



Regulatory Perspective of Cyanotoxins in Oregon

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PUBLIC HEALTH DIVISION
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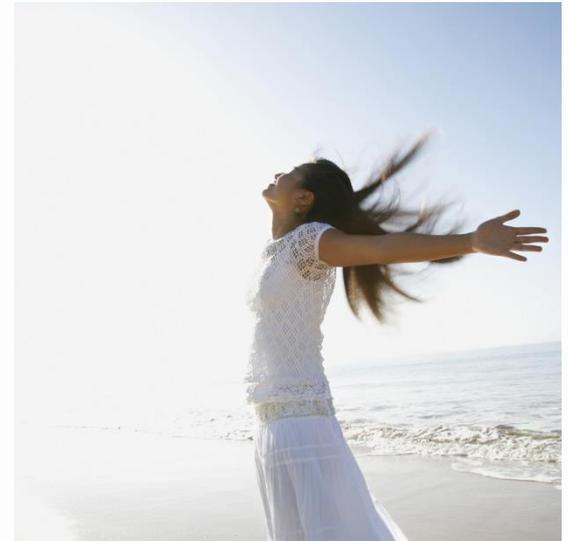
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Presentation Overview

- Characteristics and health effects of cyanotoxins
- Cyanotoxins history in Oregon
- Temporary cyanotoxin monitoring rules & results
- Permanent cyanotoxin monitoring rules
- Resources

Characteristics of cyanobacteria

- It's not an algae but needs sunlight, nutrients to live
- Much of Earth's atmosphere oxygen can be attributed to algae and cyanobacteria: oxygen is a by-product of photosynthesis.
- Can be found almost everywhere in our environment; oceans, fresh water, damp soil, bare rock and soil, Antarctic rocks.
- Can reproduce explosively under certain conditions.
- Some can produce toxins.



Factors Favoring Cyanobacteria Blooms

- Rapid, seemingly sudden growth with the right conditions.
- Fast growth, can double three times a day.
- Sunny weather and warm water (>~25 C, 77 F).
- High nutrients, especially higher P to N. Nitrogen fixers.
- Stagnant or slow moving water.



Willamette River 2015

Cyanobacteria Blooms



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Health Effects



- Cyanobacteria can produce toxins
- Can cause a red, raised rash or irritation from skin exposure.
- Symptoms from ingesting: headaches, cramps, diarrhea, nausea and vomiting, numbness, dizziness, fever.
- Can have long-term effects on liver and kidneys
- Children, pets, livestock, wildlife are at increased risk because of their size

Cyanotoxins history in Oregon

- 2000-2007
 - Periodic public health advisories for recreational lakes posted.
- 2008-2009
 - OHA-EPH received 5-yr grant from CDC for HAB occurrence, resulting in more recreational advisories posted.
 - DWS Algae procedure created, PN templates completed.
 - DWS asks WSs to test weekly for toxins, WS to pay all costs.
- 2011
 - DWS pays for cyanotoxin analysis and shipping
- 2012-2013
 - DWS Algae resources webpage created with new BMP's.
- 2015-July 2018
 - Oregon uses EPA Health Advisory Levels and EPA guidance/recommendations documents.

Regulations for drinking water - Federal

US Environmental Protection Agency (EPA) currently has no regulations for cyanotoxins.

- Health Advisory Levels for two cyanotoxins (Total Microcystin and Cylindrospermopsin)
- Testing occurring with Unregulated Contaminant Monitoring Rule (UCMR4)
- Currently each state is implementing individual programs. Regulations in Ohio, Rhode Island, and now Oregon.



Advisory Levels

- Drinking water:

Cyanotoxin	For Vulnerable People (ppb)	For Age 6 and Above (ppb)
Total Microcystins	0.3	1.6
Cylindrospermopsin	0.7	3

- Recreational waters:

Table 2. Health advisory RUVs for cyanotoxins in Oregon recreational waters (µg/L)

<i>RUVs*</i>	<i>Microcystin</i>	<i>Anatoxin-a</i>	<i>Saxitoxin</i>	<i>Cylindrospermopsin</i>
	4	8	4	8

Until July 2018, Public Water Systems voluntarily monitoring for toxins in Oregon

- Salem conducting aggressive toxin monitoring in Detroit reservoir, downstream of reservoir and at their treatment plant.
- Beginning in May 2018, Salem starts detecting a bloom on Detroit reservoir, recreational advisory posted on May 23rd.
- Toxins being detected downstream of Detroit reservoir including Salem's raw water intake
- Salem detects toxins in finished water!



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Salem Cyanotoxin Incident

Quick Facts:

- 33 days of Do Not Drink Advisory for vulnerable population.
- 5 days with exceedances of HALs, no 10 day exceedance.
- Local emergency response with State support.
 - Marion County EOC
 - State EOC
 - PHD AOC
 - Joint Information Center
- Assistance from other water systems received through ORWARN.
- City, County and National Guard operated bulk water distribution sites, some operated 24/7.
- Salem installed PAC pre-treatment within weeks.
- OHA adopted temporary cyanotoxin rules within 3 weeks.

Salem Cyanotoxin Incident--After Action

- Legislature's Emergency Board action:
 - New permanent NRS 4 Emerging Contaminants Coordinator
 - Cyanotoxins, Legionella, Manganese, PFAS, etc
 - Engage in UCMR process
 - New limited duration NRS 3 Emergency Preparedness
 - Request to fund 5 FTEs proposed for 2019
- State Drinking Water Response protocol:
 - Working with OHA/PHD Health, Security, Preparedness and Response section staff

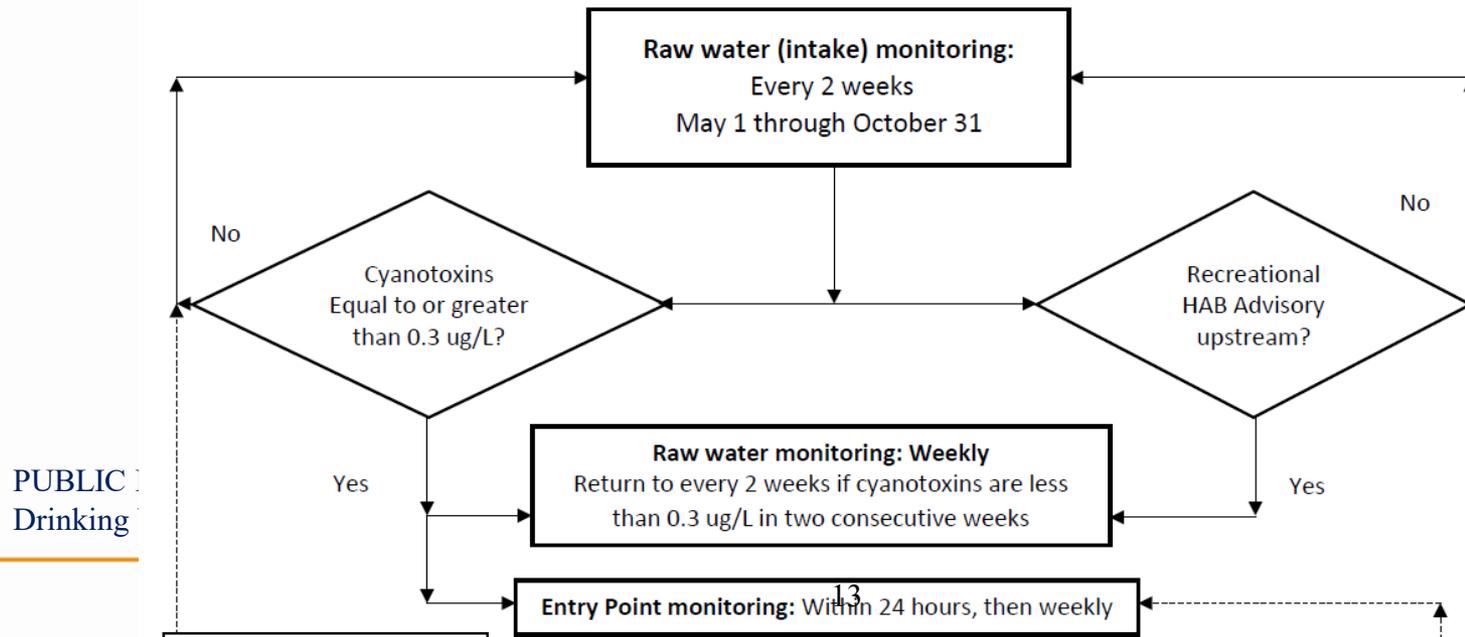


Temporary cyanotoxin rules (effective July 1, 2018)

- 100 sources were sampled every two weeks for total microcystins and cylindrospermopsin
- If detected, raw and finished water sampled weekly
- If detected in finished water, test daily

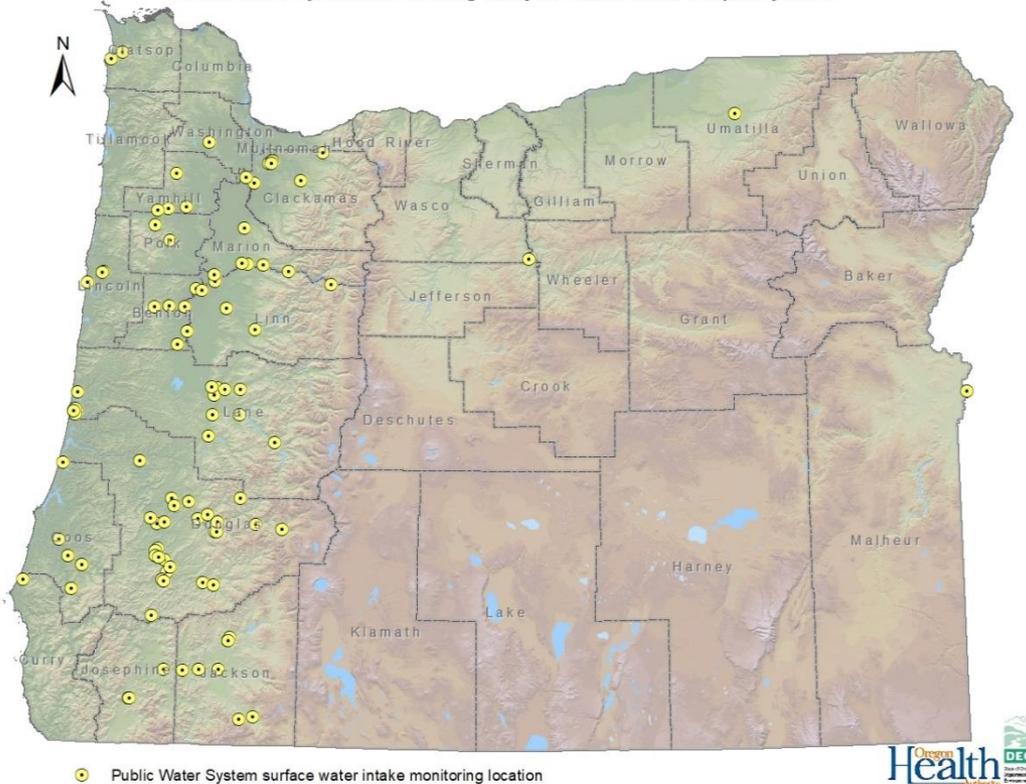
Cyanotoxin Monitoring Requirements

Oregon Health Authority
July 2018



Temporary Cyanotoxin Monitoring Results

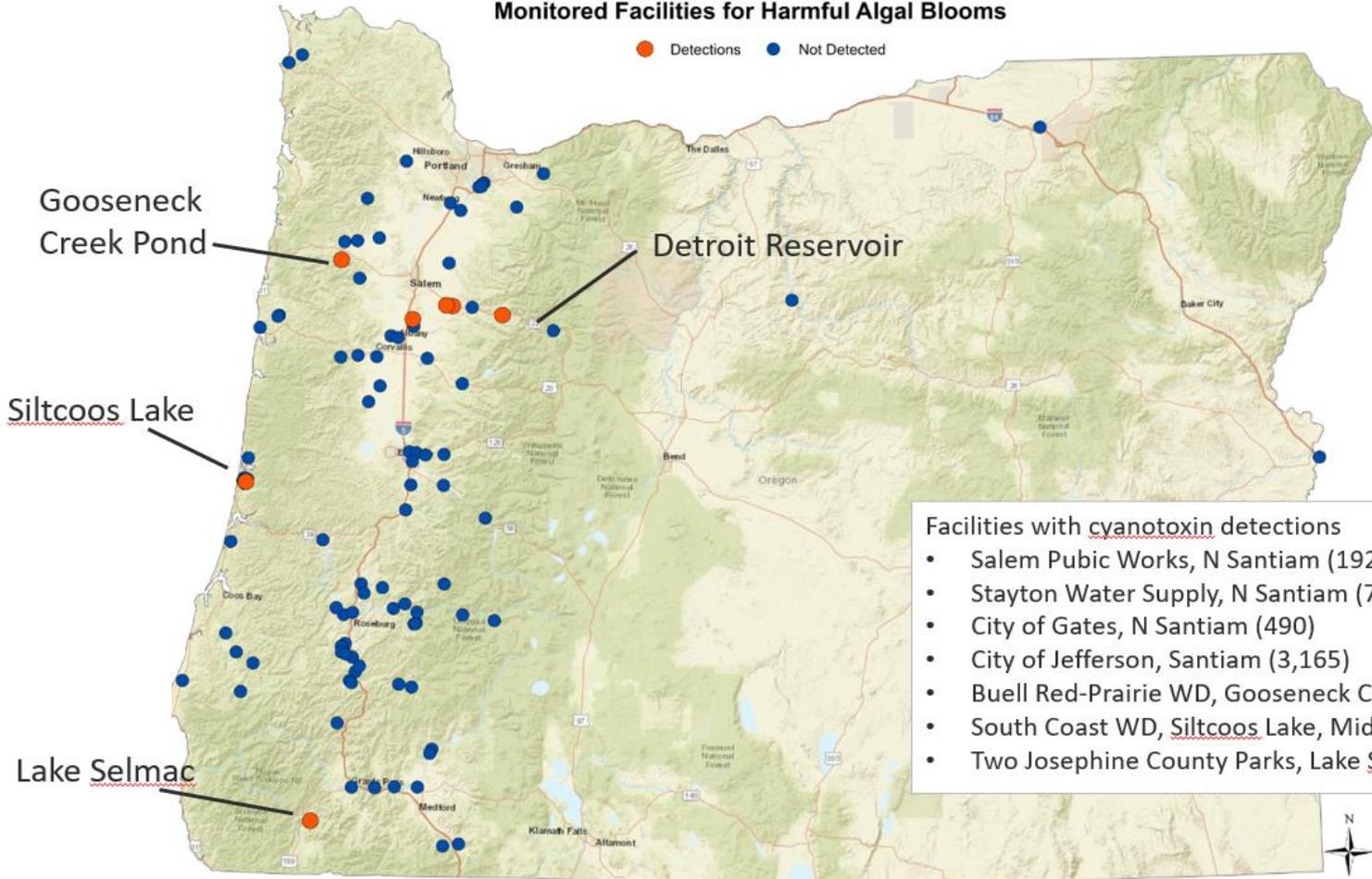
Public Water Systems monitoring for cyanotoxins under temporary rules



- 8 systems (4 sources) detected total microcystins
- Other than Salem, 17 samples found Microcystins in source
- 1 system detected cylindrospermopsin in source
- **No detections at any entry point (finished water) samples**

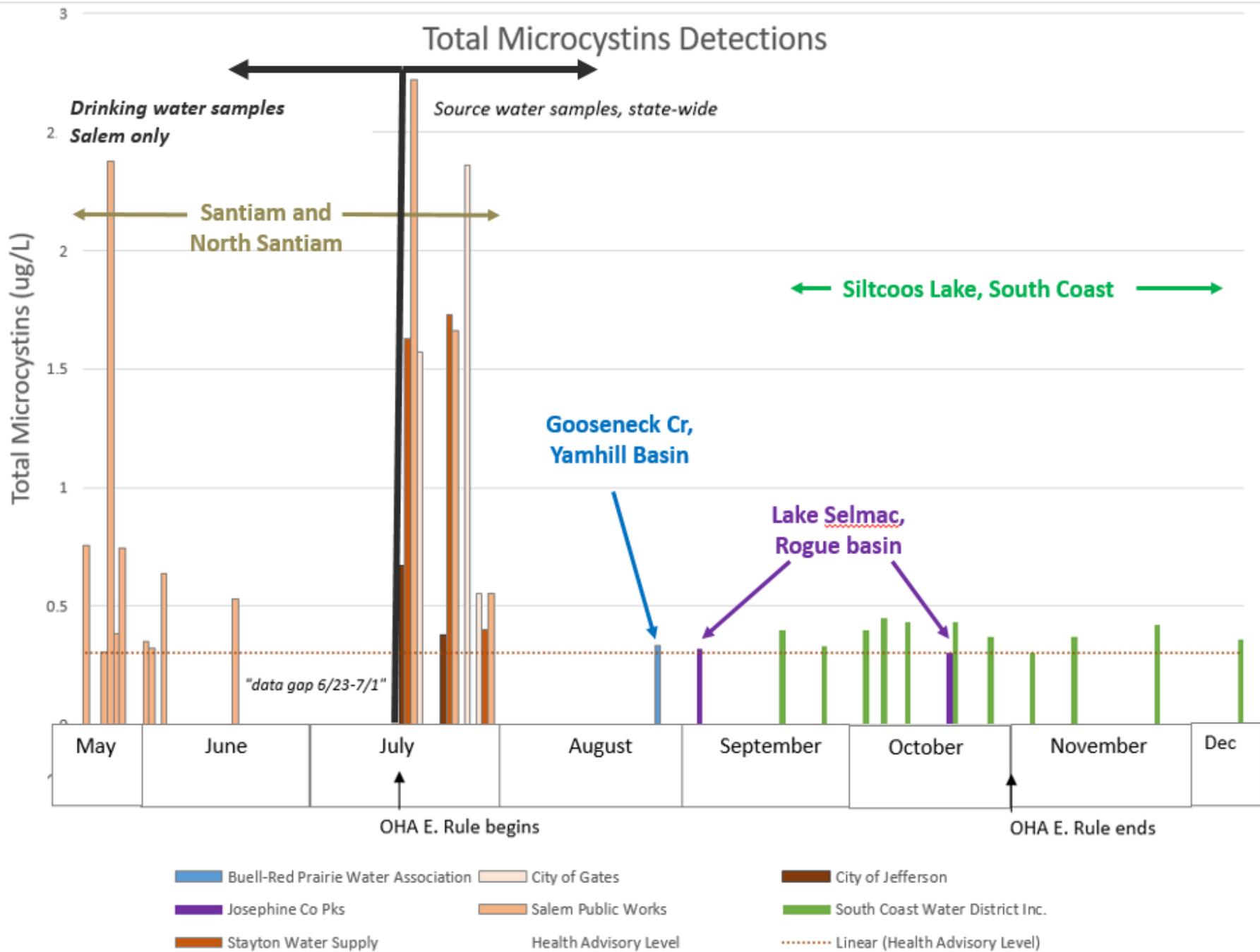
Monitored Facilities for Harmful Algal Blooms

● Detections ● Not Detected

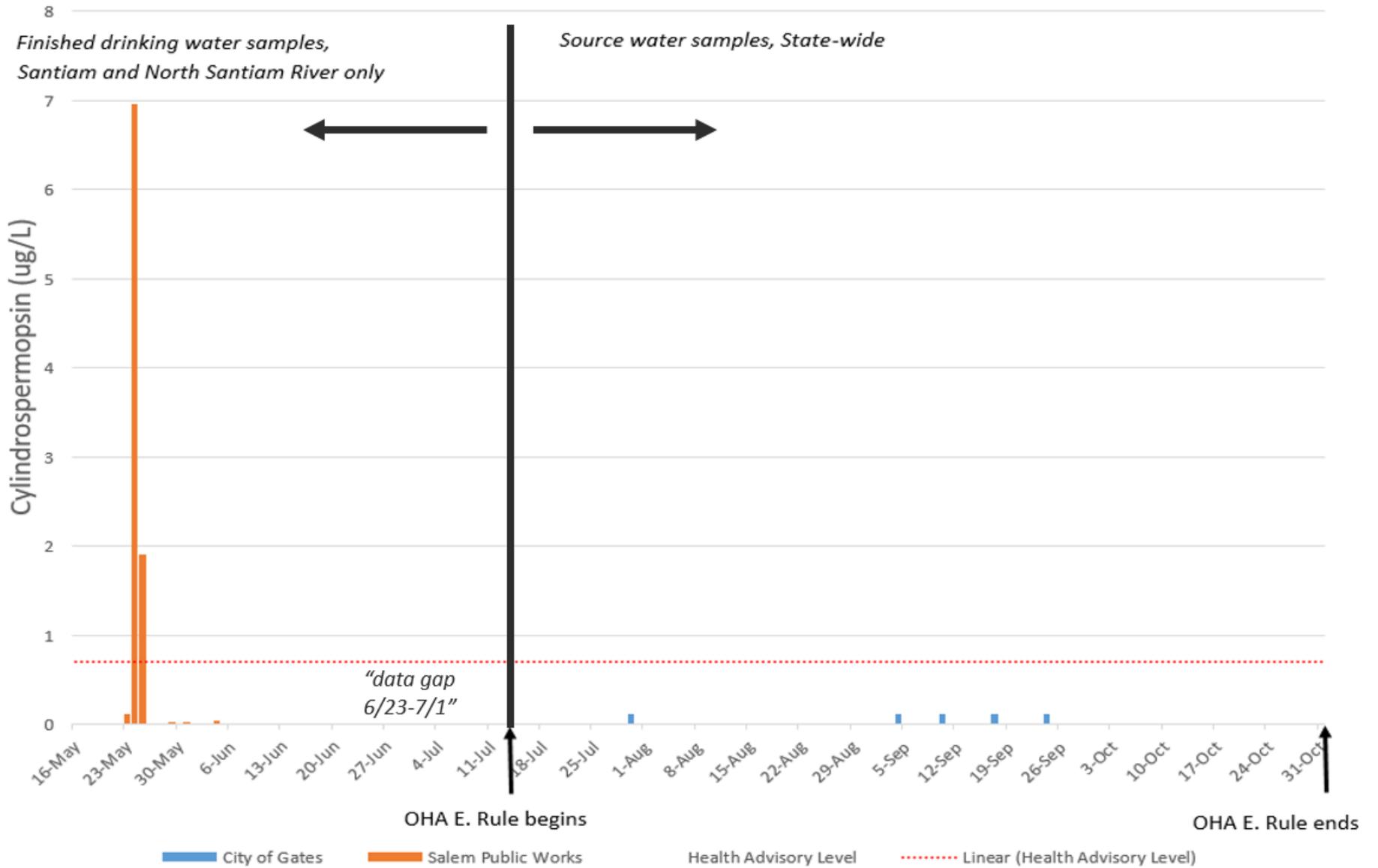


- Facilities with cyanotoxin detections
- Salem Pubic Works, N Santiam (192,000)
 - Stayton Water Supply, N Santiam (7,830)
 - City of Gates, N Santiam (490)
 - City of Jefferson, Santiam (3,165)
 - Buell Red-Prairie WD, Gooseneck Cr Pond, Yamhill basin (976)
 - South Coast WD, Siltcoos Lake, Mid Coast basin (200)
 - Two Josephine County Parks, Lake Selmac, Illinois basin (50)

Total Microcystins Detections



Cylindrospermopsin Detections



Permanent cyanotoxin monitoring rules 2019 – Susceptible systems

- Approximately 58 PWS currently meet the rule criteria for conducting routine monitoring (“susceptible source”):
 - 1 or more HABs documented, or at least 1 cyanotoxin detected in source or other location in a PWS;
 - Source or upstream waterbody on DEQ 303(d) list for not meeting WQ standards for algae and aquatic weeds;
 - Downstream / influenced by source susceptible to HABs or cyanotoxins; or
 - DWS determines the source is susceptible based on other factors (slow moving / stagnant water, temp, available sources of nutrients, WQ data, satellite imagery, presence of MYC or CYN producing genes)
- List of susceptible systems posted on our website. Subject to change as new information becomes available.

Table 1. Public Water Systems susceptible to harmful algae blooms (HABs) and subject to OAR 333-061-0510 to 333-061-0580 for OHA-DWS Permanent Cyanotoxin Rules

version: April 14, 2019 , subject to change

Notes:

(1) Includes surface water intake and groundwater under the direct influence of surface water (GWUDI) sources. Systems that purchase water from wholesale providers (*) can be identified in OHA's Data Online for each individual PWS.

(2) System Type: C = Community; NTNC = Non-Transient Non-Community; NC=Transient Non-Community; NP= Non-Public State Regulated systems

(3) Previous HAB Detection or Advisory based on Recreational HABs from OHA, 2011, updated with data from OHA Recreational HAB Website for 2012-2018; Previous cyanotoxin detections based on 2018 or earlier PWS or watershed data.

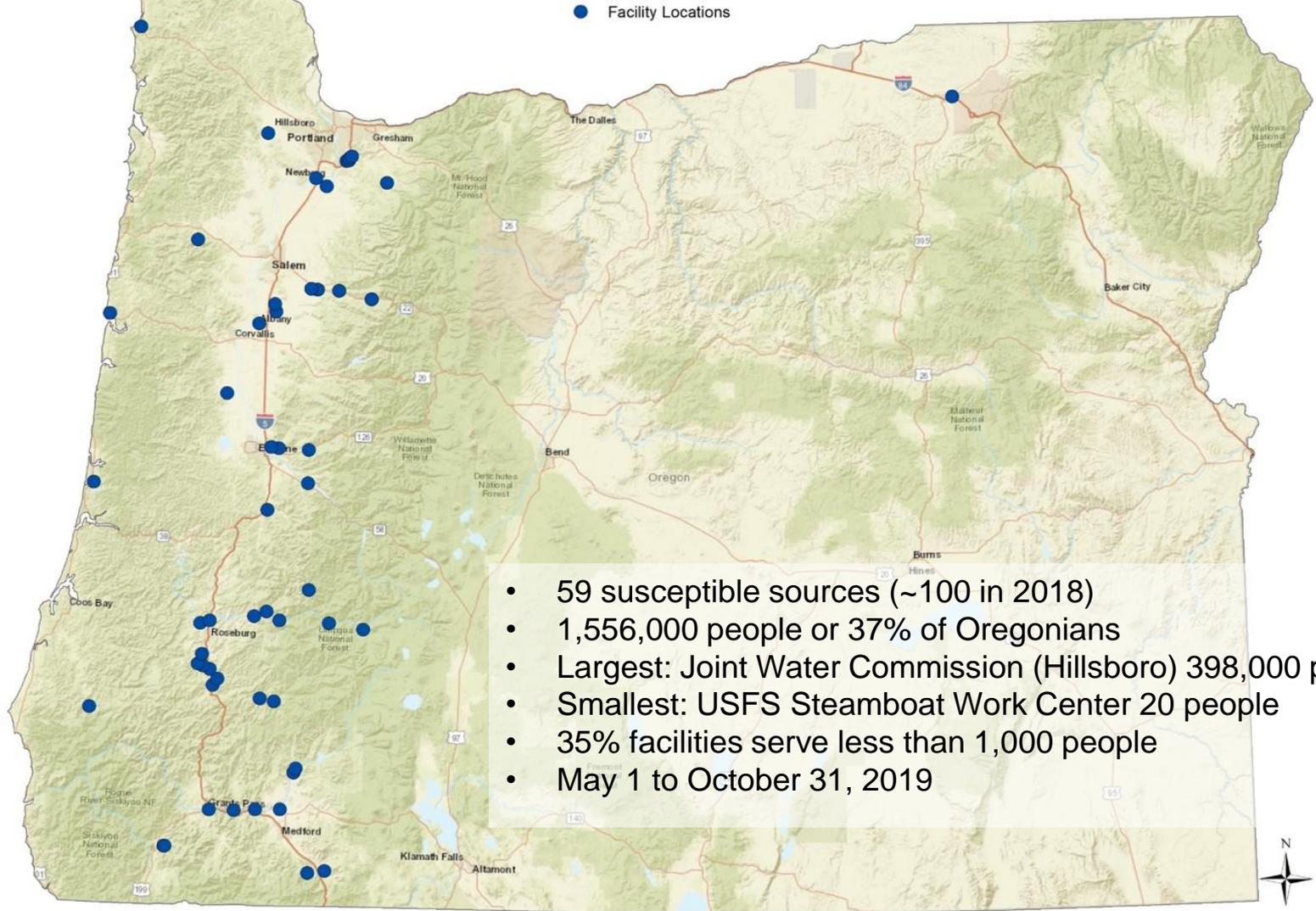
(4) DEQ Water Quality Limited (WQL) listing indicates the waterbody is impaired and needs a Total Maximum Daily Load to calculate amount of pollutant a water body can receive and still meet Oregon water quality standards. Based on Category 4 and 5 listings in most recent OR DEQ Integrated Report and 303(d) list (2012).

(5) GU - Groundwater under the direct influence of surface water - refers to a groundwater source that is located close enough to nearby surface water (e.g., a river or lake) to receive direct surface water recharge. Since a portion of the groundwater source's recharge is from surface water, the groundwater source is considered at risk of contamination from pathogens and viruses that are not normally found in true groundwaters and the water source is subject to the surface water treatment rule.

PWS_ID	PWS Name ⁽¹⁾	Drinking Water Source	County	System Type (2)	Population Served	"Susceptible" Water Source (OAR 333-061-0510 (2)) risk criteria/factors identified in the Drinking Water Source Area		
						Previous Documented HAB or Cyanotoxin Detection ⁽³⁾ OAR 333-061-0510 (2a and 2c)	DEQ Water Quality Limited (WQL) listing ⁽⁴⁾ for algae and aquatic weeds OAR 333-061-0510 (2b and 2c)	Other Criteria OAR 333-061-0510 (2d)
Susceptible Water Source per OAR 333-061-0510 (2)								
OR4100012	Albany, City of (*)	Santiam River	Marion	C	56,100	X	X	
OR4101483	Angler's Cove/SCHWC	Rogue River	Jackson	C	80	X	X	
OR4100047	Ashland Water Department	Ashland Creek	Jackson	C	21,505	X		
OR4101174	Buell-Red Prairie Water Association	Gooseneck Creek	Polk	C	976	X		
OR4191786	Camp Baker BSA	Infiltration Gallery	Lane	NC	75	X	X	
OR4100157	Canby Utility	Common header for Molalla River, IG and Springs Gallery	Clackamas	C	16,866	X		
OR4100187	Clackamas River Water - Clackamas (*)	Clackamas River	Clackamas	C	37,638	X	X	

2019

Monitored Facilities for Harmful Algal Blooms



Permanent rules – Monitoring requirements

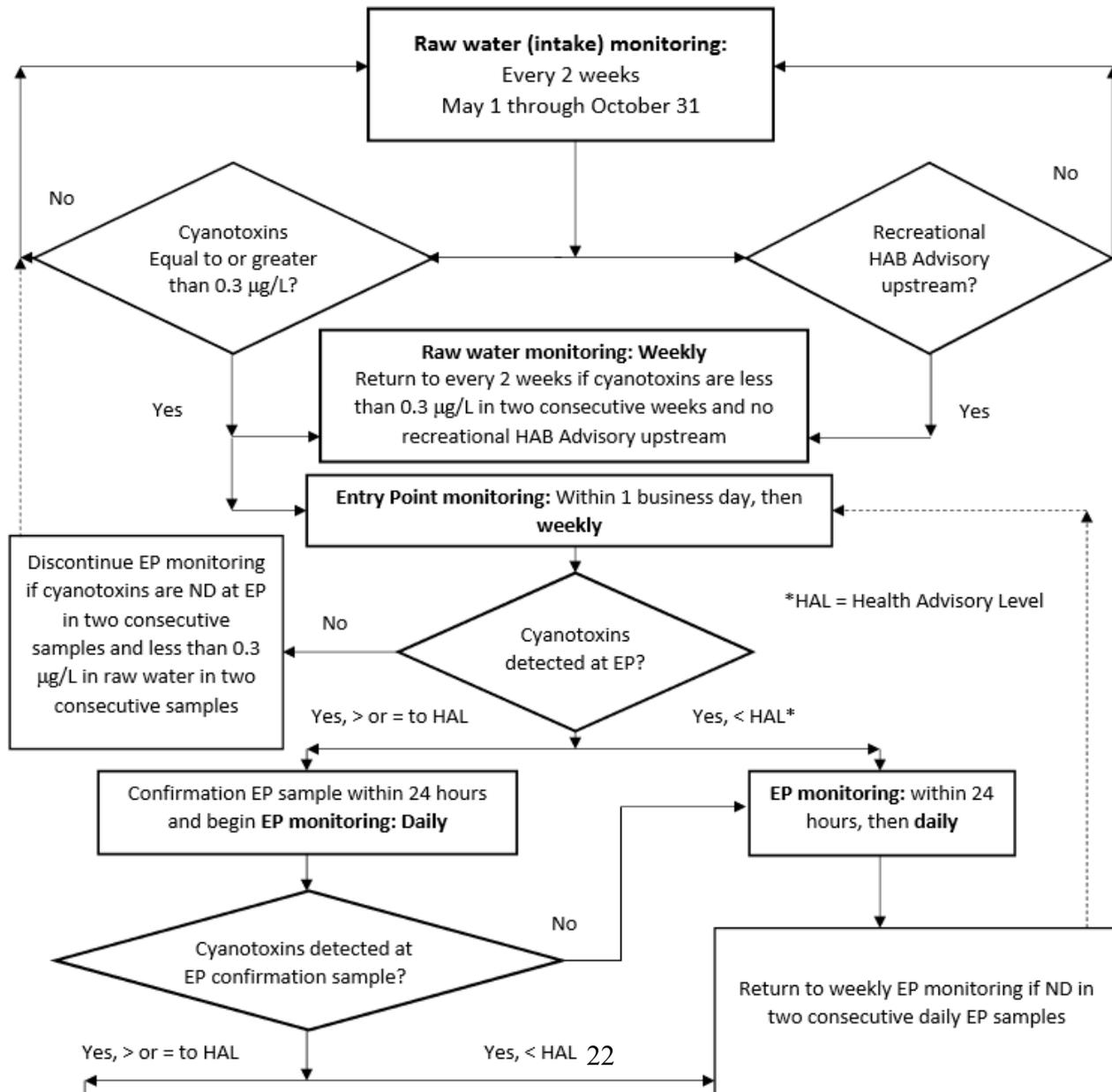
- Routine monitoring = test raw water for Total Microcystins and Cylindrospermopsin every two weeks from May to October.
- If either toxin ≥ 0.3 ppb or recreational HAB advisory upstream, weekly raw and finished water monitoring required.
- If toxins detected in the finished water, daily FW monitoring required.
- If finished water testing is confirmed above the Health Advisory Levels = issue a Do-Not-Drink advisory
- A flow chart of monitoring requirements is available on our website.

Cyanotoxin Monitoring Requirements

For Sources Determined to be Susceptible

Oregon Health Authority

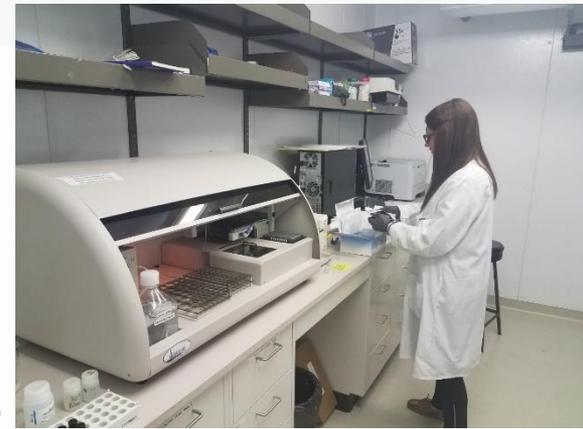
December 2018



Purchasing water systems

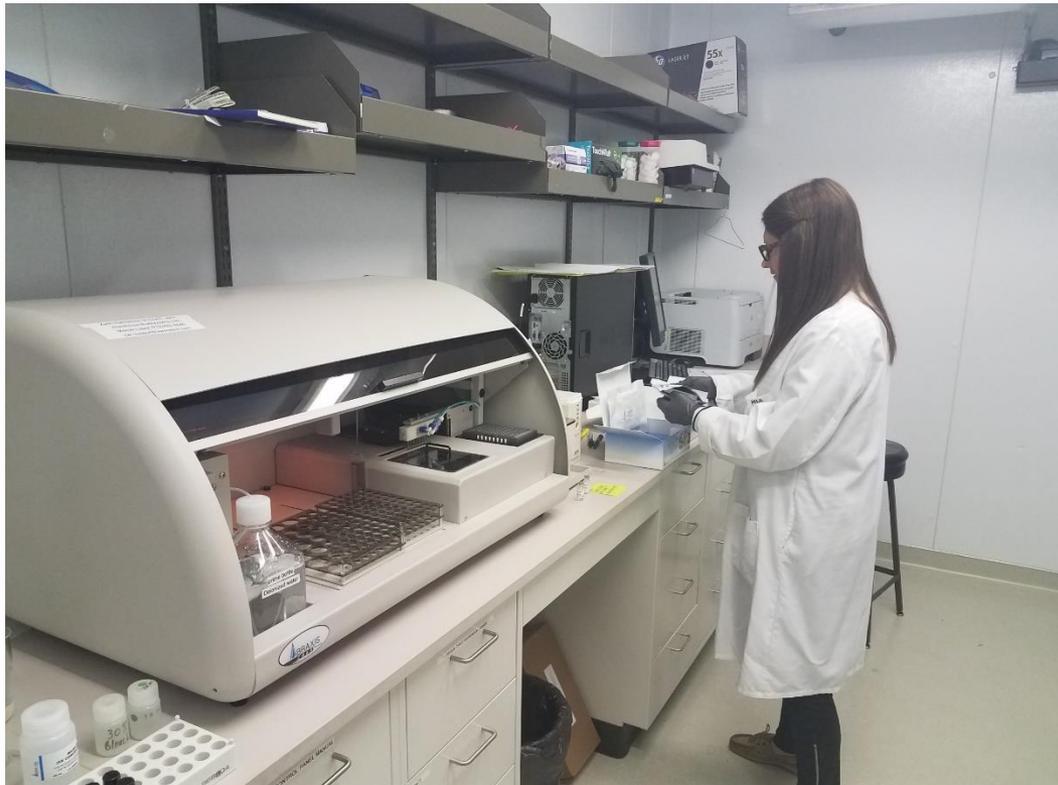
- No routine sampling is required
- If the seller has an initial sample over the HAL at their entry point, they must notify purchasers within 24 hours (heads up)
- If a confirmation sample is also over the HAL at the seller's EP, they must notify purchasers within 8 hrs (joint advisory issued)
 - * Advisory may be lifted at purchasing systems when two consecutive sample rounds at representative locations are < HAL

Analytical methods

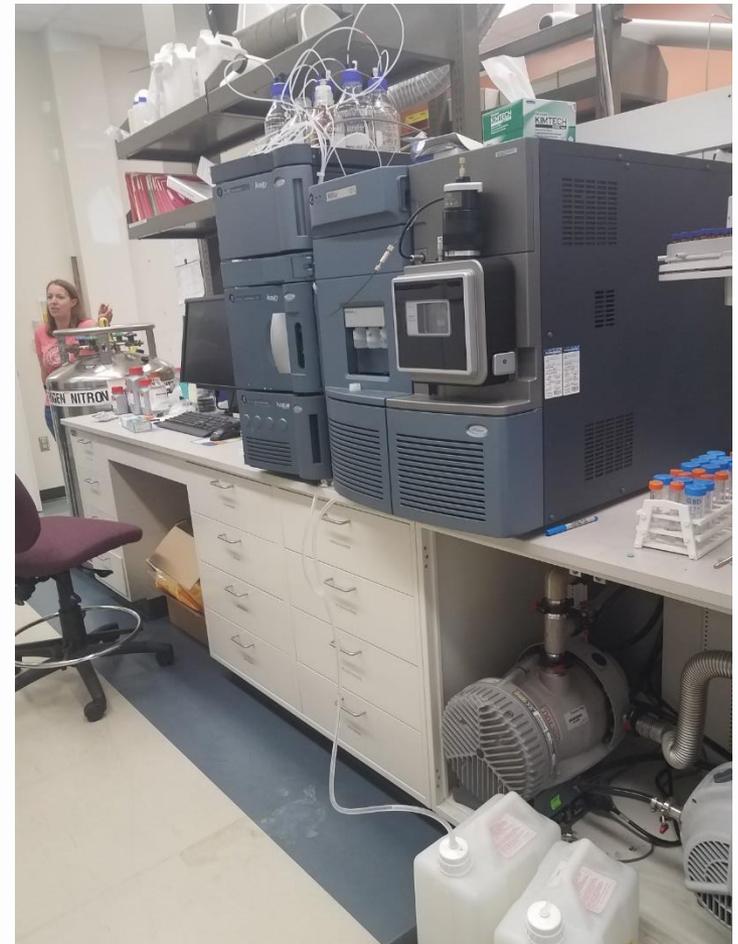


- Must use ORELAP-accredited lab or the DEQ lab.
- Total microcystins: EPA method 546 (ELISA). This is the ONLY method that measures total microcystins.
- Cylindrospermopsin: DEQ Analytical Method for Determination of Cylindrospermopsin in Raw and Finished Water by ELISA (No ELISA EPA standard method exists).
 - If detected at the entry point over the HAL, EPA method 545 must be used (LC MS/MS). Best to confirm with an EPA standard method.

Lab methods



ELISA: Enzyme Linked Immunosorbent Assay



LC MS/MS: Liquid Chromatography with tandem mass spectrometry

Reporting

- PWS must ensure labs analyze and report results > HAL within 2 business days
- Treated water samples > HAL must be reported to OHA & purchasers within 24 hrs
- Confirmation samples > HAL must be reported to OHA & purchasers within 8 hrs
- Report results to lift an advisory to OHA within one business day
- Report all other results to OHA by 10th of following month

Oregon Department of Environmental Quality Chain of Custody Record

Facility: Clackamas River Water - Clackamas - OR#100787
 Address: 8100 SE Mangan Drive
 Clackamas OR 97015
 Facility Contact: Suzanne DeLorenzo Facility Phone: (503) 722-9241

Office use Only
 A/E Work Order Barcode Here

Client: _____ Survey: _____

Sample Collector (S): _____ DEQ Contact: Michael Muirvey

Sampling Agency: _____

Sample Information						
Item	Sample ID	Water Facility/State Code	Source or Finish/ed water (Circle one)	Sample Collection Date and time	Collection Address (if in Distribution)	Comments
	TINWSF-11990_SRC-AA	Not Applicable	Source Water		CLACKAMAS RIVER	
			S F			
			S F			
			S F			

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

Sample Receipt Checklist "Office Use Only"

Yes No	Sampled Same Day?	Yes No	Temperature Check (R/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	Sample received intact and without damage?	Sample Receipt Comments	
Yes No	Sample volumes sufficient for requested analyses?	_____	
Yes No	All samples received within their holding times?	_____	

Funding

- The Oregon Legislature approved funding for analysis by the DEQ lab through June 30, 2019
- Continued funding has been requested in the 2019 legislature ([House Bill 3326](#))
- Private labs can also be accredited to analyze for cyanotoxins



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Web resources: healthoregon.org/DWP

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](#)

[Contact Us](#)

Rules for Cyanotoxin Monitoring in Drinking Water

Oregon Health Authority has developed permanent rules that require drinking water systems in the state using certain surface water sources, such as those prone 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

- [Permanent Rules for Cyanotoxin Monitoring at Public Water Systems \(final\)](#)
- [Cyanotoxin Monitoring Flowchart](#)
- [Cyanotoxin Sampling DEQ & OHA Presentation from 4/23/19](#). A recording of this webinar is not available.

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

- [EPA Water Treatment Optimization for Cyanotoxins](#)
- [American Water Works Association CyanoTOX Spreadsheet for Cyanotoxin Removal Rate Calculation](#)

What you can do now (for those required to monitor)

- Monitoring plan, including if detections are found
- Consider contracting with DEQ or other accredited lab for additional sampling
- Evaluate best treatment optimization steps if needed
- Update contact lists (internal, purchasers, state)
- Know where to get public notice templates and resources
 - * Determine representative distribution sampling sites

Take away messaging

- Public demands to know if they are at risk, even in absence of a federal regulation
- Testing the water is the only way to know for sure
- Tell people what you know when you know it
- Establish relationships with local stakeholders & agencies to prepare
 - How to reach vulnerable populations
 - Where to obtain water hauling trucks
 - Messaging plans
- Consider treatment options if your system is at risk

Questions?



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