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Salish Sea Ecosystem Conference

2014 Salish Sea Ecosystem Conference  
(Seattle, Wash.)

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May 1st, 8:30 AM - 10:00 AM

## **Students can sort stream bugs and change watershed management: a case study from Shinglemill Creek, Vashon Island**

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<https://cedar.wwu.edu/ssec/2014ssec/Day2/103>

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# Students can sort stream bugs and influence watershed management



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# Need for Real-World Science in schools



## Washington State Assessment

- Students are lacking in critical thinking, problem-solving, and decision-making skills;
- not engaged in science;
- few choose to study science in college

*“Many youngsters have to see a reason to learning algebra and chemistry and physics...and the best way to do that for some students is to link that to experiences in their lives, to the community or to a career in which they have an interest.” – Gene Bottoms, High Schools that Work*

## Need for engaged, environmentally literate citizens in communities

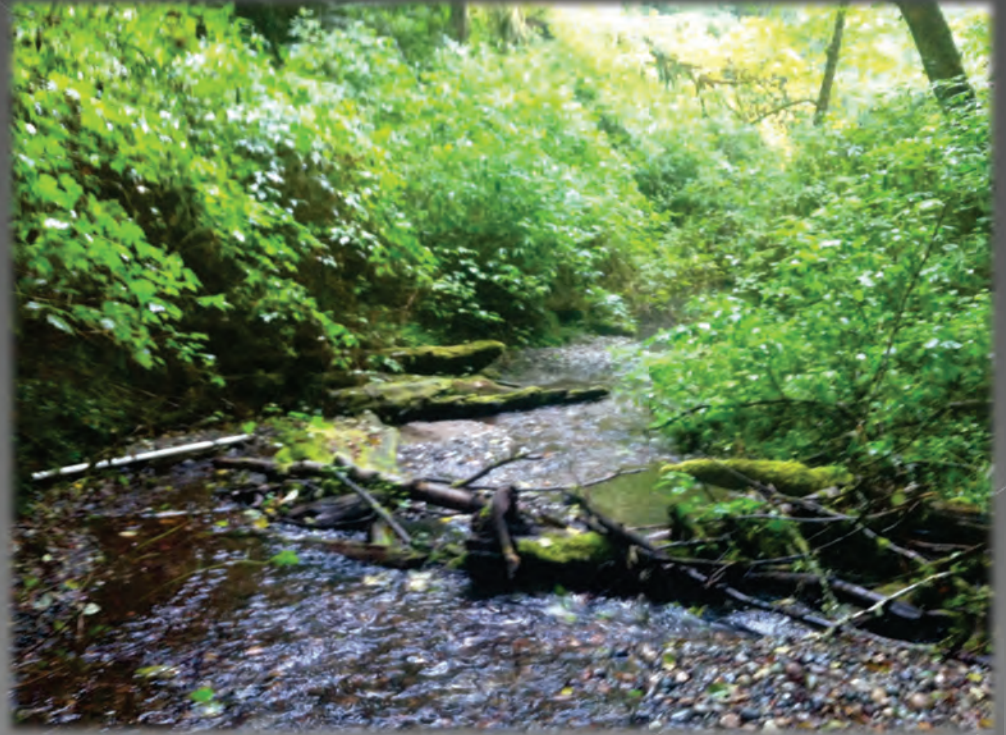
# Research Questions:

Experimental: Are sediments from eroding hillsides in Shinglemill Creek impacting the biological integrity of the creek?

Exploratory: What types of invertebrates are we seeing in the samples and do these give us any clues about any other impacts affecting Shinglemill Creek?

# Program Questions:

- Can students generate data that is useful?
- Will the community trust data generated by students?
- Will participation in community requested research actually engage students more than standard techniques?



## Methods

- Standard Stream Invertebrate Collecting Protocol in 2 stream reaches
- Students sort alongside expert scientists
- Scientists and students discuss results
- Students present to Vashon Maury Island Groundwater Protection Committee

## Participants

- 3 teachers
- 2 schools
- 106 students
- 6 Scientists
- 10 GWPC members
- 3 land management agencies
- 700+ inverts
- 3 class days



# Results

## McMurray Invertebrate Sorting Data 2013

### Upper Shinglemill Creek

★ control

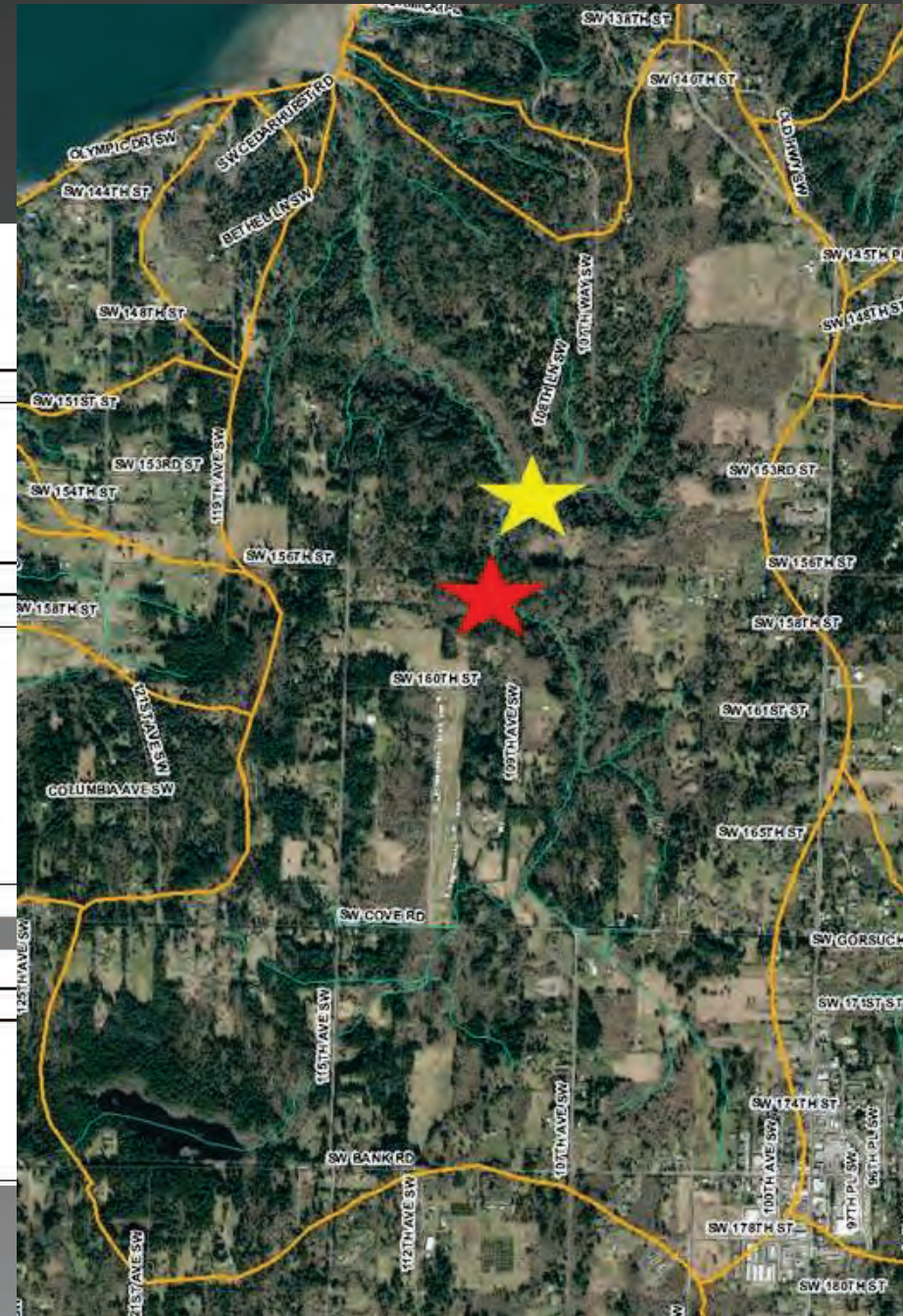
Order	Total	Taxa	Notes
Plecoptera (P)	103	7	Clingers= 12
Ephemeroptera (E)	2	1	
Trichoptera (T)	52	5	
Diptera (D)	89	3	
Other (O)	29	4	

INDEX CALCULATIONS	Number	Score	Interpretation	Notes
Taxon richness (total number of taxa)	16			
E richness (number of E taxa)	1			
P richness (number of P taxa)	6			
T richness (number of T taxa)	5			
% EPT	62			
% Diptera	28			
EPT Index (sum of EPT total over D total)	2.15			
Percent dominance	33			
<b>Total B-IBI score (sum of 8 above scores)</b>				

### Needle Creek

★ Landslides, erosion

Order	Total	Taxa	Notes
Plecoptera (P)	83	4	Clingers=11
Ephemeroptera (E)	2	4	
Trichoptera (T)	30	5	
Diptera (D)	230	4	
Other (O)	15	4	



# Results

- Accuracy: Students sorted to order with 100% accuracy and morpho-species with 80% accuracy compared to scientist team.
- Student engagement: overall satisfaction with the project=average of 4 on a scale of 1-5.
- Community engagement: standing room only at Groundwater Protection Committee meeting
- Trust: actions taken to further explore local stormwater runoff issues



"I don't understand why kids don't like science...this is the best lab ever!"

"It's cool that they let kids our age do that sort of thing. I've never done it before and I think it's pretty awesome."

*-6<sup>th</sup> grade students as quoted in local paper Beachcomber November 16<sup>th</sup>, 2013*

## What we learned

- Students can sort bugs accurately with scientist help
- When students work tightly with scientists, community will trust data and act on recommendations
- Students can be very effective messengers and presenters to community
- Students engage in learning when they know they will have an impact
- Scientists as role models
- Student citizen science can energize a community
- Projects like these require a lot of coordination between scientists, land managers and educators. But partnerships benefit everyone.



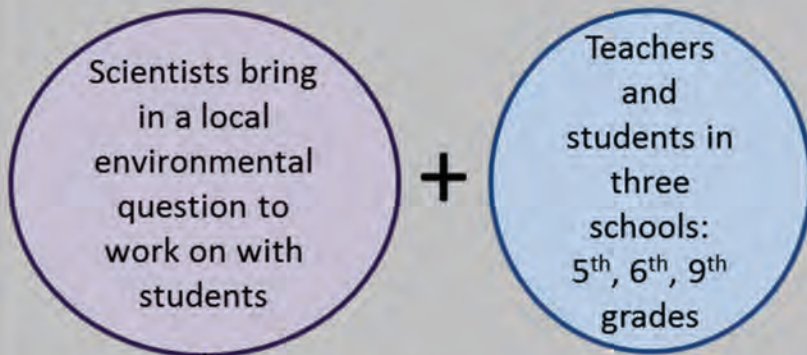
**“It takes a village to raise a child.....”**



# Scientists in Schools, Students in Community

"It takes a village to raise a child. And it takes a child to raise a village."

## Scientists in Schools



### LEARNING

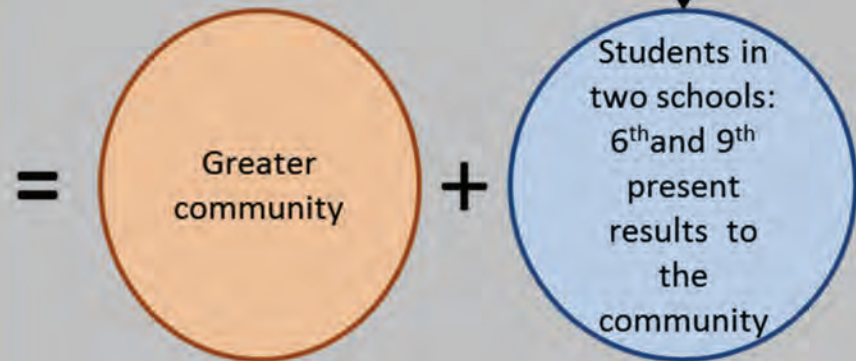
- Student-teacher awareness of local environmental issues heightened
- More teachers use local environment to teach
- Data produced that scientists can use
- Students learn critical -thinking and problem-solving skills as they interpret results

Questions

### ENVIRONMENTAL STEWARDSHIP

- Community awareness of environmental issues heightened
- Students learn how to present scientific results
- Students participate in community stewardship projects spurred by results
- Actual improvements in environmental stewardship
- Changes in health of environment

Answers



## Students in Community

# Next Steps

- Integrated expansion to other grade levels and content areas
- Connections with Next Generation Science Standards
- More in-depth accuracy assessment through repeatability and lab verification of sorting results
- Use invertebrate sampling to monitor effectiveness of stewardship actions spurred by first iteration
- Is this program sustainable long-term? Effort, economics, interest



# Acknowledgements



Vashon Maury Island Groundwater Protection Committee  
Vashon Partners in Education  
Vashon Island School District teachers, staff and students  
Vashon Maury Island Land Trust  
King County—Jo Wilhelm, Greg Rabourn, Eric Ferguson  
Shinglemill Creek and its invertebrates

Student Presenters: Zoe Mahn, Maddie McEachern, Patrick Hanson, Sierra Richter, Madison Storms—Vashon High school. Nelson Giorgini, Olivia London-Chambers, Sam Profit, Sean Robertson— McMurray Middle School

Scientists: Jeff Adams-SeaGrant; Karen Fevold; Gary Shugart-Slater Museum Natural History; Kathryn True, B Perla, Heidi Hans Petersen-VNC