

X-Stream Team

2009

Final Report

Team Members:

Janna Green, Katie MacLachlan,
Rebecca Marcus, Jolyn Overton

Project Manager:

Dana Maher

Table of Contents

Introduction.....	3
Community Partners.....	4
Project Overview.....	4-7
Winter Term.....	4-6
Table 1. Learning Objectives.....	5
Spring Term.....	7
Project Evaluation.....	7-12
Project Outputs.....	7-8
Table 2. Spring Term Outputs.....	8
Project Outcomes.....	8-12
Conclusions.....	12
Acknowledgements.....	12
Appendices.....	13-15
Teacher Quotes.....	13
Student Quotes.....	13-14
Service Day Flier.....	15

Introduction

The X-Stream Team is a collaborative service-learning project initiated through the University of Oregon’s Environmental Leadership Program (ELP). The ELP partners undergraduates with local organizations through environmentally oriented service learning projects that develop teaching, research, professional, and community outreach skills.

Undergraduate teams, supervised by a graduate student project manager, plan and implement projects that meet the needs of their partners and provide a service to the community. Our project focused on environmental education, more specifically fostering student awareness about stream ecology and issues in the local watershed. We developed four lessons around the central theme “Relationship with the Local Watershed.” Each lesson focuses on a different issue in the local Middle/Coast Fork Willamette or Siuslaw Watersheds, motivating students to become better stewards by teaching about local watershed functions and the impacts of human



The X-Stream Team at the Willamette River (left to right): Janna Green, Rebecca Marcus, Katie MacLachlan, Dana Maher, and Jolyn Overton.

settlement. Using a six-foot long stream simulator, our team facilitated hands-on lessons that taught students about the water cycle, as well as the effects on the local watershed of land use practices, pollution, and dams.

Community Partners

Our partnership with the Middle Fork Willamette Watershed Council (MFWWC) and the Middle Fork Ranger District of the U.S. Forest Service provided us with the tools and connections to pursue our mission of educating youth about environmental issues affecting local watersheds. The primary goal of this partnership was to develop material to educate youth about

environmental issues in their watershed.

The Middle Fork Willamette Watershed Council works to sustain the ecological integrity and economic viability of the watershed with a strong emphasis on restoration and education projects. The X-Stream Team worked with the MFWWC's Watershed Education Program, helping to fulfill their mission to "foster better understanding of local natural resources and environments and to create and improve long-term stewardship among residents within the Middle Fork Willamette Watershed" (MFWWC, 2009*). Ernie Ledbetter of the Middle Fork Ranger District designed and built our stream simulator, providing us with an indispensable teaching tool. The X-Stream team also benefited from the connections both community partners have to local schools.

Project Overview

Winter Term

The X-Stream team developed our "Relationship with the Local Watershed" lesson plan package as part of a winter term environmental education course that provided theoretical background and practical teaching tools. With guidance from Kathryn Lynch, our course instructor and co-director of the environmental leadership program, we developed a common underlying structure for the four lesson plans. Each of the lesson plans is comprised of three rotating, interlinked activities, allowing typical classes to be split into three groups of about 8 students. This arrangement caters to multiple learning styles and provides multiple instances of learning reinforcement and testing while meeting the requirement by our community partners that all students have hands on time with the stream simulator.

Each of the lessons built on students' prior knowledge of rivers in Western Oregon. "Dive into Water" connected students with the global water supply, had them act out the water cycle, and presented to them a scaled representation of the Earth's fresh water supply. In "Link it to Land Use" students built upon their prior knowledge of rivers, learning about concepts such as land-use, runoff, and erosion using mapping, hands-on, and team work activities. "The Dam Dance" utilized stakeholder role-plays to engage students in a dialogue about pros and cons of dams, giving them insight into the ways dams affect local ecologies and human settlement in the Pacific Northwest. "Point to the Source" covered the definition and causes of point and non-point

* <http://www.mfwwc.org>

source pollution in rivers, streams and lakes, utilizing hands on activities, inquiry, and partner work. Testing of learning objectives is an important component of each lesson plan, and is written into all activities as well as the final wrap-up segment (see Table 1). The learning objectives for each lesson were developed with our community partners in mind, to meet their goal that our lessons educate the community about issues in the local watershed.

Table 1. Learning Objectives

Lesson	Learning Objectives: By the end of the lesson students will be able to...
Dive into Water	<ul style="list-style-type: none"> · Name two distant and two local bodies of water. · Explain components of the water cycle. · Verbally demonstrate how much fresh water is available to humans and identify one way to conserve water at home.
Link it to Land Use	<ul style="list-style-type: none"> · Draw a map of a local river, including 3 land uses along the river. · List the 5 things aquatic organisms need to survive. · List 3 land use practices that can decrease runoff and erosion.
The Dam Dance	<ul style="list-style-type: none"> · Construct a visual model of how dams have affected a river or stream in a nearby town. · Name two services dams provide to human populations. · Describe two impacts dams have on stream ecosystems.
Point to the Source	<ul style="list-style-type: none"> · Explain the difference between point and non-point source pollution. · Name three types of pollution and how they affect stream ecosystems. · Name one way to prevent non-point pollution at home.

The lessons were fashioned to be interdisciplinary by incorporating life science, social studies, language arts, visual art and math subject areas. Lessons addressed local watershed issues in rural communities, such as land use and dams, from the standpoint of multiple stakeholders. Our team used inquiry and constructivist based teaching methods, first gauging the students' knowledge then adding to it by asking questions about the material. For example, in "Dive into Water" students are asked if they can properly explain the concept of a watershed as well as name local watersheds. The facilitator will use responses to this question to determine current knowledge and begin building on it with inquiry learning. All four lesson plans promote civic engagement by providing participants with tools and knowledge to make informed decisions about complex issues surrounding Oregon waterways. In "the Dam Dance," students have to weigh the potential benefits and consequences of building or removing a dam, a decision they may be making one day in their community.

Lesson plans were developed with our community partners and teachers in mind so they might adapt the activities to their curriculum. Each lesson provides a rationale, relevant background material so teachers of varying familiarity with the material can use the lessons, Oregon State Benchmarks addressed, additional materials, and step-by-step instructions for each activity. All four lesson plans were evaluated at the end of the winter quarter by ELP staff and participants, student volunteers, and community partner representatives, providing valuable feedback going into the spring term. Input from Cristina Watson of the MFWWC and Ernie Ledbetter of the US Forest Service was crucial in making final alterations and adjustments of our lessons before taking them into the classroom.

Spring Term

Once a week the X-Stream Team took the simulator to a school, amounting to 10 visits over the course of the term to 8 different schools in the Siuslaw and Greater Willamette Watersheds. Please see Table 2 in "*Project Outputs*" for a complete list of schools visited, lessons taught, and students reached. A designated team member contacted each week's teacher, working out the logistics of the visit while building the team's professional communication skills. We arrived early to set up the simulator and other stations, and taught 2-7 lessons at each visit. We worked mostly with 4th and 5th graders, but also taught classes of 2nd, 6th, and 7th graders. Each week after the classroom visit, the team met to evaluate our implementation the previous day and plan for the next week's classroom visit. During these meetings, we developed SMART objectives to improve the lesson plans and facilitation skills for the next week. SMART meaning the objectives were specific,



The stream simulator during Link it to Land Use. These Howard Elementary students are learning about erosion prevention.

measurable, accurate, relevant, and time limited. These were designed to help us better meet needs of both the community partners, teachers, and, students, while also providing a means to measure progress.

The X-Stream Team collaborated with the Canopy Connections Team, another ELP team, for a service project to restore butterfly habitat near the Willamette River. We worked with Nearby Nature and the Walama Restoration Project to remove invasive species, spread mulch, and pull weeds at Nearby Nature's learning-scape. Although students from Howard Elementary in Eugene were invited to attend, only ELP students participated. Despite this, the teams still learned about coordinating service days, local restoration projects, and the value and importance of volunteering in the community.

Project Evaluation

Project Outputs

The X-Stream Team worked with almost 600 students to increase awareness of issues in the local watershed. Each lesson encouraged students to think critically about how their lives are affected by environmental issues in their watershed, such as pollution, land uses, and dams. Taking the simulator to classrooms and educating diverse groups of students on local watershed issues was the main goal between the X-Stream Team and the community partners. Our activities taught students how to be better stewards of streams and rivers in their watershed, and equipped them with knowledge they will need to make future decisions as voters regarding stakeholder debates over watershed concerns.

Each team member put in more than the required 120 service hours, with a team total of around 600 hours. We visited 7 schools and 1 outdoor camp, mostly located in the Willamette Watershed with the exception of Siuslaw Elementary and Middle School (which are in the Siuslaw Watershed). Many of the schools were in rural areas with histories based on logging, mining, or farming activities that both impacted local rivers and made our lesson plans extremely pertinent.

The X-Stream Team created several lasting displays that will serve as future demonstrations of our work. A poster was designed to provide a viewer with the opportunity to explore the focal points of our project, such as the simulator, lesson plans, students reached,


schools visited, and community partners. The poster hangs in the main hallway on the ground floor of Pacific Hall, at the University of Oregon. We also created an X-Stream Team website which will serve as a tool for educators to utilize our lesson plans in their future projects. The development of materials for future educators was an important component of our partnership with both the Middle Fork Willamette Watershed Council and the United States Forest Service. The website is: <http://xstreamteam.pbworks.com/>.  website provides access to the lesson plans, a full project overview, community partner, stream simulator, and ELP descriptions, and team member bios. Each undergraduate on our team created a teaching portfolio to document the classroom visits and to reflect on areas of strength and improvement for each visit. These portfolios demonstrate not only the transformation and adaptation of the lesson plans over the course of the term, but also exemplify the growth in the group and individual facilitation skills.

Table 2. Spring Term Outputs

Team	Date	Activity	School Name	Participants
X-Stream	4/2/09	4 lessons taught	Siuslaw Middle School - Florence, OR	110 students
X-Stream	4/9/09	3 lessons taught	Trent Elementary School Pleasant Hill, OR	75 students
X-Stream	4/16/09	2 lessons taught	Lundy Elementary school - Lowell, OR	60 students
X-Stream	4/23/09	2 lessons taught	Oakridge Elementary school - Oakridge, OR	50 students
X-Stream	4/30/09	5 lessons taught	Pleasant Hill Middle School - Pleasant Hill, OR	100 students
X-Stream	5/7/09	4 lessons taught	Siuslaw Elementary School - Florence, OR	93 students
X-Stream	5/14/09	2 lessons taught	Howard Elementary School - Eugene, OR	49 students
X-Stream	5/21/09	6 lessons taught	Grove Christian Camp - Cottage Grove, OR	45 students
X-Stream	5/28/09	2 lessons taught	Howard Elementary School - Eugene, OR	49 students
X-Stream	6/4/09	2 lessons taught	Howard Elementary School - Eugene, OR	49 students
X-Stream & Canopy	6/6/09	Service Day	Alton Baker Park - Eugene, OR	14 (ELP people)
TOTALS	11 events	32 lessons taught	10 schools, 1 service day	589 different students

Project Outcomes

Our unit focuses on the relationship humans have with their watershed, particularly in the Middle/Coast Fork Willamette. Each lesson was uniquely geared toward broadening participant

perspectives on environmental topics and issues affecting waterways in their community. The three-station lesson design allowed us to engage participants with different types of learning styles, while ensuring every student hands on time with the simulator. Our lessons also enabled them to visualize and explore the complexities of the natural world in which they live.

The X-Stream Team created locality briefs for each school before visiting, so we could better engage students in discussions about topics or landmarks they were familiar with. For example, at our trip to Grove Outdoor School we researched Cottage Grove's history and found that frequent flooding in the valley prompted the building of Dorena Dam, thus creating Dorena Lake. During the lesson we simulated how the students hometown of Cottage Grove was dependent on the dam for flood control, water supply, and recreation. The students were amazed to watch their town go underwater when the earthen "Dorena Dam" they built in the simulator eventually broke, and they were able to appreciate the ways this dam is a part of their lives.

In other lessons we discussed water conservation and pollution prevention strategies that could be utilized by the students and their families. The importance of being knowledgeable about environmental problems in their community was stressed, and students were made aware that they will need this knowledge in their adult civic and professional life. We gave students insight into specific environmental issues relevant to their lives, equipping them with the knowledge needed to become informed, motivated environmental stewards.



Two Howard Elementary Students are happy to show off their maps of local land uses.

The feedback the team received from students suggests the curriculum was successful in its goal of fostering awareness to action for issues of local stream ecology. In a thank you card to the team, one Pleasant Hill Middle School student said: "Thank you for coming here to teach us...if you build too close to a river you

can cause erosion and animals to go extinct." Barry's quote indicates we built awareness of local

land use issues, in this case he realized human land use can contribute to erosion, which can be detrimental to aquatic organisms. The team gave students solutions for erosion problems, such as planting trees in riparian zones. Quotes indicate students retained some of the ideas, such as: "I learned that if you plant near the bank it makes it stronger." Lastly, this quote suggests we left students feeling empowered to improve their watershed: "Every station told me a way I could help rivers."

Teachers were given surveys to complete about the team's visit to their classroom. They were asked to rank the team on a scale from 1-5 (1 meaning they strongly disagree and 5 that they strongly agree) for three statements. First, that the X-Stream Team activities were audience appropriate and interesting, second that the facilitators were timely, prepared, professional and helpful and third the facilitators managed the students well, answered questions and addressed challenges appropriately. Of the 12 responses from teachers, the team received a 5 from every teacher for the activities



Students learn about qualities of a healthy stream.

being audience appropriate and interesting. 11 of the teachers strongly agreed (gave a ranking of 5) that the facilitators were timely, prepared professional and helpful, while one teacher gave the team a 4. The team received 9 5's, two 4's and one 4 1/2 for managing students, answering questions and addressing challenges well and appropriately.

In additional to numerical rankings, the surveys provided space for teachers to comment on strengths, areas for improvement and additional thoughts. Multiple teachers commented the team was well organized, prepared and had good energy. Judy Ferrari at Pleasant Hill Middle School wrote "their enthusiasm, positive feedback, and presentation of content were excellent". Cyndi Quirle at Trent Elementary School added: "your presentation fit perfectly with what we have been covering in science this year. You were all full of energy, smiles and worked very well with the kids." These comments suggest our curriculum is one that works well with the learning

objectives of teachers.

Teacher comments, as well as evaluations from the project manager and observing team members provided insight into how we might improve our teaching. Teachers suggested we work on four main areas: (1) including more reluctant students, (2) timing, (3) keeping material and tone age appropriate and (4) addressing student behavior (mostly enthusiasm) during activities in ways that created a positive learning environment for everyone. For each of the areas, the team created SMART objectives and brainstormed ways to address the issues. We included more reluctant students by having the observer identify such students, then give them special jobs and a chance to answer questions. The team worked on ways to adapt timing and age appropriateness of the material for each unique classroom visit. To address issues of student behavior we developed rules for the simulator, attention getters for the students, and a toolbox for each activity of ways to refocus the group. With more experience and group brainstorming sessions, our team significantly improved in all areas over the course of the term and was able to most effectively meet the needs of our community partners.

A primary skill developed by the X-Stream team was the ability to be flexible and adapt to constantly changing classroom situations. Flexibility and adaptability are two key characteristics of a quality leader. Organization and collaboration between team members kept us on top of any unexpected situation. The X-Stream team experience equipped us with knowledge and communication skills that will make us effective promoters of sustainability projects in our community. Developing our lesson plans involved a tremendous amount of research about local geography and history of the MFW Watershed, as well as research about stream ecology and watershed processes. We interpreted this scientific information and communicated it to our students in an understandable and meaningful way. The research and development put into our unit, and the team's growth as professional educators and communicators, contributes to our ability to be effective leaders in any situation.

The unanticipated situations confronting the X-Stream team arose from the nature of our assignment; we visited many disparate schools in several different localities, requiring us to adapt our lessons to reflect local watershed conditions and the previous learning of the students. Because of our many adaptations, the team's lesson plans evolved significantly throughout the quarter. Activities were added, subtracted, combined, and reworked, both in the formal lesson plan documents and on the fly to adapt to new teaching environments. One teaching day, when

there were only about eight students per group, we did thirty-minute sessions with just the stream simulator. We combined a land use and dam activity into one long stream simulator session over the entire teaching period. This adaptability, although unforeseen at the outset of the project, has proven to be our greatest asset.

Conclusions

Being part of the X-Stream Team has equipped us with knowledge, skills, and motivations that will prove invaluable in our future pursuits. We developed skills working on a team, working with professional partners, communicating as a team and with teachers/students, creating a website, and adapting to constantly fluctuating situations. Through the development of our unit the team discovered how to most effectively work with and meet the needs of each community partner. Each team member developed a new sense of respect and appreciation for the value of education in any setting, especially environmental education. We learned that education does not stop at the classroom door, it continues in the community, outside, and in the professional realm. The absolute importance of constant planning, implementing, and evaluation of projects is one of the most vital lessons learned by the X-Stream Team. This three-step process is something we will each carry with us to any occupation, utilizing it as we work on future environmental projects.

Acknowledgements

The X-Stream Team would like to thank the Gray Family Fund of the Oregon Community Foundation for their generous support of this program. We also want to acknowledge and thank our community partners, Ernie Ledbetter with the Forest Service and Cristina Watson with the Middle Fork Willamette Watershed Council for their support, feedback, and commitment to the X-Stream Team throughout our six month project. We would also like to extend our gratitude to Katie Lynch, the dedicated co-director of the ELP, as well as the University of Oregon for their continuing support of this program. Last, but certainly not least, the X-Stream Team would like to thank Dana Maher for his constant support, patience, advice, and dedication throughout the entire project.

Appendices

Teacher Quotes

- “What the Team did well: organized, asked students questions, prepared, age appropriate, hands-on activities, friendly, good energy.” - Ellen Meyers, Pleasant Hill Middle School
- “Organized, fast paced, excited, knowledgeable.” - Michael Nelson, Pleasant Hill Middle School
- “Their enthusiasm, positive feedback, and presentation of content were excellent.” - Judy Ferrari, Pleasant Hill Middle School
- “Your presentation fit perfectly with what we have been covering in science this year. You were all full of energy, smiles, and worked very well with the kids.” - Cyndi Quirle, Trent Elementary School
- “Involved the students and kept the students involved for whole time. Good usage of hands-on activities, which kept students interested and learning.” - Diane McPheeters, Siuslaw Elementary School
- “The students were well engaged and enjoyed the activities. They said they had a great time and learned a lot of new things about land usage.” - Katy Mallat, Lundy Elementary School
- “The X-Stream Team session is quickly becoming a favorite! The hands-on simulator and the engaging discussions that follow by the team leaders makes this a super learning experience, not too mention a very relevant experience, for our students.” Zach Alkire, Cottage Grove Outdoor School

Student Quotes

- “Dear Ex-stream Team, thank you for teaching us about the water cycle and what watershed we live in. Thank you for teaching us about evaporation, precipitation, and condensation. Thank you for letting us draw and talk about the Willamette and McKenzie River. I like when we were able to touch the stream table and do the water cycle.” Caelyn, Howard Elementary School
- “Thank you Ex-Stream team for doing a lot of stuff. The stream table must be heavy.

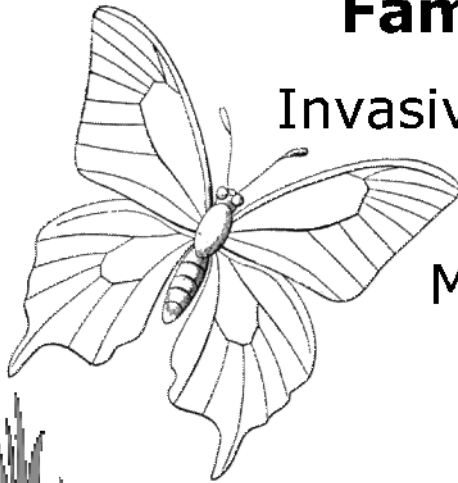
Where do you get all that stuff and water? You rock. OH and I mean it!” – MaKenzy, Howard Elementary School

- “Dear X-Stream Team, thank you for coming to our school. I learned so much thanks to you. I’ve been talking about you guys. Anyway, thank you.” - Hannah H., Howard Elementary School
- “I learned that building roads is bad because the water from rain goes into storm pipes instead of going into the ground.” Alana, Pleasant Hill Middle School
- “Thank you for teaching our class about rivers. I learned that building too close to a river can cause erosion.” Andrew, Pleasant Hill Middle School
- “Dear Extreme Team, Thank you for making us know about the rivers and how it rains and how it works. Thank you. My favorite part of all is when the toys fell off the sand.” Jackson, Howard Elementary School

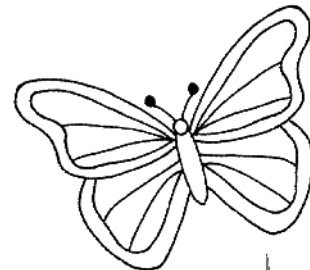
Whilamut Butterfly Meadow Restoration

Family Volunteer Day!

Invasive Species Removal!



Mulching!



Environmental Education!

Saturday June 6, 2009

10-1:30

Alton Baker Park (meet at the yurt)

What to bring: water, lunch, sturdy closed-toe shoes,
sun protection, rain gear

Presented by

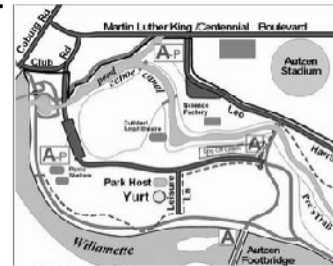
Walama Restoration <http://www.walamarestoration.org>

Nearby Nature <http://nearbynature.org/>

UO Environmental Leadership Program:

Canopy Connections Team <http://canopy09.pbworks.com>

X-Stream Team <http://xstreamteam.pbworks.com>



*****Questions? Email Thomas at troyer1@uoregon.edu*****