

Identification_Information:

Citation:

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Publication_Date: 20121025

Title: Fish Community Characterization on Shallow (<30m) Hardbottom Shelf Habitats in St. Croix, USVI. A preliminary field survey to assess operational and logistical approaches to implement the National Coral Reef Monitoring Program (NCRMP) in the USVI.

Publication_Information:

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Description:

Abstract:

Reef fish populations are a conspicuous and essential component of USVI coral reef ecosystems. Yet despite their importance, striking population and community level changes have occurred in the recent past due to fishing pressure and habitat degradation. The monitoring methodologies described in this document are necessary for understanding how natural and anthropogenic stressors are changing reef fish populations and communities and will be critical for their sustainable management.

A collaborative research effort between the NOAA's National Centers for Coastal Ocean Science, Center for Coastal Monitoring and Assessment's Biogeography Branch (BB) and the National Park Service (NPS) has been used to inventory and assess reef fish populations in reef and reef-associated habitats in the northeast region of St. Croix from 2001-2011. The survey method previously used has been refined to enable broader region-wide coverage at the scale of the USVI yet maintains high precision at the Marine Protected Area (MPA) spatial level. Region-wide population metric estimates are required to effectively manage reef fisheries but are also imperative for spatial management and understanding ecosystem-level processes. For example, the ability to place protected fish resources in the context of the greater region not only allows for the evaluation of management actions but it also provides the ability to determine the ecological role of an MPA in the greater ecosystem.

The monitoring method previously used by the Biogeography Branch and other partners in St. Croix and other regions within the USVI and Puerto Rico will be used to characterize and establish baseline data for future monitoring. St. Croix was chosen to serve as the first area to implement the protocol and to evaluate the logistics necessary to implement a long term monitoring program.

Characterization and monitoring of fish communities requires a quantitative measure of the spatial distribution and variation of those communities. These measures will enable managers to make targeted management decisions (e.g. where to allow mooring or where to allow recreational activities such as snorkeling and SCUBA diving). Additionally, the spatial setting, both within and outside protected regions allows managers to assess the impact, if any, of a change in regulation such as the prohibition of fishing. It also enables analysis of any differential effect (i.e. the effect may be the same throughout the region or it may be more effective toward an edge or center of a management area).

To quantify patterns of spatial distribution and make meaningful interpretations, we must first have knowledge of the underlying variables determining species distribution. The basis for this work therefore, is the nearshore benthic habitats maps (less than 100 ft depth) created by NOAA's Biogeography Program in 2001 and NOS' bathymetry models. The sampling domain includes all hardbottom habitats around St. Croix at depths less than 30m. The benthic habitat map and a habitat classification scheme were used to create a sample frame constructed with 50 x 50 m grids. Grids were stratified based on three variables: Hardbottom habitat type, depth zone, and region/management area. Habitat within these grids was stratified into 5 habitat categories (scattered coral/ rock, pavement, bedrock, patch reef and linear reef) each with two depth classifications (shallow (0-11.9 m) and deep (12- 30m)). Further stratification was assigned based on management zones and region of the island. There are three managed areas in St. Croix. Two federal marine protected areas are managed by the Department of Interior's National Park Service: Buck Island Reef National Monument and Salt River Bay National Historical Park and Ecological Reserve. The St. Croix East End Marine Park is a territorial marine protected area managed by the USVI Department of Planning and Natural Resources. Other strata include specific regions of St. Croix: North, East, West, and South shores. Overall there were 70 possible strata: 5 habitat types, 2 depth zones and 8 management areas/regions.

The monitoring objectives of this protocol are to determine status, trends, and variability in exploited reef fish species and communities within the USVI region and inside vs. outside different management zones, using measures such as relative abundance (density), spatial distribution, size structure and diversity.

The survey design is optimized for nine economically and ecologically important species in the USVI: blue tang (*Acanthurus coeruleus*), queen triggerfish (*Balistes vetula*), coney (*Cephalopholis fulva*), red hind (*Epinephelus guttatus*), four-eye butterflyfish (*Chaetodon capistratus*), French grunt (*Haemulon flavolineatum*), yellowtail snapper (*Ocyurus chrysurus*), stoplight parrotfish (*Sparisoma viride*) and threespot damselfish (*Stegastes planifrons*). These species were chosen to include a broad range of life history traits as well as a variety of habitat utilization patterns. The sample design is optimized with the respect to these species, but because all fish species are recorded, monitoring efforts also obtain important information about many non-targeted species, the overall trophic structure, and form the scientific basis for effective management actions.

As such, the sample allocation for this mission is based upon the existing community metrics and the above species specific distribution from the northeast region of St. Croix. It was determined that 250 samples among the various strata would be sufficient to characterize hard bottom habitats around the island and have comparable coefficient of variation (CV) to values observed in the northeast region of St. Croix. The goal was to survey as many of the 250 sites as possible in a two week time period. We organized a strong science field team and completed 286 fish and benthic surveys around the island.

Purpose: To determine status, trends, and variability in exploited reef fish species, and fish and benthic communities within the USVI region and inside vs. outside different management zones, using measures such as relative abundance (density), spatial distribution, size structure and diversity.

Supplemental Information: This work is being conducted in collaboration with the NOAA's Biogeography Branch, Southeast Fisheries Science Center, Department of Interior National Park Service, Virgin Islands Department of Planning and Natural Resources, The Nature Conservancy, the University of the Virgin Islands and the University of Miami.

Time_Period_of_Content:

Time_Period_Information:

Range_of_Dates/Times:

Beginning_Date: 20120507

Ending_Date: 20120519

Currentness_Reference: Ground Condition

Status:

Progress: Complete

Maintenance_and_Update_Frequency: none

Spatial_Domain:

Bounding_Coordinates:

West_Bounding_Coordinate: -64.965

East_Bounding_Coordinate: -64.433

North_Bounding_Coordinate: 17.860

South_Bounding_Coordinate: 17.616

Keywords:

Theme:

Theme_Keyword_Thesaurus: NOS Data Explorer Topic Category

Theme_Keyword: Environmental Monitoring

Theme:

Theme_Keyword_Thesaurus: CoRIS Discovery Thesaurus

Theme_Keyword: Numeric Data Sets > Fish Census

Theme:

Theme_Keyword_Thesaurus: CoRIS Theme Thesaurus

Theme_Keyword: EARTH SCIENCE > Biosphere > Zoology > Corals > Reef monitoring and assessment > Reef fish census > Belt transect

Theme_Keyword: EARTH SCIENCE > Oceans > Coastal Processes > Mangroves > Monitoring

Theme_Keyword: EARTH SCIENCE > Oceans > Coastal Processes > Mangroves > Animal association

Theme_Keyword: EARTH SCIENCE > Biosphere > Zoology > Corals > Reef monitoring and assessment

Theme_Keyword: EARTH SCIENCE > Biosphere > Zoology > Corals > Reef monitoring and assessment > Reef fish census > Linear transect

Theme_Keyword: EARTH SCIENCE > Oceans > Marine Biology > Marine Plants > Seagrass > Monitoring

Theme_Keyword: EARTH SCIENCE > Biosphere > Ecological Dynamics > Species richness

Theme_Keyword: EARTH SCIENCE > Oceans > Marine Biology > Fish > Fish assemblages

Theme_Keyword: EARTH SCIENCE > Oceans > Marine Biology > Fish > Fish Census

Theme:

Theme_Keyword_Thesaurus: ISO 19115 Topic Category

Theme_Keyword: biota

Theme_Keyword: 002

Theme_Keyword: environment

Theme_Keyword: 007

Theme_Keyword: oceans

Theme_Keyword: 014

Theme:

Theme_Keyword_Thesaurus: None

Theme_Keyword: coral reef fishes

Place:

Place_Keyword_Thesaurus: CoRIS Place Thesaurus

Place_Keyword: COUNTRY/TERRITORY > United States of America > U. S. Virgin Islands > St. Croix > St. Croix (17N064W0003)

Place_Keyword: OCEAN BASIN > Atlantic Ocean > Caribbean Sea > Virgin Islands > Virgin Islands > St. Croix (17N064W0003)

Access_Constraints: None

Use_Constraints: Please reference NOAA/NOS/NCCOS/CCMA/Biogeography Branch when utilizing these data in a report or peer reviewed publication. Additionally, knowledge of how this dataset has been of use and which organizations are utilizing it is of great benefit for ensuring this information continues to meet the needs of the management and research communities. Therefore, it is requested but not mandatory, that any user of this data supply this information to the Program Managers: Randy Clark (Randy.Clark@noaa.gov) or Chris Jeffrey (Chris.Jeffrey@noaa.gov)

Point_of_Contact:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: NOAA/NOS/NCCOS/CCMA/Biogeography Branch

Contact_Position: Marine Biologist

Contact_Address:

Address_Type: Mailing and Physical Address

Address: 1305 East West Hwy

City: Silver Spring

State_or_Province: MD

Postal_Code: 20910

Country: USA

Contact_Voice_Telephone: 301-713-3028

Contact_Electronic_Mail_Address: randy.clark@noaa.gov or chris.jeffrey@noaa.gov

Hours_of_Service: 9:00 - 5:00

Data_Set_Credit: This is a cooperative effort between NOAA's Biogeography Branch, Southeast Fisheries Science Center, Department of the Interior National Park Service, Virgin Islands Department of Planning and Natural Resources, The Nature Conservancy, the University of the Virgin Islands and the University of Miami.

Data_Quality_Information:

Logical_Consistency_Report: Not applicable

Completeness_Report: This data consists of fish community surveys across all shallow (<30m) hardbottom marine habitats around St. Croix, US Virgin Islands. Sites were selected using a stratified random survey design.

Lineage:

Process_Step:

Process_Description:

Once in the field, the boat captain navigates to previously selected sites using a handheld GPS unit. On-site, divers are deployed and maintain contact with each other throughout the entire census. One diver is responsible for collecting data on the fish communities utilizing the belt-transect visual census technique over an area of 100m² (25m length X 4m width). The belt-transect diver obtains a random compass heading for the transect prior to entering the water and records the compass bearing (0-360°) on the data sheet. Visibility at each site must be sufficient to allow for identification of fish at a minimum of 2m away. Once reasonable visibility is ascertained, the diver attaches a tape measure to the substrate and allows it to roll out for 25m while they are collecting data.

Although the habitat should not be altered in any manner by lifting or moving structure, the observer should record fish seen in holes, under ledges and in the water column. To identify, enumerate, or locate new individuals, divers may move off the centerline of the transect as long as they stay within the 4m transect width and do not look back along area already covered. The diver is allowed to look forward toward the end of the transect for the distance remaining (i.e. if the diver is at meter 15, he can look 10 meters distant, but if he is at meter 23, he can only look 2 meters ahead).

On-site, no attempt to avoid structural features within a habitat such as a sand patch or an anchor should be made as these features affect fish communities and are "real" component of the habitats. The only two instances where the transect should deviate from the designated path is to stay above 110 ft (limitations imposed by diving) or while surveying mangrove habitats. In mangrove areas, the diver swims close to the prop roots and looks as far into the mangroves as possible; up to 2m and then out to the edge of the mangrove overhang such that the total area surveyed is still 100m². In this case, some of the survey may necessarily fall on seagrass habitat. This is allowed as the mangrove habitat is defined as a transition zone habitat. The transect should take 15 minutes regardless of habitat type or number of animals present. This allows more mobile animals the opportunity to swim through the transect, and standardizes the samples collected to allow for comparisons.

Data are collected on the following:

1) Logistic information - diver name, dive buddy, date, time of survey, site code, transect bearing.

2) Taxa presence - as the tape rolls out at a relatively constant speed, the diver records all fish species to the lowest taxonomic level possible that come within 2m of either side of the transect. To decrease the total time spent writing, four letter codes are used that consist of the first two letters of the genus name followed by the first two letters of the species name. In the rare case that two species have the same four-letter code, alternate four-letter codes are used to distinguish between the species. These alternate codes contain the first two letters of the genus, the first letter of the species and then the first letter in the species name that differs from the other code. If the fish can only be identified to the family or genus level then this is all that is recorded. If the fish cannot be identified to the family level then no entry is necessary.

3) Abundance & size - the number of individuals per species is tallied in 5cm size class increments up to 35cm using visual estimation of fork length. If an individual is greater than 35cm, then an estimate of the actual fork length is recorded.

4) Photos - individuals too difficult to identify or unique in some manner may be photographed for later clarification.

Data Caveats: Site selection is different from prior Caribbean Coral Reef Ecosystem Monitoring Program (CCREMP) data collection. This data set is the first time a sampling frame has been used to do site selection. CCREMP surveys (2000-2011) had stations on hard- and soft- bottom habitats; this dataset is from hardbottom sites only. CCREMP surveys were conducted only in the northeast portion of St. Croix; primarily waters less than 30 m from Green Cay to Point Udall. This dataset reflects surveys from hardbottom habitats in waters less than 30m around the entirety of St. Croix.

Process Date: 20121025

Process_Date: Not complete

Spatial_Reference_Information:

Horizontal_Coordinate_System_Definition:

Geographic:

Latitude_Resolution: 0.00001

Longitude_Resolution: 0.00001

Geographic_Coordinate_Units: Decimal degrees

Entity_and_Attribute_Information:

Overview_Description:

Entity_and_Attribute_Overview: We supply abundance and size information of fish species at the lowest possible taxonomic level. This information is collected across all nearshore Hardbottom habitat types. In addition, we provide photographs of many of the taxa. For specific information please see the data dictionary available on the database website.

Entity_and_Attribute_Detail_Citation: NOAA/NOS/NCCOS/CCMA/Biogeography Branch

Distribution_Information:

Distributor:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: NOAA/NOS/NCCOS/CCMA/Biogeography Branch

Contact_Position: Caribbean Coral Reef Ecosystem Monitoring Database Manager

Contact_Address:

Address_Type: Mailing and Physical Address

Address: 1305 East-West Hwy. (SSMC4, N/SCI-1)

City: Silver Spring

State_or_Province: MD

Postal_Code: 20910

Country: USA

Contact_Voice_Telephone: 301-713-3028

Contact_Electronic_Mail_Address: tom.mcgrath@noaa.gov

Hours_of_Service: 9:00 - 5:00

Resource_Description: Downloadable data

Distribution_Liability: These data were prepared by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their

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Standard_Order_Process:

Digital_Form:

Digital_Transfer_Information:

Format_Name: tab delimited text file

Digital_Transfer_Option:

Online_Option:

Computer_Contact_Information:

Network_Address:

Network_Resource_Name: http://www8.nos.noaa.gov/biogeography_public/query_fish.aspx

Digital_Form:

Digital_Transfer_Information:

Format_Name: .jpg

Digital_Transfer_Option:

Online_Option:

Computer_Contact_Information:

Network_Address:

Network_Resource_Name: http://www8.nos.noaa.gov/biogeography_public/reef_photos.aspx

Fees: None

Metadata_Reference_Information:

Metadata_Date: 20121025

Metadata_Review_Date: 20121025

Metadata_Contact:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: NOAA/NOS/NCCOS/CCMA/Biogeography Branch

Contact_Position: Western Atlantic and Caribbean Coral Reef Ecosystem Monitoring

Managers

Contact_Address:

Address_Type: Mailing and Physical Address

Address: 1305 East-West Hwy. (SSMC4, N/SCI-1)

City: Silver Spring

State_or_Province: MD

Postal_Code: 20910

Country: USA

Contact_Voice_Telephone: 301-713-3028

Contact_Electronic_Mail_Address: randy.clark@noaa.gov or chris.jeffrey@noaa.gov

Hours_of_Service: 9:00 - 5:00

Metadata_Standard_Name: Content Standard for Digital Geospatial Metadata

Metadata_Standard_Version: FGDC-STD-001-1998