

CMP Grant “Willacy County Youth Coastal Adventures”

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Final Report

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“No one will protect what they don't care about; and no one will care about what they have never experienced.” — David Attenborough

The primary objective of “Willacy County Youth Coastal Adventures” was to allow as many students as possible to experience the unique ecosystem of the Laguna Madre and to empower them to protect this valuable natural resource and the organisms that inhabit it by being aware of man-made debris and non-point source pollution. Several groups of students were told that the goal of the program was for them to “fall in love” with the fish, shrimp, crabs, and other animals in the Laguna Madre so that they would be motivated to protect them.

A secondary objective of the program was to provide Willacy County youth with a positive introduction to boating. For about 35% of student participants as well as several adult chaperons, this program provided their first experience on a boat. A few students expressed trepidation at the beginning of the field trip, but all were smiling when they stepped off the boat at the end of the cruise.

This project was comprised of multiple components spanning two academic years and all grade levels Pre-Kindergarten through high school. All four Willacy County school districts were engaged in the project, as well as local Boy Scouts, Girl Scouts, Sea Scouts, 4-H, and homeschool groups. Student Field Trips took place during two visits by the *R/V Archimedes* to Port Mansfield, during the Spring of 2018 and the Fall of 2019.

School districts and other groups were allowed to select the grade levels to participate in the program. In each instance, lesson concepts and vocabulary were adjusted to meet the Texas Essential Knowledge and Skills (TEKS) for each grade level so that science teachers could more easily refer back to the field trip experience later in the school year. For example, while examining animals collected in the trawl in the touch tank, 4<sup>th</sup> graders were asked to identify the individual animals’ various structures and their functions, while 5<sup>th</sup> graders were asked to identify adaptations.

During both visits, the Port of Port Mansfield provided crew accommodations; Willacy County provided classroom space at the Coastal Land Resource Center; and the Port Mansfield Chamber of Commerce provided dock space for the *R/V Archimedes* as well as restrooms and a place for students to eat lunch and to take pre- and post-tests.

- **Marine Science Cruises:** Students who participated in the program were treated to a marine science cruise aboard the 30-passenger *R/V Archimedes* during which they collected, viewed, and identified live plankton using a high-powered microscope and helped to pull in a trawl net with a variety of specimens for hands-on examination in an on-board touch tank. Students also used scientific equipment to measure depth, salinity, temperature, turbidity, pH and dissolved oxygen and discussed careers in the marine science and maritime industries. Atlantic bottle-nosed dolphins were sighted on about 75% of the 73 cruises conducted, and were always a hit with passengers and crew alike. A total of 1309 students and 268 adult chaperons participated in marine science cruises. Pre- and post-tests were administered to all student participants in 4<sup>th</sup> grade and above.
- **Shore-side Lessons:** Simultaneous shore-side lessons allowed school districts to economize on bus transportation costs by sending two classes to Port Mansfield on a single bus. While one

class was out on the *R/V Archimedes*, the other was at the Willacy County Coastal Land Resource Center participating in two hands-on marine science lessons (45 minutes each):

- **Marine Transportation:** In “Barge Races” students were shown how to manipulate a miniature model of a barge through a “barge canal” filled with water, simulating the Intracoastal Waterway they had or would see while on the *R/V Archimedes*. Students were asked to distribute one or more weights representing cargo in the barge and then vary the barge’s speed through the canal by adding one or more “motors.”

Students were allowed to experiment with the amount of cargo and cargo placement as well as the number of motors used. They were then divided into teams, and each team was given the assignment of managing a mock marine transportation company. Competing to generate the most “profit,” each team tried several combinations of cargo and motors, using a stopwatch to record the time it took each combination to transit the canal.

Students were given calculators and worksheets and asked to calculate “profits” by deducting crew (calculated per second) and fuel (calculated per motor) expenses from revenue received for delivery of each unit of cargo. Some teams tried to deliver as much cargo as possible or travel as fast as possible while others attempted to maximize profits by experimenting to find the best combination of weight and speed using the given values for costs and income.

The exercise was then repeated with same “cargo” and “motors” using a model truck traveling the same distance over “land” (table top). Students were able to articulate at the end of the lesson why it is more efficient to transport cargo by barge than by truck or train.

- **Water Pressure:** In “Don’t Pressure Me!” a four-foot water column was used to demonstrate a model of a submarine and to allow students to experience the direct relationship between water pressure and depth by attempting to blow bubbles through a tube at increasing depths. Older students were also asked to measure and graph this relationship using a pressure gauge and grid board.

In the submarine unit, students were asked to brainstorm about submarine design and what methods submariners might employ to control the vessel’s depth in the water as well as how the crewmembers might be protected from the immense pressure of the deep ocean. They were then shown a transparent model of a submarine and allowed to experiment with varying its position in the water column by manipulating the ratio of air to water in the submarine’s ballast tank, located between the inner and outer hulls.

In the next unit, students were shown a standard snorkel and asked why all manufactured snorkels are of similar length, even though longer snorkels would be

popular if they were available. After a discussion about the possible problems that might be encountered with a longer snorkel, students individually experimented with attempting to blow bubbles through a tube with a one-way valve at increasing depths in the water column. This hands-on experience allowed students the opportunity to intuitively grasp the relationship between water depth and pressure, which led to discussions about what adaptations various marine organisms that are able to survive in the deep ocean might possess.

- **Campus touch tank visits:** During Fall 2019, inclement weather made boat field trips impossible during three days of the *R/V Archimedes'* twelve-day visit to Port Mansfield. To accommodate, the program and associated lessons were adjusted and specimens previously collected were taken to schools in portable touch tanks. The water column and associated demonstration materials were taken to Lasara schools as well. The thunderstorms provided an opportunity to discuss where rain water – along with debris or anything else on the road or the ground – ends up, why that matters, and what students can do to help maintain water quality in the Laguna Madre.

One unexpected result of taking the program and collected specimens to the students on campus was that the student audience for the project was greatly expanded, especially at Lasara schools. During Spring 2018, 77 Lasara 6<sup>th</sup>, 7<sup>th</sup>, and 8<sup>th</sup> graders were bused to Port Mansfield and participated in marine science cruises and shore-side lessons. In Fall 2019, every child in Lasara from Pre-Kindergarten through 8<sup>th</sup> grade was able to participate in the program, totaling 227 students, a 295% increase.

A new student worksheet was developed in coordination with the 5<sup>th</sup> grade science teacher at Lyford Elementary School for their on-campus touch tank visit in Fall 2019. Students were asked to choose one organism, sketch it, describe it, and identify several of its adaptations for survival. Students then researched their chosen animal and reported their findings to the class. Examples of student efforts have been provided in the attached photos. A total of 98 Lyford 5<sup>th</sup> graders participated in the project via campus touch tank visits during Fall 2019.

### **Pre- and post-test Results**

A 10-question test was administered to all students in 4<sup>th</sup> grade and above. During the pre-test, students were instructed not to guess, but to leave blank any questions they did not understand in order to eliminate false correct answers. Questions were true/false and multiple choice, focusing on marine food webs, plankton, filter feeders, and crabs. Students were asked why the water in the Laguna Madre is green (microscopic algae), the definition of plankton (drifters), if exoskeletons are stronger than internal skeletons (true), how crabs grow (by molting), and whether crabs can regenerate missing limbs (true). On average, students showed a 42% improvement in post-testing. As expected, middle school and high school students had higher scores than elementary school students on both pre- and post-tests. A breakdown of average pre- and post-test scores by school is attached to this report.

### **Project Results**

This project exceeded Texas Floating Classroom staff expectations in almost every way. The Marine Science Cruises and traveling touch tank campus visits were completed from April 23, 2018 to May 4, 2018 and from September 16, 2019 to September 27, 2019.

- 73 field trip cruises were completed
- 3 full-day campus visits by educators with traveling touch tank were completed
- 1902 students, chaperons and teachers participated in the 73 cruises, 21 days of shore-based classes and 3 days of traveling touch tank campus visits
- 1613 total students participated in the WCYCA Program, as follows:
  - Lyford Middle School – 186 students
  - Lasara Middle School – 142 students
  - San Perlita ISD – 268 students
  - Raymondville High School – 27 students
  - Lyford High School – 28 students
  - Lyford Elementary School – 93 students
  - Lasara Elementary School – 146 students
  - LC Smith Elementary School – 114 students
  - Pittman Elementary School – 148 students
  - Sarita Elementary – 27 students
  - Kaufer High School – 39 students
  - Homeschool – 103 students
  - Boy Scouts, Girl Scouts, Sea Scouts – 292 students
- For 454 students, this was their first experience on a boat.

One fourth grade class sent the crew handmade “Thank You” cards after their experience. A few excerpts:

“I learned so much on the Floating Classroom. This is what I learned how there is so many different types of baby fish in plankton. It was so amazing I hope I can come again. Thank you for a good experience on a floating classroom.”

“Thank you for letting us observe all of your stuff and sea life and thank you for teaching us where the baby crabs go and how they are plankton when they are young.”

“My favorite part was when we were able to play with the fish and touch them it was very fun! Thank you!”

“My favorite part was when I learned about plankton and how they all look different it was so interesting! Thank you so much.”

“My favorite part was when we looked at the saltwater and saw the plankton and animals in the water.”

Due to this project’s success, Willacy County and Texas Floating Classroom, Inc. are looking into alternative funding sources to establish Willacy County Youth Coastal Adventures as an annual event for local students.

	Current Federal/ CMP Budget	Billed to Date	Obligated* CMP Budget	Remaining CMP Budget
Personnel			\$ -	\$ -
Fringe			\$ -	\$ -
Travel			\$ -	\$ -
Supplies			\$ -	\$ -
Equipment	\$ -	\$ -	\$ -	\$ -
Contractual	\$ 45,400.00	\$ 45,400.00	\$ -	\$ -
Other			\$ -	\$ -
Subtotal	\$ 45,400.00	\$ 45,400.00	\$ -	\$ -
Indirect Costs		\$ -	\$ -	\$ -
Totals	\$ 45,400.00	\$ 45,400.00	\$ -	\$ -

	Current Local Budget	Billed to Date	Obligated* Local Budget	Remaining Local Budget
Personnel		\$ -	\$ -	\$ -
Fringe		\$ -	\$ -	\$ -
Travel		\$ -	\$ -	\$ -
Supplies		\$ -	\$ -	\$ -
Equipment	\$ -	\$ -	\$ -	\$ -
Contractual	\$ -	\$ -	\$ -	\$ -
Other	\$ 2,000.00	\$ 2,000.00	\$ -	\$ -
Subtotal	\$ 2,000.00	\$ 2,000.00	\$ -	\$ -
Indirect Costs		\$ -	\$ -	\$ -
Totals	\$ 2,000.00	\$ 2,000.00	\$ -	\$ -

	Current 3rd Party Budget	Billed to Date	Obligated* 3rd Party Budget	Remaining 3rd Party Budget
Personnel	\$ -	\$ -	\$ -	\$ -
Fringe	\$ -	\$ -	\$ -	\$ -
Travel	\$ -	\$ -	\$ -	\$ -
Supplies	\$ -	\$ -	\$ -	\$ -
Equipment	\$ -	\$ -	\$ -	\$ -
Contractual	\$ -	\$ -	\$ -	\$ -
Other	\$ 47,000.00	\$ 47,265.77	\$ -	\$ (265.77)
Subtotal	\$ 47,000.00	\$ 47,265.77	\$ -	\$ (265.77)
Indirect Costs	\$ -	\$ -	\$ -	\$ -