

Enhancement and Standardization of Benthic Macroinvertebrate Monitoring and Analysis Tools for the Puget Sound Region



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Overview

- 🪰 Background/Purpose
- 🪰 EPA Grant
- 🪰 Key Project Outcomes
 - 🪰 Details of Each Outcome
- 🪰 Initial Steps
- 🪰 Questions, Suggestions, Comments



Background/Purpose

- Macroinvertebrate data widely used
- Methodological inconsistencies
- Lack of causal analysis tools



Result: No integrated reporting across agencies and jurisdictions

EPA Grant

- ✈ EPA Scientific Studies and Technical Investigation Assistance Program call for proposals for the Puget Sound Region
- ✈ Submitted proposal for addressing monitoring challenges, advancing tools, and partnering with others throughout the region
- ✈ We got it!



Key Project Outcomes

- Update taxa lists – empirically derived
- Recalibrate BIBI
- Develop cross-walk between field methods
- Update database capabilities
- Develop freshwater ecosystem indicator



Updated Taxa Lists

Existing Limitations:

- ✈ Current lists have limitations: based on out-of-date and incomplete information

Project Outcomes:

- ✈ Sensitive and tolerant taxa derived from empirical testing
- ✈ Clingers, predators, long lived organisms updated based on available scientific literature

Result: Strengthen the ability to identify the cause of impairment



BIBI Recalibration

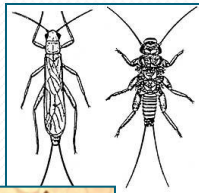
Existing Limitations:

- ✈️ Based on small data set, limited spatial coverage and need for more precise scoring system

Project Outcomes:

- ✈️ Recalibration from existing data and updated attribute lists
- ✈️ Individual metrics scored 0 – 10, total scores 0 – 100
- ✈️ Scores adjusted so comparable across region

Result: Increased sensitivity/precision and improved regional applicability



Cross-walk Between Methods

Existing Limitations:

- Puget Sound Region historically 3 ft²
- Ecology and EPA recommend collection from 8 ft²

Project Outcomes:

- Side-by-side field sampling (3 ft² vs.. 8 ft²)
- Develop conversion factor

Result: New tool that allows comparison of existing long-term and future data to evaluate trends in biological integrity over time



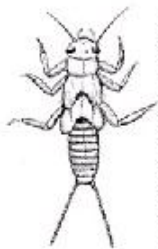
Improved Database Capabilities

Puget Sound Stream Benthos

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Analyzing Stream Health

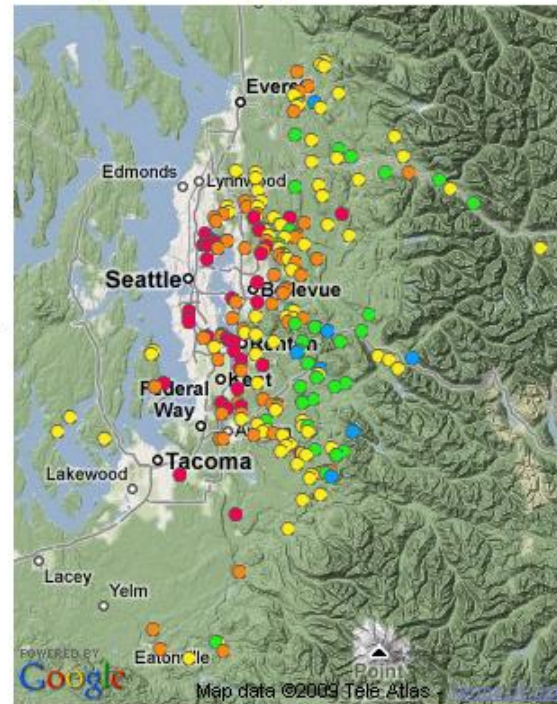
This site analyzes benthic macro-invertebrate community structure to determine the ecological health of streams. [Participating agencies](#) use this site to manage, analyze and share data from their ongoing stream monitoring programs.



Benthic macro-invertebrates, also known as stream bugs, are animals that can be seen with the naked eye, do not have backbones and live in the **stream benthos**—in or near the streambed. They include insects, crustaceans, worms, snails, clams, etc.

Benthic macroinvertebrates are monitored because they are good indicators of the biological health of stream systems and play a crucial role in the stream ecosystem.

Plotting Biotic Integrity



Click on biotic health markers for score details.

[Click here to customize chart.](#)

The BIBI Scoring System

We use the [Benthic Index of Biotic Integrity \(BIBI\)](#) scoring system to determine stream health. Since the BIBI is a standardized scoring system, it can be used to compare and rank the health of different streams.

BIBI has several variants, and we will support many of them over time. Currently, we are using Puget Sound Lowlands BIBI. This site allow you to filter the scores by a variety of parameters and then

- [Plot the scores on maps](#)
- [Show the scores in tables](#)
- [Download the scores](#)

In the future, we will chart trends. We will also calculate scores using other scoring systems.

Improved Database Capabilities

Project Outcomes:

- Incorporate new taxa attribute lists
- Update newly recalibrated BIBI
- Include Ecology's multimetric index
- Add Ecology's O/E model when available
- Add calculations of individual metrics
- Expand database contributors



**Result: consistent data storage and analysis tools;
data flexibility and regional comparability**

<http://pugetsoundstreambenthos.org/>

Ecosystem Indicator

Current Limitations:

→ Lack of indicator other than WQI

Project Outcomes:

→ Meet PSP goal for biological indicator

→ Regional measure for stream health



**Result: more precise evaluation
of current and potential biological conditions**

Initial Steps

- 🐛 Form Project Management Team
 - 🐛 Purpose: encourage collaboration, advise, and provide feedback; improve regional coordination
 - 🐛 15 entities committed
- 🐛 Develop QAPP
- 🐛 Start analyses



Questions/Suggestions

Goal: A widely adopted, effective regional monitoring program

🦋 What would you like to see out of this opportunity?

🦋 We want *YOUR* input!



The background of the slide is a photograph of a stream. In the foreground, several large, dark, segmented insects, likely stoneflies, are resting on a light-colored, textured rock. The water in the stream is clear and flows over more rocks in the background. The top of the slide features a decorative blue and white wavy border.

Contact Us!

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