

REEF Education Enhancement Program

**Final Progress Report to the
NOAA General Coral Reef Conservation Program
NOAA Award NA04NMF4630333**

Submitted by:
Christy Pattengill-Semmens, Principal Investigator
Reef Environmental Education Foundation (REEF)

February 2007

Project Summary:

The REEF Education Enhancement Program project funded by the NOAA Coral Reef Conservation Program (CRCP) focuses on education and outreach activities within the REEF Fish Survey Project, an ongoing citizen science project that enables divers and snorkelers to document marine life populations throughout the tropical western Atlantic, coastal North America, tropical eastern Pacific and Hawaii. Through CRCP support to enhance existing programs and to develop innovative new components, we aim to increase the Fish Survey Project's educational scope through the development of lesson plans and an online educator portal, improvement of training materials, support of event-based activities to increase participation in REEF's programs and enhancement of data access tools. The result will be the strengthening of an already successful citizen science program, including increased use and utility of REEF data. This will lead to a better understanding of region-wide fish distributions as well as strong public support for conservation and effective management strategies.

Objectives, Tasks and Progress:

Increase Educational Scope

This task included the formation of a panel of educators to assist REEF in realizing our educational goals and potential, to coordinate a workshop to bring together the newly formed panel, and to create a series of lesson plans using REEF data from coral reef areas that can be used by elementary school educators to teach math and science concepts with real-world data.

We made significant strides towards meeting this overall objective. During the project period, REEF formed a new Educators Advisory Committee (EAC), coordinated a three-day education workshop with the EAC and other community members, and conducted an evaluation of REEF's existing educational programs and goals. The EAC includes a dynamic and experienced group of individuals that will bring a wide-range of environmental and marine education backgrounds. The REEF EAC includes:

Rick Bonney, Cornell Lab of Ornithology

Paul Detwiler, Consortium for Oceanographic Research and Education

Marissa Lopez, Teaching Fellow

Dr. David Niebuhr, Mote Marine Laboratory

Ryan Richter, High School Educator

Ben St. Pierre, High School Educator

John Williams, University of Texas Marine Science Institute

The EAC workshop was held June 14-16th, 2005, in Key Largo, FL. During the three-day summit, participants had the opportunity to hear presentations about REEF and our outreach and education programs, to review REEF's existing training programs, and conduct REEF surveys during a dive trip to coral reefs off Key Largo. Logistical support for the EAC workshop was provided by the Island Dolphin Care, who hosted the workshop at their facility, and by Horizon Divers who sponsored the field trip portion of the workshop. CRCP grant funds provided small travel stipends to each of the participating EAC members.

The lesson plan concept was not fully realized, although REEF completed a lesson plan concept document based on input from the EAC. The concept includes instruction on using REEF data from coral reef locations in Florida to calculate population parameters such as Density and Sighting Frequency, as well as exercises that educate students on key ecological and management concepts such as marine protected areas, habitat preferences, feeding adaptations, artificial reefs, and habitat quality. The content is targeted at middle school (7th-8th grade) science and math skills. While our original intent was to fully develop and launch three lesson plans and an Educators Internet Portal as part of this project, we are now planning a thorough development and testing phase using the concept document. REEF will therefore seek additional financial support in 2007 to more fully realize our original project goal.

Improve Training Materials

This task included the development of improved introductory training materials used by REEF to introduce volunteers to fish identification, and the development of advanced curricula for REEF's main coral reef regions.

CD-ROM versions of REEF's introductory training materials for the Caribbean/Florida and Hawaii were completed and distributed during the first 6-months of the CRCP project. During the last 6-months of the project, REEF and our partners in Hawaii (Project S.E.A.-Link) and in the Caribbean (Aqua Safari, Cozumel) completed advanced training curricula modules for the Caribbean/Florida and Hawaii. Modules include approximately 100 images, including various life history phases (juvenile, initial, terminal) of some common reef fishes as well as many of the more cryptic and rare species.

The production of the CD-ROM courses required the digital scanning of images and programming. REEF worked with one of our volunteer members to create the CD-ROMs using Multimedia Director, which will limit the unauthorized duplication of images. While we originally intended to include video and custom slide-show features in the CD-ROM courses, this was not completed due to an underestimate of time that it took to complete the basic programming and features. However, video clips were captured during the course of this project and REEF is currently planning to launch a revised CD-ROM version of our course later in 2007 that will incorporate video and home study tools using other funds. An additional modification from the original proposed work is that we originally anticipated splitting the Caribbean and Florida regions to create two separate introductory and advanced modules. We decided to maintain our original approach (which has them combined), but expanded the species included.

Outreach Events

This task included the support of three of REEF's existing outreach events: Dive Into Earth Day (April), the Great Annual Fish Count (GAFC; July), and the Field Survey program (ongoing).

The Dive Into Earth Day event was held in Key Largo, Florida, on April 22-23, 2005, and included a free fish identification class and an underwater scavenger hunt, based on fish ID.

Funds from the CRCP were used to support the coordination and execution of the 2005 Great Annual Fish Count, including the recruitment of volunteers, the maintenance of the GAFC event website, logistical support for REEF's Fish Count partners (those who actually organize individual GAFC events), and management of the resulting data. Travel and event stipends were also provided to local partners in Florida, USVI and Hawaii.

Funds were also used to support 2005 Field Surveys in three coral reef areas – Puerto Rico (Culebra, March 11-18), the US Virgin Islands (St. Croix, April 23-30), and Hawaii

(Kona, August 6-13). A promotional flyer advertising the 2005 Field Survey Program was developed and distributed to 6,700 households using program grant funds.

The Culebra project included six divers (including a local REEF surveyor who lives in Candado, Puerto Rico), and diving was conducted with Culebra Divers (the only dive operation on the island). In total, 82 REEF surveys were conducted at 14 sites around the east, west and south sides of Culebra, including surveys both inside and outside the protected no-take zone on the northwest side. This project nearly tripled the amount of data previously in REEF's database for Culebra. A summary report of the data collected can be accessed online at-

http://www.reef.org/cgi-bin/batchrep.pl?region=TWA&file_name=fsculebra0305.dat

The St. Croix project included thirteen divers (including several local REEF members who conduct regular surveys around the USVI), and diving was conducted with Blue Water Divers. The group, which consisted of almost all REEF Expert surveyors, conducted 199 surveys during the week and documented 243 species of fish (a record number of species for a REEF Field Survey). A summary report of the data collected can be accessed online at-

http://www.reef.org/cgi-bin/batchrep.pl?region=TWA&file_name=scro0405.dat

The Kona project included seventeen divers and snorkelers, and diving was conducted with Jack's Diving Locker. The group conducted 189 surveys during the week and documented 221 species. A summary report of the data collected can be accessed online at- http://www.reef.org/cgi-bin/batchrep.pl?region=HAW&file_name=kona0805.dat

Data Access Tools

This task included the development of a pilot Internet mapping application using REEF data. During the first 12 months of the CRCP project, the REEF database was evaluated for spatial display readiness and updates were made accordingly. REEF's Scientific Coordinator and the CRCP project PI, Christy Pattengill-Semmens, attended the 2005 Society for Conservation GIS conference and gave a presentation about REEF's ongoing effort to create an online mapping tool. During that conference, we identified CommEn Space, a community and environmental spatial applications company, to develop the Internet mapping application. The original work plan limited the geographic extent of the mapping application to the US and British Virgin Islands and Puerto Rico. However, after consulting with CommEn Space, it was decided that the geographic extent would include REEF's entire Tropical Western Atlantic region. An initial version of the application was completed in June 2006 and after internal Beta testing, the application was presented at the 2006 joint conference of the Society for Conservation Biology and the Society for Conservation GIS.

The mapping tool, accessed at www.reef.org/fishmaps, features interactive queries of REEF's western Atlantic database. Users can generate maps of species distribution using density, abundance or sighting frequency, evaluate patterns of species or family diversity, and view REEF survey effort. Query parameters include survey date, surveyor number, surveyor experience, and survey effort. In addition to the base layer, which shows basic

bathymetry, National Marine Sanctuary boundaries are also available. Maps can be printed through the web browser and data can be exported as a shape file through an administrative login.

The new Internet Mapping Tool was officially launched to the REEF membership in mid-November through our Fall 2006 Newsletter and November e-news, *REEF-in-Brief*.

This task was the most challenging component of the funded project because of the ever changing and improving Internet and GIS technologies. In addition, the amount of time allocated toward this aspect of the project did not allow for as much consultation and collaboration with regional managers and scientists as we had originally hoped. However, we feel that the resulting mapping product is a great first step and will provide a valuable resource for visually representing REEF's fish community data. We anticipate this to be an evolving tool and hope to secure additional funding in the future to expand the query capabilities, add more base layers such as management zones, habitats, and bathymetry, as well as incorporate tools that will assist management decisions.