

## 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 [wspgaw@pwssc.org](mailto:wspgaw@pwssc.org) and Financial Office [Ironnegard@pwssc.org](mailto:Ironnegard@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:** November 10, 2020

**Name of awardee/grantee:** Prince William Sound Science Center

**OSRI Contract Number:**

**Project title:** Headwaters to Ocean Education

**Dates project began and ended:** October 2019-September 2020 (extended to December 2020)

### 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 FY20 the Prince William Sound Science Center's (PWSSC) education staff directly engaged with over 350 individual participants. Throughout the year we held over 40 separate events, programs, and meetings.

PWSSC educators coordinated our longstanding monthly program, *Discovery Room*, for Cordova elementary students. Each student in the program 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, and water quality monitoring.

Education staff coached the Cordova Jr./Sr. High School National Ocean Sciences Bowl team. The team won best overall presentation in the state, with their research on *Impacts of the Exxon Valdez Oil Spill on Prince William Sound: Economic and Ecological Resilience*.

Science Center staff hosted the ever-popular *ROV Challenge* at the Tsunami Bowl in Seward, debuting the brand-new "drum skimmer" additions to the ROVs.

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Unfortunately, COVID-19 prevented the Science Center education team from hosting the 6<sup>th</sup> grade ROV challenge, traveling to other communities for *Discovery Outreach* trips, holding summer programs, or returning to the classroom for *Discovery Room* activities after mid-March. However, despite these hurdles, the education team still held virtual “*Discovery Zoom*” sessions with four classes, hosted socially-distant community programs, and continued work on the ROV program and curriculum development for future dissemination to wider audiences.

- 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 4<sup>th</sup> grade (27 students) participated in seven 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 4<sup>th</sup> 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.

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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, though not as thoroughly as we have in the past due to COVID-19. The 29 sixth grade students participated in eight programs both in and out of the classroom. 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, but unfortunately unable to participate in the annual ROV challenge.

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, and how oil affects animals and marine ecosystems. A new *Discovery Room* activity was created to take every 6<sup>th</sup> grade student into Prince William Sound on the R/V *New Wave*. Prior to the boat trip PWSSC educators led lessons on bioluminescence and students completed independent projects on the topic. On the boat trip, we dropped the plankton nets to see if we could find bioluminescent organisms – we did! This new program will be continued for the years to come as it is an excellent hand-on experience that uses scientific equipment, explores local ecosystems on research vessel, and exposes them to scientists in the field.

### **Seventh and Eighth: Comparative Ecosystem Assessment**

#### ***Objectives for 7<sup>th</sup> and 8<sup>th</sup> 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.~~

We strongly believe that connecting with middle school students is essential to sustaining the lessons and skills developed at the elementary school level while sparking continued interest in STEM subjects. After this program had an interruption in FY19 due to changes in school scheduling, we proposed to work on finding a new avenue of reaching students during this important education transition in FY20.

The loss of school timing for this program is still unfortunate, but in early 2020 we were successful in exploring alternative options with middle school educators on how to revitalize this work. COVID-19 prevented those plans from materializing in FY20, though we think there is

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groundwork laid to continue in that direction soon. Ultimately, we feel that continuity in field-based scientific research experiences will result in a long-term, increased interest in science and natural resource careers amongst Cordova students as well as improved understanding of the nature of scientific research and data-driven decision making.

### Outreach Discovery

#### *Objectives for Discovery Outreach*

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 most of the objectives in regards to *Discovery Outreach* this year. We hosted two ROV challenges at the NOSB regional competition, the Tsunami Bowl; 6 teams (of 4-6 students each and their coaches) from around Alaska participated. This year drum skimmers were added to the ROV Challenge. These simulated drum skimmers use magnets to skim "spilled oil" (ping-pong balls painted with magnetic paint) out of the water. Individuals from several partnering organizations, staff from PWSSC, and Seward volunteers helped make this event a success. An educator from the Alaska Sea Life Center brought an ROV they use in their research to the challenge and participating students had the chance to fly it in the deep end of the pool.

\*PWSSC educators took the ROV Challenge to Yakutat where 36 middle and high school students got to design, build, and fly ROVs. Nine first and second graders in Yakutat also got to learn about oil spills, attempt "cleaning up spilled oil," and drove mini-ROVs. \*This program occurred in December 2019, so overlapped FY20 and a no-cost extension of the FY19 funding. Travel was prohibited to complete a *Discovery Outreach* trip in the spring or fall of 2020.

### 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.

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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 one team from Cordova Jr./Sr. High School for the National Ocean Sciences Bowl competition. The five students met every Monday and Thursday evening from mid-September until mid-February to prepare for the competition. They worked together to research and write a 15-page paper and create a 15-minute oral presentation on the theme “Understanding human, economic, and environmental resilience of Alaska’s oceans.” The team, *The Backstreet Buoys*, won the title of Best Overall oral presentation with their project “*Impacts of the Exxon Valdez Oil Spill on Prince William Sound: Economic and Ecological Resilience.*” The team did well in the buzzer rounds, but did not place into the final rounds.

### C. Describe problems or roadblocks encountered in project implementation.

COVID-19 posed a significant hurdle to some of our proposed programs. We were unable to return to the classroom for *Discovery Room* programs after mid-March, we were unable to complete a second *Discovery Outreach* trip, we did not hold the 6<sup>th</sup> grade ROV Challenge, and we did not hold any summer programs. However, we held virtual “*Discovery Zoom*” sessions in the months of April and May, we were able to implement the new skimmers at the 2020 Tsunami Bowl ROV Challenge, we hosted socially-distant community programs, and still met most of our FY20 deliverables.

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

#### Highlights from FY20 H2O Education Program

1. Our ROV kits got completely overhauled. All of our control boxes and motors received much-needed maintenance and upgrades. We now have 10 complete and up-to-date ROV kits.
2. Drum skimmers were added to the ROV Challenge. These simulated drum skimmers use magnets to skim “spilled oil” (ping-pong balls painted with magnetic paint) out of the water. They were debuted at the ROV Challenge during the 2020 Tsunami Bowl and were a huge hit.
3. Five high school students participated in the Regional National Ocean Sciences Bowl, the Tsunami Bowl, in Seward. The team won best overall presentation in the state, with their research on *Impacts of the Exxon Valdez Oil Spill on Prince William Sound: Economic and Ecological Resilience.*
4. Over 85 students in fourth, sixth, and ninth-twelfth grades engaged in regular ocean related activities and data collection using scientific equipment.
5. *Discovery Outreach* programs included six ROV Challenges: two at the 2020 Tsunami Bowl and four total with middle and high school students during multi-day oil-related programs in Yakutat.
6. A new *Discovery Room* activity was created to take every 6<sup>th</sup> grade student into Prince William Sound on the R/V *New Wave*. Prior to the boat trip PWSSC educators led lessons on bioluminescence and students completed independent projects on the topic. On

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the boat trip, we dropped the plankton nets to see if we could find bioluminescent organisms – we did!

7. When students were unable to return in the spring due to COVID-19, we were asked to continue *Discovery Room* sessions virtually. Four classes participated in “*Discovery Zoom*” programs about the marine environment.

### E. Conclusions.

This year was a great success despite some difficult hurdles. Education staff worked with a variety of ages and audiences and made lasting impressions on many students. People of all ages participated in hands-on activities and experiences to deepen their understanding of their environment, the scientific process, and ongoing research in the region.

- 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**: *National Ocean Sciences Bowl: Inspiring Cordova’s Youth, Advancing the ROV Challenge in 2020*

**PWSSC Blog**: [Cordova at the 2020 Alaska Tsunami Bowl](#), *NOSB, Discovery Room*

## Part II - Final Financial Statement

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

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### Photos



Top Left: 4<sup>th</sup> grade students explore marine food web connections

Top Right: NOSB team, *Backstreet Buoys*

Middle Left: Yakutat students see first-hand the effect oil has on feathers.

Middle Right: PWSSC leads an ROV Challenge with High School students from Yakutat

Bottom Left: An ROV enters the pool during the 2020 Alaska Tsunami Bowl

Bottom Right: 6<sup>th</sup> grade student watches the plankton net return to the boat on the R/V *New Wave* in search of bioluminescence