#### STANDARDIZING AND ENHANCING BIOASSESSMENT PROTOCOLS: DEVELOPING A SCIENCE-BASED PERFORMANCE MEASURE OF STREAM CONDITION

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Regional benthic macroinvertebrate monitoring issues that initiated this project
 Project goals
 Preliminary results
 Next steps



# **Regional Benthic Monitoring Issues**

<b>Regional Monitoring Issues</b>	Goals of Grant				
Different field sampling protocols	Side by side field sampling				
Taxa attributes from BPJ	Change to peer-review and real data				
Data in Excel files in multiple locations	Build central database				
Original B-IBI from small area	> 1000 sites sampled – test at larger spatial scale				
>20 cities, counties, tribes monitoring independently	Support collaboration				



# Regional Benthic Monitoring Issues

- Minconsistent sampling and data analysis methods
- Minconsistent taxa attributes used for Benthic Index of Biotic Integrity (BIBI) metrics
- Puget Lowland BIBI developed in early 1990's using limited data
- Meed to enhance data management tools
- Meed for a regional biological freshwater indicator
- Meed for regional coordination





#### Developed a proposal for funding under EPA's Scientific Studies and Technical Investigation Assistance Program to address these issues

 $\rightarrow$  Awarded the grant in late 2010!



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	In February 2011, EPA awarded more than 521 million to state, organizations for the restoration and protection of Puget Sound, will go to projects benefiting critical ecosystems. The remainder ensure public participation in Puget Sound recovery, and suppo accountability for implementing the Action Agenda to restore Pu	tribal and federal The majority of the funds will fund activities to tranagement and pet Sound by 2020.	
	We have initiated an approach that uses Lead Organizations to i strategies, largely through sub-awards to a variety of other enti when sub-awards are made. The lead organizations that have below:	mplement targeted environment argeted environment argeted environment environm	

# **Goals of Project**

Strengthen taxa attribute sensitivity

- Meconcile differences in sampling methods
- Recalibrate BIBI metric scoring
- Expand the PSSB Data management system
- Refine B-IBI as a freshwater indicator
- Methance regional coordination



# Strengthen Sensitivity of Taxa Attributes

- Long lived taxa attributes revised based primarily on Poff et al (2006)
- Clinger and predator taxa attributes revised based primarily on Merritt, Cummins and Berg (2008)
- Tolerant/Intolerant used available data to empirically derive attributes



# Strengthen Sensitivity of Taxa Attributes - Tolerant/Intolerant Taxa

- Evaluated numerous variables as BIBI drivers elevation, watershed area, road density, slope, precipitation, etc.
- % urban land use in watershed identified as primary driver for BIBI scores
  - Tested common genera against % urban at >500 sites
  - $\rightarrow$  Only inlcuded taxa with >25 sites
  - ₩159 taxa tested



#### Example of Intolerant Taxon

#### Epeorus (genus) 1.0 0.8 Cumulative % of Sites 0.6 0.4 95% of occurrences at < 40% urban 0.2 Epeorus all bugs 95'th percentile all Heptageniidae • Epeorus 0.0 % Urban ٠ 20 40 60 80 100 0

% Urbanization in Watershed

#### Example of a Tolerant Family

#### Erpobdellidae



% Urbanization in Watershed

# Next Steps

Evaluate initial classifications

Adjust as needed with more or less taxa

Test metrics against % urban disturbance using the development data set and a validation data set



# Recalibrate BIBI

- $\rightarrow$  Current BIBI protocol scores metrics from 1, 3, 5
- Future protocol will score metrics from 0-10 improving precision
- Updated metrics will be tested for correlation with natural features (elevation, metric expectations) and scoring adjusted as needed
- Impact of differing levels of taxa resolution will also be evaluated



## Reconcile Differences in Sample Collection Methods

Many Puget Sound entities collect samples from 3ft<sup>2</sup>, others use 8ft<sup>2</sup> or 9ft<sup>2</sup>

- Ecology collects 8ft<sup>2</sup>; EPA recommends 8ft<sup>2</sup>
- >>>Some reluctance to shift to 8ft<sup>2</sup>

Loss of long term trend data due to mixed methods
 Increased level of effort

Need for "cross walk" to allow comparison of data collected from different surface areas



# Data Collection: Summer 2011

#### STREAM REACH SAMPLE COLLECTION

- Sample each riffle twice, 1 ft<sup>2</sup> per sample
- Move from downstream to upstream
- 3 ft<sup>2</sup>: collect one sample from three riffles
- 5 ft<sup>2</sup>: collect one sample from three riffles and two from a fourth riffle



# Preliminary Results – Sample Area Comparison



**Overall BIBI Score** 



**Taxa Richness** 

% Predator



## Database Enhancements pugetsoundstreambenthos.org

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# Next Steps

- Minitiate work on Freshwater Indicator
- Continue to enhance regional collaboration working towards more standardized collection and analysis of benthic macroinvertebrate data



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