

Bottom deposit assessment methodologies used by other states

Colorado (pg 37)

Narrative Sediment Standard: Excessive deposition of sediment on the bottom of streams and rivers can cause harmful impacts to aquatic life such as benthic macroinvertebrates and fish, in addition to other beneficial uses. The impacts to aquatic life usually result from the loss of critical habitat for fish, aquatic invertebrates and algae. Regulation #31 includes a narrative standard that states that a waterbody should be “free from substances attributable to human-caused point source or nonpoint source discharge in amounts, concentrations, or combinations which can settle to form bottom deposits detrimental to the beneficial uses.”

The division determines attainment of the statewide narrative standard by following protocols outlined in commission Policy 98-1, *Guidance for Implementation of Colorado’s Narrative Sediment Standard Regulation #31, Section 31.11(1)(a)(i)*. For all state waters, the narrative standard is not in attainment when evidence demonstrates the following:

- The actual observed sedimentation condition for a specific waterbody is significantly different than the expected condition, and thus considered excess sediment
- The excess sediment is attributable to an anthropogenic source
- The excess sediment could be a detriment to a beneficial use

Policy 98-1 includes sediment thresholds that apply to rivers and streams in specific regions, as well as specific assessment methods to evaluate i) benthic macroinvertebrate assemblages and ii) fish assemblages.

- i. To evaluate the benthic macroinvertebrate assemblages, three components are examined:
- a census of the waterbody substrate and a resultant measure of the percent fines (%fines <2 mm),
 - a Tolerance Indicator Value for sediment (TIV_{SED} score), and
 - a review of available watershed information (watershed review).

A detailed explanation of how each component is evaluated is included in Policy 98-1. Sediment and macroinvertebrate data used to make attainment decisions must be collected within the same two week period during representative flow conditions. For a segment to be in non-attainment, a failing TIV_{SED} score, a failing % fines value and a watershed review are required. The watershed review must confirm the existence of anthropogenic sources of sediment and confirm that the sample site/watershed is not significantly different from the range of conditions used to establish the expected condition for the Sediment Region. Impairment decisions are not possible if only two of the three components are assessed. The TIV_{SED} score and the % fines must be in attainment in order for the division to propose a delisting of a previously listed segment.

- ii. To evaluate fish assemblages, the percent fines (percent fines <8 mm) is measured from targeted fish spawning habitat for a given segment. If the percent fines is greater than 20

percent and the watershed review confirms that excess sediment is attributable to an anthropogenic source, the segment is considered impaired.

Massachusetts (pg 9 Table 1)

Aesthetics Use

All Classes: All surface waters shall be free from pollutants in concentrations or combinations that settle to form objectionable deposits; float as debris, scum or other matter to form nuisances; produce objectionable odor, color, taste or turbidity; or produce undesirable or nuisance species of aquatic life.

Solids

All Classes: These waters shall be free from floating, suspended, and settleable solids in concentrations or combinations that would impair any use assigned to each class, that would cause aesthetically objectionable conditions, or that would impair the benthic biota or degrade the chemical composition of the bottom.

Use Assessment Decision Making Process: (pg 44)

Aesthetic observations (Rivers, Lakes, Estuaries) MassDEP field staff note aesthetically objectionable and abnormal conditions encountered at sampling stations. Based on these notes, an evaluation is made regarding the aesthetic quality of a waterbody. The field sheets provide documentation of conditions that exist at a site which may be indicative of nutrient enrichment (e.g., algal growth/blooms) or other aesthetically objectionable conditions (e.g., deposits, sheens, odors, unnatural color, turbidity (clarity), trash/debris, etc.). Field data are recorded at each site during each survey so analysts can later determine the general magnitude and frequency of any objectionable conditions over the course of the sampling period. Therefore, the *Aesthetics Use* is assumed to be supported unless field notes indicated otherwise. While the aesthetic assessments are somewhat subjective, issues of concern (e.g., the presence of trash/debris, one very dense algal bloom noted during the summer survey season) *may* be identified with an Alert Status to flag the need for more detailed information gathering, whereas gross-level aesthetic impairments are identified as not supporting. It should be noted that a waterbody will not be assessed as impaired for the occasional presence of litter or debris, but rather for persistent and/or other more serious indicators of aesthetic degradation. External sources of information related to aesthetic quality include volunteer stream team/shoreline surveys and lake reports. ...

Aesthetics Use Assessment (pg 45)

Use is Supported

No aesthetically objectionable conditions; waterbodies are generally “free from pollutants in concentrations or combinations that settle to form objectionable deposits; float as debris, scum or other matter to form nuisances; produce objectionable odor, color, taste or turbidity; or produce undesirable or nuisance species of aquatic life”

Use is Impaired

Aesthetically objectionable conditions frequently observed (e.g., blooms, scums, water odors, discoloration, taste, visual turbidity highly cloudy/murky, excess algal growth (>40% filamentous cover in rivers, nuisance growths >25% dense/very dense macrophytes or blooms in lakes (or the impounded reaches of a river AU), Secchi disk transparency < 4 feet at least twice during survey season.

Missouri Pg. 26

Observation and evaluation of waters for noncompliance with state narrative water quality criteria. Missouri’s narrative water quality criteria, as described in 10 CSR 20-7.031 Section (3), may be used to evaluate waters when a quantitative value can be applied to the pollutant. These narrative criteria apply to both classified and unclassified waters and prohibit the following in waters of the state:

- a. Unsightly, putrescent or harmful bottom deposits,
- b. Oil, scum and floating debris,
- ...

TABLE B - 1. DESCRIPTION OF ANALYTICAL TOOLS FOR DETERMINING IF WATERS ARE IMPAIRED

Designated Use	Analytes	Analytical Tool	Decision Rule/ Hypothesis	Criterion Used with the Decision Rule²³	Significance Level
Bottom deposits (Narrative)	Hypothesis Test, Two Sample, one tailed “t “Test , t-Test	Null Hypothesis: Solids of anthropogenic origin cover less than 20% of stream bottom where velocity is less than 0.5 feet/second.	Reject Null Hypothesis if 60% Lower Confidence Limit (LCL) of mean percent fine sediment deposition (pfsd) in stream is greater than the sum of the pfsd in the control and 20 % more of the stream bottom. i.e., where the pfsd is expressed as a decimal, test stream pfsd > (control stream pfsd)+ (0.20) ²⁴		0.40

Pg 21 Table 1.2 METHODS FOR ASSESSING COMPLIANCE WITH WATER QUALITY STANDARDS USED FOR 303(D) LISTING PURPOSES: NARRATIVE CRITERIA BASED ON NUMERIC THRESHOLDS NOT CONTAINED IN STATE WATER QUALITY STANDARDS (10 CSR 20-7.031)

Objectionable Bottom Deposits: The bottom that is covered by sewage sludge, trash or other materials reaching the water due to anthropogenic sources exceeds the amount in reference or control streams by more than twenty percent.

Oregon (pg 53)

Statewide Narrative Criteria

(11) The formation of appreciable bottom or sludge deposits or the formation of any organic or inorganic deposits deleterious to fish or other aquatic life or injurious to public health, recreation, or industry may not be allowed;

WATER QUALITY LIMITED DETERMINATION (CATEGORY 5: 303(D)):

Previous water quality assessment methodologies (Listing Criteria for Oregon's 1998 303(d) List of Water Quality Limited Water Bodies) have used stream specific documentation that showed excessive sedimentation was a significant limitation to fish or other aquatic life. This included information indicating beneficial uses impairment (aquatic community status, biomonitoring reference sites, or fishery data) and measurement data for benchmarks such as cobble embeddedness or percent fines.

DEQ is considering approaches to apply a numeric benchmark based on measurements of stream conditions to implement the narrative criteria.

Vermont

Aesthetics Use

For assessment of Aesthetic Use, the DEC Watershed Management Division uses water quality and water quantity information from field surveys for rivers and streams and public feedback and complaints as well as field surveys for lakes and ponds to determine levels of support.

Full Support: Water character, flows, water level, riparian and channel characteristics, all exhibit good to excellent aesthetic value consistent with the waters classification. Water clarity and substrate condition is good. No floating solids, oil, grease, scum, or algae blooms. Limited or no record of public concern.

Stressed: Aesthetic quality is compromised somewhat. Water unnaturally turbid at times. Moderate levels of invasive, non-native plant growth. Small or disturbed riparian zone. Some record of public concern or complaint.

Altered: Aesthetic quality is poor due to a diminished amount of water to no water in the channel or lake resulting from human activities or due to moderate or heavy densities of invasive, non-native species. Streambanks are severely slumping, stream is braided, channel is highly straightened and rip-rapped, and channel bed material is severely jumbled and unsorted.

Impaired: Aesthetic quality of water is poor. Water is frequently and unnaturally turbid. Substrate is unnaturally silt-covered, mucky, or otherwise changed so as to adversely affect the aesthetics in an undue manner. Presence of solid waste, floating solids, scum, oil or grease occurs frequently and persistently. Rocks are unnaturally colored by metal contamination.

Wyoming

4.9 Scenic value

Section 3(f) of Chapter 1 states that scenic value use involves the aesthetics of the aquatic systems themselves (odor, color, taste, settleable solids, floating solids, suspended solids, and solid waste) and is not necessarily related to general landscape appearance. Narrative criteria for the scenic value use can be found in Sections 15, 16 and 17 of Chapter 1. Credible data must be evaluated when determining scenic value designated use support.

Fully supporting - Representative data show no exceedance of any scenic value criterion within at least 2 separate years of a 3-year period.

Fully supporting, but threatened - Representative data show no exceedance of any scenic value criterion. However, data indicate a declining water quality trend, that if continued, will likely result in a designated use support determination of not fully supporting.

Not fully supporting - Representative data show that at least one scenic value criterion is exceeded within at least 2 separate years of a 3-year period.

Indeterminate - Representative data, collected during a designated use support assessment are either insufficient or inconclusive and designated use support cannot be determined.

Not assessed - Representative data are not available to determine designated use support.

Note: *several other states have a similar narrative standard, but an assessment methodology is not provided for the narrative standard.*