

Water Quality Standards and Assessment

Introduction to Listing and Delisting Procedures

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ODEQ HQ

Documents can be provided upon request in an alternate format for individuals with disabilities or in a language other than English for people with limited English skills. To request a document in another format or language, call DEQ in Portland at 503-229-5696, or toll-free in Oregon at 1-800-452-4011, ext. 5696; or email deqinfo@deq.state.or.us.

Topics

Listing Considerations:

- Expanding use of Category 3B

- Overwhelming Evidence

- Statistical methods (large datasets)

Delisting Considerations:

- Data requirements

- Statistical Methods (minimal sample size)

Listing Considerations

Category	Description
Category 1	<u>All</u> designated uses are supported. (Oregon does not use this category.)
Category 2	Available data and information indicate that <u>some</u> designated uses are supported and the water quality standard is attained.
Category 3	Insufficient data to determine whether a designated use is supported.
	Oregon further sub-classifies waters if warranted as: 3B: Potential concern when data are insufficient to determine use support but some data indicate non-attainment of a criterion.
Category 4	Data indicate that at least one designated use is not supported but a TMDL is not needed to address the pollutant cause. This includes:
	4A: TMDLs that will result in attainment of water quality standards and beneficial use support have been approved.
	4B: Other pollution control requirements are expected to address pollutants and will result in attainment of water quality standards.
	4C: Impairment is not caused by a pollutant (e.g., flow or lack of flow are not considered pollutants).
Category 5	Data indicate a designated use is not supported or a water quality standard is not attained and a TMDL is needed. This category constitutes the Section 303(d) list that EPA will approve or disapprove under the Clean Water Act.

Category 3B

Category	Description
Category 1	All designated uses are supported. (Oregon does not use this category.)
Category 2	Available data and information indicate that <u>some</u> designated uses are supported and the water quality standard is attained.
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Category 5	Data indicate a designated use is not supported or a water quality standard is not attained and a TMDL is needed. This category constitutes the Section 303(d) list that EPA will approve or disapprove under the Clean Water Act.

Category 3B

“Insufficient Data – Potential Concern”

- The sample size is insufficient to place in Category 5
 - Toxics: Only 1 sample, must be above criteria
 - Conventionals: Less than min. (5) samples but >1 (10%) above criteria
- Not enough to determine attainment OR impairment
- But...information available suggests possible impairment
- Other situations with insufficient sample size default to Category 3

Category 3B: Additional scenarios

- Conflicting attainment conclusions
 - Total recoverable pollutant sample and dissolved criteria
 - Calculated criteria: (hardness-based, ammonia, biotic ligand model)
 - Measured criteria attained but default criteria exceeded
- Non-detect and non-quantifiable results

Category 3B

- Identify water bodies that are *possibly* impaired
- How we might align these with our monitoring program

Overwhelming evidence

*“An assessment methodology should take into account the balance between desired data requirements and the practical realities affecting the availability of information and the strength of the available evidence. Generally, **decisions should be based on very small sample sizes only when there is overwhelming evidence for impairment.** EPA does not recommend making decisions based on small sample sizes of water column chemistry for attainment .”*

- Consolidated Assessment and Listing Methodology (CALM), EPA, 2002

Overwhelming evidence

- Currently list on as few as 2 samples
- Increase minimum sample size?
- But...list for small number of samples when other sources of information for the waterbody strongly suggests impairment
- Follow CALM weight of evidence approach

Define Types of Overwhelming Evidence

- Extraordinary magnitude (e.g. 2x chronic or any acute)
- Critical conditions
- Corroboration of nearby assessment units
- Known pollutant sources
- Also listed for biological impairment
- Other lines of evidence (e.g. documented fish kill)

Statistical methods for listing

- Large data sets
- Hypothesis testing
- Error management

Balancing Uncertainty

For aquatic life currently list if any 2 samples exceed

- e.g. 26% of Willamette Valley Aq. Life Toxics listings based on only 2 samples exceeding, all chronic
- Does not account for sample size
 - eg. a zinc listing based on 5 of 738 samples exceeding (0.6%)
- Biased against finding attainment in large data sets
- Disincentive for 3rd party data sharing
- Need more credible method to determine attainment

Statistical-based testing methods

- Treat water quality data as *random samples* of the waterbody
- Make inference about the condition of the waterbody as a whole
- Discriminate between high-confidence large data sets and low-confidence small data sets

Error management

Two ways we make errors....

- Type-I

“False Positive”

Incorrectly find impairment when waterbody actually attains.

- Type-II

“False negative”

Incorrectly find attainment when waterbody is actually impaired.

- Current method known to strongly inflate Type-I errors

*EPA encourages states to define acceptable error rates and control for each type (EPA Consolidated Assessment Listing Methodology, 2002)

Statistical methods for listing

Proposed: binomial test

- Tests the hypothesis a waterbody exceeds given the samples collected
- Method is in EPA-CALM
- Adopted by several other states
- Minimal sample size not required
 - maintain status quo of listing on any 2 exceedances for $< \sim 24$ samples (eg. $\sim 50\%$ of Willamette Valley toxics listings)
- External peer-review

Delisting Considerations

Current Guidelines

- Data requirements for de-listing a Category 5 are vague:

“Generally, **similar data** were required to delist a water body as initially used to place the water body on the 303(d) list. For example, as based on **two successive years of a standard not being met**, DEQ looked for at least **two successive years of data indicating that the standard is being met.**”

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

Data Requirements

- Define data needed to consider delisting
- Set a minimum sample size
- Weight most recent data in long-term assessment windows

Statistical De-Listing Methods

- Should match statistical method used for listing
- Manage greater risk of de-listing a waterbody that is actually impaired
- Set a minimal sample size to achieve desired certainty
- External peer-review

Summary:

Listing / Delisting Considerations

- Make methods used for listing and delisting more accurate, transparent, robust, and accountable.
- Expand tools for accurately identifying potential impairments given limited data
- Better define requirements for determinations
- Use statistical approaches to explicitly address uncertainty