

Comparative Study of Michigan's Wadeable Bioassessment & the National Rivers and Stream Assessment Procedures

Funded by:



Tamara Lipsey, Kevin Goodwin, Sarah Holden, Dawn Roush, and Joe Bohr, Water Resources Division

Objectives of this study are to:

- 1) Evaluate the comparability of USEPA NRSA and MDEQ bioassessment methodologies over a range of stream quality conditions.
- 2) Identify inconsistencies between results and investigate possible causes of incomparability.

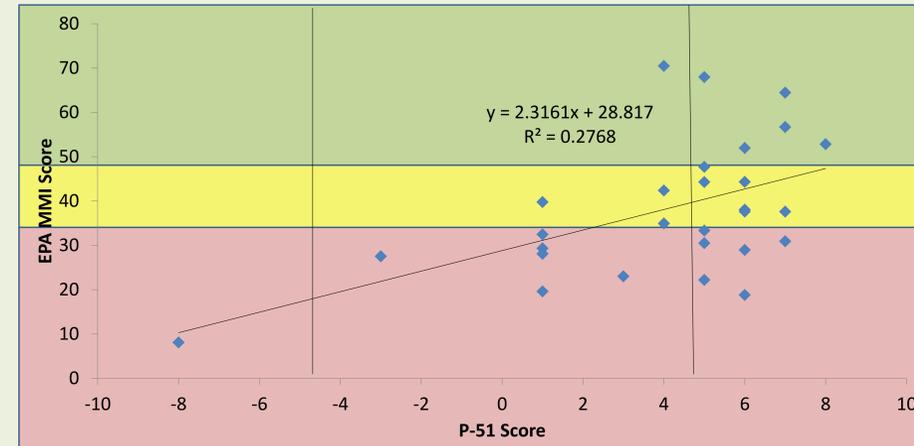
Introduction:

The Water Resources Division (WRD) of the Michigan Department of Environmental Quality uses multi-metric indices (MMI) (Procedure-51, i.e. P-51) to qualitatively assess habitat condition and macroinvertebrate and fish communities in wadeable streams. This information is used to assess aquatic life designated use support and water quality standards attainment throughout Michigan. The USEPA's National Rivers and Streams Assessment (NRSA) is taking place during 2013 and 2014 as part of the National Aquatic Resource Survey and also uses MMI to assess the quality of the Nation's aquatic habitats. This WRD study performs P-51 and the NRSA sampling methodology at 30 wadeable stream sites in Michigan and compares the results.



Study Design/Site Selection

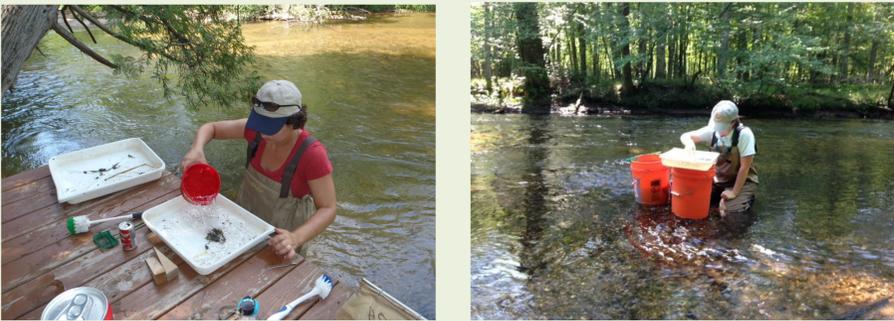
- Collect macroinvertebrates and fish at 20-30 locations using NRSA procedure and Michigan's Procedure-51.
- Study sample size was determined through power analysis of 2008 NRSA wadeable sites and nearby P-51 scores.
- Study includes sites from the 2013/2014 NRSA and added sites to create a relatively even distribution of P-51 macroinvertebrate scores.
- Sites not in the 2013/2014 NRSA pool will be sampled with streamlined NRSA protocols to only gather data to calculate NRSA macroinvertebrate and fish community MMI scores.
- Sites must have flowing water to be included in this study due to P-51 requirements.
- All sampling will be conducted in 2013 and 2014 field seasons (June 1 – September 30).
- Sites sampled using NRSA procedure followed by P-51 within 3-14 days.
- A correlation analysis will be performed on the results to determine method comparability.



2008/2009 NRSA macroinvertebrate data and nearby Michigan macroinvertebrate data. Red = NRSA poor score, Yellow = NRSA fair, and green = NRSA good. The black vertical lines Michigan ratings. Greater than 5 = excellent, -4 to 4 = acceptable, < -4 = poor.

Table 1: Macroinvertebrate Sampling Differences between USEPA National Rivers and Streams Procedure and Michigan's Procedure-51.

	USEPA NRSA	Michigan's Procedure-51
Stream reach	150-2000m	Typically 50-100m
Time bugs sampled	30 seconds x 11 transects = 5.5 minutes	20-30 minutes
Area sampled for bugs	11 ft ² of dominant habitat from 11X 1 ft ² transects	All available habitats along a 50-100m reach
Reference site selection	Upper 75 th percentile of "good" sites in Upper Midwest Ecoregion	Level III Ecoregion specific



Reasons for Study

- Goals of the USEPA NRSA are to "determine the extent to which rivers and streams support a healthy biological condition and the extent of major stressors that affect them. In addition, the survey supports a longer-term goal: to determine whether our rivers and streams are getting cleaner and how we might best invest in protecting and restoring them." - *draft NRSA Report*.
- WRD biologists assess Michigan's rivers and streams on a regular basis to examine biological condition status and trends in these waters and determine water quality standards attainment.
- Understanding the MMI results of each assessment is necessary to understand the biological condition of Michigan's rivers and streams.
- The draft NRSA 2008/2009 report indicates that 59% of river and stream miles in the Upper Midwest Ecoregion are in poor biological condition.
- Michigan's macroinvertebrate multi-metric indices indicate 4% of the waterbodies in Michigan are in poor biological condition.
- The draft results of the NRSA do not reflect the conditions we see in Michigan's rivers and streams. While the NRSA is not designed to make statements about an individual state, Michigan is almost entirely in the Upper Midwest ecoregion and makes up about one-third of that ecoregion.
- Possible reasons for contradiction include differing:
 - macroinvertebrate sampling methods (Table 1)
 - uses of reference sites (level of ecoregion)
 - metrics
 - threshold cutoffs (poor, acceptable, excellent)

