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Photo: Greg McFall



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# Sea Turtle Sprint

## ROV Workshop, Competition and STEM Career Expo

### An Innovative Technology Experience for Students and Teachers (ITEST)

Gray's Reef National Marine Sanctuary is pleased to offer 10 local middle school educators and 100 of their students the opportunity to participate in a remotely operated vehicle (ROV) design and building workshop and competition in the first ever *Sea Turtle Sprint and STEM Career Expo*.

The objective of the program is to build the infrastructure for an entry-level ROV competition class to participate in our regional event by providing professional development and student support workshops as well to increase ocean awareness through ROV-focused science, technology, engineering and mathematics (STEM) curriculum materials. Workshop participants learn to build and pilot a remotely operated vehicle then race their flying 'sea turtle' submersibles in the pool around man-made obstacles and natural threats to reach the safety of the reef.

Local universities and organizations offering STEM education programs and careers will be hosting booths to increase ocean STEM awareness and present trajectories to those careers for middle and high school audiences.

### Schedule of Events

The workshops will take place every Thursday beginning January 19<sup>th</sup> through February 9<sup>th</sup> from 5pm - 8pm at the West Broad Street YMCA. All materials will be provided, along with food and refreshments for participants.

The culminating Sea Turtle Sprint competition will be held on Saturday, February 25<sup>th</sup> from 10am- 2pm with teams racing against a clock to successfully pilot their ROV 'sea turtle' to the safety of the reef.

### Field Trip!

If that doesn't sound fun enough, workshop participants will also be invited to tour the French research vessel *TARA* which will be docked on River Street Saturday, January 21<sup>st</sup>. Meet the research team and find out about their 2.5 year expedition around the world! Transportation will be provided.

### Sponsorship

Support for this project was provided by the Marine Advanced Technology Education (MATE) Center and the National Science Foundation in partnership with NOAA Gray's Reef National Marine Sanctuary. Special thanks to Savannah Chatham County Public School System, Georgia Technical College-Savannah Campus, West Broad Street YMCA and the TARA OCEAN expedition.

Find out more about our sponsors and partners by visiting their websites:

<http://www.marinetech.org/>

<http://www.nsf.gov/>

<http://www.westbroadstreetymca.org/>

<http://oceans.taraexpeditions.org/>

<http://savannah.gatech.edu/>

## STANDARDS FOR MIDDLE GRADES TEACHERS WORKING ON THE ROV WORKSHOP

The following are a list of applicable GPS Standards for middle grades science instruction. Teachers who participate in the ROV Workshop will be exposed to these standards and will learn modeling techniques, inquiry instruction opportunities and discovery instruction strategies for use in their own classroom.

### Sixth Grade:

**S6CS3. Students will use computation and estimation skills necessary for analyzing data and following scientific explanations.**

- Analyze scientific data by using, interpreting, and comparing numbers in several equivalent forms, such as integers and decimals.
- Use metric input units (such as seconds, meters, or grams per milliliter) of scientific calculations to determine the proper unit for expressing the answer.
- Address the relationship between accuracy and precision and the importance of each.
- Draw conclusions based on analyzed data.

**S6CS4. Students will use tools and instruments for observing, measuring, and manipulating equipment and materials in scientific activities.**

- Use appropriate technology to store and retrieve scientific information in topical, alphabetical, numerical, and keyword files, and create simple files.
- Estimate the effect of making a change in one part of a system on the system as a whole.
- Read analog and digital meters on instruments used to make direct measurements of length, volume, weight, elapsed time, rates, and temperature, and choose appropriate units for reporting various quantities.

**S6CS5. Students will use the ideas of system, model, change, and scale in exploring scientific and technological matters.**

- Identify several different models (such as physical replicas, pictures, and analogies) that could be used to represent the same thing, and evaluate their usefulness, taking into account such things as the model's purpose and complexity.

**S6CS6. Students will communicate scientific ideas and activities clearly.**

- Write clear, step-by-step instructions for conducting scientific investigations, operating a piece of equipment, or following a procedure.

**S6E3. Students will recognize the significant role of water in earth processes.**

- Explain that a large portion of the Earth's surface is water, consisting of oceans, rivers, lakes, underground water, and ice.
- Describe the composition, location, and subsurface topography of the world's oceans.

### Seventh Grade:

**S7L4. Students will examine the dependence of organisms on one another and their environments.**

- Explain in a food web that sunlight is the source of energy and that this energy moves from organism to organism.
- Recognize that changes in environmental conditions can affect the survival of both individuals and entire species.
- Categorize relationships between organisms that are competitive or mutually beneficial.
- Describe the characteristics of Earth's major terrestrial biomes (i.e. tropical rain forest, savannah, temperate, desert, taiga, tundra, and mountain) and aquatic communities (i.e. freshwater, estuaries, and marine).

### Eighth Grade:

Teachers will be exposed to the following ideas and will learn to model these ideas in inquiry instruction:

**S8CS2. Students will use standard safety practices for all classroom laboratory and field investigations.**

- Follow correct procedures for use of scientific apparatus.
- Demonstrate appropriate techniques in all laboratory situations.
- Follow correct protocol for identifying and reporting safety problems and violations

**S8CS5. Students will use the ideas of system, model, change, and scale in exploring scientific and technological matters.**

- Observe and explain how parts can be related to other parts in a system such as the role of simple machines in complex machines.
- Understand that different models (such as physical replicas, pictures, and analogies) can be used to represent the same thing.

**S8P3. Students will investigate relationship between force, mass, and the motion of objects.**

- Determine the relationship between velocity and acceleration.
- Demonstrate the effect of simple machines (lever, inclined plane, pulley, wedge, screw, and wheel and axle) on work.

### Eighth Grade Research Standards:

**S8SR1. Students will synthesize science content through standard science research protocols in earth, life, and physical science.**

- Determine appropriate research approaches to specific research problems in earth, life, and physical science.

**S8SR2. Students will investigate an accessible scientific research problem in earth, life, or physical science.**

- Establish a research question from the middle school earth, life, or physical science GPS content.
- Establish an appropriate research protocol for investigating the question, from within the science content of earth, life, and physical science.

**S8SR4. Students will appropriately employ instrumentation and apply technological analysis to the accessible research question within earth, life, or physical science content.**

- Understand applicable data collection and analysis techniques for studying aspects of the system in question.
- Establish systematic and appropriate data collection techniques (encourage using appropriate computer technology and/or remote sensing probe) appropriate to the science content.
- Record data using appropriate technology.
- Analyze data using appropriate technology.