Habitat Mapping

Tim Battista

NOAA Ocean Service | NCCOS Biogeography Branch
Tim.Battista@noaa.gov, 301-713-3028x171

Steve Rohmann

NOAA Ocean Service | Office of National Marine Sanctuaries
Steve.Rohmann@noaa.gov, 301-713-7283

Andrew David

NOAA Fisheries | SEFSC-Panama City
Andy.David@noaa.gov, 850-234-6541x208

Introduction

Habitat Mapping

OBJECTIVE:

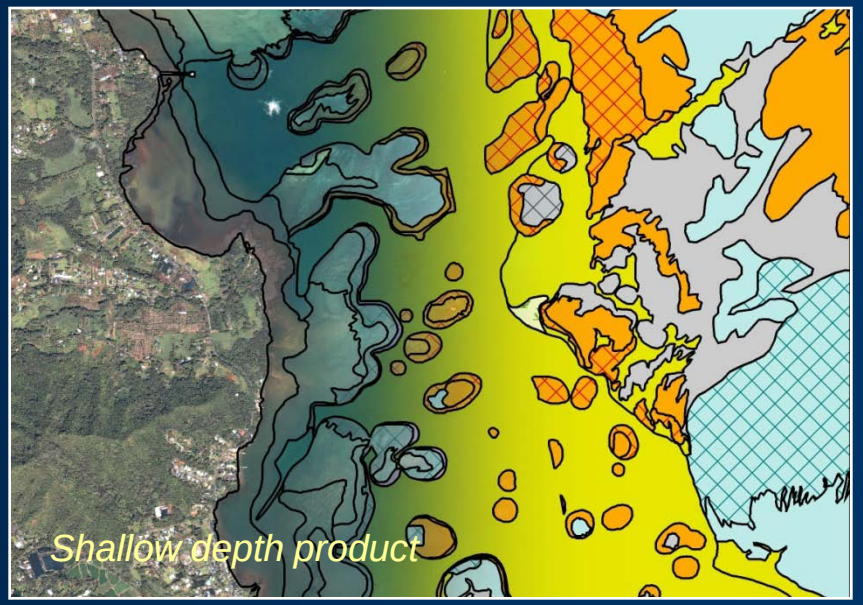
Support Jurisdictional Management and Monitoring Needs

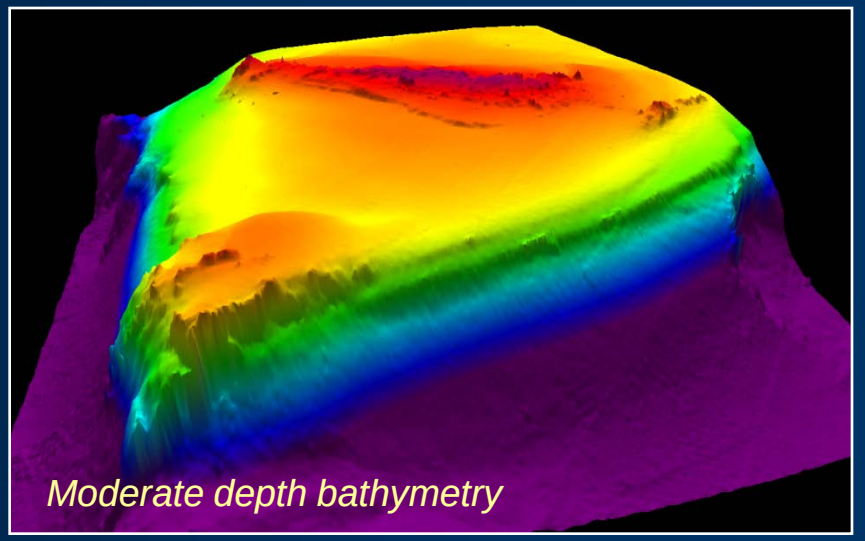
through…

Mapping the spatial extent and characteritization of coral ecosystems.

What is habitat mapping?

- *Geomorphological Structure*
- *Biological Cover*





Introduction

Habitat Mapping

PROVIDES:

Fundamental spatial framework

through…

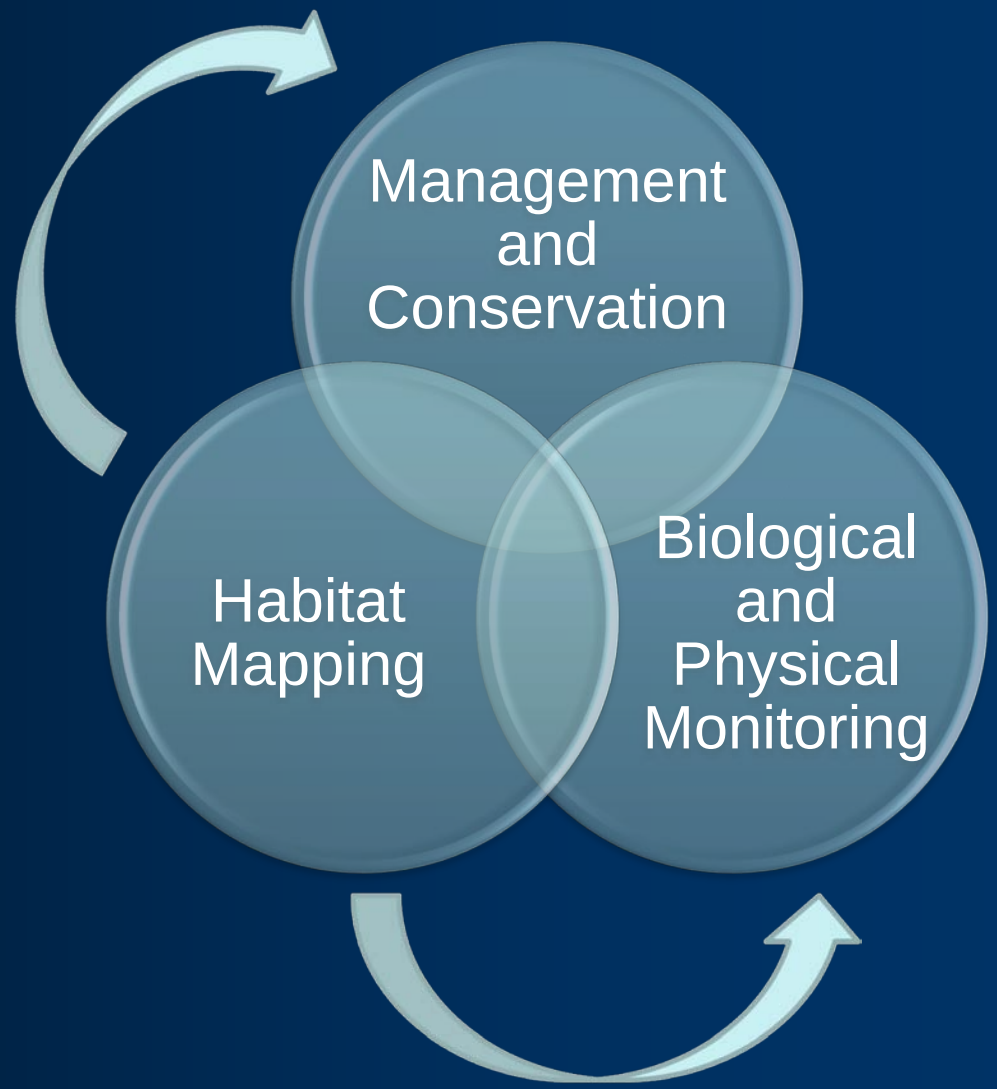
Comprehensive and consistent products

So as to…

Strategize monitoring design

and

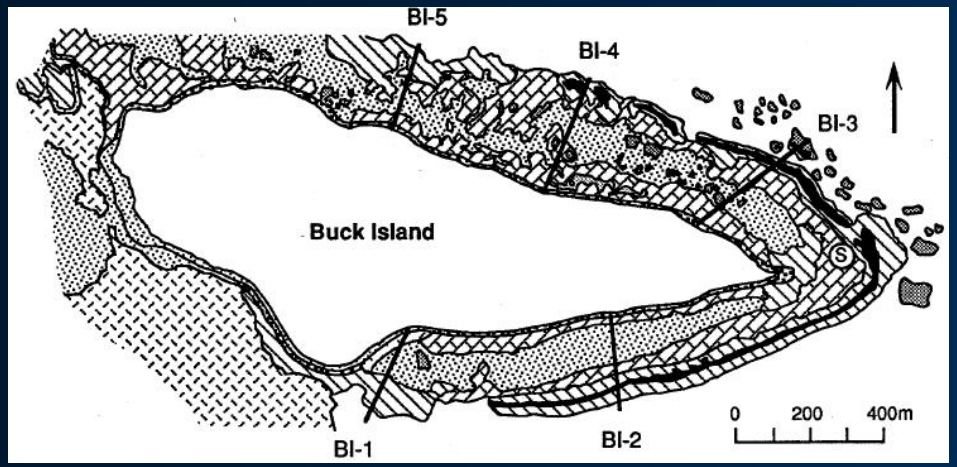
Inform management decisions



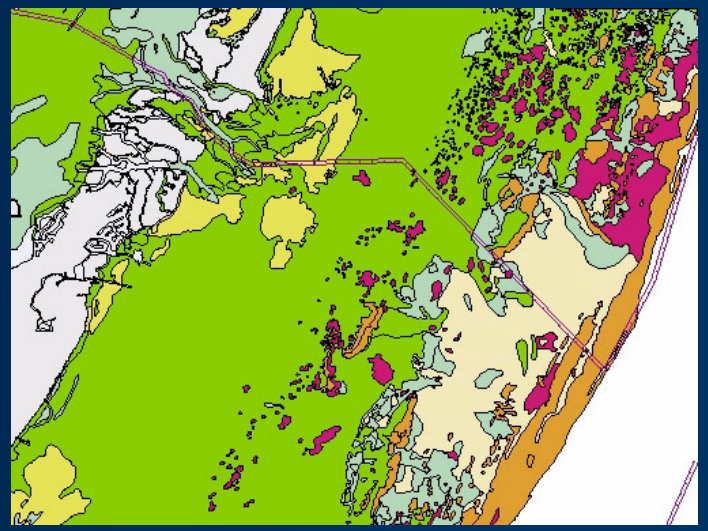
Introduction

Habitat Mapping Status pre-CRCP

- Incomplete information on the extent and distribution of U.S. coral ecosystem habitats (Florida Keys, Puerto Rico, and USVI)
- Little bathymetric and topographic information
- Existing data was difficult to discover, obtain, or use
- Lack of maps meant little information available to structure coral ecosystem monitoring, management, and conservation activities



Anderson et al. 1986 Buck Is., USVI



NOAA 1998, Florida Keys

Introduction

Habitat Mapping Goals with CRCP

1. Target Jurisdictional needs

2. Bringing Fed'l assets to bear to accomplish mapping

3. Develop and provide a range of data products and capabilities to support coral ecosystem management and conservation

    - Map all US shallow-depth (<30 m) and targeted moderate depth (>30 m) coral ecosystems

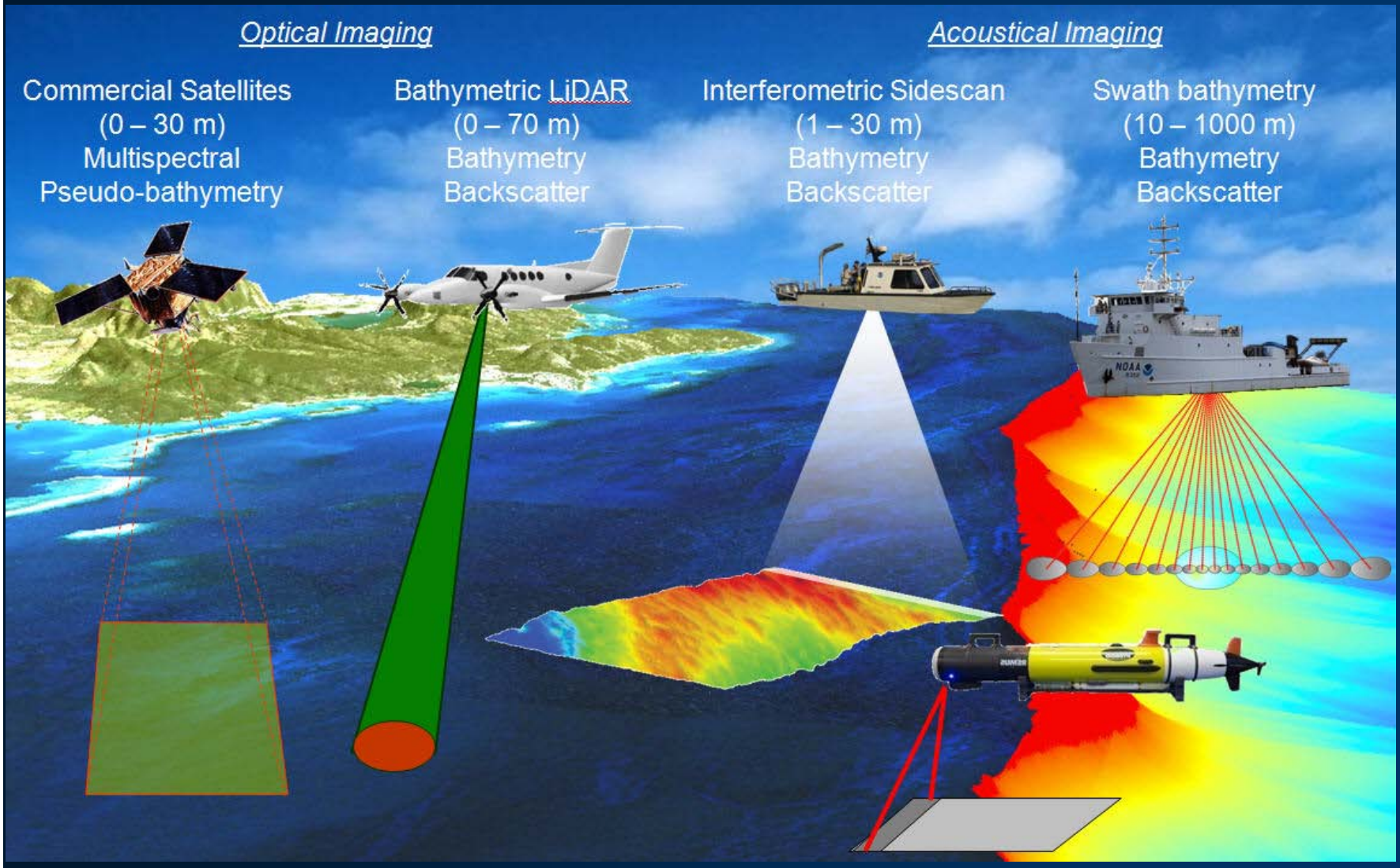
3. Advance seafloor mapping technologies and techniques

4. Develop and foster capability towards "ecosystem change analysis"

NOAA Capabilities

Habitat Mapping – Core Capabilities

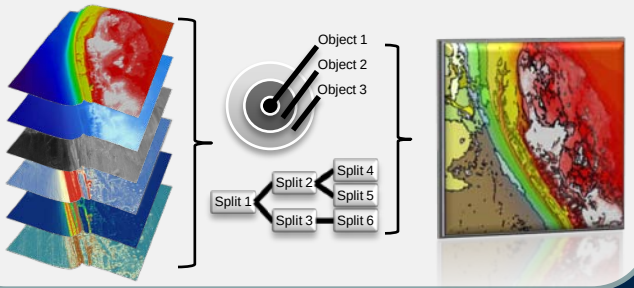
SHALLOW (0-30 m) **MODERATE (30-300 m)** **DEEP (300 -1,000 m)**



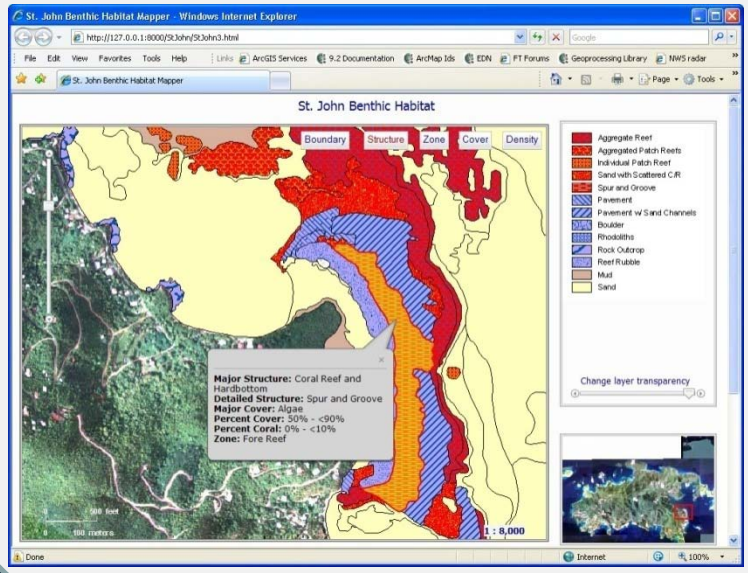
NOAA Capabilities

New Technologies and Techniques

Products – Ping/Pixel to map

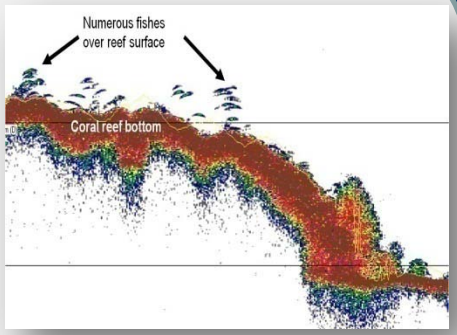


Visualization – New Access



Capabilities – New Sensors

C3D Interferometer

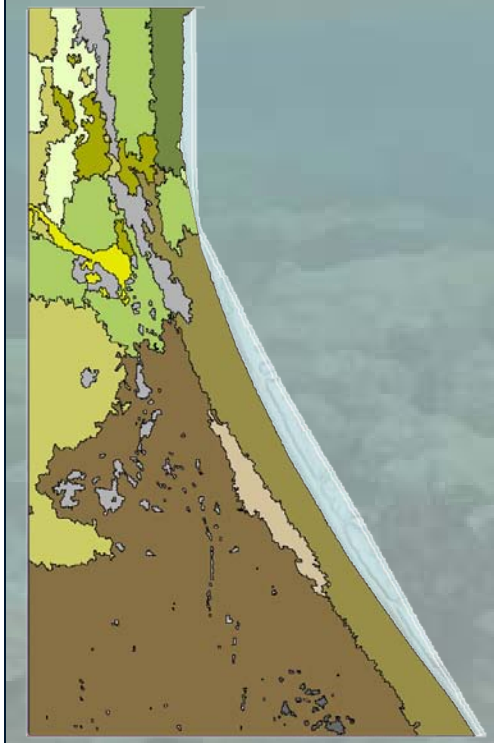


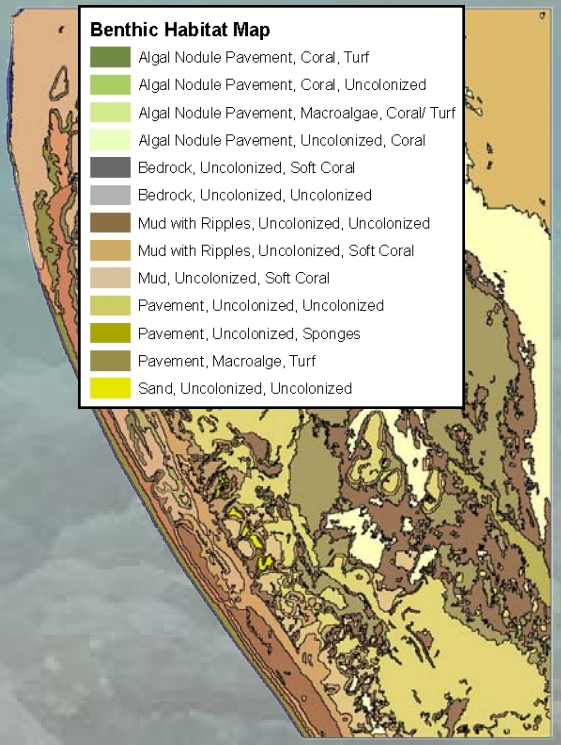
Simrad Split-beam

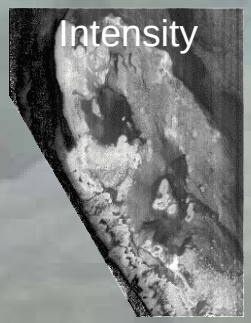
7125 Multibeam

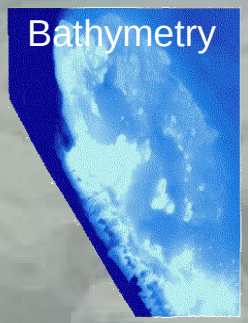
NOAA New Capabilities
Pixel/Ping to Map Capabilties

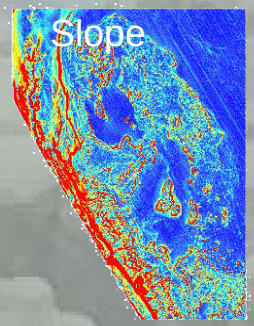
MBES (Deep > 50 m) → Merge & Edge Match ← LiDAR (Shallow <50 m)

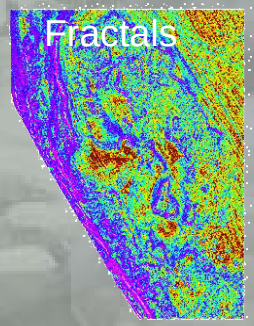


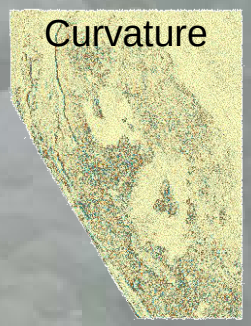












NOAA Capabilities

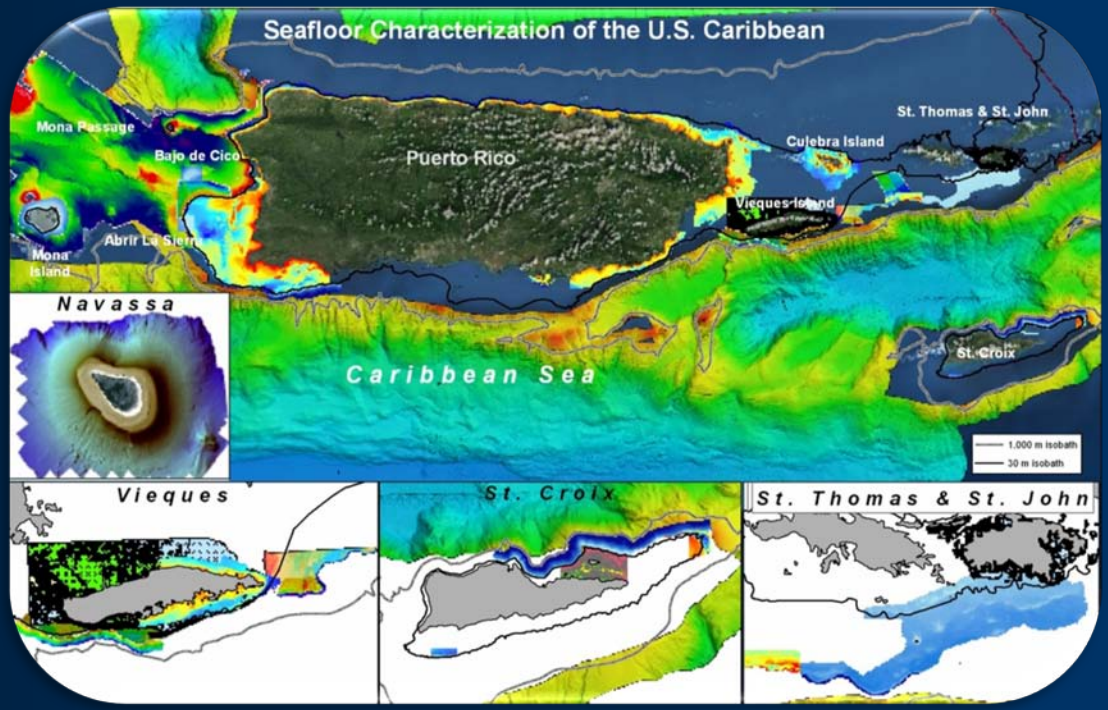
Seafloor Characterization of the Puerto Rico/USVI

OBJECTIVE: Coral Ecosystem Mapping (0-1,000 m)

STRATEGY: Fine-scale remap; and Jurisdictional prioritization of deep areas.

USES AND MANAGEMENT APPLICATIONS:

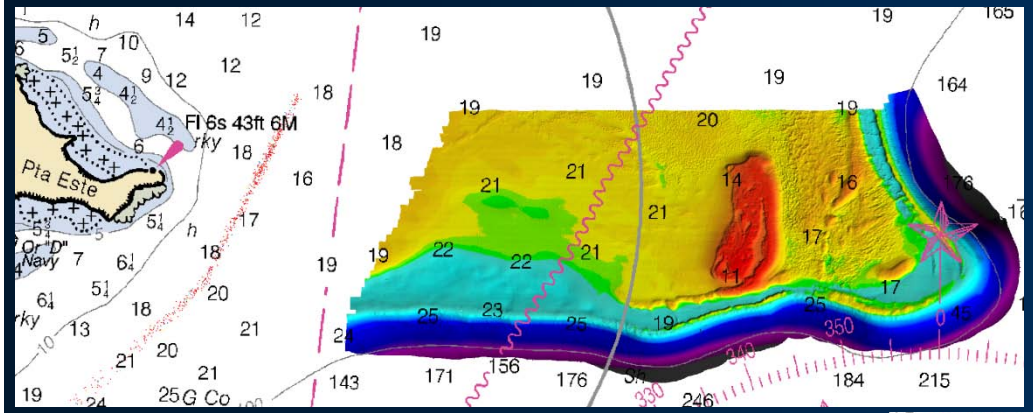
- Evaluate management actions,
- MPA boundary expansion,
- Characterize SPAG's & closure areas,
- Optimize monitoring sampling design.



NOAA Capabilities

Seafloor Characterization of the Puerto Rico/USVI

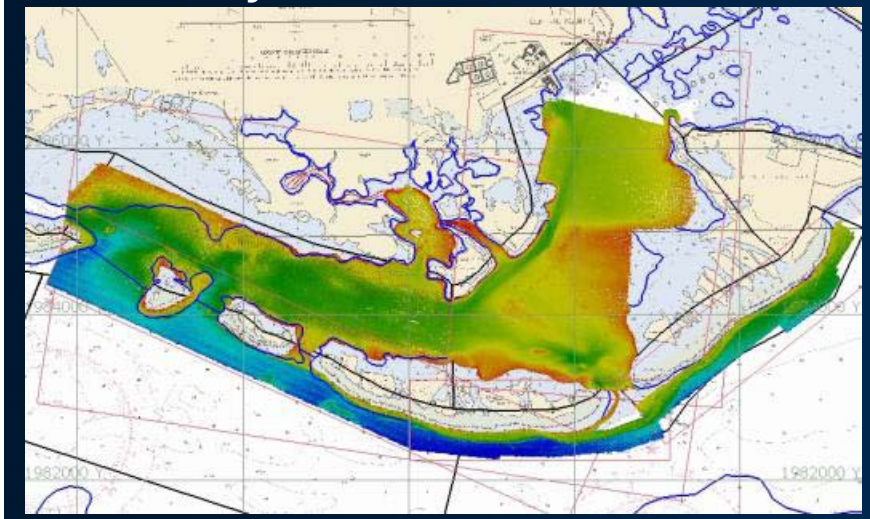
Vieques '09 – 19 km^2 El Seco, 28 km^2 S. Shore

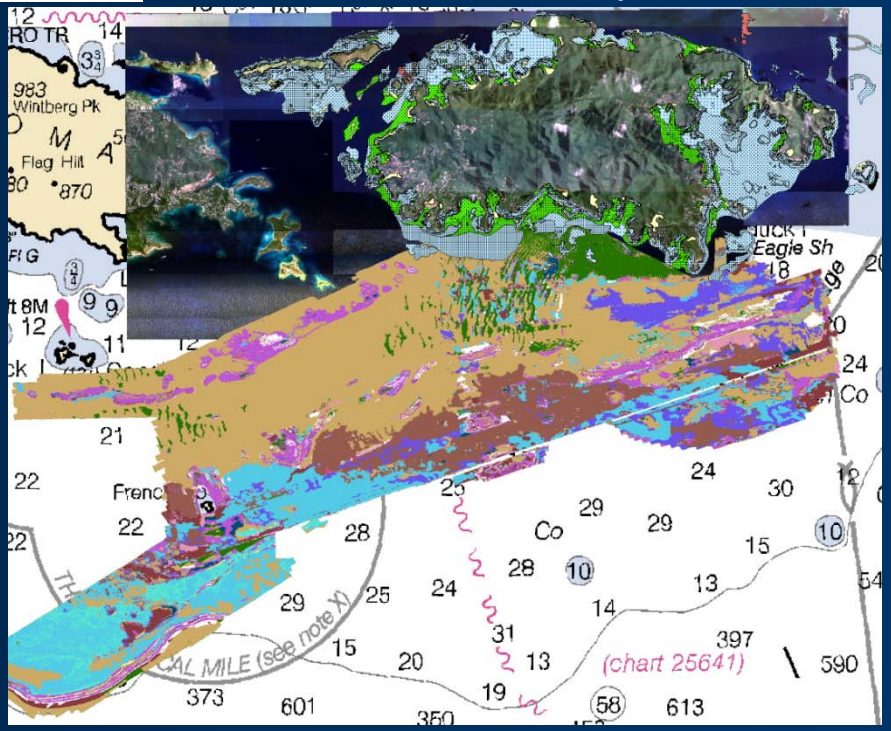


High Priority Area Mapping '09

St. John '09 – 47 km^2 Shallow, 195 km^2 Mid-depth

Jobos Bay '09 – 16 km^2 Interferometric





NOAA Capabilities

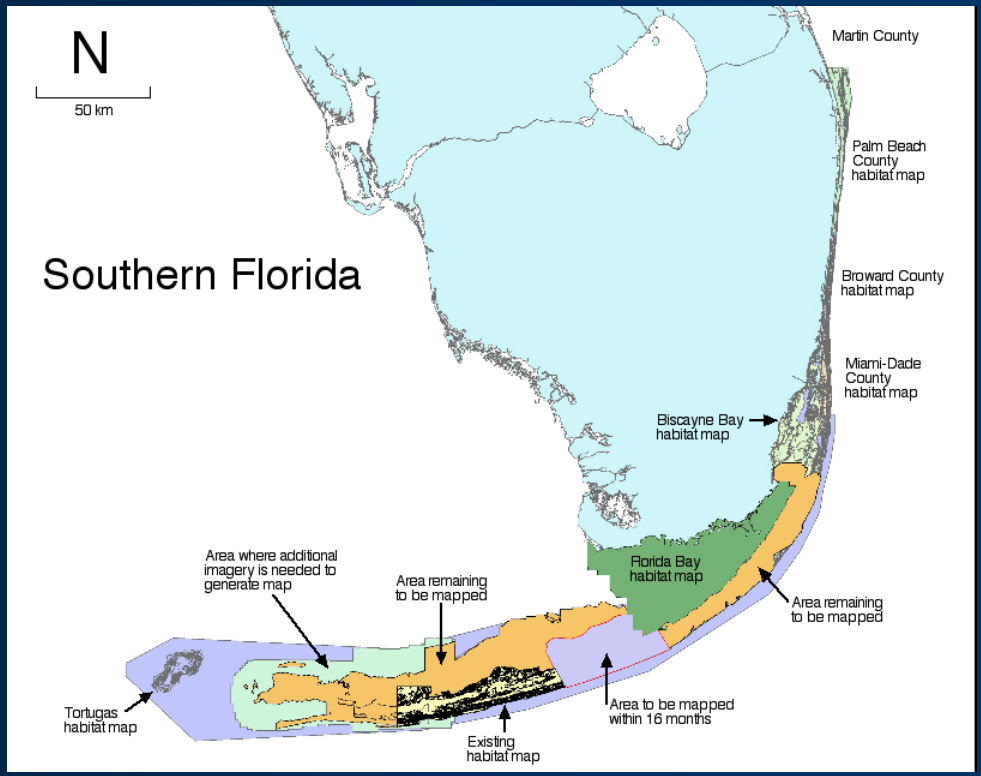
Mapping of southern Florida Coral Ecosystems

OBJECTIVE: Map ~13,000 km^2 of southern Florida <30 m.

STATUS: To date 900 km^2 have been mapped with 350 km^2 more within 16 months.

STRATEGY:

- MIP: Consensus-based prioritization of mapping areas
- Provide access to digital products to support other activities (e.g. FWC patch reef characterization)
- Integrate FWC, NPS, DEP map products.

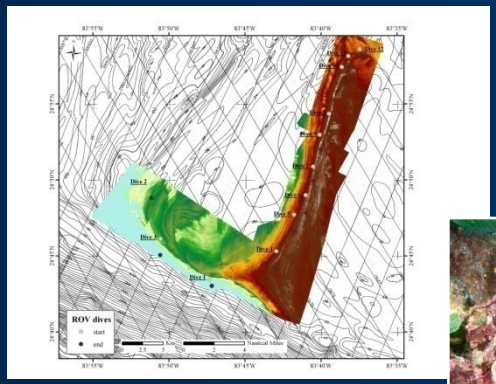


NOAA Capabilities

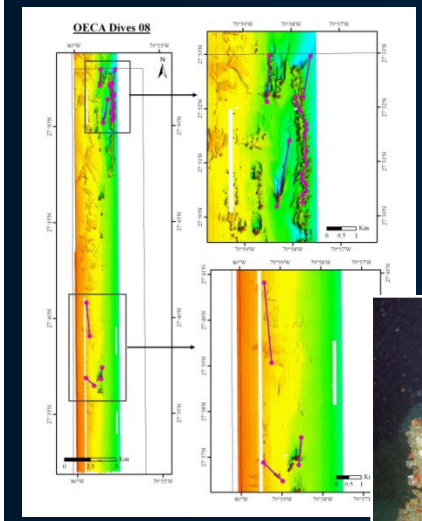
Mapping Beyond 'Traditional' Coral Reef Areas

Mapping deeper and farther north allows us to study:

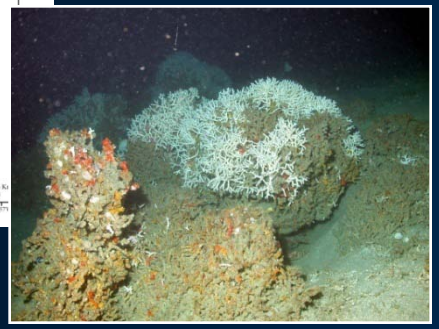
- **Connectivity**
- **Resiliency**
- **Climate Change**

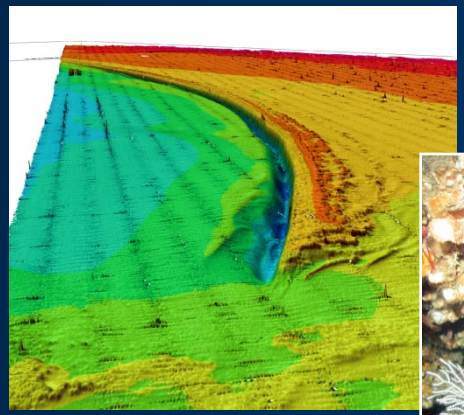


Pulley Ridge, SW FL
Hermatypic coral
below 65m

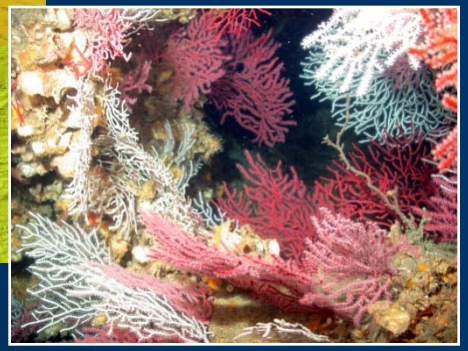


Oculina HAPC
East coast of FL
Habitat protection,
coral restoration,
EFH





Madison-Swanson MPA,
NE Gulf of Mexico
Diverse epifauna atop
paleoreef formations



NOAA Capabilities

Habitat Mapping – Meeting Management Needs

- Mapping as a monitoring tool (e.g. St John loss of coral cover)
- Delineated anchorages in the USVI to minimize damage to reefs
- Potential MPA Boundary modification in St. John
- Siting of new aquaculture facilities in Puerto Rico
- Damage assessment for grounding at Johnson's Reef, St John
- Mapping supports nautical charts updates

Future Directions and Challenges

Habitat Mapping

FY 2010

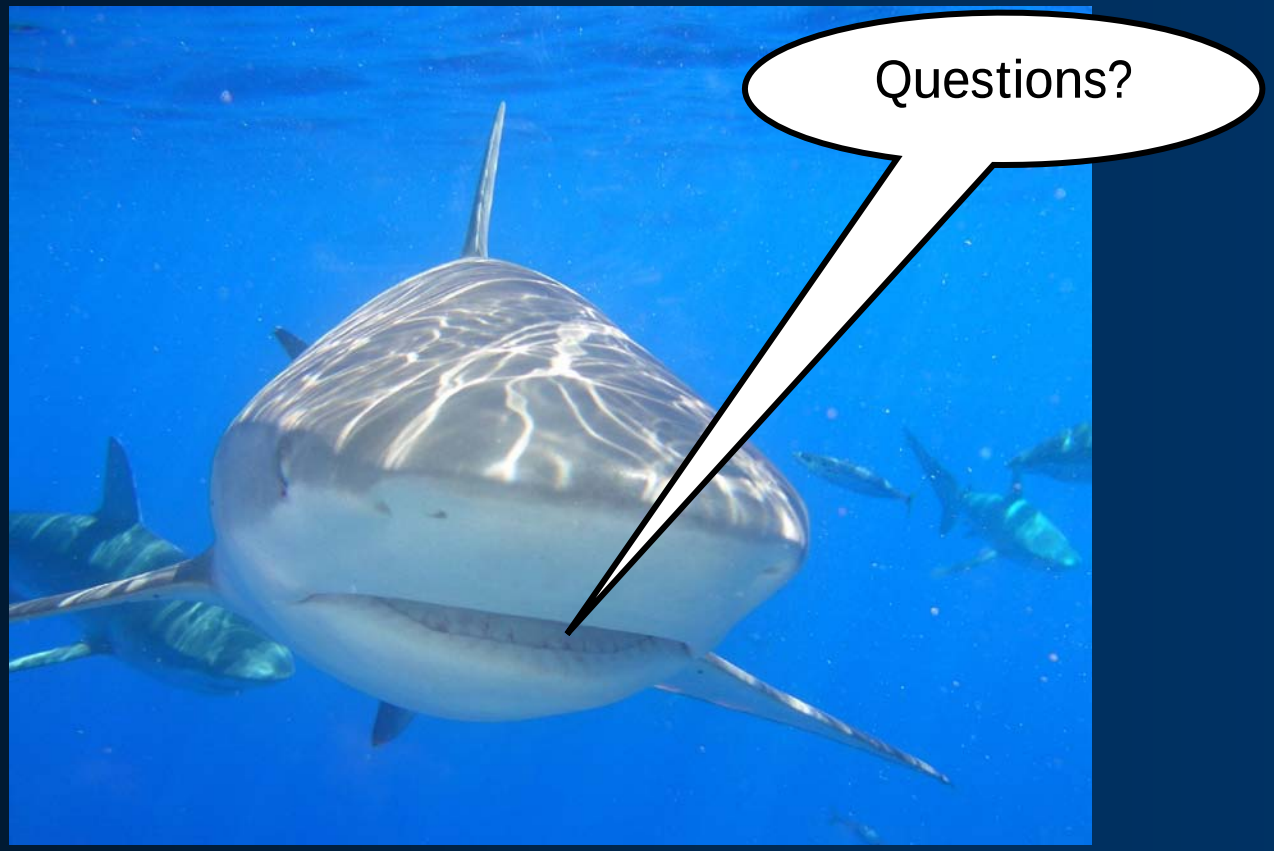
- 30 DAS Nancy Foster in Caribbean and 50 DAS Florida
- Buck Island and Salt River shallow-water habitat & bathymetric mapping
- Significant CRCP Deep Coral mapping
- Integrated shallow to mid-water mapping products for St. John

NEEDS and CHALLENGES

- Need improved training to managers on how to use products
- Continue fine-scale remapping
- Better, faster, cheaper mapping through AUV, UAS, LiDAR, and small boats (e.g. synthesis of existing map products)
- Increased Watershed mapping (e.g. Summit to Sea)
- Improve information distribution to managers

Future Directions and Challenges

Habitat Mapping



NOAA Capabilities

Mapping

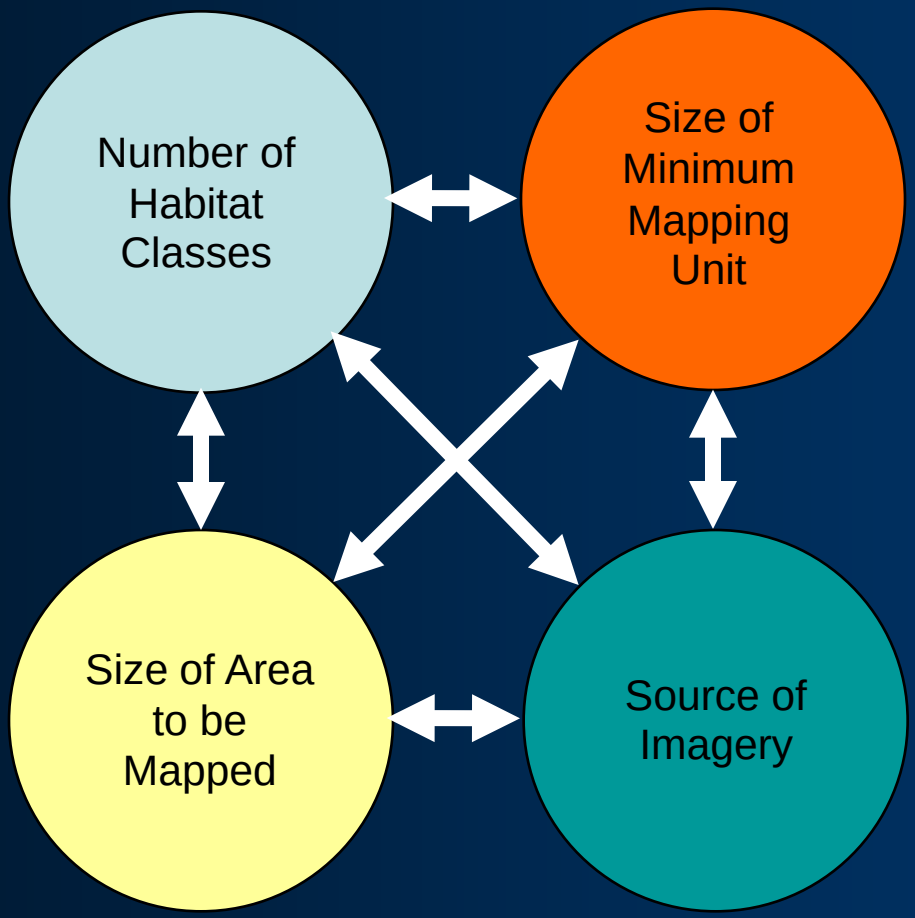
PRESENT MAPPING STATUS IN THE ATLANTIC/CARIBBEAN:

Jurisdiction	Benthic Habitat Map Products		Bathymetric Products	
	Shallow Water (<30 m)	Moderate Depth (30-100 m)	Shallow Water (<30 m)	Moderate Depth (30-100 m)
USVI	75-100%	0-25%	25-50%	25-50%
Puerto Rico	75-100%	0-25%	75-100%	0-25%
Navassa Is.	25-50%	0-25%	75-100%	75-100%
SE Florida	75-100%	0-25%	0-25%	0-25%
Florida Keys	50-75%	0-25%	0-25%	0-25%
Flower Garden Banks	N/A	0-25%	N/A	75-100%

From *The State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States: 2008*

Mapping

Factors Affecting Product Development, Cost, and Completion



What is LiDAR?

(Light Detection And Ranging)

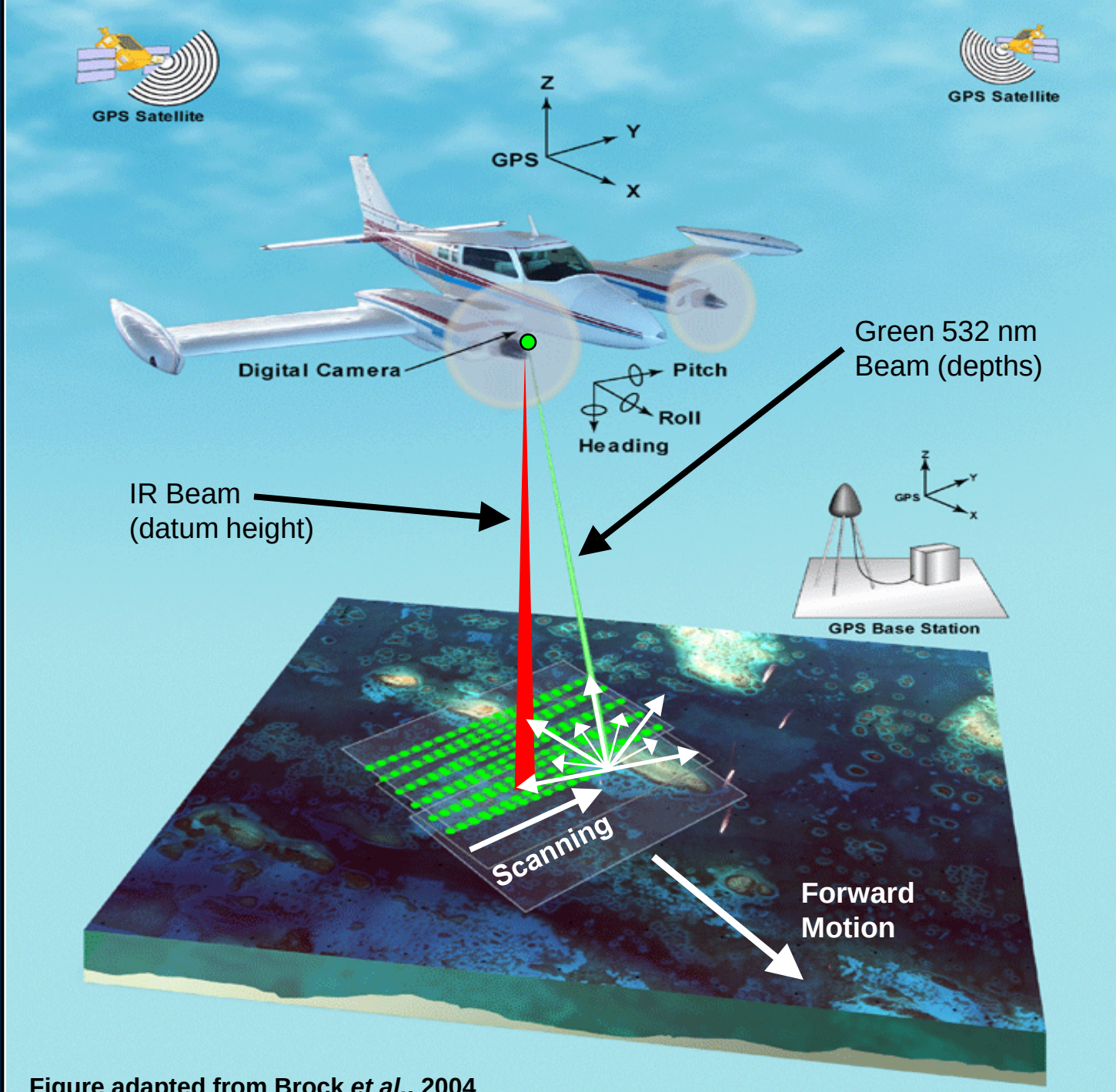


Figure adapted from Brock *et al.*, 2004

What is MBES?

(Multibeam Echosounder)