



State of Oregon
DEQ Department of Environmental Quality

Integrated Report 2022, Assessment Methodology

Water Quality Assessment Program

Nov. 10, 2022

Webinar 3

2 p.m. to 3:30 p.m.



Agenda

Time	Topic	Presenter
2:00 p.m.	Welcome and logistics	Michele Martin
2:10 p.m.	Background, Oregon's 2022 Water Quality Report and List of Water Quality Limited Waters (Integrated Report) and reminder that informal comments are due Nov. 24, 2020. <i>Presentation slides</i>	Becky Anthony
2:15 p.m.	Watershed assessment units: assessment by station <i>Presentation slides and watershed assessment units background paper</i>	Becky Anthony
2:45 p.m.	Aquatic life, aluminum <i>Presentation slides</i>	James McConaghie
3:25 p.m.	Next steps Presentation slides	Becky Anthony
3:30 p.m.	Adjourn	

Integrated Report process

Develop

- Develop a credible data policy and listing methodologies
- Public Comment

Solicit

- Issue data solicitation

Assemble and Evaluate

- Assemble and evaluate all existing and readily available water quality related data and information to develop the list

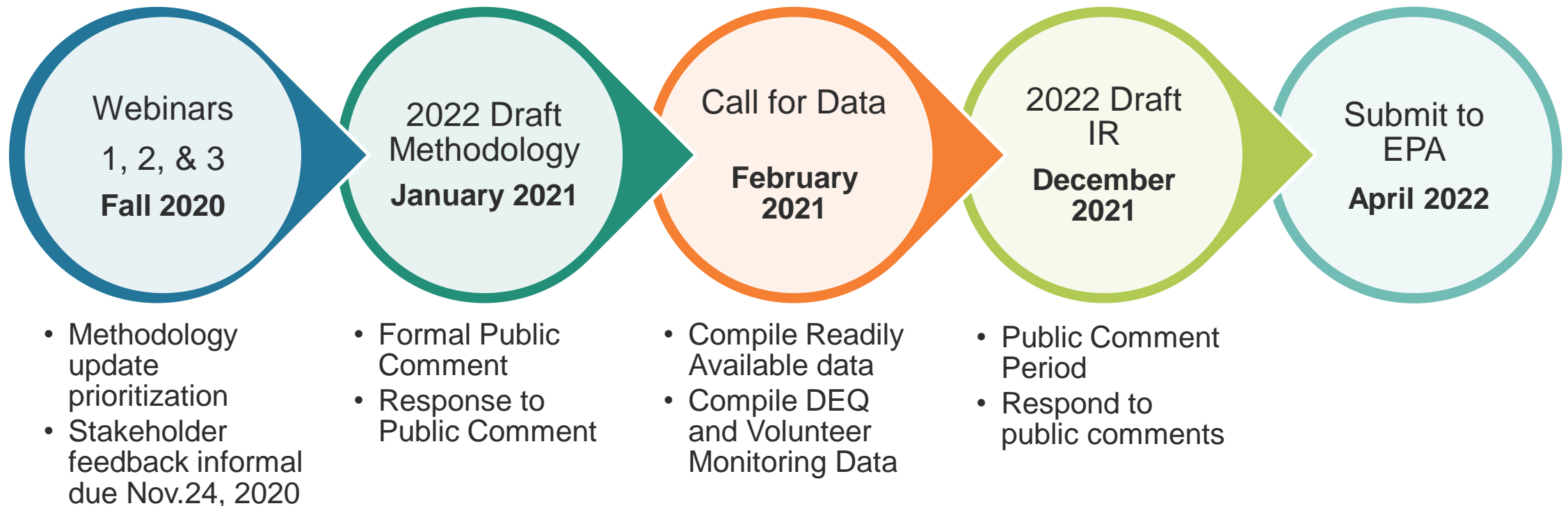
Assess

- Assess valid data using listing methodologies to compare to the Water Quality Standards

Report

- Report the status of all waters, placing impaired and threatened waters on the 303(d) list

Integrated Report 2022, schedule



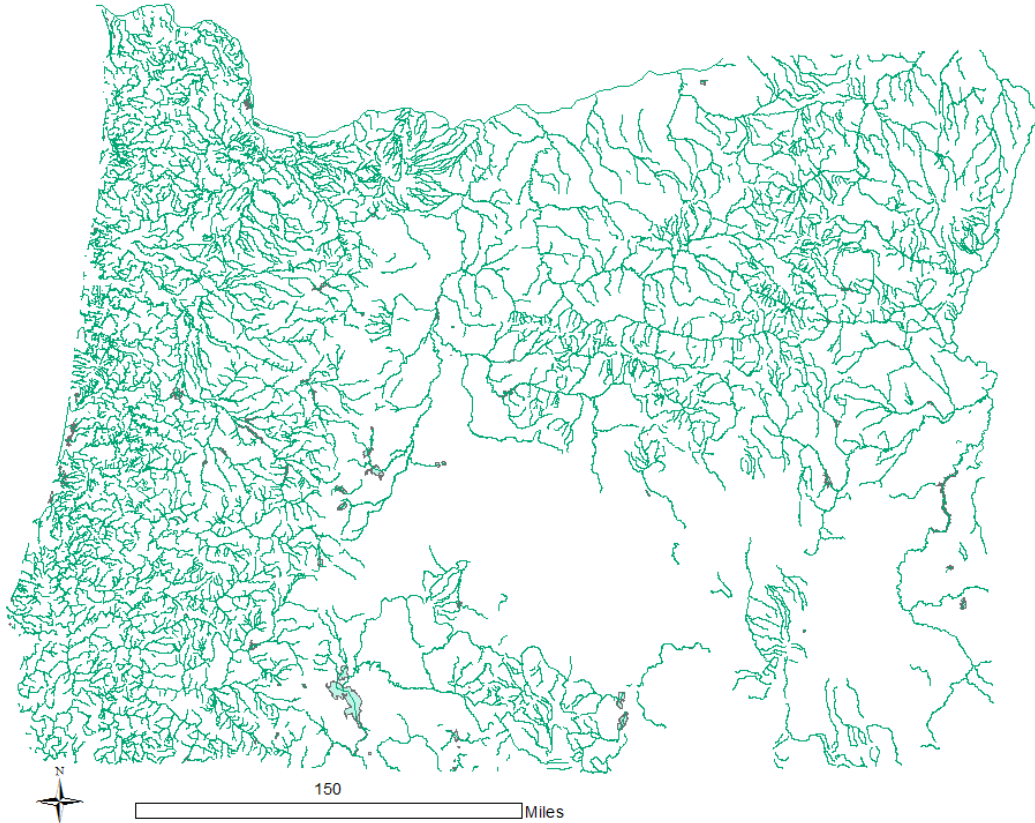
Short-term updates

- Delisting for dissolved oxygen
- Assessment of continuous pH
- Delisting for freshwater fecal coliforms
- Minimum data requirements for Category 2
- **Watershed units – assessment by station**
- **Aquatic life aluminum**

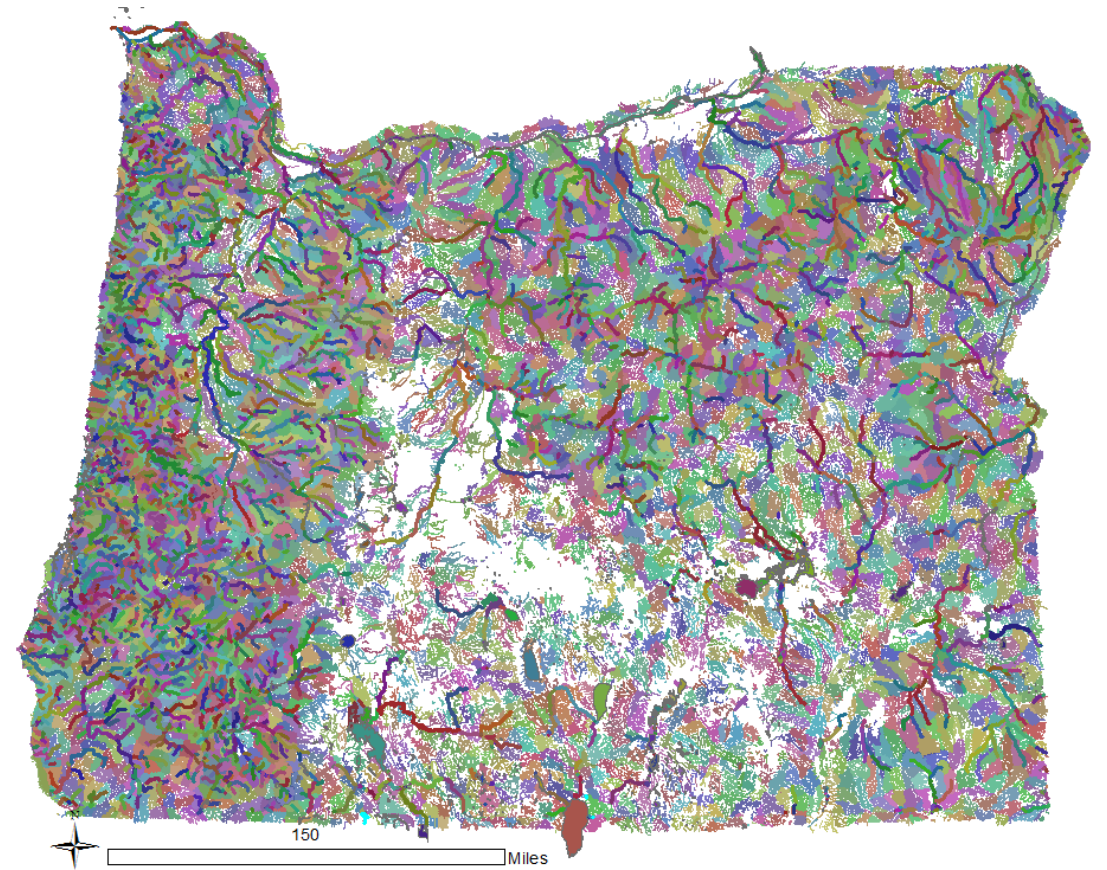
Goals of assessment unit delineation

1. Consistency between reporting cycles of the Integrated Report
2. Alignment with the National Hydrography Dataset which is the national and state standard for defining and mapping waterbodies
3. Create a manageable number of assessment units that can be assessed every two years
4. Align with EPA's ATTAINS reporting requirements
5. Base units on hydrologically relevant breaks, rather than human activity (land use changes, point sources, etc.)

Refresher on Assessment Units

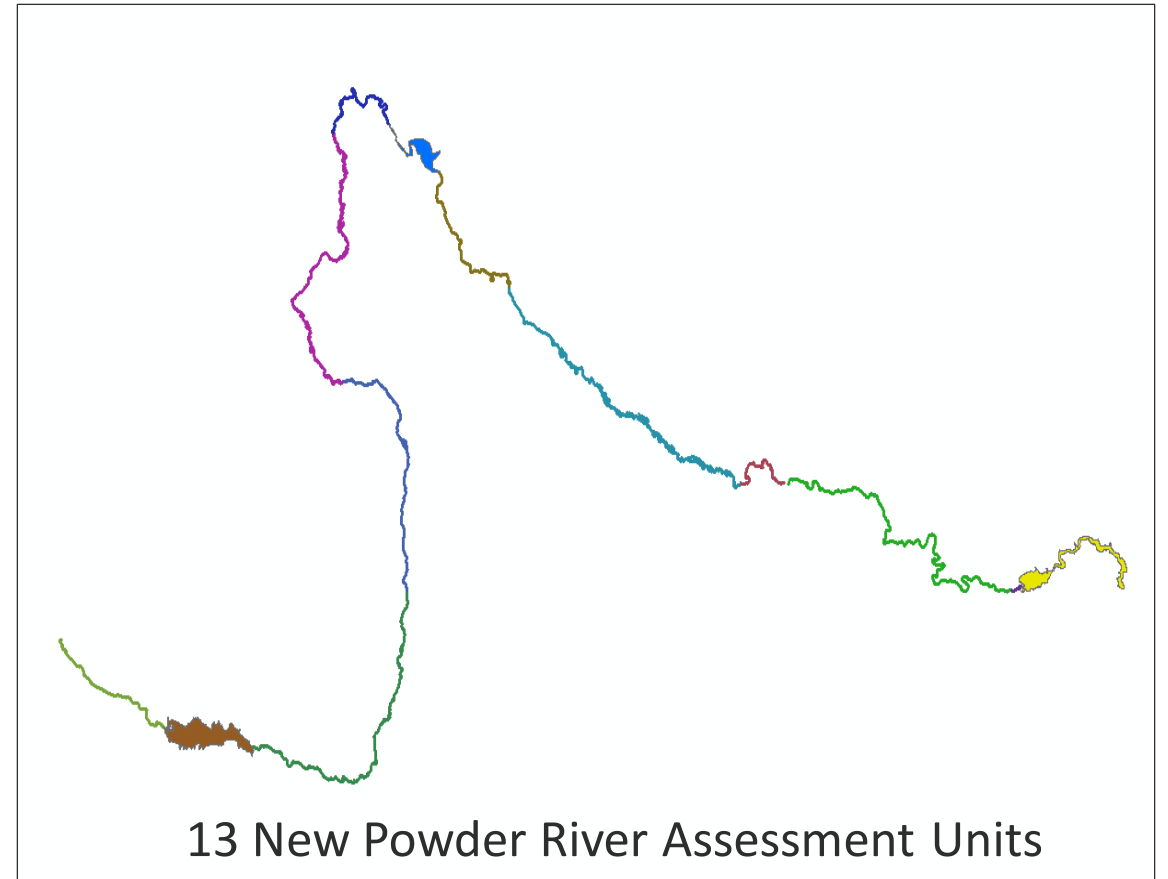
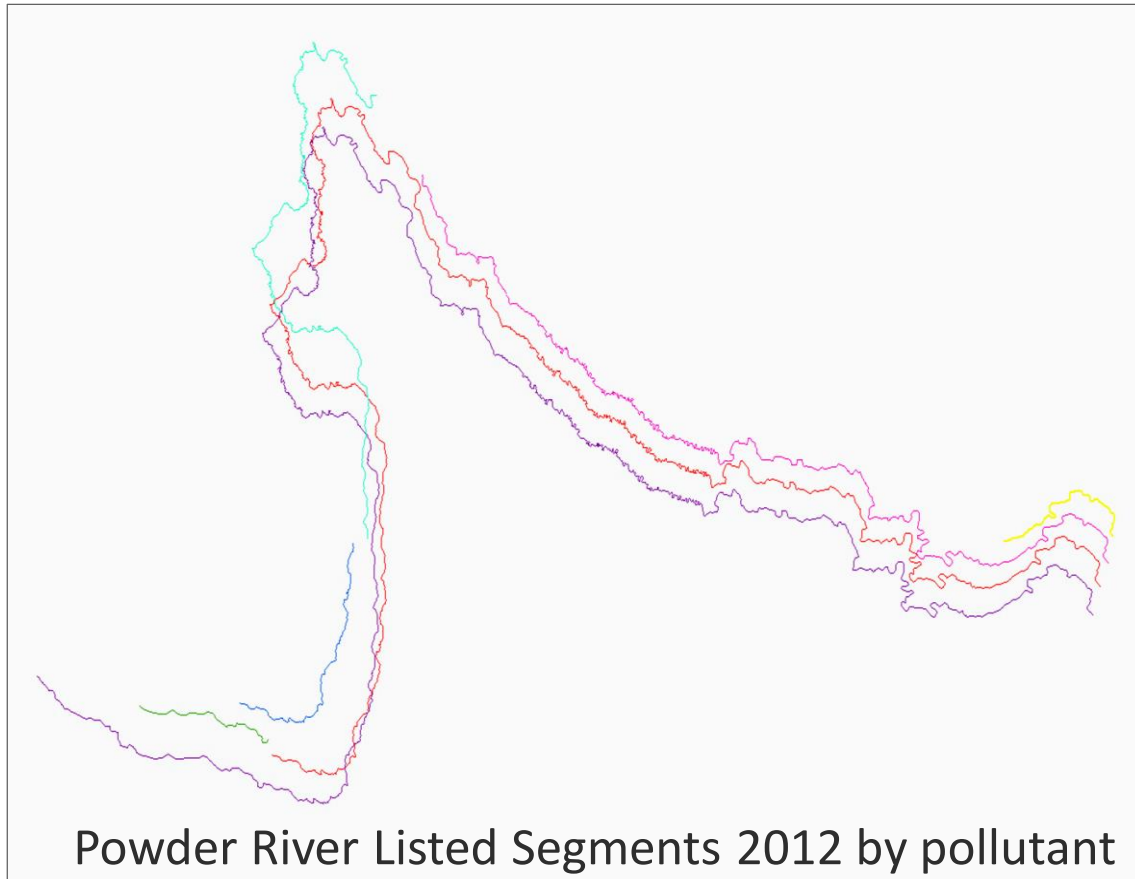


Defined Segments in 2012



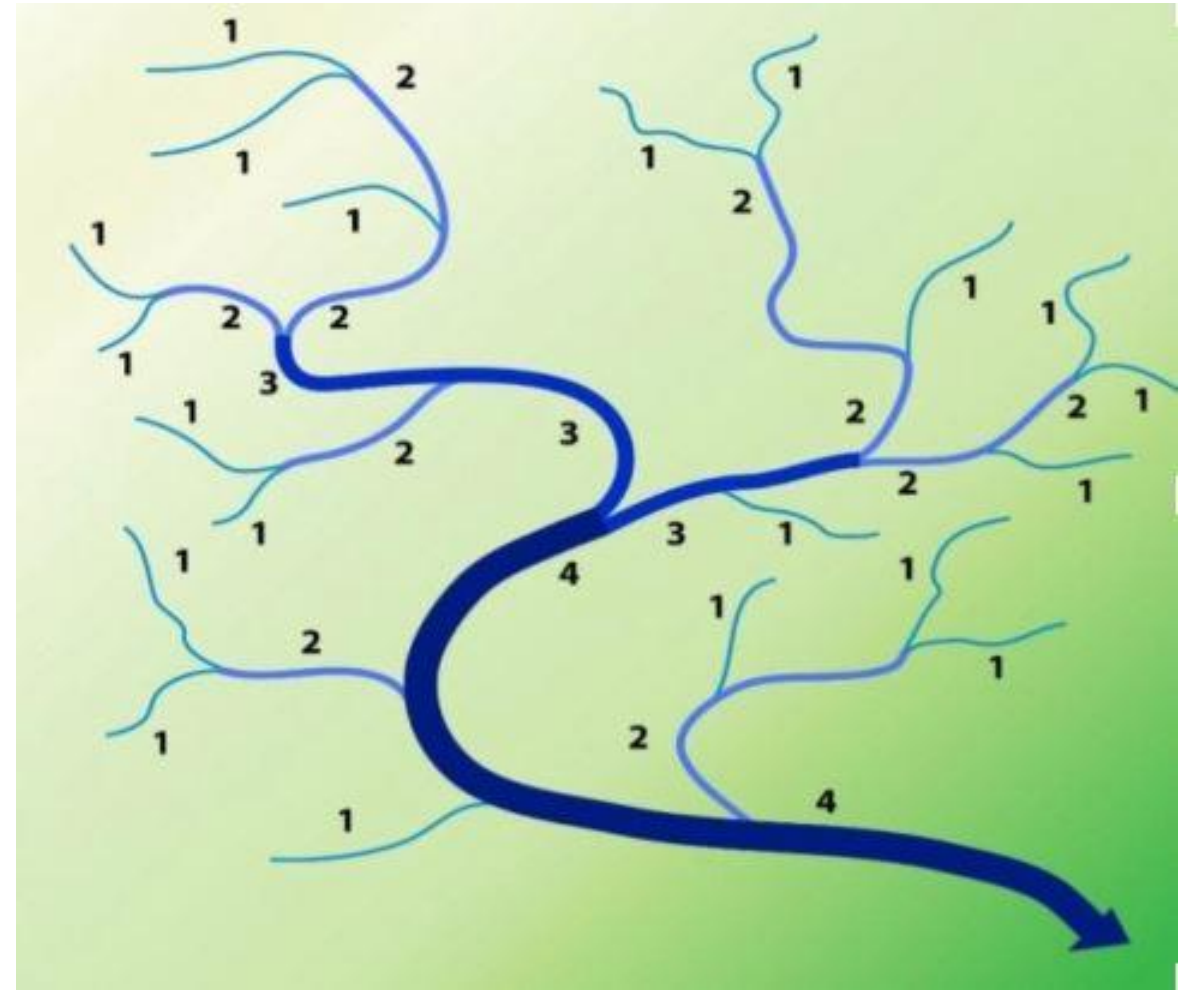
New Assessment Units

Fragmented Segments by parameter to Fixed AUs



5 Types of Assessment Units

- River and Stream
 - Medium to large streams ($\geq 5^{\text{th}}$ Order)
- **Watershed**
 - **Small, typically headwater streams (≤ 4 Order)**
 - **HUC-12 (Sub-watershed)**
- Waterbodies
 - Lakes
 - Reservoirs
 - Estuaries
- Coastline
- Oregon territorial waters

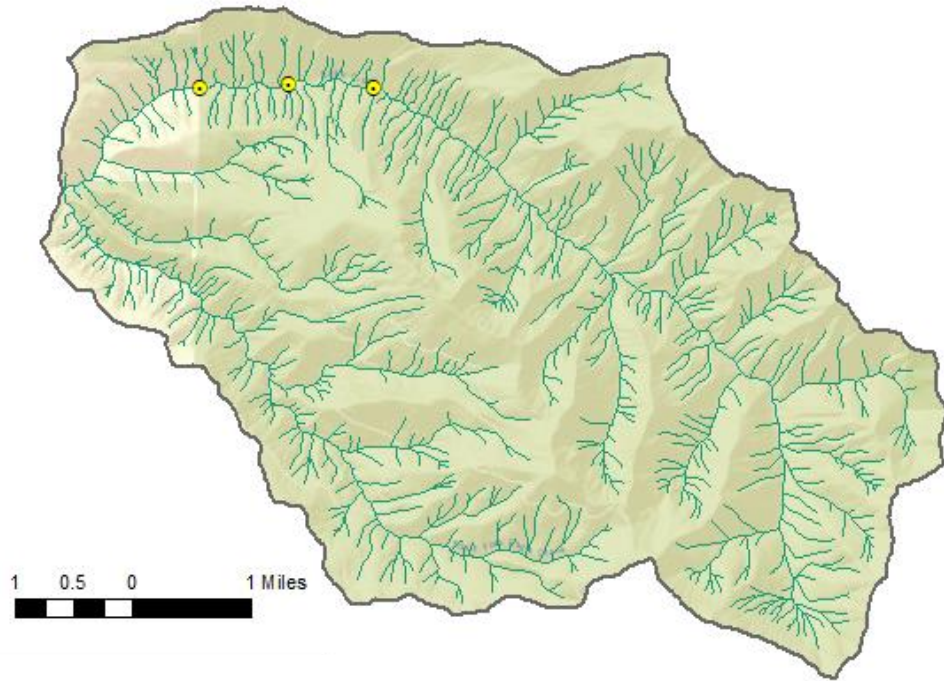


Watershed Assessment Units

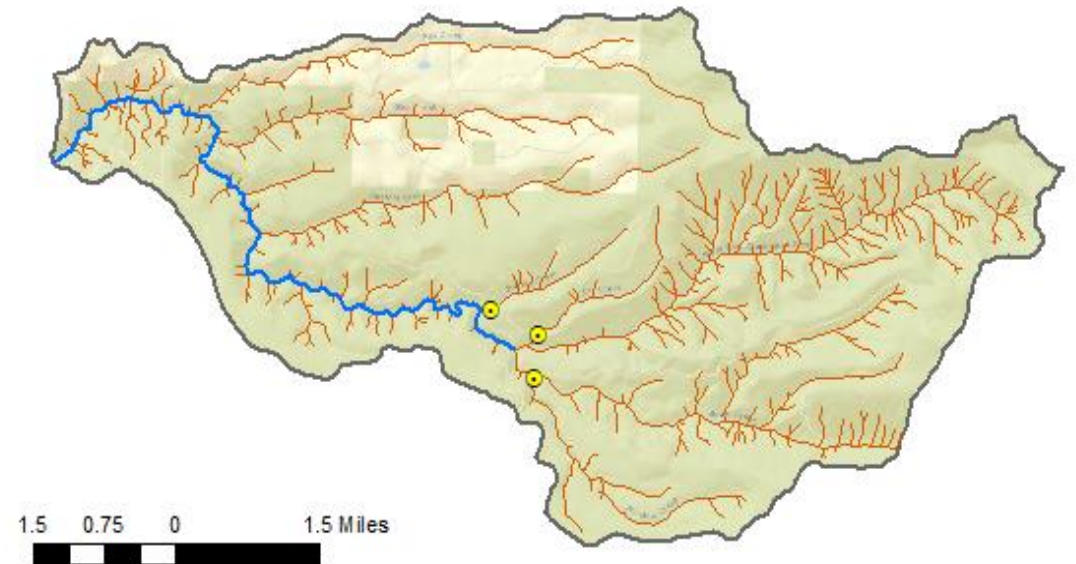
- Streams grouped at sub-watershed level (HUC-12)
- Strahler stream order 4 or lower
- Defined using NHD (1:24,000) hydrography data
- All surface waters
- May contain canal or managed water infrastructure

Types of watershed assessment units

Type 1 - Headwaters: All streams in HUC12 included

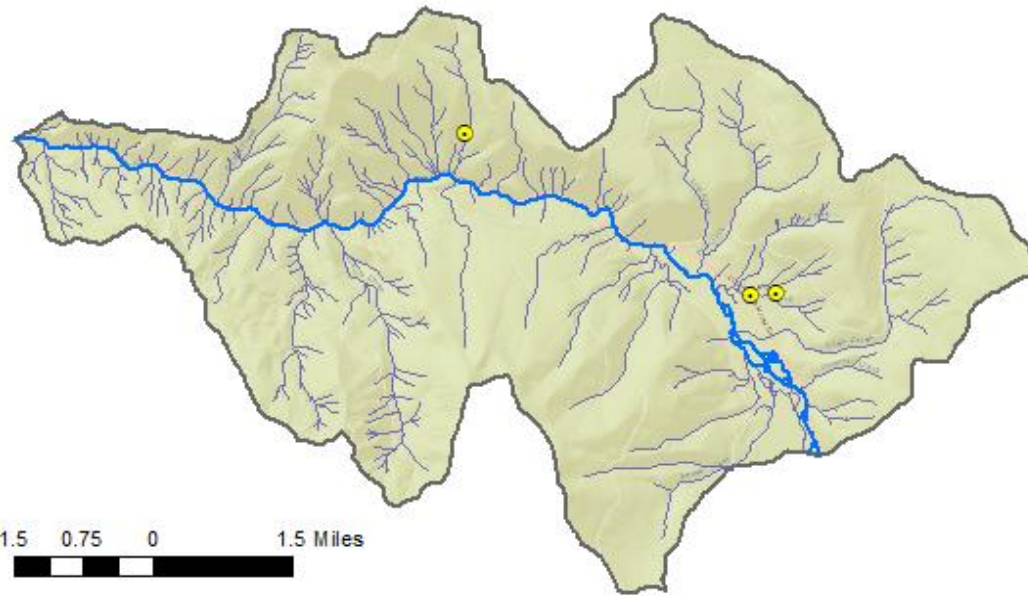


Type 2 -
Headwaters: AU divided by one or more River/Stream AU

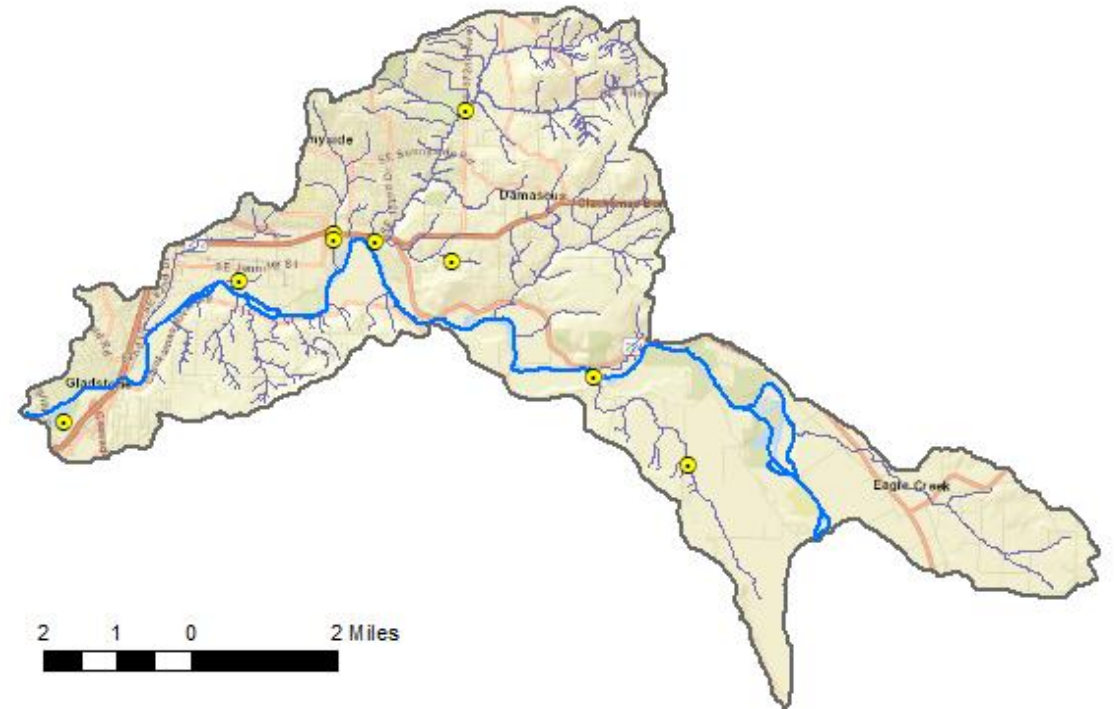


Types of watershed assessment units

Type 3 - Tributaries to River/Stream AU (Mid Subbasin)



Type 3 - Tributaries to River/Stream AU (Low Subbasin)



Comments received in 2018/2020

- Lack of detail in listing
- Inclusion of irrigation infrastructure in assessment
- Application of beneficial uses to all waterbodies
- Single assessment conclusion for multiple waterbodies
- Visual representation of impairment

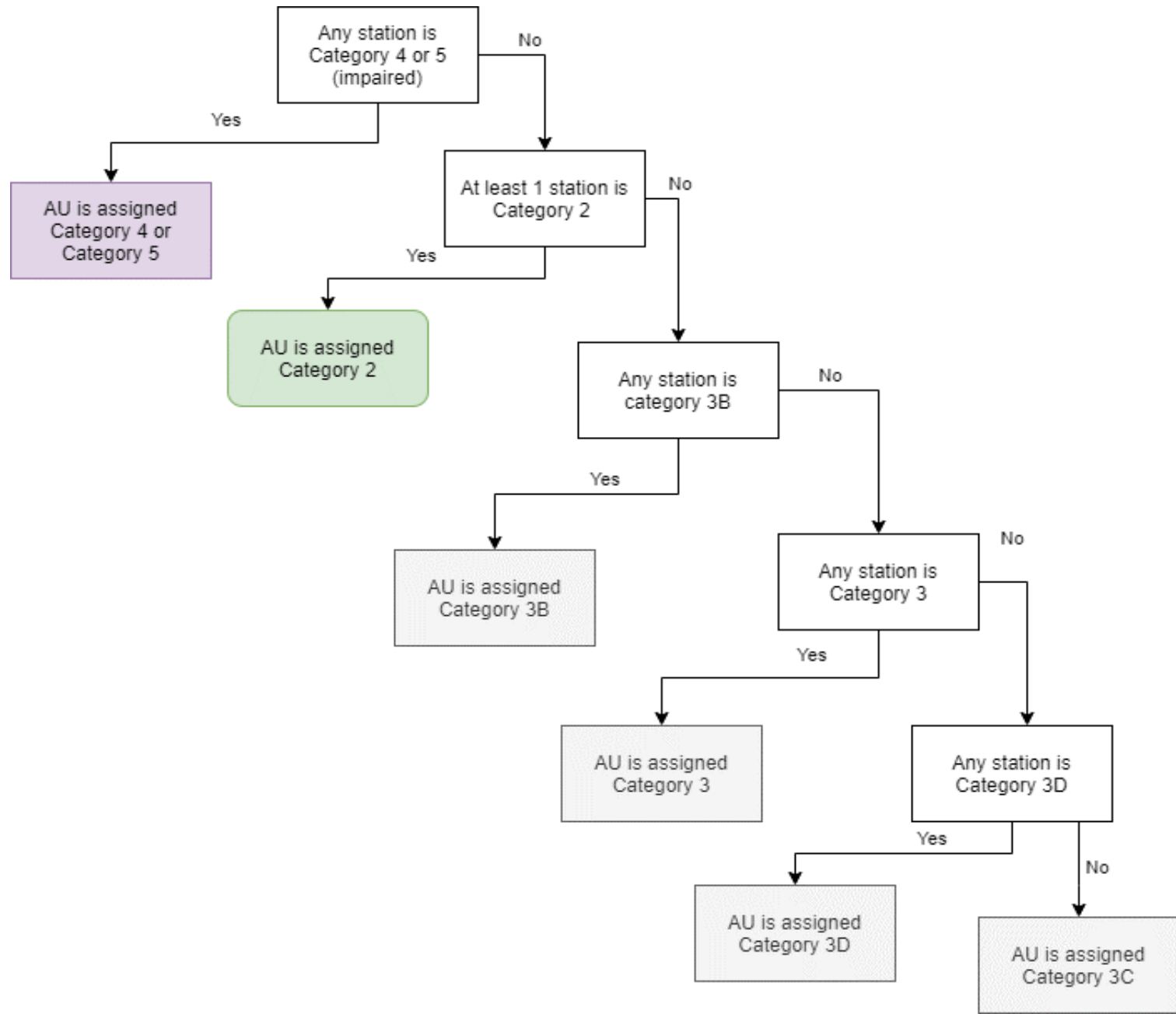
Options explored

- Defining assessment units at the NHD reach level
- Defining the Watershed Units as 1st through 3rd through (as opposed to 1st through 4th)
- Splitting units by land use
- Split units by water quality standards
- Separate natural streams from man-made infrastructure
- Assess watershed units by monitoring station

DEQ recommendation

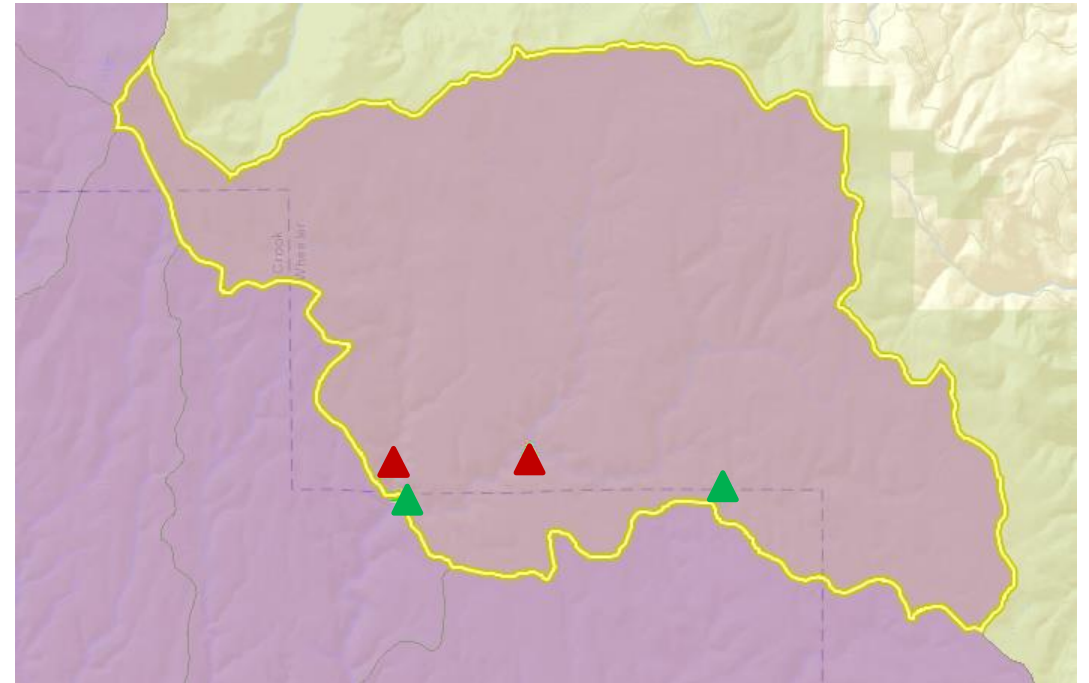
- Assess watershed unit at monitoring station level
- Identify impairment at each station
- Roll up to assessment unit conclusion

Assessment flow chart

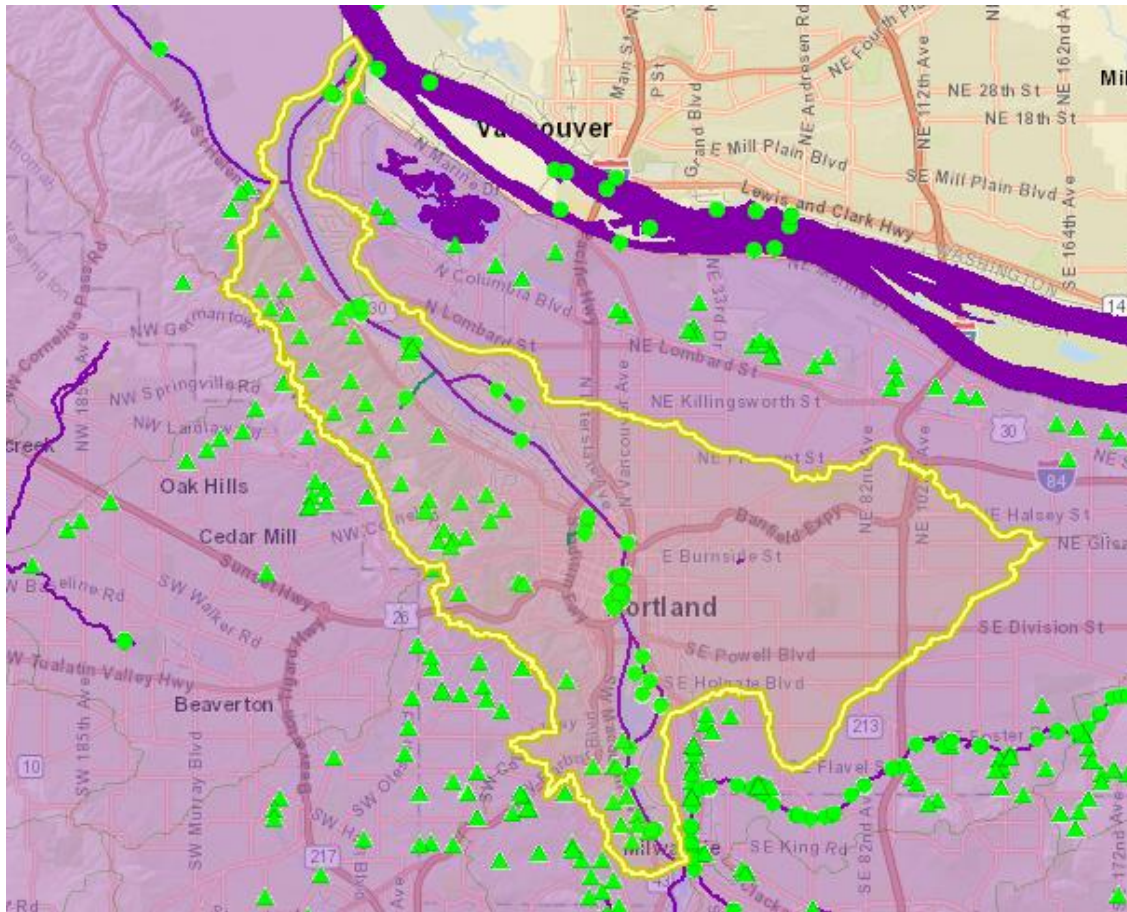


Analysis of assessing watershed units by monitoring station

- Assess at each monitoring location
- Roll up to assessment unit conclusion
 - If one station is impaired – the assessment unit would be impaired
 - Follow same methodology as Status & Trends report



Analysis of assessing watershed units by monitoring station



For assessment of toxics

- May be difficult to meet minimum sample requirements for Cat 2 or to delist
- WS Unit example
 - 37 monitoring stations
 - One station meets minimum sample size requirements
 - Given 5 year POR – may be zero

Outcomes of the recommendation

- Data from non-hydrologically connected waterbodies are not pooled together
- Greater specificity of assessment conclusions
- Easier to identify impaired waterbodies

- Harder to reach minimum data requirements
- Reported at the assessment unit level

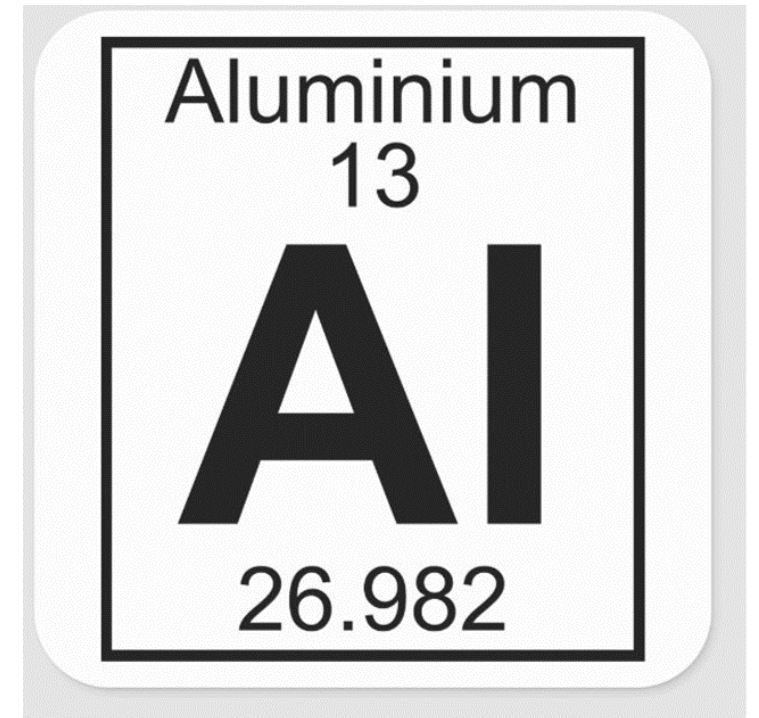
Discussion

- Thoughts on assessment of watershed units at the monitoring station level?
- Are there other opportunities or challenges this method presents that we have not thought about?
- How might this impact your monitoring program?

Aluminum Criteria and Methodology Update

Introduction

- New National 304(a) criteria for Aluminum
- Promulgation of criteria for Oregon
- Development of implementation procedures



Regulatory History in Oregon

- 2004:** Oregon submitted revised aquatic life criteria for pollutants, including aluminum based on 1988 National Criteria
- 2013:** The EPA disapproved the state's criteria submissions
- 2015:** EPA sued for failing to promptly propose and publish replacement criteria for disapprovals, including aluminum.
- 2016:** Federal Consent Decree – EPA must approve or promulgate criteria by March 27, 2020 (extended to Dec. 31, 2020)

Regulatory History

DEQ elected not to adopt new aluminum criteria in 2013:

- No criteria available to replace disapproved 1988 guidelines.
- Any new criteria would need ESA consultation.

Draft rule for OR signed April 18, 2019

- EPA final rule publication by Dec. 31, 2020

NMFS Consultation June 30, 2020

- Found “*not likely to jeopardize*” T&E species in Oregon

New National 304(a) Aluminum Criteria

- Published by U.S. EPA December 2018
- Replaces 1988 national aluminum criteria
 - Fixed 750 ug/L acute , 87 ug/L chronic; as total recoverable
- Site-specific instantaneous criteria based on water chemistry
- Calculator-based; similar to hardness-based metals and ammonia
- Requires water chemistry input data: Dissolved Organic Carbon (DOC), hardness, and pH

Aluminum Criteria Calculator

All concentrations reported are µg/L total Aluminum

Run Scenarios

-----Click Button after entering data

ENTER DATA HERE

SiteName	DOC (mg/L)	Total Hardness (mg/L as CaCO ₃)	pH	FAV	CMC	CCC	Flag	ACUTE								CHRONIC									
								Rank 1		Rank 2		Rank 3		Rank 4		Rank 1		Rank 2		Rank 3		Rank 4			
								Genus	GMAV	Genus	GMAV	Genus	GMAV	Genus	GMAV	Genus	GMCV	Genus	GMCV	Genus	GMCV	Genus	GMCV	Genus	GMCV
Site 1	1.0	25	7	1235.09	620	300		Daphnia	1,196.8	Micropterus	2,148.0	Oncorhynchus	2,381.3	Ceriodaphnia	4,000.0	Salmo	312.3	Salvelinus	458.8	Daphnia	507.2	Lampsilis	528.2		
Site 2	1.0	50	7	1572.91	790	340		Daphnia	1,668.0	Micropterus	2,533.3	Oncorhynchus	2,808.4	Ceriodaphnia	5,575.1	Salmo	368.3	Salvelinus	541.1	Daphnia	706.9	Lampsilis	736.2		
Site 3	1.0	100	7	1960.73	980	380		Daphnia	2,324.8	Micropterus	2,987.6	Oncorhynchus	3,312.1	Ceriodaphnia	7,770.5	Salmo	434.4	Salvelinus	638.2	Daphnia	985.3	Lampsilis	1,026.1		
Site 4	1.0	150	7	2210.75	1100	400		Daphnia	2,823.2	Micropterus	3,290.3	Oncorhynchus	3,647.6	Ceriodaphnia	9,436.2	Salmo	478.4	Salvelinus	702.8	Daphnia	1,196.5	Lampsilis	1,246.1		
Site 5	1.0	100	7	1960.73	980	380		Daphnia	2,324.8	Micropterus	2,987.6	Oncorhynchus	3,312.1	Ceriodaphnia	7,770.5	Salmo	434.4	Salvelinus	638.2	Daphnia	985.3	Lampsilis	1,026.1		
Site 6	1.0	100	7	1960.73	980	380		Daphnia	2,324.8	Micropterus	2,987.6	Oncorhynchus	3,312.1	Ceriodaphnia	7,770.5	Salmo	434.4	Salvelinus	638.2	Daphnia	985.3	Lampsilis	1,026.1		
Site 7	1.0	100	7	1960.73	980	380		Daphnia	2,324.8	Micropterus	2,987.6	Oncorhynchus	3,312.1	Ceriodaphnia	7,770.5	Salmo	434.4	Salvelinus	638.2	Daphnia	985.3	Lampsilis	1,026.1		
Site 8	1.0	100	7	1960.73	980	380		Daphnia	2,324.8	Micropterus	2,987.6	Oncorhynchus	3,312.1	Ceriodaphnia	7,770.5	Salmo	434.4	Salvelinus	638.2	Daphnia	985.3	Lampsilis	1,026.1		
Site 9	1.0	100	7	1960.73	980	380		Daphnia	2,324.8	Micropterus	2,987.6	Oncorhynchus	3,312.1	Ceriodaphnia	7,770.5	Salmo	434.4	Salvelinus	638.2	Daphnia	985.3	Lampsilis	1,026.1		

Microsoft Excel spreadsheet calculator, R module, or 3-way look-up table (similar to ammonia criteria)

Wide range of possible instantaneous criteria values:

1 - 4,700 ug/L acute

0.6 – 3,000 ug/L chronic

Promulgation for Oregon

- EPA’s draft rule for OR adopts the new 304(a) criteria by reference
- For characterizing ambient waters, OR may utilize a scientifically appropriate bioavailable method as allowable by state and federal regulations
 - 40CFR part 136 specifies total recoverable methods
 - NPDES permitting
 - Clean Water Act Section 401 certifications.
- DEQ intends to apply bioavailable aluminum measurements for Assessment and RPA when available

Bioavailable Aluminum

- Issue: Total Recoverable field measures may overestimate toxicity under certain conditions
- EPA considers the 304(a) criteria protective for both total recoverable and bioavailable aluminum when applied to characterize ambient concentration of receiving waters.

Aluminum speciation and bioavailability

Dissolved



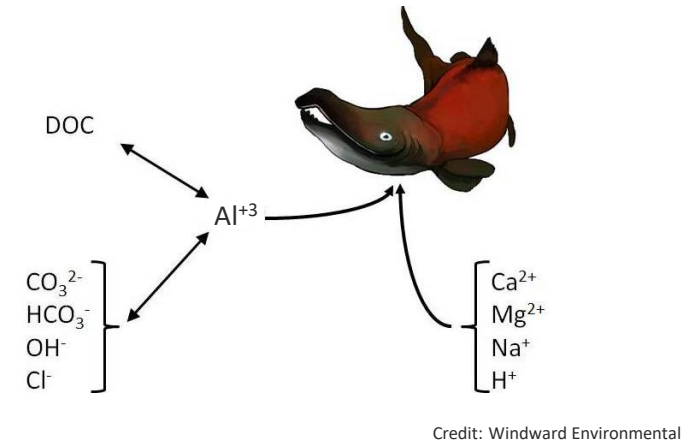
Al^{+3} , salts

Total Recoverable



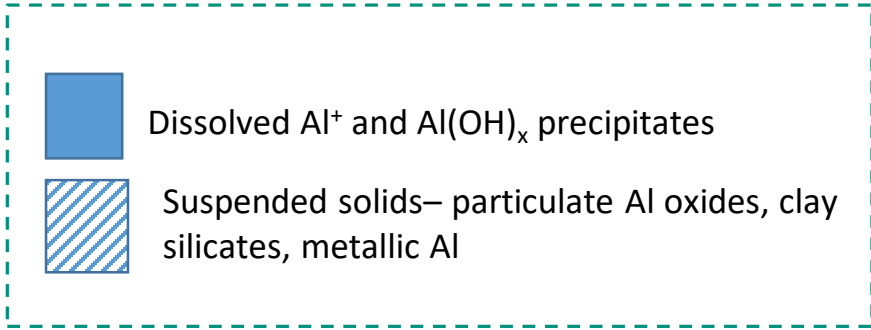
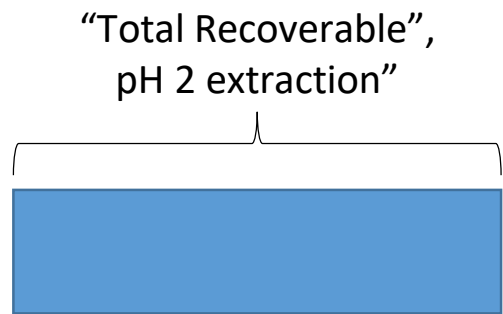
hydroxide precipitates, suspended solids, clay minerals

Bioavailable

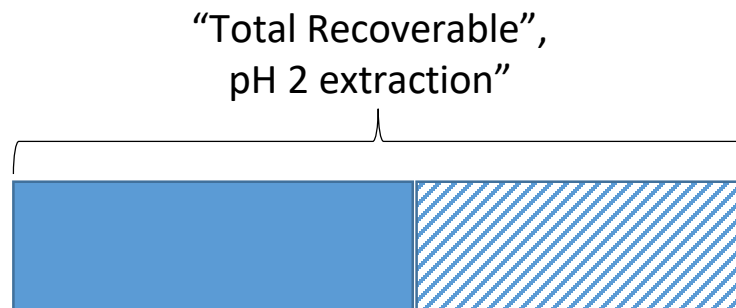


Biologically active Al ions and hydroxide precipitates

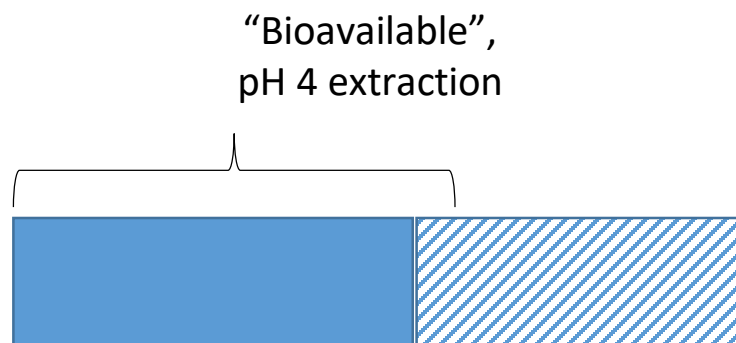
304(a) Criteria lab water



Natural waters,
conventional measurement



Natural waters,
Bioavailable measurement



Implementation

- Currently no 303(d) listings for aluminum in Oregon (based on 1988 criteria)
- Aluminum Ecotoxicity Research Group* submitted a bioavailable method for evaluation as an ASTM standard method – pending.
- DEQ Laboratory and Environmental Assessment Division is working on a bioavailable protocol and began trial monitoring in Q2 2020.
- DEQ developing criteria implementation procedures based on experience from Cu-BLM:
 - Missing input parameters
 - Default criteria
 - Total recoverable: Bioavailable conversion factors

*European Aluminum Association, OSU, independent researchers behind development of copper-BLM and aluminum-MLR toxicity models

DEQ recommendations aquatic life, aluminum

- 1. Use binomial method similar to other aquatic life toxics criteria.*
- 2. For water bodies with sufficient Bioavailable aluminum results to evaluate the data*
 - Category 5 = > 5 % samples with 90% confidence exceed criteria

DEQ recommendations aquatic life, aluminum

3. For water bodies where only Total Recoverable aluminum data are available

- Category 3B = > 5% of total recoverable samples exceed criteria with 90% confidence
- DEQ will pursue development of total recoverable translator and study influence of TSS

DEQ recommendations aquatic life, aluminum

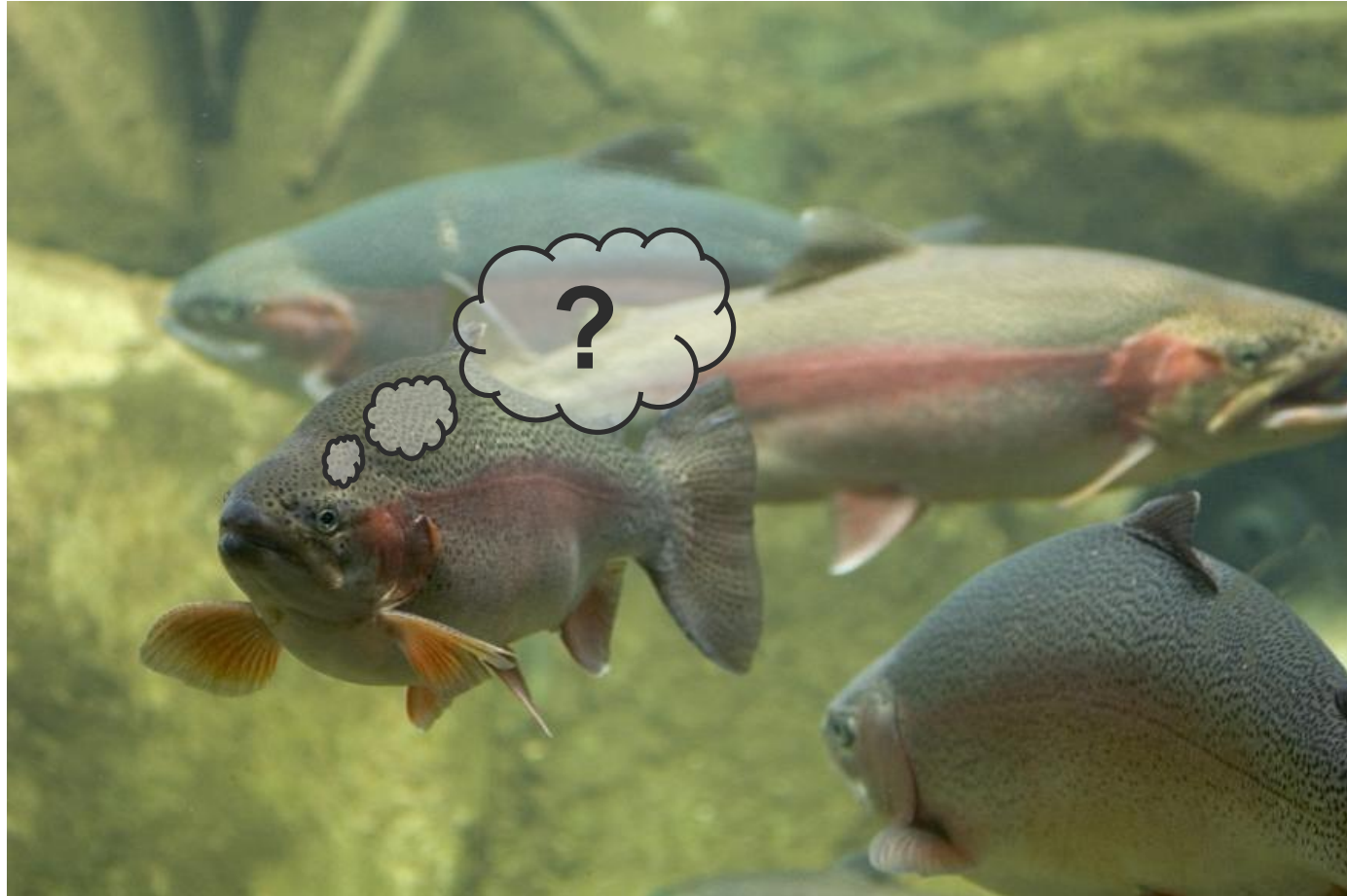
4. For water bodies with insufficient Bioavailable aluminum results, but where a combination of Bioavailable and Total Recoverable, or only Total Recoverable data is available

- Category 3B = > 5% of combined samples exceed criteria with 90% confidence
- Prioritize collection of bioavailable data

Next steps aquatic life, aluminum

- EPA finalization of criteria for Oregon by Dec. 31, 2020.
- DEQ implementation procedures - following the copper-BLM approach.
- DEQ lab is working on measuring bioavailable aluminum in the field and developing a TR-bioavailable translator to evaluate historical aluminum data
- The new criteria for Oregon will be applied to all Clean Water Act programs as required after EPA finalizes the rule.

Questions?



Aluminum Standard Staff Contacts:

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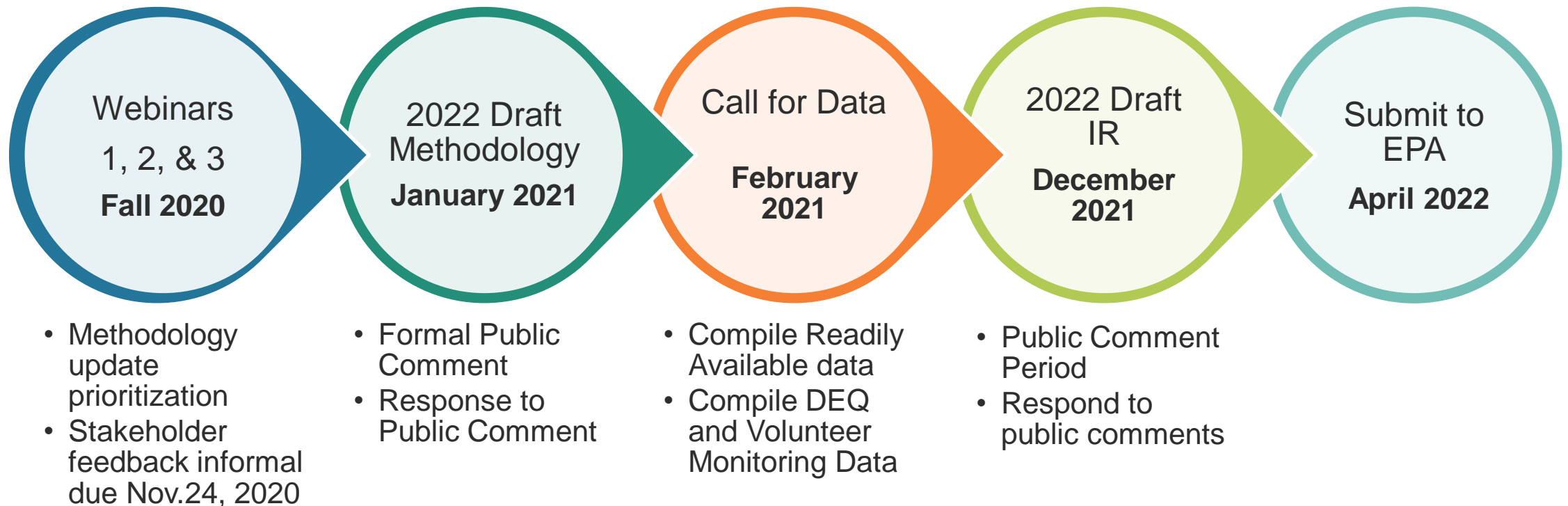
James McConaghie

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Short-term updates

- Delisting for dissolved oxygen
- Assessment of continuous pH
- Delisting for freshwater fecal coliforms
- Minimum data requirements for Category 2
- Aquatic life aluminum
- Watershed units – assessment by station

Integrated Report 2022, schedule



Next steps

- Accepting informal comments on short-term updates
November 24, 2020.
Email integratedreport@deq.state.or.us
- Finalize draft methodology Winter 2020
- Formal public comment period January 2021

Questions?

- Contact: anthony.becky@deq.state.or.us
- Email: integratedreport@deq.state.or.us
- Sign up for GovDelivery list: **WQ Assessment Reporting and 303(d)** to stay up to date. Go to DEQ's webpage: <https://www.oregon.gov/deq/wq/Pages/Integrated-Report-Improvements.aspx>