

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

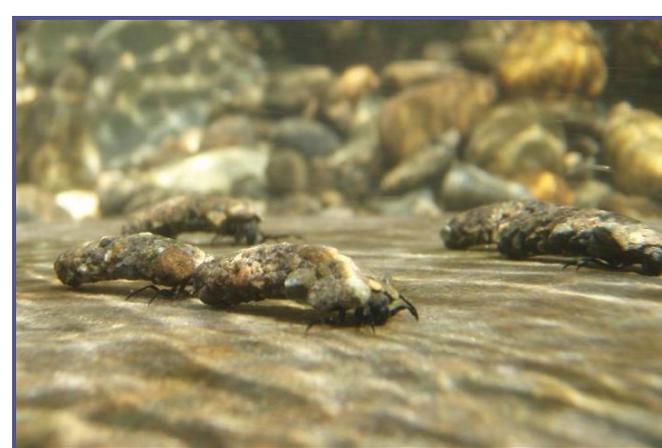
A Project Funded by US EPA Scientific Studies and Technical Investigation Assistance Program Grant



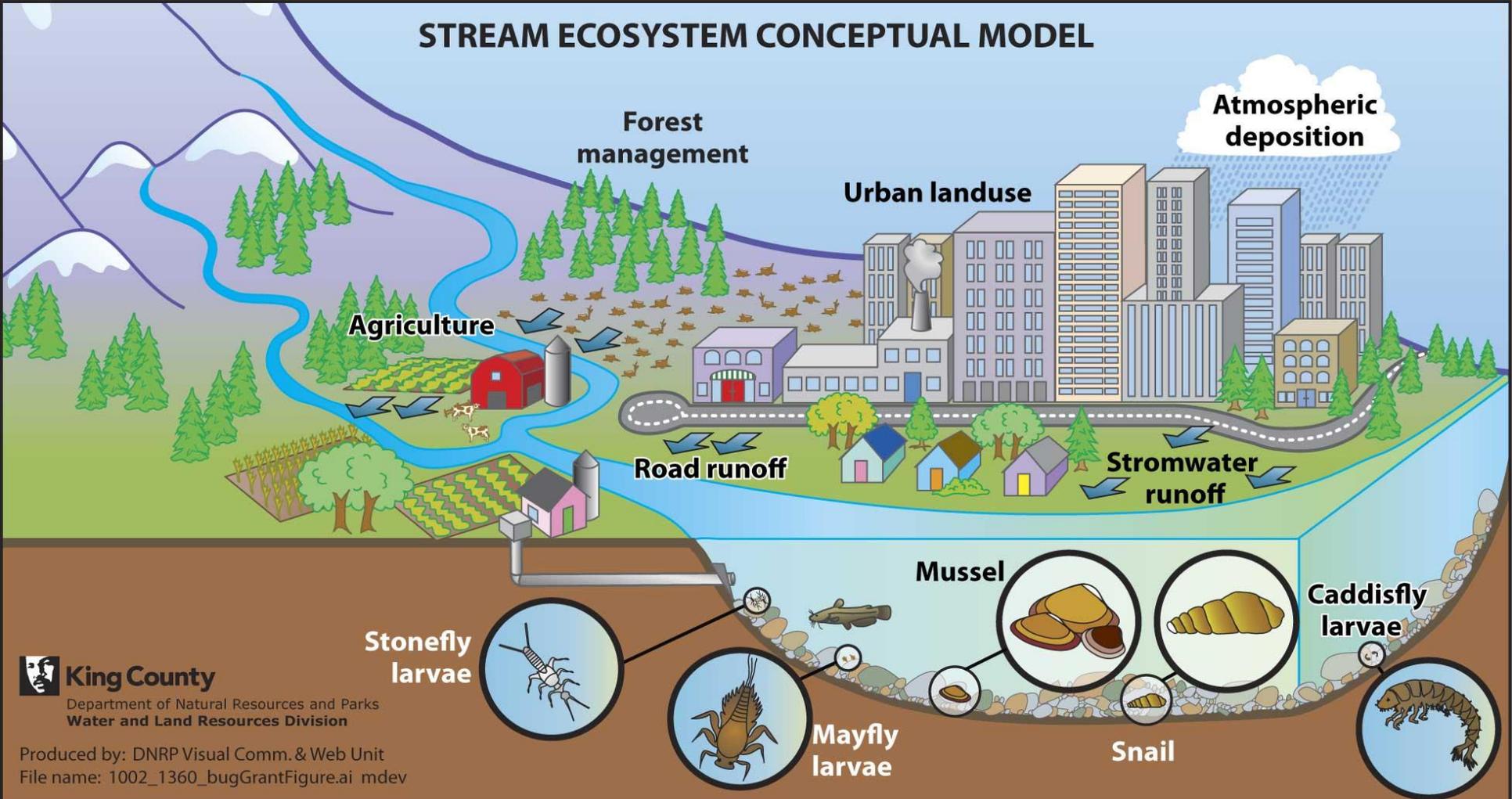
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Leska Fore, Statistical Design
Karen Adams, WA Department of Ecology
Gretchen Hayslip, EPA Region 10

Overview

- Introduction to stream benthos
- Ties to Puget Sound Partnership
- Regional macroinvertebrate monitoring
- Key grant objectives
- Take home messages



Benthic Macroinvertebrates

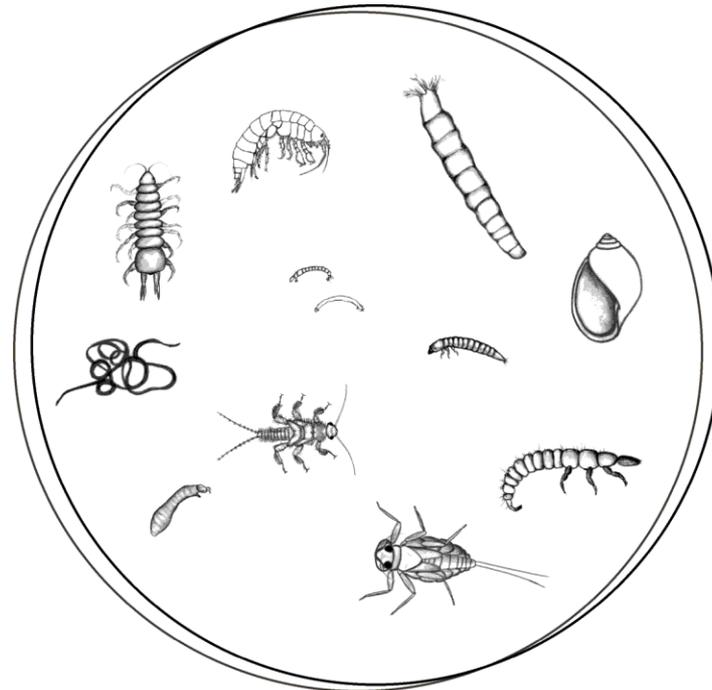


Benthic Index of Biotic Integrity

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



Puget Sound Stream Monitoring

B-IBI Score	Condition of Biotic Integrity
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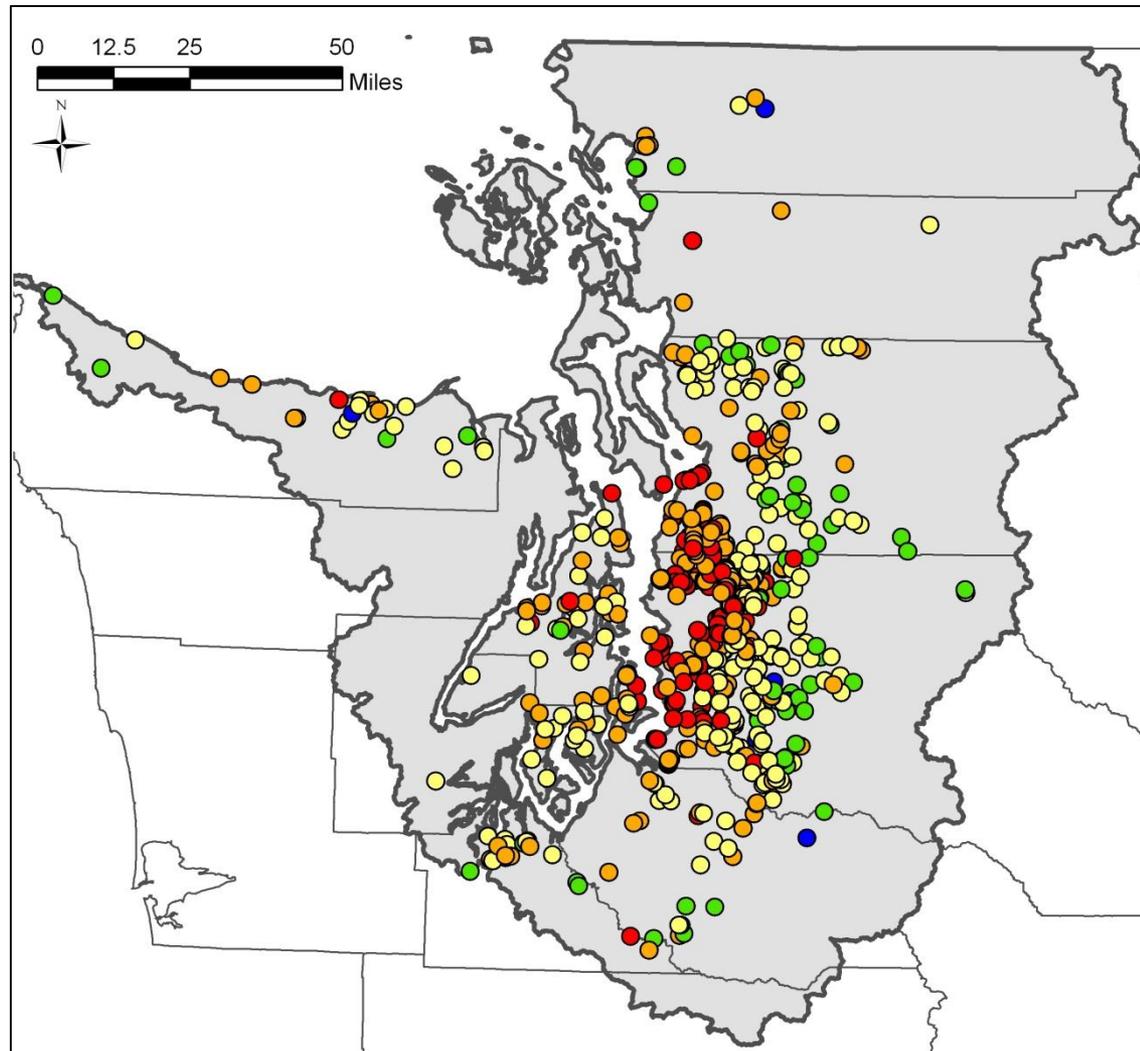
46-50	Excellent
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38-44	Good
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28-36	Fair
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18-26	Poor
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10-16	Very Poor
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Puget Sound Partnership

Enabling Legislation

Functioning ecosystem

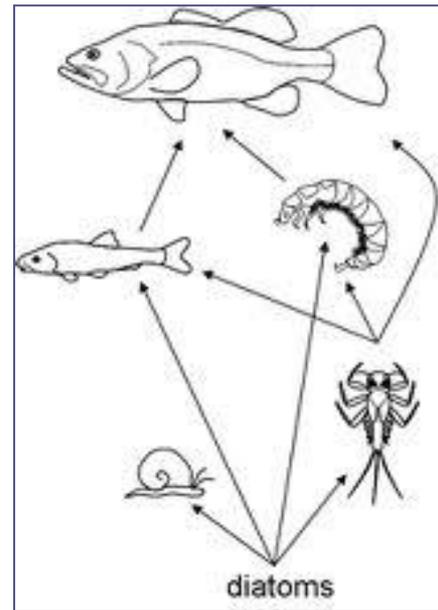
Robust native food web

Habitats protected, restored, sustained

Key Goals

Ecosystem indicator

Regional program



Integration with Policy

🐛 Puget Sound Partnership

🐛 Dashboard Indicator

🐛 2012 Action Agenda Targets:

🐛 Preserve “excellent” sites

🐛 Restore “fair” sites

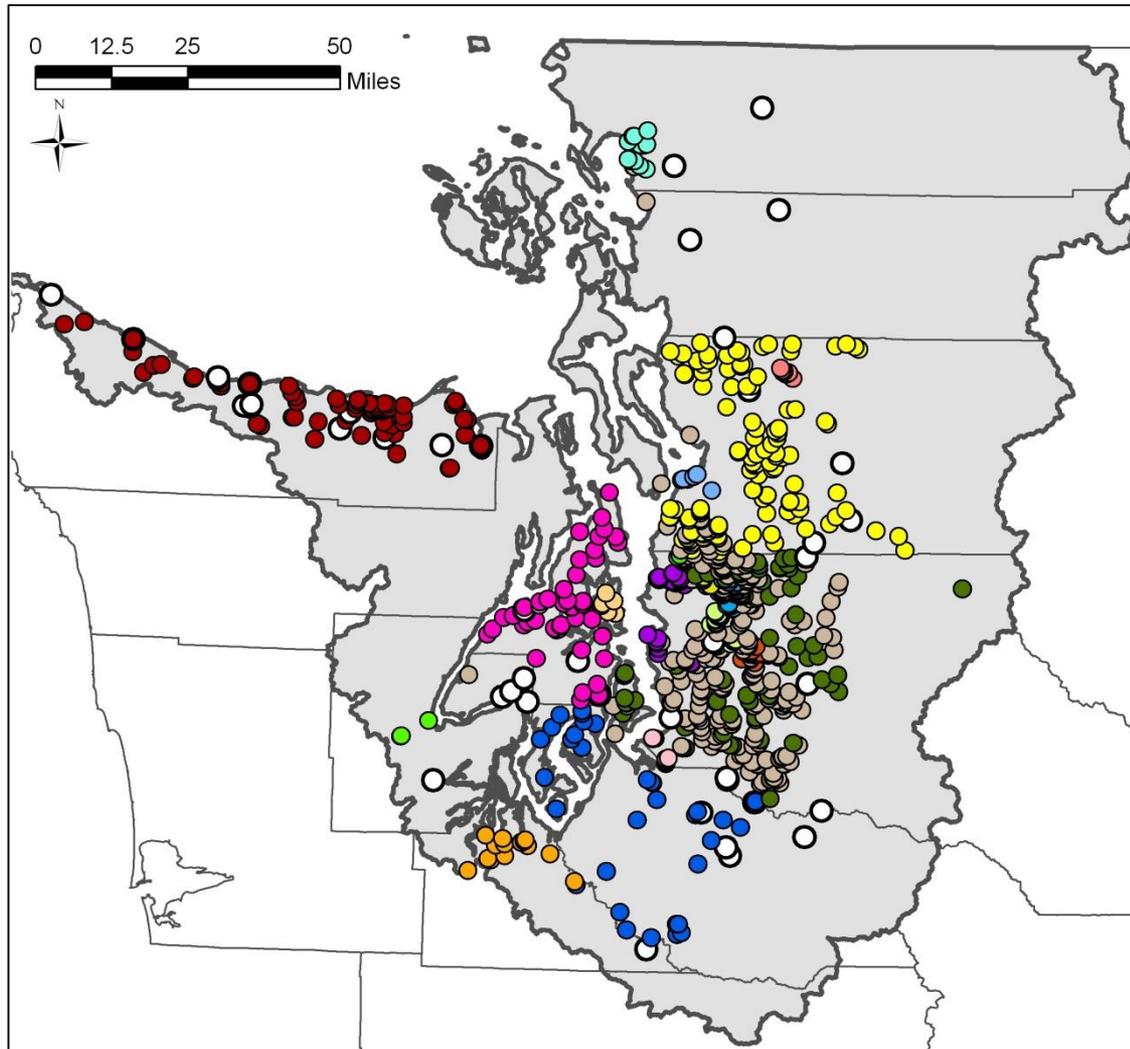
🐛 WA Dept. of Ecology

🐛 NPDES Stormwater Permit

🐛 WQ Assessment – 303(d)



Puget Sound Monitoring



- 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

Regional Benthic Monitoring Issues

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

Improved Database Capabilities

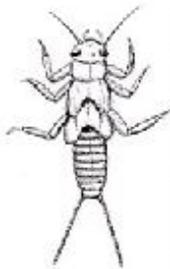
www.pugetsoundstreambenthos.org

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.

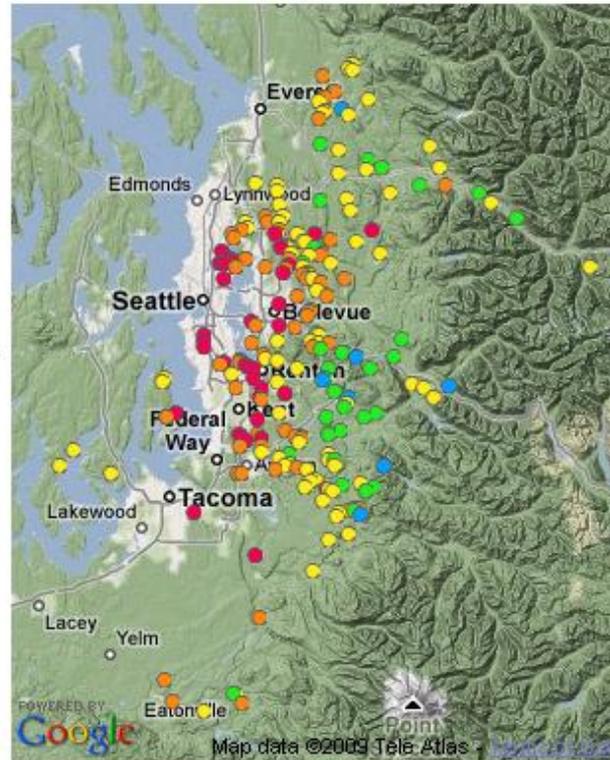


Benthic macroinvertebrates, also known as stream bugs, are animals that can be seen with the naked eye, do not have backbones and live in the **stream benthos**—in or near the streambed. They include insects,

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.

EPA Grant

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



Key Milestones – 2011

- 🪳 Kick-off mtg (42/23)
- 🪳 Field training (32/17)
- 🪳 Database workshop (20/8)
- 🪳 Side by side sampling (46/9)



Key Milestones – 2012 to 2013

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



Take Home Messages: B-IBI

- Mature, established
- Widely used
- Improving (grant work)
- Springboard for action
 - Better decision making
 - Protect streams
- Emerging issues
 - Diagnosis
 - Effectiveness



The background of the slide is a close-up photograph of several aquatic insects, likely stoneflies, resting on a piece of weathered wood. The insects are dark brown and segmented, with some showing lighter patches. The wood has a distinct grain and is surrounded by a blurred background of rocks and water, suggesting a stream environment.

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www.pugetsoundstreambenthos.org

Acknowledgements

Federal

EPA
NOAA
USFWS
USGS

State

WA Ecology

County

Clallam
King
Kitsap
Pierce
Snohomish
Thurston

City

Bellevue
Bellingham
Bothell
Everett
Issaquah
Kirkland
Redmond
Seattle
Tukwila

Private

Aquatic Biology Associates
Aquatic Entomology
Rhithron Associates, Inc.

Academic

University of Washington

Non-profit

Pierce Stream Team
Statistical Design
Lake Forest Park Streamkeepers

Tribe

Port Gamble Skallam Tribe
Snoqualmie Nation
Stillaguamish Tribe
Upper Skagit Indian Tribe