Benthic Habitat Characterization and Bathymetric Mapping of the USVI and Puerto Rico

Using the
NOAA Ship Nancy Foster
2004-2009

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A Collaboration Between
National Oceanic & Atmospheric Administration (NOAA)
Caribbean Fishery Management Council (CFMC)
US National Park Service (NPS)
USVI Divisions of Fish & Wildlife and Coastal Zone Management

IOCM Mapping: Mission Objectives

1) Mapping

- Multibeam bathymetry and backscatter
- ROV (Remotely Operated Vehicle) underwater video and stills

→ Ground truthing and accuracy assessment

2) Analysis and Modeling

- Model seafloor topology, combine with biological resource (fish census) inventory, and derive benthic habitat classifications

3) Integration

- Integrate with shallow water benthic maps and reconcile classification schemes

→ End result = tools for resource managers

Scientific Oceanographic Platform:

NOAA Vessel Nancy Foster

Based Charleston, SC

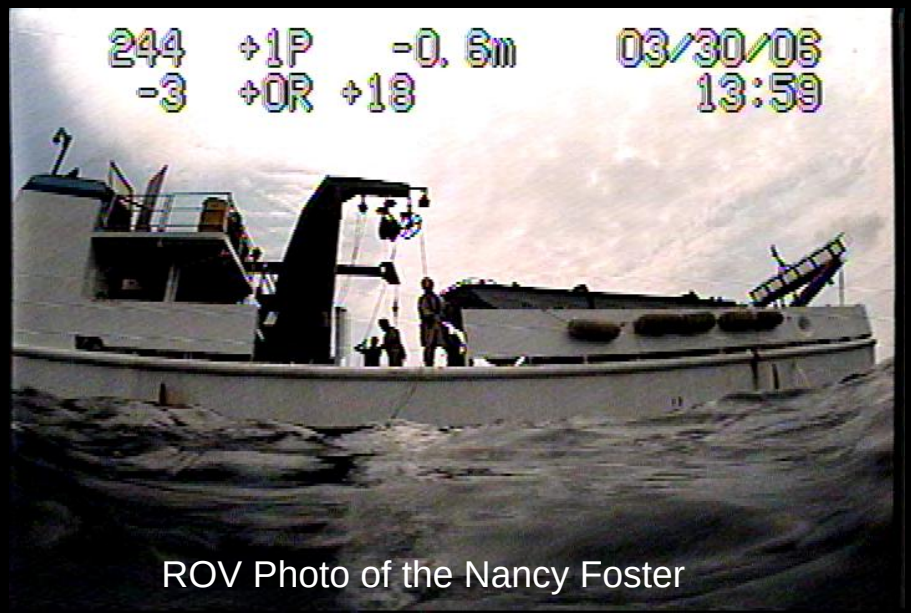
Length 187 ft, Breadth 40 ft, Draft 10 ft

Commissioned officers: 5

Licensed engineers: 3

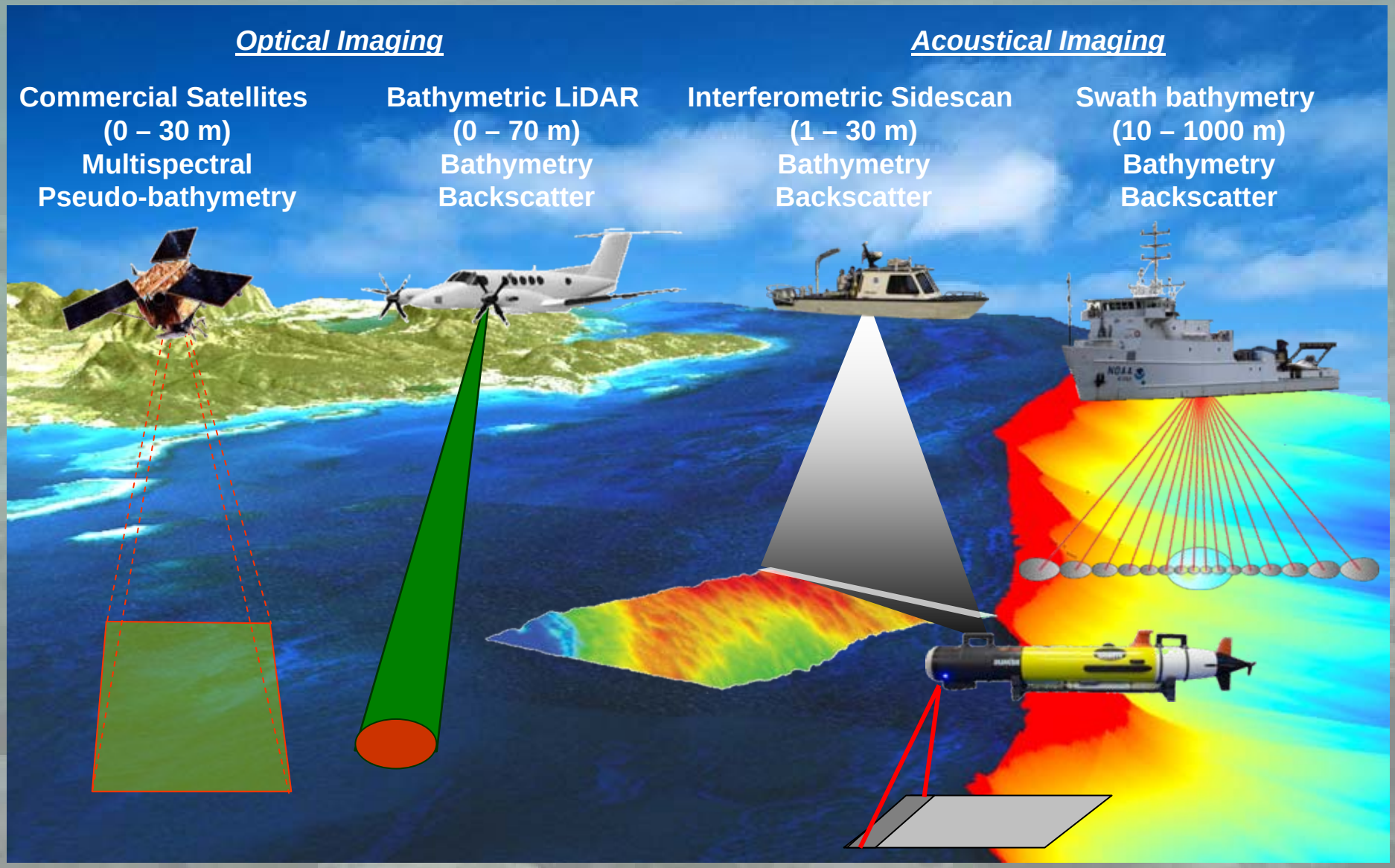
Crew: 10

Scientists: Up to 15



ROV Photo of the Nancy Foster

The Suite of Remote Sensing for Habitat Characterization



Part 1:

What is LiDAR?

(Light Detection And Ranging)

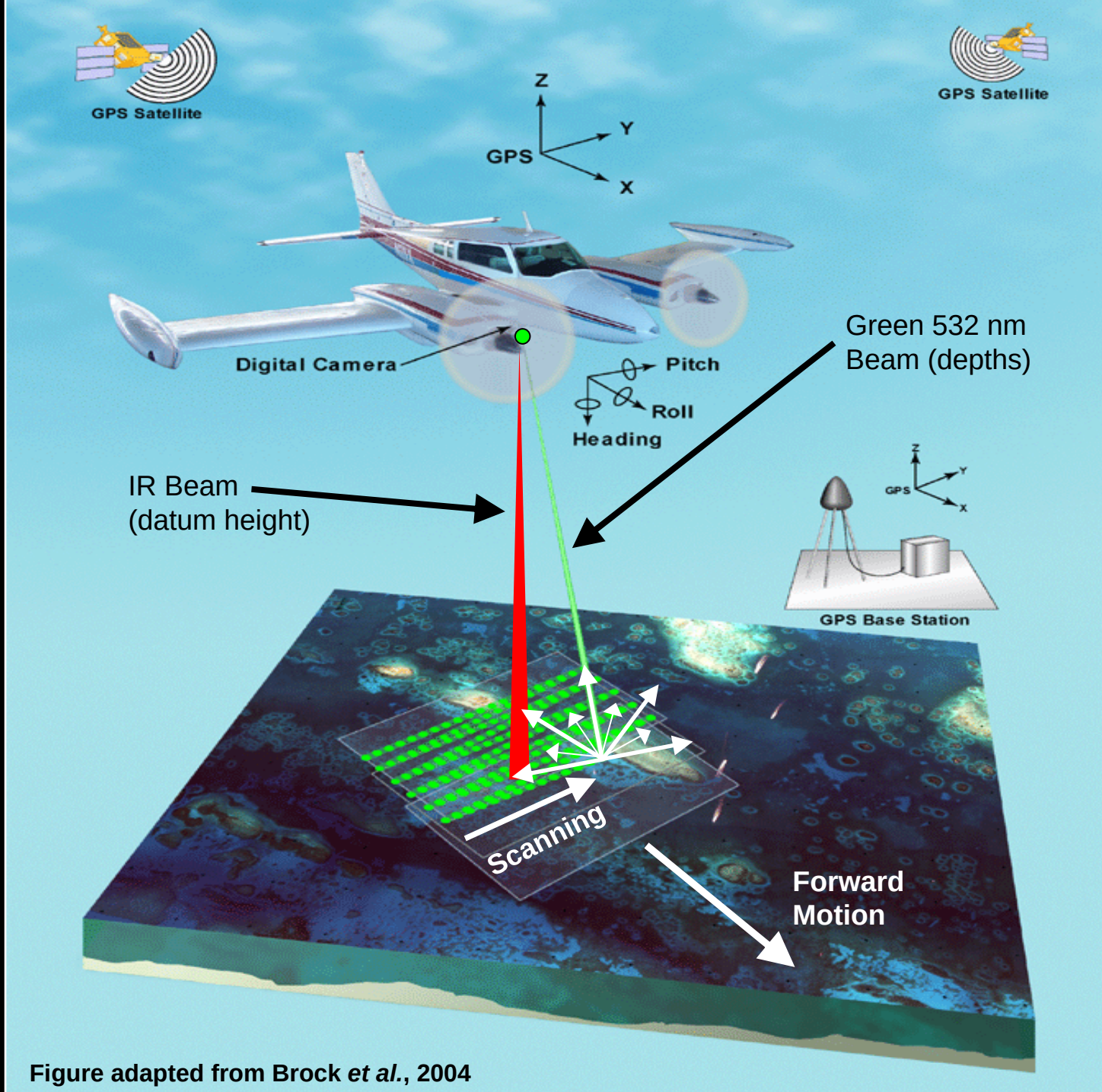
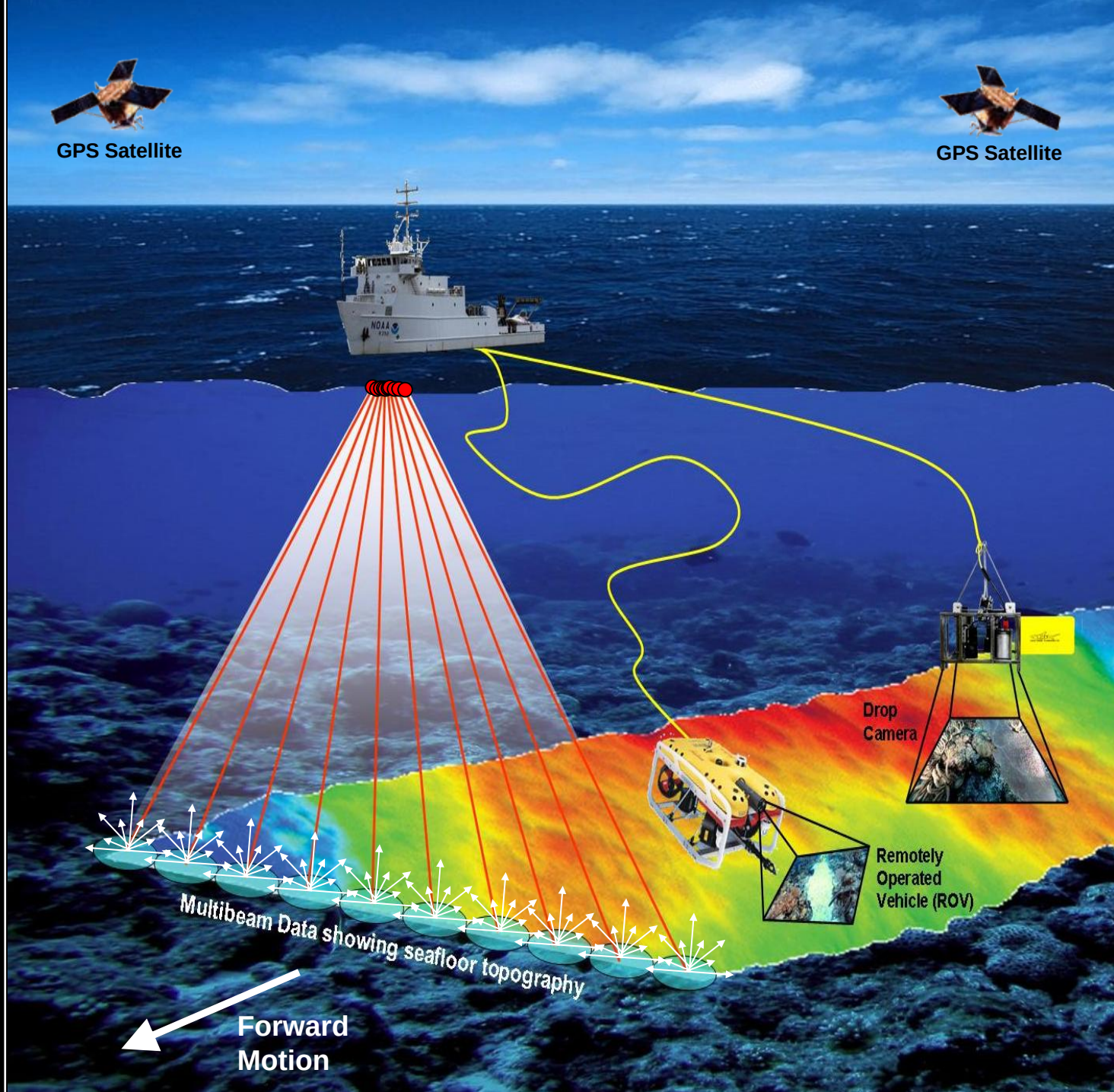


Figure adapted from Brock *et al.*, 2004

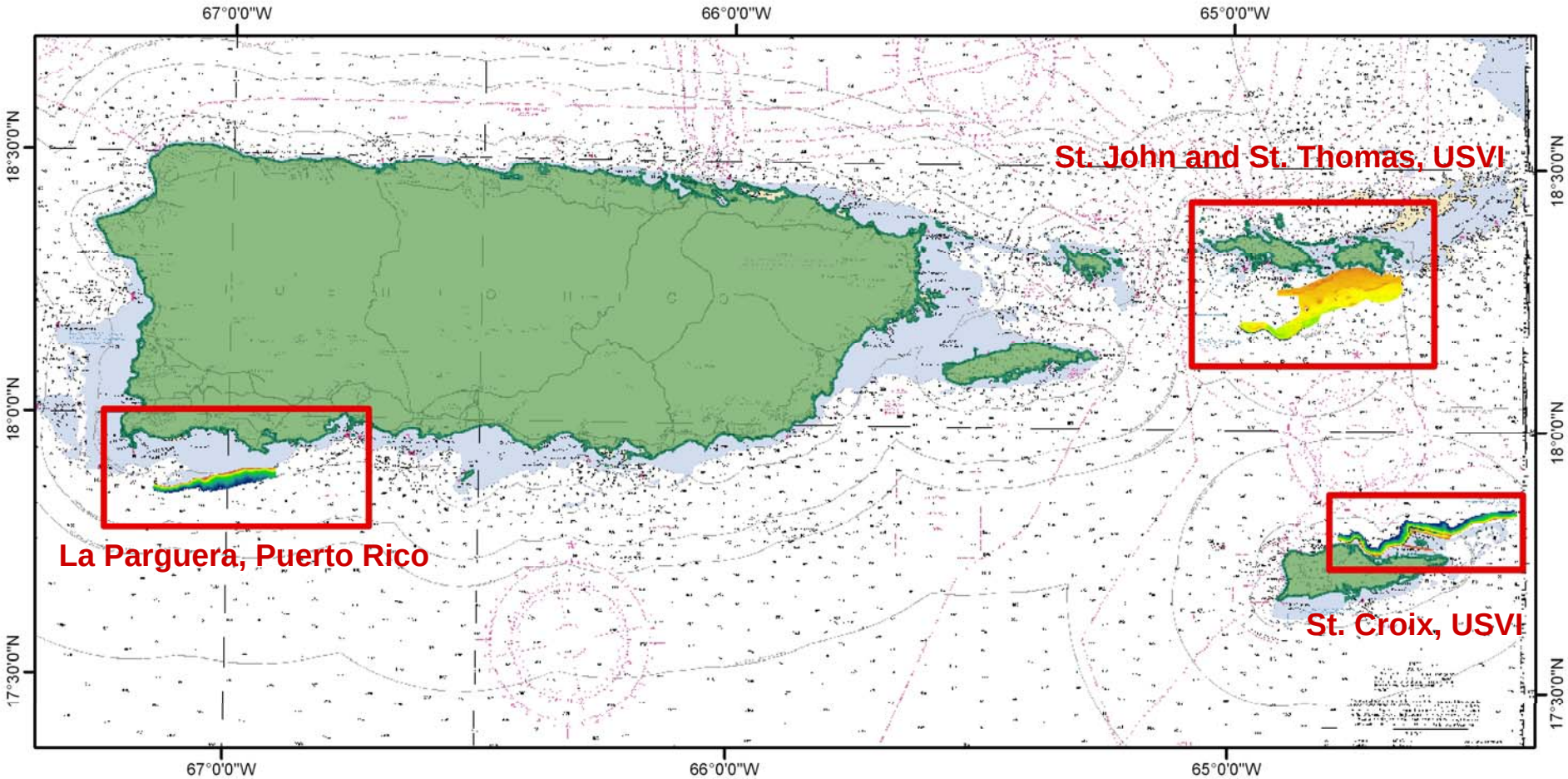
Part 1:

What is MBES?

(Multibeam Ecosounders)



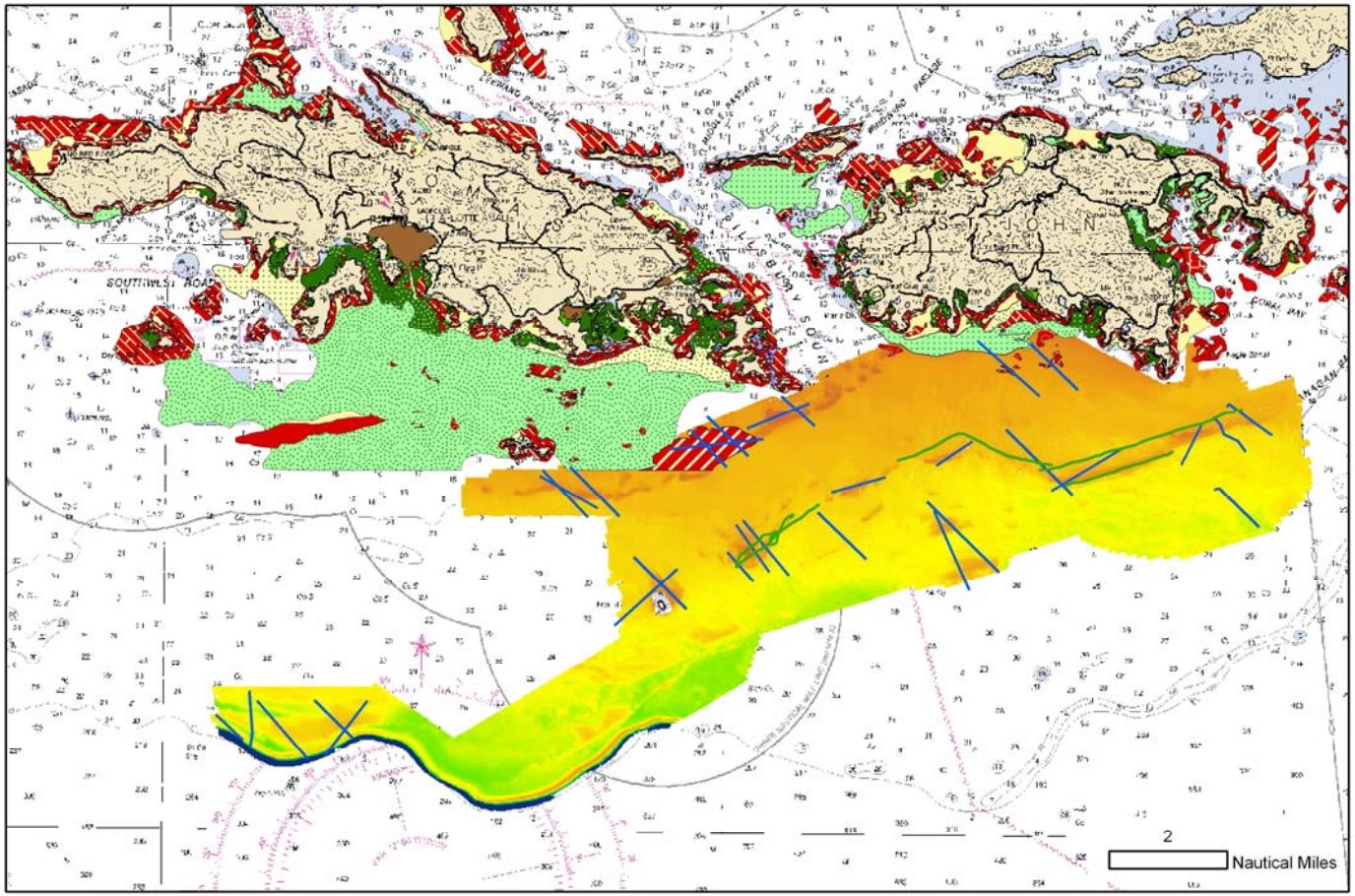
US Caribbean Project Area



NOAA Chart 25640, scale 1:326,856.

Northern Project Area:

Multibeam Coverage vs. Existing Benthic Habitat Classifications



Unified 2004/2005 Multibeam Bathymetry

Depth in meters

High : -8.435000

Low : -317.010010

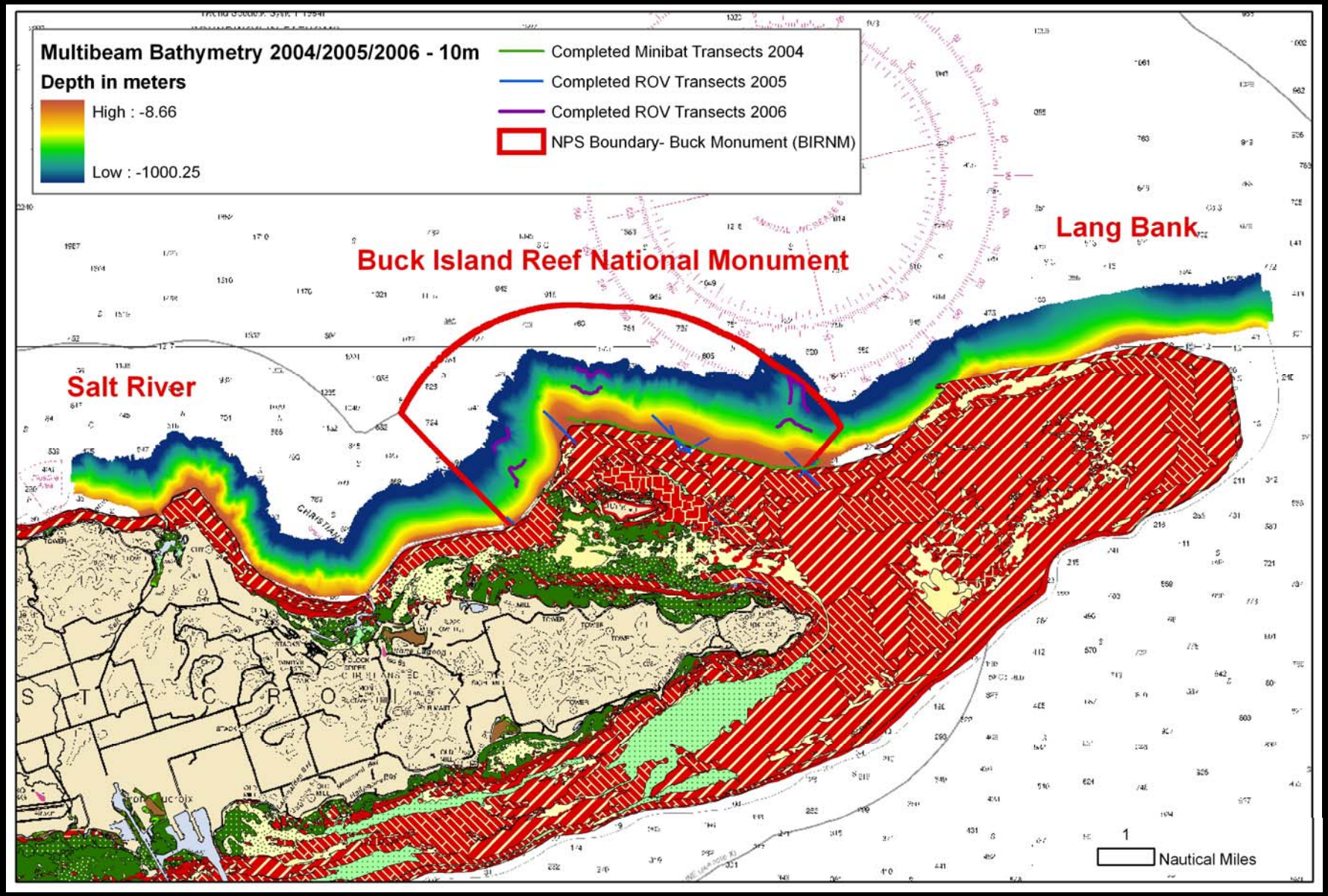
Completed Minibat Transects 2004

Completed ROV Transects 2005

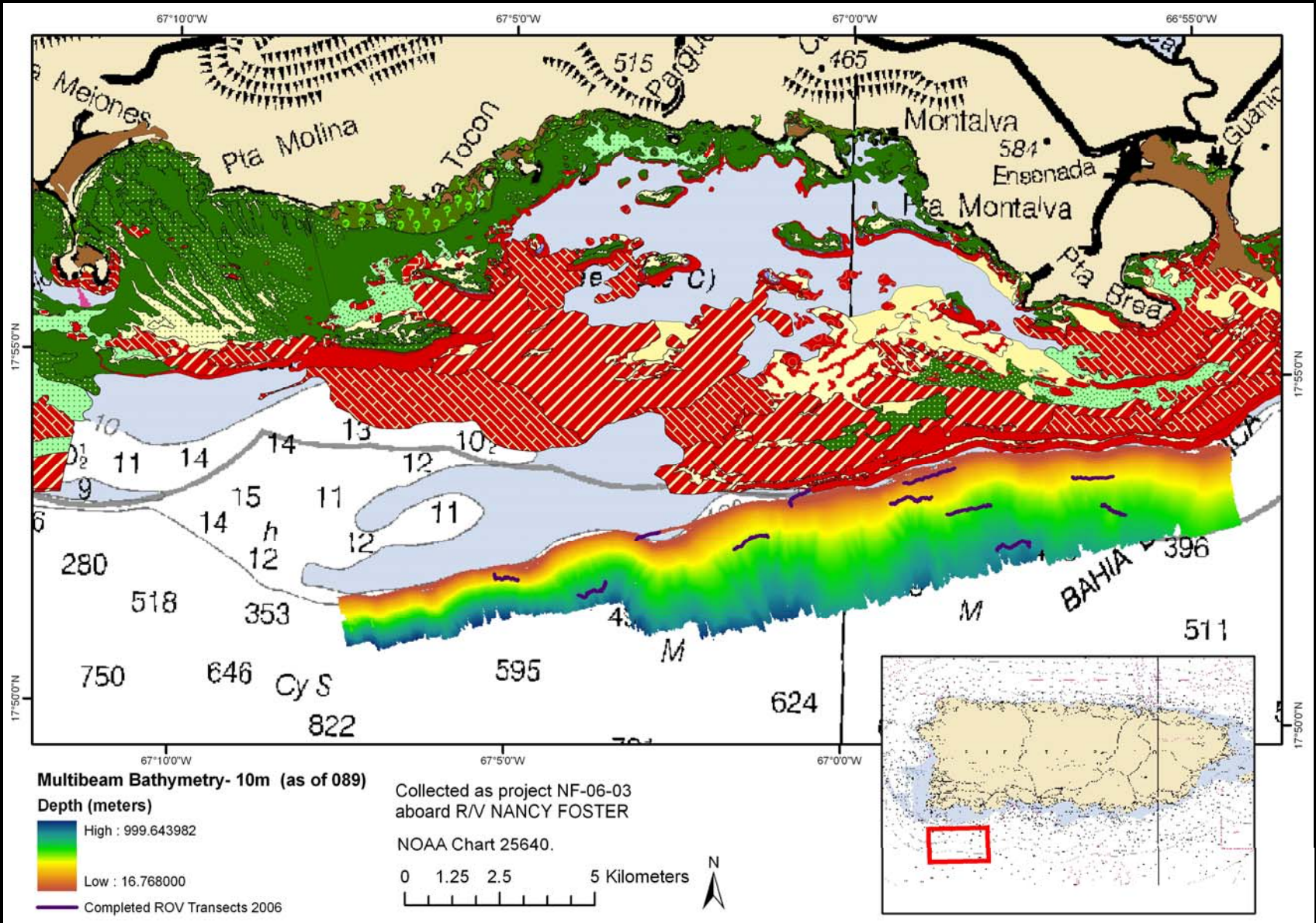
N

NOAA Chart 25641
Scale 1:100,000, units in fathoms.

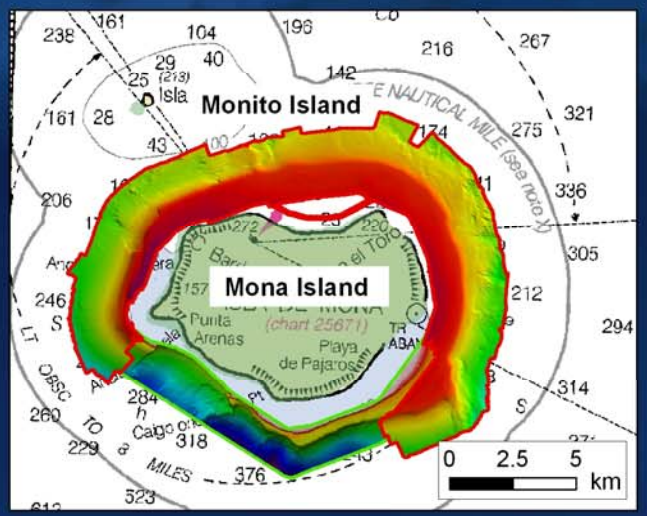
Southern Project Area: 2004, 2005, 2006 Multibeam Coverage

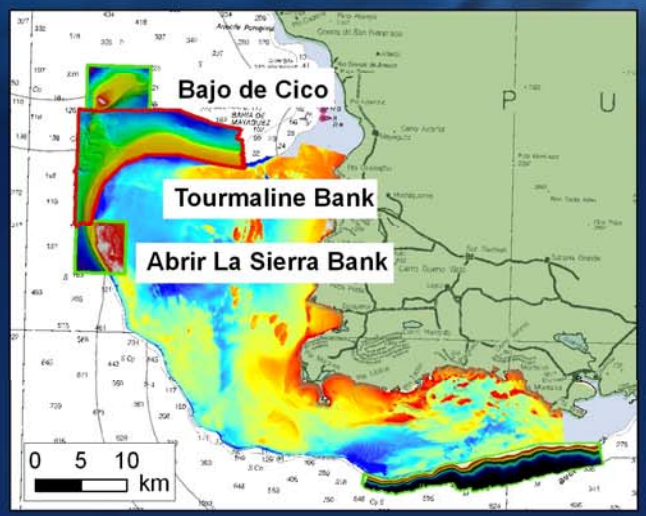


Puerto Rico: 2006 Project Area (March 21 – April 3)



Seafloor Characterization of the U.S. Caribbean
Project Areas (2004-2008)



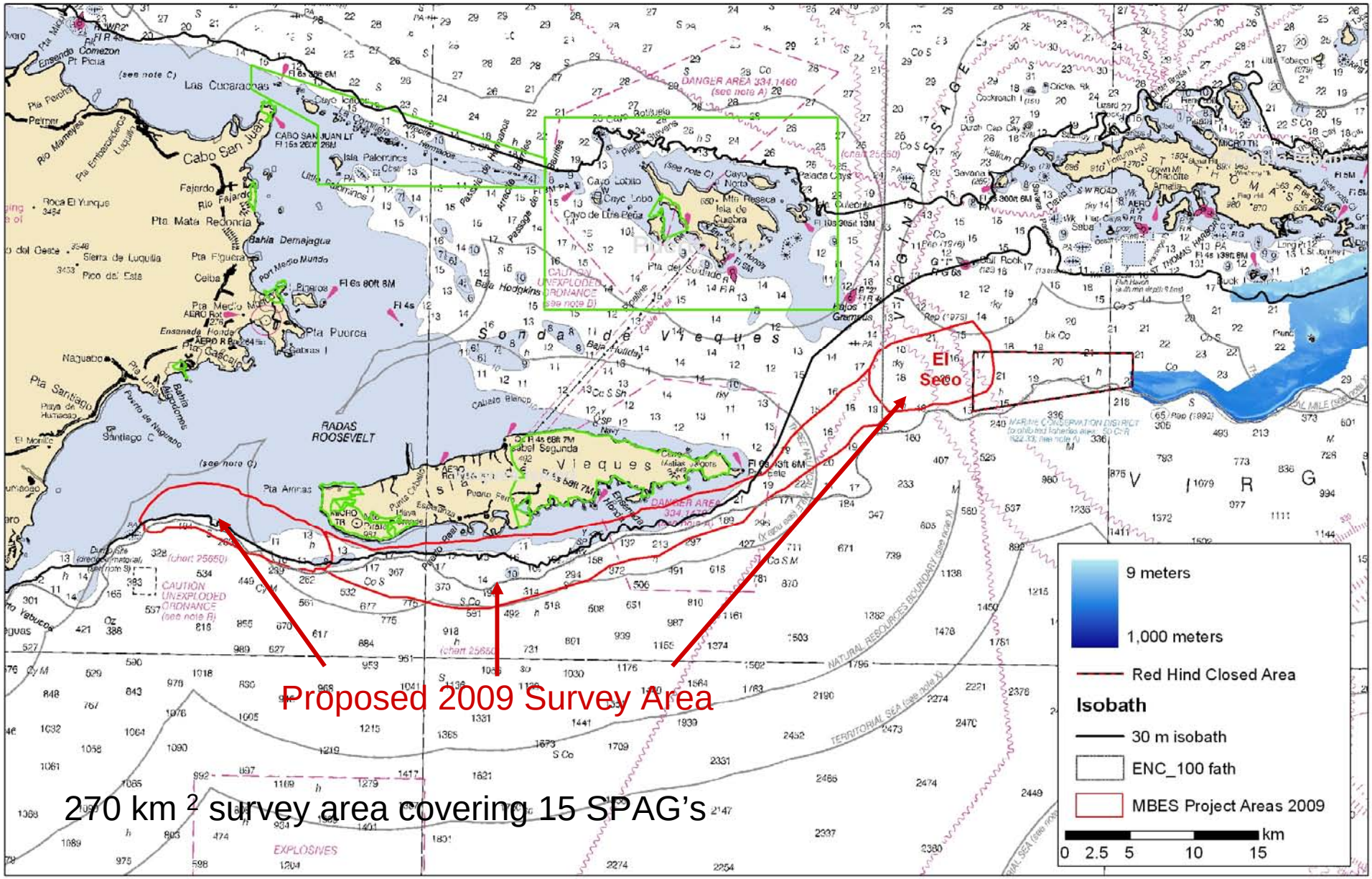


Multibeam Bathymetry

- 9 meters
- 1,000 meters
- Project Areas 2004 - 2007
- Project Areas 2008

0 10 20 30 nm

Seafloor Characterization in the U.S. Caribbean

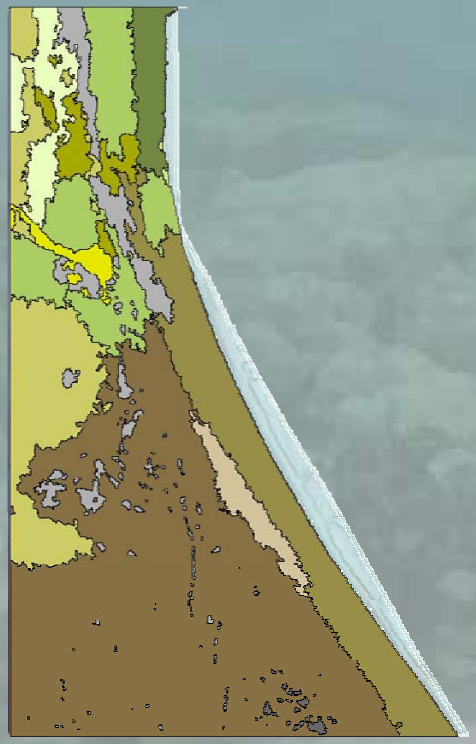


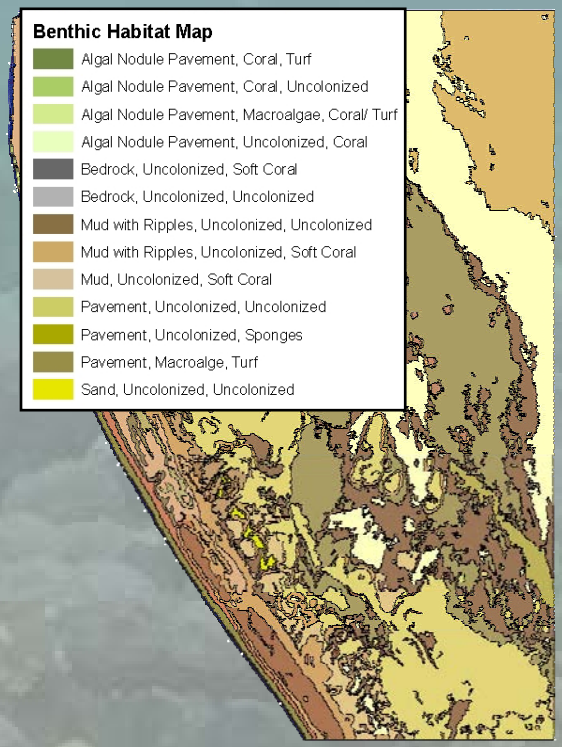
270 km ^{2} survey area covering 15 SPAG's

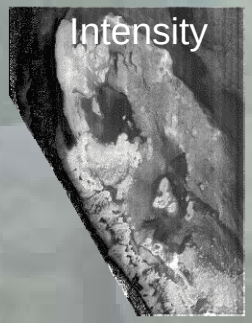
Recently Developed - Semi-automated Mapping Techniques

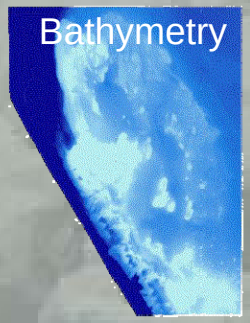
Efficient and Reproducible Segmentation

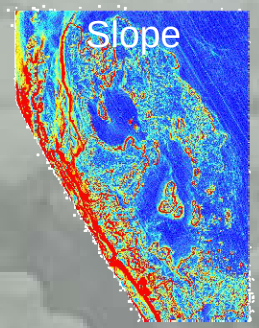
MBES (Deep > 50 m) → Merge & Edge Match ← LiDAR (Shallow <50 m)

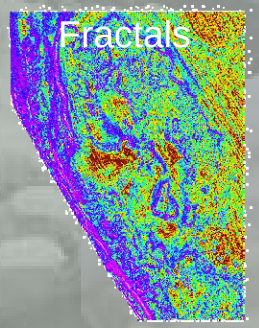


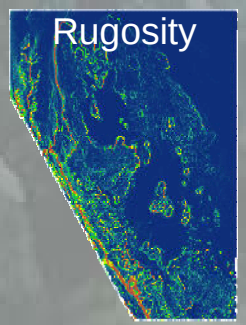


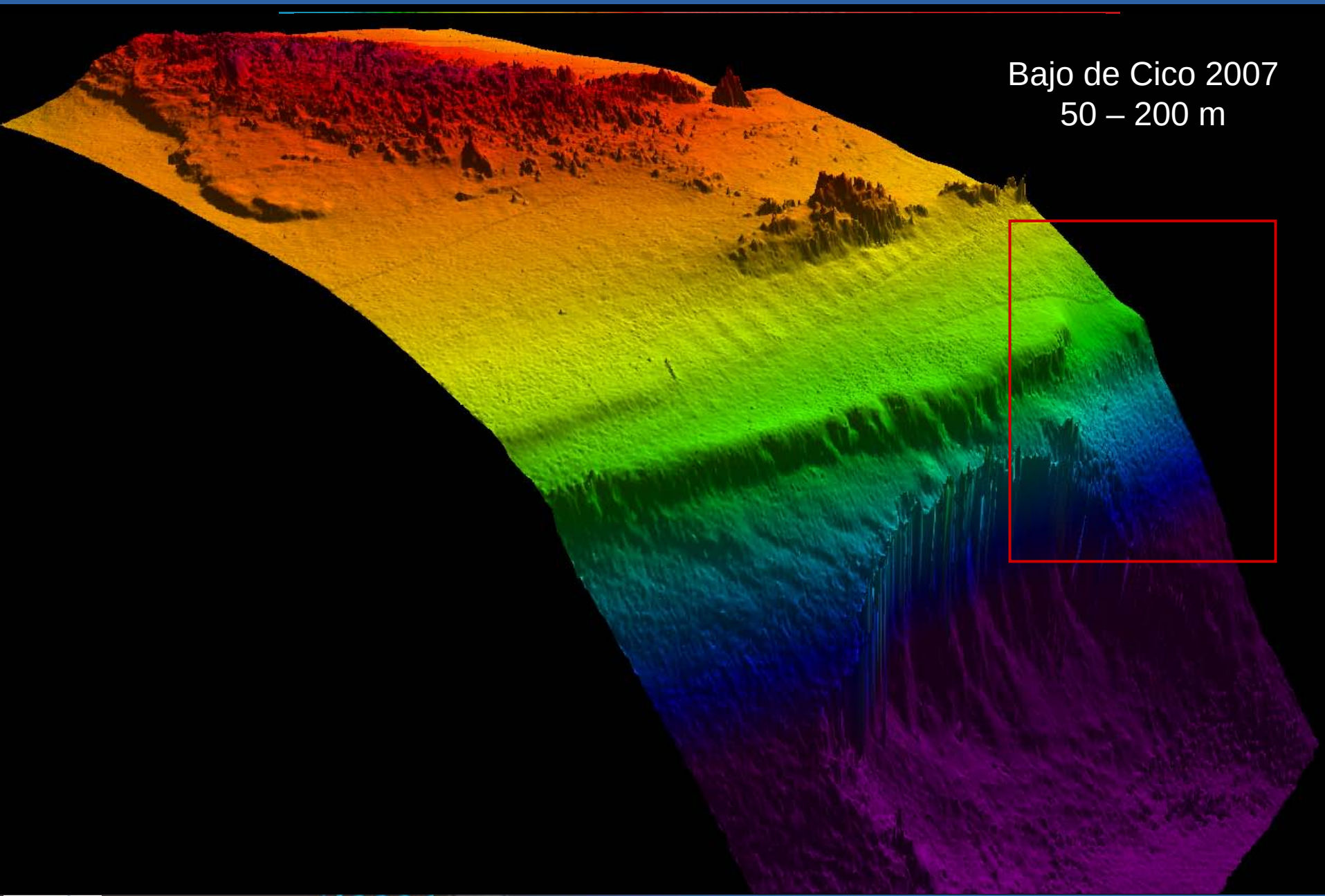






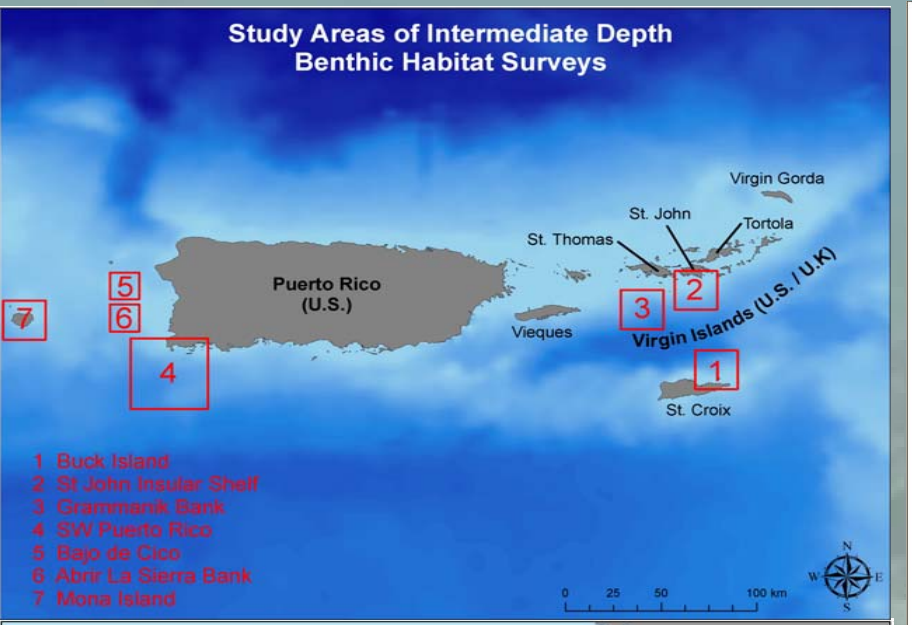


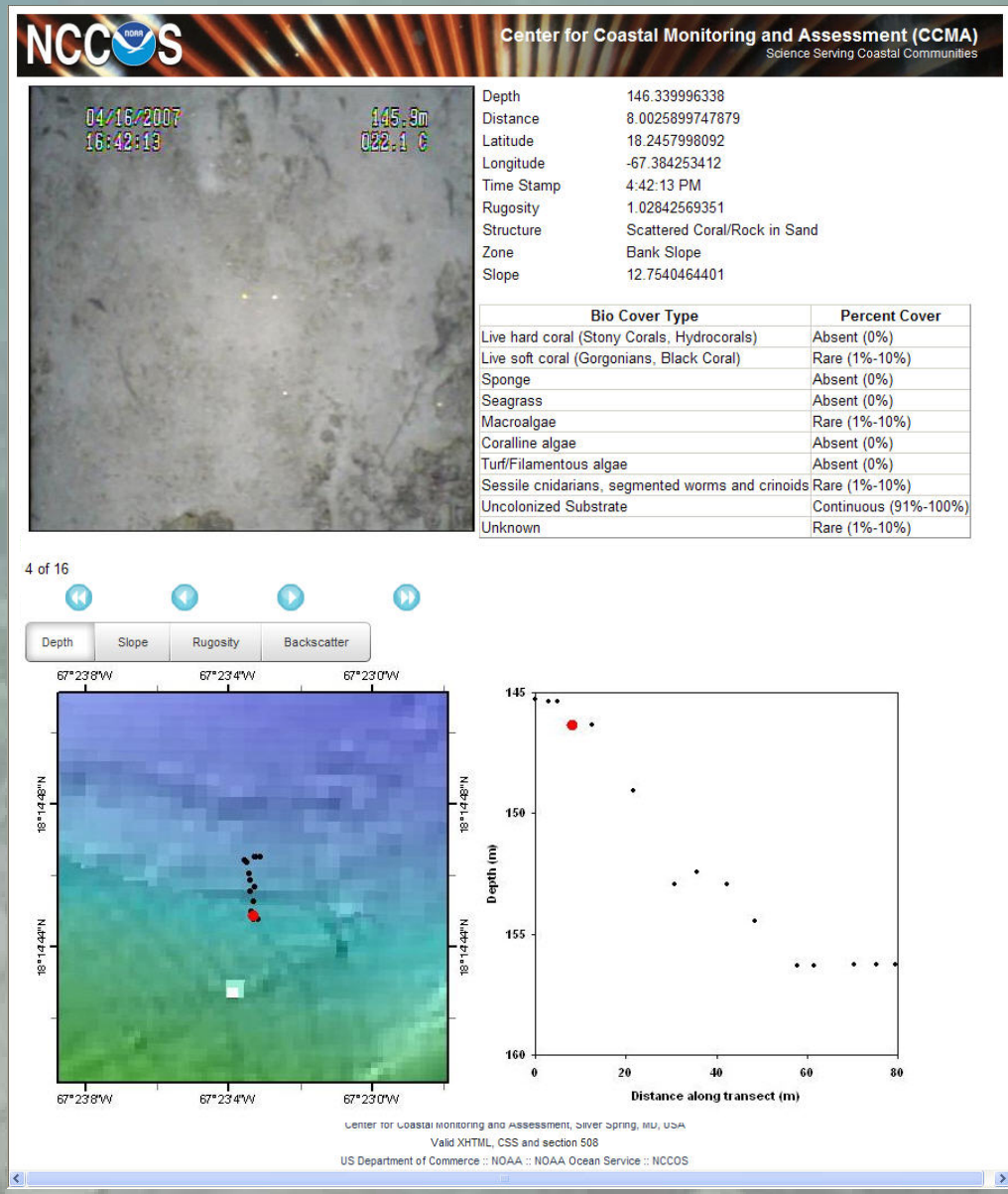



Bajo de Cico 2007
50 – 200 m

Benthic Habitat Viewer (BHV) - web database

New functionality Dec 08 (10,700 characterized photos 2004-08)





http://www8.nos.noaa.gov/bhv/bhvMapBrowser.aspx

2008 Seafloor Characterization Mission (Mona Island and Tourmaline Bank)

- Characterized 2008 ground-truthing imagery will be available on BHV 9/08.
- Multibeam bathymetry data will be available at link below 9/08.
- Multibeam backscatter and derived surfaces will be available at link below 10/08.

http://ccma.nos.noaa.gov/ecosystems/coralreef/usvi_nps.html

2009 Seafloor Characterization Mission (March 2009)

- 270 km^2 survey area along insular shelf
- Survey area covers 15 SPAG's including El Seco
- Area was ranked highest amongst Jurisdiction and Federal Partners
- Expect to use: Mid-water multibeam (30-1000m) and shallow water multibeam (10 -30 m)
- Ground-truthing using ROV, drop camera and SeaBed AUV (?)
- Need Jurisdiction scientist to participate in 2009 research cruise.
- Planning a Media Day in Vieques March 2009
- **Need letters of support from the Jurisdiction to CRCP.**