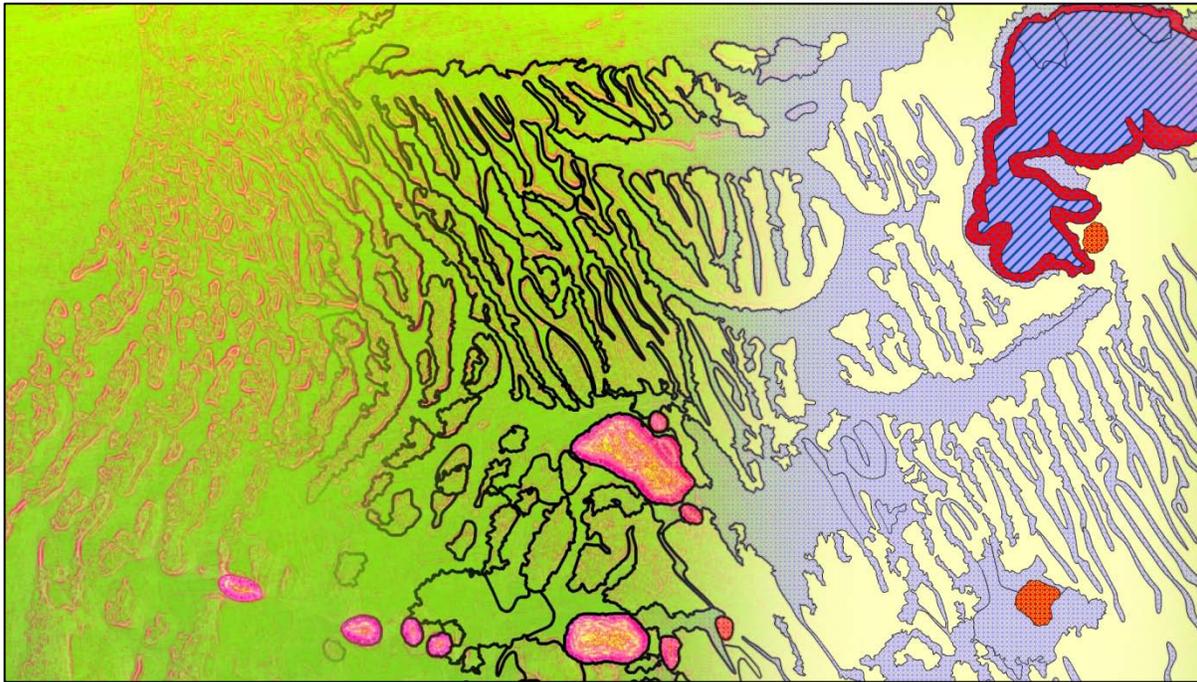


# WORK PLAN

Benthic Habitat Mapping of St. Croix, USVI  
for the Department of Interior - National Park Service  
Inventory & Monitoring Program



Prepared  
October 2009

By

NOAA/NOS/NCCOS  
Center for Coastal Monitoring and Assessment  
Biogeography Branch



Cooperative Investigation by NOS' Center for Coastal Monitoring and  
Assessment Biogeography Branch and the National Park Service



# Benthic Habitat Mapping of St Croix, USVI

## **GOAL**

This project serves to acquire and produce critical baseline benthic habitat information for the Buck Island Reef National Monument (BUIR) and/or Salt River Bay National Historical Park and Ecological Reserve (SARI), St Croix, USVI. While NOAA and NPS have collaboratively conducted extensive habitat mapping and biological monitoring within and outside BUIR and SARI, funding and vessel access has never afforded the opportunity to conduct a complete bathymetric survey and seafloor characterization within the MPA's. The Biogeographic Branch proposes to conduct small boat operations using acoustic systems which are ideally suited to map the remaining shallow areas and to produce an integrated shallow to deep water bathymetric and habitat map within the MPA's. NOAA proposes to produce and provide a digital and web-based synoptic map of the two regions, all raw and derived imagery products, access to all optical imagery collected, and a synthesis report.

## **OBJECTIVES**

1. Collect high-resolution acoustic data (bathymetry and intensity) for SARI and BUIR
2. Produce shallow to moderate depth habitat maps and products using present and previously collected acoustic data.

## **BACKGROUND**

Benthic habitat mapping of NPS coral marine parks support multiple resource management objectives, including: (1) understanding and predicting the spatial distribution of resources; (2) detecting change associated with anthropogenic and environmental impacts; (3) supporting spatially-explicit management decisions such as marine zoning (e.g. marine protected areas, anchoring locations, vessel hazards); as well as (4) designing efficient sampling strategies for evaluating the efficacy of resource management actions. NOAA and NPS collaborative efforts to address these objectives is predicated upon understanding the spatial variables that determine species distributions. The bathymetric data, derivatives of this data (e.g. topographic complexity, slope) and associated habitats from the proposed work will provide this knowledgebase.

While NOAA has conducted extensive habitat mapping and ecological characterizations of BUIR and SARI using satellite remote sensing and the acoustic multibeam mapping with the NOAA ship NANCY FOSTER, the products have been limited by the capabilities of these sensors and platforms. Specifically, satellite remote sensing does not provide a measure of seafloor topography and the NANCY FOSTER was unable to survey in depths less than 30 meters. This

project serves to complete the critical missing topographic information for the shallow water regimes (0-30 m) using acoustic bathymetric sidescan sensors on a NPS launch (Figure 1).

This project is important for filling critical informational gaps in the shallow water environments because shallow water regimes are the most susceptible to anthropogenic and natural stressors. The outcome of this project will be a baseline of the existing habitat condition within the MPA's and the first opportunity to synoptically map to the full extent of the protected area boundary. This information will primarily serve to better inform local NPS managers as to the existing state of resources, provide a baseline for future comparative efforts, and guide present and future monitoring efforts. Furthermore, these data and the monitoring activities conducted by NPS and NOAA will serve a larger research, management, and monitoring strategy by enabling inter-jurisdictional comparisons of coral reef ecosystems world-wide. The outcome of this component will be to better inform local and regional managers of the state of the resources, so as to inform their management decisions and target recovery and monitoring actions.

## **PROJECT TASKS**

### **Task 1. Project Scoping Meeting and Work Plan**

(Estimated completion date: October 2009)

This work plan will describe the overall project and serve as a blueprint for its implementation. Discussions will occur in September, 2009, to refine objectives, tasks, milestones, technical strategy, and deliverable products in the work plan. As such, the work plan should be viewed as an evolving document that will be modified during early phases of this project. The BB will work closely with collaborators to ensure that analyses address the resource management and conservation needs of each study area, and that acceptable methodologies are implemented and useful products are produced.

#### Task 1. Products:

- Preliminary list of deliverables
- Preliminary list of contacts to meet and/or talk with
- Scoping meeting with partners
- A final work plan

#### Task1. Milestones:

- Deliver final work plan (October, 2009)

## **Task 2. Data Gathering and Post-Processing**

(Estimated completion date: January, 2011)

Acoustic Data Acquisition - NOAA proposes to conduct acoustic surveys using a pole-mounted bathymetric sidescan system (Teledyne Benthos C3D <http://www.benthos.com/seafloor-bottom-mapping-survey-sonar-c3d.asp>) deployed off a NPS monitoring vessel (ideally on the Osprey Boston Whaler). NOAA will provide a turn-key acoustic system, two data acquisition operators, and one coxswain. Data will target International Hydrographic Standards Order 1. A two week data acquisition for BUIS and one week mission for SARI is proposed to collect the necessary data. Local contracted boat divers will be used to conduct the survey with NPS boats. Proposed dates are April 12 – May 3, 2010.

Sidescan Post-processing – Once the data has been acquired, NOAA will post-process the bathymetric and sidescan imagery, and produce derivative morphometrics suitable for mapping and spatial modeling (i.e. rugosity, fractals, slope of the slope). Post-processing typically requires 3:1 time ratio to data collection. A summary report of the data acquisition and data processing will be produced. See attached 1-pager on the acoustic mapping approach.

Optical Validation Missions – NOAA will collect underwater video of seafloor habitats using NOAA drop camera systems aboard the NPS Osprey vessel. Two, one week missions are proposed to collect sufficient ground-truthing and accuracy assessment data to satisfactorily produce a habitat map and independently verify the thematic accuracy of the resulting map product. Ground-truthing mission is proposed for late-September 2010 and Accuracy Assessment mission for early January 2011.

### **Task 2 Products:**

- Post-processed datasets.

### **Task 2 Milestones:**

- Post-processed datasets completion (January 2011)

## **Task 3. St. Croix Benthic Habitat Map Production**

(Estimated completion date March, 2011)

NOAA will produce a fine-scale benthic habitat map using the acoustic data collected with the bathymetric sidescan and to the full extent of the multibeam acoustic data collected by NOAA from the NANCY FOSTER (2004-2006) and the USGS Grappler (2006). Additionally, NOAA will characterize all the optical imagery collected and make it available through the Biogeography Branch Interactive Mapping Portal.

### **Task 3 Products:**

- Draft Benthic Habitat Maps of St. Croix, USVI

Task 3 Milestones:

- Draft products completion (March 2011)

**Task 3. Final Product Delivery**

(Estimated completion date: September, 2011)

Conduct final review, revisions and reporting for the project.

Task 3 Products:

- Deliver final Data Acquisition Processing Report (DAPR) – methods, specifications and results of shallow-water survey.
- Activate spatial information web portal with all acquired mapping data, derived data, and FGDC metadata to be made available.
- Prepare and deliver final project report and data.

Final Deliverable Report – Report detailing the past and present data used for mapping, methodology, classification scheme, and results of the seafloor characterization efforts.

GIS products (all files will have FGDC metadata)

*Survey Data* – will be provided as raw files (Hypack format), post-processed files (CARIS HDCS), and standard imagery format (.geotiff).

*Derivative Products* – all morphometrics derived from the bathymetric sidescan will provided as standard imagery format (.geotiff).

*Map products* – All map products will be provided as Adobe Acrobat (geo.pdf format)

*Source Files* – All ground truthing and accuracy assessment data will be exported to ESRI shapefile format.

*Optical Imagery* – All optical imagery will be converted to .mpeg movie format with characterization and spatial information provided in ESRI shapefile .

Task 3 Milestone:

- Final delivery and project completion (September, 2011)

**SCHEDULE**

See Table 1. for proposed project process and schedule.

**PROJECT PERIOD**

September 1, 2009 through September, 2011

**PROJECT TEAM**

The CCMA Biogeography Branch of the National Centers for Coastal Ocean Science (NCCOS) will lead this collaborative effort in partnership with the National Park Service.

## **Contact Information**

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**Figure 1:** Proposed new acoustic seafloor mapping of Buck Island Reef National Monument and Salt River Bay National Historical Park and Ecological Preserve and adjacent areas. Previously collected multibeam data collected by the NOAA 2004-2006 and USGS 2006 also displayed. Additional information on the products at ([http://ccma.nos.noaa.gov/products/biogeography/usvi\\_nps/data.html](http://ccma.nos.noaa.gov/products/biogeography/usvi_nps/data.html)).

