

Measuring the Health of Puget Sound Streams: Tools & Collaboration

A Project Funded by US EPA Scientific Studies and
Technical Investigation Assistance Program Grant



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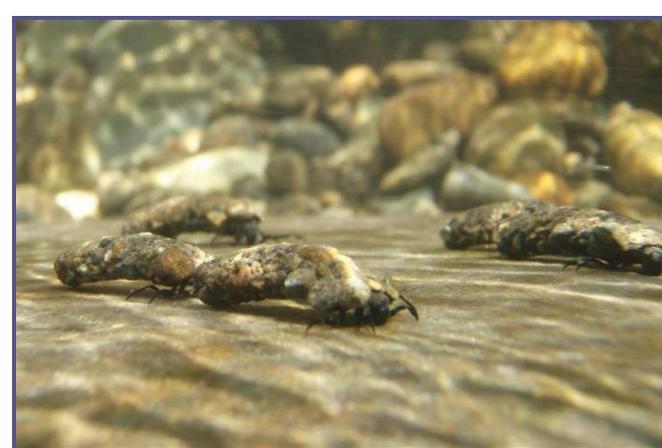
EPA Grant

- EPA Puget Sound Scientific Studies and Technical Investigation Assistance Program
- Support technical studies to guide and evaluate implementation of PSP's Action Agenda
- 2011 to 2013
 - Address stream monitoring challenges
 - Advance B-IBI tools
 - Partner with others

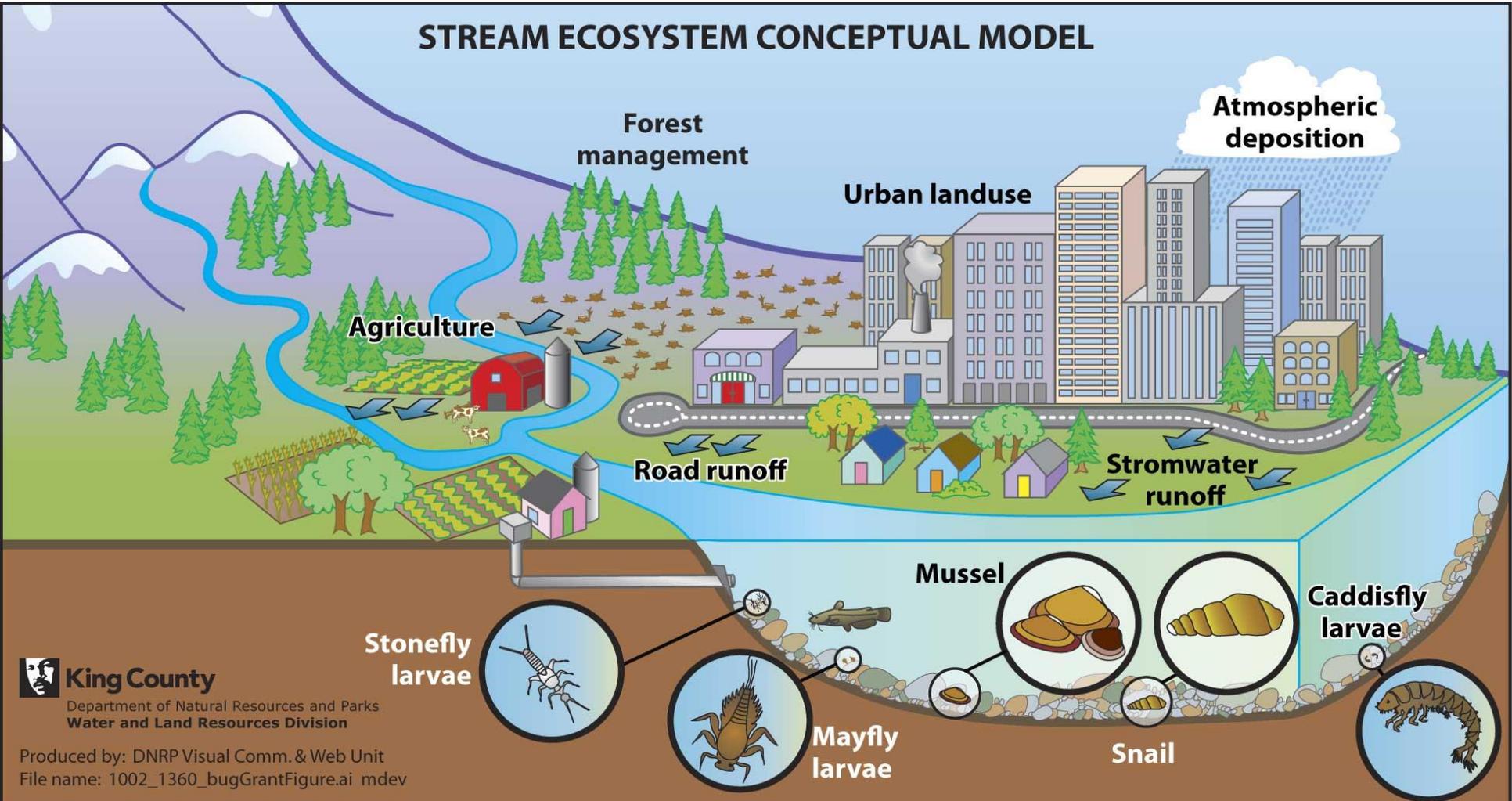


Overview

- Introduction to stream benthos
- Ties to policies and management
- Regional macroinvertebrate monitoring
- Key grant objectives
- Take home messages



Why Benthic Macroinvertebrates?

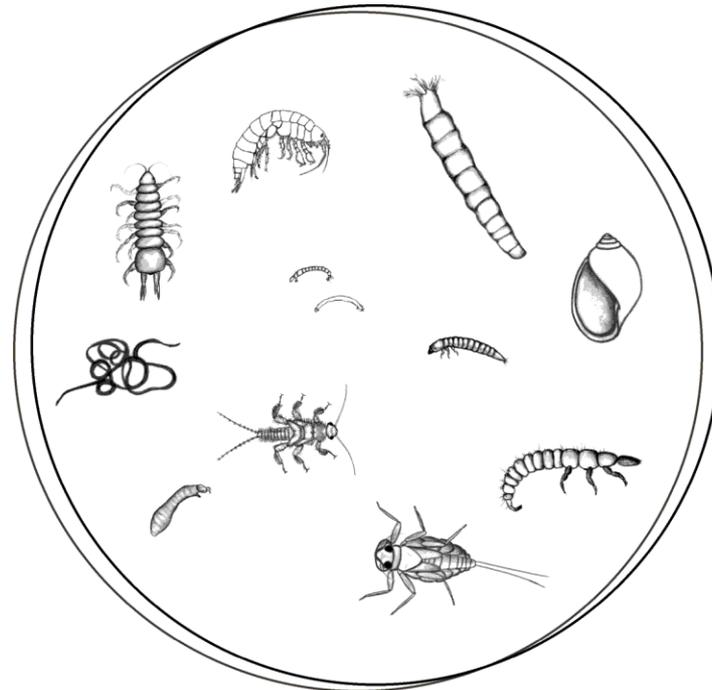


Benthic Index of Biotic Integrity

10 Metrics in the “Bug Index”

Metric
Total Taxa
Mayfly Taxa
Stonefly Taxa
Caddisfly Taxa
Long-lived Taxa
Intolerant Taxa
% Tolerant individuals
% Predator individuals
Clinger Taxa
% Dominance

-  Pollution tolerance/ intolerance
-  Taxonomic composition
-  Population attributes



Integration with Policy

🐜 Puget Sound Partnership

🐜 Dashboard Indicator

🐜 Action Agenda Targets

🐜 Preserve all “excellent” sites

🐜 Restore 30 “fair” sites to “good”

🐜 WA Dept. of Ecology

🐜 NPDES Stormwater Permit

🐜 WQ Assessment – 303(d)

🐜 Local Decision Making

🐜 Project prioritization

🐜 Basin planning



Puget Sound Stream Monitoring

B-IBI Score	Condition of Biotic Integrity
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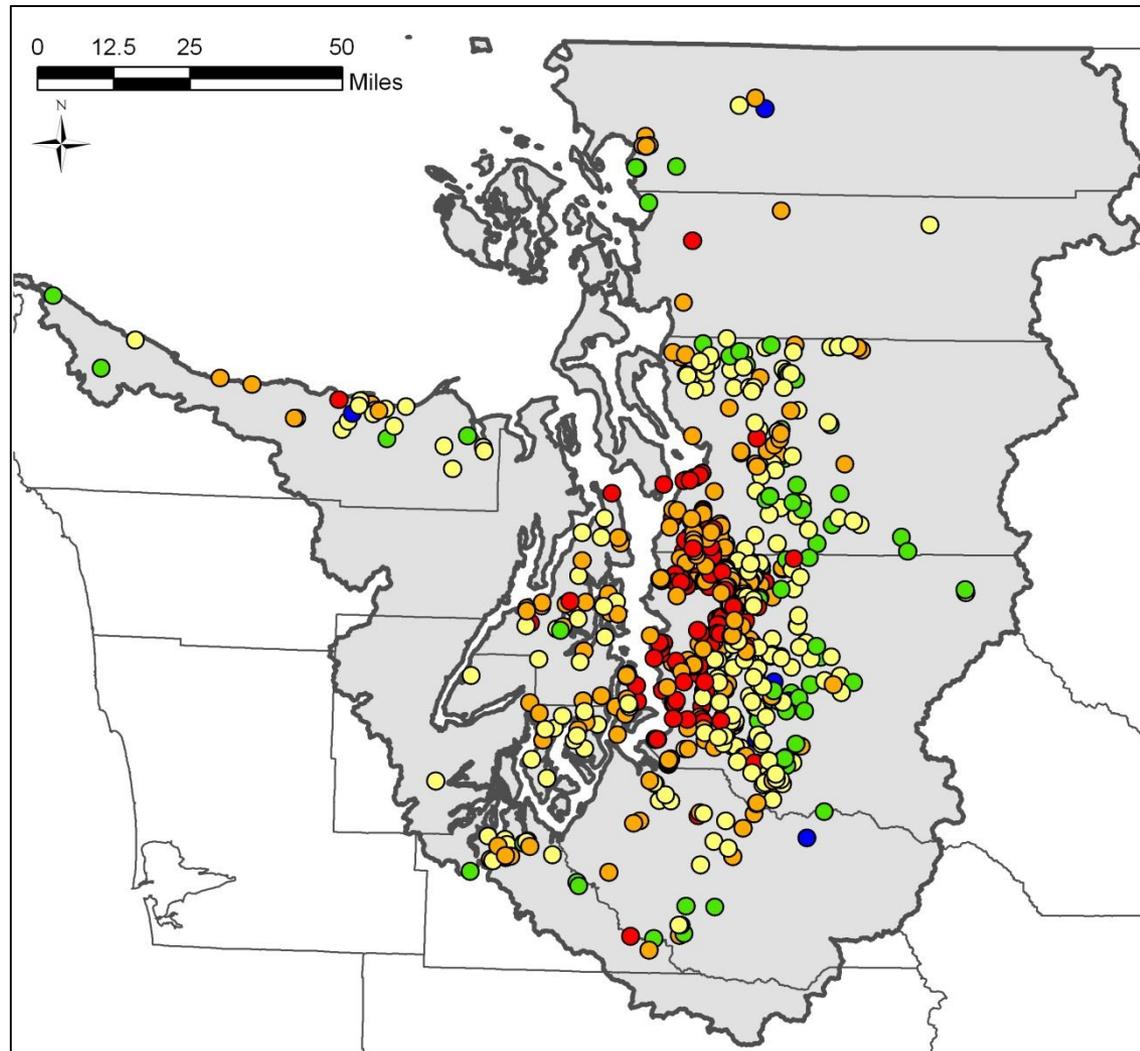
46-50	Excellent
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38-44	Good
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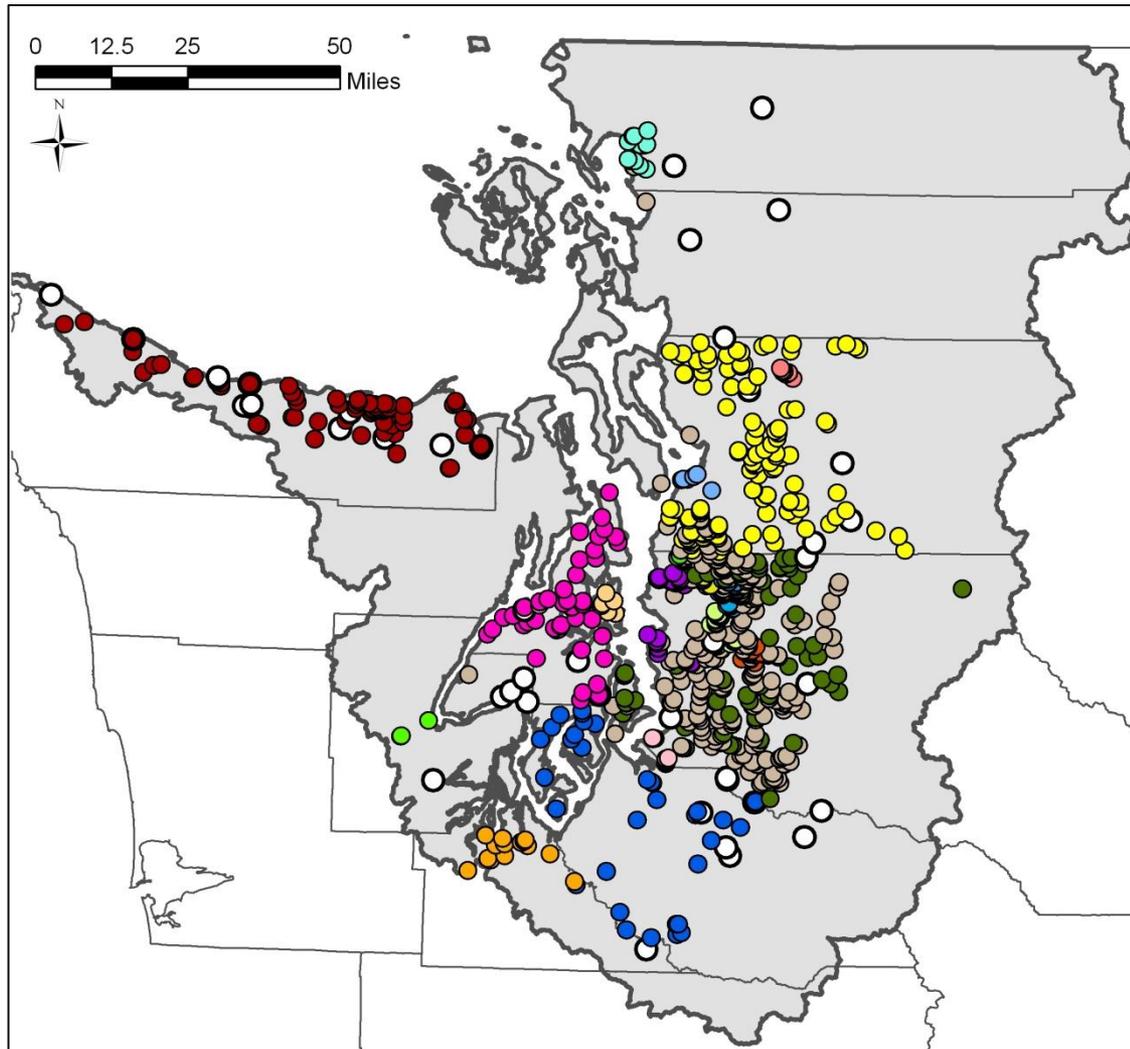
28-36	Fair
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18-26	Poor
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10-16	Very Poor
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Monitoring & Collaboration



- Adopt-A-Stream
- Bainbridge Island
- Bellevue
- Bellingham
- Everett
- Federal Way
- Issaquah
- Kirkland
- Lake Forest Park
- Redmond
- Seattle
- Clallam County
- King County - DNRP
- King County - Roads
- Kitsap County
- Pierce County
- Skokomish Tribal Nation
- Snohomish County
- Thurston County
- Ecology

Improved Data Mgmt Capabilities

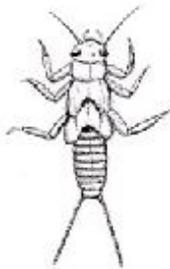
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Puget Sound Stream Benthos

Home Analysis Monitoring Projects Login About Us Site Map

Analyzing Stream Health

This site analyzes benthic macroinvertebrate 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.

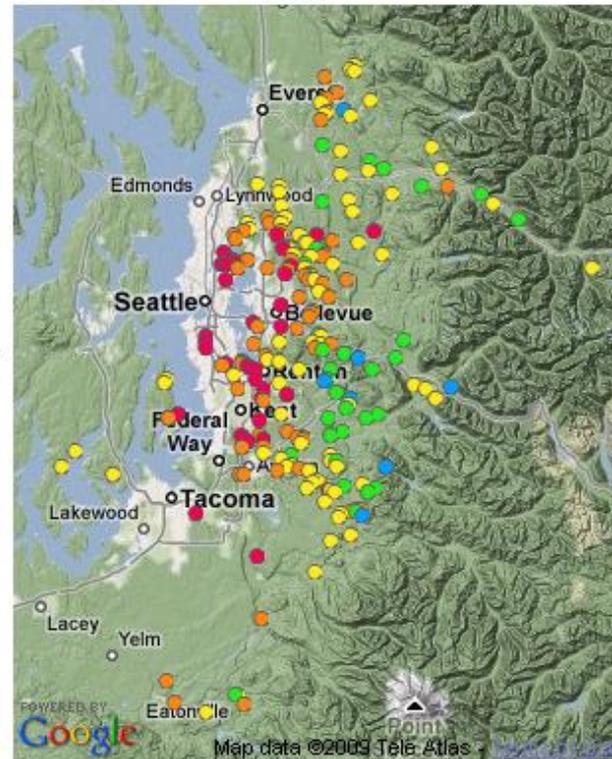


Benthic macroinvertebrates, also known as stream bugs, are animals that can be seen with the naked eye, do not have backbones and live in the **stream benthos**—in or near the streambed. They include insects,

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



● ● ● ● ●
Excellent to Very Poor

Click on biotic health markers for score details.

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.



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Key Milestones: 2011

- 🐛 Kick-off mtg (42/23)
- 🐛 Field training (32/17)
- 🐛 Data mgmt workshop (20/8)
- 🐛 Side by side sampling (46/9)
- 🐛 Watershed delineation & LC calculations

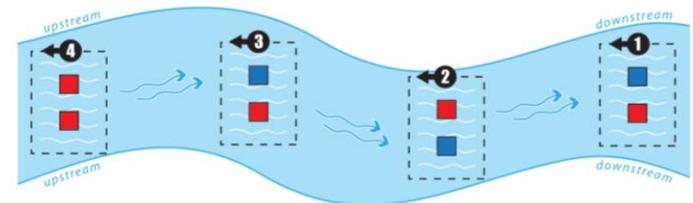
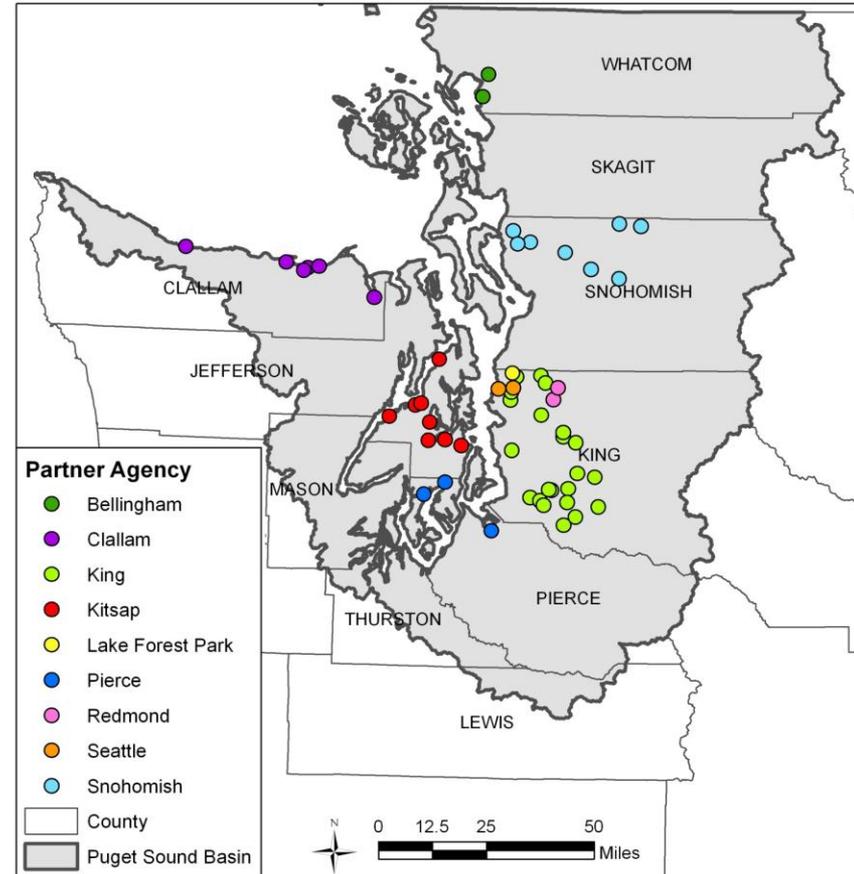
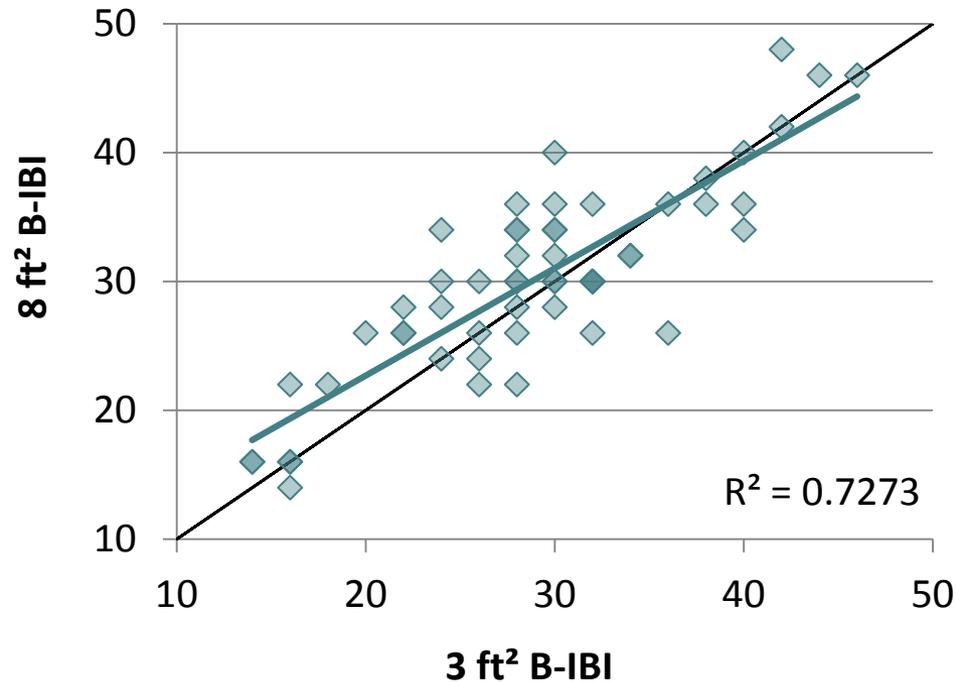


Side by Side Sampling

 3, 8, 9 sq ft

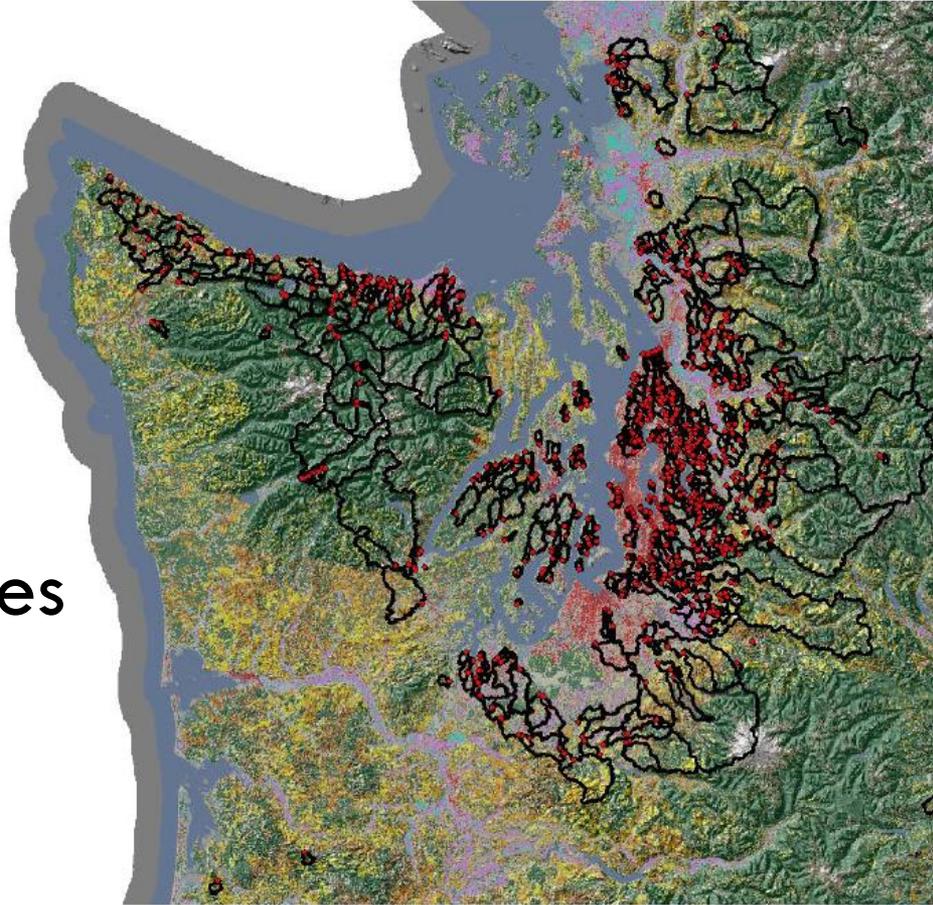
 55 sites

 9 partners



Watershed Delineation and Land Cover Calculations

- Peter Leinenbach (EPA)
- 1132 locations
- 2006 Landcover (NLCD)
- Measure disturbance
- Test/refine taxa attributes

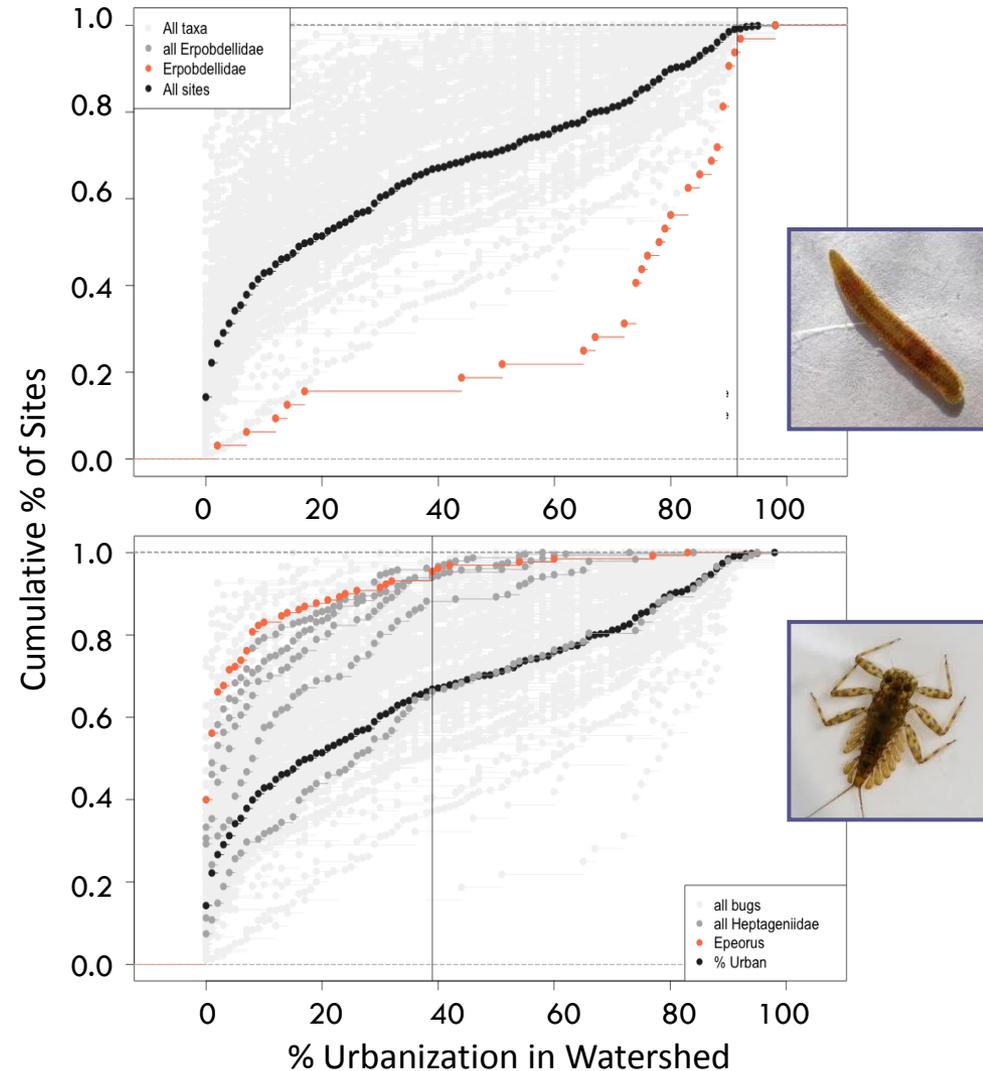
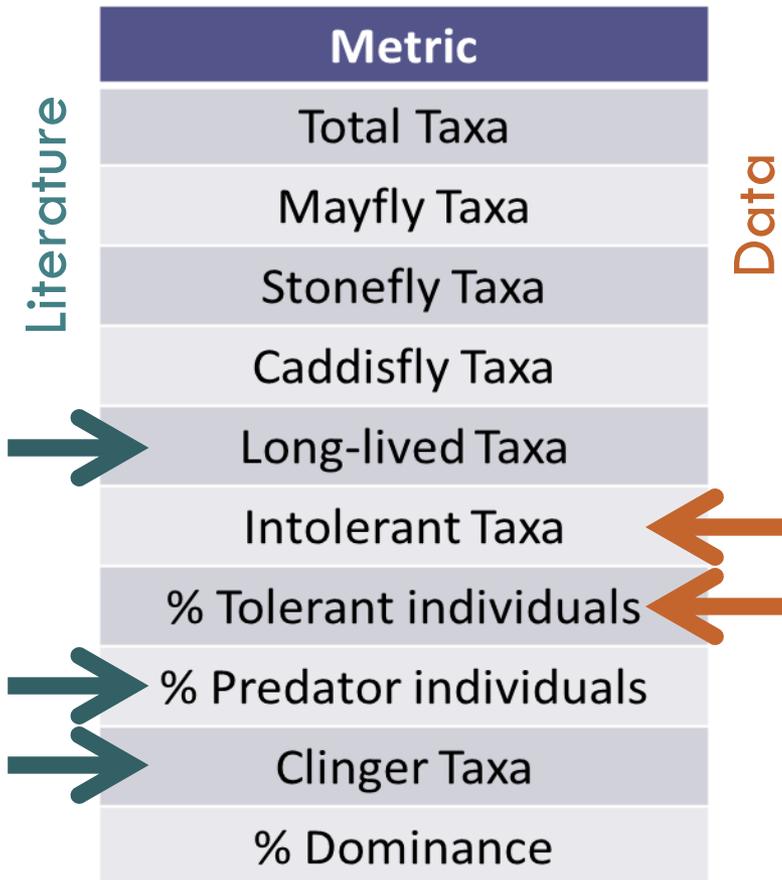


Key Milestones: 2012 to 2013

- 🐛 Data sharing mtg (35/21)
- 🐛 Revised attribute lists
- 🐛 B-IBI recalibration
- 🐛 Technical memos
- 🐛 PSSB enhancements
- 🐛 Ongoing collaboration
- 🐛 Communicate results

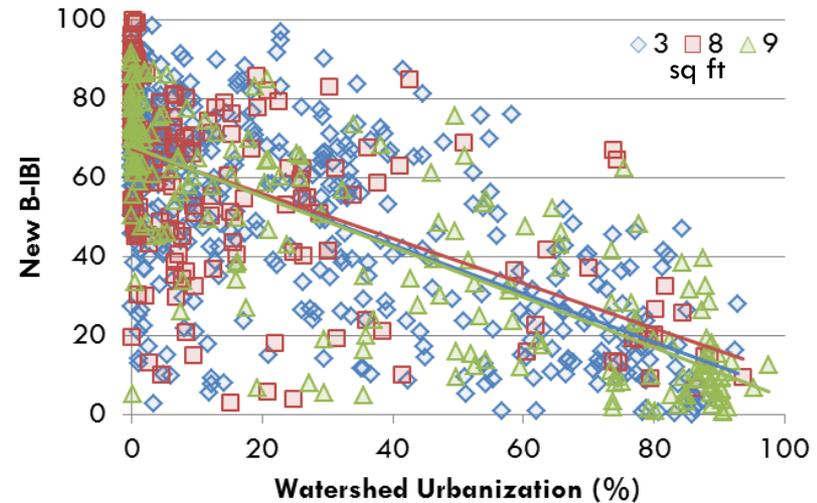


Revised Attribute Lists



B-IBI Recalibration

-  10 metrics scored 0-10
-  Total score 0-100
-  Adjusted 2 metrics
-  Surface area, elevation, watershed size tested



Regional Monitoring Solutions

Limitations	Resolution
Differing collection methods	Standardization & NBD
Decentralized data mgmt	Centralized data mgmt
Outdated taxa attributes	Peer-reviewed or Empirically derived attributes
Insufficient sensitivity	Re-calibrated scoring
>20 cities, counties, tribes monitoring independently	Collaboration and communication

Goal: Improved decision making to restore and protect streams

Take Home Messages

- Applying science in the real world to improve stream assessment
- Regional tools to assess effectiveness of programs
- Springboard for action
 - Better decision making
 - Protect, improve streams
- Responsive to emerging issues
 - Stormwater
 - Invasive species



Acknowledgements

Federal

EPA
NOAA
USFWS
USGS

Tribal

Port Gamble Skallam
Snoqualmie Nation
Stillaguamish
Upper Skagit Indian

State

WA Ecology
PS Partnership

City

Bellevue
Bellingham
Bothell
Everett
Issaquah
Kirkland
Redmond
Seattle
Tukwila

Private

Aquatic Biology Associates
Aquatic Entomology
Rhithron Associates, Inc.
Statistical Design

County

Clallam
King
Kitsap
Pierce
Snohomish
Thurston

Academic

University of Washington

Non-profit

Pierce Stream Team
Lake Forest Park Streamkeepers

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