Final Report Form - Oil Spill Recovery Institute

An electronic copy of this report shall be submitted by mail, or e-mail to the OSRI Research Program Manager wspegau@pwssc.org and Financial Office poswalt@pwssc.org
Mailing address: P.O. Box 705 - Cordova, AK 99574 -

Deadline for this report: Submittal within 90 days of grant/award expiration. **Also,** note that a summary Financial Statement shall be submitted **within 45 days** of the grant expiration. The final invoice and financial statement is due within 90 days of the grant/award expiration.

Today's date: December 27, 2018

Name of awardee/grantee: Prince William Sound Science Center

OSRI Contract Number:

Project title: Headwaters to Ocean Education

Dates project began and ended: October 2017-September 2018 (extended to December 2018)

PART I - Outline for Final Program or Technical Report

This report must be submitted by all grantees. However, for those whose project work resulted in a peer reviewed publication (whether in draft or final form), this report may be abbreviated and the publication attached as part of the report.

A. Non-technical Abstract or summary of project work that does not exceed 2 pages and includes an overview of the project. This abstract should describe the nature and significance of the project. It may be provided to the Advisory Board and could be used by OSRI staff to answer inquiries as to the nature and significance of the project.

During the 2017-2018 season the Prince William Sound Science Center's (PWSSC) education staff directly engaged with over 550 individual participants. Throughout the year we held over 90 separate events, programs, and meetings.

PWSSC educators coordinated our longstanding monthly program, *Discovery Room*, for Cordova elementary and Jr. High students. Each student in 4th, 6th, 7th, and 8th grade participated in field trips, classroom lessons, and hands-on science activities throughout the year. During these programs students were able to use scientific equipment, explore local marine ecosystems, and conduct experiments related to ocean topics of all kinds. Depending on the grade level, topics included: herring, water properties, carbon cycle, ocean circulation, ocean technology and engineering, oil behavior in the ocean, water quality monitoring, and ecosystem comparison between estuarine and freshwater systems.

Education staff coached two teams from Cordova Jr./Sr. High School for the National Ocean Sciences Bowl competition with one team winning the state competition. The team traveled to Boulder, Colorado to represent Alaska at the National competition. Science Center staff hosted the ever-popular *ROV Challenge* at the Tsunami Bowl in Seward, on an outreach trip to Nome, and for Cordova's 6th grade class.

B. Review objectives as described in original proposal and state whether these objectives were achieved.

Fourth Grade: Ocean Science and Fisheries
Objectives for Ocean Science and Fisheries

1. Students understand the role of scientists and science in ocean monitoring.
2. Students understand functional and structural components of marine ecosystems.
3. Students understand role of phytoplankton and zooplankton in the marine food chain and the explicit connection between plankton and herring.
4. Students understand herring biology and the important role herring play in marine ecosystems.
5. Students use scientific equipment and instruments to collect and analyze scientific data.
6. Students are exposed to careers in the fields of science, technology engineering and math.

PWSSC staff was able to meet all of the above objectives. Cordova's 4th grade (27 students) participated in nine Discovery Room sessions to increase their understanding of ocean sciences, oceanographic monitoring and fisheries. The Ocean Science and Fisheries program helped students understand the diversity of scientific roles involved in studying ocean sciences. By exposing 4th graders to different aspects of ocean sciences, from herring biology to physical and chemical oceanography, we hope to pique individual interests and engage students on multiple levels.

Throughout the year students explored herring life cycle, anatomy, and the role they play in the marine ecosystems through hands on activities. A particular focus of this year's theme was plankton and the interconnectedness of marine food webs. Students studied the carbon cycle, the potential impacts of climate change on ocean ecosystems, and how ocean conditions, such as pH, affect the ability of marine organisms to survive and reproduce. This information was linked to how the effects might impact herring in the region and beyond.

Sixth Grade: Ocean Circulation, Ocean Technology, and Oil Spill Response
Objectives for Ocean Circulation, Ocean Technology, and Oil Spill Response

1. Students understand properties of water and the water cycle.
2. Students examine interactions between the atmosphere, the carbon cycle, and marine ecosystems.
3. Students examine the impacts of climate change on marine organisms.
4. Students understand how technology is used in real-world environmental applications, such as ocean monitoring and oil spill response.
5. Students understand why petroleum resource extraction occurs in Alaska and identify threats associated with extraction.
6. Students examine the sources and impacts of oil pollution in marine environments.

7. Students will be exposed to a variety of careers in the fields of science, technology engineering and math

This school year we were able to meet all of the above objectives. The 26 sixth grade students participated in nine classroom programs. Students learned about the technology used to explore and study the ocean, sources of oil pollution in the ocean, effects of oil spills on the physical and biological aspects of oceans and coasts, and how to build and operate Remotely Operated Vehicles (ROVs).

Throughout the year students participated in hands on activities and demonstrations to learn basic ocean science concepts including density, pressure, and buoyancy. Students extensively explored and experimented with properties of and interactions between water and oil. Students dove into how oil is formed, how it is processed and transported, the wide variety of products it makes, how oil affects animals and marine ecosystems, and how to respond to a mock oil spill. Students concluded their year by working in teams to design, build, and fly their ROVs during our Pipeline Terminal Challenge. The student-designed vehicles are required to perform a list of tasks that relate to scenarios at a pipeline terminal such as: take underwater footage, maneuver through obstacles, move and attach chains, and respond to a small oil spill with boom.

Seventh and Eighth: Comparative Ecosystem Assessment
Objectives for 7th and 8th grade Comparative Ecosystem Assessment

1. Students design their own research questions to be tested throughout the year.
2. Students use scientific equipment and instruments to collect and analyze scientific data.
3. Students measure and record data about biotic and abiotic components of different types of aquatic ecosystems (marine, freshwater, estuarine).
4. Students generate and accurately interpret visual displays of scientific data.
5. Students compare and contrast biotic and abiotic data in upriver and downstream portions of the Copper River Watershed and Prince William Sound, which supports the transport of oil in both marine and freshwater environments.
6. Students are exposed to careers in the fields of science, technology engineering and math.

All of the above objectives were met for the 7th and 8th grade ecosystem comparison. Education staff worked with the local high school science teacher and staff from the Copper River Watershed Project to implement this program. We met with students each month for data collection at the three different sites: ocean, estuary and freshwater. Parameters measured at each site and eventually compared were water temperature, pH, dissolved oxygen, salinity, and turbidity. PWSSC educators led the ocean collecting site where all measurements were collected at the surface and at depth using a Van Dorn sampler. continue into future years for maintaining a multi-year data set. Continuing with the long-term data sets established in previous years, an emphasis was put on proper data collection protocols this year. Each month a different student was assigned to be the “task master.” This student was responsible for the group data set, kept others on task, and made sure each measurement was made using the correct method. PWSSC educators led the ocean collecting site where all measurements were collected at the surface and at depth using a Van Dorn sampler. Students continue to keep a shared Google Sheet with all

collected data points for a long-term data set. The eighth grade students gave presentations on their questions (asked as 7th graders) using their two-year data sets.

Outreach Discovery

Objectives for Outreach Discovery

1. Offer *Discovery Room* lessons to students from communities other than Cordova.
2. Increase student understanding of and connection to the natural world.
3. Students understand the function and structure of ecosystems.
4. Provide students from rural communities' access to learning opportunities that use scientific equipment.
5. Students are exposed to careers in the fields of science, technology, engineering, and math.

PWSSC staff was able to meet all of the objectives in regards to Discovery Outreach this school year. We hosted two ROV challenges at the NOSB regional competition, the Tsunami Bowl; 8 teams (of 4-6 students each and their coaches) from around Alaska participated. Individuals from several partnering organizations, staff from PWSSC, Seward volunteers, and an underwater photographer helped make this event a success. A trip to Nome in April helped PWSSC educators reach 60 middle and high school students with the ROV Challenge.

National Ocean Sciences Bowl

Goals and Objectives

Increase high school student involvement in ocean science education activities "through a high-profile national competition that increases high school students' knowledge of the oceans and enhances public understanding and stewardship of the oceans." (Source: http://www.nosb.org/about-nosb/about)

(Based on the Consortium for Ocean Leadership's objectives)

1. Broaden students' awareness of the latest scientific research on the oceans and the critical impact of the oceans on global climate, weather, economic well-being, history, and culture.
2. Use the oceans as a tool for cross-disciplinary science education and as a vehicle for teaching biology, physics, chemistry, geology, and mathematics.
3. Give oceanographic research programs the opportunity to develop new links with their local pre-college community and open students' eyes to ocean-related career options.
4. Reach out to new students and encourage participation by minorities, women, and disadvantaged students in a STEM-centered program.
5. Develop basic scholastic research and presentation skills.

Education staff coached two teams from Cordova Jr./Sr. High School for the National Ocean Sciences Bowl competition. The nine students met every Tuesday and Thursday evening from mid-September until the end of February to prepare for the competition. They worked together to research and write 15-page papers and create 15-minute oral presentations on the topic "Climate Change and Extreme Weather". Team *Voldetort* took 3rd place with their paper, "Implications of Extreme Rain". Team *The Yeti Crabs* not only won the titles of "best paper" and

"best overall project," but won the entire competition! The team beat South Anchorage high school in the final round of that regional competition to claim the championship. They traveled to Boulder, Colorado to compete in the National Competition against ever other regional winner in the country. They represented Cordova and Alaska well.

C. Describe problems or roadblocks encountered in project implementation.

D. Highlight accomplishments, whether or not they were part of the original proposal.

Highlights from 2017-2018 H2O Education Program

- Two NOSB ROV Challenges in Seward
- Successful half or whole-day ocean focused field trips for every grade
- Continuation of environmental monitoring with 7th and 8th grade students
- Tuesday Night Talks streamed, via Facebook Live, and uploaded online
- Outreach trips to Seward and Nome
- Continuing to incorporate more hands-on activities and field trips with students
- Continuing a close partnership and collaboration with CRWP and local teachers
- Three successful and well-attended Discover Cordova programs for younger audiences
- Salmon incubation tank and release of Coho fry
- Ocean themed portion of the Copper River Stewardship Program

E. Conclusions.

This year was a success. Education staff was able to work with a variety of ages and audiences, travel to new places and make new community contacts. The ROV pool challenge continues to be a hit in every community. People of all ages were excited to learn, explore, question and get outside!

F. Appendix including copies of all written reports or publications completed or in progress, resulting from the project work. This also includes abstracts of papers presented at conferences. Please note the acknowledgment of OSRI support stated in Section 10.3.4 of the Grant Policy Manual.

Delta Sound Connections: *The ROV Challenge, Young Scientists*
PWSSC Blog: *Cordova Teams win big at Alaska's Tsunami Bowl*, *Cordova Sea Squirts*, and *Summer Education Wrap-up*

Part II - Final Financial Statement

Please complete the attached Excel spreadsheet (GPM-appendix I – Fin Rpt Form).

Photos

Students of all ages participating in Headwaters to Ocean Education Programs designed to get them exploring their surroundings, asking questions, constructing explanations, and designing solutions.