

1. PROJECT SUMMARY

- (a) Organization: **Streamkeepers of Clallam County**
- (b) Principal investigator: Ed Chadd, project manager, Clallam County Streamkeepers, 223 E. 4th St., Port Angeles, WA 98362, 360-417-2281, streamkeepers@co.clallam.wa.us. If we receive funding, we plan to hire Donna Hendrix to serve as our Watershed Outreach Educator—see “Project Description” below and attached resume.
- (c) Areas of interest: Meaningful Watershed Educational Experiences for Students
- (d) Project title: **Walk Your Watershed**
- (e) Project duration: 10/1/2008 – 9/30/2011. Continuation is expected beyond the first year.
- (f) Summary: The “Walk Your Watershed” project will offer assistance to schools across Clallam County in implementing individualized, school-based curricula to engage students in scientific exploration of the neighborhood of the school, on foot, practicing critical thinking and problem solving regarding their local watershed. Streamkeepers’ Watershed Outreach Educator will work with willing teachers to create teaching units that meet their needs, and to help teach those units, in collaboration with a variety of partner organizations. Our goal is to reach 24 fourth-grade classes or the equivalent, and 700 students, comprising 2/3 of the fourth-grade age group in Clallam County, each year. The Outreach Educator and teachers will plan teaching units with sustainability in mind, assuring that teachers will be able to continue teaching the units on their own after completion of the grant.
- (g) Objectives:
- To develop a curriculum individualized for each school and teacher, paying careful attention to the achievement of state-mandated Essential Academic Learning Requirements and Grade-Level Expectations.
 - To raise awareness of watersheds in general and the local watershed in particular, in students, teachers, and parents.
 - To increase students’ scientific inquiry and critical thinking skills through meaningful hands-on, minds-on activities.
 - To promote behavior change which will lead to greater stewardship of our environment.
 - To provide a variety of resources and assistance to classroom teachers, enabling them to continue the curriculum after completion of the grant project.
 - To strengthen partnerships between the schools and other community organizations involved in caring for watersheds.
- (h) Federal cost per client: approximately \$120 per student (\$3300 per teacher) per year

2. PROJECT DESCRIPTION

(a) Project Summary

“Walk Your Watershed” will create and implement individualized curricula for schools and homeschool groups across Clallam County that bring students out into the neighborhood on foot, practicing scientific investigation, critical thinking, and problem solving regarding their local watershed. Streamkeepers’ Watershed Outreach Educator will work with willing teachers and parents to create and teach units that meet their needs and fulfill important statewide educational goals, in collaboration with a variety of partner organizations. We hope to reach 24 fourth-grade classes or the equivalent, and 700 students, comprising 2/3 of the fourth-grade age group in Clallam County, each year. Our goal will be to leave these teachers with adequate skills, knowledge, and resources to continue offering this educational experience on their own after completion of the grant.

(b) Environmental Need

The West Coast Governors' Agreement on Ocean Health includes the following action priorities that our project will address:

- Expand ocean and coastal scientific information, research, and monitoring.
- Expand cooperative scientific and educational efforts to address issues of regional significance.
- Address the threat of nonpoint source pollution along our coasts, thought to be the number one water pollution control issue for coastal states.

Specific challenges include polluted waters and declining populations of fish. Clallam County has five populations of salmonids protected under the federal Endangered Species Act, major pollution problems in its three major harbors (evidenced by Clean Water Act 303(d) “Impaired” listings, federally-mandated cleanup plans, or shellfish closures), and 185 “Impaired” listings on the draft 2008 Washington State Water Quality Report. (By contrast, King County, containing the Seattle urban area, has 403 listings, but much of the difference may be due to more intensive data collection in King County, and even so, King County has vastly greater resources to deal with such problems than our rural county of 70,000 people.) Streamkeepers of Clallam County was created to help address these vast issues by leveraging volunteer effort in the cause of citizen science, and over the past nine years, we have worked with hundreds of volunteers, mostly adults, to monitor our local streams, gather high-quality data, report on that data, and educate the public about watershed functions and values, and the state of our watersheds. In this effort, we have cooperated with a variety of local, state, federal, tribal, and nonprofit groups—another priority of the West Coast Governors. Notwithstanding all this effort, we see a need for another level of cooperation, with our local schools and young people.

(c) Educational Need

Given the environmental challenges faces both globally and locally, it is imperative that we provide environmental education to our students, and that we do so in a way that makes the problems and solutions come alive so that students will incorporate

environmental stewardship into their basic approach to the world. Furthermore, it is widely recognized that active learning is essential for the development of skills, and that scientific education must pop out of textbooks and into the real world. However, there are significant obstacles to offering this kind of impactful environmental education.

Our schools generally have great challenges and limited resources. The public schools of Clallam County collectively received \$1,883,613 in Title 1 funds in 2004, with significant minority populations (particularly on the County’s West End) and 40% of children receiving free or reduced lunches. The State of Washington has developed a set of Essential Academic Learning Requirements and an Assessment of Student Learning (WASL) that measures skills and knowledge important to our children’s success in school and life. A WASL science exam is given in grade 5, and less than 45% of those students passed that exam last year. The table below breaks this information down by school district.

Clallam County School Districts	Elementary School & Elementary Students Served	Student Minority Population	Students Receiving Free/Reduced lunches	5th grade students passing the Science WASL
Port Angeles School District # 121	2,071 students 5 schools (pre K-6)	15.0%	40.3%	43.4%
Sequim School District # 323	1,188 students 2 schools (pre K-5)	15.1%	34.4%	34.4%
Crescent School District # 313	est. 206 students 1 school (K-6)	16.2%	24.3%	12.5%
Quillayute Valley School District # 402	537 students 1 school (pre K-5)	31.6%	47.1%	23.7%
*Cape Flattery School District # 401	est. 256 students 2 public schools (K-5) 1 Title 1 elementary school (Neah Bay Elementary) 1 Tribal school (K-12) (Quileute Tribal School)	69.0%	64.8%	20.9%
<i>Washington State</i>	-----	<i>30.2%</i>	<i>36.8%</i>	<i>36.5%</i>

In addition to the above public schools, there are four private elementary schools, a tribal school, and a number of homeschooling groups, with demographics not greatly different from those listed above. Teachers in all these situations experience many demands and often lack the resources to meet them. In terms of environmental education and hands-on field science activities, teachers feel constrained by a number of issues, including the following:

- Most places typically considered for field-science activity require bus transportation, funds for which are typically lacking.
- Most elementary teachers are generalists and feel uncomfortable about science, particularly field science, for which available materials may not apply well to the local situation or the teacher’s educational needs.
- A variety of local groups with an interest in education and environmental awareness are interested in helping to teach students, but these groups typically lack the resources to do the kind of extensive and intensive outreach required to make contact with teachers and devise lessons and materials meeting their needs.

“Walk Your Watershed” will address the above problems by working with teachers one-on-one to create individualized teaching units centered on the neighborhood of the school, and coordinating contacts with community groups that are waiting to help.

(d) Educational Goals and Approach

Our educational goals will be:

- To raise awareness of watersheds in general and the local watershed in particular, in students, teachers, and parents
- To increase students' science inquiry and critical thinking skills
- To promote behavior change which will lead to greater stewardship of our environment

To reach these goals will involve multiple-leveled objectives related to understanding and cognitive function:

- Understanding the interrelationship of all facets of the ecosystem, including an understanding of basic ecological, sociological, and cultural principles.
- Realizing the value of the services that watersheds provide, and the disturbances that impair those services.
- Posing questions and applying scientific methods to search for answers.
- Making choices and solving problems based on scientific facts.
- Recognizing the difficulty in making choices relative to ecological matters, and the need to weigh the impacts of our actions on the environment, culture, and humanity.
- Sharing conclusions with the larger community.

In addition, this project will provide teachers with meaningful professional development opportunities in understanding local watershed issues, their relation to Puget Sound and the larger oceanic system, and the application of field science and inquiry-based learning to the surrounding environment.

Our Watershed Educator will develop and teach a curriculum that encompasses a variety of learning styles on local watershed studies. Classroom activities will progress as students gain a greater understanding of their local watershed environments. Outdoor activities will include watershed walks, field trips and service projects. Learners will be able to gain an awareness of watershed systems, understand imperative concerns regarding their local watersheds, and come to understand that everyone can collaborate to solve ecological issues. Cooperative planning will be used to develop and deliver a program of classroom activities, field experiences, and community service projects. Field trips will be based on local watershed environments to promote meaningful teaching and learning. The field trip experiences will be linked to classroom activities both before and after the trip. The curriculum will be based in science but will also integrate math, reading, writing, and communication skills. *See sample curricula, lesson plans, and state Essential Academic Learning Requirements appended to the application.*

The Watershed Educator will provide training and support for teachers and other school staff. Teacher training will include workshops, such as the "Wonderful Watersheds" workshop presented by the University of Washington, where participants will study, collect data and apply understanding to local watersheds. Local experts from the field will present applications relating to their

careers. Comprehensive workshops on watersheds will concentrate on topics that are included in the Washington State Essential Academic Learning Requirements Benchmarks at grades K-5. Participants will have an opportunity to explore content-rich, hands-on activities to take back and share with their students.

(e) Some Specific Lesson Content

Here is a sample of the breadth of topics and activities that can be covered, depending on the needs of the teacher:

- Watershed definition, structure, function, values, disturbances.
- Life cycle and habitat needs of salmon.
- Local stormwater and its effect on the region's ecosystems.
- Walking field trips to a park, area on school grounds, or other nearby environment, where students will observe and explore biodiversity of plant and animal life living there and their special adaptations to those environments, as well as the difference between indigenous and exotic species.
- Gathering data from local streams and conducting scientific investigations concerning their biological, physical, and chemical integrity. As appropriate, providing the results to Streamkeepers for entry into Clallam County's Water Resources database. Comparison of their data with other data from the database.
- Hands-on stewardship projects such as replanting native vegetation, removing invasive plant species, participating in stream cleanup activities, or helping to install watershed-friendly technologies such as rain gardens and rainwater-harvesting systems.
- Investigating local watershed issues and brainstorming possible solutions.
- Informing the public through such means as stenciling storm drains, creating and distributing leaflets about the local watershed and its care, mounting a cleanup campaign targeting an issue such as pet waste, hosting a watershed fair, organizing salmon-friendly car washes.

(f) Student Work Products and Assessment

Lessons will have student assessments built into them. Some units, for example, will include a portfolio with an annotated collection of work that tells the story of the student's efforts to understand the local watershed. Other projects, such as PowerPoint presentations and research reports, will be evaluated through the use of rubrics. Some field experiences will include having the students keep logs and journals which will be assessed through point values on completeness, originality, higher order thinking skills, making connections, personal examples, and personal reflections or insight. Other types of assessments will include observation checklists, peer evaluations, self evaluations, and interviews and conferences.

(g) Deliverables to Teachers

Teachers will receive written units and lesson plans; a script for each field trip; a list of community resource staff available to

provide technical assistance to teachers; a list of recommended community service projects with information on how to carry out the project; and an equipment/materials list for each unit.

(h) Three-Year Timeline:

Walk Your Watershed Project Dates	Tasks to be Accomplished
October 2008 through December 2008	project planning, coordinating, making initial contacts with district/principals' offices and teachers, coordinating with agencies like the CCD and NOSC, working with teachers in their classrooms, planning with teachers
January 2009 through April 2009	overall curriculum development, individualized curriculum development, writing lesson plans, teaching classes, conducting field trips and investigations, continued coordination and planning with teachers and agencies, attending conferences, taking workshops, giving presentations about the program
May 2009 and June 2009	teaching classes, conducting field trips and investigations. This time will also be spent on educating teachers about the project, signing them up for summer teacher trainings, gathering evaluation information, coordinating workshops and teacher trainings
July 2009 and August 2009	conducting work shops and trainings, providing information and working with the project evaluator, preparing to implement the project for the following school year
September 2009 to June 2010	implementing the project, teaching classes to students, conducting field trips and investigations, supporting teachers, and working with the project evaluator. During school breaks the environmental educator will be coordinating with agencies and preparing to give classroom presentations, preparing field experiences.
July 2010 through August 2010	providing more intense trainings, workshops, and teacher support to prepare teachers to begin project goals on their own.
September 2010 to June 2011	implementing the project, teaching classes to students, conducting field trips and investigations, supporting teachers, preparing teachers to take the project over, and working with the project evaluator. During school breaks the environmental educator will be coordinating with agencies preparing to give classroom presentations and help with field experiences, and providing more intense teacher trainings and workshops
July 2011 through September 2011	coordinating, training, and supporting teachers preparing them to present the curriculum themselves the following year.

3. ORGANIZATION AND PERSONNEL

Streamkeepers was created by Clallam County government in 1999 to gather and share information about the health of our local watersheds and to facilitate watershed stewardship. This is a unique program, developed locally and not mandated by any state or federal law, emphasizing the use of citizen science to help protect and restore our watersheds. We currently have 140 volunteers engaged in a wide range of activities, from myriad monitoring projects, to managing and analyzing data, to maintaining and calibrating equipment, to reporting on data and educating the public. Ed Chadd has managed this program since its inception and has a background in both education and environmental science. In a previous job, he provided educational outreach, similar to the current

proposal, to local elementary schools. With a primary mission to gather and report on local data, Streamkeepers is uniquely qualified to create curricula tailored around local watersheds. We will use this data to advance scientific inquiry in the classroom. For example, if students examine underwater insects, they can compare their results with those of Streamkeepers. If they collect water-quality data, we can provide a graph of the data we've collected over the past several years, and they can plot their data on that graph to see how it compares.

Streamkeepers proposes to hire Donna Hendrix as our Watershed Outreach Educator. Donna's background qualifies her well for the position. Her education includes a Bachelor's degree with the majority of course work in education, including coursework in elementary education and assessment tools. Additionally, she has an Associate's Degree in Fisheries that has given her a strong base in watershed ecosystems. With her enthusiasm for teaching and the outdoor environment, Donna has enjoyed teaching science through class activities, field experiences, assignments, and individual and group projects. Moreover, Donna has the ability to draw people together around a common purpose, prioritize, work independently to complete assignments, and support others by pulling together appropriate resources and ideas. For further details, see Donna's attached resume.

4. PARTNERSHIPS

The project will generate a rich set of partnerships between schools and other groups with an interest in environmental education, most of which will hopefully continue beyond the life of the grant:

- Obviously, our most important partnerships will be with the schools. We plan to build this partnership one district, one school, and one teacher at a time. Because of the short time-frame available between the grant announcement and the due date, we have not had the time to thoroughly discuss this proposal with our local schools and home-school groups. However, the feedback that we have received to this point has been positive, as the attached support letters demonstrate.
- The North Olympic Salmon Coalition will offer a variety of watershed educational activities to students, which dovetail with existing programs offered in Clallam County private schools, home school programs, and YMCA after-school programs:
 - Classroom lessons on watershed structure, function, and value; salmon ecology; and riparian ecosystems
 - Use of the "Salmon Trunk" of educational materials from the Washington State Department of Fish & Wildlife
 - Field exploration of stream and riparian habitat, and identification of fish and macroinvertebrates
 - Watershed-restoration projects, including planting and maintaining native vegetation and removal of invasive species
 - Funding for buses for trips beyond the neighborhood of the school

- The Clallam Conservation District visits classrooms with the Enviro-Scape watershed model, which portrays watershed issues in a very hands-on, miniaturized form, and our Watershed Educator will coordinate with the District to make their demonstrations part of a more comprehensive curriculum.
- The City of Port Angeles has a federally-mandated stormwater management plan, and they will offer educational outreach about stormwater to the students in the Port Angeles School District, which comprises about half the County's student population.
- The North Olympic Peninsula Resource Conservation and Development Council, a multi-stakeholder group convened by the USDA, is the sponsor of a three-year, \$1.6 million grant from the National Aeronautic and Space Administration (NASA) to apply hydro-climatological research to improve the scientific basis of local watershed decision making. The project team, including scientists and researchers from Peninsula College and Pacific Northwest National Laboratory, will provide data and outreach to teachers and students as needed to better understand local watershed processes and problems.
- The Storytellers of Clallam County will offer watershed-themed stories and songs, including the role of salmon and the environment to our local past, and how caring for our environment is necessary for our future.
- Streamkeepers staff will assist with equipment, monitoring protocols, field data sheets, and data management and reporting.
- Streamkeepers volunteers will assist students in small groups both inside and outside the classroom.
- The Washington State Office of Superintendent of Public Instruction (OSPI) is developing a "Sustainable Design Project," in collaboration with the Environmental Education Association of Washington and Puget Sound Energy, that will emphasize project-based learning, problem-solving, and sustainability. This project will serve nicely for an end-of-unit activity that both synthesizes learning and applies it to solving problems.

These groups generally have organizational stability, a long-term commitment to serve the community, and their own funding resources, and thus are well-placed to offer sustainable, long-term partnership.

5. OUTREACH TO THE LARGER COMMUNITY

One component we will offer to teachers will be assistance with follow-up projects in which students share what they've learned with the larger community, through a variety of activities such as hosting public events, filming TV segments, stenciling storm drains, and sponsoring salmon-friendly car washes. Teachers and students will receive support for such activities through community and local government agencies.

We also expect to do outreach to the larger teaching community by presenting our project and sample materials to a regional meeting of science teachers or environmental educators. This would not be expected to happen until the third year of the project.

6. BENEFITS EXPECTED

Our educational and community goals have been listed above under “Project Description.” In Clallam County’s public schools, there are 32 4th grade classes with approximately 900 students. Additionally, there are four private elementary schools and several homeschooling groups. We hope to reach 2/3 of these classes and students, or approximately 24 classes and 700 students each year, achieving the goals we have described.

7. PROJECT EVALUATION

One strength of our proposal is that ongoing evaluations are already built into the project. Lessons include criterion-based assessments of portfolios, presentations, research reports, logs, journals, and field experiences, with students practicing inquiry and the scientific method in an environment they interact with every day. Many of these built-in assessments provide students the opportunity to select something of personal interest and to demonstrate their understanding through various personal learning styles and strengths. More formal evaluation of the project will be required, however, both during and after the project, and a professional evaluator will direct this effort, with help from a volunteer committee that we will form. Details of the evaluation plan will be devised once the project begins, but project evaluation tools are expected to include the following, based on the educational objectives listed earlier and the four levels of evaluation described by Donald Kirkpatrick, *Evaluating Training Programs*, San Francisco: Berrett-Koehler, 1994.

- All participating students and teachers (and volunteers such as chaperones where practical) will take a written pre-test designed to measure their prior knowledge of watershed components and functions, positive and negative practices affecting the local watershed, and possible actions they can take to improve watershed conditions. This same test will be used as a post-test to demonstrate learning. (Front End Evaluation, Level 2, Learning).
- Written teacher/student feedback will be given to the Watershed Educator after select field trips and lessons as part of the follow up activities. (Level 1, Implementation Evaluation)
- Local partner organizations will be surveyed yearly regarding their experiences partnering with the schools, students and program educator. (Level 1, Implementation)
- Teachers will be given regular feedback opportunities during all phases of the project to assess their needs, questions, problems and ideas regarding the project, including discussions with the coordinator, an internet chat group among all the teachers, and one feedback/planning/practice workshop day for participating teachers each year. (Implementation Evaluation Level 1)

- Participating students will show improvement over prior years and non-participating students in scores on the Science portion of the Washington Assessment of Student Learning, which is given in 5th grade. Since this project targets 4th graders, there will normally be one year of lag time. (Learning Level 2)
- Teachers will be surveyed regarding impacts of the project on their teaching, and teachers who have participated in the program throughout the grant period will be surveyed as to whether they continue with some form of the program following completion of the grant. (Level 4, Impact)
- A random sample of parents of participating students will be given a written or telephone survey about whether their child's behavior regarding the watershed and environment has changed since completing the project. (Level 3, Application and Transfer)

8. EXEMPLARY ATTRIBUTES OF THE PROJECT

- *It brings the learning to the school's neighborhood watershed:* Localized information is more meaningful for students.
 - Field trips will visit many places that students pass by every day; these lessons will give students a “new pair of eyes” with which to look at their everyday lives. The first place to visit on a “field trip” should be the school's facility and grounds, to answer questions such as, “Where does the water drain? Where do the toilets flush?”
 - Learning about familiar territory gives a greater sense of the reality of the problems discovered.
 - Stewardship activities carried out in the neighborhood watershed will instill a greater sense of pride and ownership.
- *It emphasizes field trips on foot rather than by bus:*
 - Trips by bus are inherently subject to funding cuts and therefore less sustainable.
 - Walking is healthier for both the students, teachers, volunteers and the planet.
 - Walking, , sets a positive example for participants.
- *It presents a picture of the entire watershed:* The neighborhood watershed will be seen as a complete, integral system rather than just a few random parts.
 - Field trips will visit various parts of the watershed, including both stream/riparian and upland areas. In the uplands, emphasis will be placed on human land uses and their impact on freshwater and marine systems.
 - While students may not go to all parts of any watershed, they will be able to learn about the other parts using various information sources:
 - Clallam County's geographic information system can be accessed online, including aerial photos, wetland/sensitive land delineations, endangered-species habitat, elevation contours, zoning, and developed parcels.
 - Streamkeepers' geographic information and stream-monitoring data portrays a host of data related to watershed

processes, such as impervious surface, wetland loss, and loss of mature forest cover.

- NASA tools are generating a rich local hydro-climatological data set, mentioned above in “Partnerships.”
- The students’ own knowledge of their neighborhood will inform the discussion as well.

9. APPENDICES—see attachments