

**(1) Project summary (1 page):**

\* **Organization title:** SoundWaters, Inc.

\* **Principal Investigator(s) (PI):** Leigh W. Shemitz, Ph.D., Executive Director

\* **Address, telephone number, and email address of Principal Investigator(s):**

SoundWaters, Inc. 1281 Cove Road Stamford, CT 06902

Phone: 203- 323-1978; email: [leighshemitz@soundwaters.org](mailto:leighshemitz@soundwaters.org)

\* **Area of interest:** Meaningful Watershed Educational Experiences for Students

\* **Project title:** *Long Island Sound Watershed Educational Experience*

\* **Project duration:** Duration of *The Long Island Sound Watershed Educational Experience* is: Oct 1, 2010 – Sept 30, 2013. The project is intended to continue beyond the first year.

\* **Summary of work to be performed during the project period:**

Over three years, the *Long Island Sound Watershed Educational Experience* will engage an estimated 4,050 middle school students (1,350 per year) from an urban school district in meaningful watershed science experiences. The students will become stewards of their local watershed system through hands-on analysis and assessment of water quality in upland and coastal sites within the Long Island Sound watershed. This program will be comprehensive (reaching all middle school students); investigative and project oriented (focusing on observation, data collection and analyzing samples from the local watershed system); integrated into the school district's instructional program (supporting and amplifying specific 8<sup>th</sup> grade state standards and embraced by science coordinators and classroom teachers because it fits in the instructional sequence); sustained (students will repeatedly experience the local watershed in the winter and spring amid both upland and coastal sites), comprehensive in considering the watershed as an ecosystem (students will investigate the entire watershed and its component parts, using the landscape around them as hands-on laboratories); iterative (will build upon experience in year one and throughout the grant cycle to adapt and improve approach based upon observation, feedback and evaluations); and is enhanced by NOAA personnel and products (NOAA expertise will impact this project in three ways: NOAA watershed science curricula will be infused into our program to raise the quality of instruction; NOAA personnel will provide key trainings to SoundWaters staff to improve our knowledge and instruction; NOAA data will enable our students to contextualize their own Long Island Sound data against the NOAA data from the Chesapeake Bay Estuary).

**\* List primary objectives for entire anticipated project period broken out by year (include number of students to be reached each year):**

Our proposal delivers a Meaningful Watershed Educational Experience for students by utilizing a locally relevant source, the Long Island Sound ecosystem, as a hands-on laboratory where students can see, touch and learn about the environment. Students will come to understand and appreciate the interconnectedness of the ecosystem, and how it supports life. Ecological relationships, physical and chemical requirements and the human dimension will be explored.

The program targets the entire eighth grade each year for 3 consecutive school years (2010-2011; 2011-2012; 2012-2013). There are approximately 1,350 eighth grade students per year in the school system. We will be reaching a different cohort of eighth graders each year. This adds up to 1,350 students each year and 4,050 students over the entire three years of the grant period.

*1. Overall objective- increase knowledge of watershed systems*

- Year one, two, and three specific objectives: For each of the three years, every 8th grade student, 1,350 students per year, will learn the essential vocabulary, definitions, concepts of watershed science; develop a sense of context and connection to their own local Long Island Sound watershed; and become conversant in 5 of the 7 NOAA ocean literacy principles: #1) the Earth has one big ocean with many features; #2) the ocean and life in the ocean shape the features of the Earth; #4) the ocean makes Earth habitable; #5) the ocean supports a great diversity of life & ecosystems; #6) the ocean and humans are inextricably interconnected. Through hands-on field work, testing and analysis, students will contextualize their own findings of the Long Island Sound watershed against NOAA monitoring data from the Chesapeake Bay to understand humans' impact on the watershed.
- Metrics for evaluation: Pre and post testing of each student's knowledge (note- we have successfully piloted a method of on-line surveys of students, which enables us to readily reach students and compile and analyze data). Frequent and on-going communications with teachers and district science coordinator insures the students' field and hands-on experiences are part of what is occurring concurrently in the classroom; and, that the experiences reflect an integrated approach to learning.

*2. Overall objective- engage students in meaningful watershed experiences*

- Year one, two and three specific objectives: All 4,050 students will engage in hands-on exploration and study of the rivers and coast of Long Island Sound at two different sites and

two different experiences. The program will offer a total of 21 contact hours per student (7 hrs in preparation phase; 10 hrs in action phase, and 4 hrs in reflection phase).

- Metrics for evaluation: Track and evaluate active student participation and immersion in program at field sites; evaluate and analyze students' water quality data. Continuing follow-up with teachers and school administrators to insure the program is aligned with academic standards and work with the content being covered in the classroom.

3. *Overall objective: change students' attitude towards their local environment*

- Year one, two and three specific objectives: Students will connect with their watershed to reinforce an ethic of responsible citizenship and stewardship. Through an understanding of human impact on watersheds, students will develop a connection to their local environment.
- Metrics for evaluation: pre and post attitudinal and behavioral surveys of each student, compiled for analysis and distribution to teachers and school administrators.

4. *Overall objective: support and amplify state science standards and curriculum*

- Year one, two and three specific objectives: Under the supervision and guidance of SoundWaters educators, all 4,050 students will participate in hands-on water quality testing, measurement and assessment using a range of scientific instruments, such as computers, probeware, laboratory and testing equipment and techniques. Such technology will be integrated throughout the instructional process. These activities will be part of the curriculum and aligned with the city and state academic science standards.
- Metrics for evaluation: Track and compare annual results of statewide science testing (every 8<sup>th</sup> grade student takes a Connecticut Mastery Test in science) over the grant period.

\* **Budget Information:**

Total Federal funding requested this fiscal year: \$98,129

Cost-sharing to be provided from non-Federal sources: \$73,224

Project-related cash: \$44,665; in-kind: \$28,559

Total project cost this fiscal year: \$171,352; Cost per student: \$127

**(2) Project description and design: Describe in detail what your project will achieve.**

**A. Need Statement**

SoundWaters is currently in the first year of our implementation of the *Long Island Sound Watershed Educational Experience*. Although the project will not launch until October 2009, SoundWaters staff have already begun addressing teacher and school needs based on our on-

going communications with school administrators and science faculty. In response to input from science teachers and administrators, SoundWaters staff have shifted the field components of this watershed experience to include the winter and spring, and eliminated the fall. This reflects what is occurring in the classroom, resulting in our being completely aligned with the school-based timing and curriculum. In addition, we work closely with partners such as the Mill River Collaborative to insure that the project addresses the inland watershed's connection to estuaries, bays and oceans. The health of the Mill River directly impacts Long Island Sound.

SoundWaters educators have piloted an inquiry-based curriculum to support the system wide science curriculum. We are therefore experienced in working with every 8<sup>th</sup> grade throughout the district. NOAA B-WET funding for 2009 – 2010 this October in Stamford Public Schools enabled SoundWaters to transform our pilot program into *The Long Island Sound Watershed Educational Experience*. Going forward, our goal with this B-Wet application is to have this program embedded in the Stamford Public School system's curriculum.

Funding of this program is essential because with *The Long Island Sound Watershed Educational Experience* we are changing the way urban school districts teach science. Based upon our 20 years experience in working with school districts, we know that it takes several years for the mode of teaching to change in a public school district. Through our successful implementation we will be able to demonstrate to the Stamford Public School that this program is a significant asset. The design of this project is based upon the three inter-related needs: 1) because of limited resources, urban students do not have the opportunity to meaningfully experience the outdoors; 2) absence of understanding of their role in the local environment; and 3) lagging achievement and interest in science among different student groups. Specifically, Stamford, as with many urban districts, has a need to:

1. Provide students with opportunities to learn from, explore and develop meaningful connections to their local environment. Over 20 million people live within 50 miles of Long Island Sound, yet the majority of these residents lead lives that are disconnected from our coastal resources. Many children now experience the world from inside the house, often through television or video. This is true across the population, but especially for urban low-income children, whose families can lack the means to explore the local environment.
2. Develop a sense of connection to and stewardship of the local environment. Stamford students have a need for meaningful environmental education experiences, driven by

rigorous academic learning standards, which can engender discovery and wonder, connect students with their watershed, and reinforce an ethic of responsible citizenship.

3. Promote academic achievement and address low levels of science achievement among minority and low income populations. Over 56% of the children in the Stamford Public Schools represent minority backgrounds and approximately 40% of the students are from economically disadvantaged households. Stamford Public Schools have an urgent need to address the issue of the widening gaps in student achievement.

Through NOAA funding, curricula, training, and data, the *Long Island Sound Watershed Educational Experience* will be comprehensive and multi-disciplinary -- bringing unique opportunities for hands-on discovery to every middle school student in Stamford Public Schools. NOAA expertise will impact this project in three specific ways: 1) NOAA watershed science curricula will be infused into our program to raise the quality of instruction; 2) NOAA personnel will provide SoundWaters staff with training in interpreting water quality data to determine the relative health of the watershed; and 3) NOAA data will enable our students to contextualize their own Long Island Sound data against the NOAA data from the Chesapeake Bay estuary through the data available on the NOAA website: [www.dataintheclassroom.org](http://www.dataintheclassroom.org).

## **B. Project Goals**

The goals of *The Long Island Sound Watershed Educational Experience* are to:

*Goal 1: To change middle school students' **knowledge** of watershed systems in general and the Long Island Sound watershed specifically.*

*Goal 2: To engage middle school students in **meaningful experiences** in the Long Island Sound watershed by providing opportunities for students to explore outdoors, along the tributaries and shores of Long Island Sound.*

*Goal 3: To change middle school students' **attitude** towards their local environment through knowledge and commitment built from firsthand experience, in the context of local, community resources.*

*Goal 4: To **support and amplify state science standards and the science curriculum** by drawing upon comparative NOAA data and estuarine curricula and providing hands-on experiential activities where and when they fit into the instructional sequence.*

## **C. Activities**

The *Long Island Sound Watershed Educational Experience* will provide a year-long guided experience to watershed science for every 8th grader in the Stamford public schools, every year for 3 different cohorts of 8<sup>th</sup> graders (1,350 students per year; total of 4,050 over three years).

NOAA scientists will offer two separate trainings for SoundWaters staff. Training 1: Diana Payne, PhD, NOAA Seagrant Education Coordinator will provide a daylong training in NOAA materials and curricula to maximize the benefit of integrating key NOAA materials into the distance learning element of this grant. Training 2: Three fishery biologists (Shannon Meseck, Mark Dixon and Renee Mercaldo-Allen) from the NOAA Research Fishery Biology Lab in Milford, CT, will provide professional training for SoundWaters staff in methods of interpreting water quality data to determine the relative health of the watershed.

**1. Preparation Phase (total: 7 contact hours per student)**

**A. Distance Learning (6 contact hours per student)**

Pre survey. Students take an on line, pre-program survey to assess their: 1) knowledge of watershed systems; 2) current environmental interest and actions; 3) sense of stewardship of/ connection to local environment and 4) current attitude toward environmental issues.

Using the internet as the delivery method, SoundWaters will provide on-line curriculum for key activities for teachers to conduct with their students. This on-line, exciting program taps into the students' interest in computers to conduct an on-line exploration of their local watershed. NOAA lesson plans from [www.oceanservice.noaa.gov/education](http://www.oceanservice.noaa.gov/education), including: 1. Coastal Management Lesson Plan: Where's the Point? Each class will learn through engaging in the interactive live video "What is an estuary?" and "Why is an estuary important?" from [www.estuaries.gov](http://www.estuaries.gov). Utilizing Teacher Guide –Physical Science Module, the classroom teachers will introduce how different chemical and physical properties affect an estuary to students following "Chemistry in an estuary" from Estuaries 101 Curriculum via [www.estuaries.gov](http://www.estuaries.gov). Students will also be encouraged to play NOAA online games such as: *Where rivers meet the sea*, *Ocean Challenge Puzzle* and *Trash Smash* to further engage them into the program. The distance learning portion concludes with a student survey.

**B. In the Classroom (1 contact hour per student)**

In the classroom, SoundWaters educators will lead students through several hands-on stations focused on the Long Island Sound watershed. The small groups of students allows for each individual to take part in the experience. Curriculum is adapted from NOAA lesson

plans from [www.oceanservice.noaa.gov/education](http://www.oceanservice.noaa.gov/education), including lesson plans: “*Coastal Monitoring and Observations Lesson Plan: Do you have change*” and “*Contaminants in the environment lesson plan: Dirty Mud*”.

The stations include:

- Water Quality testing: Using scientific equipment (hydrometers, thermometers, refractometers, testing strips, colorimeters and pH meters etc), students test multiple water quality parameters (salinity, pH, nitrite, temperature, ammonia and dissolved oxygen) in different water samples and determine where the mystery sample is from through data analysis.
- Turbidity: Through creativity and ingenuity, students think outside-the-box to determine how a turbidity tube measures the cloudiness of water. Students are given all pieces of a turbidity tube, secchi disk and water samples to measure.
- Pollutants: Through hands-on investigation, students will study water, its properties and how it moves through the Earth’s environment. Students will use a watershed model to examine ways that pollution can enter the watershed and how everyday activities impact the environment. Students will conduct a cloud experiment to determine how pollutants affect the water cycle and watershed.

## **2. Action Phase (total: 10 contact hours per student)**

### **A. Hands-on outdoor learning. (5 contact hours per student) Riparian Water Quality**

Sampling and Assessment. Along the banks of the Mill River, students will collect samples using scientific equipment (turbidity meter, LaMotte water sampler, thermometers, hydrometers, portable DO, pH, conductivity field kit and refractometers). The features of the public park, a 2.6-mile nature trail and bike path with heavy human use (including a large dog walking population) will provide the students with the opportunity to see a variety of variables that can affect the water. This will provide the students with experiences from which they can develop hypotheses about watershed dynamics such as the difference between upland and coastal water quality results.

### **B. Hands-on outdoor learning. (5 contact hours per student) Coastal Water Quality**

Sampling and Assessment. Along the coast of Long Island Sound, students will follow the same field sampling and collecting techniques used at the upland site. Students will assess the quality of water based on physical characteristics and chemical substances, and look for relationships, variables and trends among the data collected at each site. During this activity students will be given a better understanding of how excess nutrient input, how nonpoint

source pollution is measured and how to monitor living resources in US estuaries, through lesson plans adapted from [www.oceanservice.noaa.gov/education](http://www.oceanservice.noaa.gov/education). Specifically, National Estuarine Research Reserves Lesson Plan: Natural Laboratories, Non-point Source Pollution lesson Plan: Get to the Point! and Estuary Lesson Plan: Eyes on the Estuaries.

### **3. Reflection Phase (total: 4 contact hours per student)**

#### **A. In the Classroom - Writing prompt. (1 contact hour per student).**

This classroom writing prompt will be adapted from the NOAA project: The “Me” Connection, where, as noted in NOAA materials: “Students will write a brief essay describing significant sources of non-point source pollution in their own communities, what specific personal activities may contribute to contamination from these sources and what they might do to reduce this problem.”

#### **B. In the Classroom - Data analysis and presentation. (2 contact hours per student).**

Students will work in groups to compare and examine upland and coastal sites data. SoundWaters educators will draw upon their collaboration with NOAA scientists to guide the students in analyzing and preparing the graphical data.

#### **C. In the Classroom - Oral presentation. (1 contact hour per student)**

The eighth grade students present their research questions, protocol, and analysis and findings on water quality to the Stamford Board of Education.

### **(3) Organization and Personnel: Proposals should demonstrate knowledge and experience in delivering the type of project requested in this application or otherwise explain why this organization can reasonably be expected to success in the delivery of this project.**

This year SoundWaters is celebrating our twentieth anniversary. Our mission has remained consistent over those twenty years - to protect Long Island Sound through education. Through education, SoundWaters provides people with an understanding and awareness of the changes they can make in their lives and communities to restore, protect and preserve Long Island Sound and the environment. SoundWaters partners with dozens of school districts. Our staff is committed to creating programs that support and amplify the science offerings of local schools. Our track record in offering innovative programs to hundreds of thousands of students both ashore and at sea since 1989, ensures that we will successfully develop, implement and evaluate a successful *Long Island Sound Watershed Educational Experience*. In 2008, *Moffly Media* chose SoundWaters for its *Light A Fire Award* as one of the top six non-profits in Fairfield County out of a field of over 2,400 non-profit organizations. Our education staff is comprised of professionals who are scientists that have developed a love and talent for teaching.

SoundWaters currently operates programs funded by several federal entities, including the NOAA B-WET grant we were awarded for 2009 – 2010, the National Fish and Wildlife Foundation and the Institute of Museum and Library Services. This experience ensures we will successfully manage the management and tracking requirements of a federal grant. Leading the SoundWaters education programs are:

**Executive Director, Leigh W. Shemitz, PhD:** Leigh graduated from Harvard magna cum laude, received her MFS in forest ecology from Yale School of Forestry and Environmental Studies, and her Ph.D. in air quality and environmental health from Yale and has served as a Lecturer and Research Affiliate at Yale. For seven years prior to her doctoral studies, Leigh led a non-profit environmental organization, the Urban Resources Initiative, which provided training and resources for ecological restoration and environmental education projects in local communities. She has published and presented on a number of issues, including air pollution, environmental restoration, and urban ecology.

**Director of Education, Alisha Mullett:** Alisha began her career in environmental education at SoundWaters as an educator / crew member aboard our schooner teaching vessel prior to joining the land-based education team. Alisha has a love for education and the environment that began as a child growing up near the waters of Long Island Sound. Alisha received a Bachelor of Science from Hawaii Pacific University in 2001, where she focused on marine science and oceanography.

**(4) Partnerships: Letters of support from each partner that is making a significant contribution to the project are required with the application package.**

Congressman James Himes, who represents our district, fully supports our application of this grant application. He participated in a press announcement on Saturday, September 26<sup>th</sup> which announced our receiving the NOAA grant which is going into effect this October. Also speaking in support of SoundWaters at this event were Kathi Rodrigues, NOAA New England B-Wet Program Manager; Beth Eiseman, Stamford Public Schools, Curriculum Associate for Science, K -12 and State Representative Carlo Leone.

For *Long Island Sound Watershed Educational Experience*, SoundWaters will partner with the Stamford Public Schools, with NOAA scientists as referenced above. Attached to this application are letters of support from:

- Congressman James A. Himes, Member of Congress, 4<sup>th</sup> Congressional District of CT
- Stamford's Legislative Delegation to the General Assembly, State of CT: Rep Carlo Leone, 148th District; Rep Jim Shapiro, 144th District; Rep Patricia Billie Miller, 145th District; Rep

- William Tong, 147th District; Senator Andrew McDonald, 27th District; Senator Frantz, 36th District; Rep Gerald Fox III, 146th District; Rep Livvy Floren, 149th District
- Dr. Joshua P. Starr, Ed.D. Superintendent, Stamford Public Schools
  - Ms. Mona Hanna, Director for Mathematics and Science, Stamford Public Schools
  - Mr. Christian Bretschneider, student, Stamford Public Schools
  - Ms. Astha Patni, student, Stamford Public Schools

**(5) Outreach and Education: Projects should include external sharing and communication. Projects should include a mechanism that encourages students and/or teachers to share their experiences with peers and with the environmental education community, e.g., through mentoring opportunities, presentations at conferences, in-school service days, or other public forums, and media.**

A valuable part of *The Long Island Sound Watershed Educational Experience* is the external sharing and communication:

1. Media. SoundWaters has a demonstrated ability to place interesting articles in the local paper. See appendix for example of such article.
2. Student online blog. At SoundWaters, we have had terrific success in encouraging students and teachers to create and maintain blogs about their scientific investigations. We will assist the classes in creating such sites to share their work in the *Long Island Sound Watershed Educational Experience*. To view a current SoundWaters Student Science Blog, see the following website: <http://mrforde.blogspot.com/2008/11/terrapin-blog.html>
3. Data on website. SoundWaters will post the students' data, by school, on a dedicated webpage on our site; [www.soundwaters.org](http://www.soundwaters.org)

**(6) Benefits or results expected: Identify and document the results or benefits to be derived from the proposed activities this project period and over the entire prospective project. Include the number of students and/or teachers directly affected by this grant this project year. Also, include a per-teacher and/or per-student calculation for this project year.**

- Total student contact hours:  
 PER YEAR OF GRANT:  
 21 hrs/ student; 1,350 students..  $21 \times 1,350 = \underline{28,350 \text{ contact hours}}$   
 OVER THREE YEARS OF GRANT:  
 19 hours/ student; 1,350 students. year for 3 years.  $19 \times 1,350 \times 3 = \underline{85,050 \text{ contact hours}}$
- Comprehensive:
  - All 8th grade students in the district will participate each year in the project.

- This translates to 1350 students directly affected by this project each year, for a total of 4050 students over the three year period.
- Benefits to students will include:
  - increase students' knowledge of watershed systems in general and the Long Island Sound (LIS) watershed specifically by providing hands-on experiential activities;
  - engage students in meaningful experiences in the LIS watershed through two different opportunities for students to explore outdoors, along the tributaries and shores of LIS;
  - increase student interest in environmental and science-related activities;
  - increase students' knowledge of, and interest in, conservation and stewardship activities;
  - change students' attitude of their environment through knowledge and commitment built from firsthand experience, in the context of local, community resources.
  - increase meaningful, outdoor, hands-on experiential learning opportunities for a population of students who would otherwise not have such experiences;
  - support and amplify state science standards and the science curriculum by drawing upon NOAA data and curricula and providing hands-on experiential activities where and when they fit into the instructional sequence.
- Cost: Per-student calculation for project year one: \$127 / per student
- Cost: Per-student calculation for average of year 1-3 for project: \$133 / per student

**(7) Budget Justification: Total project costs are the amount of funds required to accomplish what is proposed in the Project Description and includes contributions and donations.**

See attached NOAA B-WET Budget Justification Spreadsheet

**(8) Need for government financial assistance: List all other sources of funding that are or have been sought for the project and the status of each request. If no other funding has been sought, explain.**

<b>Funding Source</b>	<b>Status</b>
Hastings Foundation	pending
Linnartz Foundation	pending
Ruffin Foundation	received

**(9) Project evaluation: Evaluation here is defined as the systematic collection and documentation of information about your project's outcomes in order to improve the project's effectiveness, guide judgments about its impact, and/or inform decisions about future programming or funding.**

Our evaluation will focus on assessing success in increasing participants' knowledge about the local Long Island Sound watershed; engaging eighth grade students in quality scientific

investigations; increasing their stewardship actions toward the watershed; and increasing understanding of and interest in careers in marine sciences. We will employ three methods in our evaluation strategy:

1. Pre and post surveys of each student. SoundWaters had developed a rigorous, on-line survey for middle school students that assesses change in knowledge of, and attitude toward, the environment. Through our on-line system, we are able to capture and process the input from all 1,350 students each year.
2. Key observations of student activities (trained staff will use an observation instrument to assess the quality of participants' field investigations and share their findings with the staff so we can continually gauge and improve how we conduct field work with participants).
3. Comparison of CT Mastery Science Tests before, during and after grant period.

These three elements will provide us with formative data so we can continue to adapt and improve our program in years two and three (e.g. an iterative process) and provide summative data on the program's impact. The Principal Investigator, Leigh Shemitz, Ph.D., will oversee the evaluation.

Our evaluation has the following features:

1. evaluation questions will be directly tied to program goals and objectives;
2. evaluation questions will measure changes in participants in knowledge, attitudes, or specific conservation actions;
3. methods for gathering evaluation data are systematic and replicable
4. evaluation approach and results will be quantifiable;
5. evaluation process will be iterative (e.g. we will use the results each year to assess the program and make changes to project design as necessary).

**(10) Appendices.**

See attached:

Budget justification; (6) Letters of support; Newspaper article on SoundWaters educational program; Resumes of (2) key staff.