

Homeport



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A staff of eight persons is responsible for the daily operations of the sanctuary. A graduate student research assistant from Savannah State University and the regional associate science coordinator assist in research.

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Where We Live

Gray's Reef National Marine Sanctuary is about 16 miles east of Sapelo Island Georgia, in the South Atlantic Bight on an area of the continental shelf where temperate and tropical waters mingle west of the Gulf Stream. Other nearby features include the Charleston Bump and deep water *Oculina* coral outcroppings. The 22 square miles (approximately 14,000 acres) of Gray's Reef is just a tiny part of the vast Atlantic Ocean, yet it is linked to a much bigger region. Gray's Reef is part of the Office of National Marine Sanctuary's Southeast Atlantic, Gulf of Mexico and Caribbean Region which also includes the Florida Keys and Flower Garden Banks National Marine Sanctuaries. Because of Gray's Reef's unique location at the intersection of temperate and tropical waters, the sanctuary serves as a sentential point for various monitoring programs of the Office of National Marine Sanctuaries.

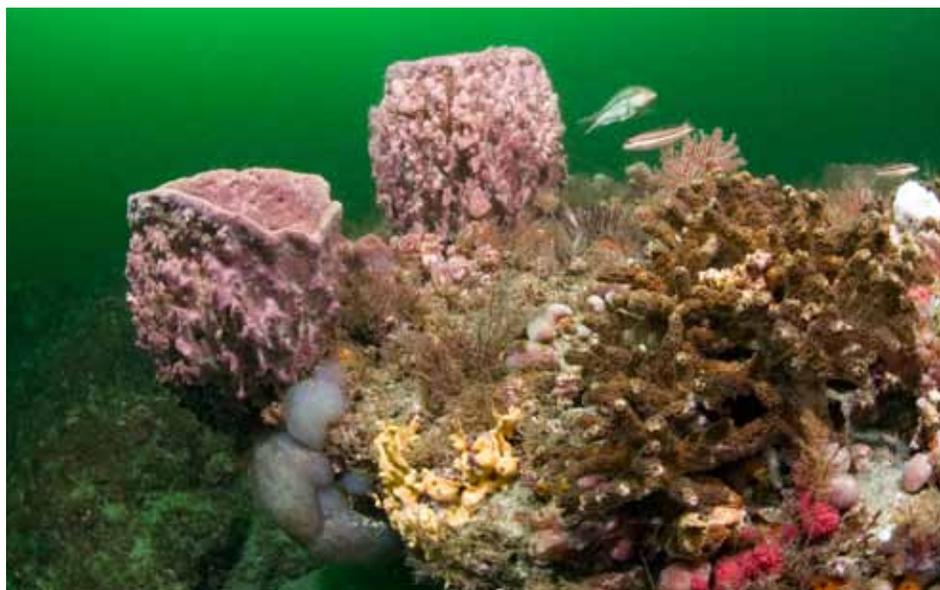
Our administrative offices are on the campus of the Skidaway Institute of Oceanography, an independent unit of the University System of Georgia. This location enhances our ability to work in partnership with a variety of educational and research institutions.

Vessels

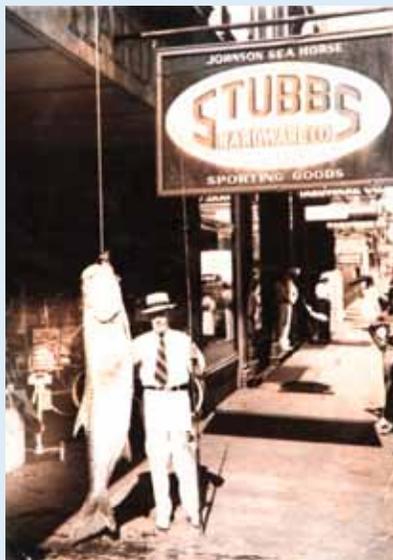
In 2010 Gray's Reef operated two vessels: the 41-foot catamaran R/V *Joe Ferguson* and the 33-foot R/V *Sam Gray*. Both the *Joe Ferguson* and the *Sam Gray* were used for research and monitoring, dive operations, education and outreach, as well as in support of a variety of activities for our research and academic partners. For the fiscal year of 2010, sanctuary vessels and staff spent 70 days on the water; for calendar year 2010, 64 days were spent on the water.

Sanctuary Greening

Two walk-through audits were conducted in March 2010 by staff of the Center for Sustainability at Georgia Southern University and the results were reported to the sanctuary in December. The sanctuary office and staff received high marks for recycling, use of task lighting in individual offices and water conservation. Improvements should be made, according to the audit report, in reducing lighting in general use areas like the halls and kitchen, reducing use of fans and space heaters and reducing the use of copy paper.



Community Involvement & Partnerships



Heritage

Sanctuary staff and volunteers are compiling a filmed oral history archive of recreational fishing along the coast. Recreational anglers, commercial fishermen, fish merchants and wholesalers, shrimpers and boat captains are being interviewed with a special emphasis on individuals in traditional African-American Gullah-Geechee island communities. Old photographs of recreational and commercial catches are being archived and old catch records reviewed. The goal of the project, funded by a NOAA Preserve America initiative, is to determine if there has been a "shifting baseline" in how today's recreational anglers view fish populations as well as to capture the flavor of a culture gone by.

The film, photo and audio collection will be featured on the sanctuary website when complete and may be part of a joint Gray's Reef-Sapelo Island National Estuarine Research Reserve Exhibit.

Volunteers

Public involvement with Gray's Reef is at an all-time high, with sanctuary volunteers clocking in 2,601 hours for 2010. Volunteer opportunities range from Team Ocean volunteer divers, ocean film festival support, to fishing for bait and for gag and snapper to tag during research expeditions. Gray's Reef was the first NOAA office to promote stewardship volunteer activities through volunteer.gov. The website featured Gray's Reef Ocean Film Festival as a volunteer opportunity on its home page.

Sanctuary staff continues to encourage volunteer participation in the sanctuary both at events and through citizen-conducted science. Citizen scientists can use on-line forms from the sanctuary website to report data on everything from lionfish to whales to sea birds.

Sanctuary Advisory Council

Gray's Reef has a Sanctuary Advisory Council, which, through its members, serves as a liaison to the community from the sanctuary and represents community interests and concerns that can be communicated back to the sanctuary staff through Council meetings. Council members represent research, education, recreational fishing and diving, commercial and charter fishing, state and federal government, law enforcement and conservation partners among others.

In 2010, the council continued its commitment to make itself more available to its constituents and the public by holding its quarterly meetings in a variety of locations up and down the Georgia coast to extend their meetings into the region to gather public comments. The council meetings include regular presentations from sanctuary program staff on current science, education and outreach activities. Resource protection initiatives are reviewed during council meetings providing an opportunity for council and public comment.

Looking Ahead: Sanctuary Advisory Council

In May 2011, Gray's Reef will host the annual National Sanctuary Advisory Council Summit in Savannah. Each year the Office of National Marine Sanctuaries brings the leaders of all sanctuary communities together in a national forum to learn from each other and to expand council efforts.



Resource Protection



Looking Ahead: Management Plan Review

In 2011, Gray's Reef will begin its next management plan review. The first such review was completed in 2006. These plans are sanctuary specific documents that: summarize existing programs and regulations; guide preparation of annual operating plans; articulate visions, goals, objectives and priorities; guide management decision-making; guide future project planning; ensure public involvement in management processes; and contribute to the attainment of system goals and objectives.

Public participation in the planning and review process is a priority.

One of the steps will be a Knowledge Attitudes and Perceptions (KAP) survey for Gray's Reef. The survey may be approved and ready to begin sometime in early 2011. A follow-up survey of the economic effects of the spearfishing prohibition put in place in 2010 and proposed research area will follow in a few years.

Spearfishing Ban Effective in Gray's Reef

A rule prohibiting all spearfishing gear in Gray's Reef became effective in March 2010. The prohibition is expected to provide protection for reef-dwelling fish species in sanctuary waters like gag and scamp and to provide protection for the natural live-bottom community for which the sanctuary was designated. The final rule also facilitates enforcement of an existing prohibition against the use of powerheads within the sanctuary. Boaters with spearfishing gear in their vessels are allowed to travel through the sanctuary without stopping if the gear is stowed and not available for use.

A spearfishing ban was considered during the 1981 designation of the sanctuary and raised again during the sanctuary's management plan review in the early 2000s. Public comments were collected in spring 2009 on the proposed rule, including those received at a public hearing held in March 2009.

North Atlantic right whale recovery

These highly endangered whales are seen in and around Gray's Reef. In 2010 the sanctuary continued to participate in the North Atlantic Right Whale Recovery Plan Southeast U.S. Implementation Team. The team held a public forum to announce findings from the 2010 summer field season that included the final tally of 19 calves and the interesting new event of seven adult males that showed up

along with the pregnant females and juveniles. Possible expansion of the right whale critical habitat area was also discussed; one version of the possible expansion plans includes Gray's Reef. The Implementation Team plans to continue aerial surveys through the 2010-2011 winter calving season to report locations of mother/calf pairs and to broadcast those locations to ships to help them avert potential collisions.

Education and outreach to recreational vessels will be increased in response to the prior season's high number of smaller vessels impacting mothers and their calves during this critical time. Gray's Reef staff stepped up outreach efforts to support right whale recovery. Right whale information has been posted on our website and on our Facebook page. Staff also distributed laminated right whale information cards to charter boat captains and marinas. Recreational boaters as well as surfers and kayakers need to be aware of the federal rule that limits approach to outside of 500 yards. Since these whales are perhaps the most endangered great whales in the world every precaution must be taken to ensure their safety and well being especially during their migrations to and from and while in their critical calving grounds.

Law Enforcement

Gray's Reef staff and law enforcement partners (US Coast Guard, NOAA Office of Law Enforcement, and Georgia Department of Natural Resources) meet regularly to discuss the status of compliance and enforcement in the sanctuary. Overall, it appears that compliance with sanctuary regulations is good.



Science & Exploration



Research Area

In October, Gray's Reef held three public meetings to take comments on the Proposed Rule for a research area within the sanctuary. Sanctuary staff was available to receive comments at the meetings, by U. S. mail, email and via the Federal eRulemaking Portal <http://www.regulations.gov>. The comment period began in September and ended December 13 with a total of eight comments received. All comments were received through the eRulemaking portal. There was no attendance at any of the three public meetings. Gray's Reef staff will now develop responses to the comments and revise the research and monitoring action plan toward a Final EIS and Final Rule.

A research area is a region specifically designed for conducting controlled scientific studies in the absence of certain human activities that could affect the results. NOAA believes a research area will help managers more accurately assess possible impacts from fishing — particularly bottom fishing — on the sanctuary's natural resources by providing an area relatively free of human activities and impacts that can be compared to the rest of the sanctuary. The research area would also allow scientists to assess the impact of natural events such as hurricanes and droughts on the sanctuary, and it could serve as a place to monitor and study impacts of climate change such as ocean acidification.

NOAA proposes to prohibit fishing, diving, and stopping while transiting in the research area. The proposed boundary — encompassing 8.27 square miles, roughly the southern third of the sanctuary — is an area of lighter vessel traffic and fishing effort, but contains all habitats needed to conduct research.

Fish Tagging Project & More

The sanctuary's annual research cruise aboard the NOAA ship *Nancy Foster* continued Gray's Reef's exploration of how shallow reef systems sustain reef fish and the other life forms they support. During the 10-day cruise — where work was done 24 hours a day — 25 fish were caught, tagged with acoustic transmitters and released (three red snapper, four scamp and 18 gag grouper). This project allows acoustically-tagged fish to be detected with acoustic receivers as the fish move about the sanctuary on daily, seasonal or annual migrations. The research will help us determine the most important habitats and locations for reef fish, and will tell us how their movements relate to boundaries that are established to protect them. New acoustic receiver sites were established and 13 existing receiver arrays were serviced and downloaded. There are now a total of 41 tagged fish and 21 receiver sites. Divers conducted habitat surveys at five acoustic receiver sites to describe habitat preferences of the fish detected at each receiver. During the cruise, divers conducted 75 dives and spent over 26 hours underwater on the fish tagging and other projects.

Additional projects included marine debris monitoring that was completed at eight sites where divers counted and removed fishing tackle, litter and other man-made debris from the reef. Carbon dioxide (CO₂) sensors were deployed on the seafloor and on the Gray's Reef data buoy and an underway CO₂ system collected samples during entire cruise. At night, scientists continued a multi-year multibeam sonar mapping effort to characterize habitats to the east and north of the sanctuary.

More than 45 volunteers assisted with seven days of fishing to catch fish for tagging. Fishing was conducted from three vessels: the Georgia DNR's R/V *Marguerite* and Gray's Reef's R/V *Joe Ferguson* and R/V *Sam Gray*. The entire cruise operation involved more than 70 individuals representing 14 institutions and agencies. After the successful first leg, the *Foster* was called to duty to support oil spill efforts in the Gulf of Mexico.

Benthic-Pelagic Coupling

Research partners at Gray's Reef have spent three years investigating the role of surface and mid-water fish predators (such as king mackerel and greater amberjack), the responses of prey fish, and linkages to feeding rates and population processes of large reef predators like snappers and grouper that feed on or near the bottom. They are looking at links between pelagic and bottom fish through their feeding behavior so as to better understand the possible impact of fishing of both communities on the reef ecosystem, and the management actions that such impacts might require.

This year, research partners were able to quantify variation in space and time of the abundance of schooling prey and mid-water predators at mid-shelf reefs. They were also able to quantify rates of prey retreat to seafloor shelter by using time series observations at specific station locations using stationary Didson high frequency sonar. The Didson system uses sound waves to detect fish, and was deployed using the sanctuary's R/V *Joe Ferguson* on the seafloor overnight. Divers were also able to quantify behavior, location and rates of predation (attacks, captures) by bottom-dwelling piscivores.



CO₂ Seafloor Observatory

In an ongoing effort to conduct long term monitoring of potential climate change effects at Gray's Reef, an ocean acidification seafloor observatory has been created and installed in the sanctuary by a university research partner. The observatory records data in conjunction with the National Data Buoy Center (NDBC) and the Pacific Marine Environmental Lab (PMEL) buoy. The surface buoy monitors percentage of CO₂ (pCO₂) in the air/sea interface in addition to many other physical oceanographic and atmospheric parameters. The sensors installed on the seafloor record pH (a measure of acidity), temperature, salinity, dissolved oxygen, turbidity and pCO₂. By monitoring these parameters and collecting long-term baseline data, Gray's Reef will be better able to detect changes in the ocean's acidity caused by increased dissolved CO₂ at the reef should they begin to occur.

Fossil Finds

University partners continue to discover bones and bone fragments from an extinct Atlantic gray whale at a research site near Gray's Reef. A fossil mandible dated at 36,000 years old was found in 2009. This year, research divers spotted and recovered another large segment of a different jaw bone. Casts of the bones are being made by the Smithsonian National Museum of Natural History. When complete, the casts will be displayed in Atlanta, Athens, Skidaway Island and at the Smithsonian in Washington, DC. It is estimated that the bone is the oldest of its kind found off the entire east coast.

Gray's Reef scientists participate in research beyond the sanctuary's boundaries as it relates back to issues challenging the management of the marine environment. Sanctuary staff participated in the Census of Marine Life Program and the project's final symposium. The program produced a marine biodiversity summary for the U. S., published on PLoS One <http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0011914> The Committee continues to

work with NOAA and USGS to update the Ocean Biogeographic Information System database iobis.org/OBISWEB/OBIS.jsp.

The Census was a 10-year project aimed at documenting biodiversity throughout the world oceans, using exploration (over 900 days at sea) and existing databases. The Census in the U. S. included data from National Marine Sanctuaries and NOAA Fisheries surveys, as well as new surveys, museum collections, and marine animal tagging projects.

Sanctuary staff also participated in a research cruise to explore deepwater coral sites off of South Carolina and Georgia. The cruise was a joint effort of the NOAA's National Ocean Service and NOAA's National Marine Fisheries Service, and was aimed at mapping deepwater (from 600 - 900 ft.) coral habitats that support important fishery species like snowy grouper, blueline tilefish and wreckfish on deep coral banks east and northeast of Gray's Reef. The cruise obtained video and still images of many invertebrate and fish species, including a new species of wrasse and a spawning aggregation of sea urchins.

Papers & Projects

Following are 2010 papers, posters and publications relevant to Grays's Reef and surrounding waters:

- Bauer, L. J., M. S. Kendall, and G. McFall. 2010. Assessment and monitoring of marine debris in Gray's Reef National Marine Sanctuary. Prepared by National Centers for Coastal Ocean Science (NCCOS) Biogeography Branch and Gray's Reef National Marine Sanctuary (GRNMS). Silver Spring, MD. NOAA Technical Memorandum NOS NCCOS 113. 40 pp.
- Fautin, D., P. Dalton, L. S. Incze, J-A. C. Leong, C. Pautzke, A. Rosenberg, P. Sandifer, G. Sedberry, J. W. Tunnell Jr., I. Abbott, R. E. Brainard, M. Brodeur, L. G. Eldredge, M. Feldman, F. Moretzsohn, P. S. Vroom, M. Wainstein and N. Wolff. 2010. An overview of marine biodiversity in U.S. waters. *PLoS ONE* 5(8):e11914. doi:10.1371/journal.pone.0011914.
- Freeman, C. J., and D. J. Gleason. 2010. Chemical defenses, nutritional quality, and structural components in three sponge species: *Ircinia felix*, *I. campana*, and *Aplysina fulva*. *Marine Biology*. 157. 11pp.
- Glasgow, D. M. Photographic evidence of temporal and spatial variation in hard bottom habitat and associated biota of the southeastern U.S. Atlantic continental shelf. M. S. Thesis, College of Charleston. 113pp.
- Gleason, D. J., New Stresses, New Strategies: Managing Marine Protected Areas in an Age of Global Environmental Change. 2010. *The Journal of Marine Education*. 26:2. 7pp.
- Goldman, S. F. and G. R. Sedberry. 2011. Feeding habits of some demersal fish on the Charleston Bump off the southeastern United States. *ICES Journal of Marine Science* 68(2):390–398. doi:10.1093/icesjms/fsq064.
- Pawson, D. L., G. R. Sedberry, S. T. DeVictor and D. J. Pawson. 2010. Images of echinoderms from 200 meters, off South Carolina, USA: Some sidelights on seasonal cidaroid sex in the sea. 7th European Conference on Echinoderms 2010 Goettingen. Poster.
- Sedberry, G. 2010. Icebergs off the southeast coast. *Waterside News* 2(9).
- Steve Kokkinakis, NOAA Fisheries' David Keys, and Gray's Reef Research Protection Coordinator Becky Shortland submitted "NOAA in the 21st Century" for inclusion in the proceedings of the National Association of Environmental Professionals (NAEP) Conference.
- Gray's Reef Graduate Research Assistant, C. J. Carroll, presented a poster "Acoustic telemetry used to track red snapper, gag grouper, red grouper, and scamp grouper in Gray's Reef National Marine Sanctuary" at the Benthic Ecology Meeting with coauthors Sarah Fangman, Greg McFall, Matt Kendall, and Matt Ogburn.
- Carroll also successfully defended her thesis, "Using Acoustic Telemetry to Track Red Snapper, Gag, and Scamp at Gray's Reef National Marine Sanctuary", at Savannah State University.

Outreach & Education



Building & Testing ROVs

Staff works with students and teachers to build remotely operated vehicles, ROVs. The building workshop is sponsored by Gray's Reef and the Savannah Science Seminar program; another nine-hour ROV Building Workshop for Educators is held at the Georgia Aquarium in Atlanta. Teachers learn to teach their students to build ROVs and will hopefully participate in the annual Gray's Reef Southeast Regional ROV Competition. These workshops help participants understand ocean science technology used in research and exploration within NOAA and sanctuaries and specifically Gray's Reef. The workshops and competition address numerous Georgia Performance Standards that are based on National Science Education Standards.

Translating Science

Gray's Reef outreach and education staff translate current Gray's Reef research for: 1) the general public in order to enhance their understanding of the sanctuary and of the marine environment upon which we all depend; and 2) for formal and informal educators so they can share it with their students. The goal of both efforts is to enhance marine science understanding for all and to foster sustainable behaviors that will ensure the health of our ocean and specifically Gray's Reef.

During our annual research cruise to the sanctuary, local and regional media, bloggers and filmmakers were invited to visit the NOAA Ship *Nancy Foster* to interview and photograph scientists working on the acoustic fish tagging project, the study of predator/prey interactions on the reef, and other dive operations.

Outreach efforts during the cruise included two media days and an expedition page on the ONMS web site: http://sanctuaries.noaa.gov/missions/2010nancy_foster/welcome.html. Education efforts were addressed by a Gray's Reef's summer education intern and NOAA Hollings Scholar who wrote a log that was posted daily and archived on our website. The logs were sent to our education listserve. Two

documentaries were shot during the cruise and several print, electronic and broadcast stories resulted from media outreach efforts. An Open House took place aboard the ship on Memorial Day and drew more than 290 people who toured the ship and spoke with scientists and crew members.

The revised Gray's Reef website is now up and running after several years of effort on the part of site and headquarters staff and improvements are on-going. Staff uses the social media outlets of Facebook and Twitter to reach an even wider audience and to direct them back to the website for more information. A newsletter of announcements, opportunities and information was also posted on our website after being distributed every two weeks to our listserve of approximately 3000 educators throughout the southeast and other states.

Gray's Reef exhibits at our exhibit partners have been revised during the past five years. Now the last one, at the Sapelo Island Estuarine Research Reserve, will be revised to demonstrate the paleontological, geographic, cultural and institutional connections between the two sites. Exhibits on right whales, marine debris, over fishing and climate change at the Georgia Aquarium are also in the final stages of development and installation.



Ocean Film Festival Wrap

About 4,000 people attended the annual film festival, where they saw premiers of National Geographic films, other international productions, and the work of local student filmmakers.

More than 40 films were viewed through the course of the three-day festival; more than 300 students attended a special Saturday morning screening honoring the marine science program at Thunderbolt Elementary; more than a dozen filmmakers and speakers attended; and 24 volunteers (including our panel of community-based judges), the most volunteer supporters to date, made it all work.

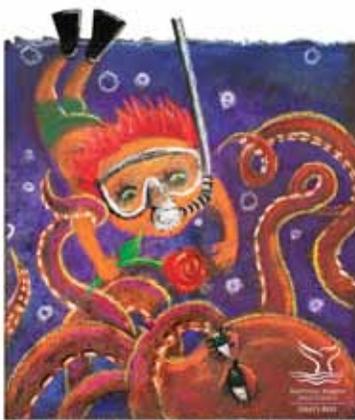
The festival was crafted to focus on films about the Gulf Coast region, an area of special interest in light of the Deepwater Horizon oil spill.

The Gray's Reef Ocean Film Festival remains a free festival with the mission to "To educate, inspire and enlighten coastal Georgia residents about the world's oceans and the issues facing them. We use films to explore the beauty of the sea, the complexity of the marine ecosystem, the creatures that inhabit it, our maritime heritage and humankind's relationship with the oceans and the environment in a positive, healthy, family-oriented format."

During the same week, 27 inaugural board members of the newly formed Savannah Ocean Exchange (a nonprofit whose aim is to promote the sustainability of the ocean) met and agreed on its theme for 2011 events. The 2011 Savannah Ocean Exchange will invite experts to propose solutions to coast-related problems.

Ocean Film Festival | 2010

17-19 September 2010 • Trustees Theater • Savannah • Georgia



Outreach Events

Gray's Reef participates in several ocean-themed events with our various partners including the Savannah International Boat Show; CoastFest and Beach Week with the Coastal Resources Division of the Georgia Department of Natural Resources; Marine Science Day with the Skidaway Institute of Oceanography and Earth Day with the City of Savannah among others. Events are added to and subtracted from the schedule as staff and volunteer time permits with an eye toward how and where we can best get our messages to stakeholders and the general public.

This year's events included a celebration of Jacques Cousteau's 100th birthday. Gray's Reef sponsored free admission to the University of Georgia Marine Extension Service aquarium where visitors got a good introduction to local marine life. Film clips of Gray's Reef were shown and visitors spent time at the aquarium tank devoted to explaining the sanctuary fish tagging project as well as visiting the diorama depicting Gray's Reef. Visitors and staff sang "Happy Birthday" to Jacques and a large cake was cut and eaten by the crowd.

Some of our most popular outreach events are our annual participation in the Savannah College of Art and Design's Sidewalk Arts Festival and Sand Arts Festivals. Some 700 artists compete for the Gray's Reef Fantastic Fishes Award and the Gray's Reef Sea Creatures Award at the festivals. The art festivals draw thousands to view the artwork and provide a way to get people—some of whom may not spend much time thinking about the ocean—to relate to the marine environment as a source of inspiration.

Teaching the Teachers

Two Rivers to Reef educator workshops and several educator cruises were conducted in 2010. The Rivers to Reef workshops, conducted in conjunction with the Georgia Aquarium, follow the Altamaha River watershed from where it begins in Atlanta to where the river meets the sea at the coast and offshore to Gray's Reef National Marine Sanctuary.

Each participant completes water quality profiles at ten stations that include tests for pH, conductivity, phosphorous, nitrogen and dissolved oxygen. Participants deploy

Niskin bottles, Secchi disks, plankton tows and trawl and cast nets. They experience the watershed by canoeing, trawling from small boats, crawling through a marsh and walking a beach at night and they hear from numerous presenters who live in and work with a particular link in the watershed. Each teacher is to develop lessons based on their experiences which are posted to websites for other educators to use.

The workshops help participants connect land to sea and help them understand that they directly impact their own watersheds. Current research projects conducted at Gray's Reef including water quality monitoring and acoustic fish tagging are presented as are the current challenges of over fishing, marine debris and climate change. The Gray's Reef Educator Cruises, conducted as staff and vessel time allows, are half-day versions of the bigger workshops. The workshops and cruises address numerous Georgia Performance Standards that are based on National Science Education Standards.

Student Workshop & Summit

Two programs conducted by Gray's Reef education staff this past summer with two different sets of partners reached program key target audiences of middle school grade females and minority students. The National Association of Black Scuba Divers Youth Education Summit was coordinated and conducted by Gray's Reef staff and intern out of Key Largo with partners at Florida Keys NMS. The main topic of the Summit was coral reef ecology with marine debris, marine underwater archaeology, over fishing and climate change also covered. Thirty-five students (aged 10 – 18) and 15 adults from across the nation all of African-American heritage participated in the six-day Summit.

A five-day ocean science and technology workshop targeted to middle school females was conducted by Gray's Reef education staff with partners at University of Georgia Marine Extension Service and Aquarium. Each day the 15 girls received an overview of the topic of the day and then participated in a field trip that helped them understand through hands-on experiences what it takes for ocean science researchers and explorers to do their work. Each afternoon the girls worked on ROVs that on the last day were tested in the campus pool.