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OFIC SUPPORTS SB 829 A-Engrossed

Purpose:

To ensure that water quality standards are adopted by the Environmental Quality Commission ("EQC"), and that methodologies implementing water quality standards are developed in consultation with outside scientists, the regulated public, and the Environmental Quality Commission, and not hidden within agency guidance.

Problem:

The EQC is authorized by statute to establish water quality standards for waters of the state. ORS 468B.048(1). Pursuant to that authority, the EQC has, at times, adopted very broad and ambiguous water quality standards. One such example, the biocriteria standard, is quoted on the following page. State water quality standards must be approved by the federal Environmental Protection Agency, and, among other things, are used to determine whether water bodies are designated as "water quality limited," requiring a TMDL.

The Department of Environmental Quality ("DEQ") does not have rulemaking authority independent of the EQC. In connection with the biennial review of Oregon's waters required by the federal Clean Water Act, DEQ has historically prepared a "methodology" document that explains how the agency is applying water quality standards.

Unfortunately, in recent years, DEQ has used this methodology document to create very specific numeric thresholds "implementing" the EQC's broad and ambiguous water quality standards. As an example, attached is an excerpt from the 2012 Methodology that includes four pages of text implementing the single-sentence biocriteria standard, including a table with numeric "benchmarks" on the final page.

It is not clear why DEQ chose the thresholds it did. Numeric thresholds are not strictly scientific assessments, but rather policy decisions about what amounts to "impaired" water quality in Oregon given scientific uncertainty and the desired level of protection. These are not decisions appropriately made by staff at DEQ alone. Rather, such decisions should involve the EQC, with robust opportunity for public involvement.

Solution:

SB 829 requires that DEQ solicit scientific and public comment on its methodologies implementing water quality standards, including an opportunity for comment before the Environmental Quality Commission, prior to publishing draft assessments of water bodies using those methodologies.

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340-041-0011

Biocriteria

Waters of the State must be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities.

Stat. Auth.: ORS 468.020, 468B.030, 468B.035 & 468B.048
Stats. Implemented: ORS 468B.030, 468B.035 & 468B.048
Hist.: DEQ 14-1991, f. & cert. ef. 8-13-91; Renumbered from 340-041-0027 by DEQ 17-2003, f. & cert. ef. 12-9-03

Environmental Solutions Division

Methodology for Oregon's 2012 Water Quality Report and List of Water Quality Limited Waters

(Pursuant to Clean Water Act Sections 303(d) and 305(b) and OAR 340-041-0046)

State of Oregon
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Environmental
Quality

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

Last Updated: 10/14/2014
By: Karla Urbanowicz

PARAMETER: Biocriteria

BENEFICIAL USES AFFECTED: Aquatic Life

NARRATIVE CRITERION: OAR 340-041-0011

> **340-041-0011**
> **Biocriteria**
> Waters of the State must be of sufficient quality to support aquatic species without detrimental changes in the resident biological communities.

NARRATIVE ASSESSMENT PROTOCOL:

Detrimental changes in resident biological communities are a form of pollution.[11,12] EPA guidance recommends using biological community assessments as an indicator for aquatic life beneficial use support.[13] This protocol is used to implement Oregon's narrative standard for Biocriteria. The protocol applies numeric benchmarks to evaluate the integrity of aquatic biological communities. Biological assessments look at conditions in the biological communities, but do not by themselves indicate if changes are related to pollutants, or identify which pollutant should be addressed by point source or other controls through a Total Maximum Daily Load. EPA guidance recommends listing waters with aquatic use impairments as Category 5: 303(d) even if the pollutant is not known.[14] This protocol outlines the process and assessment category assignment that Oregon used for the Integrated Report to apply the narrative criterion.

This protocol is based on biological assemblage information for freshwater macroinvertebrates collected by DEQ at reference sites throughout Oregon. Freshwater macroinvertebrates include insects, crustaceans, snails, clams, worms, mites, etc. DEQ identifies sites in a given region that are least disturbed by anthropogenic activities and uses these as reference sites.[15] Biological assessment tools use information from these reference sites to predict the variety and number of aquatic life species expected in Oregon streams and to make inferences about the biological condition of the waters.[16]

Assessing Macroinvertebrate Communities

To assess the biological integrity of macroinvertebrate communities, DEQ used a statistical method called a multivariate predictive model.[17] Using data from reference sites, the model describes the number and types of macroinvertebrates that are expected to be in a water body when the water is in least disturbed conditions. Reference sites are grouped by predictor variable factors that are not affected by human activities (e.g., sampling date, ecoregion, longitude, elevation, precipitation, or air temperature). DEQ developed a model specifically for Oregon, but similar model approaches are used for bioassessments in the United Kingdom (RIVPACS), Australia (AusRIVas), Canada (BEAST), and in broad areas in the United States (typically called RIVPACS models, though different from the U. K. models).

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[11] Federal Water Pollution Act Section 502(19) (33 U.S.C 1362) (Clean Water Act)
[12] Oregon Administrative Rules 340-041-0002(39)
[13] US EPA, July 29, 205, Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act, page 41.
[14] US EPA, July 29, 205, Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act, page 60.
[15] Drake, D., April 2004, Selecting Reference Condition Sites - An Approach for Biological Criteria and Watershed Assessment, ODEQ Technical Report WSA04-002. http://www.deq.state.or.us/lab/techrpts/docs/WSA04002.pdf
[16] Stoddard,J.L., et.al., 2006. Setting Expectations for the Ecological Condition of Streams: The Concept of Reference Condition. Ecological Applications. 16(4): 1267-1276
[17] Hubler, S., July 2008, PREDATOR: Development and Use of RIVPACS-type Macroinvertebrate Models to Assess the Biotic Condition of Wadeable Oregon Streams, Technical Report DEQ08-LAB-0048-TR

DEQ developed the PREDictive Assessment Tool for ORegon, or PREDATOR, to assess the macroinvertebrate communities in Oregon's perennial, wadeable streams. PREDATOR analyzes data from reference sites grouped into three regions in Oregon and models the expected assemblage. Information from a sampling site can be compared to the macroinvertebrate assemblage predicted by the model and an assessment made about how different the observed assemblage is from the expected or reference assemblage. Data collected at a sampling site is used to generate a number for the observed versus expected (O/E) macroinvertebrate taxa. This number represents the "missing" taxa at a site, and can be expressed as "% taxa loss".

For the assessment, DEQ selected values of % taxa loss to use to assign a status category to a water body. The benchmark values are indicators of differences from reference conditions that may indicate detrimental changes to biological communities and an impairment in aquatic life use support that violates the narrative standard. A discussion of the scientific basis for the model development, statistical analysis of reference site data, and basis for selecting benchmark values in terms of the reference site distributions in different regions in Oregon is given in a separate technical paper.[16]

ASSIGNMENT OF ASSESSMENT CATEGORY:

Benchmark values are expressed in terms of the percent of taxa not found in a site assemblage compared to the expected assemblage predicted by the PREDATOR model. The benchmark values are summarized in Table 7.

Category 5: Water Quality Limited, TMDL Needed (303(d) List)
Macroinvertebrate sampling data from perennial, wadeable streams evaluated by DEQ using the PREDATOR model showing:

- ≥ 15% taxa loss in the Marine Western Coastal Forest (MWCF) region,
- ≥ 22% taxa loss in the Western Cordillera and Columbia Plateau (WCCP) region, or
- ≥ 50% taxa loss in the Northern Basin and Range (NBR) region.

Category 4: Water Quality Limited, TMDL Not Needed
In some water bodies, DEQ has information relating specific pollutants to the condition of the biological communities in the water body. Where data are available identifying a specific pollutant as the cause of detrimental changes to biological communities, and a TMDL has been approved with load allocations for the pollutant, the water body will be placed in Category 4 if no additional TMDLs are needed. Water bodies will also be placed in Category 4 for biological criteria if adequate information is available to indicate that detrimental changes to biological communities are not due to a pollutant.

Category 3B: Insufficient Data – Potential Concern
Some macroinvertebrate sampling data from perennial, wadeable streams evaluated using the PREDATOR model are inconclusive and are insufficient to assign a status category until additional information is collected.

Macroinvertebrate sampling data from perennial, wadeable streams evaluated by DEQ using the PREDATOR model showing:

- 8% to 14% taxa loss or > 24% taxa gain in the Marine Western Coastal Forest (MWCF) region,
- 8% to 21% taxa loss or > 23% taxa gain in the Western Cordillera and Columbia Plateau (WCCP) region, or
- 25% to 49% taxa loss in the Northern Basin and Range (NBR) region.

Results showing taxa loss in these ranges could be due to sampling error or modeling error and may be over or under-estimating taxa loss. A large gain of observed taxa over expected may indicate more natural diversity, or may indicate disturbance that has enhanced diversity.[18] Additional samples are necessary to better assess biological conditions. A minimum of 5 replicate samples should be collected to provide sufficient data for status classification. The stream is a potential concern until more information is evaluated.

Category 2: Attaining
Macroinvertebrate sampling data from perennial, wadeable streams evaluated by DEQ using the PREDATOR model showing:

- 0% to 8% taxa loss or 0% to 24% taxa gain in the Marine Western Coastal Forest (MWCF) region,
- 0% to 7% taxa loss or 0% to 23% taxa gain in the Western Cordillera and Columbia Plateau (WCCP) region, or
- < 25% taxa loss in the Northern Basin and Range (NBR) region.

TIME PERIOD:
Year Round

DATA REQUIREMENTS:
Site sample data must be collected during or after 1998 to be comparable to the reference site data (1998 to 2004) that is used in the PREDATOR model. Site samples must be collected within the model season of June 1 through October 15. Field duplicates and seasonal replicate samples are averaged to account for sampling and seasonal variability.

Site sample data must be collected using standard field methods and identified to appropriate taxonomic levels, as described in the DEQ Mode of Operations Manual, or equivalent protocols used throughout the Pacific Northwest.[19] The standard method for macroinvertebrate sampling requires collecting organisms from specific habitats within a specified size reach of a stream. The data are evaluated to generate one sample result in the PREDATOR model.

One sample result is sufficient to evaluate for the assessment using the benchmarks developed from the PREDATOR model. If samples from multiple years are available, the most recent sample result in either Category 2: Attaining or Category 5: 303(d) will determine the site status. If the most recent sample result is Category 2: Attaining and a previous sample is Category 5: 303(d), the site status will be Category 3B. Recent Category 2: Attaining sample results must outnumber earlier Category 5: 303(d) sample results for the site status to be considered Category 2.

When results for replicate site samples are collected to clarify inconclusive results (Category 3B), a minimum of 5 samples is required to achieve the target statistical confidence. The site will be assigned a status category if 3 out of 5 replicate samples show results in the Category 2: Attaining or Category 5: 303(d) ranges. Replicate samples must be collected in the same sampling season, in the same reach, or in adjacent and comparable reaches.

DATA REVIEWED:
2012 Integrated Report
DEQ did not evaluate data or information for biocriteria for the 2012 Integrated Report.

[18] Ward, J.W, and Stanford, J.A., 1983, Intermediate-Disturbance Hypothesis: An Explanation for Biotic Diversity Patterns in Lotic Ecosystems. In Dynamics of Lotic Systems, Ann Arbor Science, Ann Arbor, MI, pages 347-356.
[19] ODEQ, 2009, Mode of Operations Manual, Version 3.2, DEQ03-LAB-0036-SOP, http://www.deq.state.or.us/lab/techrpts/docs/DEQ03LAB0036SOP.pdf

DEQ reviewed EPA's action on Oregon's 2010 303(d) list. Based on EPA's determination that waters with impaired biological conditions should be placed on the 303(d) list, DEQ re-assigned several waters to Category 5: Water Quality Limited, TMDL Needed (303(d) List).

Last Data Review
DEQ evaluated data and information for biocriteria for the 2010 Integrated Report. EPA reviewed DEQ's analysis and determined that waters with impaired biological conditions should be added to Oregon's 2010 303(d) list. EPA took final action to add these waters to the 303(d) list in December, 2012.

DELISTING:

Once TMDLs are approved for pollutants that will also improve biological conditions, water bodies may be delisted for biocriteria. These waters will be placed in Category 4: Water Quality Limited, TMDL Not Needed if no additional TMDLs are needed.

Water bodies may be delisted for biocriteria based on multiple site sampling events showing results that are attaining benchmarks. A minimum of 5 samples must be collected in the same sampling season and in the same or adjacent and comparable reaches, with 3 out of 5 samples showing results that attain appropriate benchmarks. These waters will be placed in Category 2: Attaining.

SEGMENTATION:

General segmentation protocols will be followed (Appendix 1). The status category from one sampling site will apply to the sampling reach and upstream portions of the wadeable, perennial stream. A minimum segment length of 0.6 miles will be imposed when multiple sample sites are closely located within a small stream reach. Given the sampling design and field protocols, assessment segments less than 0.6 miles are likely to impose artificial divisions that are not true representations of stream conditions.

Table 7: Biocriteria Assessment Benchmarks

PREDATOR Model Region	Assessment Category		
	Category 5: Water Quality Limited	**Category 3B: Insufficient Data Potential Concern**	**Category 2: Attaining**
Marine Western Coastal Forest	≥ 15% taxa loss	9% - 14% taxa loss or > 24% taxa gain	0% - 8% taxa loss or 0% - 24% taxa gain
	PREDATOR score ≤ 0.85	PREDATOR score 0.86 to 0.91 or > 1.24	PREDATOR score 0.92 to 1.24
Western Cordillera and Columbia Plateau	≥ 22% taxa loss	8% - 21% taxa loss or > 23% taxa gain	0% - 7% taxa loss or 0% - 23% taxa gain
	PREDATOR score ≤ 0.78	PREDATOR score 0.79 to 0.92 or > 1.23	PREDATOR score 0.93 to 1.23
Northern Basin and Range	≥ 50% taxa loss	25% - 49% taxa loss	< 25% taxa loss
	PREDATOR score ≤ 0.50	PREDATOR score 0.49 to 0.75	PREDATOR score > 0.75