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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Students can sort stream bugs and influence watershed management

Bianca S. Perla PhD, Director, Vashon Nature Center LLC
Gay Roselle, Science Teacher, McMurray Middle School
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
Questions:

- Looking at the data what do you notice about the health of both stream samples?
- What are some differences and similarities between sites?
- From what you know about this watershed list some factors that could be affecting stream health.
- What questions arise from this data that could be explored further? What can we say about the erosion hypothesis? What may be some sources of error or variation that affect the results? If you could do more research what would you do?

### Results

#### Clingers=12

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**INDEX CALCULATIONS**

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**Total B-IBI score (sum of 8 above scores)**

### Clingers=11

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**McMurray Invertebrate Sorting Data 2013**

**Upper Shinglemill Creek**

- **control**

**Needle Creek**

Landslides, erosion
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.”

-6th grade students as quoted in local paper Beachcomber November 16th, 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**

- Scientists bring in a local environmental question to work on with students

**Teachers and students in three schools: 5th, 6th, 9th grades**

**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

**Answers**
- Students in two schools: 6th and 9th present results to the community
- Greater community

**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

**Questions**
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 Raboum, Eric Ferguson
Shinglemill Creek and its invertebrates

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

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