

Appendix G

New Jersey Impairment Scoring (NJIS) Criteria for Rapid Bioassessments and High Gradient Macroinvertebrate Index (HGMI) Protocols

High Gradient Benthic Index (HGMI)¹

Study area: northern New Jersey, above the geologic fall-line including the following ecoregions: North Central Appalachians, Central Appalachian Ridges and Valleys, Northeastern Highlands, Northeastern Coastal Zone, and Northern Piedmont. See figure A1.

Index Metrics

1. Total number of genera_{adj} = $26.53 + \text{Metric} - [22.776 + 4.173 \cdot \log_{10}(\text{areasqkm})]$
2. Percent of genera that are not insects
3. Percent sensitive EPT (excluding Hydropyschidae, including Diplectrona)_{adj}
= $37.49 + \text{Metric} - [49.922 - 13.800 \cdot \log_{10}(\text{areasqkm})]$
4. Number of scraper genera_{adj} = $5.44 + \text{Metric} - [3.889 + 1.724 \cdot \log_{10}(\text{areasqkm})]$
5. Hilsenhoff Biotic Index_{adj} = $4.23 + \text{Metric} - [3.407 + 0.918 \cdot \log_{10}(\text{areasqkm})]$
6. Number of New Jersey TALU attribute 2 genera
7. Number of New Jersey TALU attribute 3 genera

ADJ (Adjusted metric value) = $\text{Mean}_{\text{reference}} + \text{Metric}_{\text{observed}} - \text{Metric}_{\text{predicted}}$, where predictions are based on linear regression analysis of reference metric values on catchment size.

| <u>Assessment Rating</u> | <u>Score</u> |
|--------------------------|--------------|
| Excellent | ≥ 63 |
| Good | $< 63 - 42$ |
| Fair | $< 42 - 21$ |
| Poor | < 21 |

Reference

Benjamin Jessup, et al. Report. Development of the New Jersey high gradient macroinvertebrate index (HGMI). TetraTech, Inc. Owings Mills, MD. February, 2007.

Attributes

Excellent: Minimal changes in structure of biological community and minimal changes in ecosystem function. Virtually all native taxa are maintained with some changes to biomass and/or abundance; ecosystem functions are fully maintained within the range of natural variability.

Good: Some evident changes in structure of the biotic community and minimal changes in ecosystem function. Some changes in structure due to loss of some rare native taxa; shifts in relative abundance of taxa but sensitive-ubiquitous taxa are common and abundant; ecosystem functions are fully maintained.

Fair: Moderate to major changes in structure of biological community and moderate changes in ecosystem function. Sensitive taxa are markedly diminished; conspicuously unbalanced distribution of major groups from that expected; organism condition shows signs of physiological stress; system function shows reduced complexity.

Poor: Extreme changes in structure of biological community and major loss of ecosystem function. Extreme changes in structure; wholesale changes in taxonomic composition; extreme alterations from normal densities and distributions; organism condition is often poor; ecosystem functions are severely altered.

¹ Based on 100 organism subsample, genus level taxonomy

Table A1: Descriptive and regulatory thresholds for Fresh Water High Gradient (Highlands, Ridge And Valley, Piedmont), Low Gradient (Coastal Plain, Excluding Pinelands Waters) and Pinelands Waters.

| High Gradient Macroinvertebrate Index (HGMI) (Highlands, Ridge and Valley, Piedmont): | | |
|---|--------------------|--|
| Assessment category | Index Score | Regulatory Threshold |
| Excellent | 63 - 100 | Full Attainment |
| Good | <63-42 | Full Attainment |
| Fair | <42-21 | Non-Attainment |
| Poor | < 21 | Non-Attainment |
| | | |
| Coastal Plain Macroinvertebrate Index (CPMI) | | |
| Assessment category | Index Score | Regulatory Threshold |
| Excellent | 22 - 30 | Full Attainment |
| Good | 20 - 12 | Full Attainment |
| Fair | 10 - 6 | Non-Attainment |
| Poor | < 6 | Non-Attainment |
| | | |
| Pinelands Macroinvertebrate Index (PMI) | | |
| Assessment category | Index Score | Regulatory Threshold |
| Excellent | 63 - 100 | Full Attainment |
| Good | <63-56 | Full Attainment |
| Fair | <56-34 | Non-Attainment(PL) Full Attainment(FW2) |
| Poor | < 34 | Non-Attainment |

New Jersey Impairment Score (NJIS)¹

Study Area: All of New Jersey. The NJIS was used for assessments in reports prior to 2007. This table can be used when referring to these historical documents.

| Index metrics | 6 | 3 | 0 |
|---|-----|-------|-----|
| Taxa Richness (total Families) | >10 | 10-5 | 4-0 |
| E+P+T Index (EPT) | >5 | 5-3 | 2-0 |
| Percent Dominance (%CDF) | <40 | 40-60 | >60 |
| Percent EPT ² (%EPT) | >35 | 35-10 | <10 |
| Modified Family Biotic Index ³ (FBI) | <5 | 5-7 | >7 |

Biological Assessment Total Score

| | |
|---------------------|-------|
| Non-impaired | 24-30 |
| Moderately Impaired | 9-21 |
| Severely Impaired | 0-6 |

Reference

Kurtenbach, J. A method for rapid bioassessment of streams in New Jersey using benthic macroinvertebrates. Bull. N. Am. Benth. Soc. 8(1):129. 1991.

Attributes

Non-impaired: Benthic community comparable to other undisturbed streams within the region. A community characterized by a maximum taxa richness, balanced taxa groups and good representation of intolerant individuals.

Moderately Impaired: Macroinvertebrate richness is reduced, in particular EPT taxa. Taxa composition changes result in reduced community balance and intolerant taxa become absent.

Severely Impaired: A dramatic change in the benthic community has occurred. Macroinvertebrates are dominated by a few taxa which are very abundant. Tolerant taxa are the only individuals present.

¹ Based on 100 organism subsample, family level taxonomy. Used in previous assessments, replaced in favor of genus level indices.

² Including the hydropsychid family

³ Also known as the Hilsenhoff Biotic Index