

Ocean Acidification and Hypoxia

Technical Workgroup Meeting #1

Feb. 17, 2022, 9 a.m. – 12 p.m. PT
Zoom Meeting

List of attendees

Technical Workgroup Members:

Simone Alin (National Oceanic and Atmospheric Administration; NOAA), Jim Barry (Monterey Bay Aquarium Research Institute), Cheryl Brown (U.S. Environmental Protection Agency, Office of Research and Development); EPA ORD), Burk Hales (Oregon State University; OSU), Jessica Miller (OSU), Stephen Pacella (EPA ORD), George Waldbusser (OSU), Steve Weisberg (Southern California Coastal Water Research Project), Richard Feely (NOAA), Samantha Siedlecki (University of Connecticut), Jan Newton (University of Washington/Northwest Association of Networked Ocean Observing Systems)

Agency Representation:

Brock Tabor (AK Dept. of Environmental Conservation), Keara Tusio (CA State Water Resources Control Board; SWRCB), Michelle Robbins (SWRCB), Michael Patton (SWRCB), Andy Lanier (OR Dept. of Land Conservation and Development), Lori Pillsbury (OR Dept. of Environmental Quality; DEQ), Rian Hooff (DEQ), Caren Braby (Oregon Department of Fish and Wildlife; ODFW), Dave Fox (ODFW), Steve Rumrill (ODFW), Becky Anthony (ODFW), Charlotte Whitefield (ODFW), Susan Braley (Washington State Department of Ecology), Hanh Shaw (EPA, Region 10), Rochelle Labiosa (EPA, Region 10), Michelle Maier (EPA, Region 10), Terri Fleming (EPA, Region 9), Eric Dubinsky (EPA, Region 9), Jill Fullagar (EPA, Region 10, Kat Walsh (SWRCB), Ana Maria Saenz (SWRCB)

DEQ Standards and Assessment Program Staff:

Connie Dou, Trina Brown, Kaegan Scully-Engelmeyer, Lesley Merrick, Travis Pritchard, Debra Sturdevant, Kaley Major

Meeting Facilitator:

Donna Ortiz (EPA)

Roles of the Technical Workgroup

- The role of the workgroup is to provide scientific expertise and perspective to help inform policy, but not the policy decisions themselves.
- DEQ is asking the workgroup to help in identifying and developing thresholds/metrics for biology that can be used to interpret Oregon's biocriteria narrative standard.
- The workgroup [Charter](#) was sent to the members before the first meeting.

Technical Workgroup Scope:

1. Assist DEQ in developing ocean acidification and marine dissolved oxygen assessment methodologies for future Clean Water Act (CWA) Integrated Reports.
2. Provide technical expertise for methodology development discussions.

Desired outcomes for this meeting:

- Kickoff Process – introductions, roles, expectations
- Information sharing – big picture, CWA policy framework, sideboards
- Discussion – preliminary assessment approach



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DEQ is a leader in restoring, maintaining and enhancing the quality of Oregon's air, land and water.

Time	Topic
9 a.m.	<p>Welcome and Introductions:</p> <ul style="list-style-type: none"> Jennifer Wigal (Oregon DEQ Water Quality Division Administrator) and Cami Grandinetti (Branch Manager; Standards, Assessment and Watershed Management Branch, EPA Region 10) welcomed the technical workgroup members and thanked them for taking the time to help Oregon DEQ with the assessment methodology development effort. The meeting facilitator (Donna Ortiz, EPA) reviewed the agenda and ground rules for the meeting. Technical workgroup members introduced themselves.
9:45 a.m.	<p>Charter Review and Timeline</p> <p>Connie Dou (DEQ) presented on the main goals of the workgroup, membership, and the tentative timeline and outcomes:</p> <ul style="list-style-type: none"> The main goal for this workgroup is to provide scientific/technical expertise not currently available in DEQ and assist DEQ in developing assessment methodology to determine the impairment status within Oregon territorial sea. The main workshop deliverable will be assessment methodology recommendations. For complex issues, Oregon Statutes require DEQ to seek independent scientific review (peer review). The technical workgroup will tentatively be active from February 2022 through the end of the year. After draft methodologies are established, they will move to an independent scientific peer review process, then public comment on the draft assessment methodology as required by OR statute. There will then be a presentation to the Environmental Quality Commission for informational purposes Workgroup member question (Q): Do you envision any of these meetings taking place face to face? DEQ staff response: It's too early to say. The current plan is virtual meetings. There may be other formats and smaller meetings throughout the process using all expertise available to us.
10 a.m.	<p>Policy Framework Presentation</p> <p>Jill Fullagar (USEPA) presented on Clean Water Act (CWA) assessment background/requirements.</p> <ul style="list-style-type: none"> Assessment methodology describes how the state is going to implement and apply Water Quality Standards (WQS). Methodology also lays out interpretation of narrative criteria, where applicable. Waters are typically broken into assessment units, using segmentation system. Data within assessment units are considered as representative of the area as a whole. Assessment methodologies outline: data quality and availability, minimum sample size, thresholds for impairment, allowable number or frequency of exceedance, account for spatial and temporal variability. Process to establish Water Quality Criteria vs. Methodology. <ul style="list-style-type: none"> i. Criteria: developed to protect designated uses, scientifically defensible, adoption includes public process, not effective under CWA until EPA reviews and approves. ii. Methodology provides interpretation of WQS for implementation in assessment, can be revised as necessary through state public process, and may require peer review or additional process per state regulations, but does not require EPA approval. EPA approves WQ status determinations based on methodology. Q: I'm struggling to differentiate between "criteria" and "standards". EPA staff response: [Reviewed of 3 elements of Water Quality Standards (beneficial uses, criteria, antidegradation) and how they are considered together to be WQS.] Criteria is often what the states are using to make an assessment, so it is commonly discussed in this conversation. Waters of the State (OAR 340-041-72): the Pacific Ocean within the territorial limits of the state of Oregon the waters and seabed extending three geographical miles off the coast

- Oregon Ocean Stewardship Area extends outside of the territorial seas. States may use data collected outside the territorial sea, but they must justify that the data is representative of state waters. It's important to consider: is data collected from outside territorial waters representative of the official territorial waters.
- States are required to submit an Integrated Report (IR) to EPA every 2 years. States report on status of all state CWA Section 305(b), identify the list of water quality limited waters 303(d) list (EPA takes approval on this), report on condition of publicly owned lakes (CWA section 314).
- Potential next steps for impaired waters: additional monitoring, 4b plan development, 5-alt plan development, 4c determination, modeling, permit monitoring requirements, and/or TMDL development.
- Jill presented on the history of OAH and the Integrated Report (see slide)

Questions from Workgroup members:

- **Q (chat):** "I have a question about the definition of ocean acidification. I am assuming the definition includes a "human-caused" element?
EPA staff response: That is part of what is being considered by the states when trying to reach an assessment determination. There is flexibility in determining whether/how anthropogenic component is specifically considered. It is not a requirement to have an anthropogenic component but that may be something a state wants to include.
Workgroup member comment (comment): It's a struggle to figure out when CO2 or some other parameter is causing a problem due to OA.
Comment: Many states have a human caused element in their standards. But not for all parameters.
Comment: The proper definitions of Ocean Acidification are delineated in the [IPCC Workshop Report on Ocean Acidification](#).
- **Q:** Is there a clear difference between what is the definition of impaired and waters of concern?
EPA staff response: Impaired waters are Category 5 waters. So, they are clearly not meeting standards, or they are threatened (there is data that the standards will not be met by the next cycle). For the waters of concern generally there's information to show that something going on, but we don't have enough information or the ability to assess to be sure there is a problem (i.e., 2 years of impairment when 3 are required to call "impaired" officially).
- **Q:** Do you make a distinction between Ocean acidification and anthropogenic ocean acidification in the review process?
EPA staff response: It depends on the state's WQS and their methodology. With Washington State, pH there cannot be a 0.2 pH unit change due to anthropogenic action. In Oregon there is no specific anthropogenic component for pH standard at this point.

10:30 a.m.

State Updates – OR, CA, WA, AK (State Representatives)

Oregon: Lesley Merrick (DEQ) presented on Oregon DEQ Integrated Reports – marine waters focused

- 2018/2020 Final integrated report approved by EPA November 2020
 - Category 3b (potential concern): biocriteria narrative, OA; narrative DO criteria
 - Category 5 (Impaired): entire coastline (beaches) for shellfish toxins
- 2022 – Draft Integrated report (in process).
 - Incorporated newly submitted data and public comments (since 2018/2020 report) - e.g., OOI buoy data, Newport line buoy data

- ii. Draft listings remained the same as 2018/2020 integrated report for marine assessment units.
- iii. Formation of scientific-technical workgroup for methodology development for future assessments.

California: Keara Tusso and Michelle Robbins (CA State Water Resources Control Board) presented on OAH challenges and approaches

- Challenges in Integrated Report assessment methodology
 - i. Identifying the relationship between OA and marine life,
 - ii. Identifying connections with land based anthropogenic sources.
- No narrative or numeric criteria for OA in CA yet. Data submission quality has not been sufficient to use data for assessing.
- Geographic challenges in figuring out standard for the entire state because of very large coastline and different regulations and systems up and down the coast. Spatial and temporal changes across years, most data are from 10+ years ago, so not sure how representative it is now.
- Huge rains after drought conditions may change the pollutant scape.
- IR methodologies being considered for numeric criteria (pH, aragonite, temp, D.O. all considered).
- Narrative standard also considered taking a marine degradation approach but need to define and determine what that means.
- Potential weight of evidence approach with aragonite saturation.
- The 2019 Triennial Review identified OA standard development as a high priority. The state is starting to write project charter and plan stakeholder engagement.

Washington: Susan Braley (Washington Department of Ecology) presented on OA and 303(d) listing process

- Marine pH standard is the only numeric criteria related to OA. Narrative standard “toxic, radioactive, or deleterious material – concentrations.”
- There is no specific listing methodology for OA.
- The State has methodology in policy for impairment determination process for narrative standards (Policy 1-11).
- To date WA has not received sufficient credible data or information to demonstrate a clear connection that OA in a specific waterbody in WA is impairing a designated use within that waterbody.
- **Q:** Does OA look at the natural variability of other variables that are related to OA? Aragonite saturation is an example.

WA staff response: In Washington: Impairment must: 1) impair designated use, 2) be related to water quality alteration to a variable in that water. In order to make a 303(d) listing, data must be taken from that waterbody. Washington found that a broader study showing OA is a problem and concern is generally not sufficient to connect OA causes to a waterbody in order to have a listing. WA did receive NOAA pacific studies data that have been done in the last few years and reviewed but could not determine impairment. Data demonstrated pteropod shell damage but there were no reference conditions to compare, so could not determine if this is different than natural background.

- **Q:** What do you mean by a reference station for comparison, particularly since OA is a global portal problem?

WA staff response: In Washington: To respond to your question on what I meant by the need for a reference condition to be able to compare the pteropod data we received from NOAA PMDEL. Data was submitted that showed pteropod shell damage characterization and calculated aragonite saturation based on samples collected from a 2014 WOAC and NANOOS cruise of Puget Sound. Ecology currently does not have numeric criteria for aragonite saturation or an approved standard methodology for analyzing marine biological organism data for purposes of the Water Quality

Assessment, which is a regulatory program. We reviewed the data and found that while data demonstrate a range of severity in pteropod shell damage, there are no reference conditions or sites with which to compare these data. Without reference conditions, it is unclear whether or not these data represent the natural variability of aquatic life conditions in Washington's waters, or to what degree the damage observed would be considered an impairment of the water.

Alaska: Brock Tabor presented about OA in Alaska

- In much the same place as WA at this point. Significant geographic difference in coastline and in waters, great diversity makes it difficult to make numeric thresholds.
- Fewer litigants in AK, 2012 was last time Center for Biological Diversity raised concerns in AK

10:50 a.m.

DEQ's Preliminary Assessment Approach

Kaegan Scully-Engelmeyer (DEQ, Oregon Sea Grant Fellow) presented on DEQ's preliminary approach to assessment

- In this presentation DEQ gave an overview of the policy framework of the assessment methodology and will be in looking for feedback about DEQ's approach moving forward.
- DEQ's options:
 - i. Oregon has numeric criteria and established methodologies for pH but none for D.O. We could update or develop numeric criteria (for DO or aragonite sat). Worthwhile and necessary. Lengthy and resource intensive process
 - ii. Oregon has narrative criteria for marine D.O. without an assessment methodology. We could move forward by developing an assessment methodology for marine D.O. – Assessment of this criteria is challenging because if “no measurable reduction” interpreted as relating to only localized inputs then larger climate change related biological impacts (e.g., prolonged upwelling) would be excluded from the assessment. Certainly an option, but would need more effort on the interpretation of the criteria to proceed.
 - iii. Oregon has narrative criteria for Biocriteria that apply to both marine and estuarine waters without assessment methodologies. We could move forward by developing assessment methodologies for marine Biocriteria.
- **For the purposes of this workgroup, DEQ believes developing assessment methodology to assess the narrative Biocriteria is the most feasible** at the present time. There is still consideration on if a single methodology is developed for ocean acidification and hypoxia together, or if two methodologies are developed.
- **Q:** Narrative criteria for marine DO – wondering if it's possible to change the narrative criteria?
DEQ staff response: Yes, it is possible. Similar to updating and developing numeric criteria, the narrative DO criteria can be updated and would require a state rulemaking and EPA approval that could be a lengthier and more resource intensive process.
- Focusing on developing biocriteria assessment methodologies for OAH allows DEQ to build directly from West Coast OAH science panel recommendations, specifically to:
 - i. Incorporate metrics and indicators beyond DO and pH,
 - ii. use ecologically relevant assessment thresholds,
 - iii. customize methodology to maximize existing monitoring data/network,
 - iv. adapt methodology to future data/monitoring availability.
 - v. Can update assessment methodology as more data comes available in the future.
- Additionally, focusing on biocriteria assessment methodologies allows DEQ to:
 - i. Take a multi-attribute approach to assessment (not a single parameter or chemical, allows for focus on multiple lines of evidence).

	<ul style="list-style-type: none"> ii. Direct quantification of biological impacts – water quality status determination based around biological impairment • Challenges with this approach under CWA. OA is a global stressor with regional impacts. Primary challenges include: <ul style="list-style-type: none"> i. assessing biological impacts within state waters, ii. developing scientifically rigorous multi-attribute index with achievable data collection requirements, iii. capturing appropriate monitoring timeframes and locations/depths while leveraging existing ongoing data collection efforts, iv. ensuring ocean assessment areas represent ecologically relevant spatial extents, v. determining reference conditions. • Q: If the impairment isn't due to processes that are going on in that watershed, then it doesn't make the list. But OA is a global stressor with regional impacts. If states don't show that there are low values caused by low OA, then governments won't think there is a problem. <p>DEQ staff response: Approaching this issue from a biocriteria perspective, the assessment methodology is tied to a direct interpretation of biological impairment. In this case, the biological impact from OAH stressor(s) is used to determine if there is an impairment taking place. That is one of the key elements to this approach in terms of quantifying biological impairment. This doesn't require tying impairment all the way back to the source.</p> • Assessment methodology development process considerations: <ul style="list-style-type: none"> i. Traditional bioassessment processes for biocriteria: freshwater and estuarine bioassessment efforts use multi-metric Index and/or biological condition gradient to characterize biological condition in conjunction with stressor identification/characterization. ii. In our case, we are working in the other direction, we are starting with OA and Hypoxia (starting with stressors), working to determine biological condition (via the best indicators). <p>This is the focus of the assessment methodology development process (and workgroup outcome), determining the best indicators of biological condition based on available data relevant to Oregon's territorial waters.</p> • Q: Are you going for biocriteria as a water quality standard or are you developing thresholds for biology that can be used to interpret a narrative. <p>DEQ staff response: The second, developing thresholds for interpreting the existing narrative. DEQ is not looking to develop biocriteria, we are asking the workgroup's help in developing thresholds/metrics for biology that can be used to determine impairment based on the existing biocriteria narrative standard.</p> • Workgroup comment: California is taking the same approach OR is. In terms of developing a narrative biocriteria. • Other DEQ Comment: This is the direction we are leaning, but we are not wedded to that approach and want to encourage input from technical workgroup members on whether alternatives could be more productive/efficient/justified. Would encourage round robin to comment on thoughts and processes, and where they would like to plug in, whether they want to split off into smaller groups to be more efficient.
11:50 a.m.	<p>Next Steps</p> <p>Connie Dou (DEQ) presented on the tentative timeline for upcoming meetings</p> <ul style="list-style-type: none"> • The original plan was to have the next meeting in April, focusing on marine dissolved oxygen biological impact assessment. (UPDATE) Based on feedback from the workgroup, DEQ is adjusting the original meeting timeline and working in a subgroup format to develop a draft assessment

	methodology proposal to present at the next full group meeting along with a set of specific technical questions.
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11:58 a.m.	Feedback <ul style="list-style-type: none">• More info on the workgroup’s specific charge will be important before the next meeting. Some workgroup members suggested to provide more specific information on the next steps for future workgroup meetings.• DEQ appreciates the thoughtful input from the workgroup. To best use the technical workgroup member’s expertise and time, DEQ will incorporate the input and feedback from the workgroup members and outline a more specific engagement strategy going forward.
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Discussion & Comment Themes – Q&A and paraphrased key concepts from the meeting

Workgroup Scope & Engagement

DEQ is thinking of this a synthesis process. In one hand we have research and information showing OAH impacts and in the other we have our assessment methodology process. We don’t know the data available and the details necessary to connect the two, this is where we will rely on expert opinion going forward. Since we are taking an integrative approach, drawing elements from existing assessment methodologies (biological condition gradient and ecosystem-based approaches coastal assessment) will be essential in developing our assessment methodology.

In this meeting DEQ is trying to ensure everyone understands terminology and the framework that we are working within. We are talking about a high-level approach (pro/cons of biocriteria assessment vs. numeric criteria update or development). Filling in the details (best indicators, data type/availability, etc..) will be the topics for future meetings and the primary focus of this workgroup. At this point, DEQ generally wants to know: are we on the right path?

- **Comment:** Very interesting discussion. It would be helpful to have a clear direction where our collective expertise in science can be applied. I don't know if you want us to help make policy decisions unless our expertise can help identify what science information might be most informative. It would help if we can either contribute science expertise to science questions and/or how a scientific perspective can help inform policy decisions
- **Comment:** There seem to really be 3 separate conversations happening here: 1) policy discussion: numeric versus narrative, anthropogenic vs non anthropogenic contributions, what level of biology is acceptable. 2) if you decide to go biological, then you need to decide which are the best biological stressors, 3) where do we get the best data? Suggestion for future meeting: define the policy decisions and then ask specific questions.
DEQ staff response: Today we have been talking about our policy approach but we want to highlight the second technical piece mentioned (Identifying the best indicators). That is why we’ve convened this workgroup and will be the focus going forward. DEQ presented the policy framework today to help people understand what space we are working in.
- **Comment:** One commenter expressed that they would like to see EPA take the lead on developing national OA criteria and expressed concern about lack of expertise for state lead OA standard development.
DEQ clarification: DEQ would like to clarify that we are not looking to develop OA standard in this workgroup process, we are asking the workgroup’s help in developing thresholds/metrics for biology that can be used to determine impairment based on the existing biocriteria narrative standard.

Water Quality Impairment Considerations

- **Q:** What is necessary to see that a water body is impaired? Wouldn't active buffering of incoming water by an industry (like a hatchery) be considered evidence of "impairment"?
EPA staff response: much of it has to do with what the state water quality standards and criteria say and how the state listing methodology implements those when assessing the data. The hatchery example in particular came up during the 2010 listing cycles for OR and WA and I'm happy to talk with you about it more. I can send a link to some of our decision documents that speak directly to that.
DEQ staff response: Here is the assessment methodology for Oregon. On page 16, it explains the difference between impaired waters category and waters of concern category.
<https://www.oregon.gov/deq/wq/Documents/ir2022AssessMethodDraftPublicComment.pdf>
- **Q:** Term biological impairment: what is the threshold to determine "biological impairment"? Do you have to show population effect? Whole species effect? Is 20 years of data enough?
DEQ staff response: All those considerations go into the assessment methodology and how we will structure our decision framework to make an assessment. We need assistance from this workgroup in understanding the best indicators/thresholds to set. We want to incorporate all that information into this process

Reference Condition & Anthropogenic Contributions

- **Comment:** This has been very interesting conversation and many questions have been discussed in many of the recent publications from many of us on this call. We have ability to quantify anthropogenic contributions to these different variables (pH, D.O.). This allows us to determine pre-industrial biological conditions in comparison to now. This has been a topic missing in this discussion – to understand that we do have a basis for understanding the biological condition before industrialization.
DEQ staff response: This information will be critical to incorporate moving forward and determining an understanding of reference condition.
- **Comment:** For listing, data are requested for a specific time period for the listing cycle. How do you reconcile this with potential long-term trends that might be related to climate change, which would argue for using data collected over longer time periods?
EPA A: The data used to make an impairment determination are typically within a certain window, but long-term trends can also be used. Certainly if they are demonstrating reference conditions, that is appropriate. Impairment determinations can also be made based on trends of declining water quality and waters that are perceived to be threatened.
DEQ A: In this workgroup (scope), we want to know what the most relevant data to understand biological condition in the nearshore. For this meeting, we want to discuss the high level assessment direction. The details will come in future meetings.
- **Q:** Doesn't the Newport line have a long historical collection for pteropods that could be used to develop such a reference condition?
Comment: Bill Peterson previously presented that he believed there had been long term declines in pteropods on Newport line (maybe NH-5) but unfortunately that work isn't published. I'm not sure if someone has that data.
Comment: Long term change is happening while trying to document a reference state unfortunately -but that never stopped anyone from taking a long term average in some way for a reference state. These reference states in physical conditions have to be revisited and revised every so often because of that change.
Comment: I agree regarding reference condition - either an unaffected site or unaffected period is required. Since OA is global and complicated regionally, defining a reference condition is also complicated and may be difficult. History, as best it can be estimated, will be important.
Comment: I believe modeling approaches can be used to estimate reference conditions, correct? They will be useful for teasing out long-term climate change related changes
Comment: Jennifer Fisher would be the one to ask about the Peterson time-series on pteropods.

Comment: Identify amount of anthropogenic carbon, lab experiments that demonstrate thresholds. The circular logic is: If we rely on reference conditions, we know we have already affected reference populations. Some things are pre-adapted. acclimation versus adaptation. It might be important to have a framework to couch this in.

Assessment Boundaries

- **Comment:** Offshore waters versus territorial sea line. Majority of data stations are outside of the territorial sea, so they get into the stewardship area. This group may be able to discuss where are the really rich data sources in the science. This may give us the best ability to describe what is happening to water quality. It's saying, "where the rich datasets?" and there are experts here who can describe what is happening biologically. NH line is great source for discussion. Opportunity for data.
- **Q:** There has been a lot of talk about water quality data needs to come from the waterbody. Does that mean that lab studies on multi-stressor effects is sufficient? OR do you need data from the waterbody itself?
 - DEQ A:** In developing a methodology for assessment, we can pull from data in other regions and in the lab to justify thresholds in methodology. When talking about making a determination to apply that methodology, that's where the data within an assessment unit is the most important.
 - EPA A:** EPA has addressed these questions related to reference conditions and can share with members. We keep talking about scientifically defensible, but decisions also need to be legally defensible as well. We need to be able to have a robust rationale for the reason these effects show impairment. For pteropod, even if you are seeing high dissolution, what are the normal rates of dissolution in the real world? Without a documentation of reference condition, it's hard to defend these numbers as impaired.
- **Q:** (Paraphrased) It is clear that the territorial area is the place we have most control. How does this compare to the Oregon ocean stewardship area? Can data collected in the stewardship area be used in this process?
 - Comment (Follow-up):** Offshore wind development is looming and may change ocean circulation enough to make data potentially inappropriate to apply. This discussion will be interesting and important to have with the group moving forward.
- **DEQ staff comment:** Want to address whether we can use data outside state boundaries. For methodology development we can use data outside Oregon state waters. For impairment decisions, DEQ will primarily focus on data within state boundaries in order to assess Oregon state waters and may evaluate data and information outside of the Oregon territorial sea to determine if they are representative of conditions within Oregon state waters.

Data Considerations

- **DEQ staff Comment:** It would be helpful if this group can think about and consider data collection efforts that people know about that could contribute to DEQ efforts on this methodology. It is helpful to base this methodology on data that has already been collected.
- **Comment:** The Newport line data, the pteropod data has not been published. Jennifer Fisher considering publishing? We may want to consider that data point.
- **EPA staff comment:** it is not a requirement that data be published to be used.
- **Comment:** So, Newport line, there is a push to process data from more nearshore stations. This dataset should be available soon.
- **Q:** How do you see this group providing these expert data to DEQ? AWQMS may not be user friendly for this type of data.
 - DEQ staff response:** Our methodology will inform how we will accept the correct format and type of data. We will not need submitted data to develop the methodology.

Other DEQ response: I agree that discussions around data storage are premature. As we work together to identify types of data useful to methodology development and assessment, our AWQMS database can be adapted to accommodate.

- **Comment:** Given the time frame, you will rely on existing data for this report, but that path could lead you to limit the methodology developed if overly focused on existing data rather than desired data.
- **Comment:** I appreciate the conversation about data quality! California has also found this to be a major issue when looking to evaluate data that does not have proper QA/QAPP associations. We are also looking into identifying data sets that are not only high quality, but spatially and temporally representative of our waterbodies. It would be great to discuss in a future meeting the specific types of data sets states are using and if there are specific sets being pulled (i.e., NOAA WCOA).
- **Comment:** To me his group's work on attribution of the hatchery collapse was pretty convincing and am surprised to hear the concerns that the prior report had on the topic. We might need some time dedicated to that discussion in a future meeting.

Alternative formats

DEQ can provide documents in an alternate format or in a language other than English upon request. Call DEQ at 800-452-4011 or email deqinfo@deq.oregon.gov.