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

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Overview

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

Regional Benthic Monitoring Issues

Regional Monitoring Issues	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

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

EPA Grant

- Developed a proposal for funding under EPA's Scientific Studies and Technical Investigation Assistance Program to address these issues
- Awarded the grant in late 2010!

Goals of Project

- Strengthen taxa attribute sensitivity
- Reconcile differences in sampling methods
- Recalibrate BIBI metric scoring
- Expand the PSSB Data management system
- Refine B-IBI as a freshwater indicator
- Enhance regional coordination

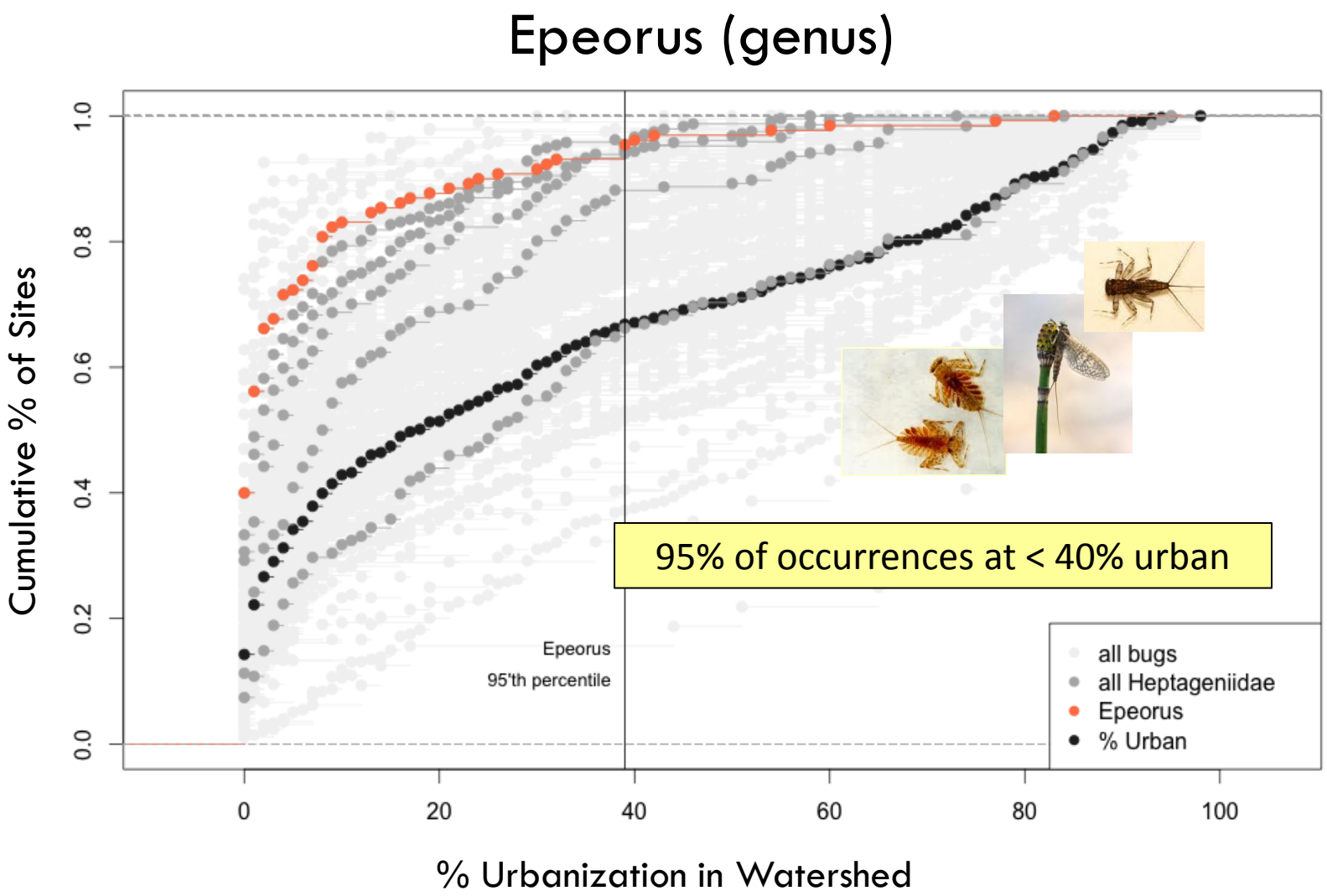
Strengthen Sensitivity of Taxa Attributes

- 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

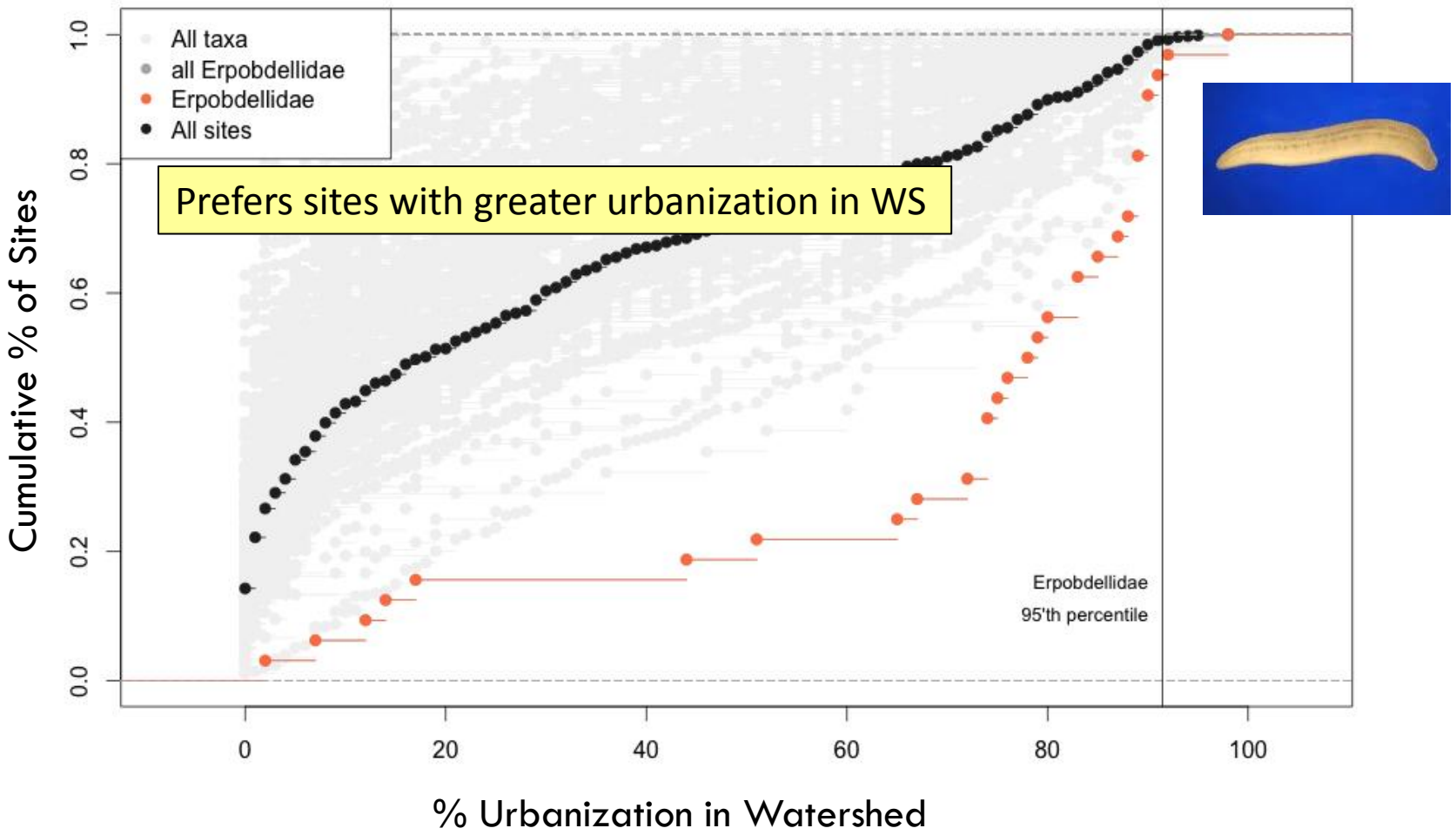
- Evaluated numerous variables as BIBI drivers – elevation, watershed area, road density, slope, precipitation, etc.
- % urban land use in watershed identified as primary driver for BIBI scores
  - Tested common genera against % urban at >500 sites
  - Only inlcuded taxa with >25 sites
  - 159 taxa tested

Example of Intolerant Taxon



Example of a Tolerant Family

Erpobdellidae



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

- 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

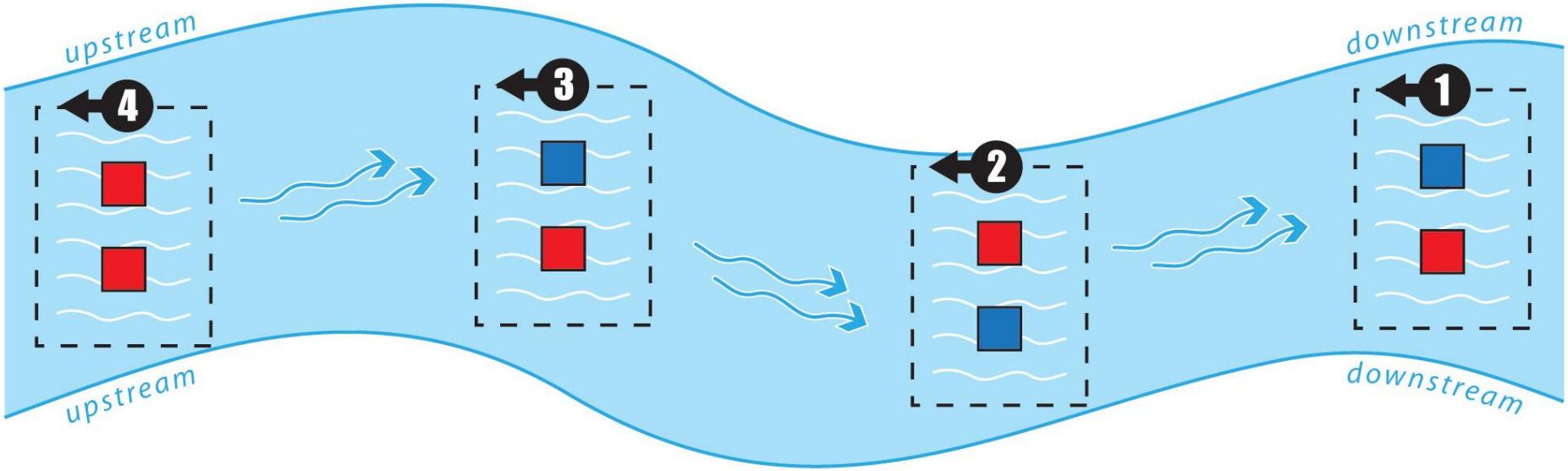
Reconcile Differences in Sample Collection Methods

- Many Puget Sound entities collect samples from $3ft^2$, others use $8ft^2$ or $9ft^2$
- Ecology collects $8ft^2$; EPA recommends $8ft^2$
- Some reluctance to shift to $8ft^2$
  - 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

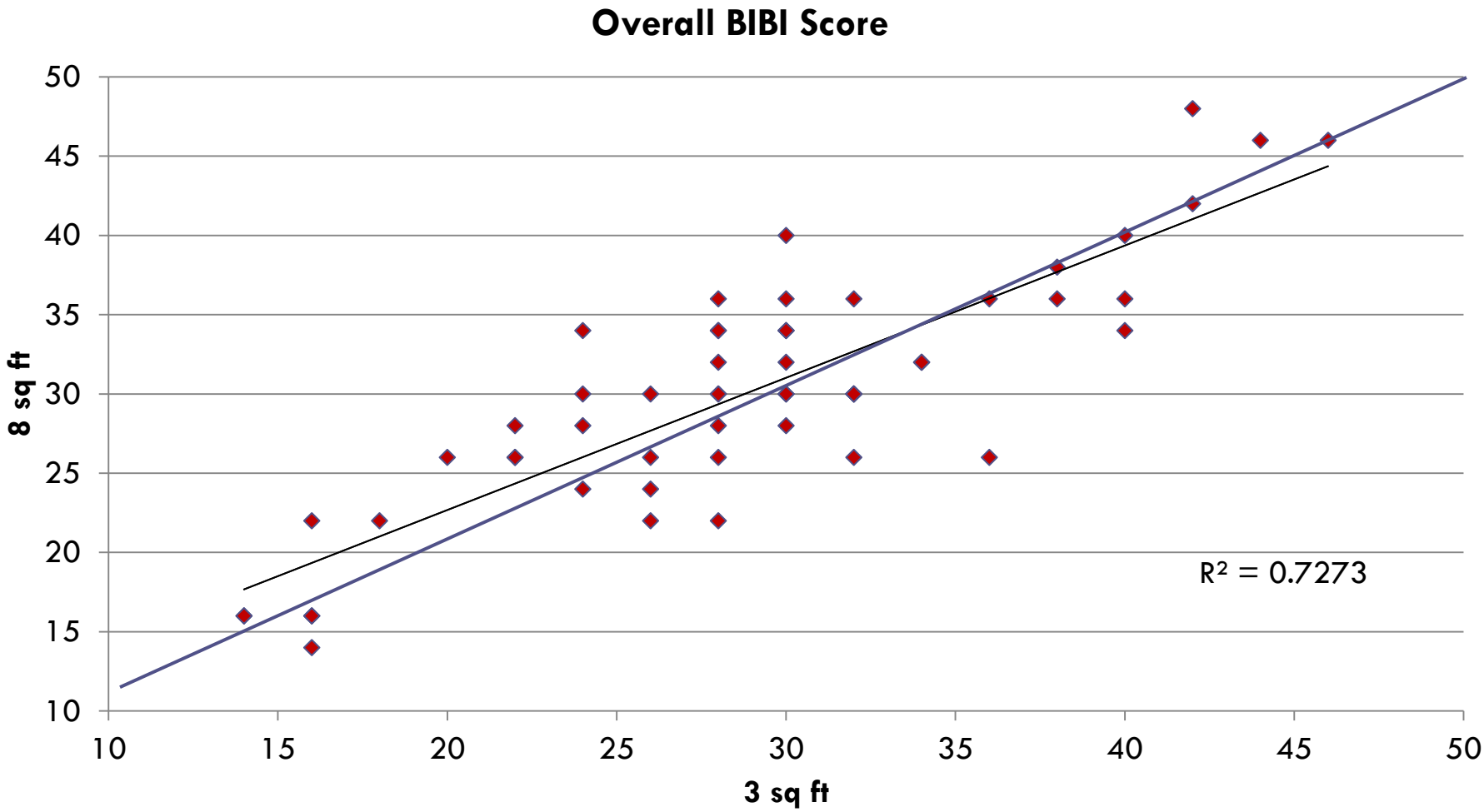
Data Collection: Summer 2011

STREAM REACH SAMPLE COLLECTION

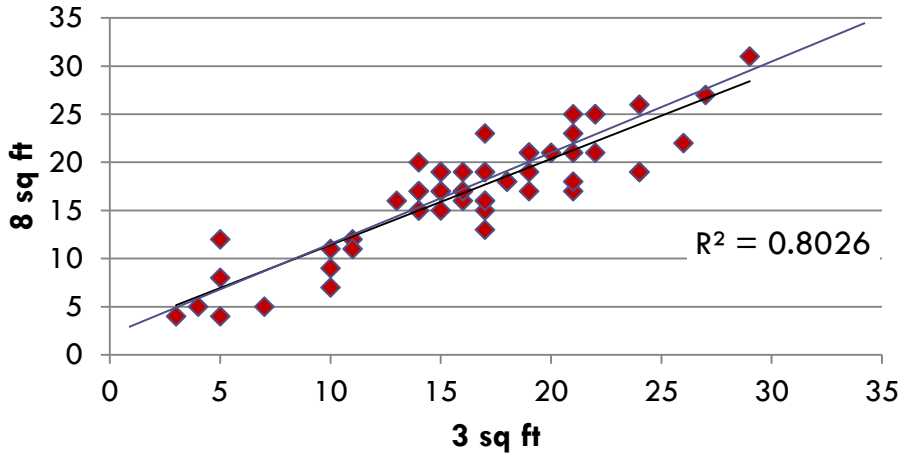
- Sample each riffle twice, 1 ft^2 per sample
- Move from downstream to upstream
- 3 ft^2: collect one sample from three riffles
- 5 ft^2: collect one sample from three riffles and two from a fourth riffle



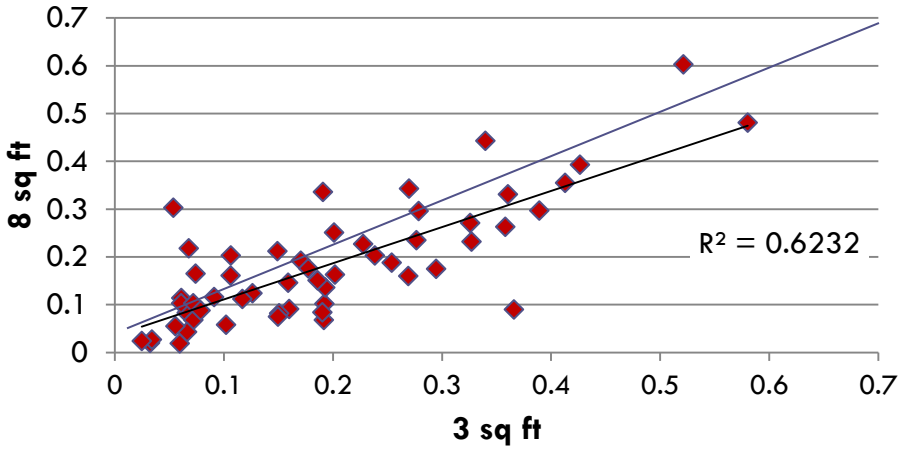
Preliminary Results – Sample Area Comparison



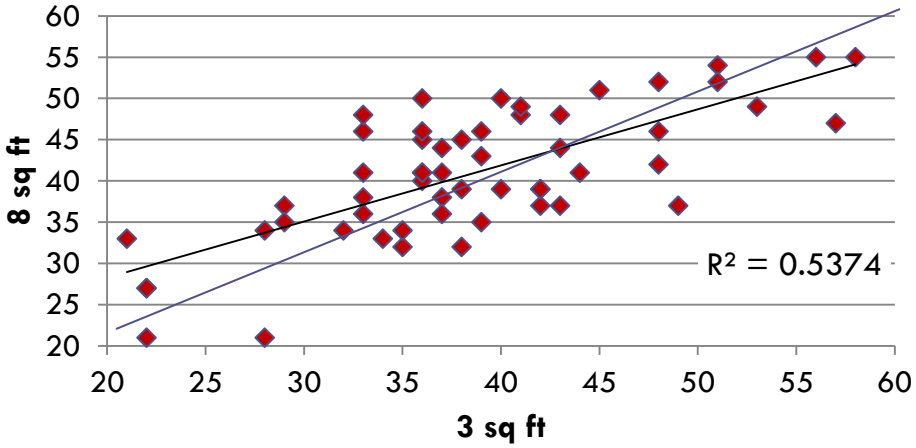
EPT Richness



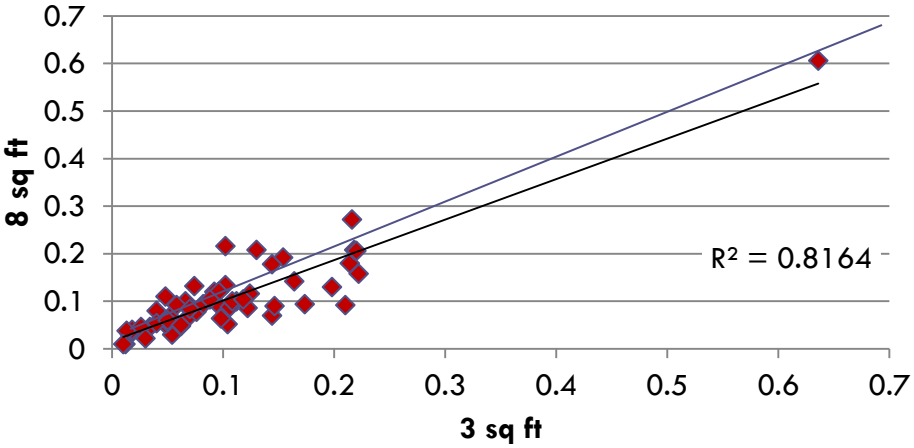
% Tolerant



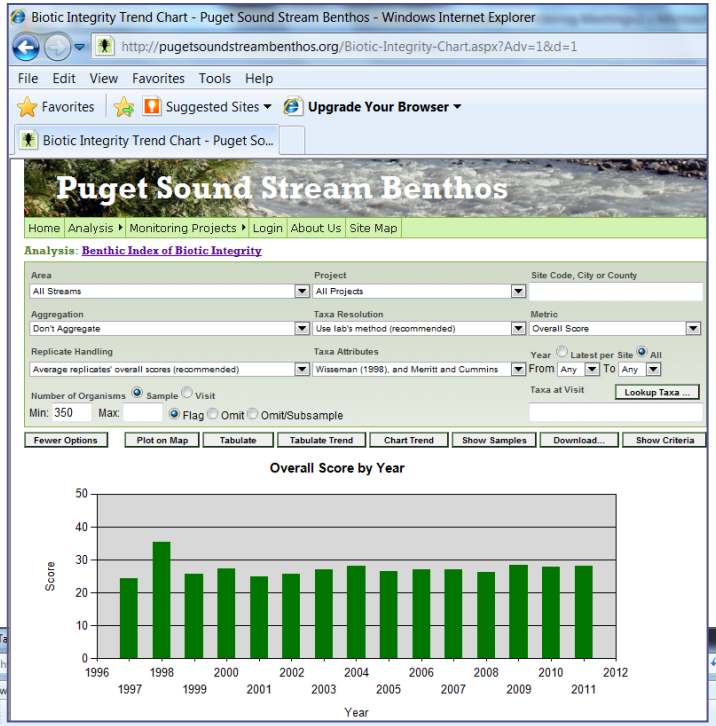
Taxa Richness

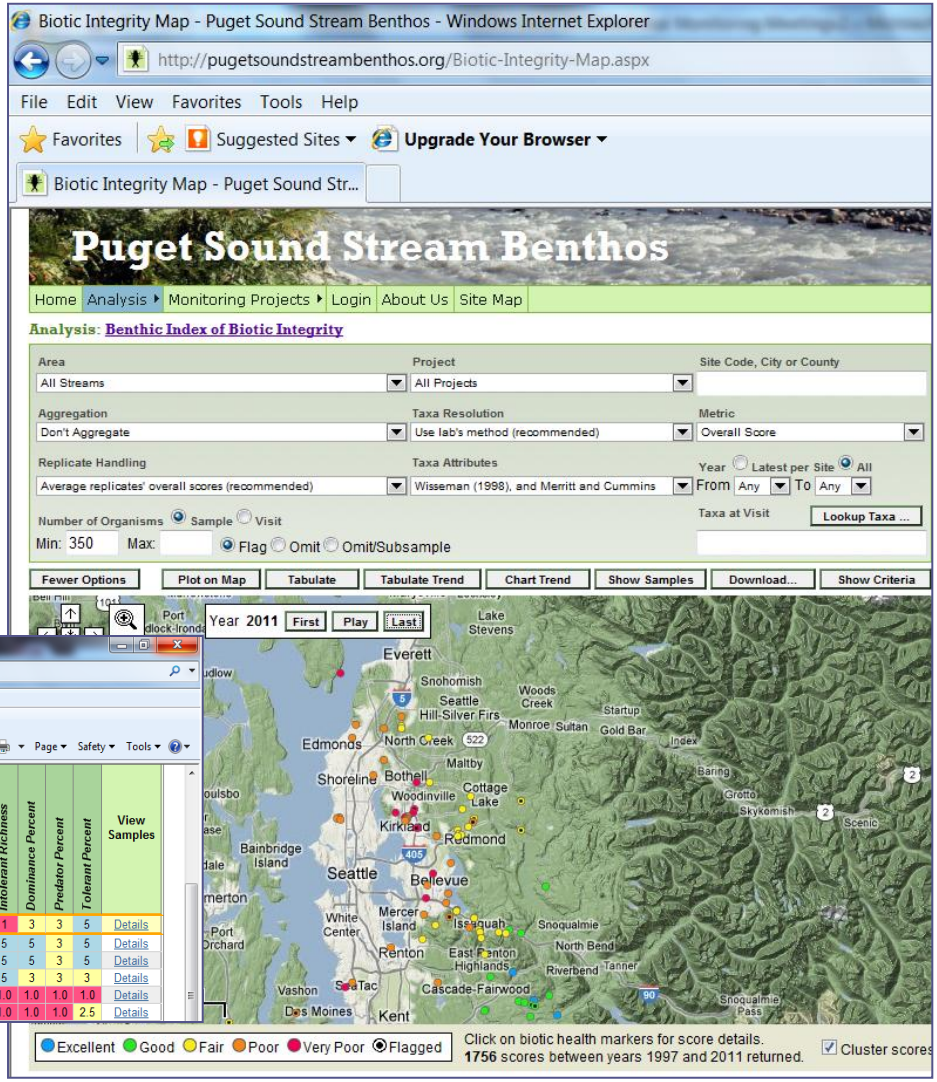


% Predator



Database Enhancements - pugetsoundstreambenthos.org

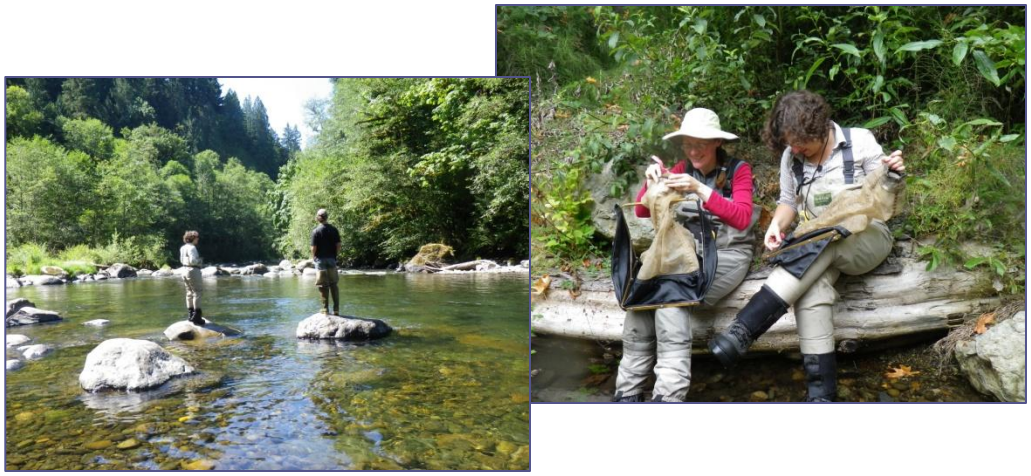




Row	Site Code, Location	Year, Project	Taxa Richness	Ephemeroptera Richness	Plecoptera Richness	Trichoptera Richness	EPT Richness	Clinger Richness	Long-Lived Richness	Intolerant Richness	Dominance Percent	Predator Percent	Tolerant Percent	Organisms	Overall Score	Taxa Richness	Ephemeroptera Richness	Plecoptera Richness	Trichoptera Richness	Clinger Richness	Long-Lived Richness	Intolerant Richness	Dominance Percent	Predator Percent	Tolerant Percent	View Samples
1	WAM06600-000...	2009, Status and ...	40	4	4	4	12	7	1	2	66.9%	14.5%	1.8%	550	22	3	1	3	1	1	1	1	3	3	5	Details
2	WAM06600-000...	2009, Status and ...	51	4	5	8	17	13	3	7	47.6%	13.9%	0.0%	288	36	5	1	3	3	3	3	5	5	3	5	Details
3	WAM06600-000...	2009, Status and ...	53	10	10	11	31	22	3	13	45.4%	15.5%	7.1%	496	46	5	5	5	5	3	5	5	3	5	5	Details
4	WAM06600-005...	2009, Status and ...	16	5	4	3	12	7	0	4	56.5%	14.1%	32.9%	85	24	1	3	3	1	1	1	5	3	3	3	Details
5	SqualBghamAbB...	2003, City of Bell...	17.2	1.5	1.2	2.5	5.2	2.8	0.0	0.0	93.8%	0.3%	92.0%	1286.0	11.5	2.5	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	Details
6	SqualBghamBak...	2003, City of Bell...	14.5	1.0	0.2	1.8	3.0	2.5	0.2	0.0	91.8%	1.5%	48.3%	615.8	12.5	2.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.5		Details

Next Steps

- Complete initial analysis presented here
- Initiate work on Freshwater Indicator
- Continue to enhance regional collaboration working towards more standardized collection and analysis of benthic macroinvertebrate data



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