

# Drinking Water Cyanotoxin Monitoring 2020 training webinar

April 29, 2020

Gregg Baird, OHA

Alison Minerovic, DEQ Lab



**DEQ**

State of Oregon  
Department of  
Environmental  
Quality

Oregon  
**Health**  
Authority

# Introduction

- Please let us know if you cannot hear, etc.
- Mute your phone/computer
- Do not pause webinar
- Ask questions in chat box
- This presentation is being recorded

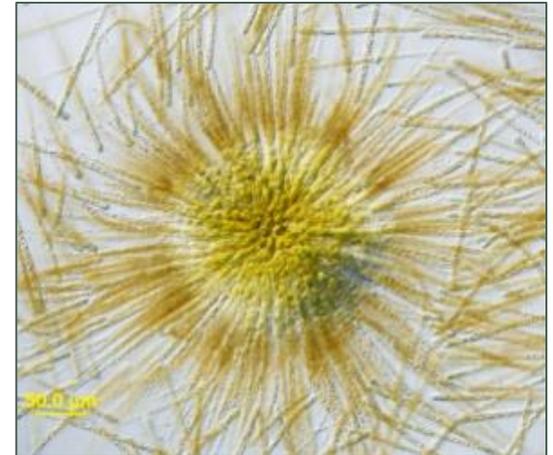


State of Oregon  
Department of  
Environmental  
Quality

Oregon  
Health  
Authority

# Training Outline

- Background: Cyanobacteria, HABs, toxins - Alison
- HABs monitoring in Oregon drinking water - Gregg
  - OAR 333-061-0510
- 2019 monitoring season recap - Alison
- Step-by-step guide to sampling - Alison
  - Field collection
  - Shipping samples to DEQ
  - Lab analysis and reporting
- Updates to 2020 monitoring - Alison
  - Adding qPCR 'early warning' monitoring



Questions and Discussion - all



State of Oregon  
Department of  
Environmental  
Quality

Oregon  
Health  
Authority

# Background: Cyanobacteria

- Also known as “blue-green algae” – actually bacteria
- Naturally-occurring in wet environments
- Some species able to fix nitrogen from atmosphere (as N<sub>2</sub>)
- Some species can sometimes make toxins



State of Oregon  
Department of  
Environmental  
Quality

Oregon  
Health  
Authority

# Background: Harmful Algal Blooms (HABs)

- Not all HABs are cyanobacteria
- CyanoHABs tend to grow rapidly under certain conditions:
  - Sunny, warm weather
  - Slow, shallow water
  - High nutrients (N:P ratio)
  - Introduced invasive species
- Toxins not necessarily present when algae bloom, and vice-versa
- Toxins affect skin, liver, kidney, nervous system



**DEQ**

State of Oregon  
Department of  
Environmental  
Quality

Oregon  
**Health**  
Authority

# Oregon Administrative Rule 333-061-0510

## Oregon Health Authority roles:

- Drinking water safety
- OAR 333-061-0510
- Contact recreation safety
- Issue advisories

## OHA is your go-to for questions about:

- Drinking water rules
- Regulations
- Resources

## DEQ Laboratory roles:

- Provide lab support for OHA drinking water rule
- Coordinate with DW facility operators
- Provide training, supplies, shipping, lab analyses and report results to OHA

## \*DEQ is your go-to for questions about:

- Logistical issues (shipping, training, etc.)
- Sampling (schedule, protocol, etc.)
- Interpreting results



State of Oregon  
Department of  
Environmental  
Quality

Oregon  
Health  
Authority

# HABs monitoring in Oregon drinking water

- Voluntary monitoring 2008-2018
  - Based on EPA Guidance for water suppliers downstream of recreational advisory
  - OHA began paying for testing in 2011
- Temporary monitoring rules in 2018, made permanent in 2019
  - Detections found in finished (treated) water in 2018 in Detroit Lake
  - Some detections found in raw water



State of Oregon  
Department of  
Environmental  
Quality

Oregon  
Health  
Authority

# Health Advisory Levels

- Cyanotoxins monitored in Oregon: microcystins, cylindrospermopsin
- EPA Health Advisory Levels in drinking water (10-day values):

<b>Cyanotoxin</b>	<b>Vulnerable population (ppb)</b>	<b>Ages 6+ (ppb)</b>
Total Microcystins	0.3	1.6
Cylindrospermopsin	0.7	3

Health effects include: upset stomach, diarrhea, vomiting, long-term liver/kidney damage



State of Oregon  
Department of  
Environmental  
Quality



# Who is required to monitor?

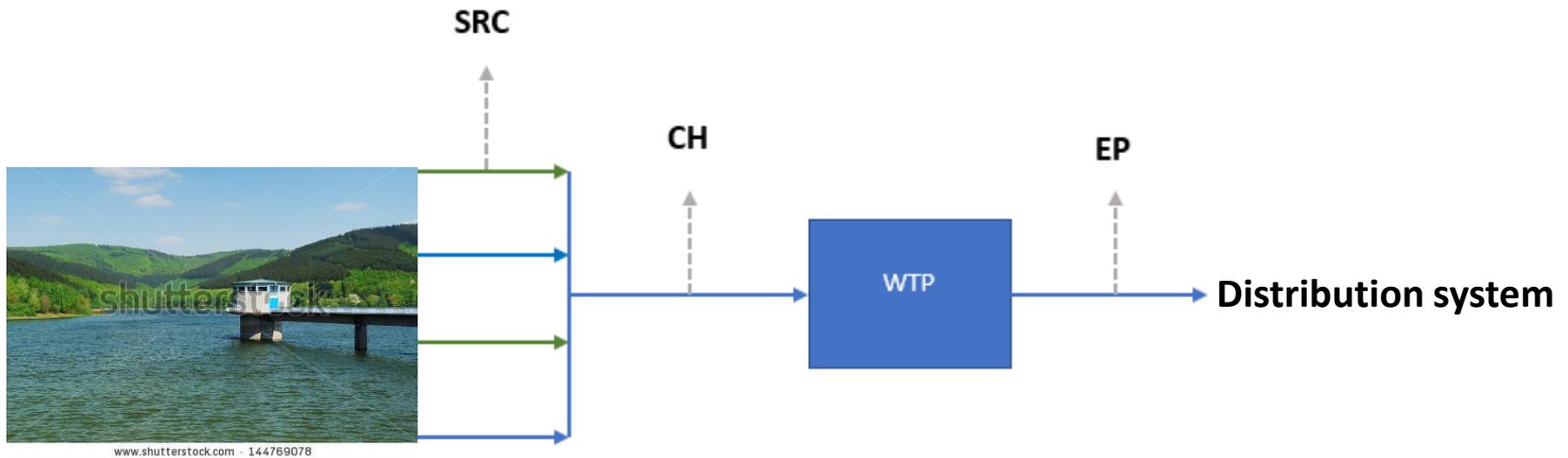
- Sources deemed susceptible by OHA, DEQ
- “Susceptible” means:
  - HAB and/or cyanotoxins previously detected in drinking water
  - HAB and/or cyanotoxins previously detected in source upstream of facility
  - Source water on 303(d) list for limiting factors of algae or aquatic weeds



State of Oregon  
Department of  
Environmental  
Quality

Oregon  
Health  
Authority

# Sampling locations



- **SRC** = Source, from intake prior to any treatment (“raw” water)
- **CH** = Common header; after all sources combine, as it enters the treatment plant (also “raw” water)
- **EP** = Entry point to the distribution, representing treated or finished water
- **Distribution system** = sample at representative distribution locations

# Monitoring requirements

- Raw water sampling every 2 weeks
- If  $\geq 0.3$  ug/L, sample at raw and EP weekly
  - If detected at EP, sample daily
- If  $\geq$  Health Advisory Level (HAL), confirmation ASAP
- If confirmation  $\geq$  HAL, issue advisory



State of Oregon  
Department of  
Environmental  
Quality



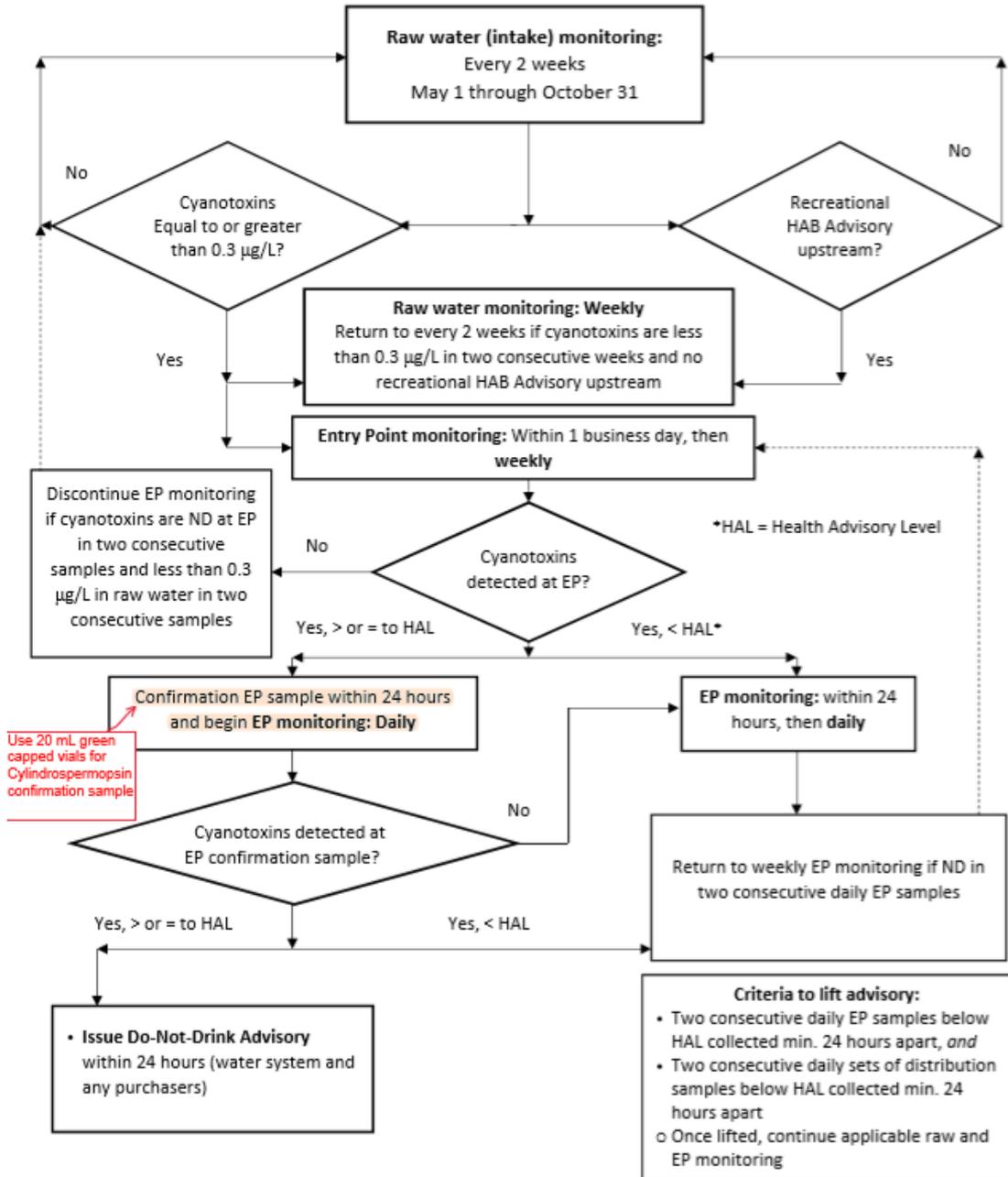
# Purchasing water systems

- **No routine sampling required**
  - Purchasers only monitor if under an advisory (in order to lift advisory)
- If seller has an initial EP >HAL at entry point, must notify purchasers w/in **24 hours** (gives a “heads up”)
- If confirmation at EP is >HAL, must notify purchasers within **8 hours** (joint advisory issued)
- Advisory may be lifted at purchasing systems according to flowchart



State of Oregon  
Department of  
Environmental  
Quality





**DEQ**  
 State of Oregon  
 Department of  
 Environmental  
 Quality



# Public Notification & Advisories

- If EP water has toxins  $\geq$ HAL, must notify
  - PWS and any purchasers
  - Press release
  - If advisory is delayed with OHA approval (rare), PWS must issue press release stating results but no advisory
  - Must publish detections in annual CCR
- To lift advisory:
  - 2 daily EP samples  $<$  HAL and
  - 2 daily distribution samples  $<$  HAL



State of Oregon  
Department of  
Environmental  
Quality



# Reporting results

- PWS must ensure labs analyze samples, report results >HAL w/in 2 business days
- PWS must report EP samples >HAL to OHA w/in 24 hours
- PWS must notify purchasers if EP result >HAL w/in 8 hours
- To lift advisory, PWS must report “non-detect” results to OHA w/in 1 business day
- PWS must report all other results to OHA by 10<sup>th</sup> of following month



State of Oregon  
Department of  
Environmental  
Quality



## Other related monitoring

- qPCR study
  - All PWS with susceptible sources
  - Monitor raw water for presence of microcystin, cylindrospermopsin, and saxitoxin producing genes
- Voluntary cyanotoxins monitoring program
  - PWS *without* susceptible source can test if observe bloom



State of Oregon  
Department of  
Environmental  
Quality



# Web resources: healthoregon.org/dwcyanotoxins

## Cyanotoxin Resources for Drinking Water

[Drinking Water Services](#)

[Water System Operations](#)

[Surface Water Treatment](#)

[Capacity Development](#)

[Public Notice Resources & Templates](#)

[Fact Sheets & Best Management Practices](#)

[Water System Surveys & Outstanding Performance](#)

[Circuit Rider Program](#)

[Pipeline Newsletter](#)

[Emerging Contaminants in Drinking Water](#)

[Contact Us](#)

### Rules for Cyanotoxin Monitoring in Drinking Water

Oregon Health Authority (OHA) has developed regulations that require drinking water systems using surface water sources susceptible to harmful algae blooms to routinely test for cyanotoxins that these blooms produce and notify the public about the test results.

These rules are effective starting December 27, 2018 and replace temporary administrative rules adopted for cyanotoxin monitoring and testing that were effective July 1, 2018 through December 27, 2018.

OHA is encouraging water systems not subject to the cyanotoxin monitoring rules that serve surface water and have had algae issues in the past to voluntarily test for cyanotoxins and notify the public about the results.



### Rules Resources

- [Rules for Cyanotoxin Monitoring for Public Water Systems](#)
- [List of Susceptible Sources required to monitor for cyanotoxins - April 23, 2019, subject to change](#)
- [Cyanotoxin Monitoring Flowchart](#)
- [Cyanotoxin Rules Fact Sheet](#)
- [Cyanotoxin Sampling DEQ & OHA Presentation from 4/22/19](#) ( [webinar recording from 5/2/19](#))
- [Cyanotoxin Health Advisory for Vulnerable People Frequently Asked Questions](#)
- [Cyanotoxin Health Advisory for All Consumers Frequently Asked Questions](#)
- [Guidance for Health Care Providers and Facilities Frequently Asked Questions](#)

### Recommended Reading

- [EPA Recommendations for Public Water Systems to Manage Cyanotoxins in Drinking Water](#)
- [EPA Fact Sheet on Cyanobacteria and Cyanotoxins - Information for Drinking Water Systems](#)
- [EPA Drinking Water Cyanotoxin Risk Communications Tool Box](#)
- [EPA Cyanotoxin Management Plan Template and Example Plans](#)

### Treatment Information

- [Optimizing Toxin Removal](#) - All surface water systems can take steps at their treatment plants to increase the removal efficiency of cyanotoxins.
- [EPA Water Treatment Optimization for Cyanotoxins](#)
- [American Water Works Association CyanoTOX Spreadsheet for Cyanotoxin Removal Rate Calculation](#)



State of Oregon  
Department of  
Environmental  
Quality



# What you can do now

- Understand monitoring requirements, including if detections are found
- Determine potential distribution sampling sites
- Evaluate best treatment optimization steps if needed
- Update contact lists (internal, purchasers, state)
- Know where to get public notice templates and resources



State of Oregon  
Department of  
Environmental  
Quality



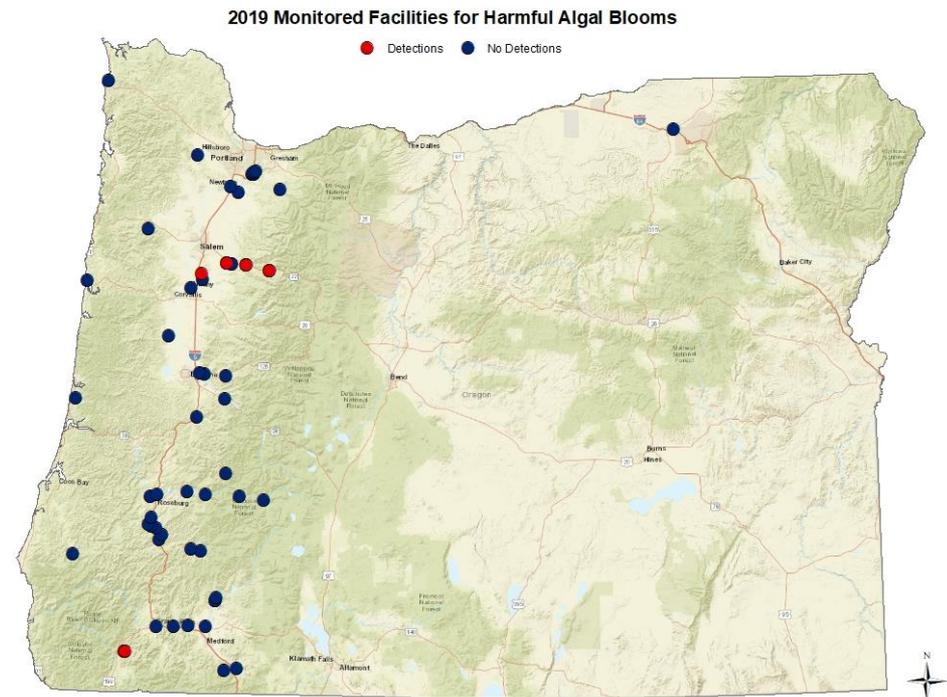
# Take away messages

- Public needs to know if they are at risk, even without federal regulation
  - Report as soon as possible
- Testing water only way to know for sure
- Tell people what you know when you know it
  
- Establish relationships with local stakeholders & agencies to mitigate risk
  - How to reach vulnerable populations
  - Where to obtain water hauling trucks
  - Messaging plans

Consider treatment options if your system is at risk

# 2019 monitoring season recap

- 57 sites participated
- 819 samples analyzed
- Source water detections at 6 facilities
  - Blooms lasted 1-9 weeks
- No detections in finished water



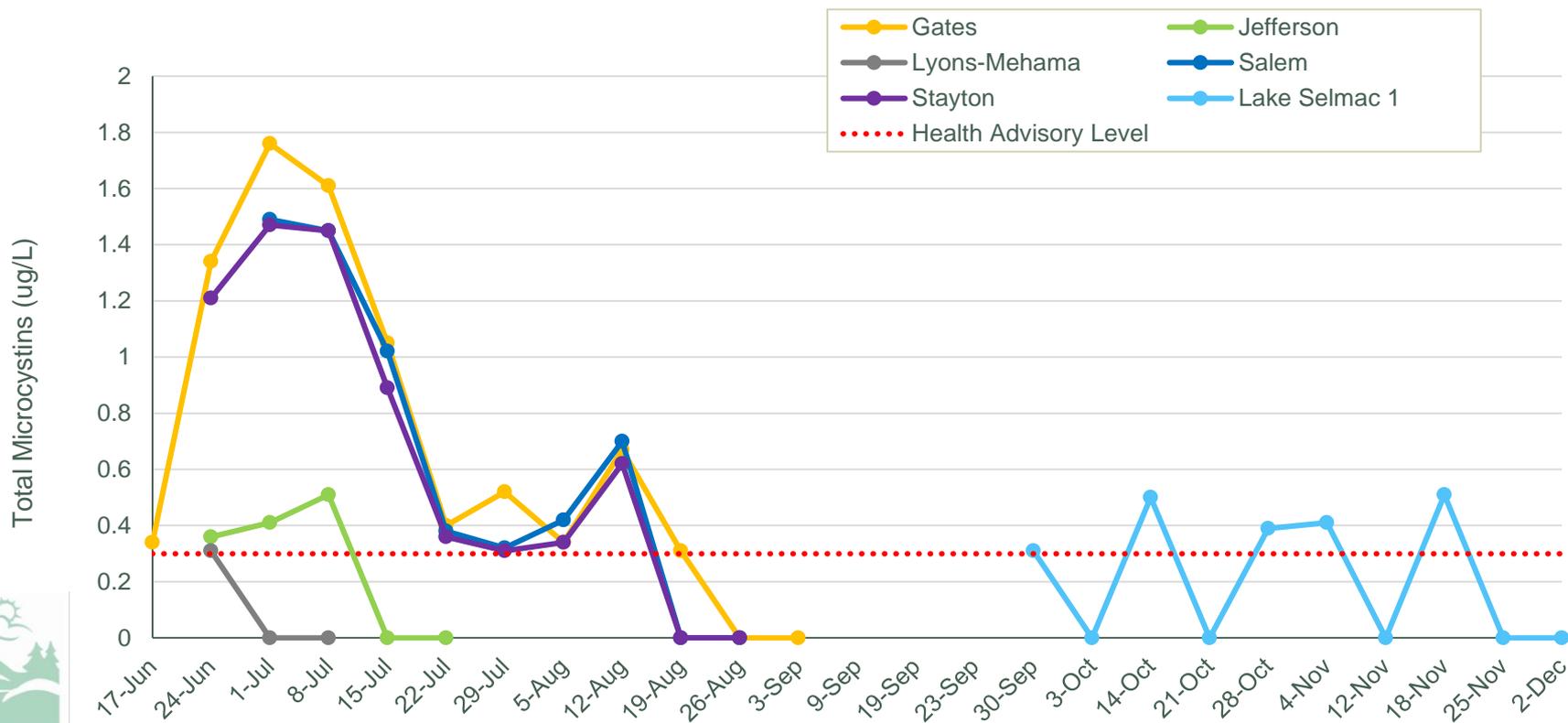
Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community



State of Oregon  
Department of  
Environmental  
Quality

Oregon  
Health  
Authority

# Microcystins Source Water Detections 2019



**DEQ**

State of Oregon  
Department of  
Environmental  
Quality

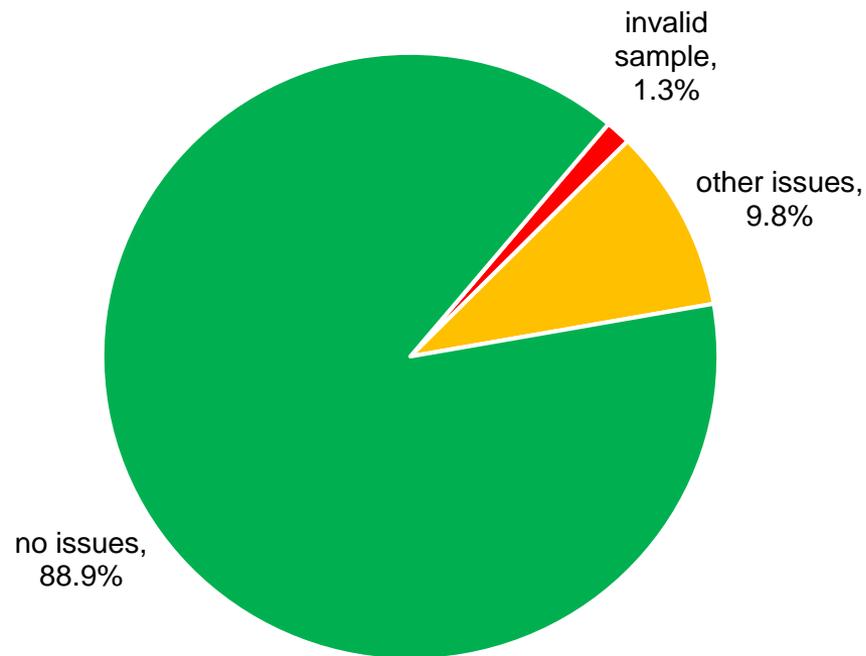
Oregon  
**Health**  
Authority

# Areas for improvement

Great 2019 monitoring season!

Most common issues:

- Overfilled bottle
- Site name mislabeled or blank
- COC date/time missing, not signed



**DEQ**

State of Oregon  
Department of  
Environmental  
Quality

Oregon  
**Health**  
Authority

## NEW for 2020: qPCR sampling

- New addition to monitoring program
  - DNA from water samples that code for cyanotoxins
  - Signal may be seen ~1-2 weeks before toxins appear

What does this mean for you?

- Filling 250 mL plastic bottle of raw water during routine sample collection
  - 6 of 13 collection days
  - Completing separate chain of custody form

If there is a detection...

- Collect qPCR sample (source water only) along with toxin sample

# Sampling schedule 2020

Week	Group A	Group B
1	5/4/2020	
2		5/11/2020
3	5/18/2020	
4		<b>5/26/2020</b>
5	6/1/2020	
6		6/8/2020
7	6/15/2020	
8		6/22/2020
9	6/29/2020	
10		7/6/2020
11	7/13/2020	
12		7/20/2020
13	7/27/2020	
14		8/3/2020
15	8/10/2020	
16		8/17/2020
17	8/24/2020	
18		8/31/2020
19	<b>9/8/2020</b>	
20		9/14/2020
21	9/21/2020	
22		9/28/2020
23	10/5/2020	
24		10/12/2020
25	10/19/2020	
26		10/26/2020

Shipment 1 – includes all qPCR samples

Shipment 2 – no qPCR sample collections (unless toxins are detected)

qPCR sampling week

# Sampling protocol - cyanotoxins

Unpack box and inspect kits. Each box will contain the following:

- 8 coolers in cardboard boxes
- 32 ice packs (4/cooler) – **freeze these before collecting samples!**
- 8 Amber Glass 125mL bottles
- 8 bubble bags (1/glass bottle)
- 8 lab paperwork packets (1/cooler)
- 8 prepaid UPS return labels

## BOX 1 WILL ALSO HAVE

- 6 clear plastic square bottles, unlabeled
- 6 smaller Ziploc bags (1/plastic bottle)
- 6 green chain of custody forms

**\*Contact Alison at DEQ Lab if you are missing any items!\***

# Labeling bottles

## Check appropriate water type

- “Raw water” = SRC or CH
- “Finished water” = EP
  - You will only collect EP sample if requested by DEQ

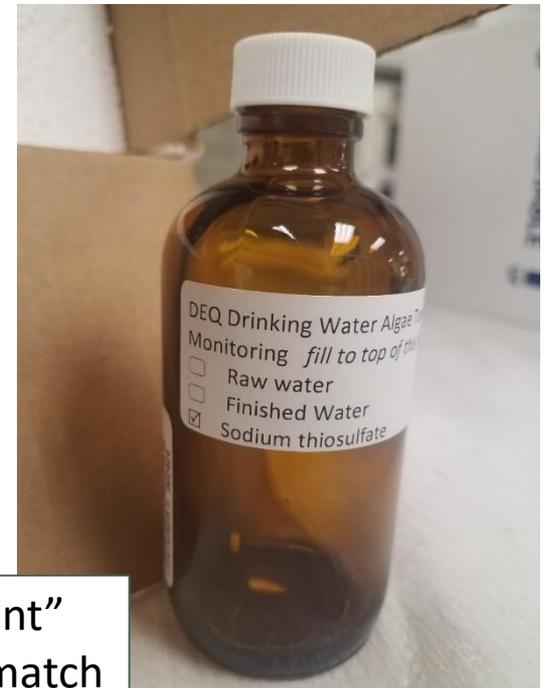
OR4101174

Buell-Red Prairie Water Association

Sampling Point: PWS01174:SRC-AA

Date: 5/4/2020 Time: 1105

“Sampling Point”  
should exactly match  
ID on COC

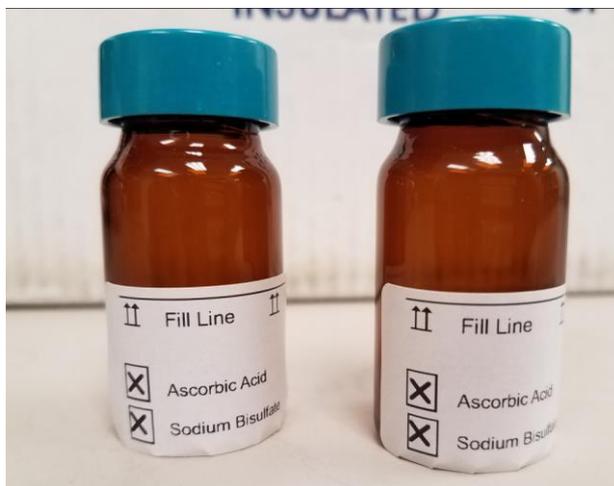


State of Oregon  
Department of  
Environmental  
Quality

Oregon  
Health  
Authority

## Additional samples – by request ONLY

- Raw water confirmation sample
- Weekly raw water (source or common header) samples
- Weekly finished water (entry point) samples
- Cylindrospermopsin confirmation vials – finished water (entry point)



State of Oregon  
Department of  
Environmental  
Quality

Oregon  
Health  
Authority

**Oregon Department of Environmental Quality Chain of Custody Record**

**Facility:** Salem Public Works - OR4100731  
**Address:** 1410 20TH ST SE BLDG 2  
 Salem OR 97302  
**Facility Contact:** Dwayne Barnes      **Facility Phone:** (503) 588-6483

\*Office use Only\*  
 Affix Work Order Barcode Here

---

Qtime: \_\_\_\_\_ Survey: \_\_\_\_\_

**Sample Collector (s):** \_\_\_\_\_  
**Sampling Agency:** \_\_\_\_\_      **DEQ Contact:** Alison Minerovic

**Sample Information**

Item	Sampling Point ID	Water Facility State Code	Source or Finished water (Circle one)	Sample Collection Date and time	Collection Address (if in Distribution)	Comments
	PWS00731:SRC-AA	Not Applicable	Source Water		North Santiam River I.G.	
			S   F			
			S   F			
			S   F			

Relinquished By:	Agency/Company	Date/Time	Received By:	Agency/Company	Date/Time

**Sample Receipt Checklist \*Office Use Only\***

- |   |   |
|---|---|
| <p>Yes   No   Sampled Same Day?</p> <p>Yes   No   Cooler Contained Ice?</p> <p>Yes   No   Samples collected in the appropriate containers?</p> <p>Yes   No   Sample containers clearly and properly labeled?</p> <p>Yes   No   Samples received intact and without damage?</p> <p>Yes   No   Sample volumes sufficient for requested analyses?</p> <p>Yes   No   All samples received within their holding times?</p> | <p>Temperature Check (IR/Sample): _____ <b>C</b></p> <p>Yes   No   Sample preservation checked at time of sample receipt?</p> <p>Yes   No   If yes were all samples properly preserved?</p> <p>Yes   No   COC form properly signed?</p> <p style="text-align: center;"><u>Sample Receipt Comments</u></p> <p>_____</p> <p>_____</p> |
|---|---|

**Oregon Department of Environmental Quality Chain of Custody Record**

**Facility:** Salem Public Works - OR4100731  
**Address:** 1410 20TH ST SE BLDG 2  
 Salem OR 97302  
**Facility Contact:** Dwayne Barnes **Facility Phone:** (503) 588-6483

\*Office use Only\*  
 Affix Work Order Barcode Here

---

Qtime: \_\_\_\_\_ Survey: \_\_\_\_\_

**Sample Collector (s):** \_\_\_\_\_

**Sampling Agency:** \_\_\_\_\_ **DEQ Contact:** Alison Minerovic

Sample Information					
Item	Sampling Point ID	qPCR	Sample Collection Date and time	Collection Address (if in Distribution)	Comments
	PWS00731:SRC-AA	Source Water Only		North Santiam River I.G.	

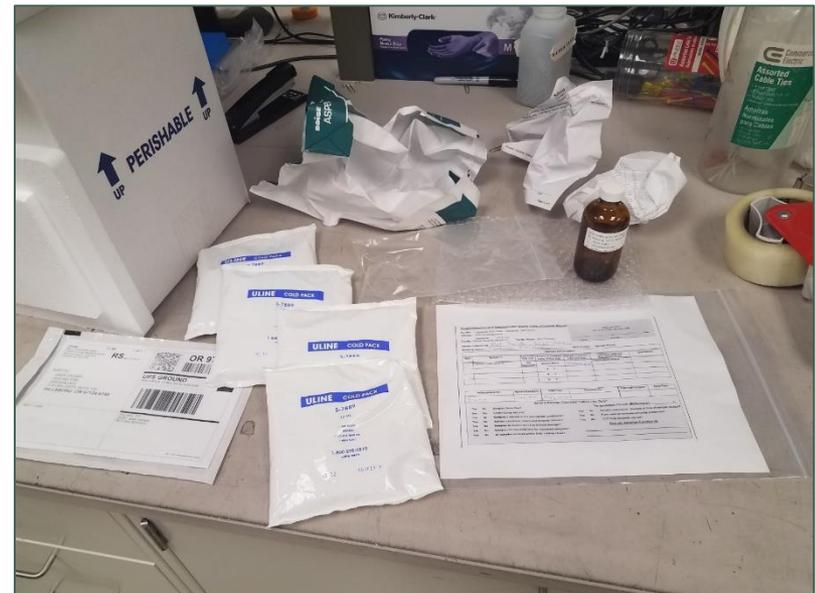
Relinquished By:	Agency/Company	Date/Time	Received By:	Agency/Company	Date/Time

**Sample Receipt Checklist \*Office Use Only\***

Yes	No	Sampled Same Day?	Temperature Check (IR/Sample): _____ C
Yes	No	Cooler Contained Ice?	Yes No Sample preservation checked at time of sample receipt?
Yes	No	Samples collected in the appropriate containers?	Yes No If yes were all samples properly preserved?
Yes	No	Sample containers clearly and properly labeled?	Yes No COC form properly signed?
Yes	No	Samples received intact and without damage?	<b><u>Sample Receipt Comments</u></b>
Yes	No	Sample volumes sufficient for requested analyses?	_____
Yes	No	All samples received within their holding times?	_____

# Packing and shipping samples to DEQ Lab

- Pack 4 frozen ice packs/cooler
- Double-check bottle labels. Are they both complete, labeled correctly?
- Double-check COC form(s). Are they circled, signed, dated?
- Wrap glass bottles in bubble packs
- Place lab COC(s) in Ziploc bag
- Fill empty space with packing material



## Notes about shipping

- Labels are prepaid; each may only be used once (do not photocopy)
- No sample receiving on Saturdays, Sundays, holidays
- Double-check shipping drop-off times (\*changes due to COVID-19?)
  - Next-day delivery to Hillsboro



State of Oregon  
Department of  
Environmental  
Quality

Oregon  
Health  
Authority

# Invalid samples

- Too warm ( $>10^{\circ}$  C)
  - Freeze ice packs early
- Too old ( $>48$  hours after collection)
  - Ship ASAP after sampling
- Broken/leaking bottle
  - Check for broken bottles upon receipt
  - Pack in bubble packs carefully
  - Make sure lid is tightened

\*Invalid samples cannot be analyzed. You will need to resample\*

# Reporting results

- Data management software automatically emails results
- Alison will call facility contacts if extra sampling required (>HAL)
  - Thursday or Friday
- Alison will email OHA with results >HAL
  - Thursday or Friday
- All results will be uploaded to OHA data repository weekly
  - Friday afternoon



State of Oregon  
Department of  
Environmental  
Quality



# Lab methods

- Samples must be analyzed by an accredited lab
  - DEQ lab is accredited
  - Please contact Alison if not using DEQ lab
- Analyze using following methods:

Toxin	Screening method	Confirmation
Total Microcystins	EPA method 546 (ELISA)	n/a
Cylindrospermopsin	OR DEQ 18-LAB-0050 (ELISA)	EPA method 545 (LC MS/MS)



State of Oregon  
Department of  
Environmental  
Quality



## Additional lab analyses

- DEQ Lab can analyze additional samples for a fee
  - IGAs from 2019 still valid
  - Cost depends on sample load. OHA samples are priority

Contact Alison if you are interested in additional sampling



State of Oregon  
Department of  
Environmental  
Quality



## For more information...

- Regarding OHA rules, regulations, FAQs, or resources:
  - Gregg Baird, OHA
    - 971-673-0423
    - [gregg.c.baird@dhsoha.state.or.us](mailto:gregg.c.baird@dhsoha.state.or.us)
- Regarding DEQ sampling, analysis, logistical issues, or lab results:
  - Alison Minerovic, DEQ Lab
    - 503-693-5727 (office); 503-979-5910 (cell)
    - [minerovic.alison@deq.state.or.us](mailto:minerovic.alison@deq.state.or.us)



State of Oregon  
Department of  
Environmental  
Quality

Oregon  
Health  
Authority

# Questions?



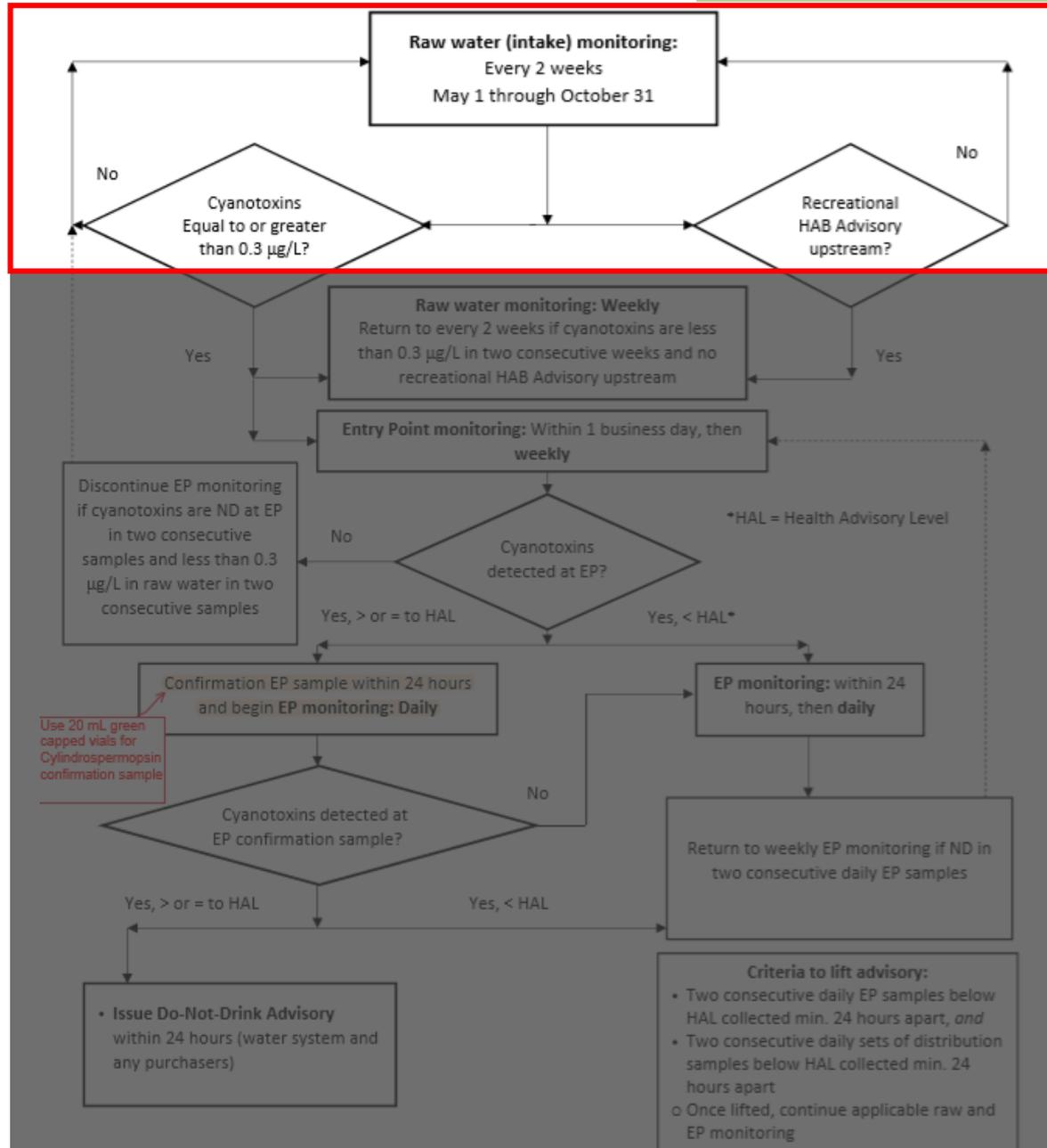
Thank you!



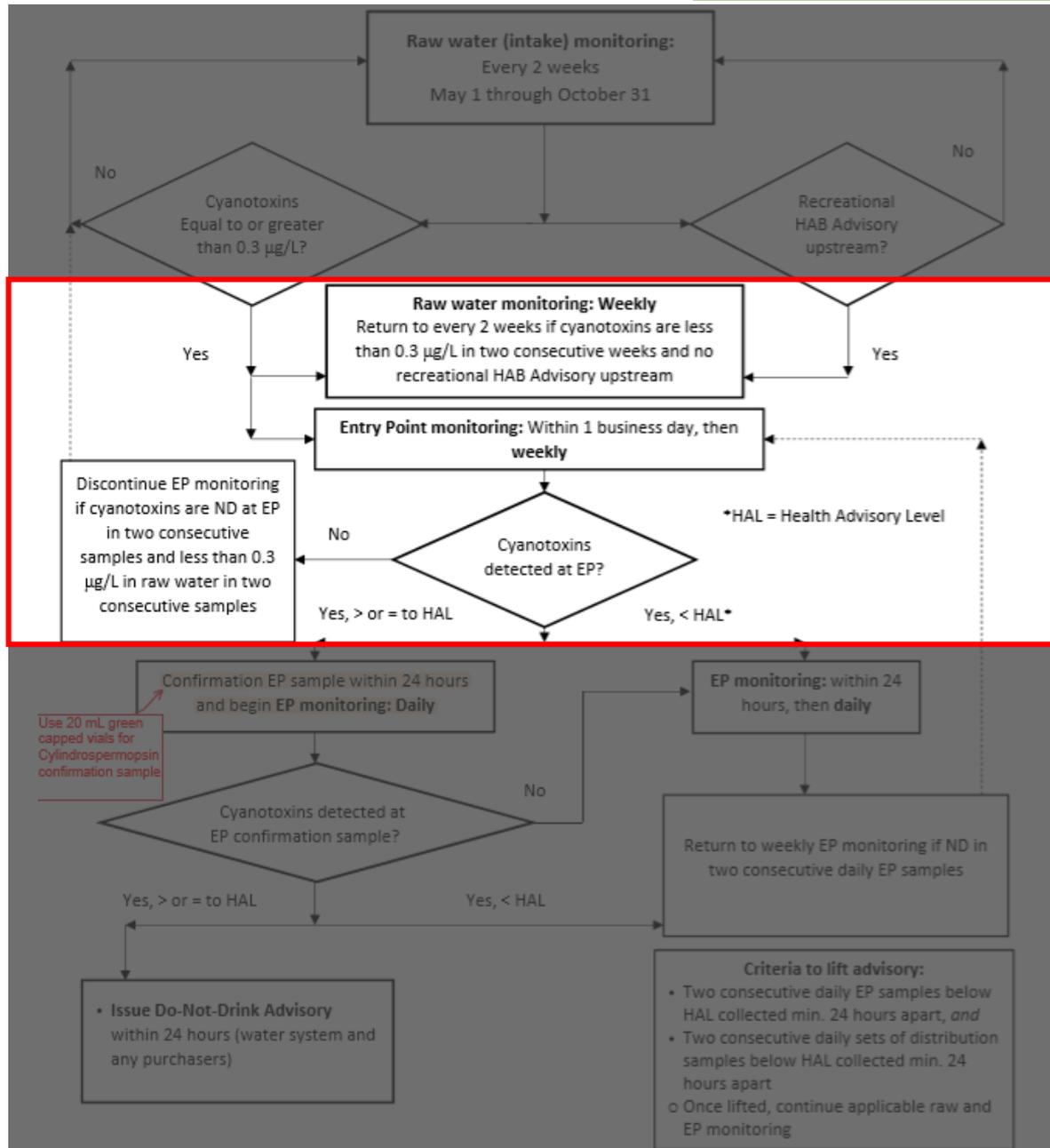
State of Oregon  
Department of  
Environmental  
Quality

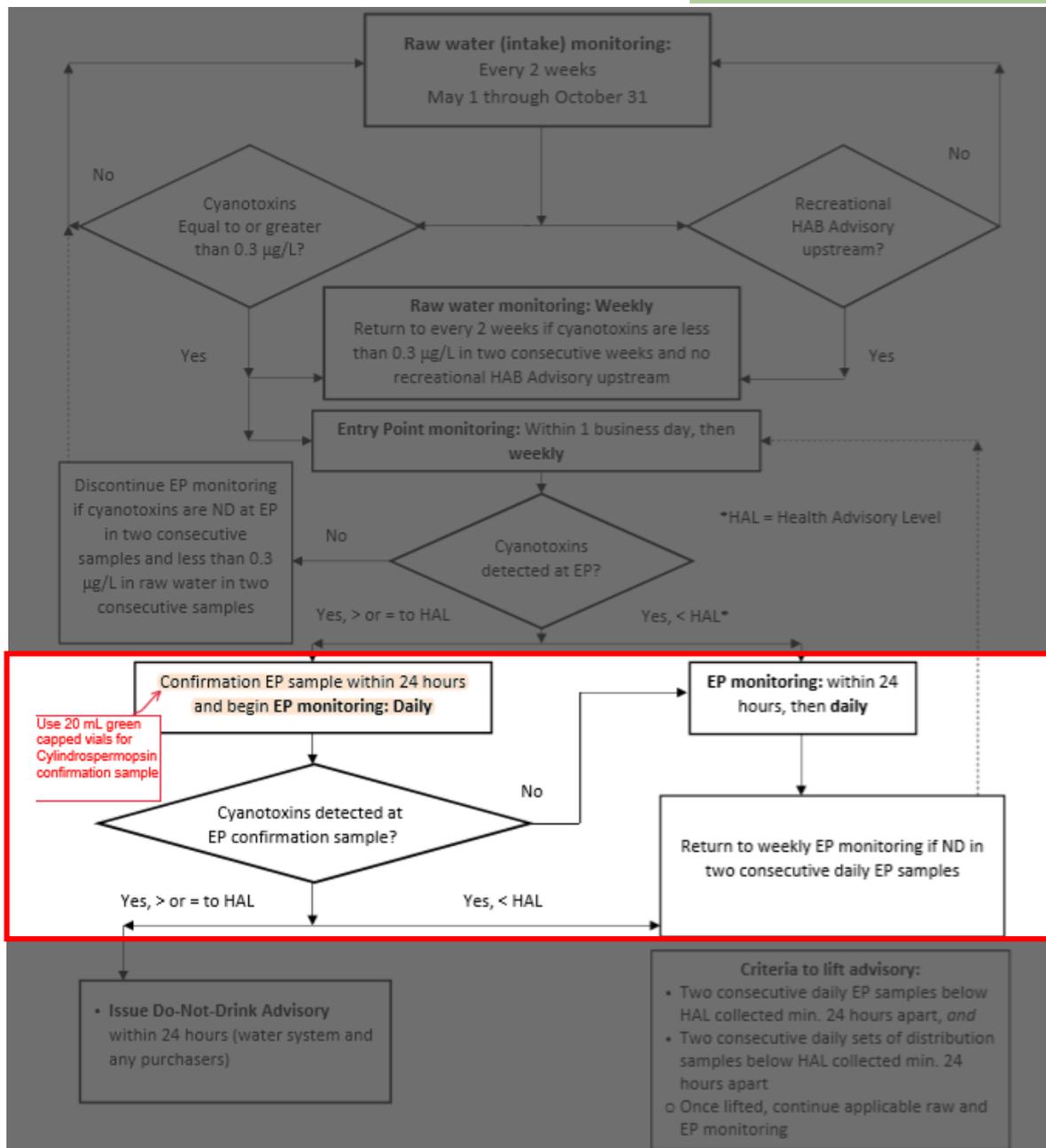


# Routine sampling, May-October

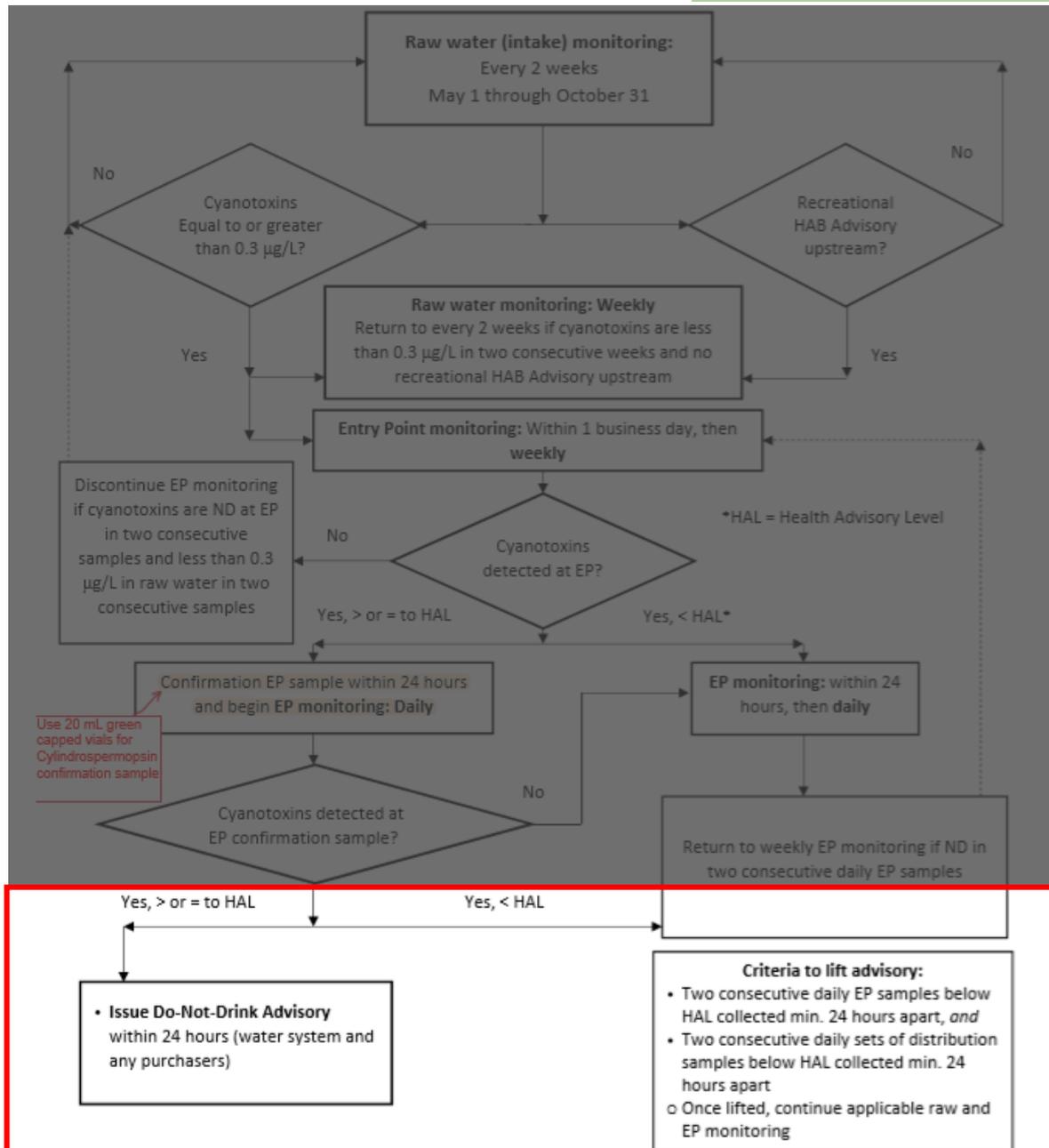


Toxins in source (raw) water and/or recreational advisory in effect upstream





Toxins in source (raw) and entry point (finished) water



Toxins in entry point (finished) water >HAL

• Issue Do-Not-Drink Advisory within 24 hours (water system and any purchasers)

**Criteria to lift advisory:**

- Two consecutive daily EP samples below HAL collected min. 24 hours apart, *and*
- Two consecutive daily sets of distribution samples below HAL collected min. 24 hours apart
- Once lifted, continue applicable raw and EP monitoring