

Puerto Rico & Vieques 2008 Cruise

<u>Details on NCCOS Project Explorer</u>	<u>Track the NANCY FOSTER on NOAA Ship Tracker</u>	<u>Check Local Weather</u>
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Yellow goatfish schooling over reef habitat
(Credit: Amy V. Uhrin, CCFHR)

Cruise title: Comparative distribution of habitat, fishes, and habitat utilization on the insular shelf, south of Vieques Island, Puerto Rico

Cruise dates: March 26–April 5, 2008

Cruise Number: NF-08-06-SEAS

Area of Operation: Southern coast of Vieques Island and the northeast coast off Puerto Negro, sailing from San Juan, Puerto Rico aboard [NOAA Ship NANCY FOSTER](#).

Cruise Objectives:

1. Conduct comprehensive hydroacoustic multi-beam and split-beam surveys of shelf waters from a depth of 20 m out to the shelf break (40 m) within six study areas along the south coast of Vieques.

2. Conduct diver surveys of benthic habitat and the associated fish communities.
3. Estimate abundance and species composition of resident fauna from nursery areas within lagoon/backreef regions using diver-operated push net sampling.

Personnel

NOAA/NCCOS: Center for Coastal Fisheries and Habitat Research

- Jud Kenworthy
(Chief Scientist)
- John Burke
(Principal Investigator)
- Brian Degan
(Field Party Chief)
- Roger Mays
(Dive Master)
- Amy Uhrin
(Web Page Coordinator)
- Christine Addison
- Don Field
- Brett Harrison
- Brooke Landry
- Brad Teer

NOAA/NMFS: Southeast Fisheries Science Center

- Jack Javech

NOAA/NCCOS: Center for Coastal Monitoring and Assessment

- Kim Foley

Florida Fish and Wildlife Conservation Commission/Fish and Wildlife Research Institute

- Jennifer Kunzelman
- Manuel Merello



Habitat survey diver Amy Uhrin over hard-bottom habitat colonized with gorgonians
(Credit: Michael Judge, NMFS/SEFSC)



[NOAA Ship NANCY FOSTER](#)
(Credit: Amy V. Uhrin, CCFHR)

Comparative distribution of habitat, fishes, and habitat utilization on the insular shelf, south of Vieques Island, Puerto Rico

In collaboration with NOAA's [Office of Response and Restoration](#), the Center for Coastal Fisheries and Habitat Research is conducting ongoing fish and benthic habitat surveys around the Island of Vieques, Puerto Rico. The goal of this study is to collect data which will serve to prioritize conservation efforts related to the cleanup and restoration of Vieques' coastal waters. Surveys are designed to identify benthic habitats of high value for fisheries by quantitatively sampling benthic habitats and associated fish communities within coastal shelf habitats.

The southern shelf of Vieques is the focus of our 2008 cruise based on previous observations of marine resources around the island. Analyses of survey data collected annually since 2004 suggest that fish abundance and habitat complexity is highest on the southern shelf of the island. The southern shelf has large open bays and extensive backreef/lagoon habitats that act as nurseries for juvenile fishes and crustaceans and provide recruitment to deeper areas of the shelf.

The southern shelf has been divided into six sampling areas to provide a spatial framework for comparative sonar and diver surveys of the distribution of resources. Simultaneous multi-beam and split-beam sonar surveys will be conducted to provide data on the bathymetry of benthic habitat and fish abundance and biomass respectively. Sonar surveys will be conducted, both day

and night, in depths of 10 to 40m. Diver surveys will be conducted in sampling strata defined by two cross-shelf depth zones (1–10, 10–20m) and two substrate types (vegetated sediments and reef). Stations within each of the four sampling strata of each study area are randomly selected. Comparison of fish distribution, abundance, biomass, and habitat utilization among the study areas will provide insight to regional patterns of fish productivity and a basis for decisions relevant to the sustainable management of Vieques' marine resources.

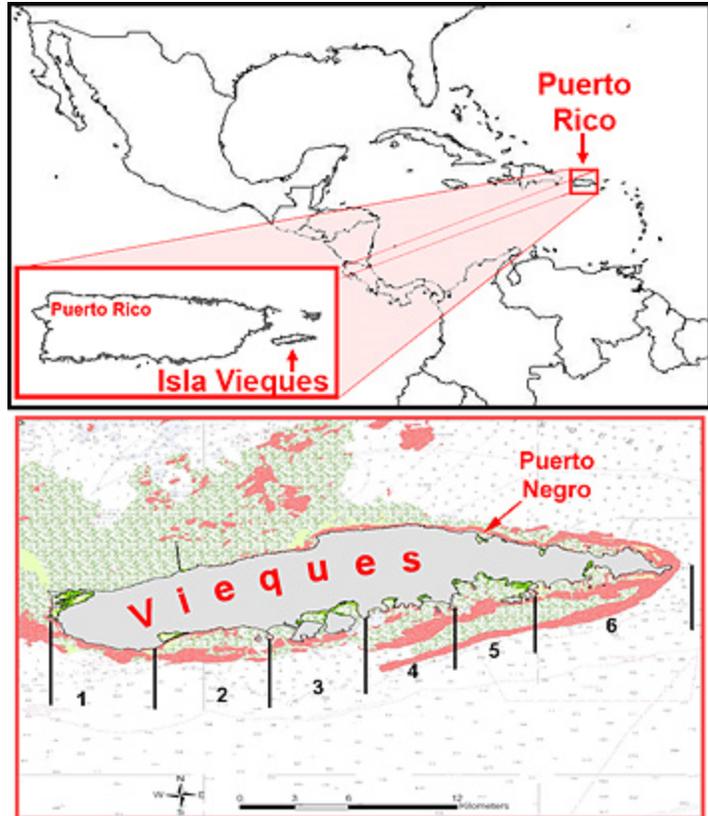
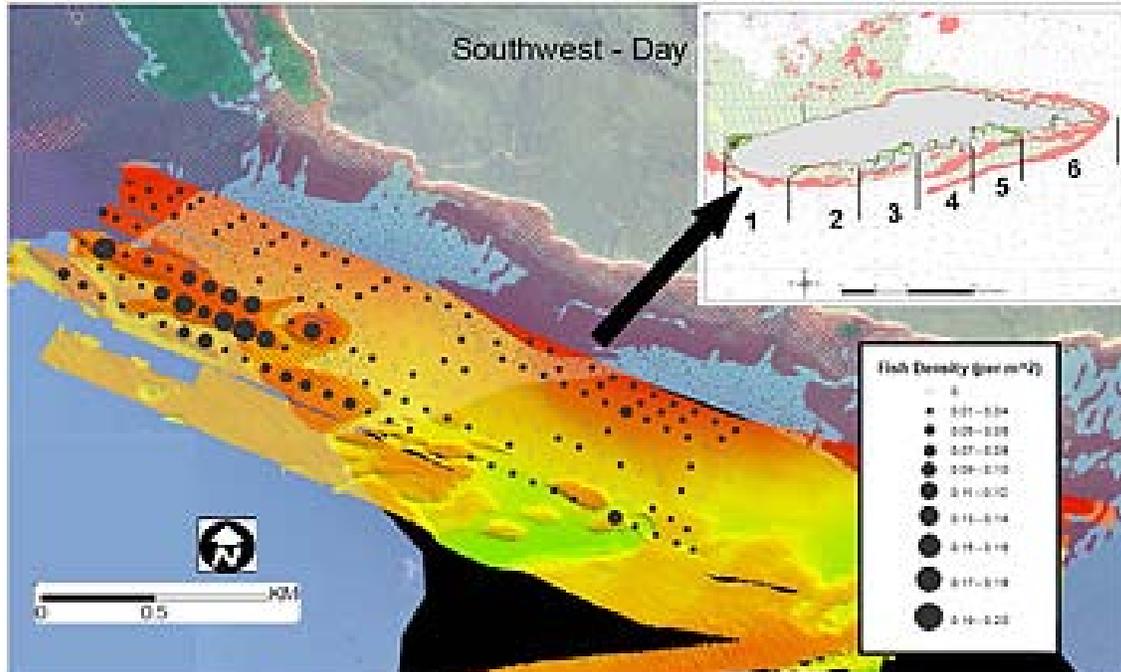


Illustration: Map of Puerto Rico with location of Vieques Island and the six study areas.
Credit: The Center for Coastal Fisheries and Habitat Research



Daytime fish density along the southwest corner determined by split-beam sonar relative to bathymetric features determined by multi-beam sonar gathered in 2007.

Densities are measured in fish/m² for fish greater than 100 mm total length and are represented as closed circles proportional to the legend. (Credit: Chris Taylor, CCFHR)

Puerto Rico & Vieques 2008 Cruise, day one: March 26, 2008

El Morro, the Spanish fort at the entrance of San Juan Harbor (Amy V. Uhrin, CCFHR)

The first order of business this morning was to load one of the small launches back onto the ship. The prior cruise did not use all of the small boats, so this launch was off-loaded and remained "docked" at the Coast Guard Station in Old San Juan. At 10:30am, we cast off our lines and set sail for Isla Vieques under sunny skies. There was a slight chop to the sea as we cruised past *El Morro*, the antiquated guardian of *Puerto San Juan*. The flags of Puerto Rico, the United States, and an historic colonial Spanish military flag waved majestically, as if wishing us *¡bien viaje!*.



We arrived on station after a seven-hour steam and prepared to launch two small boats for late-afternoon dive operations. Our next task was to conduct "practice" fish and habitat surveys to let all the divers acquaint themselves with our survey methods. We divided the scientific party into "fish specialists" and "habitat specialists" and set off to dive on two small patch reefs.

Our first day was a success. However, the trip to Isla Vieques and subsequent diving has left everyone a bit droopy-eyed. Tomorrow we will begin the actual data collection.



Scientist John Burke reels in his meter tape after finishing his "practice" fish transect (Kevin Kirsch, NOAA ORR)

Puerto Rico & Vieques 2008 Cruise, day two: March 27, 2008



Scientist Christine Addison rolls off the small boat to begin her dive. (Credit: Amy V. Uhrin)



Pillar coral colony. (Credit: Amy V. Uhrin)

Up bright and early, the small boats were launched and we were off to our sites at 8:00 am. Our mission today was to begin fish and habitat survey work. At each site, one of a pair of divers swims along a 30 meter transect line identifying and recording all fish sighted within one meter on each side. The second diver follows behind the first and estimates the percent cover of various habitats falling within a 0.5 x 0.5 m² quadrat. A total of 25 stations were surveyed today, a great start!

One of the dive teams encountered a spectacular colony of pillar coral (*Dendrogyra cylindricus*) at the end of a transect. These colonies may contain dozens of upright cylindrical branches which can attain heights up to three meters. This particular colony had 14 branches and was over a meter tall. The distribution of this coral is spotty throughout the Caribbean and we have never before encountered this species in four years of survey work at Isla Vieques. At the base of the colony, a large mixed school of fish including highhats, wrasses, butterfly fish, and squirrelfish swayed in rhythm together.

The crew of the NANCY FOSTER is a critical resource during the cruise. They provide small boat support so that we can conduct remote dive operations. Crew members navigate to the dive sites, assist divers in donning gear, track divers while underwater by maintaining visual contact of surface exhalation bubbles, and record important dive statistics such as time in and out of the water, air pressure remaining in SCUBA tanks after a dive, bottom time, and maximum depth. Our work would not be possible without them. Thanks guys!



*Highhats among pillar coral branches
(Credit: Amy V. Uhrin)*



*Scientist Don Field finishes up his fish survey at the base
of the pillar coral (Credit: Amy V. Uhrin)*



*NANCY FOSTER's Executive Officer, Dan Simon,
navigates to a site (Credit: Amy V. Uhrin)*



*General Vessel Assistant, Dave Brown, records statistics
after a dive (Credit: Amy V. Uhrin)*

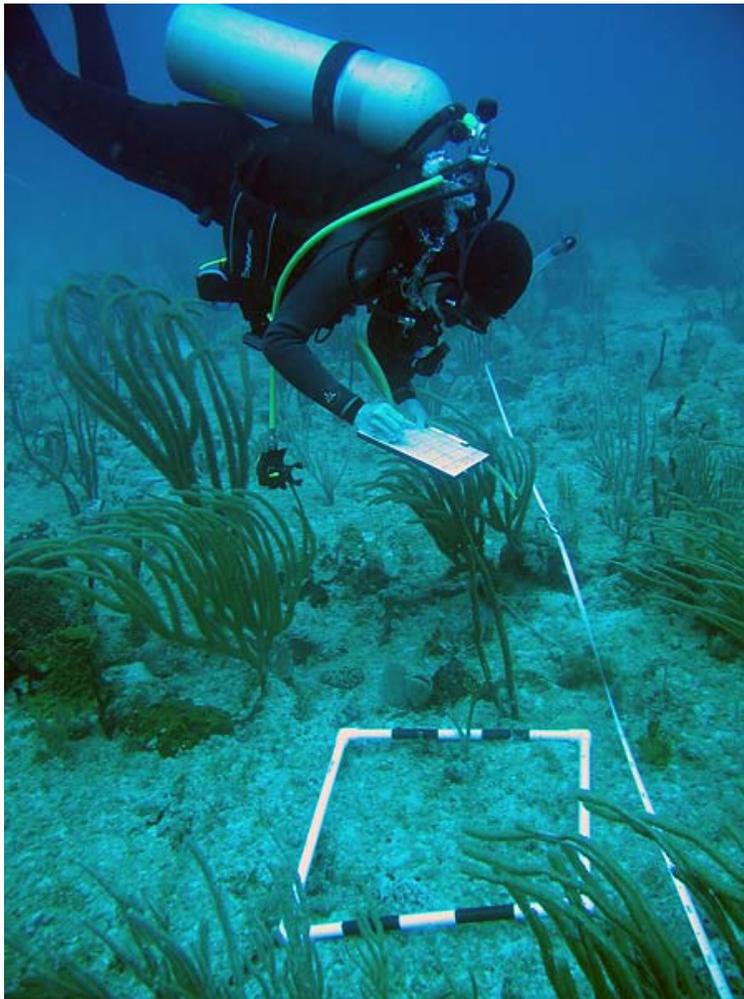
Puerto Rico & Vieques 2008 Cruise, day three: March 28, 2008

Today was a struggle between man and nature in the name of science. The small boat dive teams managed to successfully complete 26 surveys, despite the baking tropical sun and five-foot swells. Ten of these were completed in our inshore sample area in conjunction with push net samples collected from seagrass beds. Sixteen surveys were completed at midshore locations where fish counts and habitat assessments were made.

On one of the transects, divers discovered a colony of thin finger coral (*Porites divaricata*) with a lavender hue. Normally beige to yellow-brown and brown, this species is common to abundant in the Caribbean, and the purple overtones are not often encountered.



Roger and Brett swim the push net
(Credit: Brian Degan)



Jennifer Kunzelman estimates habitat cover
(Credit: John Burke)

The smooth trunkfish (*Lactophrys triqueter*) is common in the Caribbean, but ranges from New England to Brazil. These reef fish are typically solitary, but they may also be found over sand and seagrass.



A colony of lavender-hued finger coral
(Credit: John Burke)



A smooth trunkfish (Credit: Brian Degan)



Divers aboard a small boat manage to take a lunch break in a calm cove (Credit: Brett Harrison)

Puerto Rico & Vieques 2008 Cruise, day four: March 29, 2008

This morning's dives fell under the watchful eye of the Puerto Ferro lighthouse. Located near the former U.S. Navy bombing range (now the Vieques National Wildlife Refuge), the abandoned and inactive light is deteriorating rapidly. Established in 1896, the building is of typical nineteenth century Spanish architectural design with a stucco keepers quarters and white octagonal stone tower directly in the center. The lighthouse was abandoned in 1926. In 1975, the United States Coast Guard erected a black steel skeletal tower. The Puerto Ferro lighthouse is listed in the U.S. Federal Register of Historic Places.



Puerto Ferro Lighthouse
(Credit: Amy V. Uhrin)



Colony of staghorn coral (Credit: Brian Degan)

In the afternoon, divers encountered a colony of staghorn coral (*Acropora cervicornis*), a rare sighting in this area. Once abundant throughout the Bahamas and the Caribbean, staghorn coral has suffered mass mortality since the 1990s due mainly to disease outbreaks, especially white band disease. The fragile branches of this coral render it highly susceptible to breakage during hurricanes, leading to localized losses. In 2006, this species was listed as threatened throughout its range under the Endangered Species Act.



Elegant anemone (Credit: Amy V. Uhrin)

The elegant anemone (*Actinoporus elegans*) is an interesting creature with its numerous knob-like tentacles. This specimen was found in a sand patch within a larger seagrass meadow. Another interesting creature, the puffer fish will blow up like a balloon, when feeling stressed or threatened. This bandtail puffer (*Sphoeroides spengleri*) was scooped up in the push net, counted, identified, and safely returned to the water.

This beautiful juvenile French angelfish (*Pomacanthus paru*) was found cruising along the reef by scientist Brian Degan.



Bandtail puffer (Credit: John Burke)



Juvenile French angelfish
(Credit: Brian Degan)

Puerto Rico & Vieques 2008 Cruise, day five: March 30, 2008

Hurray for Habitat!

Seagrasses

The coastal waters of Puerto Rico are home to a number of seagrass species, including *Thalassia testudinum* (turtle grass), *Syringodium filiforme* (manatee grass), *Halodule wrightii* (shoal grass), and *Halophila decipiens* (paddle grass). Yes, turtles do eat turtle grass and manatees do eat manatee grass. Manatees are often destructive during foraging, bulldozing through an area removing not only green blades and stalks, but also below-ground root material. Turtles are a bit more refined in their eating habits. Turtles crop seagrass blades at the base of the shoot leaving behind a meadow that looks as if someone ran over it with a lawn mower.



Mixed turtle grass and manatee grass bed (Credit: Guiseppe DiCarlo)

Algae



Mixed algae field (Credit: Brian Degan)

The algae fields that we have encountered have been dominated by three species of green algae, *Udotea flabellum* (mermaid's fan), *Penicillus pyriformis* (flat-top bristle brush), and *Halimeda incrassata* (three-finger leaf alga). These species of green algae are stalked and calcified, producing rigid and erect plants. It is common to find these species intermixed with seagrass.



Grooved brain coral (Credit: Amy V. Uhrin)



Mixed soft coral reef (Credit: Amy V. Uhrin)

Reefs

Most of our reef sites have been low relief, mixed reefs where the seafloor is colonized by small stony corals, large gorgonians and sponges, and small amounts of algae. Stony corals secrete a hard calcium carbonate skeleton, forming the basic building blocks of tropical coral reefs. The grooved brain coral, *Diploria labyrinthiformis*, forms hemispherical heads with deep trough-like grooves. This species is a common reef-building species. Gorgonians do not have a rigid skeleton and are therefore commonly referred to as "soft corals." Sea fans and sea rods are types of gorgonians. This giant barrel sponge (*Xestospongia muta*) is a species frequently encountered in our soft coral reef habitats. *Padina boergesenii* is a brown alga that attaches to rocky substrates in most reef environments. Perhaps the most notable feature on this species is the concentrically banded blades. *P. boergesenii* is quite common at our reef sites.



Large barrel sponge (Credit: John Burke)



Padina boergesenii (Credit: Amy V. Uhrin)

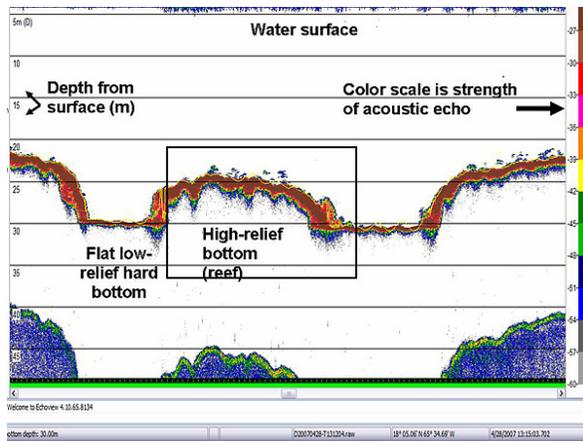
Puerto Rico & Vieques 2008 Cruise, day six: March 31, 2008

Hydroacoustic Fish Surveys

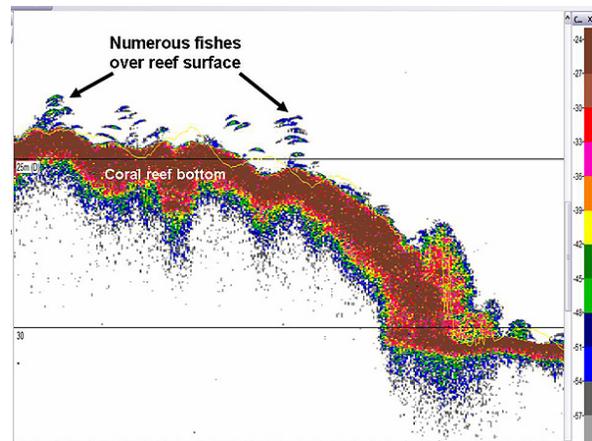
Previous research has shown that key members of reef fish communities, most notably grunts and snappers, migrate from reefs to surrounding soft-bottom habitats at night to feed. At dusk, these fishes concentrate in schools at the edge of reefs, providing an opportunity to estimate the biomass of these communities. Observing these behaviors at night using divers is very difficult due to low-light conditions. To overcome this, researchers often use hydroacoustic (sonar) technology to assess nocturnal fish communities. We began using this approach in night surveys last year at Isla Vieques and will continue this year.

NANCY FOSTER Survey Technician,
Melody Ovard, monitors the progress of
the multibeam sonar unit
(Credit: Amy V. Uhrin)





Screen capture from the Simrad EK60 split-beam echo sounder



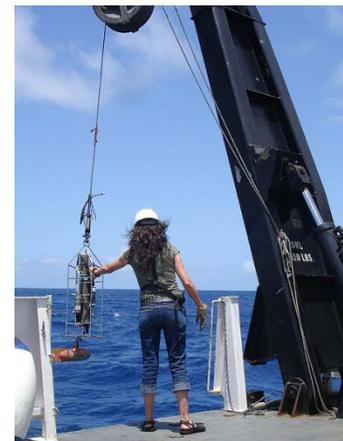
Close up of screen capture showing fish movement above the reef

Each evening after dive operations are complete, the fisheries sonar unit is activated. This unit is a scientific fish finder used to estimate reef fish biomass in specific areas around Isla Vieques. The unit consists of a Simrad EK60 split-beam echo sounder coupled with a Simrad EM1002 multibeam sonar. The transducer for the sonar, located on the underside of the NANCY FOSTER, sends out 15 pings per second. The pings reflect off the bottom as well as fish in the water column. Reflected "echoes" are monitored on a laptop computer and recorded onto its hard drive for later analysis and biomass estimations. The images above on the right are actual echo recordings from Isla Vieques. The use of fisheries sonar permits observations during all hours and under most ocean conditions.

A CTD (Conductivity, Temperature, and Depth) is a standard oceanography tool used for measuring variations in conductivity and temperature along depth profiles in the water column. The CTD also calculates the speed of sound underwater. The speed of sound is then used to calibrate the ship's multibeam sonar.

We continue to have new fish sightings every day. Today's top picks include the butter hamlet (*Hypoplectrus unicolor*) and the sand tilefish (*Malacanthus plumieri*). Typically, hamlets with like color patterns and markings will mate together. However, when a **similar appearing mate** is not available, **different appearing** individuals will mate, producing hybrids. Because of this hybridization, there has been much scientific debate regarding the classification of hamlets.

Sand tilefish create burrows out of sand and rubble and can be difficult to photograph as they are quite wary and will retreat head first into their lair when approached.



Missy Partyka, a Survey Technician aboard the NANCY FOSTER, about to deploy the CTD (Credit: Amy V.Uhrin)



Butter hamlet (Credit: Brian Degan)



Sand tilefish (Credit: Christine Addison)

Puerto Rico & Vieques 2008 Cruise, day seven: April 01, 2008



A cero. (Credit: Brian Degan)

"Eat or be eaten" is a common saying when referring to how we view predator and prey relationships among fish. It's an overly simplified way of viewing things, but it is true that most fish have to pursue their food, or evade other fish that are pursuing them as food. Some fish have responded by evolving more efficient forms of swimming by streamlining their bodies like the cero (*Scomberomorus regalis*) and the great barracuda (*Sphyraena barracuda*). Many smaller fish, like scad (*Decapterus* sp.), school and hover near a larger predator as a mechanism of protection or feed on scraps left behind by the larger fish.



A school of scad hovering above a great barracuda
(Credit: Amy V.Uhrin)

Fish have also developed deterrents such as elongated spines like the longspine squirrelfish (*Holocentrus rufus*).

Many species have become adept at blending with their surrounding environment via camouflage. Camouflage is used as frequently by predators as by prey. Benthic predators such as the sand diver (*Synodus intermedius*) use camouflage to mimic the substrate and enable them to approach closer to prey.



Longspine squirrelfish (Credit: John Burke)

All wrasses have multiple stages during their lives. The larval and juvenile stages of the blackear wrasse (*Halichoeres poeyi*) exhibit shades of green to chartreuse to blend in with the seagrass beds they inhabit.

Similarly, the juvenile stage of the slender filefish (*Monacanthus tuckeri*) often drifts among branches of gorgonians.

The hogfish (*Lachnolaimus maximus*) is a popular fish to harvest via spear fishing and will use special cells known as *chromatophores* to change color. The hogfish can change color and blend in with its environment very quickly if it feels endangered by a predator, and then just as quickly change back once the danger has passed.



Sand diver (Credit: Jack Javech)

Today's web page content was contributed by CCFHR Scientist Brian Degan (*right*). Brian is the Field Party Chief on our cruise, which means that he is responsible for assisting the Chief Scientist in whatever fashion is necessary, most notably selecting the random sample sites and generating the plan of the day. Hats off to Brian for taking the time out of his hectic day to contribute this page!



Brian Degan

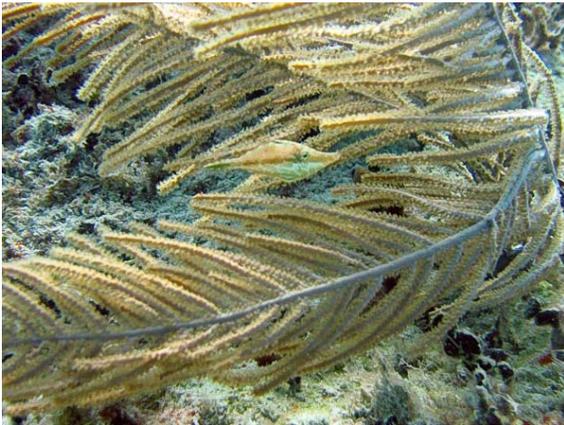
Camouflage patterns in fish seen during this cruise. Each pair is a before and after mini-slideshow, with the fish revealed in more detail in slide two of each:



Blacked wrasse (Credit: Brian Degan)



Blacked wrasse (Credit: Brian Degan)



Slender filefish (Credit: Brian Degan)



Slender filefish (Credit: Brian Degan)



Hogfish (Credit: Brian Degan)



Hogfish (Credit: Brian Degan)

Puerto Rico & Vieques 2008 Cruise, day eight: April 02, 2008

Mother Nature is really giving us a time out here. Yesterday, we had to call off dive operations for the afternoon due to high winds. Wind gusts continued today, up to 40 knots at times, and we were unable to get out all day. This an unfortunate fact of conducting research at sea.



A typical stateroom aboard NANCY FOSTER
(Credit: Amy V.Uhrin)

About the NANCY FOSTER

[NOAA Ship NANCY FOSTER](#) was originally built for the U.S. Navy as a yard torpedo test craft. The vessel is 187 feet long, 40 feet in breadth, and drafts 10 feet. In 2001, the ship was transferred to NOAA and converted to conduct marine research along the Atlantic and Gulf coasts of the United States and the Caribbean. The ship was commissioned in 2003 and named for Dr. Nancy Foster in tribute to her outstanding contributions in advancing NOAA's mission. The vessel is capable of remaining at sea for 14 days before returning to port to refuel. NANCY FOSTER homeports in Charleston, South Carolina.

Life at sea

In addition to withstanding the rolling of the ship, inclement weather, equipment malfunctions, and other typical incidents at sea, spending 10 days on a research cruise requires patience, flexibility, and consideration for others. Scientists must remember and respect that NANCY FOSTER is home for the crew. Imagine being inundated with 14 crazy relatives all coming to stay at your house for a couple of weeks.



The mess hall (Credit: Amy V. Uhrin)



The "theater" (Credit: Amy V.Uhrin)



Ben and Greg on the crane.
(Credit: Amy V. Uhrin)

Scientists bunk in staterooms consisting of two sets of bunk beds (racks), a sink, and four lockers. A typical stateroom on NANCY FOSTER berths four scientists comfortably. If you didn't know your roommates before the cruise, you will certainly get to know them intimately, living in such close quarters. Bathrooms (heads) are same-sex, with separate stalls with lockable doors for showers and toilets. Lito Llena and Dennis Moore cook up their culinary delights in the galley, and everyone eats together in the mess hall during established meal times. For entertainment, there is a "theater" with a library of over 600 movies, a small area with board games and books, and a small workout room with some exercise equipment and free weights.

When not in the field, scientists spend the majority of their time in the wet and dry labs, prepping equipment, processing samples, logging data, and organizing the Plan of the Day.

Starting the Day

Each day begins with the launching of the small boats, involving no less than four line handlers and one crane operator to tame each boat like a Macy's Parade balloon. This is no easy task, especially in rough seas as we have been experiencing the past two days. Our thanks to the crew once again for seeing us off safely each morning.



*Lito and Dennis in the galley
(Credit: Amy V. Uhrin)*



*The dry lab
(Credit: Amy V. Uhrin)*



Greg Walker (on the crane), and Bosun Group Leader, Gordon Pringle, prepare the harness of a small boat prior to launching.



NANCY FOSTER's Operations Officer, Sarah Mrozek (foreground) and Junior Officer Trey Emmons, secure lines prior to full deployment as Captain Rogers observes.



General Vessel Assistant, Jeremy Brock (left) and the NANCY FOSTER's Commanding Officer, Ralph Rogers, man the "air tuggers" that assist in stabilizing the small boats while they are being hoisted by the crane.

Puerto Rico & Vieques 2008 Cruise, day nine: April 03, 2008

Although the winds subsided enough to permit dive operations, we faced overcast skies and a number of small squalls this morning to forge onward with our underwater surveys. Despite our gray ceiling, below the surface we continued to encounter a number of interesting creatures.

Cymothoid isopods (a type of crustacean) attach to the head region of fish using hook-like legs and scavenge food particles as their host fish feeds. These isopods are not parasitic on their host fish and once settled, lose their ability to swim and remain attached for life. Sometimes mated pairs will attach, and once the female dies, the male has the ability to change sex and await the arrival of a young male.



Cymothoid isopod attached to the nape of a squirrelfish (*Holocentrus adscensionis*)
(Credit: Brett Harrison)

Sharksuckers have a suction cup–type disc on top of their heads that resembles the tread of a sneaker but is actually a modified foredorsal fin. The disc is used for attachment to sharks, rays, large fish, and turtles. The sharksucker feeds off scraps made by its host.

Neon gobies (*Elacatinus* sp.) are well-documented cleaner fish, setting up stations where larger fish come to have the gobies eat their small external parasites.



Pair of sharksuckers looking for someone to attach to
(Credit: Brett Harrison)



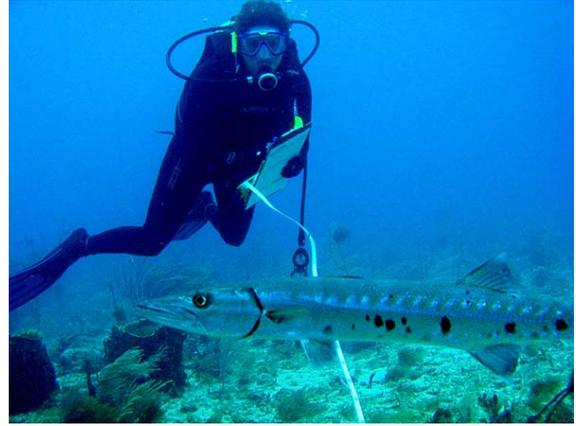
Scientist Brett Harrison refuses to let the weather get him down
(Credit: Amy V. Uhrin)



Neon goby resting on a small colony of great star coral (*Montastrea cavernosa*) while patiently awaiting the arrival of his next customer
(Credit: Manuel Merello)



*A diver's-eye view of a small boat on this blustery day
(Credit: Brett Harrison)*



A curious barracuda offers to help scientist Kim Foley with her fish survey by getting up close and personal (Credit: Brett Harrison)



*Scientist Manuel Merello conducts a habitat survey over a mixed soft coral reef
(Credit: Jack Javech)*

Puerto Rico & Vieques 2008 Cruise, day ten: April 04, 2008

Ah, the final day! The morning was spent multi-beaming along the eastern part of the island, while divers anxiously paced the ship, awaiting their final splash.

After a day of diving, it is necessary to re-fill the SCUBA cylinders with compressed gas for the next day. A special diving compressor onboard the ship is used for this. The greatest risk of cylinder explosion occurs at filling time. Care must be taken to continuously monitor the pressure of the gas and its oxygen content. A big thank you to Brad Teer, Brooke Landry, and Jack Javech for taking on this important task and keeping our supply constant.



A school of white grunts forms a yellow cloud over the reef
(Credit: Jack Javech)

Along the way, we have observed three of the six conch species found in the wider Caribbean. All three inhabit seagrass beds and sand flats, typically around shallow patch reefs. Algae is their primary food source. When approached, they will retract rapidly into their shells. It soon became a game among a couple of the scientists to see who could capture the best conch eye photo.



The science party awaits final deployment



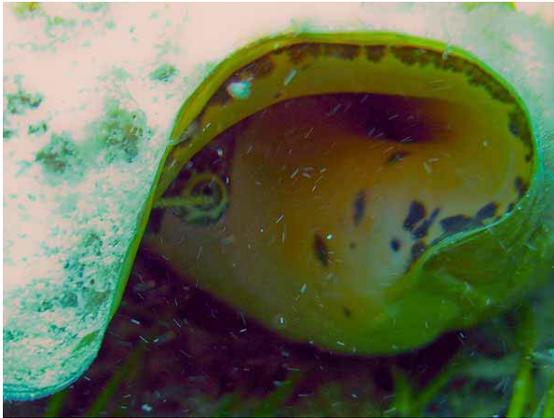
Scientist Brad Teer monitors the diving compressor
(Credit: Jack Javech)



Conch eye



The queen conch
(Credit: Amy V. Uhrin)



Conch eye



Conch eye

With a rosy-pink interior, the Queen conch (*Strombus gigas*) is perhaps the most recognized and is the largest of the six species. Queen conchs have been harvested in the Caribbean since prehistoric times. Commercial harvest of queen conchs continues in roughly 25 Caribbean nations and territories, but has been prohibited in some areas, including Florida. Heavy exploitation has resulted in severe local population declines. This species was added to Appendix II of the [Convention on International Trade in Endangered Species of Wild Fauna and Flora \(CITES\)](#) in 1992. Species listed in this appendix "are not necessarily now threatened with extinction but that may become so unless trade is closely controlled".

The milk conch (*Strombus costatus*) is identified by its thick, milky white outer lip. When queen conch began to decline in the 1970s, fishermen turned to milk conch. This species is commercially harvested in 22 Caribbean nations and this demand is being reflected by dwindling numbers.

The rooster tail conch (*Strombus gallus*), so named for the narrow, elongated extension of the outer lip of its shell, is an uncommon to rare occurrence in the Caribbean. How fortunate we were to see one.



The rooster tail conch
(Credit: Amy V. Uhrin)



Scientist Jack Javech prepares to don his gear for another dive



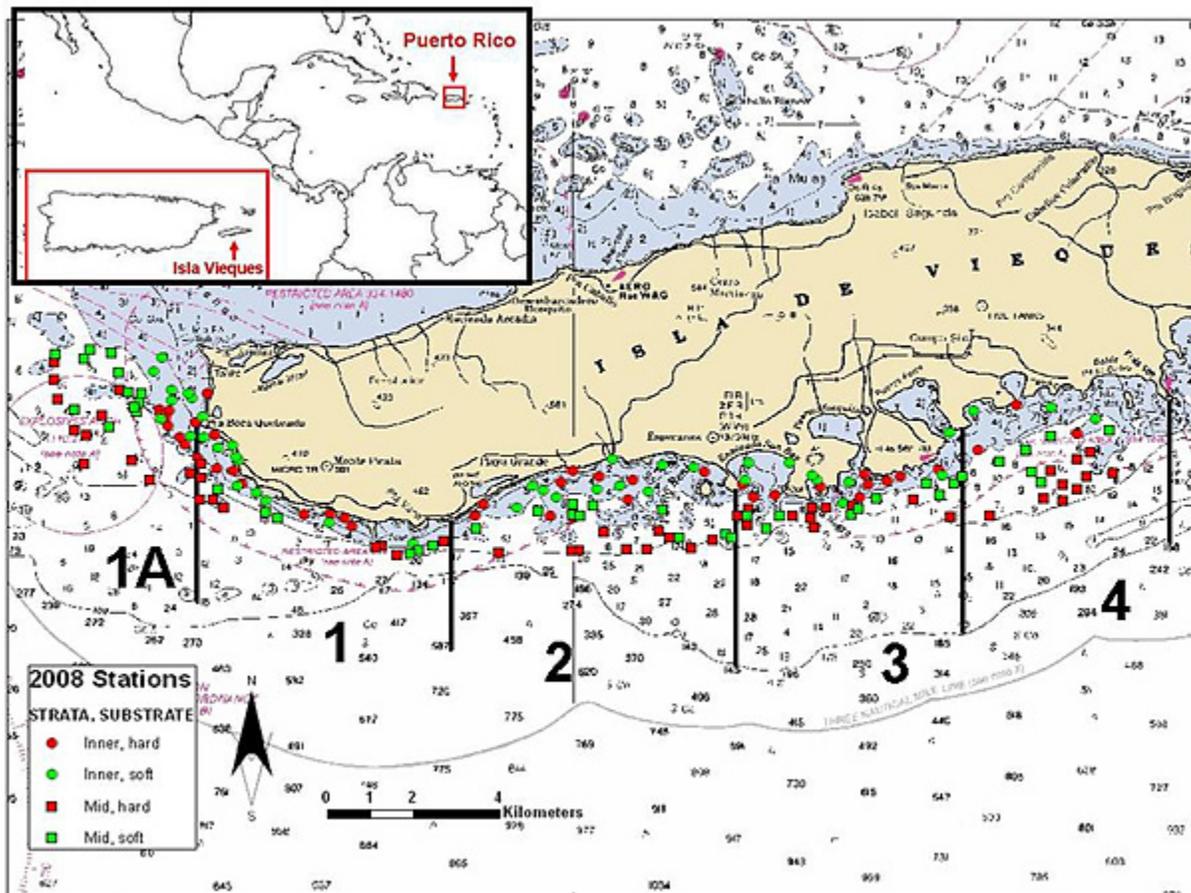
The milk conch
(Credit: Amy V. Uhrin)



The final dive!
(Credit: Brian Degan)

Puerto Rico & Vieques 2008 Cruise Wrap-Up

Significant progress was made in documenting the marine resources of Isla Vieques during the NANCY FOSTER 2008 survey cruise. The cruise was a collaborative effort, and vital contributions were made by the officers and crew of the NANCY FOSTER and personnel of [NOAA / NOS / NCCOS](#) / Center for Coastal Fisheries and Habitat Research and the [Center for Coastal Monitoring and Assessment](#), NOAA / [NMFS](#) / [Southeast Fisheries Science Center](#), and [Florida Fish and Wildlife Conservation Commission](#) / [Florida Wildlife Research Institute](#). Our goal this year was to survey the southern shelf of Vieques as results from previous years indicated that biologically, this shelf was particularly rich. Despite three days with 40-knot winds and seas to 10 feet, divers conducted stratified random surveys of benthic habitat, reef and soft bottom fish communities, and of juvenile fishes within nursery grounds in five shelf areas. A total of 436 dives were completed safely and without incident in support of this cruise.



Distribution of stratified random stations among the five study areas sampled by divers.

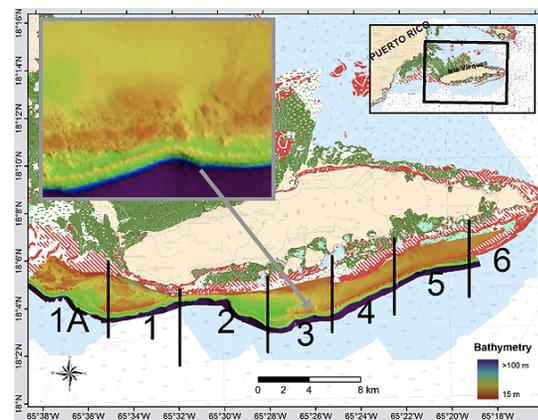
Area	Habitat survey	Fish visual census	Push net samples	Sonar survey (km ²)
1A	42	42	9	19.9
1	33	33	10	12.7
2	40	40	10	12.2
3	39	39	9	18
4	23	23	3	12.4
5	-	-	-	14.6
6	-	-	-	3

Table 1: Summary of number of stations or square kilometers sampled in seven areas that collectively comprise the southern shelf of Vieques. Areas 5 and 6 were only sampled with sonar as restrictions due to proximity to the Naval Bombing Range prohibited diving in these areas.



Sea grass bed (Credit: John Burke)

During periods when dive operations were not conducted, multibeam and split beam sonar surveys were conducted from the NANCY FOSTER in seven study areas. Data analyses of these complimentary surveys will provide resource managers with a quantitative description of key aspects of shelf resources in support of conservation and restoration efforts. For more information, a report generated for the Puerto Rico [Departamento de Recursos Naturales y Ambientales](#) will be available on this page soon.



Areas surveyed with multi and split beam sonar during the cruise.

The Principal Investigator, John Burke, led the design team for this field study of the waters around Vieques. John also contributed this final synopsis page and has contributed many colorful photos to the web log over the course of the past 10 days.



John Burke (Credit: Brett Harrison)

Final photos from the cruise:



Red hind (Credit: Amy V. Uhrin)



Push net (Credit: John Burke)



Transect swim (Credit: Brian Degan)



Push net collection (Credit: John Burke)



The scientific party (Credit: Sarah Mrozek)



Mixed juveniles (Credit: John Burke)