Oregon's Approach to Incorporate Harmful Algal Blooms in 303(d) programs

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2025 National Training Workshop Breakouts IV:
Algal Blooms/HABs: Innovative Approaches to Criteria Development, Assessment, and TMDLs

June 5, 2025

Oregon House Bill 3409 and ORS 468B.600

(1) The Department of Environmental Quality (DEQ), in coordination with the Oregon Health Authority (OHA), shall:

(a) Develop and maintain a coordinated state agency harmful algal bloom monitoring and response strategy.

….

(c) Produce timely and high-quality data that allow the authority to determine the level of risk of harm or injury to public health by the occurrence of harmful algal blooms.

….

(f) Develop and implement strategies for reducing pollutants that contribute to the occurrences of harmful algal blooms and the frequency and severity of harmful algal blooms.

….

(g) Monitor and evaluate the effectiveness of strategies implemented for reducing pollutants that contribute to the occurrences of harmful algal blooms.

….

Oregon DEQ HABs Strategy (2023)

- Outlines how DEQ detects, monitors, assesses, and manages HABs with partners
- Identify achievements and gaps in the current DEQ approach to HABs
- Make recommendations for improvements and expansion of the strategy

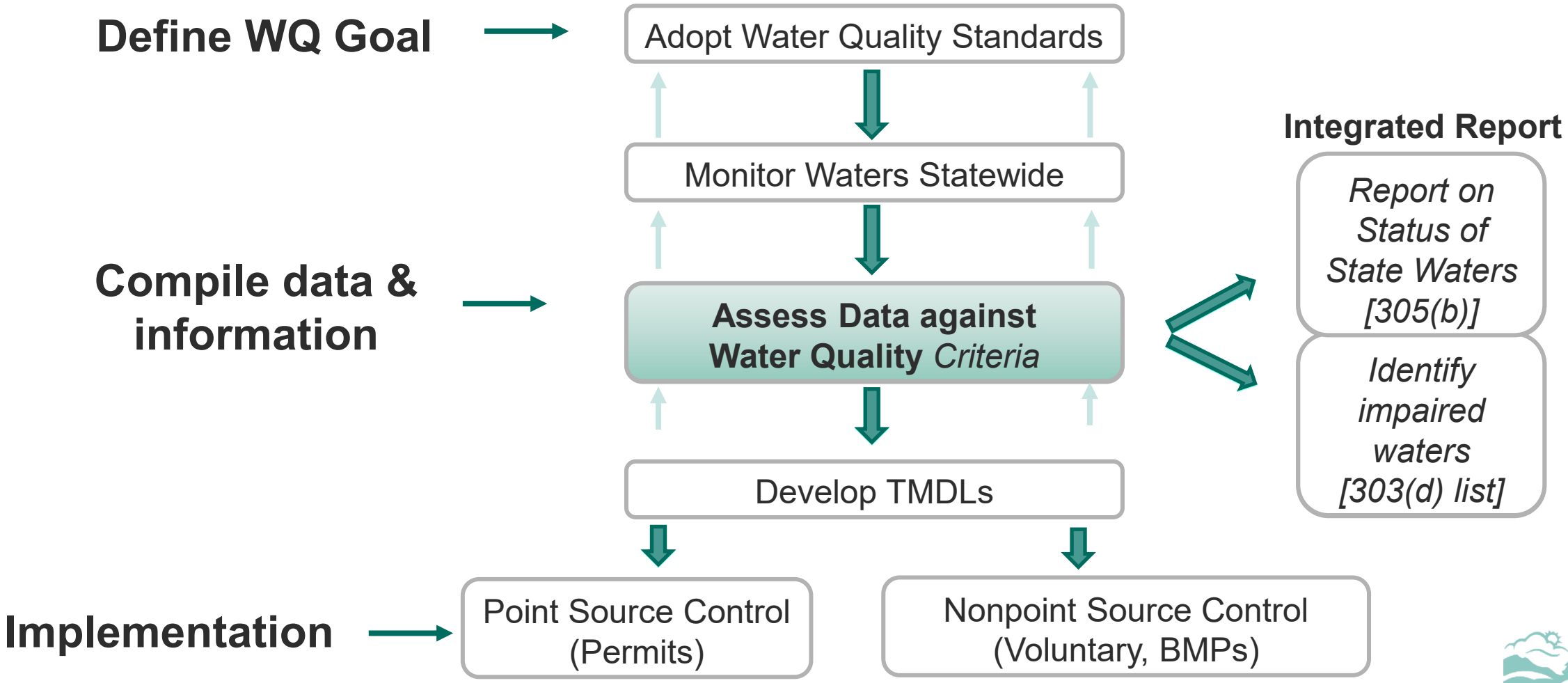
https://www.oregon.gov/deq/wq/pages/harmful-algal-blooms.aspx

DEQ HABs Strategy (2023) Components

- Drinking Water: Monitoring and Public Response
- Recreational Use: Public Health Response
- Clean Water Act: Assessment and Actions

https://www.oregon.gov/deq/wq/pages/harmful-algal-blooms.aspx

Clean Water Act Framework



History of HABs Assessment

2010

Began to include waters with HABs related health advisories on the 303(d) list of impaired waters

- Based solely on Oregon Health Authority advisories

2012

DEQ applied the same 2010 methodology

2014/2016/2018/2020

Updated assessment methodology

- Includes toxins values
- Added a delisting

2022 & 2024

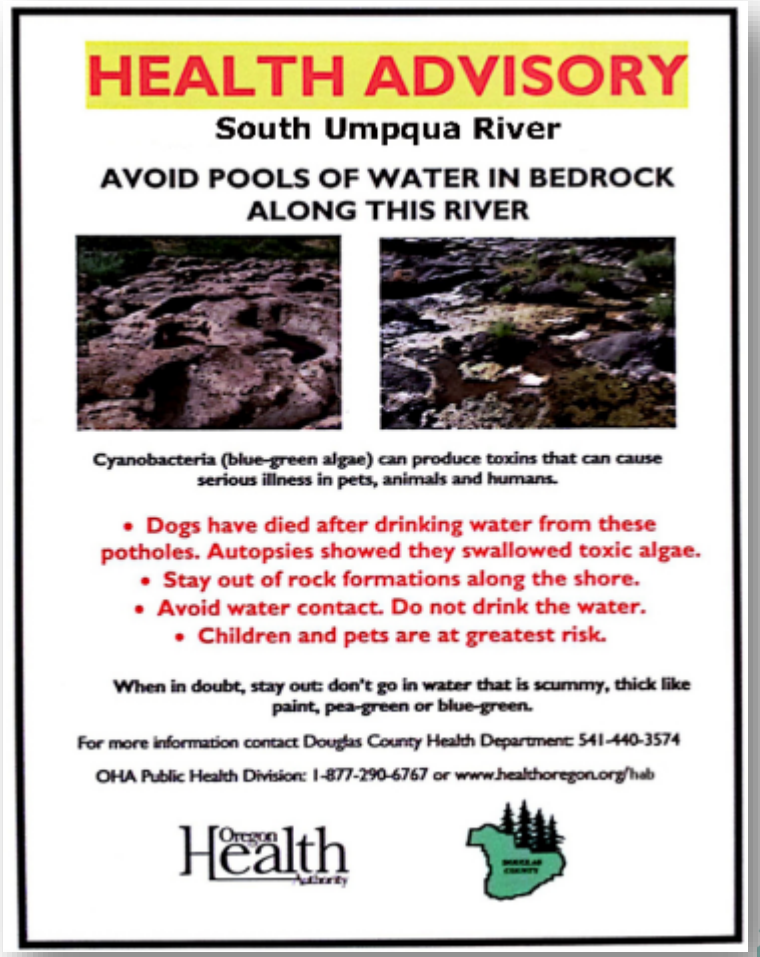
Applied the updated methodology

Initial Assessment Methodology

- Beneficial Use = Water Contact Recreation
- WQS = Statewide Narrative Criteria - OAR 340-041-007(9)
    - *The development of fungi or other growths having a deleterious effect on stream bottoms, fish or other aquatic life, or that are injurious to health, recreation, or industry may not be allowed;*
- Any waterbody with one or more Oregon Health Authority health-based advisory will be added to the 303(d) list
- Focus of the methodology
  – acknowledgement that recreational health-based advisories indicate beneficial use is not fully supported

Initial Assessment Conclusions

- Data and information used
  - Advisory information from OHA who is the authority for health-based advisories
  - Advisories at that time were based on photographic evidence, local lake authority reports and cell counts
- Category 5
  - 42 waterbodies added to the 303(d) list in 2010 & 2012
    - 35 lakes and reservoirs
    - 7 rivers and streams



Methodology Revisions

2020 - Specified beneficial use

- Recreation
  - Remain public health advisory driven
  - Required toxin data or multiple advisories for adding to 303(d) list
- Drinking water source water
  - Assessment of cyanotoxins in finished water
- Livestock watering
  - Used a microcystin threshold value published in the literature
- Delisting Methodology

2026 – Minor updates to all uses

NEWS

Salem reissues do-not-drink alert after toxins found again in drinking water

Jonathan Bach and Zach Urness Statesman Journal

Published 10:50 a.m. PT June 6, 2018 | Updated 7:05 p.m. PT June 6, 2018

HABs Water Contact Use Assessment

Category 5

- Any public **health advisory issued by the Oregon Health** Authority,
  - is a permanent advisory;
  - a single advisory issued with OHA current guidelines requiring cyanotoxin results are above their recreational use value;
  - does not have associated toxin data, but has reoccurred for two or more times in the IR data window, (advisory issued with previous OHA guidance

Category 3B

- Single season public health advisory issued by the Oregon Health Authority, with **no associated toxin data** (advisory issued with previous OHA guidance)
- OHA issued a **precautionary** advisory based on the 2024 Advisory Guidelines

Delisting

1. free of a recreational advisory for 3 consecutive seasons in the IR data window
2. at least three years of critical period cyanotoxin data below OHA advisory levels

HABs Drinking Water Use Assessment

Category 5

- **finished water** exceeds EPA Drinking Water Health Advisories for Cyanotoxins for vulnerable groups **AND** where the water body is the source of water for a public water system
- **raw source water** exceeds EPA Drinking Water Health Advisories levels for Cyanotoxins for vulnerable groups for water bodies with known drinking water intakes **AND** the Public Water System operator reports that cyanotoxins are causing operational difficulty.
- where there is a livestock watering use and state and local partners confirm a HABs related animal death occurred

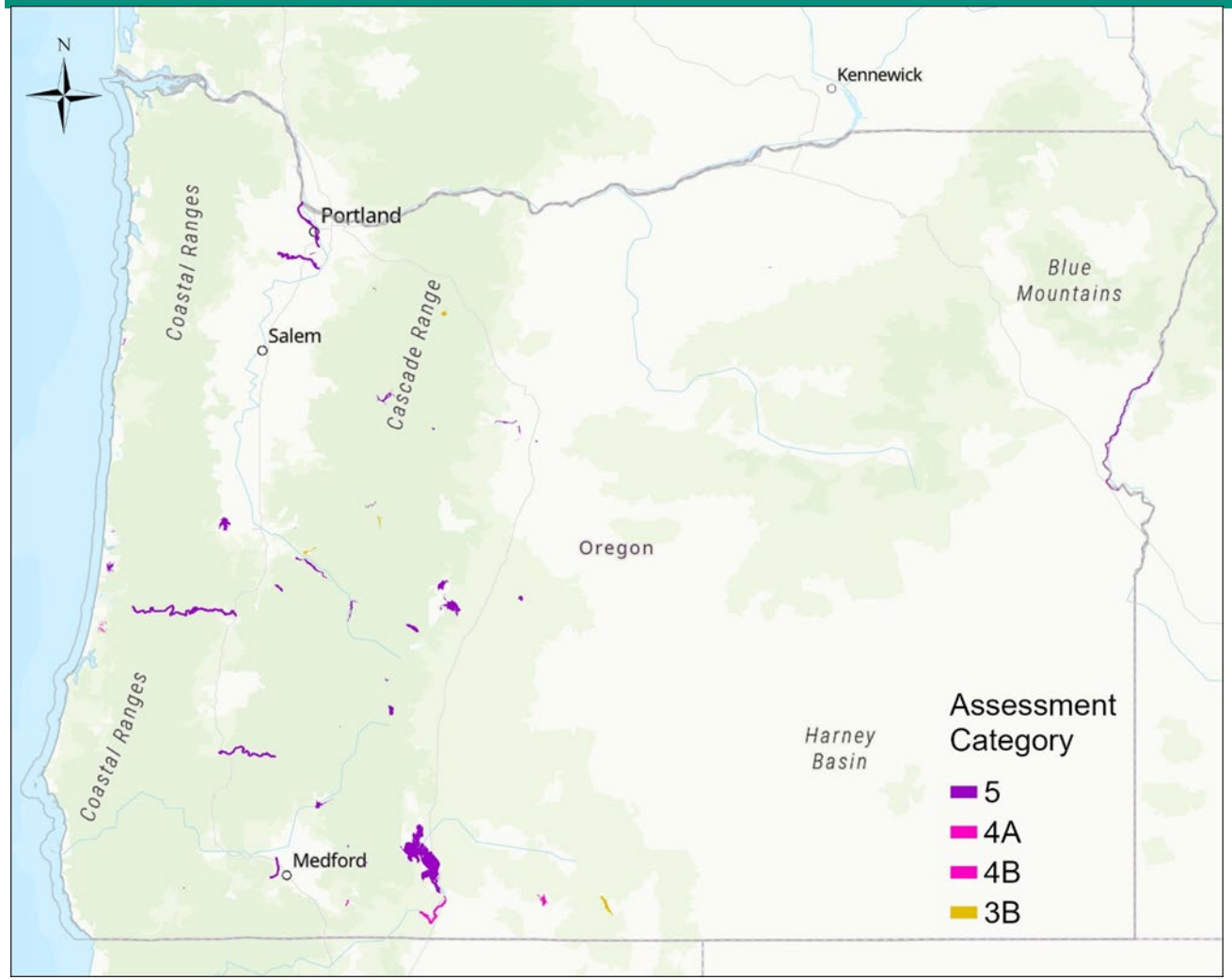
Category 3B

- If raw source water exceeds EPA Drinking Water Health Advisories levels for Cyanotoxins for vulnerable groups for water bodies with known drinking water intakes **AND** no operational difficulty are reported

Delisting

- For HABs related impairments to drinking water beneficial uses, DEQ will work partners to ensure the underlying causes of the bloom in the source water have been reduced and that all cyanotoxin data from raw and finished water in the IR data window are below EPA Drinking Water Health Advisories for Cyanotoxins for vulnerable groups.

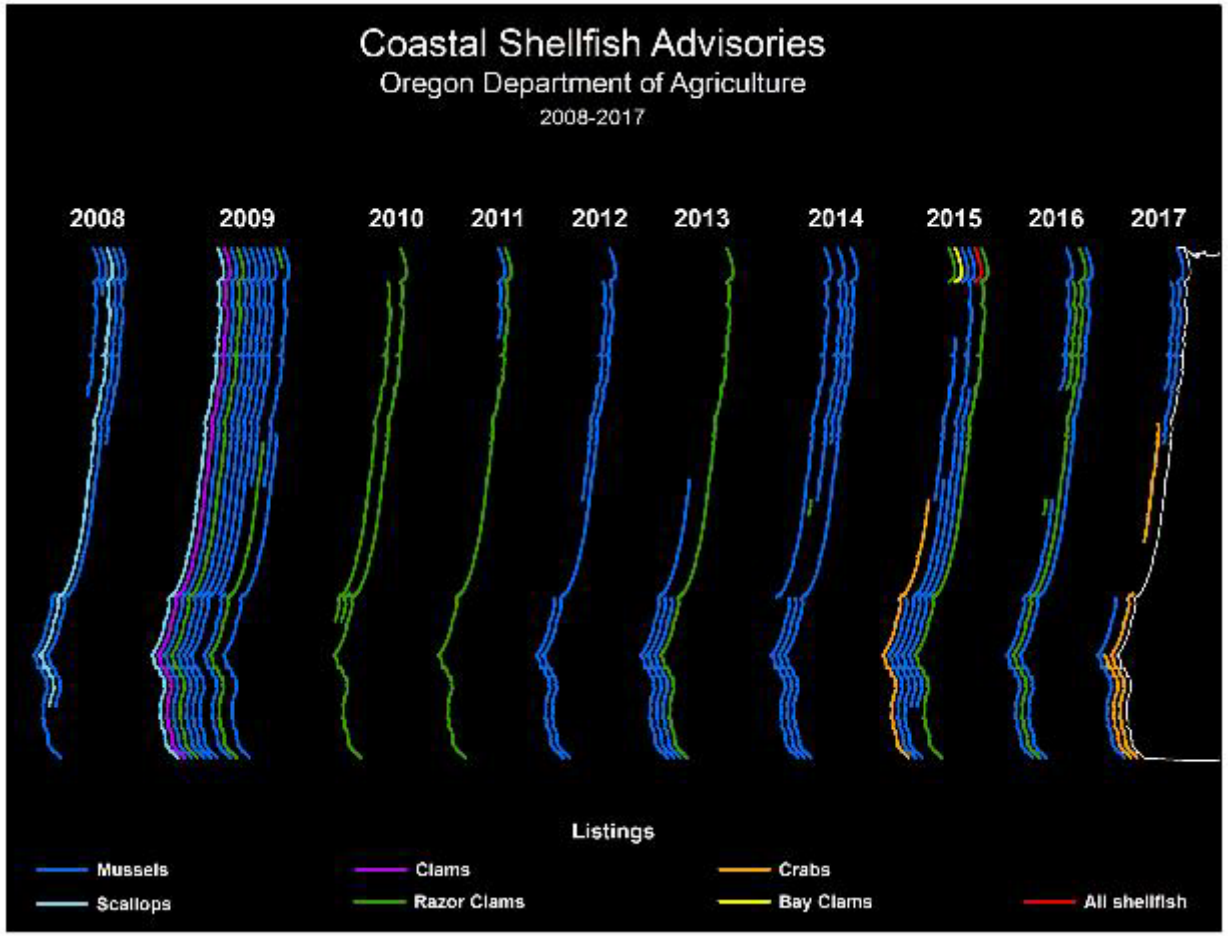
2022 HABs Impaired Waters



- Category 2 (Supports)
  - 0 Category waterbodies
- Category 3B (Potential concern)
  - 6 lakes and reservoirs
- Category 4A (TMDLs)
  - 5 lakes and reservoirs
  - 2 rivers and streams
- Category 4B (Alternative Plan)
  - 1 lake (Laurelhurst Pond)
- Category 5 (Impaired)
  - 37 lakes and reservoirs
  - 8 rivers and streams

Ideas for Future Revisions

- Allow for independent assessment of toxin data not linked to an OHA advisory
  - Potentially as Category 3B
- Satellite data
  - Potentially as Category 3B
- Marine HABs
  - Currently listing waters based on ODA shellfish advisories



Addressing HABs through TMDLs in Oregon

- 25 “official and unofficial” TMDLs for HABs
  - Five “official” TMDLs linked to health advisories
  - All address either pH, DO, chlorophyll *a*, total phosphorus, or narrative criteria

- Most current HABs TMDLs address nutrients
  - 19 set limits for phosphorus loading
  - Seven set limits for nitrogen loading
  - One addresses nutrient cycling affected by invasive species (fish)

rstudioconnect.deq.state.or.us/tmdlquery/

Examples of TMDLs addressing HABs

- Columbia Slough (1998)
  - TP and DOP
- Tualatin River (2001)
  - TP, NH_3, BOD, settable solids
- Umatilla River (2001)
  - Heat
- Upper Klamath Lake (2002)
  - TP
- Snake River (2004)
  - TP

https://www.oregon.gov/deq/wq/tmdls/Pages/default.aspx

- Diamond Lake (2007)
  - Invasive fish (tui chub)
- Upper Klamath and Lost River (2019)
  - TP, TN, DIN, BOD
- Upper Yaquina Watershed (2023)
  - TP, solar radiation

https://www.oregon.gov/deq/wq/tmdls/pages/upperyaquina.aspx

www.bendbulletin.com

Other HABs related work in Oregon

- Drinking water cyanotoxin monitoring (coordination with OHA)
- Recreational monitoring network (coordination with OHA)
- 401 Certification for Dredge and Fill and Hydroelectric projects
- Satellite imagery (coordination with EPA CyAN project)

State of Oregon
DEQ Department of Environmental Quality

Satellite Estimates of Cyanobacteria in Oregon Lakes and Reservoirs

Reporting Period: May 21, 2025 - May 27, 2025

Introduction

This report presents recent and historical estimates of chlorophyll-a concentrations for 49 large waterbodies in Oregon. These estimates are derived from satellite imagery provided by the Cyanobacteria Assessment Network (CyAN) project. The Oregon DEQ updates the estimates weekly from spring through fall each year. The current report presents Version 6 (V6) data reprocessed by NASA in February 2025. The V6 dataset includes updated calibration for Sentinel 3A and 3B, an enhanced filter for turbid water, and atmospheric correction for water vapor. Additional information about the V6 dataset can be found on the NASA Ocean Color website. This report also includes available field measurements collected by the Oregon DEQ and other entities, as well as recreational health advisories for cyanobacterial bloom issued by the Oregon Health Authority.

Concentrations of chlorophyll-a (µg/L) associated with cyanobacteria dominance are shown at three levels: Low: 3-12 µg/L, Moderate: 12-24 µg/L, and High: >24 µg/L. These levels correspond to the World Health Organization (WHO) exposure guideline values for recreational waters (WHO, 2021). Also included are EPA's seven-day forecasts from the experimental CyanoHAB forecasting model based on CyAN satellite data. The model provides weekly probabilities that the median surface chlorophyll-a concentration is ≥12 µg/L. Higher probabilities indicate greater likelihoods of bloom occurrence. For more information on harmful algal blooms in Oregon, visit the Oregon DEQ and Oregon Health Authority websites.

All data presented in this report are provisional and subject to change. Satellite-derived estimates do not confirm the presence of cyanotoxins or other water quality impairments and do not have regulatory implications. **Visit the Oregon Health Authority to learn about recreational use and drinking water advisories related to cyanobacteria blooms.** Additional assessments using Sentinel 2 imagery, local visual assessments, and/or water quality sampling are needed to provide further information on potential human health and environmental effects of cyanobacteria. Factors such as cloud cover, ice, sun glint, water surface roughness, dry lake beds, algal mats, and shoreline effects can interfere with satellite imagery and estimation accuracy.

DISCLAIMER: Information is preliminary. Additional data are needed to confirm the presence of cyanobacteria blooms.

Oregon HABs R Shiny App

- Uses EPA CyAN V6 data
- Satellite chlorophyll *a* estimates
- Available field data
- OHA advisories
- EPA CyAN bloom forecasting

https://rstudioconnect.deq.state.or.us/Oregon-cyanobacteria-satellite-report/

DEQ

Oregon HABs Coordination Team

- Personnel from DEQ and OHA programs on HABs
- Maintain communication network
- Have monthly meetings to discuss current HABs issues
- Work with US EPA Region 10 and other partners

Questions?

Thanks to OHA and EPA Region 10!

Title VI and alternative formats

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