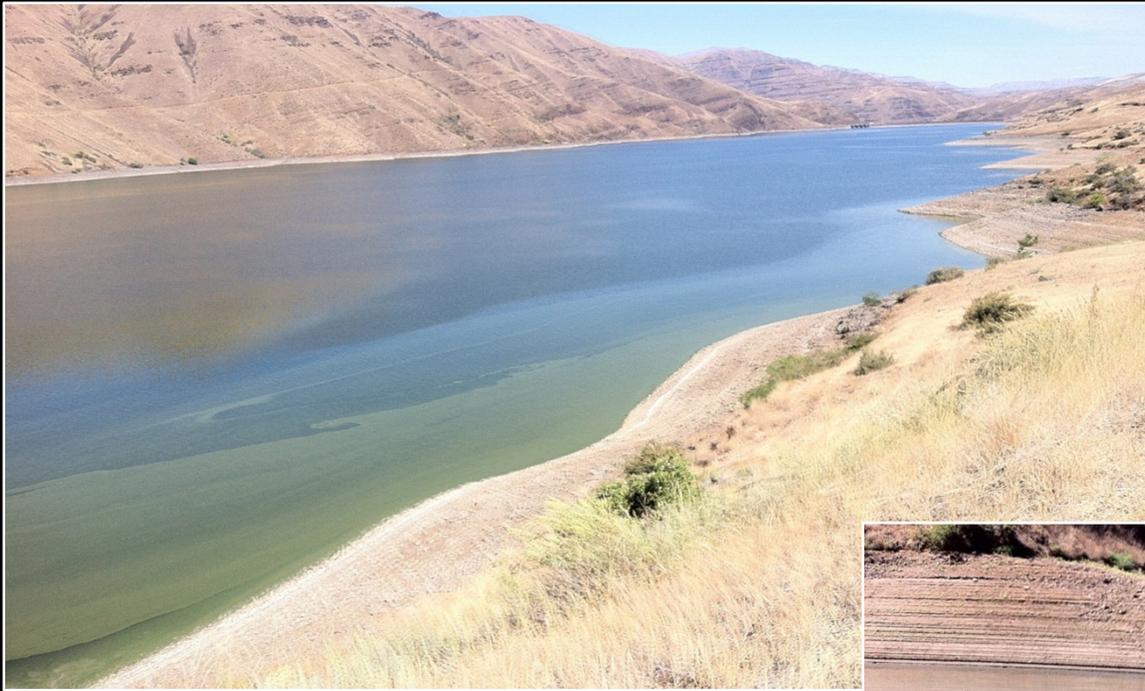
Microcystins	Cylindrospermopsin
4 µg/L ^{a, b}	8 µg/L ^{a, b}

a) Swimming Advisory: not to be exceeded on any day

b) Recreational Criteria for Waterbody Impairment: not exceeded more than 10 percent of days per recreational season up to one calendar year.



Brownlee Reservoir, Aug. 26, 2016



- *Lyngbya, Microcystis, Aphanizomenon*
- Over 22 million cells/mL
- Microcystin toxin greater than 1,000 ppb
 - Recreational HA is 4 ppb; DW HA is 0.3 ppb!

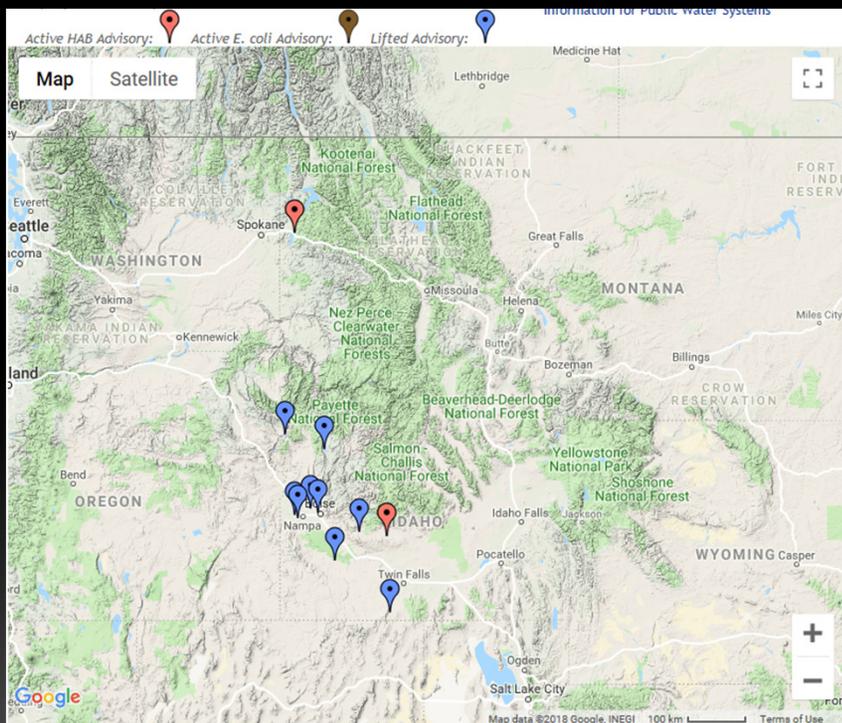
Other Implications

- Irrigation of crops with cyanotoxins
 - Uptake of toxins into plants
 - Research showing impacts to crop yield
- General permits
 - Canal companies using algaecide (i.e. Diquat) to treat blooms in the canals
 - Algaecide ruptures (lyses) cyanobacteria releasing toxins

What we are doing

Current and future activities

Coordinated Communications & Outreach



- DEQ-IDHW Response Plan
 - Agency roles in recreational HA response
 - DEQ = sampling
 - HDs = posting of advisory
 - Drinking water part of communications chain
- Social media
- DEQ surface water and drinking water websites
 - Interactive map & list of advisories

Idaho Harmful Algal Bloom Response Partners



IDAHO DEPARTMENT OF HEALTH & WELFARE
DIVISION OF PUBLIC HEALTH





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**Panhandle
Health District**
Healthy People in Healthy Communities

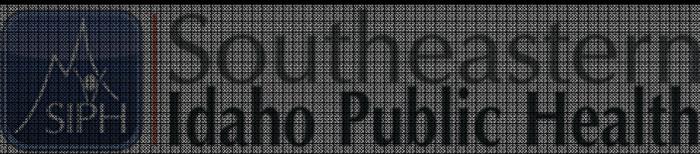
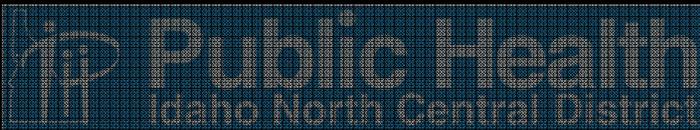
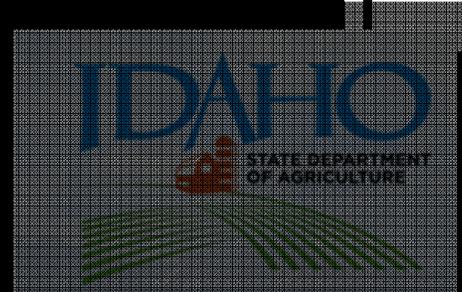


CENTRAL
DISTRICT
HEALTH
DEPARTMENT
HEALTHY PEOPLE IN HEALTHY COMMUNITIES





IDAHO DEPARTMENT OF HEALTH & WELFARE
DIVISION OF PUBLIC HEALTH



Workgroups focused on cyanotoxins



- EPA R10 States Workgroup
- DW Workgroup
 - Vulnerable public water system (PWS) identification
 - PWS operator outreach/assistance:
 - Website (working to update)
 - Info on Switchboard
 - Awareness/education material development
 - 2018 source water sampling pilot project for cyanotoxins

Public Communications & Education

Idaho Department of Environmental Quality
Published by Sara Cassinelli [?] · July 23 · 🌐

What does a harmful algal bloom look like and how can you report one? We explain what to look for and how to contact DEQ if you suspect a bloom is in an Idaho water body. When in doubt, stay out! Check our map for current recreation water quality health advisories and learn how to report a harmful algal bloom here: <https://go.usa.gov/xRnSJ>.



Harmful Algal Blooms in Idaho
01:32

WWW.DEQ.IDAHO.GOV Learn More

Harmful Algal Blooms in Idaho

7,876 People Reached **362** Engagements Boost Again

Recent Activity

Boosted on Jul 30
Audience: United States: Idaho, 13 - 65+
By Sara Cassinelli · Completed

[View Results](#)

Performance for Your Post

7,876 People Reached

3,508 Video Views

98 Reactions, Comments & Shares

63 Like	31 On Post	32 On Shares
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2 Love	2 On Post
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1 Wow	1 On Post
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1 Sad	1 On Post
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5 Comments	3 On Post
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26 Shares	25 On Post
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264 Post Clicks

69 Clicks to Play	37 Link Clicks
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NEGATIVE FEEDBACK

1 Hide Post	0
0 Report as Spam	0

Insights activity is reported in the Pa reported in the time zone of your ad

Harmful Algal Blooms



Photo provided by the Idaho Department of Environmental Quality

October 2017



IDAHO DEPARTMENT OF HEALTH & WELFARE

Protect Your Pets from Harmful Algae Blooms



Blue-green algae can form harmful blooms in lakes, ponds, and rivers that make the water murky or look like pea soup or paint. These blooms may produce toxins that could kill or sicken pets.

- Do not allow your pet to swim in or drink water that may have a bloom.
- If pets do come into contact with an algae bloom, don't allow pets to groom themselves and rinse them off immediately.
- If any pet toys are exposed to the algae, thoroughly clean them or throw them away.

Call your vet immediately if your pet has been around an algae bloom and shows symptoms such as vomiting, staggering, drooling, or convulsions.

For more information about HABs and to report a bloom, go to www.deq.idaho.gov/recreation-health-advisories.

If in doubt, stay out!

cyanos.org/bloomwatch/



POISON HELP
1-800-222-1222





What we know about treatment



- More 'every day'
- "Do Not Boil"
- Intracellular vs. extracellular
- If done wrong, can lyse (rupture) cells releasing toxins
- Specific to toxin identified and the treatment system
- Most research/attention is on conventional treatment
 - Idaho is dominated by SSF and direct filtration
- Options are PAC, GAC, UV, chlorine (increase contact time)



DEQ Cyanobacteria Pilot Program 2018

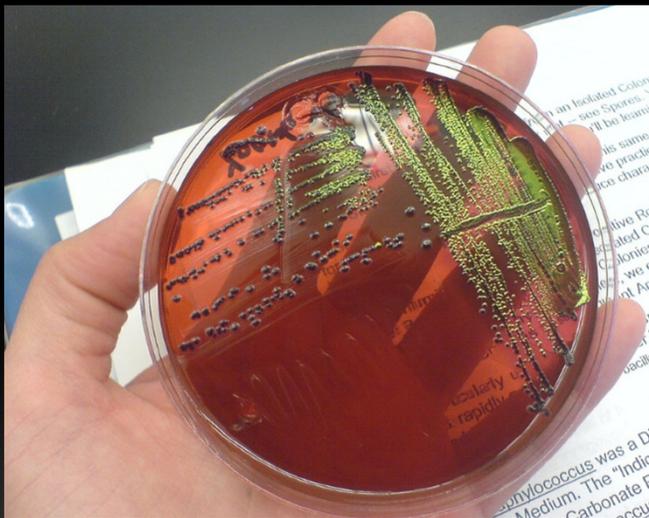
- Purpose – source water characterization & preparedness
 - 5 volunteer surface water PWSs
 - Raw & finished water sampling, June-Sept.
 - Binder and kit (cooler w/ all materials needed to sample)
 - Test strips & water sample collection
 - Lab analysis
 - qPCR
 - ELISA
 - CEUs for training and pre/post homework

Indicators



- Visual observations of a bloom near intake
- Taste and odor complaints*
- Spike in pH
- Higher temps
- Higher turbidity with no weather event
- Low dissolved oxygen
- Increased levels Phosphorus and Nitrogen

Analytical Methods



OhioEPA

- Identification, enumeration, and toxins
 - Enzyme-linked immunosorbent assay (ELISA)
 - Quantitative polymerase chain reaction (qPCR)
 - genetics
 - Test strips
 - Screening only
 - Available for recreational and drinking water

Posts



Idaho Department of Environmental Quality shared a post.

11 hrs · 🌐

An algal bloom has been spotted in Horsethief Reservoir. Water samples have been taken to a lab for analysis to determine if there are any potential toxins related to the bloom. Visitors can continue to boat and fish at the reservoir, but should avoid the water for drinking or swimming until further notice. Pets should also stay out of the water.



Idaho Fish and Game Southwest Region

👍 Like Page

14 hrs · 🌐

Blue-green algae has been discovered at Horsethief Reservoir near Cascade. Read the full story here...



IDFG.IDAHO.GOV

Blue-Green Algae Discovered at Horsethief Reservoir

| Warmer water temperatures resulting from southwest Idaho's...

👍 🙄 🙃 11

10 Shares

During the pilot...

YMCA Horsethief

- Recreational and Drinking Water
- 4 species identified, producing Microcystins
- Access to recreational and drinking water closed; bottled water provided
- All detections well below recreational and drinking water health advisories
- Operator/owner and DEQ coordination was excellent

In response to Salem...



- DEQ Directive on Drinking Water Health Advisories
 - UCMR4 contaminants (i.e., cyanotoxins) with short-term HAs
 - If above the HA DEQ requires a Tier 1 PN is necessary to protect public health
- Established a DW health advisory webpage

Pilot Results

- Baseline
- No results required additional sampling
- Results showed the need to run larger samples in the future to which to achieve a lower limit of detection.
- State lab working on being able to offer sample analysis state-wide by Spring 2019

Tools & Resources

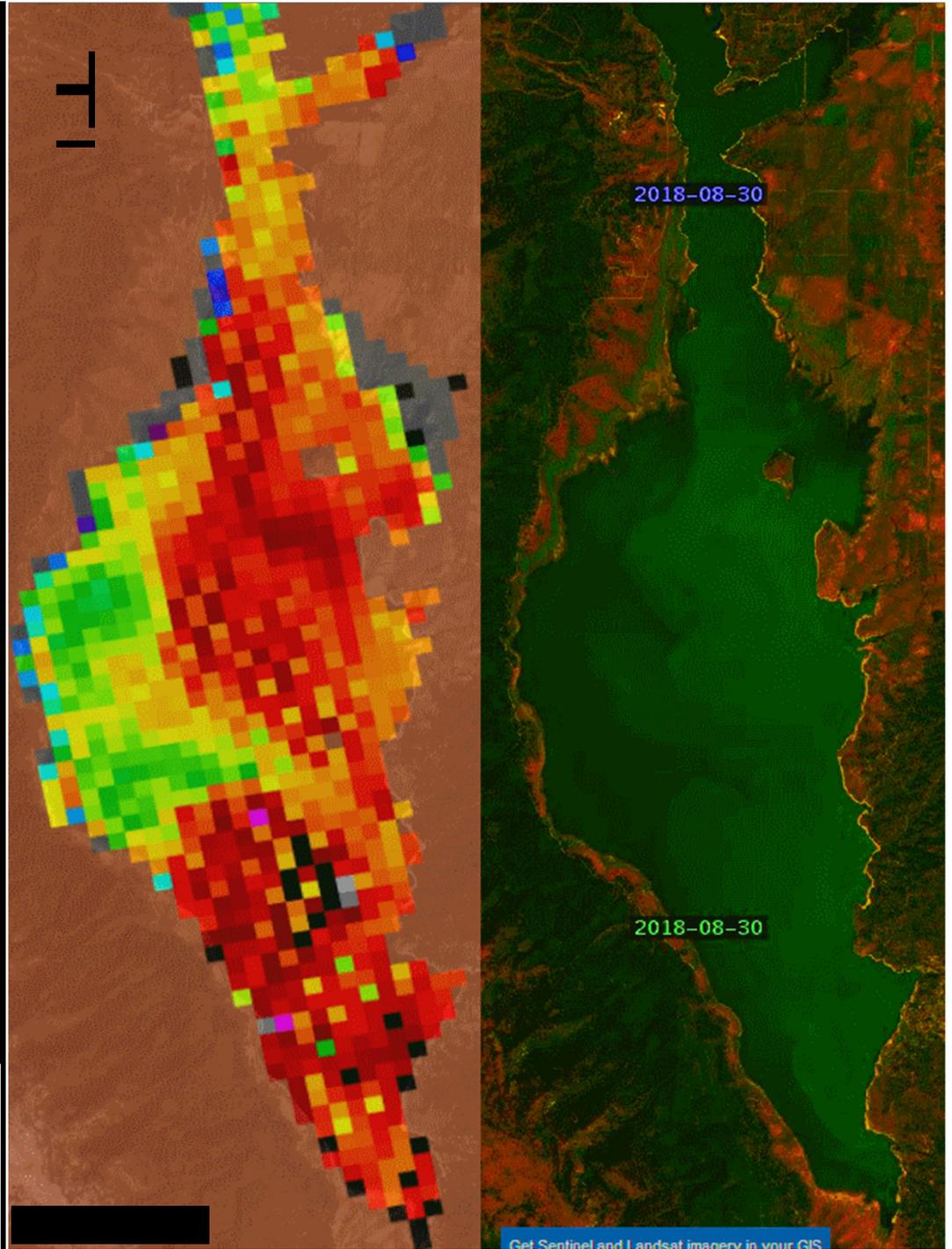
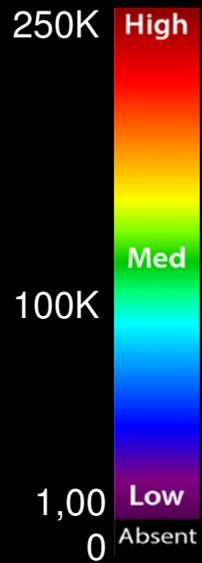


- DW webpage for operators on cyanotoxins
 - Resources specific to operators
 - Fact sheets, management plans/template, PN templates
 - Switchboard link – coming soon
- EPA ORD, NASA, NOAA, USGS
 - CyAN – Cyanobacteria Assessment Network
 - Uses historical and current satellite data to detect algae blooms in US fresh water systems; improving each version



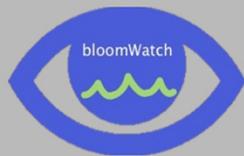
Cascade Reservoir

9/2 / 8/30



Technology & Citizen Science

Cyanobacteria Monitoring Collaborative



bloomWatch App

Crowdsourcing to find and report potential cyanobacteria blooms

Engaging the public to report when and where potential cyanobacteria blooms appear.

[LEARN MORE](#)



cyanoScope

Mapping cyanobacteria one slide at a time

Engaging trained citizen scientists and professional water quality managers to understand where and when cyanobacteria species occur.

[LEARN MORE](#)



cyanoMonitoring

Monitoring cyanobacteria populations over time

Engaging professionals and trained citizen scientists to track seasonal patterns of cyanobacteria.

[LEARN MORE](#)

Three coordinated monitoring projects to locate and understand harmful cyanobacteria.

Taking photos

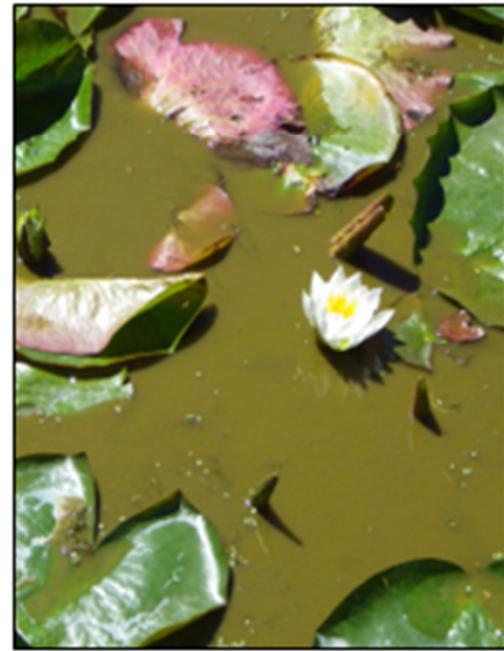
- Extent of the bloom
- View from the shore
- Close up of the bloom (as close as possible while staying in focus)



Bloom extent
Brownlee Reservoir–August 2016



Shoreline view
Mountain Home Reservoir–July 2017



Close up
Fernan Lake–June 2013

Up Next...

- Pilot lessons learned report & recommendations for future
- OneHealth Meeting at IDHW
- DEQ Water Quality Conference
- Training on cyanotoxin treatment options
 - Can be arranged for operators if interested
- 2019 Cyanotoxin Source Water Monitoring Pilot - TBD



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