ADEQ's Evaluation of Benthic Scoring System 2018 Assessment Methodology

As part of ADEQ's 2017 Assessment Methodology Stakeholder Workgroup, ADEQ solicited public comments in order to provide clarification of the water quality assessment process. One commenter requested clarification on the discrepancies between ADEQ's benthic scoring system and EPA's Rapid Bioassessment III (Plafkin et al. 1989) (Figure 1). In response to this comment, ADEQ staff reviewed available historic Assessment Methodologies and Office of Water Quality's (OWQ) Quality Assurance Project Plans (QAPP) for the documentation requested by the commenter, as these two documents have historically included the biological assessment information. However, no supporting documentation for deviation from Plafkin scoring was located. During early discussion, a proposal came forth that the deviation may be due to metric variability and perhaps this was why ADEQ deviated from the original Plafkin method. Two metrics had been removed from ADEQ's modified Plafkin method, ratio of scrapers to filtering collectors and shredders to total taxa. ADEQ staff moved forward with an exercise to evaluate metric variability and presented the possible derivation explanation to the stakeholder workgroup in March 2017. This explanation prompted a second comment requesting further information for the deviation from Plafkin.

In response to the second request, ADEQ staff delved further into historic reports for the origin of the 75 percent assessment similarity threshold. Review of historic reports suggests application and interpretation of the 75 percent assessment similarity threshold was incorrect. Historical intent of the 75 percent threshold was to evaluate physical habitat similarity between study sites and reference site/condition, not macroinvertebrate assemblages. Historical intent of the 54 percent threshold was used to evaluate macroinvertebrate similarity to reference site assemblage. However, during the early 2000's descriptive language in the QAPP was removed that clarified habitat assessment thresholds. Removal of this language provided misrepresentation of applicability for macroinvertebrate attainment decisions.

Other research findings included that ratio of scrapers to filtering collectors was removed in 1999 during a wasteload allocation study and was never incorporated back into the OWQ QAPP. Exclusion of shredders to total taxa was intentional, as the OWQ does not sample coarse particulate organic matter, which is required to calculate this metric.

At this time, the removed metric (ratio of scrapers to filtering collectors) was be reinstated and aquatic life designated use attainment decisions for macroinvertebrates will be at 54 percent similarity to a reference site or condition (Figures 2, 3).

Literature Cited

Plafkin, J.L. M.T. Barbour, K.D. Porter, S.K. Gross, and R.M. Hughes. 1989. Rapid bioassessment protocols for use in streams and rivers: Benthic macroinvertebrates and fish. U.S. Environmental Protection Agency, Office of Water Regulations and Standards, Washington D.C. EPA 440-4-89-001

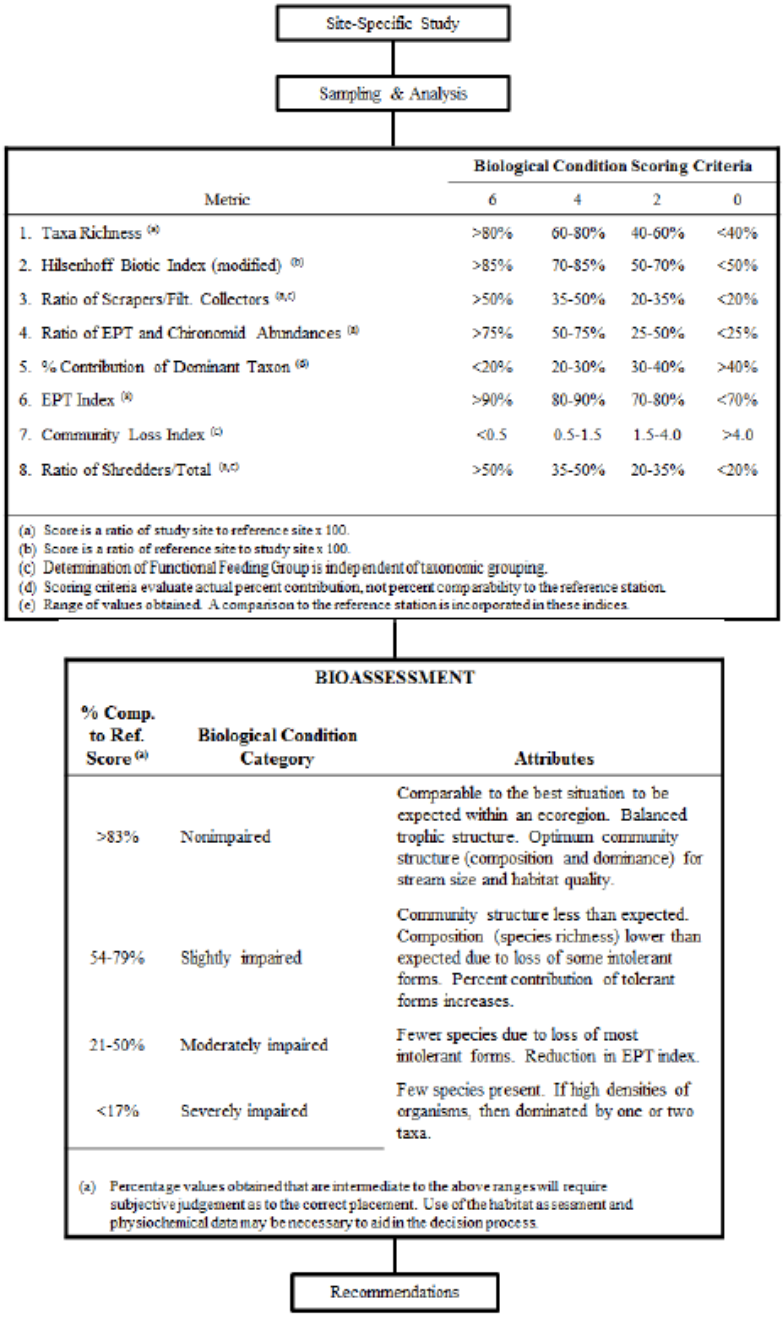
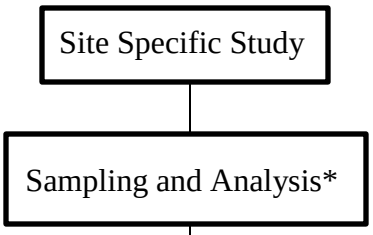


Figure 1. Flowchart of Bioassessment approach advocated for Rapid Bioassessment Protocol III. (Plafkin et al. 1989).



Metric	Biological Condition Scoring Criteria			
	6	4	2	0
Taxa Richness[2]	≥80%	<80-60%	<60-40%	<40%
Hilsenhoff Biotic Index[3]	≥85%	<85-70%	<70-50%	<50%
Ratio of EPT to Chironomid Abundances[2]	≥75%	<75-50%	<50-25%	<25%
% Contribution of Dominant Taxa[4]	<20%	20-<30%	30-<40%	≥40%
EPT Index[2]	≥90%	<90-80%	<80%-70	<70%
Community Loss Index[5]	<0.5	0.5-<1.5	1.5-<4.0	≥4.0
Ratio of Scrapers to Filter-Collectors[2]	≥50%	<50-35%	<35-20%	<20%

Figure 2. ADEQ's draft 2018 Assessment Methodology Flowchart Identifying Macroinvertebrate Bioassessment Metrics and Scoring Criteria.

	Biological Condition Category	% Comparable Estimate	Attribute
Support	Comparable to reference	≥83%	Comparable to the best situation in an ecoregion.
	Supporting	54-79%	Community structure less than reference site. Taxa richness lower and tolerant forms are more prevalent.
Non-Support	Partially Supporting	21-50%	Obvious decline in community structure with loss of intolerant forms. EPT index reduced.
	Non-supporting	<20%	Community dominated by 1 or 2 taxa, few taxa present.

Figure 3. ADEQ's draft 2018 Assessment Methodology scoring criteria for macroinvertebrate assemblage attainment decisions