Bioindicators are biological systems that can show (indicate) a measurable effect. Aquatic insects can be used as bioindicators of water quality. The Indiana 4-H bioindicator cards show larval stages of aquatic insects that may be found in Indiana streams. A tolerance score (0-10) is used to estimate water quality. The score represents the insect’s sensitivity to pollution. Insects with a score of 0 are intolerant to pollution (cannot tolerate any water pollution) while insect families with a score of 10 are very tolerant of polluted water.

Instructions:

Materials Needed:

data sheet, dip net, plastic bowl or dishpan (white), egg cartons or ice cube trays (2-3, white) and a stream to sample. The white color makes it easier to see the insects.

* Locate a stream to sample. The stream should only be at most knee deep and have easy access to the water. Make sure you have permission to sample the stream.
* Take samples from all stream habitats along a 200 foot section. Jab your dip net against the vegetation and into mud or sand in the riverbed to collect insects. Scrape the underside of rocks and logs into the net.
* Put stream water in the dishpan and ice cube tray so insects don’t dry out. Collect insects for 45 minutes. Captured insects should be placed in the dishpan.
* Sort the insects that look the same into different compartments of the ice cube tray using your hand or forceps.
* Use the bioindicator cards to identify the insects. Record the number of insects from each insect family you identify on the data sheet. Place the insects back in the stream when you are finished.
* Complete the calculations and determine the stream water quality rating.

Note: The cards are grouped by insect order and identified to the family level. Note: Insects with a tolerance score of “undetermined” are not included on the data sheet.

Assessing the water quality for your site:

* Determine the *Family Tolerance Score* by multiplying the number of insects in each family by the tolerance value given for that family.
* Determine the *Order Totals* by summing the number of insects and Family Tolerance Scores for each Order.
* Determine the *Grand Total* by summing the Order Totals (number of insects and Tolerance)
* Determine the *Biotic Index* by dividing the Grand Total tolerance score by the Grand Total number of insects.
* Estimate the stream water quality rating and degree of organic pollution from the *Biotic Index* table (next page).

Data Sheets: available online

(www.four-h.purdue.edu/natural\_resources/Resources/BioindicatorWQ/BioindicatorsWQ.html)

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| --- | --- | --- |
|  **Biotic Index** | **Water Quality Rating** | **Degree of Organic Pollution** |
| 0.00-3.75 | Excellent |  | Organic Pollution Unlikely |
| 3.76-4.25 | Very Good | Slight Organic Pollution Possible |
| 4.26-5.00 | Good | Some Organic Pollution Probable |
| 5.01-5.75 | Fair | Fairly Substantial Pollution Likely |
| 5.76-6.50 | Fairly Poor | Substantial Pollution Likely |
| 6.51-7.25 | Poor | Very Substantial Pollution Likely |
| 7.26-10.0 | Very Poor | Severe Organic Pollution Likely |

Resources:

* Environmental Protection Agency (EPA) www.epa.gov/bioindicators/html/about.html
* www.epa.gov/bioindicators/html/invertebrate.html
* Bugguide.net (hosted by Iowa State University Entomology)
* Hoosier Riverwatch provides training on this and many other water-related topics. Their training manual is available at <http://www.in.gov/dnr/nrec/files/nc-Riverwatch_Manual.pdf> and Chapter 5 covers Biological Monitoring. See the Riverwatch Event Calendar for training dates, <http://www.in.gov/dnr/nrec/>.