



ANNOUNCEMENTS

First Larval Lionfish Collected in the Atlantic. The first recorded sample of a larval lionfish (*Pterois volitans*) in the Atlantic has been verified. The specimen was collected ~40 nautical miles east of Cancun, Mexico in April 2010. It was identified by biologists from El Colegio de la Frontera Sur (ECOSUR), Mexico. The specimen was verified to be a lionfish in late October via genetic analysis by scientists from Duke University and NOAA, along with an intern from the University of North Carolina. The larva measured 7 mm (total length) and was collected using Neuston nets aboard the [NOAA Ship Gordon Gunter](#) as part of the Spring Gulf of Mexico/Mexican Caribbean Ichthyoplankton cruise. The cruise was conducted in collaboration with NOAA Fisheries, the University of Miami, the Mexican Instituto Nacional de Pesca (INAPESCA), and ECOSUR.

Coral Micrographs Place in International Photo Competitions. Micrographs of coral by James Nicholson, a volunteer with the Coral Culture and Collaborative Research Facility at the [National Centers for Coastal Ocean Science](#) Center for Coastal Environmental Health and Biomolecular Research in Charleston, S.C.—operated by NOAA—recently placed in international photo competitions for Nikon and Olympus. Mr. Nicholson's image of a [mushroom coral](#) placed 3rd in the Olympus BioScapes Digital Imaging Competition (out of 2000 entries). *Scientific American* featured this image, among others, in the December issue in an [article](#) highlighting the Bioscapes competition. Another entry of an [Acropora species](#) received an honorable mention in the same contest. A different image of a [live mushroom coral](#) placed 13th in the Nikon Small World Competition, with an image of a [fluorescing mushroom coral](#) included in the Images of Distinction for the competition. Winners of the Nikon competition were announced on the Today Show in October and 13th place image also appears in the Nikon Small World 2011 [Calendar](#) as the image for July. For more information, please contact [Cheryl Woodley](#).

Search Feature Added to the CoRIS Acronyms and Abbreviations List. The NOAA Coral Reef Information System (CoRIS) [Acronyms/Abbreviations list](#) was compiled from a variety of sources, including the coral, coral reef, and marine tropical ecosystems peer-reviewed literature and grey literature, among other sources. The Acronyms/Abbreviations list contains over 4,700 entries and new content is added on a continual basis. Recently, a [search tool](#) was added to the CoRIS Website to increase the usability and functionality of this expanding resource. This new feature gives users the ability to quickly search the list by acronym or keyword, thus providing accurate concise search results. CoRIS encourages readers to contribute additional terms; please send suggestions to: coris@noaa.gov.

Recent Petitions for Coral Reef Associated Species. NOAA Fisheries received four petitions from WildEarth Guardians in early September to list 11 species that occur in tropical waters on or near coral reefs under the Endangered Species Act (ESA). These are:

- Saltmarsh topminnow: emergency listing
- Goliath grouper (a [former species of concern](#)), Nassau grouper, speckled hind
- Caribbean electric ray
- Knifetooth, Dwarf, Freshwater, Common, Narrowsnout, and currently unlisted populations of Smalltooth sawfishes. (This group of species all occur outside of US waters around the globe.)

UPCOMING EVENTS

February

22-25: [25th US Coral Reef Task Force Meeting](#), Washington, DC.

March

10-13: [National Science Teachers Association National Conference: Celebrating the Joy of Science](#), San Francisco, CA.

May

14-18: [2nd International Marine Conservation Congress: Making Marine Science Matter](#), Vancouver, BC, Canada.

July

17-21: [Coastal Zone 2011](#), Chicago, IL.

CURRENTS: WHAT'S NEW ON OUR WEBSITE

Corals in the News: [September](#), [October](#), [November](#), and [December](#)

Miscellaneous: Full color versions of [Guam](#) and [CNMI](#) Coral Reef Management Priorities, [Fiscal Year 2010 Grant Awards Table](#), [International Year of the Reef 2008: The Year in Review](#), [Search Tool](#) for Acronyms/Abbreviations List

It should be noted that a proposal for listing does not guarantee that a species will be listed as 'threatened' or 'endangered.' NOAA Fisheries has 90 days to make a determination whether each species "may be warranted" for listing under the ESA. For any species where listing "may be warranted," there would then be a more expansive review of the species' status to determine whether the species should be proposed for actual listing under the ESA. Results of the 90-Day Findings will be listed in the [Federal Register](#) as they are completed. Once 90-Day Findings are completed, any species for which listing "may be warranted" will also appear as 'proposed species' [here](#).

UPDATES FROM HEADQUARTERS

CRCP Developing Program-Wide Monitoring Plan. The CRCP National Coral Reef Monitoring Plan (NCRMP) Working Group met November 15-18 in Silver Spring as part of an ongoing planning effort to develop a handful of core variables for assessing status and trends of coral reef ecosystems across the Program. The workshop was successful in producing the following outcomes:

- agreement on critical 'Tier 1' indicators to be monitored under the following five themes: Coral/benthos, Fish, Climate, People, and Ecosystem Function;
- initial discussions on a new, more user-friendly, reporting mechanism; and
- a robust discussion and initial agreement on spatial domains and monitoring frequency

The working group is now drafting the Plan, which will go out for external review in February. The final Plan will be completed in the Spring, with an accompanying implementation plan slated for development by June.

NOAA Hosts 24th US Coral Reef Task Force Meeting. The [24th meeting](#) of the [US Coral Reef Task Force](#) (USCRTF) was held September 10-19. It was jointly hosted by Guam, the Commonwealth of the Northern Mariana Islands (CNMI), and Pohnpei (Federated States of Micronesia). Andy Winer, Director of External Affairs, represented NOAA as the co-chair of this meeting.

Regional meetings of this body focus on the specific coral reef conservation issues relevant to the host region. As such, the first two days of the meeting were comprised of workshops held in Guam about the expected impacts to coral reef habitat by military build-up and the subsequent population increase, as well as mitigation of these impacts. USCRTF Members then participated in site visits on Saipan (CNMI), including one to the American Recovery and Reinvestment Act-funded Laolao Bay project site.

Methods in which US government agencies can support the Micronesia Challenge were a large focus of the Business Meeting on Saipan. Members also discussed how the USCRTF should interact with the new Ocean Policy Task Force and the National Ocean Policy. During this meeting, NOAA announced the availability of management priority documents for both CNMI and Guam. NOAA also released *Coral Reef Ecosystems of the Mariana Archipelago: a 2003-2007 Overview*, the contents of which were requested in 2009 by local management agencies.

The Task Force is comprised of 12 federal agencies and the seven US states and territories that contain coral reefs within their boundaries. The USCRTF is charged with coordinating government efforts to protect these valuable resources. Updates on individual and cross-agency conservation initiatives, as well as decisions for the future direction and actions of this body, are a key part of these meetings and contribute to overall U.S. coral conservation successes. Regional meetings of this body focus on the specific coral reef conservation issues relevant to the host region. NOAA serves as the co-chair of the USCRTF with the [Department of the Interior](#).



Coral Fellows at USCRTF Poster Exhibit, September 2010: (L to R: Aric Bickel, Lauren Waters, Tammy Jo Tafi, Rina Hauptfeld, Marija Micuda, Luna Kekoa Jr., and Clare Shelton). Photo credit: Paulo Maurin

Coral Fellows Training Retreat. The [2010-2012 cohort](#) of Coral Reef Management Fellows participated in a training retreat from September 18-20th, 2010 where they received training on social marketing, participatory mapping and fund raising techniques. In addition, each fellow gave a presentation on their work, sharing their success stories and challenges with one another. It was a valuable opportunity for the fellows to learn about coral reef management efforts across the Pacific and Caribbean and to share ideas about how to creatively tackle similar issues in their own jurisdictions. They also each prepared a poster on the work that they are conducting which were displayed at the 23rd U.S. Coral Reef Task Force (USCRTF) meeting. Finally, they visited several classrooms at local schools in the Commonwealth of the Northern Mariana Islands to give

presentations on ocean conservation. Some of the presentation topics included: Plastics in the Marine Environment, Traditional and Cultural Aspects of Conservation, and Climate Change and the Oceans.

UPDATES FROM THE ATLANTIC/CARIBBEAN REGION

Grouper Spawning Research in the Dry Tortugas. [Southeast Fisheries Science Center](#) (SEFSC) investigators conducted a three day research cruise in the Tortugas South Ecological Reserve from December 5-7 to study grouper spawning aggregations. The project is a collaboration of scientists from the SEFSC's [Beaufort](#) and [Miami](#) laboratories, the [University of South Florida](#) and the [National Centers for Coastal Ocean Science](#). On this cruise, scientists retrieved and redeployed digital spectrum recorders and passive acoustic listening devices at sites likely to harbor spawning aggregations of grouper species. Scientists aim to pin down location and timing of spawning events from any acoustic signals associated with grouper spawning that these devices captured.

Scientists Collect Pre-experimental Closure Biological Data in FGBNMS. From October 9-15, a team of researchers from the [National Centers for Coastal Ocean Science](#) (NCCOS) and partnering organizations completed scuba surveys to determine fish and benthic community structure on the shallow coral caps of the [Flower Garden Banks National Marine Sanctuary](#) (FGBNMS). This effort is part of a comprehensive, two-year project to establish baseline data on the condition of the biological resources within the sanctuary prior to the establishment of a proposed eight to ten year experimental fishing closure. Data from the surveys, along with information on the deeper coral caps (110'-150') and other deep habitats (> 150'), will be used to determine closure location and to develop a monitoring strategy to evaluate the efficacy of the proposed closure. In addition to the scuba surveys, hydro acoustic technology was used to estimate nocturnal fish densities and algal samples were collected for investigation of ciguatera toxins.

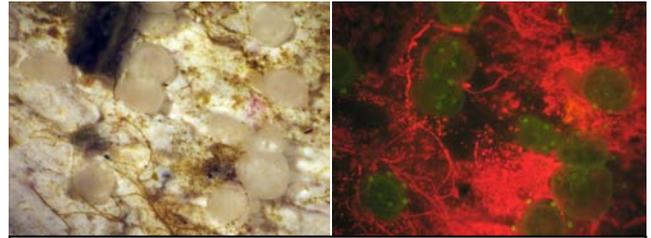


Bleached fire coral in the FGBNMS. Photo Credit: FGBNMS

Scientists also observed the onset of a coral bleaching event in the sanctuary at Stetson Bank, East Bank and West Bank. "Several species were bleached and we are concerned we could lose much of the fire corals this year," said Emma Hickerson, sanctuary research coordinator for the site, located off the coasts of Texas and Louisiana.

This mission was a collaborative effort funded in part by the CRCP and supported by researchers from NCCOS, [Harbor Branch Oceanographic Institute](#), and the FGBNMS.

SEFSC Leads Effort to Document Coral Spawning in the Florida Keys. The [Southeast Fisheries Science Center](#) (SEFSC) coordinated a multi-institutional effort to document coral spawning from August 26 to September 1 in the upper region of the [Florida Keys National Marine Sanctuary](#) (FKNMS). In addition to FKNMS, participants included non-governmental organizations such as the [Coral Restoration Foundation](#), [John G. Shedd Aquarium](#), [The Florida Aquarium](#), [TRUE Dive Team](#); academic partners such as the [University of Miami](#), [Penn State University](#), and the [University of Florida's Tropical Aquaculture Lab](#); and involved six vessels and about 30 divers. Unfortunately, no Elkhorn coral (*Acropora palmata*) spawning was observed at the four monitored sites during the predicted nights. Mountainous star coral (*Montastraea faveolata*) spawned on August 31, but weather and poor fertilization success for the collected gametes impacted culturing of the coral. It is possible that the tremendous [cold stress](#) endured by Florida Keys corals during the past winter impaired their reproductive investment this year. Some pilot experiments were accomplished and the partner teams gained valuable field experience, building the overall capacity to study coral spawning and aquaculture for basic research and restoration.



These images show cultured babies of *Montastraea faveolata*, cultured from captured spawn and settled on artificial substrate. The left image shows the polyps under normal light and the right image shows the same individuals under fluorescent light. Each polyp is less than one mm in diameter. Photo Credit: SEFSC



A CCREMP diver collects survey data along a transect in Puerto Rico. Photo Credit: NCCOS Biogeography Branch

Long-term Data Set the Stage for Coastal Marine Spatial Planning in Puerto Rico. A long-term data series collected by scientists with the [National Centers for Coastal Ocean Science](#) may help the Commonwealth of Puerto Rico as it moves ahead with coastal marine spatial planning (CMSP) efforts. The Department of Natural and Environmental Resources and the University of Puerto Rico are examining how to use [Caribbean Coral Reef Ecosystem Monitoring Project](#) (CCREMP) efforts to inform CMSP. The CCREMP products enable the management community to make spatially explicit management decisions, balancing conservation with human uses of the marine environment. Field work conducted from August 8-29 marked the tenth year of data collection in Puerto Rico. The CRCP provided funding for this project.

Scientists Contribute to Guánica Bay, Puerto Rico Restoration Effort. Scientists from the [National Centers for Coastal Ocean Science](#) (NCCOS) completed a three-week field mission to Guánica, Puerto Rico. This mission was a core component of a larger collaborative effort to restore the Guánica Bay watershed and improve the condition of the neighboring coral reef ecosystem. The co-led NCCOS/University of Puerto Rico component of this effort includes a baseline assessments of biological resources (fish, corals and seagrass), chemical contaminants, and nutrients and sedimentation rates. This information, collected prior to proposed watershed restoration activities, will then be utilized to evaluate the subsequent effectiveness of restoration efforts. Complementary efforts to identify, design and implement appropriate watershed restoration activities are being led by the [Center for Watershed Protection](#), [NOAA's Restoration Center](#), and the [US Department of Agriculture's Natural Resource Conservation Service](#). Funding for this [project](#) was provided by the CRCP.



NCCOS divers conducted a baseline assessment of Guánica Bay that will ultimately help scientists and managers evaluate the effectiveness of future restoration efforts. Photo Credit: NCCOS Biogeography Branch

UPDATES FROM THE PACIFIC REGION

Cruise Monitors Coral Reef Ecosystems of Main Hawaiian Islands. On November 5, scientists aboard the [NOAA Ship Hi'ialakai](#) returned to Honolulu from a 30-day [mission](#) to study coral reef ecosystems in the Main Hawaiian Islands (MHI). This is the fourth expedition by staff of the NOAA [Pacific Islands Fisheries Science](#)

[Center](#) (PIFSC) [Coral Reef Ecosystem Division](#) (CRED) and partner agencies to assess and monitor reef-associated plant and animal life in this region. Biennial Reef Assessment Monitoring Program cruises have monitored conditions in this region since 2000 and are funded by the CRCP.



Divers conducting belt transect surveys on the North Kohala Coast of the Big Island. Photo Credit: Darla White, NOAA

Divers surveying along 25-m transect lines conducted [rapid ecological assessment](#) surveys of reef fishes, corals, other invertebrates, and algae. [Towed-diver](#) surveys were conducted for larger-scale assessments. Diversity of coral reefs will be evaluated by retrieved autonomous reef monitoring structures previously placed on the seafloor. Other scientists aboard the *Hi'ialakai* collected data on water temperature, salinity, and other physical characteristics of the coral reef environment using an assortment of oceanographic sampling and monitoring instruments.

Data collected during this mission are pivotal to long-term biological and oceanographic monitoring of coral reef ecosystems in the Hawaiian Archipelago. The 2010 expedition will add to information collected during monitoring and mapping surveys conducted in 2005, 2006, and 2008. Data on the abundance and spatial distribution of reef fishes, invertebrates, corals, and algae will allow scientists to evaluate potential changes in the condition and integrity of coral reef ecosystems in the Hawaiian Archipelago and enable federal and state resource managers to more effectively conserve coral reefs ecosystems of the MHI and manage ecosystem services.

NOAA/SeaWeb Kick-Off Coral Communications Partnership. The Commonwealth of the Northern Mariana Islands (CNMI) identified social marketing as a priority approach to advance coral conservation goals during its first Conservation Action Plan (CAP). As a result, the CRCP is helping develop a social marketing campaign strategy to reduce damaging activities on CNMI's coral reefs. NOAA has partnered with [SeaWeb](#), a Washington, DC-based organization with offices in the Pacific Islands, to provide CNMI with support and guidance in developing the campaign strategy.

On October 13-14, SeaWeb led a planning workshop for outreach staff from CNMI natural resource management agencies. Key workshop outcomes were providing participants with working experience with the tenets of social marketing and identifying core campaign roles, including the campaign team, key support staff, and campaign partnerships. The workshop also identified specific campaign goals and barriers to change. In future stages of the CNMI effort, the team will conduct further research of community attitudes and perceptions, complete the design and implementation of a campaign strategy, and conduct an impact evaluation.

The CNMI initiative comes at the leading edge of a larger, three-year partnership which will dedicate NOAA funding and matching funds from SeaWeb to help the US coral jurisdictions identify initial priority areas for building a foundation for social marketing and strategic communications campaigns. Campaign strategies will be designed, carried out and evaluated within target areas, with the aim of increasing public dialogue on coral conservation, protection and management. The partnership and agreement are the result of a competitive selection process following a request for proposals issued by NOAA in early 2010. To learn more, read the NOAA [press release](#).

NWHI RAMP Cruise Monitors Papahānaumokuākea Marine National Monument. Pacific Islands Fisheries Science Center (PIFSC) Coral Reef Ecosystem Division (CRED) scientists and their partners left Honolulu on September 5 aboard the NOAA Ship *Hi'ialakai* for a 26-day Pacific Reef Assessment and Monitoring Program (RAMP) [cruise](#) in the Papahānaumokuākea Marine National Monument (PMNM). Research partners were from the University of Hawaii Joint Institute for Marine and Atmospheric Research, Ocean Associates, San Diego State University, and the Papahānaumokuākea Marine National Monument.

This Northwestern Hawaiian Islands (NWHI) RAMP cruise focused on French Frigate Shoals, Pearl and Hermes Atoll, Kure Atoll, and Lisianski Island. Scientists used standard Pacific RAMP techniques to survey

benthic and fish populations and hydrographic properties and to deploy and retrieve scientific instruments. For the first time in the NWHI, the CRED installed calcification acidification units to establish baseline information on crustose coralline algae and stony corals in the NWHI, including the growth rates and other changes in these critical reef-building organisms as oceans become more acidic.

NOAA's Coral Reef Watch issued a widespread bleaching alert for parts of the Pacific for September through December 2010. To better understand coral reef ecosystem responses, Pacific RAMP scientists observed conditions across the Hawaiian Archipelago. In the north and northwest backreef areas at Kure Atoll, scientists reported up to 100% bleaching of a single species, *Montipora capitata*, in localized areas at depths less than three meters. However, researchers noted that the overall degree of bleaching was similar to what was reported during 2008 and 2009 missions and that no dead corals were observed during the mission that were associated with this bleaching event. At French Frigate Shoals, a number of overturned table corals were observed which could be an effect of Hurricane Neki, which passed directly over French Frigate Shoals in October 2009.

Monitoring biological, physical, and oceanographic parameters in the NWHI is a critical part of understanding the condition of and changes to this region's coral reef ecosystems and the processes that influence them, ultimately providing resource managers with information needed for ecosystem-based management. The first NWHI RAMP cruise occurred in 2000.

Teachers Environmental Workshop in American Samoa. From June 29-30, the American Samoa-based group, Le Tausagi, hosted a teachers environmental workshop for 21 participants (8 teachers, 5 junior counselors and 8 Le Tausagi members). Le Tausagi is a group of educators and technical experts from various resource agencies, both local and federal. The major theme of the workshop was "Ridge to Reefs Teachers Discovering American Samoa's Natural Resources". Its primary goal was to engage elementary science teachers and resource agencies personnel in an environmental workshop focusing on marine-related issues that prepared them to take leads during the 2010 Enviro-Discoveries summer camps. A pre-evaluation was conducted prior to the workshop in several elementary schools; it identified the major themes that teachers need more resources and information about:

coral reefs and fisheries, water quality and climate change. The workshop itself included presentations on the three themes, group activities, field trips, development of lesson plans and student activities, and how to work together as a team to facilitate group activities. Teachers who participated in the workshop gained knowledge and resources—such as student activities and other tools—to use in developing lesson plans and educating their students about environmental and marine issues. In addition, the teachers gained skills, knowledge and increased understanding of various marine issues. The participating teachers formulated a network of science teachers in partnership and collaboration with Le Tausagi to plan, develop and implement marine science education and awareness activities in local schools. The outcomes of this workshop should enhance the local environmental education campaign. The major sponsors for the workshop were NOAA's Pacific Islands Regional Office and the local Department of Marine and Wildlife Resources.



Participants in the 2010 environmental workshop. Photo Credit: Fatima Sauafea-Leau



Participants in the 2010 Tutuila Enviro-Discoveries camp. Photo Credit: Fatima Saua'ea-Leau

2010 Enviro-Discoveries Camps. Enviro-Discoveries Camp is an annual event put together by the Le Tausagi group to educate the young people of American Samoa on the importance of conservation and management of resources while fostering and promoting their stewardship and interest. From July 13-15, Le Tausagi hosted the 2010 Enviro-Discoveries Camp for students ages eight to 13 on Tutuila island, American Samoa. The three-day sleep-away camp provided 48 students with hand-on activities such as skits, plays, drawing, presentations, singing, swimming, boat rides, kayaking, and snorkeling that connected them to their land and marine environments. This year's camp was unique since it was the first time teachers participated as facilitators and presenters. The activities that were developed during the

Teachers workshop in June were implemented and utilized by students in small groups. In addition, a popular activity introduced last year, the Environmental Wish Banner, was repeated this year. In this activity, the kids were asked to envision what they would like to see in the future in their environment and write it down as a vision on a piece of paper. Each student was then asked to take their vision and make it into a wish. Each student wrote their wishes on the banner and created a Wish Banner. From July 20-22, Le Tausagi held another session of the Enviro-Discoveries Camp on the Manu'a islands for over 60 children. The major sponsors for the camp were NOAA's Pacific Islands Regional Office and the local Department of Marine and Wildlife Resources.

INTERNATIONAL UPDATES

CRW Staff Attends Coral Triangle Regional Exchange in Indonesia. A NOAA [Coral Reef Watch](#) (CRW) staff member attended a workshop entitled "Regional Policy and Action Planning for Climate Change Adaptation in the Coral Triangle Countries" in Ancol, Jakarta, Indonesia from October 19-21. The meeting was held as part of the US Coral Triangle Initiative (CTI) Support Program and included delegates from each of the six Coral Triangle (CT) countries, as well as resource staff from NOAA, the Coral Triangle Support Program (i.e., The Nature Conservancy, World Wildlife Fund, and Conservation International), and other organizations with experience and expertise relevant to the Coral Triangle. The broad goal of the workshop was to support the following objective from the CTI's Regional Plan of Action: *Region-wide Early Action Plan for Climate Change Adaptation for the near-shore marine and coastal environment and small islands ecosystems developed and implemented.* The workshop focus included: solidifying timelines and actions for developing an Early Action Plan for Climate Change Adaptation (CCA), collaborating on CCA policy and capacity building, and finding common ground on regional and global policy issues where CTI countries can stand together and work toward shared solutions.

Outcomes from the workshop included: (1) a draft CTI Ministerial Communiqué on Climate Change Adaptation for the United Nations Framework Convention on Climate Change 16th Conference of the Parties (COP 16) that was held in Cancun in early December; (2) identification of timeline, objectives, approaches, financing, and a framework for the CTI Early Action Plan for CCA; (3) sharing of climate change and adaptation policy information among the CT

countries to define common ground for collective actions and opportunities for filling future policy gaps; (4) a commitment to support development of a Climate Adaptation Funding Marketplace, in consultation with the Sustainable Finance Working group; (5) establishment of the CTI technical Climate Change Working Group, with Indonesia and the Solomon Islands as co-chairs; (6) a commitment from each CT delegation to prepare and present a briefing package for CT ministers; and (7) a commitment from CT delegates to work toward forming a 'CT block' of negotiators at the COP16 & 17 meetings.



Participants in the "Regional Policy and Action Planning for Climate Change Adaptation in the Coral Triangle Countries" Workshop. Photo Credit: Ms. Diah Adji Purbosari.

CRW Attends Community Climate Adaptation Planning Workshop in Pohnpei, FSM. A workshop entitled “Climate Camp 2010: Preparing for Climate Change” was held at the former Pohnpei Agriculture and Trade School in Pohnpei, the capitol of the Federated States of Micronesia (FSM) from September 6-9. The workshop was facilitated by the [Micronesia Conservation Trust](#) (MCT) and [The Nature Conservancy](#) (TNC), with support from the [Pacific Islands Managed and Protected Area Community](#) (PIMPAC), and with funding from the German Ministry for the Environment, Nature Conservation, and Nuclear Safety. Participants attended from the country and state members of the Micronesia Challenge, which includes the FSM (Yap, Chuuk, Pohnpei, and Kosrae), the Republic of the Marshall Islands, Palau, Guam, and the Commonwealth of the Northern Mariana Islands. NOAA [Coral Reef Watch](#) (CRW) staff attended the workshop to provide information on coral reefs, which are one of the target resources of concern. Other experts from MCT, TNC, the [Secretariat of the Pacific Community](#), the [University of Guam](#), and the [US Geological Survey](#) discussed climate impacts to coastal ecosystems, water security, fisheries and food security, and issues of sea level rise and hazard risk management. Outcomes of the workshop included a plan to update the PIMPAC manual with the climate lenses for MPA planning, as well as draft support materials to be translated into local languages. These supporting documents are designed to help community and traditional leaders communicate climate change impacts and actions to adapt to climate change to the citizens of FSM, RMI, Palau, Guam, and CNMI.

Caribbean Regional Lionfish Workshop. A workshop to identify and refine ‘best practices’ for responding to invasive lionfish (*Pterois sp.*) in the Wider Caribbean was held in Cancun, Mexico, from August 25 to 27. The objectives of the workshop were to:

- Identify, review, consolidate and refine ‘best practices’ for control of invasive lionfish,
- Create the foundation for a regional body to work collaboratively on lionfish issues in the Wider Caribbean,
- Increase regional awareness, communication, collaboration and capacity to control lionfish in the Wider Caribbean, and
- Achieve consensus among workshop participants on effective lionfish control strategies, next steps, and action items, while simultaneously recognizing the unique challenges faced by each country represented at the workshop.

Participants from seventeen countries and territories gave presentations on the status of lionfish across the Caribbean region and shared stories on successes, challenges, and needs for responding to the highly invasive species. Workshop presentations can be found [online](#). To identify and refine best practices for responding more effectively to lionfish in the Caribbean, the participants also engaged in roundtable discussions organized under the following themes: education and outreach; control strategies; policies and regulations; partnerships; research priorities; and resource needs. Concluding discussions focused on the need for continued collaboration on lionfish issues and follow-up activities, including developing a best practices manual for distribution across the Caribbean, establishing a body of lionfish experts to serve as a regional task force; and establishing a central clearing house to share information on lionfish control strategies. A report from the workshop and initial steps on developing the lionfish best practices manual were presented at the 25th [International Coral Reef Initiative](#) General Meeting, November 8-12, in Apia, Samoa.

The workshop was co-hosted by NOAA, the Mexican National Commission for Protected Areas, and the [Reef Environmental Education Foundation](#), with additional support from the [International Coral Reef Initiative](#) (ICRI) and the government of France. NOAA representatives played major roles planning and leading the workshop. Approximately 40 participants were in attendance, including representatives from the Bahamas, Belize, Bermuda, Bonaire, Canada, Cayman Islands, Colombia, Cuba, Dominican Republic, Jamaica, Martinique, Netherlands Antilles, Turks and Caicos, United States (including representatives from Puerto Rico and the US Virgin Islands), and Venezuela, as well as the SPAW Regional Seas Database and Mexico’s Comisión Nacional de Acuacultura y Pesca, Comisión Nacional para el Conocimiento y Uso de la Biodiversidad, and Comisión Nacional de Áreas Naturales Protegidas.



Members of the international science team for this field work at Parque Nacional Isla Contoy; (back row, L to R) Alberto Burgos, Lourdes Vasquez, Mario Yescas, Elias Caamal, Jose Cohuo, Gonzalo Badillo, (front row, L to R) Laura Carrillo, Selene Morales, Estrella Malca, Jose Olivares. Photo Credit: NOAA Early Life History Lab

Larval Fishes, Connectivity, and Management: A Mesoamerican Reef Case Study. In July and August, a team of scientists, graduate/undergraduate students and local managers carried out the research field work component of the CRCP project “Applying capacity assessment programs to biophysical monitoring of MPA effectiveness along the Mesoamerican Reef” at [Parque Nacional Isla Contoy \(PNIC\)](#) in Quintana Roo, Mexico. The Mesoamerican reef is connected to the US via the Yucatan current that turns into the loop current into the Gulf of Mexico and the Florida Straits. This MPA is therefore important as it may be a source of larval fish recruits to the US Southeast region. This study combined expertise from ongoing and previous CRCP-funded projects to assess larval and juvenile fishes along with physical oceanographic parameters within a connectivity context. The [Early Life History Unit](#) at the NOAA [Southeast Fisheries Science Center](#) (SEFSC) participated along with the University of Miami’s [Cooperative Institute for Marine and Atmospheric Studies](#), two Mexican academic institutions and the Mexican government’s Comisión Nacional de Áreas Protegidas. The ten-day

mission carried out daily collections of larval/juvenile fishes using channel nets, light traps, and seine nets. Simultaneously, instruments were deployed to measure meteorological parameters, water current velocities, temperature and salinity around the island and lagoons. The island’s lagoons are protected as nursery grounds for valuable commercial species; at the request of the director of the MPA, researchers carried out additional sampling to support management decisions in the upcoming re-evaluation of the island’s management plan, which may allow recreational activities that are currently prohibited on the island.

In order to inform the scientific community about management practices for coral reef connectivity science on a regional basis, researchers presented a poster of this project in October at "A Conference & Workshop on the Florida Keys Marine Ecosystem - Linking Science to Management" as a case study that can be applied to connectivity science and management for functional networks of MPAs.

DIVE DEEPER: DEEP-SEA CORALS

Deep-sea Coral Research Priorities in Alaska. In the frigid seas of Alaska, deep-sea corals and sponges form dense “gardens” that are structurally complex and offer habitats for various fish and invertebrate species. Starting in 2012, NOAA’s [Deep Sea Coral Research and Technology Program](#) will support a three-year effort to study these unique ecosystems.

To prepare for this research, on September 14 and 15, NOAA organized a workshop in Anchorage, Alaska, to determine the information needs regarding deep-sea corals and to identify the research activities that can address those needs. Representatives from the fishing industry, the [North Pacific Fishery Management Council](#), academia, conservation groups, the state of Alaska and NOAA met at the workshop and reviewed the existing knowledge on deep-sea coral distribution, ecology, and management. With this common background, the workshop participants then determined the information gaps that need to be filled. The information needs identified range from a thorough inventory of data sources to studies on the habitat functions provided by deep-sea corals to managed fish species. On the last day of the workshop, the participants offered ideas on the research activities for NOAA to consider in its three-year research effort. The activities proposed include extracting coral-related data from existing datasets and conducting field observation and sampling of deep-sea coral communities.



A yelloweye rock fish (*Sebastes ruberrimus*), associated with a red tree coral near Baranof Island, southeast Alaska. Photo Credit: Victoria O’Connell, Alaska Department of Fish and Game, photo courtesy of NOAA/OER

NEW DATA IN CoRIS

Product Name	Description
Gridded Geomorphology data files for Ta'u Island Sample Metadata Link	The geomorphological data layers of slope, rugosity, bathymetric position index (BPI) structures and BPI zones produced at the Pacific Islands Benthic Habitat Mapping Center (PIBHMC) were derived from multibeam bathymetry and bathymetry derived from multispectral IKONOS satellite imagery. This data set is for Ta'u Island, American Samoa.
US Environmental Protection Agency National Coastal Assessment for Hawaii 2002 (NODC Accession 0061250) Sample Metadata Link	In 2002, the Environmental Protection Agency (EPA) Environmental Monitoring and Assessment Program (EMAP) National Coastal Assessment (NCA), in conjunction with state agencies, Region 9, and the University of Hawaii, conducted the first comprehensive survey of the condition of estuarine resources in Hawaii. The survey sampled 79 stations on islands of the Hawaiian chain and included all of the indicators of the NCA surveys.
Sea surface temperatures from AVHRR Sample Metadata Link	The production of these AVHRR L2P data is a NEODAAS activity in collaboration with the UK National Centre for Ocean Forecasting (NCOF). NEODAAS-Dundee acquires approx. 15 AVHRR HRPT passes per day over NW Europe and Arctic, each approx. 15 minutes duration. These are immediately transferred to NEODAAS-Plymouth where they are processed into SST products and converted to L2P. This metadata record is a collection-level description for sea surface temperatures from AVHRR data for all time periods.
2010 CRED REA Line Point Intercept Surveys of Benthic Parameter Assessments for American Samoa and the Pacific Remote Island Areas Sample Metadata Link	Benthic biologists from NOAA's Coral Reef Ecosystem Division conducted Line Point Intercept surveys to quantitatively document the benthic cover at pre-determined long-term monitoring REA sites. All living benthic elements (e.g., coral, algae, and other invertebrates) were identified to the lowest taxonomic level possible, often substituting functional group categories for turf algae and crustose coralline algae when identification in the field was extremely difficult. In cases where the substrate is bare or covered with turf algae, the substrate composition is also noted as either sand, rock, rubble, carbonate pavement, or dead coral.
C-CAP Land Cover, United States Virgin Islands Sample Metadata Link	These datasets consist of land cover derived from high resolution imagery and was analyzed according to the Coastal Change Analysis Program (C-CAP) protocol to determine land cover. Datasets available include Saint Croix 2002 land cover, Saint Croix 2007 land cover, Saint Croix 2002 - 2007 land cover change, Saint John 2005 land cover, Saint John 2007 land cover, Saint John 2005 - 2007 land cover change, Saint Thomas 2002 land cover, Saint Thomas 2007 land cover, and Saint Thomas 2003 - 2007 land cover change.
2005 CRED REA Algal Assessments for the Commonwealth of the Northern Mariana Islands Sample Metadata Link	Raw survey data included genus presence and relative abundance, and voucher specimens. Detailed taxonomic analyses of voucher specimens are presented.

PUBLICATIONS

CRW Leads Satellite Remote Sensing of Coral Reefs Paper in Special Issue of *Oceanography*. The Coordinator of NOAA [Coral Reef Watch](#) (CRW) is the lead author of a new paper published online as part of the December 2010 *Special Issue on the Future of Oceanography from Space*. The paper, entitled [Monitoring Coral Reefs from Space](#) highlights the many ways that satellite remote sensing tools map and monitor coral reefs and their threats. It also discusses how remote sensing data and information is of use to coral reef managers, presents some of the limitations of current technologies, and provides a look toward future capabilities and research needs. CRW Knauss Fellow coordinated the entire publication and serves as the second author on it.

CRW Authors Paper on Collaborative Project in the Bahamas. NOAA [Coral Reef Watch](#) (CRW) staff, Dr. Mark Eakin and Dr. William Skirving, co-authored a paper released on November 24 in the journal *Ecology Letters*, entitled [Reserve design for uncertain responses of coral reefs to climate change](#). The paper uses NOAA satellite data and larval connectivity models to design marine reserves in the Bahamas best suited for future climate change. The approach taken provides a tool that scientists, managers, and other stakeholders can use when considering different coral reefs for protection against local threats. The work was supported, in part, by the CRCP and the [Coral Reef Targeted Research](#) (CRTR) & Capacity Building for Management program, which is funded by the Global Environment Facility and the World Bank. NOAA CRW, partners at CRTR and the University of Queensland announced the *Ecology Letters* paper in a press release entitled, [Location Location Location: Some coral reefs less vulnerable to rising sea temperatures](#).

Ocean Acidification Threatens Coral Reproduction. Scientists from the University of Miami, [Rosenstiel School of Marine and Atmospheric Science](#) and NOAA [Southeast Fisheries Science Center](#) conducted experiments to determine whether ocean acidification threatens successful sexual recruitment of reef-building corals. Researchers tested fertilization, settlement, and post-settlement growth of Elkhorn coral (*Acropora palmata*) at partial pressure of carbon dioxide (pCO₂) levels that represent average ambient conditions during coral spawning and the range of pCO₂ increases that are expected to occur in this century due to ocean acidification. The resulting paper published in the *Proceedings of the National Academy of Sciences*, entitled [Ocean acidification compromises recruitment success of the threatened Caribbean coral *Acropora palmata*](#), documents declines in fertilization, settlement and growth with increasing pCO₂; lower sperm concentrations; and a reduction in linear extension rates. Under pCO₂ conditions projected for the middle and end of this century, coral recruitment could be reduced between 52% and 73%. While this work was not directly funded by CRCP, it relied directly on Dr. Margaret Miller's coral spawning work supported by CRCP and thus, the CRCP is acknowledged in the paper.

CRW Bleaching Paper in PLoS ONE. [Caribbean Corals in Crisis: Record Thermal Stress, Bleaching, and Mortality in 2005](#) was published in [PLoS ONE](#) on November 15. The paper was authored by the [Coral Reef Watch](#) (CRW) Coordinator and co-authored by 64 coral reef ecosystem scientists and managers from 22 countries, including other CRW staff. The *PLoS ONE* paper focuses on the record losses of Caribbean corals in 2005 as a result of high ocean temperatures in the tropical Atlantic and Caribbean. It uses data from the most comprehensive documentation of basin-scale bleaching to date and directly compares the event to the thermal stress measured by NOAA satellites. Of note, the work conducted as a part of this study raised the standards for documenting coral bleaching impacts and for testing satellite and forecast products. NOAA issued a [press release](#) about the paper and an interview of Dr. Eakin by *ClimateWire* led to an article in that publication and [another](#) in *Scientific American*.

Report Sheds Light on MPA Design and Function in Hawai'i. A report published by the [National Centers for Coastal Ocean Science](#) links marine protected areas (MPAs) in Hawai'i with greater fish abundance, size and diversity, as well as higher coral species richness, illustrating the effectiveness of the closures. The report, entitled [Monitoring Hawaii's Marine Protected Areas: Examining Spatial and Temporal Trends Using a Seascape Approach](#), compares four marine life conservation districts with surrounding areas that are not protected and managed. The report is based on benthic habitat maps and coral ecosystem monitoring studies conducted between 2002 and 2004 at Pupukea, Kealakekua Bay, Honolua Bay and Hanauma Bay. Researchers found that fish biomass increased in three of the four Marine Life Conservation Districts. Other key findings demonstrate that top predators, such as sharks and jacks, and important fisheries species were more abundant and larger inside the protected areas. Coral species richness and cover was also higher. The results clearly show that areas with good habitat quality and management conserve fish populations within their boundaries while areas without protection are in poorer ecological condition and continue to decline over time. The findings from this study greatly contribute to the understanding of MPA design and function in Hawai'i and can be useful in the development of comprehensive coastal and marine spatial planning.

Caribbean Reefs Featured in NOAA *Climate Watch Magazine*. A story featuring Caribbean reefs in the face

of climate change was featured in the October 7 issue of *ClimateWatch Magazine*. Entitled [*Hope in the Face of a Caribbean Coral Crisis*](#), the story features an interview of an [US Geological Survey](#) biologist based at the [US Virgin Islands National Park](#) and her thoughts in facing the possibility of another massive coral bleaching event in the Caribbean Sea in late summer and early fall 2010. The story was compiled by a Coral Reef Watch intern and is still available as one of the rotating pieces on the [Climate Portal](#).

NOAA Issues Press Release about High Potential for Coral Bleaching in the Caribbean in 2010. In September, NOAA issued a press release, entitled [Coral Bleaching Likely in Caribbean This Year](#) about the high probability of coral bleaching in the Caribbean for the remainder of 2010 and the utility of NOAA [Coral Reef Watch's](#) (CRW) suite of operational and experimental [products](#) in predicting the bleaching events. Sea surface temperatures have been consistently above-average in the Caribbean basin this year. CRW's [Seasonal Bleaching Outlook](#) provided maps showing that this region had a strong potential for bleaching-levels of thermal stress. Reports of minor to substantial coral bleaching were submitted this Fall from NOAA offices and partners throughout the Caribbean, especially in Puerto Rico. Bleaching was also reported in the Gulf of Mexico, including the [Flower Garden Banks National Marine Sanctuary](#).

Summary Booklet on the Coral Reef Ecosystems of the Mariana Archipelago Released at USCRTF Meeting. In response to specific requests in 2009 from management agencies in the Commonwealth of the Northern Mariana Islands and Guam, the [Pacific Islands Fisheries Science Center Coral Reef Ecosystem Division](#) (CRED) produced a succinct booklet summarizing coral reef conditions, as observed between 2003 and 2007, in the Mariana Archipelago. The booklet is designed to be understandable and visually compelling for ecosystem managers, students, and the general public. CRED distributed this new booklet, titled [Coral Reef Ecosystems of the Mariana Archipelago: a 2003–2007 Overview](#), at the [24th US Coral Reef Task Force](#) (USCRTF) meeting on September 15, in Saipan, Commonwealth of the Northern Marianas. The 38-page booklet summarizes results from NOAA's Pacific Reef Assessment and Monitoring Program (RAMP) of coral reef ecosystems in the Mariana Archipelago. It is derived from a more extensive document, scheduled for publication in early 2011, that provides the most comprehensive integrated ecosystem assessment ever completed of the benthic habitats and biological and oceanographic conditions around 14 islands and other offshore banks in the Mariana Archipelago. The booklet provides a brief comparison of the key components of coral reef ecosystem of the largely uninhabited northern volcanic islands and the more heavily populated, southern, carbonate islands and illustrates distinct differences in benthic conditions and fish populations across the Mariana Archipelago. It also presents an integrated overview of benthic and fish compositions and various natural and human factors influencing coral reefs around Guam and Saipan.

Biennial Pacific RAMP cruises monitor the distribution, diversity, abundance, and condition of corals, fish, algae, and non-coral invertebrates in the context of their benthic habitats and changing oceanographic conditions across gradients of population and latitude in the Mariana Archipelago. This Pacific-wide monitoring program facilitates understanding of how coral reef ecosystems are affected by global threats, such as climate change and ocean acidification, as well as by local threats, such as fishing and land-based sources of pollution, and provides information to coral reef resource managers to facilitate ecosystem-based management.

New Remote Sensing Directory for Coral Reef Management: NOAA [Coral Reef Watch](#) (CRW) helped to compile a directory of remote sensing applications and techniques that are useful in coral reef management, the [Directory of Remote Sensing Applications for Coral Reef Management](#). CRW's operational product suite and [experimental Coral Disease Outbreak Risk product](#) are featured, along with many other mapping and monitoring techniques for tropical marine environments. The directory, which was co-authored by CRW staff, was published by the Remote Sensing Working Group of the World Bank/GEF [Coral Reef Targeted Research & Capacity Building for Management](#) (CRTR) Program.

Mesophotic Coral Ecosystems Featured in *Coral Reefs*. A special issue of *Coral Reefs* was published in June featuring mesophotic coral ecosystems. The issue includes several contributions by CRCP staff. To view articles, please click [here](#).

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