

Testing an Invertebrate Index of Biotic Integrity (IBI) for Citizen Volunteers A Final Report to The Nature Conservancy for the 2000 Field Season

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A volunteer monitoring protocol for citizen volunteers was developed to assess the water quality of coastal marshes in the Les Cheneaux Islands region of Lake Huron. The protocol is an index of biotic integrity (IBI) that uses the macroinvertebrate community to determine marsh quality. A trip to meet with potential volunteers was scheduled in March. We presented the protocol at that meeting and asked for volunteers to sign up. Leigh Bartoo and Jessie Hadley recruited volunteers based on this meeting and their contacts. We conducted a volunteer training session in July, 2000, to familiarize citizens with the IBI methodology. Leigh and Jessie were able to attend part of this volunteer training session. Only three volunteers showed up with only two of them participating in the training. They were Randy and Nick Schaedig. Volunteers were trained in sample collection procedures, invertebrate identification, data management, and data analysis. They were only able to collect and sort samples from one zone in Mackinac Bay (the Inner *Scirpus* zone) in July. We worked with them in the afternoon to process the samples. Their ranking of the Mackinac Bay wetland gave the same results that we had obtained using our more extensive IBI developed for use by professional biologists with data for all four zones.

The science class from Cedarville High School sampled Prentiss Bay in early Fall, 2000. The samples they collected were sorted and analyzed by both the high school students and our laboratory. The IBI results from the volunteers scored the wetland at 88% of the possible score, categorizing it as 'mildly impacted'. This score was very similar to the results that we have obtained previously for the site using a more involved version of the IBI that we published in the journal *Wetlands*. The citizen's samples were re-sorted and recalculated by our laboratory. We scored the site at 71% of the possible score, also categorizing the site as 'mildly impacted'.

Although the discrepancy between the percentage scores was small enough to place the wetland in the same water quality category, it was large enough to generate some concerns.

Evaluation of the volunteer monitoring showed that enumeration as well as taxonomic mistakes were made during sample sorting. Specifically, misidentification of Ephemeroptera (Mayflies) as Odonata (Dragonflies and Damselflies) led to artificially elevated Odonata metrics. This increased the total IBI score. In addition, pieces of plant material were misidentified as Sphaeridae (fingernail clams) and included in the percent Sphaeridae metric and the percent Crustacea plus Mollusca metric further inflating the IBI score. Some of the smaller invertebrates such as the Chironomidae (midges), were overlooked, and therefore, not included in the total sample count. This added to the inflated score by artificially increasing relative abundances of other key indicators.

Another problem reported by Jessie Hadley and the high school students was that it took too much time to collect an adequate number of invertebrates from the Outer *Scirpus* zone. We have subsequently suggested that sampling of this zone should be limited to a certain period of time (probably 30 person minutes). If 150 specimens are not collected in this period of time, that is ok. Collectors would just collect to the next multiple of 50 (i.e. 50, 100, 150) and quit.

We feel that many of the problems indicated above could be corrected with a few hours of additional training of volunteers. It is our understanding that none of the individuals attending the original training session for the full period of training were able to accompany the high school students during the citizen IBI testing phase. This undoubtedly contributed to the minor discrepancies found between the volunteer's and our laboratory's analyses. Given these problems, we think the fact that the high school students ranked the marsh in the same category as we did argues that this is a procedure that can be done by volunteers with adequate training with a reasonable degree of accuracy.

Five additional wetlands in the Les Cheneaux area were sampled by our laboratory in July 2000. These sites included Mismar Bay, Cedarville Bay, Mackinac Bay, Duck Bay, and the Pine River. Macroinvertebrates were sampled at each wetland and water samples were taken at three of the sites. Basic limnological parameters measured included: ammonium, phosphate, dissolved oxygen, temperature, pH, alkalinity, specific conductance, and turbidity. Water chemistry results are given in Table 1. Macroinvertebrates were collected using the rapid bioassessment protocol described in the volunteer IBI, which includes repeated dip net sampling

of all present plant zones within a site. Invertebrate samples were sorted and identified in the laboratory. The data was analyzed using the volunteer monitoring protocol. Table 2 describes the results of the volunteer IBI.

Table 1. Water Chemistry

| SITE | PLANT ZONE | NH4 (ug/L) | PO4 (ug/L) | DO (mg/L) | TEMP (°C) | SpCOND (uS) | TURB | pH | ALKYL |
|-------------|-------------------|-------------------|-------------------|------------------|------------------|--------------------|-------------|-----------|--------------|
| Mackinac | Inner Scirpus | 6.34 | 19.25 | 8.52 | 9.1 | 377.0 | 8.52 | 195 | 3.4 |
| Mackinac | Outer Scirpus | 8.08 | 12.00 | 9.01 | 9.5 | 226.2 | 9.01 | 102 | 7.6 |
| Mismer | Inner Scirpus | 8.69 | 13.25 | 22.3 | 7.4 | 331.1 | 7.77 | 213 | 2.4 |
| Mismer | Outer Scirpus | 15.96 | 11.25 | 21.4 | 9.0 | 208.1 | 8.28 | 93 | 1.6 |
| Cedarville | Inner Scirpus | 27.00 | 25.00 | 25 | 5.4 | 304.5 | 7.19 | 106 | 3.3 |

Table 2. IBI scores derived using the volunteer protocol. Scores are given as percentages of the total possible score.

| SITE | SCORE | CATEGORY |
|-------------|--------------|---------------------|
| Mismer | 83% | Mildly Impacted |
| Duck | 67% | Mildly Impacted |
| Mackinac | 58% | Moderately Degraded |
| Pine River | 58% | Moderately Degraded |
| Cedarville | 50% | Moderately Degraded |

The results are generally consistent with previous years. The volunteer IBI protocol ranked the sites in the same order as the original IBI has in previous years. Although the category scores for Mismer Bay, Mackinac Bay, and the Pine River are lower than those calculated in previous years using the original IBI, each of those sites were at the top of the scoring range for their categories. One or two additional points would have placed these in the next highest category. We also analyzed these samples using our more detailed, published IBI. Again, the marshes were ranked in the same order although the scores were different with both the volunteer and more detailed IBI metrics. Continued evaluation of volunteer monitoring efforts will need to be done to provide feedback regarding the accuracy and success of the

program. Results to date indicate that the volunteer IBI can produce valuable information about wetland "health" or condition. Repeated sampling each year by volunteers would be an inexpensive and valuable way to establish trends in marsh condition over time.