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Coral Reef News



NOAA
CORAL REEF
CONSERVATION PROGRAM

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The Coral Reef Conservation Program (CRCP) is a partnership between the NOAA Line Offices working on coral reef issues, including the National Ocean Service (NOS), the National Marine Fisheries Service (NMFS), the Office of Oceanic and Atmospheric Research (OAR) and the National Environmental Satellite, Data and Information Service (NESDIS). From mapping and monitoring to managing reef resources and removing harmful debris, the CRCP addresses the priorities laid out in both the [National Action Plan to Conserve Coral Reefs](#) and the [National Coral Reef Action Strategy](#).

Volume 7, No. 2

November 2009

From the Desk of the Program Manager



This month, I am pleased to be able to share the news that NOAA has pledged \$550,000 towards an inter-agency coral conservation partnership in Puerto Rico. The announcement came during the 22nd Meeting of the [US Coral Reef Task Force](#) (USCRTF),

which the CRCP and the Commonwealth of Puerto Rico co-hosted in San Juan from October 30 through November 5. At this meeting, the [US Department of Agriculture](#) (USDA) announced a [partnership initiative](#) focused on restoring the Guanica watershed in Puerto Rico, an initiative which will benefit the offshore reefs in that region. The USDA led the initiative by pledging \$1

Million from their Environmental Quality Incentives Program for best management practices in the watershed's headwaters and an additional \$250,000 for competitive grants to local community organizations. The USDA challenged the other federal members of the Task Force to contribute to the effort. NOAA was the only federal member able to affirmatively respond to the USDA's challenge during the meeting, pledging at least \$450,000 in technical assistance and \$100,000 for community grants this fiscal year. The NOAA effort is a partnership between the Coral Program, [NOAA Restoration Center](#), the [National Centers for Coastal Ocean Science](#), and [Coastal Services Center](#) and is an example of our commitment to ensuring our funding reflects the three threats and goals outlined in the [NOAA Coral Reef Conservation Program Goals & Objectives 2010-2015](#).

- Kacky

Announcements

Free Climate Change Webinar for Educators. NOAA, the US Forest Service and the University Corporation for Atmospheric Research are collaborating with the [National Science Teachers Association](#) to provide a free Web seminar series and symposia about climate science and impacts of climate change. The next seminar, "Higher than a Sea-Bird's Eye View: Coral Reef Remote Sensing using Satellites," will be held on December 15. It will cover how coral reef ecosystems are being impacted by climate change, a problem that is expected to become more severe in future decades. While corals are robust enough to create structures like the Great Barrier Reef, visible from space, they can be damaged and destroyed by even small changes in the Earth's climate.

The presenters will focus on how NOAA satellites monitor the temperature conditions that

lead to coral bleaching. Major concepts include climate change, coral bleaching, cutting-edge satellite technology, and ocean ecology in the context of coral ecosystems. The presenters will share their science expertise, answer questions from the participants, and provide Websites and tools that students can use in the classroom. This Web seminar is designed for educators of grades 5-12. Learn more or register [here](#).

Atlantic/Caribbean CREIOS Workshop: Supplementary US Caribbean Mapping Resources Available. The CRCP conducted two regional workshops the last year to address its [Coral Reef Ecosystem Integrated Observing System](#) (CREIOS). At the request of participants from CRCP's May 2009 [Atlantic/Caribbean CREIOS Workshop](#), the CRCP has made available supplementary maps and a table compiled by Tim Battista of the [National Cen-](#) (continued on page 2)

UPCOMING EVENTS

November

29: Application deadline for [Puerto Rico Fellowship position](#).

30: Pre-applications due for NOAA Coral Reef Management Grant Program.

December

15: Free NSTA Webinar: [Higher than a Sea-Bird's Eye View: Coral Reef Remote Sensing using Satellites](#)



Be a Reef-
Hugger

Corals are
already a gift.
Don't give them
as presents this
holiday season.

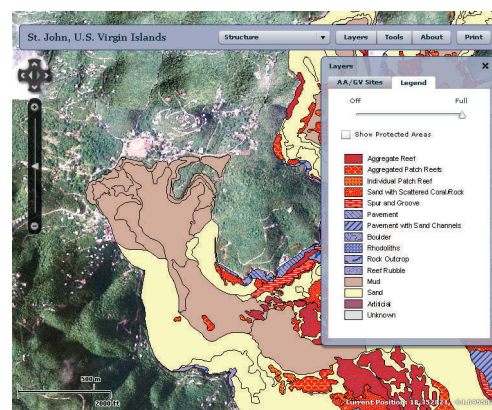
Announcements continued...

[ers for Coastal Ocean Science Center for Coastal Monitoring and Assessment](#). The maps depict 1) existing bathymetric data for Puerto Rico and the US Virgin Islands by data source and 2) future priorities for high-resolution bathymetric data acquisition. The table summarizes existing bathymetric data resources that were collected by numerous government agencies and includes information about the area and depth ranges encompassed by each product, the dates of collection, and the resolution of the data available. These supplemental products are available [online](#); scroll down to the section entitled 'Supplementary Materials' to access the PDF files. Due to the maps' large file sizes, download times may be considerable, especially for individuals with slow connection speeds. Requests for access to data files should be directed to Tim.Battista@noaa.gov.

NCCOS Unveils Interactive Mapping Tool for St. John, USVI. NOAA [National Centers for Coastal Ocean Science](#) announces the launch of the St. John Biogeography Integrated Online Mapper ([BIOMapper](#)). BIOMapper lets users interactively view data, aerial imagery, dive photography, underwater video, and related publications for a project in the US Virgin Islands (USVI), "[Benthic Habitat Mapping off St. John, US Virgin Islands National Park, and Virgin Islands Reef National Monument](#)." The tool is an easy way to view the project's benthic habitat data, examine the attributes of the data, and show different thematic representations of the

data. In addition, photography and videos taken during dive missions are viewable, linked to the location of the dives. PDF maps can be produced of user-selected areas in a pre-formatted template. BIOMapper uses software that is easily modified to display a variety of data types for any region. The site is viewable in all browsers that have a Flash plugin.

The St. John BIOMapper provides NOAA and National Park Service managers and scientists improved access to coastal and ocean data and a way to print customized maps of specific areas of interest. This product is currently featured on the NOAA [National Ocean Service](#) homepage.



View aerial imagery and customize maps using the St. John BIOMapper tools and data layers. Courtesy: NOAA NCCOS

Updates from the Atlantic/Caribbean Region

Survey of US South Atlantic MPAs. The inaugural research cruise of NOAA's newest and fastest ship, the [NOAA Ship Pisces](#), was conducted between November 12 and 23. The focus of this cruise was a survey of five marine protected areas (MPAs) in the US South Atlantic that were designed for the protection of grouper and tilefish. This survey is in support of the [South Atlantic Fishery Management Council's](#) evaluation of MPAs as a tool to increase the population levels of five grouper and two tilefish species. Five natural-bottom, shelf-edge MPAs created in February 2009 off the coast of Florida, Georgia, South Carolina, and North Carolina will be examined annually in this survey. The project began in 2004 with SEFSC funding and has continued since then with CRCP support. The protection of spawning grounds and critical life stage habitats has been shown to have significant positive impacts on many marine

species. It is hoped these MPAs, designed to protect reef fish species of high economic value, will have similar results. Juvenile fish from these MPAs have the potential to supply recruits to the fishery across a very large geographic area along the US eastern seaboard.

[National Marine Fisheries Service](#) (NMFS) scientists from the [Panama City Laboratory](#) lead the mission. The principal gear utilized for the MPA surveys was a Phantom remotely operated vehicle which was operated by pilots from The [National Undersea Research Center](#) at the [University of North Carolina Wilmington](#). Also participating in the cruise were two [Teachers at Sea](#), including one teacher whose class proposed the name of the new ship. Two [US Navy](#) civilian scientists collaborated as well to foster future cooperation between NOAA and the Navy in deep reef habitat of mutual (continued on page 3)

Atlantic/Caribbean continued...

interest in the South Atlantic Bight. Lastly, two marine mammal scientists from the NMFS [Miami Laboratory](#) sailed on this mission to develop operational protocols for a series of cruises planned for early 2010. Outcomes from the mission will be reported in a future issue of this publication.

Acropora Conservation and Restoration Workshop. [Elkhorn and staghorn corals](#) (two Caribbean *Acropora* species) were listed as threatened under the Endangered Species Act in 2006. NOAA's [National Marine Fisheries Service](#) (NMFS), the [Smithsonian Institution](#), and [Counterpart International](#) sponsored the 2nd *Acropora* Conservation and Restoration workshop, held at the National Zoo in Washington, DC November 12th -13th. Participants included scientists and conservation leaders, including practitioners and experts in Caribbean *Acropora* species health, genetics, and growing cultured coral. The participants represented projects in Florida, Puerto Rico, the US Virgin Islands, Belize, Jamaica, Curaçao, Honduras, and the Dominican Republic. The group made good progress in the development of 'best practices' for *Acropora* culture from both larvae and fragments and for managing genetic and health concerns in using cultured corals for restocking wild populations. In developing science-based guidance for coral culture and outplanting, this workshop addressed needs identified in the draft *Acropora* Recovery Plan and supports the \$3.3 million federal investment in *Acropora* nursery culture under the American Recovery and Reinvestment Act. Other activities and outcomes from the workshop included an evening public lecture and panel discussion on coral reef threats and conservation held at the Zoo, identifying prioritized research needs relevant to culture and restocking, and planning for a more formalized *ex situ* conservation strategy for threatened reef corals.

2009 Deep Water Coral Teacher Workshop. On November 7th, 30 teachers from North Carolina gathered for the [2009 Deep Water Coral Teacher Workshop](#) held at the [North Carolina Museum of Natural Sciences](#) in Raleigh, North Carolina. There were four presentations from leading deep-sea coral scientists and managers: Introduction to Deep Water Corals, Science in the Deep Water Environment, Introduction to Deep Water Species, and Conservation and Management of Deep Water Corals. Instruction on the accompanying lesson plans followed each topic. Finally, attendees were given a brief overview of [NOAA's Teacher at Sea Program](#), took a field trip to the Mu-

seum's wet lab to complete a fish key exercise, and toured the Museum's fish and crustacean collection. Attending teachers received copies of the lesson plans presented during the workshop. Additional resources provided to attendees included copies of relevant DVDs and a tote bag filled with promotional and educational materials donated by partners and research institutions. Teacher evaluations, completed at the end of the day, confirmed that the workshop was a resounding success, with many teachers stating they appreciated being exposed to new materials, and would easily and readily disseminate these materials in their classrooms. This workshop was part of NOAA's outreach and education efforts in support of deepwater coral resources

USCRTF Steering Committee Briefed on New Mesophotic Coral Ecosystem Publication. On November 2, during the 22nd Meeting of the [US Coral Reef Task Force](#) (USCRTF) in San Juan, Puerto Rico, the USCRTF Steering Committee was briefed on a joint publication by the [National Centers for Coastal Ocean Science/Ocean Exploration and Research](#), the [Mesophotic Coral Ecosystems Research Strategy](#). The presentation represented the first time that mesophotic coral ecosystems (MCEs) have been formally introduced to management representatives from US federal, state, and territorial agencies. MCEs comprise approximately two-thirds of the total depth range of light-dependent coral environments and are found at intermediate depths from 30-150 m in tropical and sub-tropical regions. At present, very little is known about these ecosystems and few are under any level of management protection. The research strategy provides a basis for the USCRTF to consider the importance of MCEs in the overall effort to restore and protect shallow coral reef ecosystems.

NOAA and NIST Scientists Explore Fluorescence as a New Tool to Diagnose Coral Health. Scientists from NOAA's [National Centers for Coastal Ocean Science](#) (NCCOS) and the [National Institutes of Standards and Technology](#) (NIST) recently embarked on a joint exploratory project to determine if changes in the autofluorescence of corals could serve as a useful indicator of their health status. Many of the corals from around the world fluoresce in bright colors when illuminated under specific colors of light. Corals which appear tan under sunlight may produce brilliant green, red, and other colors when exposed to blue light, for example. NOS scientists (*continued on page 4*)



NAVIGATING OUR NEW WEBSITE

Having trouble finding some of the content from our old Website in the redesigned format?

Try using the search function or the [Site Map](#) to find the new location of pages and documents.

DID YOU KNOW...

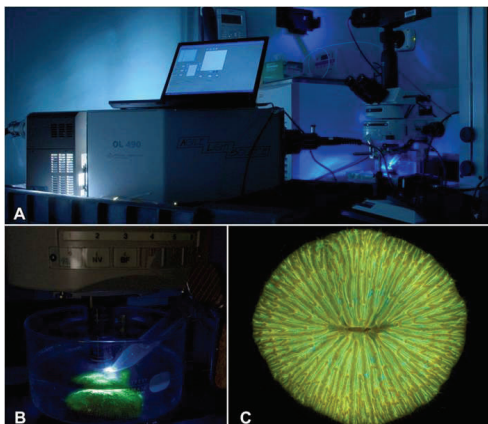
One estimate places the total net benefit per year provided by the world's coral reefs at \$29.8 billion!

Worldwide, 30 million people are virtually totally dependent upon coral reefs for their livelihoods or the land they live on!

Coral reefs are the only living structures that can be seen from space!

Even if you don't live near a reef, you can [help protect coral reefs](#) in the U.S.A. and around the world.

Atlantic/Caribbean continued...



Examination of coral fluorescence using a DLP: A) Optronic tunable light source used to digitally select excitation wavelengths. B) Hyperspectral Microscopic System acquiring fluorescence spectra of live coral. C) Full view of blue light excited *Fungia* coral demonstrating the green fluorescent emission pattern used to evaluate diagnostic features. Courtesy: Coral Disease and Health Consortium

are working towards developing an understanding of the relationship between the fluorescence and the coral health. The scientists hope to use this built-in indicator of the metabolic state of the animal to detect changes in the general health of corals and relate these changes to specific stressors, such as changes in temperature, salinity, pathogens, and toxicants. The overall goal is to transition what is learned in the lab into a method which can be used in the ocean as an early indicator to detect changes in the health of the coral.

A tunable light source equipped with a digital light processor (DLP™) was used to digitally control the color characteristics of light used for illuminating the coral specimens. The DLP technology is the same technology used in projectors and large screen televisions. The study involves exposing coral specimens to light of known wavelengths and capturing their fluorescence emissions under different experimental conditions. By changing the characteristics of the light projected on a coral specimen, a deeper understanding of the coral fluorescence will be developed. Innovative research using new technologies strengthens the efforts to preserve and protect coral reefs, as early indicators of the decline in coral health could improve the ability to determine what may be the cause. This collaborative research will continue through late spring or early summer 2010 and supplements

individual research projects conducted by the two institutions.

Live Sampling Method Provides New Tool for Spatial Mapping of Toxic Coral Reef Habitats.

Ciguatera fish poisoning (CFP) is the most common nonbacterial food poisoning in the world and is caused by the bioaccumulation of toxins produced by benthic dinoflagellates in the genera *Gambierdiscus* and *Ostreopsis*. CFP increases with disruption of coral reef habitat and currently has the highest public health impact of all harmful algae poisonings combined by more than twenty-fold. Scientists from NOAA's [National Centers for Coastal Ocean Science](#) (NCCOS), in collaboration with scientists from [Carleton University](#) in Ottawa, Canada, have measured ciguatoxins in the blood of great barracuda that were caught, tagged, and released off the coast of Cape Eleuthera in the Bahamas. This data was compared with data showing toxin distribution among blood and liver and muscle tissue obtained from simultaneous lethal sampling at the same site in the Bahamas. The comparison indicates that blood toxin level may be a good marker of recent exposure, allowing future live sampling. This is the first report of ciguatoxin detection in fish using a non-lethal sampling method. Low-impact biomonitoring methods provide valuable tools to assess spatial changes in the occurrence of ciguatoxic fish, especially in the context of climate change and declining health of coral reef habitats in the Caribbean. Future telemetry data analysis of these fish, to be collected as part of ongoing [great barracuda research](#) based out of Carleton University, will provide better understanding of barracuda behavior and ecology in defined coral reef habitats, and their relationship to ciguatoxin accumulation.

Biannual Survey of Coral Reef Ecosystems Around Buck Island USVI Completed.

Scientists with NOAA's [National Centers for Coastal Ocean Science](#) recently completed their ninth field season in St. Croix, US Virgin Islands (USVI), where they (*continued on page 3*) evaluated the health of coral reef resources both inside and outside the boundaries of the [Buck Island Reef National Monument](#) and [St. Croix East End Marine Park](#). With support from the CRCP, the researchers partnered with several organizations and local volunteers to gather information on the distribution and abundance of fishes, lobster, long-spined sea urchin, and conch, as well as benthic composition. Coral disease and distribution data were also collected by a Nancy Foster Scholar (*continued on page 5*)

Atlantic/Caribbean continued...

accompanying the team. Along with [The Nature Conservancy](#), the group conducted roving diver lionfish surveys over half of the hardbottom survey sites throughout the study area, and no lionfish were seen. These results suggest the geographic distribution of lionfish has not yet expanded into the monument or adjacent coral reefs. The data collected during the biannual survey will aid [US National Park Service](#) managers in understanding and making informed decisions regarding the resources in the region. For more information and to download available data, click [here](#).

Preliminary Research Results Give New Insights into MCEs. Mesophotic coral ecosystems (MCEs) are found in tropical and subtropical regions at depths from 30-150 m. Preliminary results, based on work conducted from 2007 to the present by researchers funded by NOAA's [National Centers for Coastal Ocean Science](#) in Hawai'i, show that mesophotic macroalgal species derive their nutrients from open ocean sources. This suggests that nutrients from human activities have little or no influence on macroalgae abundance in the Au'au

Channel. These results are opposite of what one would expect compared to shallower coral reef ecosystems, where high algal abundance is often an indicator of an increase in nutrients caused by human activities. Thus, for mesophotic coral ecosystems, algae may not be good indicator of human impacts, as high algal abundance may represent a healthy ecosystem.

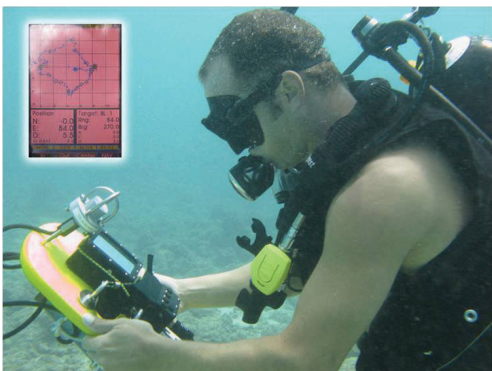
Analysis of Marine Ecosystem Data for U.S. Parks Containing Coral Reefs

Launched. In September, [National Centers for Coastal Ocean Science](#) scientists, in partnership with the [US National Park Service's](#) (NPS) [Inventory and Monitoring Program](#) launched an effort to collect, assimilate, and distribute marine geospatial information in order to support monitoring and management of coral reef ecosystems included within NPS jurisdiction. NPS manages and protects more than 250,000 acres of coral reef in ten national parks. In addition to collecting and sharing information for Geographic Information Systems, the project will also establish priorities for future investment in information to support monitoring and management of marine natural resources.

Updates from the Pacific Region

Experimental Mapping System Advances Underwater Spatial Data Collection.

Gathering underwater spatially correlated data is essential when working on assessment, mitigation, and restoration projects of damage to coral reefs and near shore underwater habitats. An experimental real-time underwater mapping system is being tested and applied through a coop-



Robert O'Conner conducting ocean test of the AquaMap acoustic mapping system (with inset of graphical user interface).

Courtesy: Matthew Parry, NOAA Damage Assessment Remediation and Restoration Program/Restoration Center

erative grant obtained by staff from the NOAA [Damage Assessment Remediation and Restoration Program/Restoration Center](#) and the [Pacific Islands Region Office](#) (PIRO) Habitat Conservation Division. These NOAA entities currently partner in responding to oil spill threats under the [Oil Pollution Act](#), conducting assessment and mitigation work under [Executive Order 13089](#) and the [Fish and Wildlife Coordination Act](#), as well as working towards near shore coral reef restoration in response to natural and human-induced incidents.

This project is significant because it involves the use of experimental technology that can improve accuracy, efficiency, and resolution at which NOAA acquires underwater spatially correlated near shore and coral reef resource data. Incorporating real-time underwater mapping abilities will allow for a much greater level of accuracy and precision in determining the extent of injuries that occur either through planned (mitigated actions) or unplanned (unpermitted actions) events. The increase in mapping abilities will directly allow NOAA to better meet its federally mandated obligations in response, restoration, and mitigation of damage to near-shore coral reef resources. (continued on page 6)



Be a Reef-Hugger

If every household in the U.S. replaced a burned-out bulb with an energy-efficient, **ENERGY STAR**-qualified compact fluorescent bulb, it would prevent greenhouse gas emissions equivalent to that from at least 800,000 cars. Climate change is one of the leading threats to coral reef survival, so let your conservation light shine.

Every Act Counts

It stinks to send chemicals into our waterways.

Whether you live one mile or one thousand miles from a coral reef, the chemicals we use to clean our houses and beautify our lawns end up in our waterways and are carried to the oceans. Just one pound of phosphorus in water produces an estimated five hundred pounds of algae, blocking sunlight and starving coral reefs.

Do your part by using naturally-derived and biodegradable detergents and cleaning products. Outside the house, minimize the impacts of fertilizer by using zero-phosphorus products or no more than one pound per 1,000 square feet of turf area for nitrogen (you need just half that amount in shade).

Whether you live one mile or one thousand miles from a coral reef, your actions affect the reefs' future – and the reefs' future affects yours.

Pacific continued...

Students in Hawai'i Get Their Hands on ARMS. The [University of Hawaii, School of Ocean and Earth Science and Technology's](#) Annual [Open House](#) on October 16th-17th event attracted over 6,000 people. As a follow-up to this popular event, scientists in NOAA's [Pacific Islands Fisheries Science Center Coral Reef Ecosystem Division](#) who are working on the [Census of Marine Life Census of Coral Reef Ecosystems](#) project hosted hands-on exhibits and educational discussions about coral reef biodiversity from November 4th-6th. Hundreds of elementary-aged schoolchildren from local schools and home school programs, their parents, and other community members were in attendance. The scientists recovered an Autonomous Reef Moni-

toring Structure (ARMS) that had been recruiting reef fauna for over two years off the south shore of Oahu. ARMS are designed to mimic the reef environment and attract colonizing coral reef organisms. The ARMS unit was disassembled and the organisms inhabiting it were showcased in aquariums and touch tanks where children and adults could observe unusual and fascinating marine life. NOAA scientists talked about marine biodiversity and taxonomy and shared fascinating facts about the life history and behavior of the organisms on display. At the end of the project, the ARMS unit was reassembled and returned to the sea floor with its original organisms.

International Updates

NOAA Team Conducts Climate Change Workshop for Reef Managers in Belize.

Coral reef managers from the Mesoamerican Barrier Reef region participated in the training workshop "Satellite Tools and Climate Change: A Workshop for Coral Reef Managers" held November 15th-18th in Belize City, Belize. Twenty-four international experts in coral reef management from Mexico, Belize, and Honduras met to learn about climate change impacts on coral reefs, responding to coral bleaching, resilience, incorporating resilience into management and marine protected areas design, early warning tools available for managers to use, and ways to communicate about threats to coral reefs. This workshop had a special emphasis on the NOAA [Coral Reef Watch](#) (CRW) [satellite tools](#) to predict bleaching as well as more recently developed tools. Participants shared strategies and local management actions and participated in exercises that planned draft coral bleaching response plans. Workshop trainers came from CRW, the Smithsonian's [Healthy Reefs for Healthy People](#) program, the [Caribbean Community Climate Change Center](#), the [World Wildlife Fund](#), [The Nature Conservancy](#), the [Universidad Nacional Autonoma de Mexico](#), and ECO MAR. The workshop was the eighth in a series, which includes workshops in Australia

(two), American Samoa, the Florida Keys, Guam, Hawai'i, and the Netherlands Antilles. To date, over 200 coral reef experts and managers have been trained; these individuals are able to apply what they learned to their local reefs in over 20 nations around the world. The meeting was hosted by NOAA and the [Healthy Reefs for Healthy People](#) program. It was funded primarily by the [GEF/World Bank Coral Reef Targeted Research Program](#), and particularly the Mesoamerican Center of Excellence at Puerto Morelos, Mexico.



Participants worked in small groups to practice using NOAA satellite data during the workshop. Courtesy: NOAA Coral Reef Watch

(continued on page 7)

New Data in CoRIS

Product Name	Description
SEAKEYS - Meteorological and Oceanographic Observations 2006 Link to sample metadata for this product	The Florida Institute of Oceanography's (FIO) SEAKEYS (Sustained Ecological Research Related to Management of the Florida Keys Seascape) program began in 1989 and has continued until the present. The network consists of six instrument-enhanced Coastal-Marine Automated Network (C-MAN) stations, cooperatively managed with NOAA's National Data Buoy Center. These stations measure the usual C-MAN meteorological parameters, such as wind speed, gusts and barometric pressure, but are enhanced with oceanographic instruments measuring salinity, sea temperature, fluorometry and turbidity.
CRED Wave and Tide Recorder (WTR) data for the Northwestern Hawaiian Islands Link to sample metadata for this product	Data from Coral Reef Ecosystem Division (CRED), NOAA Pacific Islands Fisheries Science Center (PIFSC) Wave and Tide Recorders (WTR) provide a time series of temperature, wave and tide data at coral reef sites. Data is typically collected for a duration of 2 years using a SBE26 or SBE26plus SEAGAUGE Wave and Tide Recorder (Sea-Bird Electronics, Inc., www.seabird.com). Sensors include: Real-time clock, thermistor, and Digiquartz temperature-compensated pressure sensor.
CRED Sea Surface Temperature (SST) Buoy data for the Northwestern Hawaiian Islands, American Samoa, Guam, Commonwealth of the Northern Marianas Islands and the PRIAs Link to sample metadata for this product	Data from Coral Reef Ecosystem Division (CRED), NOAA Pacific Islands Fisheries Science Center (PIFSC) Sea Surface Temperature (SST) Buoys provide a time series of surface water temperature at coral reef sites. The SST buoy (Model SST-001, Sound Ocean Systems, Inc., www.soundocean.com/index.htm) with external temperature recorder (Sea-Bird Model SBE39, Sea-Bird Electronics, Inc., www.seabird.com) telemeters a subset of the daily data in Near Real Time (NRT) via a Telonics ST-13 or ST-20 ARGOS PPT transmitter and internally records higher resolution temperature data from the SBE39, typically at a 600 second sampling interval for a duration of 2 years. These records refer to the internally recorded (high resolution in situ) SBE39 temperature data.
CRED REA Invertebrate Quantitative Assessments at American Samoa, NWHI, CNMI, Guam, Main Hawaiian Islands and the PRIAs, 2000 to 2009 surveys Link to sample metadata for this product	Invertebrate surveys were focused on quantifying key non-coral invertebrate species common to the reef habitats, and were conducted using a combination of different survey techniques to quantify the diverse communities. These methods included belt-transect surveys, roving-swim surveys, and quadrat surveys.
CRED Recording Current Meter (RCM) for American Samoa Link to sample metadata for this product	Data from Coral Reef Ecosystem Division (CRED), NOAA Pacific Islands Fisheries Science Center (PIFSC) Recording Current Meters (RCM) provide a time series of water current and temperature at coral reef sites.

(continued on page 8)

DID YOU KNOW...

Our new Website has a section dedicated to helping you get personally involved in coral reef conservation, whether you are looking for a job, internship, volunteer work, funding, or want to know what you can do in your daily life to help.

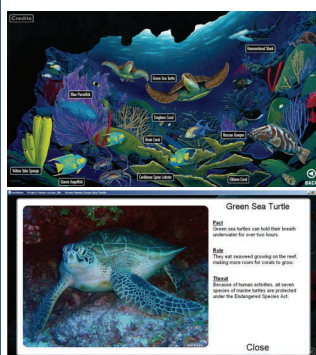
Check out the 'Get Involved' section of our site to learn



Coral Reefs support more species per unit area than any other marine environment. Courtesy: Dave Burdick

New Data in CoRIS continued...

Product Name	Description
CRED Subsurface Temperature Recorder (STR) data for the Northwestern Hawaiian Islands Link to sample metadata for this product	Data from Coral Reef Ecosystem Division (CRED), NOAA Pacific Islands Fisheries Science Center (PIFSC) Subsurface Temperature Recorders (STR) provide a time series of water temperature at coral reef sites. Data is typically collected at 1800 second intervals for a duration of 2 years using a SBE39 Temperature Recorder (Sea-Bird Electronics, Inc.).
CRED Coral Reef Early Warning System (CREWS) Enhanced Buoy data for the Northwestern Hawaiian Islands, CNMI, Main Hawaiian Islands, American Samoa and the PRIAs Link to sample metadata for this product	CREWS Enhanced (CREWS-ENH) buoys are equipped to sea surface measure water temperature and conductivity (Sea-Bird Model SBE37-SM, Sea-Bird Electronics, Inc., www.seabird.com); PAR, UV305 nm, UV330 nm and UV380 nm (Biospherical BIC2104U) at 1 m (nominal) below the water line and air temperature (R.M Young Model 41342); barometric pressure (Heise DXD); wind vectors (Vaisala WAS425A); PAR, UV305 nm, UV330 nm and UV380 nm (Biospherical BIC2104R) at 2 m (nominal) above the water line. A compass (KVH C100 SE-25) is used in the calculation of wind direction and a GPS system provides



Interactive Reef

Looking for a fun way to learn about some of the creatures that inhabit coral reefs? Check out the [Interactive Reef](#), a Flash-driven product that provides a photo of, fact about, threat to, and ecosystem role of ten Caribbean reef species.

IndoPacific Lionfish Invasion Professional Exchange. Lionfishes are venomous species of scorpionfishes which are native to IndoPacific oceanic coral reef ecosystems and adjacent habitats. Because of their colorful and dramatic appearance, they are prized by aquarists around the world. Through accidental and purposeful release into warm Atlantic waters, they have become established as voracious alien species that pose a serious threat to coral reefs in Bermuda, the American tropics of Florida, the Gulf of Mexico, the Caribbean islands, Central America, and northern South America.

CoRIS has created a [professional exchange](#) about the IndoPacific lionfish invasion of the US

south Atlantic sea coast and Caribbean Sea, as discussed on the [Coral Health and Monitoring Program Coral-List listserv](#), an online forum for online discussions pertaining to coral reef ecosystem research, conservation, and education. The participants in this Coral-List discussion were concerned with the sources of introduction of lionfishes into the Atlantic Ocean, the increased number of sightings of at least two species of lionfishes in various locations, the nature of threats posed by these fishes to Atlantic coral reefs, and what protective or control measures could be applied to reduce these threats. To obtain additional information about this new professional exchange, please [contact CoRIS](#).

(continued on page 9)

Publications

Report Details Effects of Disease and Bleaching in Two Regions of Puerto Rico. Remote reefs off southwest Puerto Rico have experienced recent losses in live coral cover of 30 to 80 percent, primarily due to the decline of *Montastraea annularis* and *M. faveolata* from disease and bleaching. The publication, "[Ten years of change to coral communities off Mona and Desecheo Islands, Puerto Rico, from disease and bleaching](#)," appears in the Volume 87 (1-2) of the journal *Diseases of Aquatic Organisms* and chronicles the decline of coral communities over a decadal time frame in the US Caribbean. This work was funded, in part, by the CRCP, and demonstrates the catastrophic impact of bleaching and disease.

New Paper Analyzes Use of LiDAR to Predict Coral and Fish Abundance and Diversity. Light Detection and Ranging (LiDAR) is a remote sensing system used to collect topographic data. A recent study by [National Centers for Coastal Ocean Science](#) scientists in the *Journal of Coastal Research* demonstrates the utility of LiDAR-derived bathymetry and spatial predictive modeling as a novel and cost-effective technique to improve knowledge of faunal distributions over complex coral reef seascapes. The techniques can be used to support ecosystem-based management and marine spatial planning. The techniques developed may also have broader applications for predicting the occurrence of deep water corals and for predicting the geographical shifts of species under varying climate change scenarios. This study demonstrates great utility for LiDAR-derived bathymetry in the future development of benthic habitat maps and faunal distribution maps to support ecosystem-based management and marine spatial planning. For further information or to request a pdf of the paper, contact [Simon Pittman](#).

Citation: Pittman, S.J., B.M. Costa, and T.A. Battista. 2009. Using LiDAR Bathymetry and Boosted Regression Trees to Predict the Diversity and Abundance of Fish and Corals. *Journal of Coastal Research*, Special Issue No. 53, pp. 27-38.

New Report Now Available on CoRIS. A new publication that was announced in the October issue of this newsletter, [Proceedings of the First International Workshop on Corallium Science, Management, and Trade](#), is now available online on the CoRIS Website.

Report Details Monitoring Protocol to Assess and Monitor Coral Reef MPAs in the Florida Keys. Long-term monitoring of coral reef fish and habitat in the Florida Keys and the Dry Tortugas region are the focus of a multi-agency collaborative project. Results from the monitoring efforts are used to (1) assess the effects of marine reserves and other management zones in these regions, and (2) improve understanding of ecosystem dynamics and guide ecosystem management, including the maintenance of sustainable fisheries. Sampling uses non-destructive visual assessments based on a stationary-diver technique deployed in a two-stage, stratified random sampling design.

As part of this ongoing effort to monitor the status and trends of reef fish populations inside and outside marine protected areas in the Florida Keys, a multiagency collaboration of NOAA [National Marine Fisheries Service](#), the [US National Park Service](#), the [State of Florida Fish and Wildlife Conservation Commission](#), and the [Rosenstiel School of Marine and Atmospheric Science](#) at the [University of Miami](#) have published a comprehensive protocol to standardize field sampling and data management. The multi-agency protocol is the first of its type for marine monitoring efforts in the US, and will be used as a standard and model for development and implementation of future collaborative monitoring efforts nationwide.

Citation: Brandt, M.E., N. Zurcher, A. Acosta, J.S. Ault, J.A. Bohnsack, M.W. Feeley, D.E. Harper, J. Hunt, T. Kellison, D.B. McClellan, M.E. Patterson, S.G. Smith. (2009). A Cooperative Multi-agency Reef Fish Monitoring Protocol for the Florida Keys Coral Reef Ecosystem. Natural Resource Report NPS/SFCN/NRR—2009/150. National Park Service, Fort Collins, Colorado.

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