

# NOAA IN THE CARIBBEAN

CONNECTING NOAA & PARTNERS ACROSS THE CARIBBEAN



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## Coral Nurseries Replant Damaged Caribbean Reefs

### U.S. Caribbean Coral Nurseries Produce Over 10,000 Transplants a Year

Elkhorn and staghorn corals are now being intensively farmed in coral nurseries and successfully transplanted to repair and restore damaged reefs across the U.S. Caribbean.

Once dominant reef building corals in the Caribbean, both species have seen greater than 90 percent declines in abundance in the last 25 years, prompting their listing as "Threatened" under the Endangered Species Act in 2006 and a current NMFS proposal to list them as "Endangered".

As genetic diversity and potential for successful sexual reproduction has plummeted, propagation and population enhancement have become key species recovery tools. In addition to repairing and restoring damaged reefs, transplanting coral fragments is designed to increase populations, improve genetic diversity, supply larvae to nearby reefs and overcome genetic bottlenecks.

Scientists from The Nature Conservancy's (TNC) Coral Nursery and the NOAA Restoration Center have collected "fragments of opportunity", which are branches of coral broken by natural processes (i.e., storms, high wave action). The fragments are further divided, then attached to blocks on the seafloor or to artificial frames called "trees." The fragments would most likely die if not proactively replanted onto the reef or placed into nurseries.

Over 1,500 corals have been transplanted to local reefs around St. John and St. Croix, with survival rates ranging between 97-100 percent.

"The coral nurseries appear to offer a viable option for a rapid, on-the-ground response to restoring damaged reefs, in addition to their core purpose of increasing population size and genetic diversity," John Christensen, director of the Coral Reef Conservation Program, said. "However, more research is needed to determine the ecological effects and long-term survival rates for transplanted corals," he said.

In Puerto Rico, collaborative coral nursery efforts between NOAA's Restoration Center, the Department of Natural Environmental and Resources (DNER) and local businesses are meeting emergency restoration needs.

Such was the case in 2012 when the M/V *Jireh*, a small freighter, collided with reefs at Mona Island. Following the grounding, scientists relocated 1,000 corals that were in danger during salvage operations. During the restoration phase that followed, 900 corals were re-attached and *Acropora* colonies were transplanted from nurseries in La Parguera to the grounding site to help mitigate the damage.



A tree of staghorn coral fragments in the U.S. Caribbean. Credit: TNC

To date, 10 coral nurseries are in operation in the U.S. Virgin Islands and Puerto Rico supplying over 10,000 transplants per year. Monitoring of the outplantings continues and includes measuring survival and growth rates, as well as the fish populations present to get an idea of the effect on the overall ecosystem. Preliminary results suggest that these outplanting sites have higher fish density and diversity. ■

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# Chemical Analyses Reveal Elevated Levels of Contaminants and Toxicity in Portions of the St. Thomas East End Reserves

## NOAA Researchers find Higher than Expected Levels of Tributyltin and Copper

Recent analyses by NOAA's National Centers for Coastal Ocean Science (NCCOS), found sediment from portions of the St. Thomas East End Reserves (STEER) contained elevated levels of chemical contaminants that may be impacting marine life within the reserves.

Tributyltin (TBT), an ingredient once widely used in antifouling paints for boat hulls, and banned in the U.S. since 1989, was found at the third highest concentration in the history of NOAA's National Status and Trends (NS&T) Program. The NS&T Program is an NCCOS long-term monitoring effort to characterize chemical contaminants and bioeffects in the nation's coastal and estuarine waters.

Results from the first phase of the project indicate elevated levels of chemical contaminants along with sediment toxicity in Mangrove Lagoon and northern Benner Bay in the western

portion of the STEER, where marinas and a municipal waste disposal site exist. The concentration of copper at one site in northern Benner Bay was above a NOAA guideline, indicating that negative effects on marine life were likely.

The chemical contaminants work is being done in conjunction with an ongoing assessment of natural resources within the STEER. As part of this effort, coral tissue and conch have also been collected and are currently being analyzed.



NOAA and partner scientists collect coral samples for chemical contaminant analysis. Credit: NOAA NCCOS

"These results fill critical management gaps and provide evidence to communicate real impacts to the community," Anne Marie Hoffman, St. Thomas East End Reserves coordinator for TNC, said. "We now have a far better understanding of current conditions and the incentive to improve them."

In July, NCCOS and DPNR scientists collected additional surface sediments for analysis, along with sediment cores to determine metal and TBT contamination over time. This project provides information to assess the presence and impacts of pollution in vulnerable marine areas. For more information, visit <http://coastalscience.noaa.gov/projects/detail?key=19>. A detailed report is forthcoming. The project was funded by the Coral Reef Conservation Program. ■

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# \$1 Million NOAA Grant Boosts Protected Habitats in Northeast Puerto Rico

## Land Purchase Includes Wetlands, Forested Wetlands and Coastal Mangroves

NOAA's Coastal and Estuarine Land Conservation Program (CELCP) recently provided \$1 million to the Puerto Rico DNER to complete the acquisition of Dos Mares Farm, an 87-acre parcel that includes wetlands, forested wetlands, and a coastal mangrove forest.

The acquisition of the Dos Mares parcel completes the overall San Miguel Phase III CELCP project, which included the previous purchase of a 117-acre parcel. Both properties are located within Puerto Rico's Reserva Natural Corredor Ecológico del Noreste (Northeast Ecological Corridor Nature Reserve). The reserve is home to more than 800 species of flora and fauna and its beaches are a popular

nesting area for endangered leatherback and hawksbill turtles. Currently about 65 percent of the reserve's 3,000 acres are in public ownership.

"The Northeast Ecological Corridor is an area of high priority and importance for us. The acquisition of these lands guarantees the long-term protection of this ecologically magnificent area," Irma Pagán, sub-secretary of Puerto Rico DNER, explained.

The long-term protection of the Dos Mares and San Miguel properties complements the efforts of NOAA's Coral Reef Conservation Program to manage and protect coral reefs within the reserve.

The Coral Reef Conservation Program is currently supporting the development of a watershed plan for Rio Fajardo and an integrated marine management plan to support DNER.

DNER provided \$2 million in matching funds for the acquisition, the U.S. Fish and Wildlife Service contributed \$500,000, and the Trust for Public Land also contributed other costs related to the purchase. For more information and an aerial photo of the newly purchased area, see the June 2013 NOAA [press release](#). ■

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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

### NOAA and partners conduct national reef condition surveys in the USVI

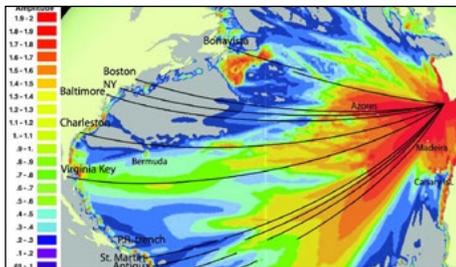
In July, NOAA led a fish and benthic community survey around the islands of St. Thomas and St. John, USVI as part of the National Coral Reef Monitoring Program (NCRMP). NCRMP data provides a synthesis of reef condition (including fish and corals) on an island-by-island basis as well as across an entire region. Over 280 underwater surveys were carried out by teams of scientific divers and boat operators over a two week period including staff from the National Park Service, University of the Virgin Islands, USVI DPNR and TNC. ■

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### Mark your calendars! The third regional tsunami exercise, CARIBE WAVE

The Third Regional Tsunami Exercise, CARIBE WAVE will take place on Wednesday, March 26, 2014. It will include two scenarios: Transatlantic Tsunami modeled after the 1755 Lisbon earthquake and tsunami and a tsunami generated by a submarine slope failure in the Gulf of Mexico. These scenarios give an opportunity for all stakeholders of the U.S. and UNESCO Intergovernmental Oceanographic Commission tsunami warning system to be able to review and exercise their emergency response plans. Materials for the exercise will be available in November 2014 at the [NWS Caribbean Tsunami Warning Program](#) web site. ■

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*Maximum wave amplitude projected on a sphere from one of the proposed earthquake sources. Credit: NWS*

### Don't Stop Talking Fish

Managers and researchers in the USVI have begun an effort aimed at increasing fishing community awareness and compliance with rules and regulations called "Don't Stop Talking Fish." Since 2011, CRCP and local partners have coordinated outreach to commercial fishers on contemporary fisheries topics during the annual USVI Division of Fish and Wildlife fishers' registration process. Their efforts reached over 200 fishers in St. Croix and St. Thomas/St. John this year alone. In June 2014, the Don't Stop Talking Fish team will coordinate a community event during fisher appreciation week at the St. Croix East End Marine Park to highlight the eco-heritage and cultural aspects of USVI fisheries. The goal is to build both appreciation of and desire for conservation of the local fisheries. Don't Stop Talking Fish is part of the Marine Outreach and Education USVI Style (MOES-VI) initiative funded by the Coral Program. Plans are currently underway to develop the MOES-VI communications, outreach and education strategy with support from community members. ■

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*USVI Division of Fish and Wildlife staffer engages a group of commercial fishers in St. Croix during the annual MOES-VI commercial fisher license registration workshop. Credit: Lia Ortiz*

### New regulations for the snapper-grouper fishery in the south Atlantic

The final rule for Regulatory Amendment 13 to the Fishery Management Plan for the Snapper-Grouper Fishery of the South Atlantic Region was published on

June 17, 2013 (78 FR 36113). Regulations became effective on July 17, 2013. This ruling revises the calculation of acceptable biological catches, annual catch limits and annual catch targets based on the new method of estimating recreational catches using the Marine Recreational Information Program. This ruling affects 37 snapper-grouper species and is expected to help avoid triggering accountability measures caused by using the previous method of estimating recreational catch. ■

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### TsunamiReady

The Virgin Islands Territorial Emergency Management Agency (VITEMA) has begun the installation of 120 tsunami hazard zone and evacuation route signs in the U.S. Virgin Islands to be followed by the release of evacuation maps. VITEMA has provided more than 1,000 government employees with a Tsunami Awareness course conducted by instructors from the University of Hawaii's Disaster Preparedness Center. Three public service announcements, one of them in Spanish, have been developed for television and radio. VITEMA has been working closely with NOAA's National Weather Service's Caribbean Tsunami Warning Program to ensure the Territory attains TsunamiReady status. ■

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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](mailto: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 in the U.S. and international Caribbean

## U.S. Caribbean (continued from page 3)

### Fisheries management goes island style: an update

The Caribbean Fishery Management Council is developing island-based fishery management plans (FMPs). Meetings held in early July received input from the fishing community, the general public and local organizations in Puerto Rico and the U.S. Virgin Islands. These meetings focused on four main issues: 1) establishing the fishery management units for the comprehensive island-based FMPs; 2) revising the species composition of the comprehensive island-based FMPs; 3) establishing management reference points for any new species added to the comprehensive islands FMPs; and 4) modifying or establishing additional management measures. ■

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### Vessel permits available for Highly Migratory Species

The Atlantic Highly Migratory Species (HMS) Commercial Caribbean Small Boat permit is now available to vessels less than or equal to 45 feet overall length. This permit is valid only in the U.S. Caribbean and allows fishing for and sales of bigeye, albacore, yellowfin and skipjack tunas; swordfish; and sharks. This permit cannot be held in combination with other Atlantic HMS vessel permits. Permit applications can be accessed [online](#) or by calling 877-376-4877. ■

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### Scientists listen to fishy noises at spawning aggregations

NOAA-funded research led by scientists at the Caribbean Coral Reef Institute in Puerto Rico are using the underwater sounds or "vocalizations" of reef fish, such as groupers, to identify areas where they gather to spawn. Spawning sites are designated as essential fish habitat and

locating them is a high priority in fisheries management. Using seafloor mounted underwater sound recording devices called hydrophones, the researchers are able to identify the presence of several key fishery species and confirm locations and timing of spawning aggregations. ■

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*University of Puerto Rico scientist deploys boat-based hydrophone to capture sounds from spawning fish aggregation sites. Credit: University of Puerto Rico/NOAA*

### New regulations for parrotfish in federal waters surrounding St. Croix, USVI

The final rule for Regulatory Amendment 4 to the Fishery Management Plan for the Reef Fish Fishery of Puerto Rico and the USVI was published on June 30, 2013 (78 FR 45894). Regulations will be effective on August 29, 2013. This rule establishes minimum size limits for parrotfish in the exclusive economic zone off St. Croix in the USVI. The purpose of this final rule is to provide protection from harvest to juvenile parrotfish so they can reach sexual maturity and assist the stock in achieving optimum yield.

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### NOAA and the National Park Service (NPS) to track of reef fish in Coral Bay

NCCOS and NPS scientists will travel to Coral Bay, St. John from August 18-30 to begin a one-year study of reef fish movements. Acoustic receivers will be strategically deployed along the Virgin Islands Coral Reef Marine National Monument boundary in an effort to understand the scale and timing of movements for key taxa in the region. Seventy five fish including grunts, snappers and parrotfish will be surgically implanted with acoustic transmitters and monitored continuously. Results are expected to show how often fish move among reefs, bays and across management boundaries. ■

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*A queen triggerfish recently implanted with an acoustic transmitter. Credit: NCCOS*

## International Caribbean

### Florida elkhorn show signs of resilience to disturbance

Storm battered elkhorn in Florida recovered more quickly than similarly disturbed colonies in the southern Caribbean report NOAA NMFS scientists in a new publication in the Bulletin of Marine Science. Allan Bright and colleagues at the Southeast Fisheries Science Center in Miami tracked the recovery of elkhorn in the Florida Keys and in Curaçao to compare resilience. Three years after the storm event, Curaçao



## International Caribbean

(continued from page 4)

corals showed negligible recovery, while Florida Keys populations showed a slight, significant increase of live tissue. High recruit mortality and disease occurrence in the Curaçao population, underscores the acute need to develop research and management strategies to enhance fragment survivorship and mitigate disease effects. ■

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### U.S. MPAs proposed for SPAW Protocol

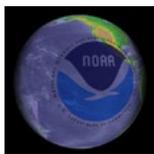
Three U.S. marine protected areas have been recommended for listing under the Specially Protected Areas and Wildlife Protocol (SPAW Protocol) of the [Cartagena Convention](#). These newly designated sites include Flower Garden Banks National Marine Sanctuary, Everglades National Park and Dry Tortugas National Park, expanding the total to 18 sites for the wider Caribbean. NOAA scientists assisted in the designation process in October 2012, at the 5th Meeting of the Scientific and Technical Advisory Committee held in Punta Cana, Dominican Republic. As a signatory government, the U.S. works with its Caribbean neighbors to improve

regional protected areas and species conservation, and to learn and share best practices with other SPAW-listed sites.

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*U.S. Delegation that attended the SPAW Protocol Meeting in October. Credit: Gonzalo Cid*



## Data Zone

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

### The Caribbean Challenge dashboard

NOAA essential fish habitat maps and coastline data are featured in a new online geoportal to support development of MPAs and renewable energy initiatives across the Caribbean Sea. TNC and University of Southern Mississippi have produced the Caribbean Challenge Dashboard. To date, the tool only shows a few data layers including protected areas and nursery habitat, but will be incorporating more data in the next few months. Visit <http://131.95.155.157/ccd/> to explore the data (NOTE: this application is not currently supported by Internet Explorer). ■



*A new database to support the Caribbean Challenge Initiative.*

### Sea level rise and coastal flooding impacts viewer

Being able to visualize potential impacts from sea level rise is valuable for identifying areas vulnerable to flooding and developing spatially explicit adaptation strategies to climate change. The Sea Level Rise Viewer brings this capability to coastal communities with an interactive tool to allow you to show the impact of varying the magnitude of sea level rise. Puerto Rico and the USVI were recently added to the viewer. Watch the online webinar by Doug Marcy on the Coastal Services Center's Digital Coast website--<http://www.csc.noaa.gov/digitalcoast/tools/slrviewer>. ■



*New tool assesses threats from sea level rise.*

### Weather and climate toolkit

NOAA's Climatic Data Center has released a online map viewer for climate data that includes historical hurricane tracks, paleoclimatic observations, climate station summaries, hourly precipitation and river flow rates (U.S. only) and more. The tool provides simple visualization and data export of weather and climatological data. Visit <http://gis.ncdc.noaa.gov/map/viewer/#app=clim> to explore the tool. ■

### Updated LIDAR for USVI Underway

New high-resolution elevation data are being collected for the U.S. Virgin Islands. Errors have been discovered in the 2007 elevation data for the area creating usage limitations. Data collection technology and geodetic information have improved since then, and the new collection will represent state-of-the-art data. The NOAA Coastal Services Center will make the LIDAR data available from the [Digital Coast](#) in spring 2014. The data will also be used to update several tools, including the [Sea Level Rise Viewer](#). ■



# Profiles in Partnership

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

## NOAA Maps Seafloor to Support Marine Management in Northeast Puerto Rico

Researchers from NOAA and Puerto Rico's DNER recently completed the final year of a two-year mission to map deep water portions of Puerto Rico's Northeast Ecological Corridor.

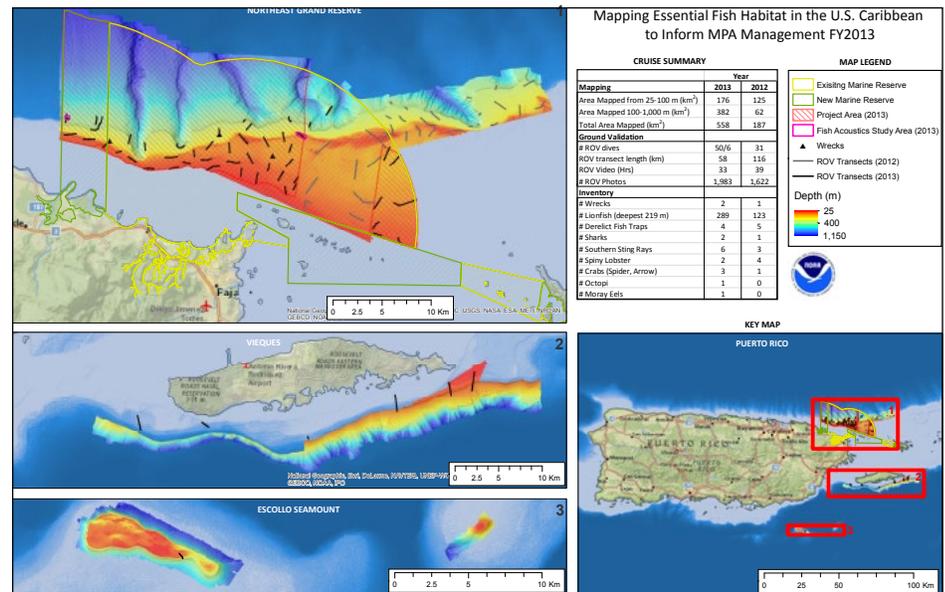
Using the NOAA Ship Nancy Foster, the team mapped nearly 150,000 acres of sea floor, while simultaneously collecting acoustic data on fish distribution and abundance. See a recent feature on the [NOAA Ocean Science Blog](#) for more details.

Tim Battista, an oceanographer and principal investigator with NCCOS, said "Using the NOAA ship, we have now gathered seafloor mapping data for the northern extent of the Northeast Ecological Corridor, covering from 25 to 1,000-meter depth range. This will be integrated with the maps of the shallow portion (<25m) of the area. This is a big accomplishment for the region as it provides critical data to support the watershed management plan currently under development." These data are available [online](#).

This mapping effort is an example of the success of strong federal and territorial collaboration. NOAA is able to bring expertise and large assets to the region and partner with local territorial scientists and managers to collectively gather

information needed to support resource decision-making. Partners include DNER, the Caribbean Fishery Management Council, University of Puerto Rico and others. ■

*Alicia Clarke, NCCOS  
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Essential fish habitats mapped in Puerto Rico's Northeast Ecological Corridor to inform marine protected area management. Credit: NCCOS

## Surfrider Foundation Rincón Teams with NOAA and the Community for Marine Debris Cleanups in Puerto Rico

Since 2007, the [Rincón chapter of the Surfrider Foundation](#) has orchestrated three marine debris removal and prevention projects in coral reef habitats along the west coast of Puerto Rico.

The foundation collaborated with the NOAA Restoration Center, DNER, local businesses and the community to tackle marine debris as part of a two-phase project called, "Coral Reef Protection through Marine Debris Removal in two Marine Protected Areas (MPAs): Arrecifes de Tourmaline and Reserva Marina Tres Palmas."



Members of the Surfrider Foundation Rincón chapter strike a pose during a debris removal mission. Credit: Wess Merten

In phase I of the project, over 400 volunteers helped the Rincón chapter and its partners remove more than 2 tons of marine debris off Cayo Ron reef. The debris, remnants of a shipwreck from the 1990s, covered roughly 83 square meters of substrate scattered amongst 3.2 acres of coral reef habitat at Cayo Ron.

Phase II targeted marine debris in the Tres Palmas Marine Reserve. Approximately 550 tires were removed from near and mid-shore reefs along with clothing, blocks, cable and derelict boat debris. Reefs off Cayo Ron and in the Tres Palmas



# Profiles in Partnership (continued from page 6)

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

Marine Reserve contain extensive thickets of elkhorn and staghorn coral, which are two of the many shallow-water reef building species found within the Caribbean Sea. Marine debris removal and reef restoration was necessary to ensure the future health and fecundity of these species and the species they support.

Aside from marine debris removal, the chapter focused on marine debris prevention by working to enhance recycling in local schools and participating municipalities.



*Surfrider removed hundreds of tires from the reefs of Tres Palmas Marine Reserve. Credit: Wess Merten*

“Working with the community, especially school kids, is a lot of fun! I think the biggest ‘take-home’ lesson for the volunteers is that virtually all of this trash (shipwrecks and fishing gear aside) comes from the land- and this is where community engagement is so vital,” Steve Tamar, vice-chair and director of the Surfrider Blue Water Task Force, said. ■

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## NOAA Helps Fill Data Gap on Shore-based Fishery of St. Croix Study Developed to Characterize Non-Commercial Fishing

In response to a data gap identified by fishery managers in the USVI, NOAA scientists are collecting information using a short questionnaire to gain a better understanding of the non-commercial, shore-based fishing around St. Croix.

A survey conducted in 2004 found that there were approximately 3,300 non-commercial fishers on St. Croix, USVI, but very little was known about their effort or the types and amount of fish caught.

Theresa Goedeke, a NCCOS social scientist leading the project, said, “We’re hoping to accomplish two important tasks. The first is to document basic information about this mode of recreational, personal-use fishing – things like how often folks fish and what they like to catch. The second task, which is probably of greater interest to the community, is to document how important this mode of fishing is to local people – in other words, the cultural

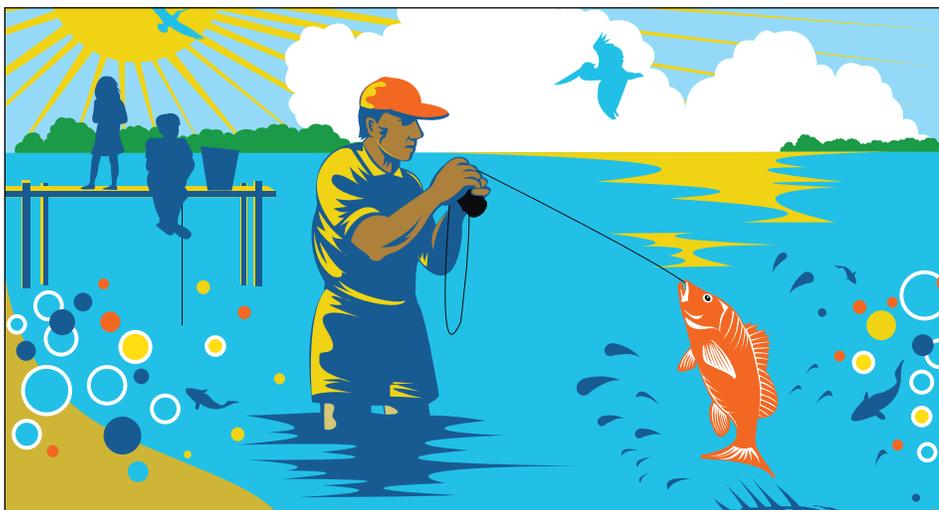
significance of fishing and peoples’ reliance on fishing to feed their families.”

Gathering this information will allow DPNR fishery managers to evaluate the fishery and the habitats that support it to help ensure a long-term sustainable resource for future generations.

A local individual will be hired to ask the survey questions of willing participants during their fishing activities. Community meetings are set for September 2013 (see dates in the Upcoming Events & Announcement calendar, page 8) to provide an informal discussion on the goals of the study, equipment used to weigh and measure the fish and an introduction to the surveyor.

The participants’ knowledge regarding the cultural significance of shore-based fishing on St. Croix is vitally important in conveying its importance to decision-makers looking to improve their resource management efforts. ■

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*Advertisement for the fall community meetings in St. Croix. Credit: Zhe Liu*



# 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](mailto:CaribbeanNews@noaa.gov). Be sure to include your full name, affiliation, a one or two sentence description and the date the image was made.



**Artist:** Albert Padilla

**Description:** A swordfish painted by local USVI artist Abert Padilla.

**Date:** Unknown



**Photographer:** L. Carrubba, NOAA

**Description:** Participants in the Green Construction Rewards Program training held in St. John.

**Date:** July 2013

## Upcoming Events & Announcements

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

### Events

#### September

**10:** Shore-based Recreational Fisher Survey Community Meeting in Frederiksted at Villa Morales Restaurant, 382 C Estate Whim from 5:30 – 7:30 pm

**12:** Shore-based Recreational Fisher Survey Community Meeting in Christiansted at Gertrude's, 114 Castle Coakley from 6:30 – 8:30 pm

#### October

**2-4:** [United Nations 2nd Global Conference on Land-Ocean Connections](#), Montego Bay, Jamaica

#### November

**4-8:** [66th Gulf and Caribbean Fisheries Institute Meeting](#), Corpus Christi, Texas; Call for abstracts extended to 1 September

**TBD:** 30th U.S. Coral Reef Task Force Meeting. Check <http://www.coralreef.gov/meetings.html> for details

#### December

**4-6:** The Climate Services Partnership [3rd International Conference on Climate Services](#) will be held at the Montego Bay Conference Center in Montego Bay, Jamaica

**9-13:** [14th Meeting of the Meso American & Caribbean Sea HC](#) will be held at St. Maarten, Netherlands

**10-11:** The next regular meeting of the [Caribbean Fishery Management Council](#) will be held in St. Thomas, USVI

### Announcements & Funding Opportunities

#### 6th annual lionfish sessions at GCFI

This half-day session continues to provide new insights into the lionfish invasion and opportunities for information exchange. If you are doing primary research on lionfish, please consider presenting in this session.

There is also a special workshop titled *Lionfish in the Market: Challenges and Opportunities* on harvesting lionfish as a foodfish. This workshop will discuss challenges and opportunities of harvesting lionfish as a foodfish. For more information, e-mail: [Lad@REEF.org](mailto:Lad@REEF.org)

#### NOAA Climate Program Office federal funding opportunity

The NOAA Climate Program Office released its federal funding opportunity. The announcement is available at: <http://www.grants.gov/view-opportunity.html?oppld=239854>. Letters of intent are due by 5 p.m. Eastern Time, September 10, and the deadline for final applications is 5:00 p.m. Eastern Time, November 14.



## **NOAA in the Caribbean Newsletter Editorial Team**

Please e-mail us at [CaribbeanNews@noaa.gov](mailto:CaribbeanNews@noaa.gov) to subscribe 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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