

NOAA IN THE CARIBBEAN



CONNECTING NOAA & PARTNERS ACROSS THE CARIBBEAN



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U.S. Caribbean Unites for Regional Ocean Governance

U.S. Virgin Islands and Puerto Rico Sign Agreement to Improve Ocean Management

Puerto Rico and U.S. Virgin Islands governments are collaborating on a new initiative to improve coordinated management of their coastal and ocean resources. The Caribbean Regional Ocean Partnership (CROP) agreement was signed in May 2012 to tackle shared challenges related to economic growth and the sustainable use of marine resources in the U.S. Caribbean.

Enhanced communication between the two governments and the implementation of coordinated inter-island strategies will improve the territories' understanding of regional coastal ecosystems and help them address important issues, such as urban development, polluted runoff, offshore energy development, shipping, fisheries, tourism, waste management and climate change impacts at a regional level.

"Development pressures are great in the region and are growing. CROP presents an opportunity for ecosystem-based management at a scale that we have not seen before in the U.S. Caribbean," Dana Wusinich-Mendez, Atlantic and

Caribbean team lead for NOAA's Coral Reef Conservation Program, said.

CROP will develop a framework for the U.S. Caribbean to support coastal and marine policies and legislation to enable regional ocean planning. Improvements will be made to the coordination, management and application of spatial data within the region. CROP will also work closely with the Caribbean Regional Planning Body of the National Ocean Council to address some of the marine planning recommendations set out by the President's [Interagency Ocean Policy Task Force](#). Marine planning is expected to reduce conflicts by facilitating compatible uses of ocean resources, reducing environmental impacts, and preserving critical ecosystem services to meet economic, environmental, security and social objectives.

"This is an incredible opportunity for both the U.S. Virgin Islands and Puerto Rico," Jean-Pierre Oriol, Director of Coastal Zone Management for the Virgin Islands Department of Planning and Natural Resources, said during an interview with

CBS2 news. "There are a number of things we share. It will allow us to better identify some of our cultural, historical, economic and environmental linkages and allow us to plan for a sustainable future," he added.

Stakeholders and the public will be encouraged to participate in the process at various stages. CROP is supported by funding from NOAA's Regional Ocean Partnership Funding Program and coordinated by The Nature Conservancy Caribbean Office.

Look for information on [NOAA's role in marine spatial planning](#). For short movies on ocean planning [America's Ocean Economy: Challenges and Opportunities Tools for CMSP](#). ■

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IN THIS ISSUE

- 1 **U.S. Caribbean Unites for Regional Ocean Governance**
- 2 **Meet Roberto Garcia: The Meteorologist in Charge**
- 2 **NOAA Supports Underwater Munitions Response Efforts**
- 3 **News from Around the Caribbean**
- 5 **Data Zone**
Access to latest NOAA data portals
- 6 **Profiles in Partnership**
- 7 **How Valuable are Virgin Islands Coral Reefs?**
- 7 **Share Your Photos & Artwork**
- 8 **Upcoming Events & Announcements**



NOAA data support the complex challenge of managing U.S. Caribbean ocean uses.



Meet Roberto Garcia: The Meteorologist in Charge

New Leadership at the National Weather Service San Juan Forecast Office

Last fall Roberto Garcia took the helm as the new meteorologist in charge of the National Weather Service (NWS) forecast office in San Juan, Puerto Rico. Garcia speaks with *NOAA in the Caribbean Newsletter* editors about his new role and the important services he and his team provide.

Tell us about some of your duties as the lead meteorologist for the forecast office in San Juan.

I have been a forecaster for nearly 22 years. As a meteorologist-in-charge, not only will I continue to do forecasting from



Roberto Garcia, the new meteorologist-in-charge at the San Juan forecast office. Credit: NWS

time to time, but I will also be responsible for the management of the weather forecast office in San Juan. In other words, more paper work and supervision.

In addition to weather forecasts, what other services does your office provide?

Our office provides, not only general forecasts for Puerto Rico and the U.S. Virgin Islands, but also provides aviation, fire weather and marine forecasts for the same area. One of our major duties is the coordination with the National Hurricane Center and dissemination of products, statements, watches and warnings during the hurricane season.

What are the rewards and challenges of being a NWS meteorologist in the Caribbean?

One of the main rewards is to be back to work in the region and to work with a very enthusiastic staff of professional individuals, among them, meteorologists, hydrologists and technicians.

The biggest challenge has always been

how to achieve our mission. How to come up with a message that would be scientifically correct, yet simple enough for the general public and our customers to understand it and act accordingly. After all, if our message is not understood, we are not doing our work.

What's on the horizon for the NWS forecast office in San Juan?

One improvement in technology is expected to occur before the summer of 2013. The NWS San Juan WSR-88D radar, located in Cayey, Puerto Rico, will be upgraded to incorporate a new technology called "dual-polarization". This technology will result in 14 new radar products that will enable us to continue providing our suite of high quality products and services and also help describe types of precipitation and improve rainfall estimates. ■

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NOAA Supports Underwater Munitions Response Efforts

Researchers Tackle Relics of Former Military Training Exercises in U.S. Caribbean

Environmental scientists from NOAA Office of Response & Restoration (OR&R) are helping the Department of Defense address the problem of unexploded ordnance in the waters around Vieques and Culebra Islands.

Beginning in the 1940s, parts of the islands were used as targets for live training exercises such as ship-to-shore gunfire and air-to-ground bombing by the Atlantic Fleet.

Military exercises in Vieques ceased in 2003 and in Culebra in 1975, but derelict underwater munitions on coral reefs now pose unusual challenges for removal. Over the years corals and other marine life have colonized the munitions making

them hard to see and difficult to remove without damage to corals.

In October 2012, NOAA OR&R scientist Diane Wehner helped shape discussions to develop remediation solutions at the Fourth International Dialogue on Underwater Munitions meeting in San Juan, Puerto Rico. "Recovery of munitions in coral reef ecosystems results in unavoidable impacts to corals because corals grow on the munitions themselves," Wehner said.

OR&R is working in conjunction with NOAA Fisheries Protected Resources Division, U.S. Environmental Protection Agency and U.S. Fish and Wildlife Service to provide expert scientific advice to the

Department of Defense and the Puerto Rico Environmental Quality Board.

Wehner and other NOAA scientists previously worked with the Department of Defense to help minimize the impact of munitions removal on corals during a pilot project off the coast of Oahu, Hawaii. OR&R expects that lessons learned from the Hawaii work will help guide future remedial efforts in Vieques and Culebra.

For more information, visit the [NOAA Damage Assessment and Restoration Program](#) web site. ■

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News from Around the Caribbean

Connecting you with news and updates from NOAA and partners around the U.S. and international Caribbean

U.S. Caribbean

Fisheries management goes island style

The Caribbean Fishery Management Council (CFMC) is developing island-specific fishery management plans (FMPs) in response to requests by the fishing communities and territorial governments of Puerto Rico and the U.S. Virgin Islands. Transitioning from species-specific to island-specific FMPs recognizes that each of the U.S. Caribbean islands has unique differences with respect to culture, markets, fishing gear, ecology and seafood preferences. A three-island option was most popular requiring [separate plans](#) for Puerto Rico, St. Thomas/St. John and St. Croix. The logistics of transitioning to island-based FMP's was discussed at the 145th Council Meeting in March 2013. ■

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Listening in on grouper spawning

In Puerto Rico, underwater listening devices called hydrophones are being used to identify fish spawning aggregation sites for species such as Red Hind and federally-protected Nassau Grouper. Recording and analyzing the noises that fish make when aggregating before and during spawning provides evidence that an area is essential fish habitat. The types of vocalization and the number of sounds can be used to identify species and estimate how many fish are present. Results are used by the federal and local fishery managers to evaluate and protect these locations to help rebuild local fish stocks and ensure a sustainable fishery. This collaborative research is conducted by the NMFS Southeast Region, the Southeast Fisheries Science Center and the NOAA-funded Caribbean Coral Reef Institute at the University of Puerto Rico, Mayaguez. ■

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New rain radar improves flash flood predictions

Current radar technology provides estimates of rainfall and is important in detecting the possibility of flash floods and other hazards from extreme weather. Until now, mountainous terrain and distance have limited the use of radar technology on the western end of Puerto Rico. An atmospheric sensing network is now being installed that also features new dual polarization technology, which will not only be able to detect the intensity of precipitation events but also the size and shape of objects. With the installment of three radar nodes called CASA's (Collaborative Adaptive Sensing of the Atmosphere), weather and flash flood predictions will improve, filling in the gap to boost short-term forecasts and understanding of the island's diverse weather processes. ■

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Mapping of Puerto Rico's North East Great Reserve (year 2)

In March, National Centers for Coastal Ocean Science (NCCOS) researchers onboard the NOAA ship Nancy Foster completed seafloor habitat and fish distribution mapping of the North East Great Reserve in Puerto Rico. Approximately 335 km² of the coast remained to be mapped this year in water depth ranging from 30 to 1,000 meters. Last year, NOAA completed 220 km² within the reserve and 75 km² of adjacent, potential spawning aggregation areas. Efforts are focused on detailed multibeam mapping, ROV ground-truthing of habitats and fish acoustic surveys. Preliminary results indicate fish densities are largest in coral hard-bottom dominated regions found along linear reef features close to shore and along the shelf edge.

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International Caribbean

MPA managers and rangers share expertise

Marine protected area (MPA) managers and rangers from 10 Caribbean nations came together in the Florida Keys in August 2012 to share best practices for strengthening law enforcement for coral reef conservation. The workshop provided an overview of the elements necessary for successful MPA enforcement. Break-out sessions covered an array of issues, including deterrence and detection, surveillance, intelligence gathering, partnering with relevant organizations and the role of community alert networks. Participants are now working with the organizers to develop possible follow-up activities at the regional and country levels. The workshop was supported by NOAA Coral Reef Conservation Program, UNEP-Caribbean Environment Programme and The Nature Conservancy as the second event in a series of peer-to-peer learning exchanges. These exchanges are designed to address the outcomes of the NOAA and CaMPAM sponsored [Management Capacity Assessment of Selected Coral Reef Marine Protected Areas](#) in the Caribbean. ■

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Questions or Comments?

We want to hear from you! Please e-mail us to [subscribe/unsubscribe to the newsletter](#) or to [submit any questions, comments and story ideas](#) at: CaribbeanNews@noaa.gov.

Editorial Note: blue underlined text indicates a live hyperlink. When viewing pages in an Adobe PDF, click to open relevant web pages.



News from Around the Caribbean

Connecting you with news and updates from NOAA and partners around the U.S. and international Caribbean

International Caribbean

(continued from page 3)

Fishers taking FADs seriously

Florida Sea Grant is helping Caribbean partners test best management practices for the use of fish aggregation devices (FADs) using input from Dominican fishermen. In December 2012, more than 100 FAD fishers participated in Sea Grant-facilitated meetings in Dominica. By talking to the fishermen about their use of both private and public FADs, researchers learned that managing use is as important as the design, placement and maintenance of FADs. Florida Sea Grant is supporting local efforts to collect information on use, catch effort and economics to evaluate the efficacy of various FAD fishery governance arrangements. ■

Florida Sea Grant
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Fish aggregation device (FAD) fishers meet with researchers in Fond St. Jean, Dominica to discuss options for improving FAD fishing success. Credit: C. Sidman, Florida Sea Grant

NOAA supports coastal zone management in Trinidad and Tobago

The director of the National Ocean Service (NOS) International Programs Office recently participated as the NOAA representative at the first National Steering Committee meeting of the Coastal Zone Management (CZM) Program of Trinidad and Tobago. The meeting was held to develop the program's work plan. NOS has provided staff training, technical advice and help developing the CZM framework. This activity is a collaboration between NOS,

the Institute of Marine Affairs in Trinidad and Tobago and the Ministry of the Environment. NOS continues to provide technical advice to the National Steering committee, which meets quarterly. ■

NOS International Programs Office
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Free lionfish manual released

A manual to assist coastal managers and field workers with local control and research efforts for invasive lionfish is now [available for free download](#). The manual, *Invasive Lionfish: A Guide to Control and Management*, was supported by NOAA NMFS Office of International Affairs, REEF, ICRI, United Nations Environment Programme, Caribbean Environment Programme, SPAW-RAC and over 40 participants of the 2010 Caribbean Regional Lionfish Workshop. The manual is also available in [Spanish](#). ■

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Joint study shows success in lionfish control

Lionfish removal efforts in some Mexican MPAs are controlling local populations, according to a collaborative study by NCCOS and Mexico's National Commission of Federally Protected Areas. The two groups monitored lionfish inside two MPAs along the Yucatán Peninsula during the summer of 2012. Preliminary results suggest that lionfish densities are lower and fish are smaller in the parks compared with surrounding reefs, suggesting that control efforts are working. ■

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Coral Program building MPA capacity in Mesoamerica

The NOAA Coral Reef Conservation Program established a two-year cooperative agreement with the Gulf and Caribbean Fisheries Institute (GCFI) to build MPA management capacity in the Mesoamerican Reef region. The agreement was initiated by the managers

of nine Mesoamerican MPAs, three each from Mexico, Belize and Honduras, in partnership with GCFI. Included are regional training activities to address common MPA capacity building needs, alternative livelihoods and socioeconomic monitoring. Each participating MPA is also receiving support for site-specific priorities identified in a 2011 Caribbean MPA management capacity assessment. These include fisheries management, sustainable financing and outreach/education. ■

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Alternative livelihoods for Mesoamerican MPAs

As part of a two-year cooperative agreement with NOAA Coral Reef Conservation Program, the GCFI and the Toledo Institute for Development and Environment organized a four-day workshop in Belize for Mesoamerican MPA managers to focus on alternative sustainable livelihoods. Managers spoke about their experiences and lessons learned from diversifying local incomes through options such as seaweed cultivation, pig rearing, tour guiding, dive training, and employment in scientific diving, merchandising and micro-enterprise development. Tourism industry representatives also joined the workshop for a special focus on sustainable tourism and MPAs. ■

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Caribbean countries support regional planning for queen conch

The CFMC-led working group on queen conch last October concluded with recommendations to the 16th Conference of Parties of CITES, regional fishery bodies and countries in the western central Atlantic. Queen conch is a candidate for listing under the Endangered Species Act and listed in Appendix II of CITES. The meeting was attended by more than 50 fisheries sectors and CITES authority delegates from 23 countries



International Caribbean News

(continued from page 4)

and territories. Participants expressed their commitment to take a regional perspective and collectively take measures and actions to further improve management and conservation of the queen conch resource in the wider Caribbean region. Additionally, the working group issued a "Declaration of Panama City," which contains a number of important recommendations. ■

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Simulated tsunami supports disaster planning

In March, the Caribbean region participated in a simulation of an 8.5 magnitude earthquake occurring off the coast of Venezuela to aid in Tsunami planning. The event, known as **CARIBE WAVE/LANTEX 2013**, tested the early warning system. The Caribbean Tsunami Warning Program (CTWP) started in 2010 as the first step of a phased approach for the establishment of a Caribbean Tsunami Warning Center. Forty five of 48 countries in the region participated this year, including Puerto Rico and the U.S. Virgin Islands, for a participation rate of

94%, 20% more than in 2011. The office currently provides support and guidance for tsunami observations, including seismic and sea level systems, tsunami forecasting, communications, education and preparedness. The CTWP is hosted by the University of Puerto Rico at Mayagüez and its Puerto Rico Seismic Network. ■

National Weather Service
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Caribbean-Florida fisheries exchange kicks off

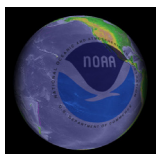
Florida Sea Grant is piloting a two-year program that provides for exchange of fisheries professionals between the Caribbean and Florida. The Caribbean Fisheries Exchange Program will promote greater collaboration and knowledge sharing among organizations that manage and promote the sustainability of the region's natural resources. The inaugural participant, Randel Thompson, is a fisheries manager from Saint Kitts. From January to May 2013, Thompson is studying GIS technologies at the University of Florida while working with Florida Sea Grant on its Caribbean fish aggregation device project. Project partners include the Caribbean Regional Fisheries Mechanism, and the Gulf and Caribbean Fisheries Institute. ■

Florida Sea Grant
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New approach improves thermal stress predictions in corals

NOAA Coral Reef Watch (CRW) has developed a new approach to improve predictions of thermal stress in corals that can lead to bleaching. The daily **Light Stress Damage (LSD)** product is available for the greater Caribbean region. It improves upon the previous NOAA CRW operational Degree Heating Weeks product by combining light and sea surface temperature data from the Geostationary Operational Environmental Satellites and Polar Operational Environmental Satellites. The approach was developed in collaboration with the Universidad Nacional Autónoma de México, University of Queensland, and the University of Exeter, with support from a number of agencies including the NOAA Coral Reef Conservation Program. A global version of the product is currently under development. ■

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Data Zone

Here we connect you with NOAA data portals and datasets for the Caribbean that are easily accessible via the internet

NOAA provides access to authoritative ocean data

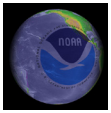
In support of the National Ocean Policy, NOAA created a **Coastal and Marine Spatial (CMSP) Planning Data Registry**, a web-based resource to provide access to a collection of NOAA geospatial data sets that directly contribute to comprehensive regional marine planning. For most regions currently available data include navigational charts, bathymetry, benthic habitat maps, socioeconomic data, hurricane tracks, shipping routes,

essential fish habitat and boundaries for U.S. MPAs. The datasets are available for download in a variety of formats. This new portal gives transparent access to the same data and information that federal agencies have about the oceans and coasts. These data are also being integrated into **Data.Gov/Oceans** to support an even broader audience.

Data can be accessed via the CMSP **Data Registry** and **Digital Coast**. ■



Screenshot of the CMSP Registry.



Data Zone (continued from page 5)

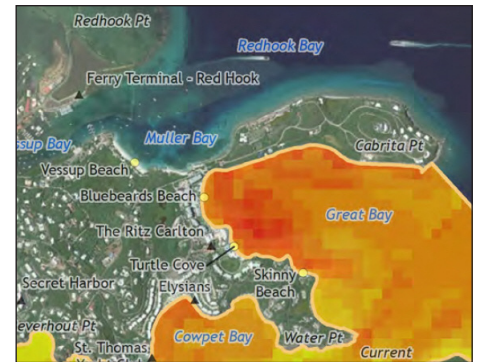
National Geodetic Survey NOAA Shoreline Data Explorer

The [Data Explorer](#) provides public access to high-resolution shoreline data that users can view and download through the interactive portal along with metadata. These datasets include vector shorelines, raster shoreline surveys and aerial imagery. Additional information about shoreline data can be found at the [One NOAA Shoreline](#) web site ■

Maps of coastal use for St. Thomas East End Reserves

A NOAA Coral Reef Conservation Program-funded project to map human uses of

marine resources and activities for the St. Thomas East End Reserves in the U.S. Virgin Islands is now complete. Products include a map book, a supplemental map product and GIS data files. These products are available on the NOAA [Coral Reef Information System](#) and are already aiding planning efforts and scientific research within the reserves. The project team offer their appreciation to the participants and community members who attended the public meetings and provided important feedback. ■



Map showing intensity of human uses of the St. Thomas East End Reserves.

Profiles in Partnership

Research highlights from the Caribbean with a focus on collaborations between NOAA and partners

Caribbean Regional Climate Outlook Forum: Enhancing Early Warning Systems Across the Caribbean

Climate variability and change pose significant risks for the Caribbean region, making early warning information systems critical components of preparedness, disaster risk reduction and adaptation. The Caribbean Regional Climate Outlook Forum (CariCOF) was established to provide accessible, usable and authoritative information tailored to the Caribbean region across climate time scales.

“The CariCOF helps to gain a better understanding of what the climate forecasts are, and what they mean [to the Caribbean society] on a continued and long-term basis,” Adrian Trotman, an agrometeorologist and chief of applied meteorology and climatology at the Caribbean Institute for Meteorology and Hydrology, said.

CariCOF represents an outstanding example of regional partnership with contributions from 23 countries and territories. The forum was first initiated



Engineering the optimal forecasting method during the CariCOF 2012 seasonal climate forecasting training workshop. Credit: Dale Destin, Antigua and Barbuda Meteorological Service.

in 1997/1998 in response to an El Niño event and later re-established in 2010. Partners include the Caribbean Institute for Meteorology and Hydrology, the Caribbean Meteorological Organization, the Caribbean Community Climate Change Center, the International Research Institute for Climate and Society, the World Meteorological Organization and other academic and non-governmental partners. The forum provides a number of services, including: conducting training in climate forecasting, capacity building and

interpretation. It also offers communities of practice for mainstreaming climate information into national and regional climate risk management efforts.

Additional regional organizations engaged in the CariCOF represent a wide range of socioeconomically important activities and sectors including: disaster risk reduction, fisheries management, tourism, water resources, agriculture and human health.

NOAA co-sponsored the 2012 CariCOF, and another is planned for May 2013. This upcoming forum will explore the creation of a sustained process to monitor and report on climate impacts and indicators across the region.

For more information, visit: <http://www.cimh.edu.bb/?p=precipoutlook>. ■

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How Valuable are Virgin Islands Coral Reefs?

Study Values VI Coral Reef Ecosystem Services at Over \$180 Million a Year

The total economic value of U.S. Virgin Islands coral reefs is estimated at over \$180 million annually, according to a new study funded by NOAA Coral Reef Conservation Program.

For the first time, the U.S. Virgin Islands community now has an idea of the economic value of their coral reef ecosystems. Contributions vary across



A man fishes in the U.S. Virgin Islands. The territory's coral reefs support a number of activities, including fishing, that add value to the local economy Credit: C. Loper

ecosystem services: reef related tourism (\$96 million), recreation (\$48 million), amenity (\$35 million), coastal protection (\$6 million) and support to commercial fisheries (\$3 million).

In an effort to provide managers with key economic data on the goods and services and associated dollar value of coral reefs in the U.S. Virgin Islands, NOAA's Coral Reef Conservation Program funded an economic study by the Institute for Environmental Studies at Vrije University in the Netherlands.

The project, which looked at various sectors of U.S. Virgin Islands ecology, culture and economy, gathered data from both residents and visitors to quantify the dollar value of coral reef resources and map the ecosystem service values across the islands. The project considered such things as shoreline protection values and real estate values in relation to coral reef.

The total economic value of the coral reefs of the U.S. Virgin Islands is a useful tool that will be used by coral reef managers to make informed decisions about coral reefs and related resources and to inform decision makers and the public regarding these important resources.

The study also revealed the perceived value that people place on clean water and a healthy environment, values that when used in awareness building become a powerful ally in how the territory manages its resources.

The report is available for [download](#) (13.59 MB).■

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SHARE YOUR Underwater Photos & Artwork

A picture is worth a thousand words, so we want to hear from you! Share your best Caribbean underwater and science-in-action stories captured through a camera's lens or an artist's pen. Two images will be featured in each issue. Please e-mail your photo or artwork to CaribbeanNews@noaa.gov. Be sure to include your full name, affiliation, a one or two sentence description and the date the image was made.



Photographer: Henry Tonnemacher/7-Seas-Ltd., Copyright 2013.

Description: A shark eats a lionfish in St. Croix, U.S. Virgin Islands.

Date: 2013



Photographer: NCCOS

Description: NCCOS scientists aboard the NOAA ship Nancy Foster documented a lionfish at 193 meters (and 66°F) while mapping the sea floor in Puerto Rico's Northeast Great Reserve.

Date: March 2013



Upcoming Events & Announcements

A preview of upcoming important events and happenings around the Caribbean and beyond

Events

March 2013

27-31: Caribbean Regional Climate Outlook Forum (CariCOF) in Trinidad and Tobago

April 2013

5: Comment period ends for CFMC Amendment 4 to the Corals FMP of Puerto Rico and the USVI to modify management of seagrasses in the U.S. Caribbean

6: Comment period ends for [Proposed Rule To List 66 Reef-Building Coral Species; Proposed Reclassification of Elkhorn \(*Acropora palmata*\) and Staghorn \(*Acropora cervicornis*\) Under the Endangered Species Act](#)

8: Meeting of the Caribbean Regional Ocean Partnership with Federal Representatives from the Caribbean Regional Planning Body, San Juan, Puerto Rico.

9-12: [Coastal and Marine Spatial Planning Advancement Training](#) for ocean managers in the U.S. Caribbean, in San Juan, Puerto Rico

10: Comment period ends for Fisheries of the Caribbean, Gulf of Mexico and South Atlantic; Reef Fish Fishery of Puerto Rico and the U.S. Virgin Islands; Parrotfish Management Measures in St. Croix

29: 8th Session of the Intergovernmental Coordination Group for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions, Port of Spain, Trinidad.

May 2013

17-18: Caribbean Challenge Initiative Summit of Caribbean Political and Business Leaders organized by The Nature Conservancy, British Virgin Islands

23: Caribbean Landscape Conservation Cooperative Spring 2013 USVI Meeting of Steering Committee and Partners, St. Croix, USVI

June 2013

17-21: Association of Marine Laboratories of the Caribbean 36th Scientific Conference in Jamaica

Announcements

New navigation chart between Florida and Cuba

NOAA Coast Survey has released a [new chart for the Dry Tortugas region](#) with depth converted to the metric system.

Research on Proposed Endangered Species

If you will be conducting scientific or enhancement activities on one of the following species after December 7, 2013, please contact Jennifer.Moore@noaa.gov or Anita.Pritchett@noaa.gov

Proposed Endangered Species:

- Staghorn coral (*Acropora cervicornis*)
- Elkhorn coral (*A. palmata*)
- Pillar coral (*Dendrogyra cylindrus*)
- Lobed star coral (*Montastraea annularis*)
- Mountainous star coral (*M. faveolata*)
- Knobby star coral (*M. franksi*)
- Rough cactus coral (*Mycetophyllia ferox*)

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Please e-mail us at CaribbeanNews@noaa.gov to subscribe or unsubscribe to the newsletter or to submit any questions, comments, story ideas, artwork and photographs. *NOAA in the Caribbean Newsletter* is produced by NOAA's National Centers for Coastal Ocean Science for the Southeast and Caribbean Regional Team. Contract labor was provided by CSS-Dynamac.

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