Aquatic Life Use Attainment

Methodology to Determine Use Attainment
for
Rivers and Streams

Policy Statement 10-1

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Water Quality Control Commission
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List of Acronyms and Abbreviations

AAH   Administrative Action Hearing

Commission Colorado Water Quality Control Commission

CDOW   Colorado Division of Wildlife

CWQCA   Colorado Water Quality Control Act

CWA   Clean Water Act

Division   Colorado Water Quality Control Division

EPA   U.S. Environmental Protection Agency

EPT Taxa   The number of Ephemeroptera, Plecoptera and Trichoptera genera represented
                in a macroinvertebrate sample. These genera are generally very sensitive to
                pollution.

MMI   Multi-metric Index

WQCC   Water Quality Control Commission

WQCD   Water Quality Control Division

Definitions

Aquatic Assemblage means a group of interacting species in a given water body, united by habitat and ecology. For example, "fish assemblage" or "benthic macroinvertebrate assemblage."

Benthic Macroinvertebrates (also macrobenthos) means the animals (without backbones) living on or in the streambed. These animals generally are large enough to be seen by the unaided eye; the size of the smallest organisms in this community is determined operationally by what can be retained by a U.S. Standard No. 30 sieve (28 openings/inch, 0.595-mm openings).

Biological Assessment (or bioassessment) means an evaluation of the biological condition of a water body using biological survey data and other direct measurements of resident biota in surface waters.

Biological Thresholds means numeric values or narrative expressions that describe the expected biological quality of aquatic communities in waters of a given classified aquatic life use. Biological thresholds are based on direct measurement of the aquatic community, including its structure and functions.

Macroinvertebrates see benthic macroinvertebrate.

Metric means a calculated term or enumeration representing some aspect of biological assemblage, function, or other measurable aspect. A multimetric approach combines metrics to provide an integrative assessment of the status of aquatic resources.

AQUATIC LIFE USE ATTAINMENT
METHODOLOGY TO DETERMINE USE ATTAINMENT
FOR RIVERS AND STREAMS

I.   INTRODUCTION

Direct measurement and characterization of the health and well being of the aquatic community in surface water are critical to determining how effectively Colorado is achieving the ultimate goals of the Colorado Water Quality Control Act ("CWQCA") and the federal Clean Water Act ("CWA"), which are to restore, maintain, protect, and improve the quality of our water resources.[1] To this end, one of the specific policy goals of the CWQCA is the "protection and propagation of wildlife and aquatic life.[2]" The federal CWA similarly speaks to the importance of healthy aquatic ecosystems in its often-quoted Congressional declaration, which sets forth the CWA's key objective - to "restore and maintain the chemical, physical and *biological integrity* of the Nations waters.[3]" These legislative policy statements highlight the importance of having tools and techniques available to evaluate the current aquatic-life conditions in our surface waters, and to set goals for the future.

This policy document provides the Colorado Water Quality Control Commission's ("Commission") methodology for determining whether the aquatic life use is attained in rivers and streams. The procedures detailed in this guidance rely upon direct measurement of the aquatic life use rather than on comparing existing water quality to numeric standards for individual pollutants (e.g. copper, zinc, ammonia) set to protect aquatic life.

The Commission's approach to making aquatic life use-attainment decisions has evolved over time. The intent of this policy is to describe the cumulative result of regulatory actions taken by the Commission. It is envisioned that as the Commission gains experience and takes action on individual use-attainment decisions in the context of Regulation No. 93 "Colorado's Section 303(d) List of Impaired Waters and Monitoring and Evaluation List" and in considering re-classification of water bodies in rulemaking hearings, this policy document will be revised to reflect those new policy decisions.

The contents of this document have no regulatory effect, serving instead to summarize the Commission's thinking and actions in a single public document. In other words, as opposed to a rule or regulation, this policy statement has no binding effect on the Commission, the Water Quality Control Division ("Division"), or the regulated community. Moreover, this policy is not intended, and should not be interpreted, to limit any options that may be considered or adopted by the Commission in future rulemaking proceedings. Therefore, this policy statement can, and will, be modified over time as warranted by future rulemaking decisions.

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[1] *See* Colorado Water Quality Control Act, § 25-8-102(2), C.R.S.; Federal Clean Water Act, § 101(a), 33 U.S.C. § 1251(a).
[2] Colorado Water Quality Control Act at section 25-8-101(2) and Clean Water Act at section 101(a) (2).
[3] Federal Clean Water Act at section 101(a), emphasis added.

II.   COLORADO'S AQUATIC LIFE USES

Colorado classifies water bodies for beneficial uses that, along with chemical and physical standards, assure their protection. Along with water supply, recreation and agriculture, Colorado classifies waters for "aquatic life" use. Colorado's aquatic life use classifications are assigned to individual water body segments based upon the potential to support that use according to a narrative description in Regulation No. 31 "Basic Standards and Methodologies for Surface Water" at section 31.13:

31.13 <u>STATE USE CLASSIFICATIONS</u>

Waters are classified according to the uses for which they are presently suitable or intended to become suitable. In addition to the classifications, one or more of the qualifying designations described in section 31.13(2), may be appended. Classifications may be established for any state surface waters, except that water in ditches and other manmade conveyance structures shall not be classified.

(1) <u>Classifications</u>

. . .

> (c)   <u>Aquatic Life</u> These surface waters presently support aquatic life uses as described below, or such uses may reasonably be expected in the future due to the suitability of present conditions, or the waters are intended to become suitable for such uses as a goal:
>
> > (i)   <u>Class I - Cold Water Aquatic Life</u> These are waters that (1) currently are capable of sustaining a wide variety of cold water biota, including sensitive species, or (2) could sustain such biota but for correctable water quality conditions. Waters shall be considered capable of sustaining such biota where physical habitat, water flows or levels, and water quality conditions result in no substantial impairment of the abundance and diversity of species.
> >
> > (ii)   <u>Class 1 - Warm Water Aquatic Life</u> These are waters that (1) currently are capable of sustaining a wide variety of warm water biota, including sensitive species, or (2) could sustain such biota but for correctable water quality conditions. Waters shall be considered capable of sustaining such biota where physical habitat, water flows or levels, and water quality conditions result in no substantial impairment of the abundance and diversity of specifies.
> >
> > (iii)   <u>Class 2- Cold and Warm Water Aquatic Life</u> These are waters that are not capable of sustaining a wide variety of cold or warm water biota, including sensitive species, due to physical habitat, water flows or levels, or uncorrectable water quality conditions that result in substantial impairment of the abundance and diversity of species.

III.   BACKGROUND

Historically, Colorado's aquatic life use classifications have sometimes been difficult to determine for a given water body. The broad categories and the generalized terms in the

classification descriptions have led to disagreements and sometimes contentious hearings about the appropriate classification of specific water bodies.

The current effort to refine the aquatic life use classifications and provide a more consistent basis for determining the condition of aquatic life arose from specific issues in Colorado, as well as an increased national focus on biological thresholds. In the late 1990's, a contentious hearing about the proper classification of the Lower Arkansas raised awareness of problems with the existing descriptions of the aquatic life use classifications. This coincided with EPA encouragement for States to incorporate biological assessments and biological thresholds as major components of the standards and monitoring programs. In June 2000, the Division established the Aquatic Life Work Group to develop biological assessment methods and biological thresholds, and propose refinements of the aquatic life use classifications.

In 2002, an amendment of the CWQCA (§ 25-8-309) directed the Division to study (among other things) the need for refined aquatic life use classifications and a better method with a uniform approach to determine whether a water body had attained its aquatic life use. These subjects were explored by the Aquatic Life Work Group. The result of the "309" study was to flesh out the expected condition concept and identify a "Strawman" classification system which contained nine primary aquatic life use categories and 27 possible subcategories and called for voluntary pilot studies to characterize the "expected condition" for candidate sub-categories. However, the pilot studies did not proceed as intended due to a lack of interest, funding, and study sites.

In November of 2004, the Commission reviewed the Aquatic Life Work Group's "expected condition concept" during the Basic Standards Issues Formulation Hearing. At that time, the Commission decided not to incorporate the expected condition concept in the 2005 Basic Standards and Methodologies for Surface Water (Regulation #31) Rulemaking Hearing. Instead, the Commission tasked the Aquatic Life Work Group with strengthening the underlying biological data from which the Strawman's nine principle use classification categories and sub-classifications would be defined. At that time the Commission targeted the 2010 Rulemaking Hearing for Basic Standards for the next Strawman iteration. Coincidentally, the Division began to work with EPA and their contractors to use Colorado's data to develop bioassessment tools. This effort is described below in Section IV.

Rather than restructuring the existing classification system with potentially numerous ramifications, the Division decided to proceed with the more modest step of utilizing bioassessment tools and data to refine how existing classifications are interpreted and applied. This policy represents the first official step to add more specificity to Colorado's aquatic life use classifications.

IV. BIOASSESSMENT AND BIOLOGICAL THRESHOLDS

Bioassessment is a quantitative measure of the biological condition of the resident aquatic community. A biological threshold is the establishment of numeric criteria against which the current biological condition can be evaluated. Each of these regulatory concepts – biological assessment and biological thresholds – is defined briefly, and then discussed in more detail in Section IV subsection A.

Biological Assessment (or bioassessment) means an evaluation of the biological condition of a water body using biological survey data and other direct measurements of resident biota.

Biological Thresholds means numeric values or narrative expressions that describe the expected biological quality of aquatic communities in waters of a given classified aquatic life use, and are based on direct measurement of the aquatic community, its structure and functions.

A.   Bioassessment Tools

Aquatic communities are an association of interacting populations of aquatic organisms in a given waterbody or habitat (EPA 1991). They provide valuable information regarding the overall biological integrity of a given waterbody. These organisms are capable of integrating the effects of stressors over time; thus, they can provide a broad ecological measure of fluctuating environmental conditions (EPA 1999). Bioassessments provide the means to evaluate biological condition in relation to the goal or expectation, such as designated use support.

Several biological assemblages are available for study including periphyton (attached algae), benthic macroinvertebrates and fish, each of which responds somewhat differently to the suite of anthropogenic stressors. The decision to rely exclusively on the benthic macroinvertebrates assemblage was based on community characteristics and practical considerations. The combination of relatively long life spans, limited mobility, representation in most Colorado habitats, and ease of collection make macroinvertebrates the best single assemblage for bioassessment.

Within the benthic macroinvertebrate assemblage, metrics are selected that represent some measureable aspect of the community structure and function. These measurements are grouped into metric categories such as taxa richness, composition, pollution tolerance, functional feeding groups, and habit. Combining metrics from these categories into a multi-metric index transforms taxonomic identifications and individual counts into a unitless score that ranges from 0-100.

Choosing metrics that are sensitive to stressors yields an index that defines the health, or the biological condition, of the aquatic community. A bioassessment tool of this kind is a powerful basis for a direct assessment of aquatic communities that can be used to reach conclusions about attainment of the aquatic life use.

B.   Colorado's Multi-Metric Index (MMI) Bioassessment Tool

The Division, with assistance from EPA and its contractors, has developed a multi-metric bioassessment tool for Colorado that is composed of separate indices calibrated to respond to stressors affecting aquatic communities in one of the three analytically defined biotypes[4].

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[4] A biotype is an aggregation of macrobenthos sites that have similar community composition. Environmental attributes (elevation, stream slope and ecoregion) common to sites within each of the biotypes can be used to predict membership of a new site.

Multi-metric indices were then calibrated for each biotype. Each index is composed of several metrics selected to represent categories of community characteristics including richness, composition, functional feeding group, mode of locomotion, and pollution tolerance. Metrics were chosen on the basis of their ability to discriminate between reference and stressed sites, represent multiple metric categories, are ecologically meaningful, and are not redundant with other metrics in the index. See Appendix A for details.

Because of this metric selection process, the metrics used in the MMI vary in their ability to detect or diagnose specific types of stress. The MMI is designed to detect environmental stresses that result in alteration of the biological community. No specific stressors are identified because the intent is to have a generalized tool that responds to a wide range of potential stressors. In other words, the MMI tool cannot determine if the stressor is a specific pollutant, pollution or habitat limitation (including flow). Once impairment is identified, however, other tools are available to identify the likely cause of impairment.

V. METHODOLOGY FOR DETERMINING CURRENT BIOLOGICAL CONDITION

Determining biological condition involves the steps of calculating the MMI for the appropriate biotype and comparing the MMI score to a threshold.

To calculate an MMI a representative macroinvertebrate sample is collected from the appropriate habitat(s). Standardized procedures for collecting macroinvertebrates are in Appendix B. Field sampling is typically followed by preservation, laboratory identification and enumeration, and entry into a biological database capable of calculating the MMI. See Appendices C and D for details.

VI. HISTORY OF USE ATTAINMENT DECISIONS BASED ON BIOLOGICAL INFORMATION

Direct measurement and characterization of the health and well being of the aquatic community in surface water is critical to determine whether or not the aquatic life use is attained at a given site. Historically, Colorado has used biological information to make attainment decisions, even though no specific methods of assessment or thresholds were set. This section describes the history of such decisions.

A. Impaired Waters Listing Decisions

In 1998, the Colorado List of Impaired Waters included three segments found to be impaired for aquatic life. The associated listing methodology explained the protocol for reaching those decisions:

> Biological assessments by the Colorado Division of Wildlife (CDOW) were utilized in developing the List. These consist of fish surveys performed by CDOW staff using both seining and electrofishing. The results of these assessments were compared with the Standards and Classification System in the following manner. For segments that are

designated as Aquatic Life Class 1, evidence of a decline over time from a healthy and diverse fish community or the absence of a Species of Critical Concern[5] constitutes an impairment of the use. For segments that are designated as Aquatic Life Class 2, evidence of significant reduction of the species composition of a fish community over time constitutes an impairment of the use. The Division limited the time frame for comparison of fish communities as shown by fish surveys, to only the late 1970's (when aquatic life classes were established) through more recent conditions.

The requirement for a Section 303(d) List in 2000 was suspended by EPA, and no List of Impaired Waters was compiled. The 2002 303(d) List included six waters with an impaired aquatic life use. Decisions about impairment were based on the following narrative that appeared in the 2002 Listing Methodology:

> B. IMPAIRMENT OF NARRATIVE STANDARDS AND CLASSIFIED USES
>
> Impairment of narrative standards and classified uses may be supported by chemical data and/or information generated by biological and/or physical assessments. In instances where a determination of impairment is based solely upon biological and/or physical assessments, such assessments must provide clear and convincing evidence of non-attainment. For aquatic life uses, as previously referenced, the WQCD will generally consider impairment of narrative standards and classified uses to be demonstrated when either the physical/habitat data or biological community metrics reflect a condition that is significantly less than reference condition. When such data do not indicate specific pollutant(s) causing non-attainment, the WQCD may place the segment on the M&E List for further study.

In 2004, the Section 303(d) List was promulgated as Regulation No. 93, and the Monitoring and Evaluation List became Regulation No. 94. As in 2002, a separate Listing Methodology document was developed. The 2004 Section 303(d) List included six waters with an impaired aquatic life use. The 2004 Listing Methodology section regarding decisions of impairment based on biological information is essentially the same as 2002, but with the addition of the concept of "expected condition," as provided below.

> 3.   Impairment of Narrative Standards and Classified Uses
>
> Impairment of narrative standards and classified uses may be supported by chemical data and/or information generated by biological and/or physical assessments. In instances where a determination of impairment is based solely upon biological and/or physical assessments, such assessments must provide clear and convincing evidence of non-attainment. For aquatic life uses, as previously referenced, the Division will generally consider impairment of narrative standards and classified uses to be demonstrated when either the physical/habitat data or biological community metrics reflect a condition that is significantly less than *the expected or* reference condition. When such data do not indicate specific pollutant(s) causing non-attainment, the Division will recommend placing the segment on the M&E List for further study. (*emphasis added*).

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[5] Species of Critical Concern includes native fish species observed to be in decline and rare in abundance or limited in distribution (as identified by CDOW in the <u>Inventory and Status of South Platte River Native Fishes in Colorado,</u> CDOW, 1997).

The 2006 Section 303(d) List included three segments determined to be impaired for the aquatic life use. The 2006 Listing Methodology considerations were the same as 2004. In 2008, the structure of this portion of the Listing Methodology was modified; however, the level of proof (clear and convincing) and decline from reference condition (significantly less than) remained unchanged. The 2008 Section 303(d) List contained four segments with aquatic life use impairment (not including Fish Consumption Advisories). The 2008 Listing Methodology explained as follows:

> 3.   Impairment of Narrative Standards and Classified Uses
>
> Impairment of narrative standards and classified uses may be supported by chemical data and/or information generated by biological and/or physical assessments. In instances where a determination of impairment is based solely upon biological and/or physical assessments, such assessments must provide clear and convincing evidence of non-attainment.
>
> a.   Aquatic Life Use: For aquatic life uses, as previously referenced, the Division will generally consider impairment of narrative standards and classified uses to be demonstrated when either the physical/habitat data or biological community metrics reflect a condition that is significantly less than the expected or reference condition.

The 2010 Section 303(d) List contained three segments for aquatic life use impairment (not including Fish Consumption Advisories). The 2010 Listing Methodology has the same provisions as the 2008 Methodology; however, Regulation Nos. 93 and 94 were combined as Regulation No. 93.

VII.   ASSOCIATION BETWEEN AQUATIC LIFE POLICY AND OTHER WQCC ACTIONS

Aquatic Life Use Policy 10-1 provides guidance for determining whether sites on rivers and streams with watersheds lesser than 2700 square miles are attaining their aquatic life use. It offers a systematic assessment method for comparing the biological condition of a test site in a given biotype, as characterized by an MMI score, against an expectation of biological condition (threshold) for a similar biotype. If biological conditions fall below expectations, the site may be deemed "impaired".

Once a determination of impairment is reached, however, there is a range of possible regulatory outcomes that may be reached. One outcome is inclusion in the biennial Regulation No. 93 "Colorado's Section 303(d) List of Impaired Waters and Monitoring and Evaluation List". Another is through the consideration of re-classification of water bodies in rulemaking hearings. These Commission actions are guided by their own policy considerations, which should be consulted separately as the need arises.

It is envisioned that as the Commission gains experience and takes action on individual use-attainment decisions in these or other contexts, this policy document will be revised to reflect those evolving policy decisions. Further, if major changes are made in related policy documents, (e.g., the section regarding "Impairments where the Pollutant is Unknown" in the Section 303(d)

Listing Methodology), those policy changes may necessitate changes to Aquatic Life Use Policy 10-1.

VIII. AQUATIC LIFE USE ATTAINMENT: BASIC CONCEPTS

In order to protect and maintain Colorado's aquatic life, it is the policy of the Commission to apply a defined method and a uniform approach to determine whether a water body has attained its aquatic life use classification. The method and approach are based on the following tenets:

1**.**   Quantitative Assessment of the Biological Condition**:** The Commission has determined that the Colorado Multi-Metric Index is an appropriate tool for quantitative bioassessment because:

- The condition of the macroinvertebrate community is an appropriate surrogate for the entire aquatic community.
- The macroinvertebrate community is an appropriate indicator of stream quality because of limited migration patterns and short life spans. As such, they are capable of integrating the effects of physical and chemical stressors over short time periods (weeks to months).
- The Multi-Metric Index tool was developed exclusively with macroinvertebrate data collected in Colorado.
- Supporting data represent the variability expected within the state and accounts for the broad environmental gradients through spatial classification.

2.   Comparison with Expected Condition: The Commission continues to support the use of "reference condition" or "expected condition" as the basis for characterizing use support. It is important to note that this concept of use support embraces considerable variation in the biological community. This variability must be acknowledged in developing the biological thresholds and implementation approach.

3.   Impairment is a Significant Departure from Expected Condition: At this time, the Commission affirms the position taken in prior decisions made in the context of the Section 303(d) Listing Methodology -- that clear and convincing evidence is needed to show impairment, and that the status of non-attainment represents a significant departure from reference or expected condition.

4.   Recognition of Warm / Cold Distinction: The Commission believes it is important to preserve the existing distinction between warm-water and cold-water biota that is set forth in the Basic Standards. Accordingly, the assessment methodology should accommodate the different thermal tolerances that are expected within each subclass.

5.   Recognition of Class 1 / Class 2 Distinction: The Commission believes it is important to preserve the existing distinction between Class 1 and Class 2 aquatic life classifications that is set forth in the Basic Standards, i.e. that Class 1 waters are to be capable of sustaining a wide

variety of biota including sensitive species.[6] Accordingly, showing attainment of the Class 1 aquatic life use may require additional demonstration that diversity and sensitivity characteristics are maintained.

6.   Statistical Methods: Consistent with CWQCA at section 25-8-204(5), the Commission requires that statistical methodologies be based on assumptions that are compatible with the water quality data. Application of those methodologies should be transparent with respect to uncertainty and risk of mistaken conclusions.

7.   Protection Against Large Decline: Natural variability in biological condition at reference sites leads to thresholds that could inadvertently expose high scoring sites to the risk of undetected degradation. It is the Commission's policy to provide additional protection by defining an allowable change in biological condition that is independent of biological thresholds.

IX.   AQUATIC LIFE USE ATTAINMENT: NUMERICAL THRESHOLDS

It is the Commission's intent that there should be predictable, transparent, and understandable techniques for evaluating the aquatic life use, and that the methods for assessing attainment of the aquatic life use should be consistent with the classifications and standards system previously adopted by the Commission.

A.   Use Attainment Thresholds for Streams and Small Rivers

For Colorado's streams and rivers with a watershed area less than 2,700 mi^2, the Commission has established aquatic life use attainment thresholds that were derived using a statistical methodology that relies on a normal operating range to define use support and interval and equivalence tests.

1.   Quantitative Assessment of Biological Condition: Implementation of this policy relies upon use of the Colorado MMI (version 3, 2010, see Appendix A). The following documents describe the procedures for collecting data and determining MMI scores:
- Standard Operating Procedures for the Collection and Preservation of Benthic Macroinvertebrates (Appendix B)
- Standard Operating Procedures for the Identification and Enumeration of Benthic Macroinvertebrates (Appendix C)
- Methodology for Determining Biological Condition (Appendix D)

2.   Recognition of Warm / Cold Distinction: Use of the predictor variables for establishing biotype membership provides appropriate refined recognition of the thermal tolerances that are expected within the warm water and cold water biota subclasses. Sites are to be compared against the attainment and impairment thresholds for their predicted biotype.

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[6] Regulation No. 31, section 31.13(1)(c)(i).

3.   <u>Comparison with Aquatic Life Thresholds</u>: Thresholds are established based on analysis of the biological condition at reference sites in each of three biotypes. Figure 1 provides a flowchart of the comparison process. Derivation of thresholds is described in Appendix E.

Table 1. Aquatic Life Use Thresholds			
	Biotype	Attainment Threshold	Impairment Threshold
1	Transition	52	42
2	Mountains	50	42
3	Plains & Xeric	37	22

- Class 2 water bodies: When the MMI score falls within the gray zone (between the attainment and impairment thresholds discussed above) and the site is from a Class 2 stream, the stream is considered to be in support of the use.
- Class 1 water bodies: An MMI score in the gray zone for site on a Class 1 water requires examination of additional information – see Subsection 4 below.
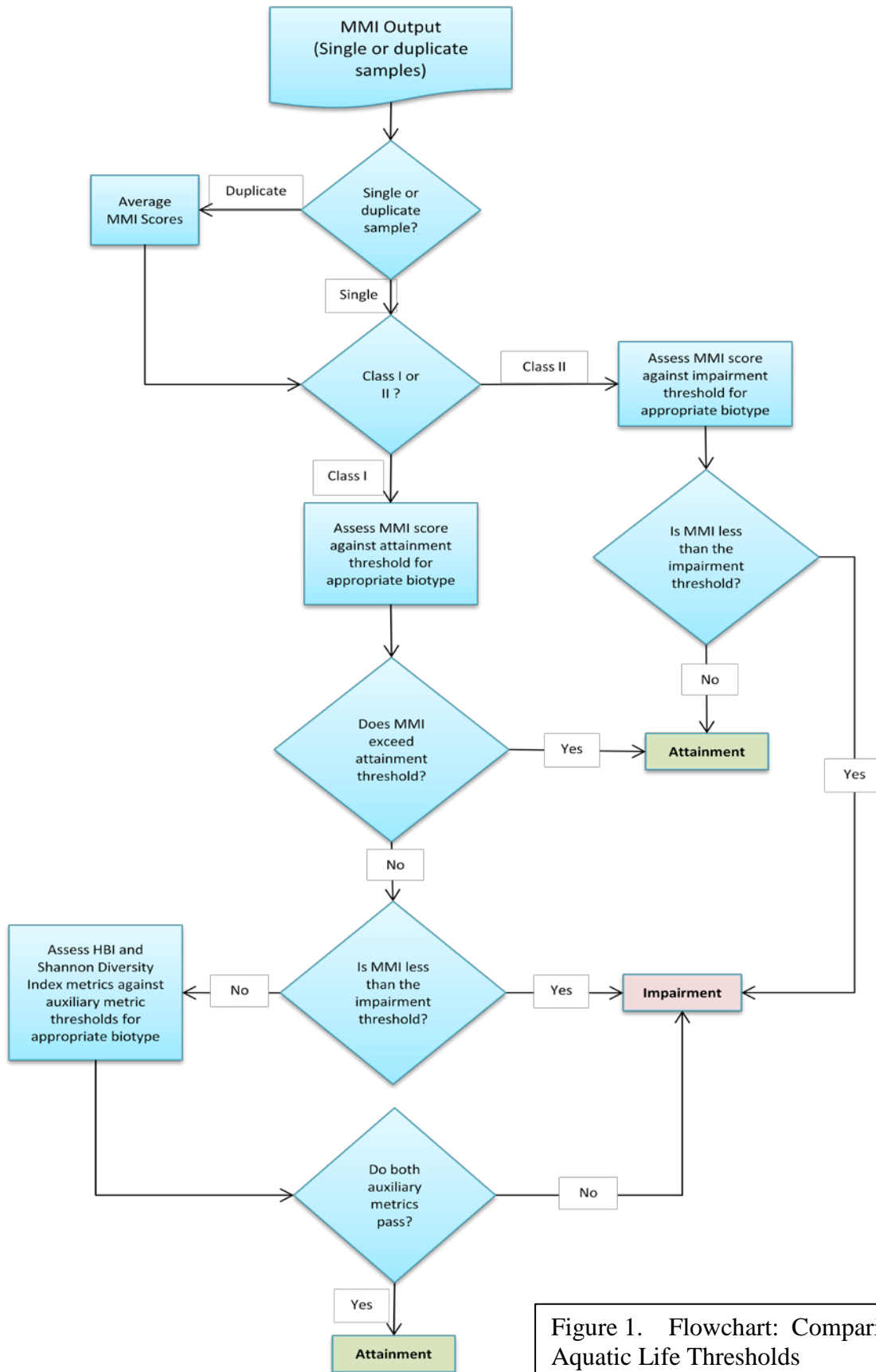
Figure 1.   Flowchart: Comparison with Aquatic Life Thresholds

4.   Recognition of Class 1 / Class 2 Distinction: The Hilsenhoff Biotic Index and the Shannon Diversity Index are used as auxiliary metrics that supplement the MMI for Class 1 waters with MMI scores between the attainment and impairment thresholds. If a Class 1 site fails to meet the criteria shown in Table 2 for either auxiliary metric, the site will be considered impaired. For Class 2 waters, the premise that these "waters are not capable of sustaining a wide variety of cold or warm biota, including sensitive species" mitigates the need to further confirm attainment or impairment through use of auxiliary metrics. Accordingly, for Class 2 waters, a single threshold provides the basic determinant between attainment and impairment (see Table 1). Auxiliary metrics are not applicable to Class 2 waters. Derivation of Auxiliary Metric thresholds is described in Appendix E.

Table 2. Auxiliary Metric Thresholds For Class 1 Waters with MMI Scores Between the Attainment and Impairment Thresholds		Hilsenhoff Biotic Index	Shannon Diversity Index
	Biotype	Hilsenhoff Biotic Index	Shannon Diversity Index
1	Transition	<5.4	>2.4
2	Mountains	<5.1	>3.0
3	Plains & Xeric	<7.7	>2.5

5.   Protection Against a Large Decline: Thresholds are established for a decline in biological condition that is acceptable over time. Samples must be representative of normal conditions and be separated by more than 12 months. Conditions under which factors of representativeness apply may be found in Section IX, subsection C of this document.   Table 3 presents the thresholds for "high scoring waters[7]" for each biotype. A 22 point decline in the MMI score results in a conclusion of impairment. Figure 2 provides a flowchart for determining protection of high scoring waters. Derivation of High Scoring Waters thresholds is described in Appendix E.

Table 3. Criteria for Protection of High Scoring Waters [7]		High Scoring Water (MMI score)	Allowable MMI decline
	Biotype	High Scoring Water (MMI score)	Allowable MMI decline
1	Transition	>64	-22
2	Mountains	>64	-22
3	Plains & Xeric	>44	-22

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[7] In concept, this threshold applies to all sites; in practice, it affects only high-scoring sites since a large decline for a moderate scoring site would bring it below the attainment threshold. The MMI threshold that constitutes a high score is indicated in Table 3.
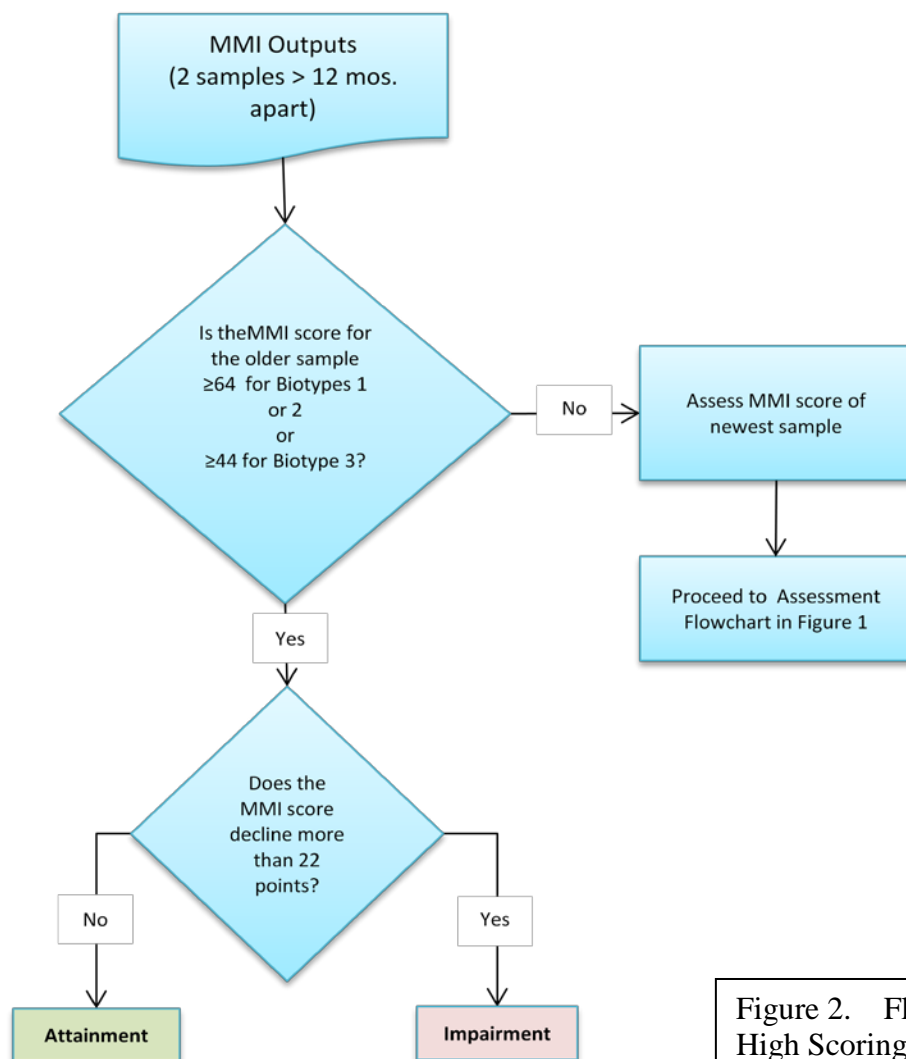
Figure 2.   Flowchart: Protection of High Scoring Waters

B.   Use Attainment Thresholds for Bigger Rivers: *RESERVED*

[The Commission will not apply the 2010 MMI-based Impairment Thresholds to Big Rivers (watershed areas >2700 mi^2) as a single indicator.]

C.   Considerations of Representative Data

The 2010 Section 303(d) Listing Methodology contains appropriate coverage of the representative data issue: It clearly provides: "Data that are not representative of normal conditions shall typically be discounted in making the listing decision." The 2010 Listing Methodology explains "representativeness" as follows: "[T]he Monitoring and Evaluation List identifies water bodies where there is reason to suspect water quality problems, but there is also uncertainty regarding one or more factors, such as the representative nature of the data."

1.   The representativeness of an individual sample may be affected by antecedent physical or chemical events within the generation time of the macroinvertebrate community. Events might include scouring flood flows or accidental spills of toxic chemicals.

2.   The representativeness of an individual sample may be inferred from spatial or temporal patterns where multiple samples exist. For example, an anomalously low MMI score at one site in a spatial group or on one date in a time series might be evidence that a site is not representative. However, there must be no evidence of perturbation that could explain the low score.

3.   The length of stream that a single sample can fairly represent depends on the site-specific considerations of the location. Generally, the length would be limited to a portion that was hydrologically consistent with the sample location (i.e., no intervening dams, diversions, tributaries or discharges).

D.   Alternative Thresholds

In order to set an alternative threshold, a party would need to establish that the situation is "natural or man-induced irreversible" (i.e., there are no sources to remediate) and determine the central tendency of the MMI scores.

X.   REFERENCES

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