



NOAA Reef Smart— A Coral Reef Ecosystem Education Initiative

A Summary of Results and Outcomes from NOAA
Reef Smart Puerto Rico (2012)

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INTRODUCTION

Description and Goals

NOAA Reef Smart—A Coral Reef Ecosystem Education Initiative (Figure 1) is a series of strategic community-based outreach activities that are designed to engage students, teachers, managers, partners, stakeholders, and policy and decision-makers to increase awareness of coral reef ecosystem research and conservation stories from across the Coral Reef Conservation Program - and from local agency and NGO partners. Reef Smart is a flexible communication vehicle intended to highlight jurisdictional-level coral reef ecosystem conservation and management stories with the guidance and consultation of on-the-ground partners (e.g., Coral Program management and fisheries liaisons). The ultimate goal of NOAA Reef Smart is to improve coral reef ecosystem conservation through grass roots education and messaging.



Figure 1: The NOAA Reef Smart logo was created to increase the initiative's brand recognition.

Credit: Zhe Liu

NOAA Reef Smart 2012 events took place in San Juan, Puerto Rico aboard the NOAA Ship Nancy Foster during a National Centers for Coastal Oceans Science (NCCOS) and Coral Program mapping mission in the North East Ecological Corridor Great Reserve, a recently established marine protected area. The following hands-on demonstrations offered the opportunity for face-to-face interaction between NOAA NCCOS and Coral Program leadership and key target audience members from Puerto Rico and the U.S. Virgin Islands:

1. Reef Smart Day at Sea for Policy and Decision Makers, April 13, 2012 - 10:00 a.m. to 2:30 p.m.;
2. Be Reef Smart! Interactive Q&A Skype sessions with Maryland students; and a Kid's Day for local invited middle and high school students and teachers held on April 21, 2012 - 9:00 a.m. to 12:00 p.m.); followed by
3. Reef Smart Open House for invited coral reef ecosystem managers and researchers, April 21, 2012 - 1:00 p.m. to 3:30 p.m.

Additionally, Reef Smart Puerto Rico included: a media strategy designed to target local and national-level press; a daily blog featuring in-depth reports on the day-to-day outcomes of the mapping mission, as well as human dimension stories, written by mission scientists; and two interactive, hour-long question and answer sessions with the chief scientists and elementary schools in Maryland.

Team Members

The Reef Smart team consisted of NCCOS Center for Coastal Monitoring and Assessment (CCMA) Biogeography Branch and Coral Program staff with skills in a range of fields, including: communications, science education, social science, policy analysis, oceanography and marine biology. Core team members, and their roles in the project, are outlined below:

- Alicia Clarke (NCCOS CCMA Biogeography), Reef Smart project lead responsible for coordinating and overseeing all aspects of the initiative.
- Jon Corsiglia (Coral Program), Reef Smart co-lead responsible for coordinating and overseeing all aspects of the initiative.
- Antares Ramos Álvarez (Coral Program), Puerto Rico management liaison responsible for identifying key audience members (i.e., managers and policy and decision makers), assistance with coordinating Reef Smart Day at Sea and Manager/Academic open house, as well as blogging during the mission.
- Tracy Gill (NCCOS CCMA Biogeography), responsible for co-coordinating Be Reef Smart! Kid's Day activities. Duties included: reaching out to students, teachers and translators from Puerto Rico; collecting and providing educational materials for teachers and students; teaching the coral reef ecosystem class during Kid's Day; and blogging. Also provided notes for manager's open house.
- Shannon Simpson (Coral Program), responsible for assisting with the coordination of Reef Smart Day at Sea. Duties included identifying guests, coordinating speakers and presentation content; and blogging.
- Theresa Goedeke (NCCOS CCMA Biogeography) responsible for developing the Reef Smart Day at Sea participant evaluation survey. Duties included: developing survey questions and design, shepherding through the Office of Management and Budget clearance process, analysis of responses and summarizing survey results.

NOAA Reef Smart was also supported by many additional people, both within NOAA and from local partnering agencies, not on the core team. They include: Tim Battista (mapping mission chief scientist), Chris Caldwell, Damaris Delgado Lopez, Astrid Green Caceres, Helena Antoun Kucerova, Paulo Maurin, Chris Taylor, Erik Ebert, Laura Kracker, Lance Horn, Glenn Taylor, Graciela Garcia-Moliner, Keeley Belva, David L. Hall, Ricardo.D.Castrodad, Rich Appeldoorn, Ernesto Diaz, Miguel Canals, Humberto Figueroa, Jeanine Montgomery, Rebecca Wynne, Sara Eckert, Will Sautter, Gustav Kagesten, Zhe Liu and the crew of the NOAA Ship Nancy Foster.

The Reef Smart Initiative was funded by the Coral Reef Conservation Program and led jointly by staff at the Coral Program and NCCOS Center for Coastal Monitoring and Assessment Biogeography Branch. Additional partners include: Puerto Rico Department of Natural and Environmental Resources and Consolidated Safety Services-Dynamac.

Time line

NOAA Reef Smart was funded in FY12. Work began in December 2011 with team coordination meetings, initial event planning and conversations on the Day at Sea participant survey. The in-field components of Reef Smart began with the start of the mapping mission, April 3, 2012, and concluded on April 21, 2012. Primary in-field events occurred on April 13 and 21, 2012.

ACTIVITIES AND RESULTS

Day at Sea for Policy and Decision Makers

The four-hour long event consisted of several presentations by scientists and local managers, a ship tour and equipment demonstrations. Unfortunately, due to technical difficulties the remotely operated vehicle deployment was cancelled at the last minute.

A total of 13 representatives from the governments of Puerto Rico and the U.S. Virgin Islands, as well as leadership from the U.S. Coast Guard Sector San Juan participated in the Day at Sea for policy and decision makers (Figure 2). A full list of attendees follows:

1. Alicia Barnes, U.S. Virgin Islands Department of Planning and Natural Resources Commissioner
2. Maria Teresa Carro, Counsel for Pedro Pierluisi, Resident Commissioner of Puerto Rico¹
3. Jose R. Diaz Marrero, advisor to Puerto Rico Speaker of the House of Representatives Jennifer A. Gonzales Colon
4. Daniel Galán Kercadó, Secretary of Puerto Rico Department of Natural and Environmental Resources¹
5. Johanna Vasquez, assistant to Secretary Galan¹
6. Priscila García, Environment Office, Puerto Rico Aqueduct and Sewer Authority
7. CDR James Sutton, Sector San Juan Chief of Response Operations
8. LTJG Adam Skordinski, Sector San Juan Living Marine Resources Officer
9. LCDR Kurt Michaelis, Sector San Juan Chaplain
10. Damaris Delgado Lopez, Puerto Rico Department of Natural and Environmental Resources
11. Ernesto Diaz, Department of Natural and Environmental Resources, Coastal Zone Management
12. Rich Appeldoorn, University of Puerto Rico
13. Graciela García-Moliner, Caribbean Fisheries Management Council

The Reef Smart team developed a participant evaluation survey for the Day at Sea to assess its success in terms of participant satisfaction and self-reported improvement in awareness. Results from the evaluation will be used to improve any future events by informing adjustments in content, planning and execution. Ten participants (those who stayed for the duration of the event) completed the six-question survey. Key findings from the survey are presented below. Please email Alicia.Clarke@noaa.gov for the full summary of the results or to request a copy of the survey.

¹ Due to scheduling conflicts, three participants departed midway through the event. They were met by a Department of Natural and Environmental Resources boat that took them back to San Juan.



Figure 2: NOAA Reef Smart Day at Sea participants on the bow of the NOAA Ship Nancy Foster with San Juan in the background. From left to right: Richard Appeldoorn, Alicia Barnes, Darmaris Delgado Lopez, Jose R. Diaz Marrero, Shannon Simpson, Chris Caldow, Ernesto Diaz and Antares Ramos Álvarez. Photo: NCCOS CCMA Biogeography Branch

Participants were asked to rate the quality of the information that was provided to them during the Reef Smart Day at Sea event on a five-category scale from very poor to very good.

100% of the participants indicated the information provided during the event was relevant to their jurisdiction and constituents, with 90% of participants indicating that informational content was very good in this regard.

Ratings for the quality of the demonstrations of research equipment and technology were slightly more varied.

70% of the participants thought that the demonstrations were good (30%) or very good (40%), while 30% reported that this aspect of the event was fair.

Next, participants were asked to indicate their level of satisfaction with the event itself in terms of organization, duration, venue and staff. Participants rated their level of satisfaction with the event on a four-category scale from extremely unsatisfied to extremely satisfied.

100% reported being satisfied or extremely satisfied with both the organization and duration of the event. All participants indicated that they were extremely satisfied with the venue where the event took place.

Participants were also asked whether or not the Day at Sea was a good use of their time and helped increase their awareness of coral reef ecosystems, scientific research and management activities. Participants agreed that the “Day at Sea” event was a good use of their time and helped to increase their awareness of coral reef ecosystems, scientific research and management activities (Figure 3).

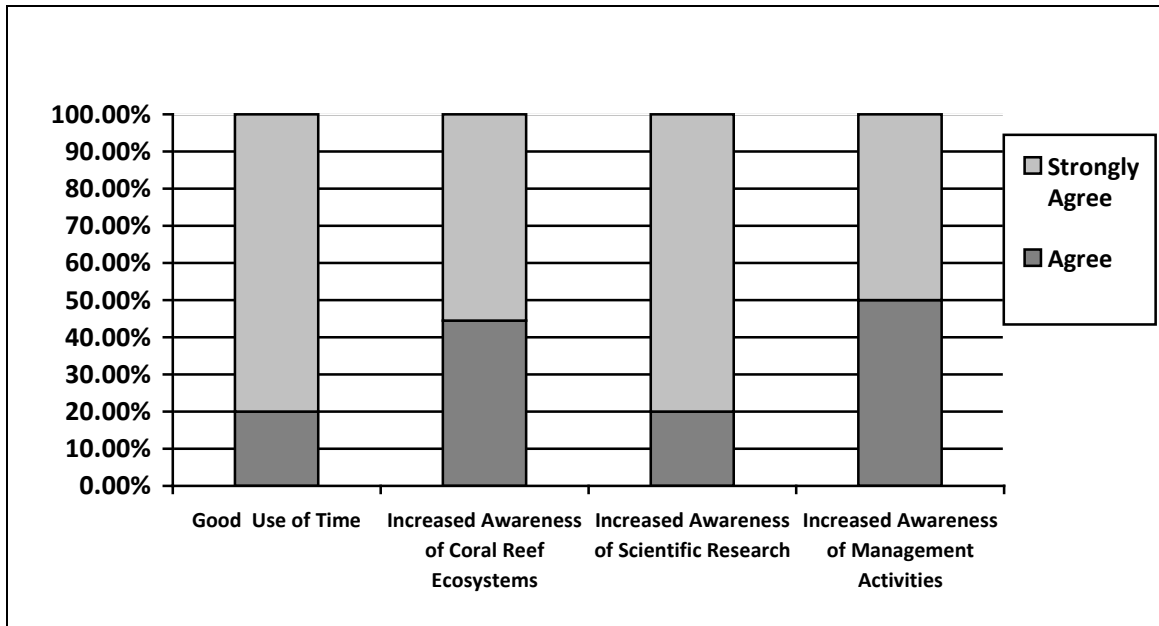


Figure 3: Usefulness of time and increased participant awareness reported by survey respondents.

Participants were given the opportunity to provide written comments with two open-ended questions. The first question asked the participant to list any “coral reef-related topics or issues” that they would like to know more about. Six persons out of 10 provided one or more topics for which they would like additional information:

- ***“Enforcement actions: Authority and jurisdictions to hold recreational vessels accountable for groundings and anchoring in coral reef areas.”***
- ***“Yes. -Mesophotic-deep water reef condition. -Live coral cover condition over time. -Species richness/diversity.”***
- ***“Deep water areas = > 30m; >50 to 100m and deeper to include the queen snapper and habitat ~ 300 fathoms (250-280)”***
- ***“Correlation of coral reef management unit with fisheries management strategies”***
- ***“Fisheries population findings in Puerto Rico.”***
- ***“Clarification on types of restrictions in place in the newly created reserves in Puerto Rico.”***

Finally, participants were given the opportunity to provide any additional comments or suggestions that they might have in general. Four persons responded to this open-ended question. Two persons offered suggestions. The first suggestion was for the addition of a topic of information to provide “Socioeconomic correlates and [their] use as a metric for terrestrial environmental management.” The second suggestion was for the Reef Smart staff to prepare DVDs of the 3-D fish distribution graphics to provide to schools.

Be Reef Smart!

Several Reef Smart activities branded under the umbrella of “Be Reef Smart!” were planned to target school-aged students and teachers. The first were a series of interactive Skype Q&A sessions between chief scientist Tim Battista and two elementary school classrooms in Maryland. Specifically, a group of 3rd graders at Sherwood Elementary and a 5th grade class at Charles R. Drew Elementary School joined the Q&A. During each of the hour-long sessions, Battista spoke to the students about coral reef ecosystems, the different types of corals, the various threats facing corals, and how he and his team study coral reef ecosystems and fish habitats (Figure 4). Sessions also included a virtual tour of the NOAA Ship Nancy Foster. The students responded with lively and thought-provoking questions about reefs and how scientists study them.

The primary and largest component of Be Reef Smart! was Be Reef Smart! Kid’s Day, which occurred following the conclusion of the mapping mission and the ship’s return to port in San Juan. Kid’s Day consisted of a three-hour coral reef ecosystem education program where area students rotated through three topical 40-minute classes (Figure 5). The program offered the opportunity for students to meet mission scientists and ship crew, learn more about the 2012 mission, discover high-tech tools used to collect underwater data, gain a better understanding of Puerto Rico’s marine resources and explore the variety of careers in marine science. Thirty-four students (grades 6-10), five teachers and a few parents from two schools--Escuela Intermedia Teresita Nazario de Guanica and Colegio Sagrado Corazon—participated (Figure 6). The group from Guanica drove more than two hours to meet the event’s Saturday 9 a.m. start time. Additionally, Puerto Rico DNER Secretary Galán attended with his wife and daughter. Before leaving, both students and teachers received NOAA backpacks filled with coral reef education resources.

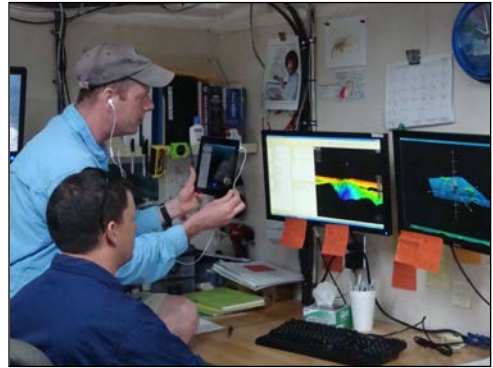


Figure 4: Chief scientist Tim Battista and survey technician Mark Blankenship show students in Maryland data they’ve collected in Puerto Rico. Photo: NCCOS CCMA Biogeography Branch



Figure 5: Be Reef Smart! Kid’s Day participants experienced a bit of life at sea during the class on ship life. Here they are trying on emersion, or “gumby”, suits. Photo: N. Perdomo, Caribbean Fisheries Management Council



Figure 6: Be Reef Smart! Kid’s Day participants and organizers pose for a group shot at the conclusion of the event. Photo: NCCOS CCMA Biogeography Branch

Open House for Managers and Academic Researchers

The final event of NOAA Reef Smart Puerto Rico, an open house for managers and academic researchers, occurred shortly after the activities for the students. The goal of this open house was to connect NOAA researchers with the people who use their data most: local managers, academic researchers and nongovernmental organizations. Roughly 30 managers, researchers and specialists from the following organizations attended: Sociedad Ambiente Marino, The Nature Conservancy, Coalicion pro Corredor Ecologico Nordeste, Puerto Rico Department of Natural and Environmental Resources, University of Puerto Rico, Sea Grant, Caribbean Fisheries Management Council and U.S. Environmental Protection Agency.



Figure 7: Guanica manager Miguel Canals (Puerto Rico Department of Natural and Environmental Resources) describes how only a generation ago fishermen routinely caught larger fish in Puerto Rico. Credit: NCCOS CCMA Biogeography Branch

Chief scientist Tim Battista and fishery acoustic scientist Erik Ebert shared some of their findings from the mission in the North East Ecological Corridor Great Reserve and explored ways NOAA technology and expertise can be leveraged to support the needs of local managers and coral reef priority areas. Additionally, Miguel Canals and Humberto Figueroa — managers of Guanica Bay and the Northeast Reserve and Culebra, respectively — presented highlights of their management areas and focused on the most pressing needs for both regions (Figure 7).

A note taker was present to record a portion of the presentations and discussion. Parts of the two-hour event were also digitally recorded. Key highlights and questions from the discussions are summarized below:

- **Managers expressed interest in studying the land-based impacts on the resources, including erosion, sedimentation and contaminants in Fajardo.**
- **Managers and academics need to prioritize a list of seafloor areas they need to have mapped—make a list of four to seven places.**
- **More information is needed on where fish recruit and where they mature.**
- **Keep the lines of communication open between managers, federal organizations and academic researchers.**
- **What are the specific, indefinable impacts from the watersheds specific to coral reefs?**
- **How do we get the school system to get the kids to snorkel or dive on the reefs and to learn to appreciate and protect them? Most have never seen or visited a coral reef.**
- **Get out of the reefs and look up! We need to work on the land-sea connection.**
- **Map recreational uses of costal marine areas and resources.**

Media Coverage and Blogging Outcomes

Collaborative efforts between communications staff at NCCOS CCMA, the Coral Program, Office of Marine and Aviation Operations and the National Ocean Service yielded far-reaching media coverage. NOAA's work to map the North East Ecological Corridor Great Reserve was covered locally by Univision and [El Nuevo Dia](#). A reporter from the Associated Press (AP) interviewed the chief scientist and others, as well as came aboard the NOAA Ship Nancy Foster for follow-up interviews. The feature story was released on the AP wire and subsequently picked up by a number of news agencies around the country, including: The Washington Post, ABC News, The Miami Herald, Newsday, The StarTribune, The South Carolina Herald, Fox News, Fox News Latino, The Daily Press, The Las Vegas Sun, and Sonar Resource (and potentially others). Additionally Reef Smart and the mapping mission were featured in the [Caribbean Business](#) Newsletter in the 'Top Stories of Puerto Rico' section.

The daily mission logs posted to the [NCCOS Coastal Ocean Science Blog](#) attracted numerous viewers. A summary of general blog statistics is provided below.

- Total views (April 2 – 22): 3,044 views (35% of total views since the beginning of the blog)
- Day of Highest Views: 359 on 4/5/12 – published *Ocean Exploration: Day 2 – The Northeast Great Reserve and the Science Team*
- Promotional Partners: Coral Reef Conservation Program, NOS, NOAA, NCCOS (CCMA) via Listserves, Facebook, Twitter, NOS Homepage, NCCOS weekly report
- Top Three Countries: USA, Puerto Rico, United Kingdom
- Top Three Referrers: Facebook, Search Engines, NCCOS website
- Number of Nancy Foster Posts: 18
- Number of Contributing Authors: 7 across NCCOS and Coral Reef Conservation Program

CONCLUSIONS

Discussion

The inaugural year of NOAA Reef Smart proved very successful with high attendance for all events, far-reaching coverage both within the press and NOAA, and effective messaging to key audience members (policy/decision makers, teachers and students, and manager and academic researchers). The Coral Reef Conservation Act of 2000 charges the Coral Program with “enhancing public awareness, education, understanding and appreciation of coral reef ecosystems.” NOAA Reef Smart was specifically designed and executed to do just that by leveraging a scheduled field mission to draw attention to the program's large body of work at the jurisdictional level.

NOAA Reef Smart events in Puerto Rico are already yielding benefits to the program. In the weeks following the conclusion of the initiative, policy makers from both Puerto Rico and the U.S. Virgin Islands have expressed concern about the potential loss of ship time on the NOAA ship Nancy Foster. They have reached out to NCCOS and Coral Program leadership with their support and offered to send letters to continue mapping efforts in the region. Plans are currently underway to submit a signed letter of support from policy makers from Puerto Rican and the U.S. Virgin Islands. On April 23, 2012, the Coalition for the Northeast Ecological Corridor sent a wish list of research needs for the reserve,

highlighting the need for continued funding of mapping, fish assessment and shipwreck identification work in the area (see Appendix I). Additionally, the U.S. Coast Guard has expressed interest in follow-up conversations about potential future collaboration with the NCCOS CCMA Biogeography Branch to improve information on vessel activity around Puerto Rico and possible enforcement technologies.

Finally, education resources and existing data reports advertised at the Reef Smart events in Puerto Rico were delivered to the Caribbean Fisheries Management Council and the Coastal Zone Management program for distribution to wider audiences at their request.

Next Steps

The project managers of NOAA Reef Smart envision the program as a flexible communications model that can be tailored, with the guidance of local liaisons, to meet the messaging needs of various Coral Program jurisdictions. Project managers intend to submit a pre-proposal for the FY13 funding cycle.

APPENDIX 1: SUPPORT FROM POLICY AND DECISION MAKERS



Coalición Pro Corredor Ecológico del Noreste

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Mr. Jon Corsiglia

Communications & Outreach Specialist

NOAA Coral Reef Conservation Program

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Ms. Antares Ramos Álvarez

NOS/OOCRM

NOAA Coral Conservation Division

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April 23, 2012

Dear Mr. Corsiglia and Ms. Ramos-Álvarez:

The leadership of the Coalition for the Northeast Ecological Corridor would like to thank the Coral Reef Conservation Program and the personnel of the NOAA Ship *Nancy Foster* for having invited us to the Open House on April 21, 2012. Mr. Battista's and Mr. Ebert's excellent presentations shed light on NOAA's impressive capabilities, which we are pleased to see applied to our coasts.

As Mr. Battista suggested that local stakeholders continue providing input on NOAA's regional activities, we provide our "wish list" in hopes we will continue to have future exchanges with your committed scientists:

1. Completion of Benthic Mapping along the area designated Grand Northeast Ecological Corridor of Puerto Rico with field validation (e.g., through the use of ROV technologies, SCUBA, etc.).
2. Paleo-coral studies or studies showing how past storm events and sea level changes affected the reefs and how the associated reef response might be useful.
3. Continued fish aggregation studies, to include (1) possible cooperation with the University of Puerto Rico in order to enhance sensing capabilities as to identify unique spectral signatures for individual species, and (2) plankton tows that might help explain fish locations in the water column.
4. Ship wreck identification and descriptions.

We would hope that, after conducting further research, NOAA might be able to produce *A Baseline Assessment of the Ecological Resources for the Grand Northeast Ecological Reserve*, similar to the one published in 2011 for the Jobos Bay Estuary. Such a study might integrate the wave action studies shown at the Open House.

Respectfully submitted,

Luis Villanueva-Cubero

Coalition for the Northeast Ecological Corridor



Alicia Clarke <alicia.clarke@noaa.gov>

RE: NOAA Event in San Juan

1 message

José R. Díaz Marrero <jdiaz@camaraderepresentantes.org>

Fri, Apr 20, 2012 at 10:56 AM

To: Alicia Clarke <alicia.clarke@noaa.gov>

Dear Alicia:

I wish to thank you and have you convey my thanks to everyone at NOAA and the scientists, crew and officers of the Nancy Foster for a very good experience during the Reef Smart Day at Sea last Friday. This was an outstanding opportunity to see the scientific work that is being done and that can be so important for the betterment of the marine environment and for the economic production that depends on it. We are aware of the many budgetary limitations and further pressures on resources that these programs face and I believe I can speak for many here in saying that you can count on having supporters in Puerto Rico and the USVI for the continuation of this valuable work.

With every wish for success,

José R. Díaz

PR House of Representatives