



# Benthic Habitat Mapping of the Marquesas/Quicksands Area: Management Implications and Lessons Learned

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## PURPOSE

The United States Coral Reef Task Force, in 2002, developed a National Action Plan to address the health of the Nation's coral reefs, and included a goal of producing comprehensive digital maps of all shallow coral reef ecosystems in the United States in order to characterize priority moderate-depth reef systems. The Florida Fish and Wildlife Conservation Commission (FWC) Fish and Wildlife Research Institute (FWRI) has been mapping benthic habitats in Florida for nearly two decades. With funding from the National Atmospheric and Oceanic Administration (NOAA), Coastal Planning & Engineering (CPE) is working with FWRI to produce a comprehensive digital map of benthic habitats within the Marquesas/Quicksands area at the western end of the Florida Keys. The project is an on-going 3-year mapping effort that will ultimately digitize and identify benthic habitats over a total area of 1,354 km<sup>2</sup> (Figure 1).

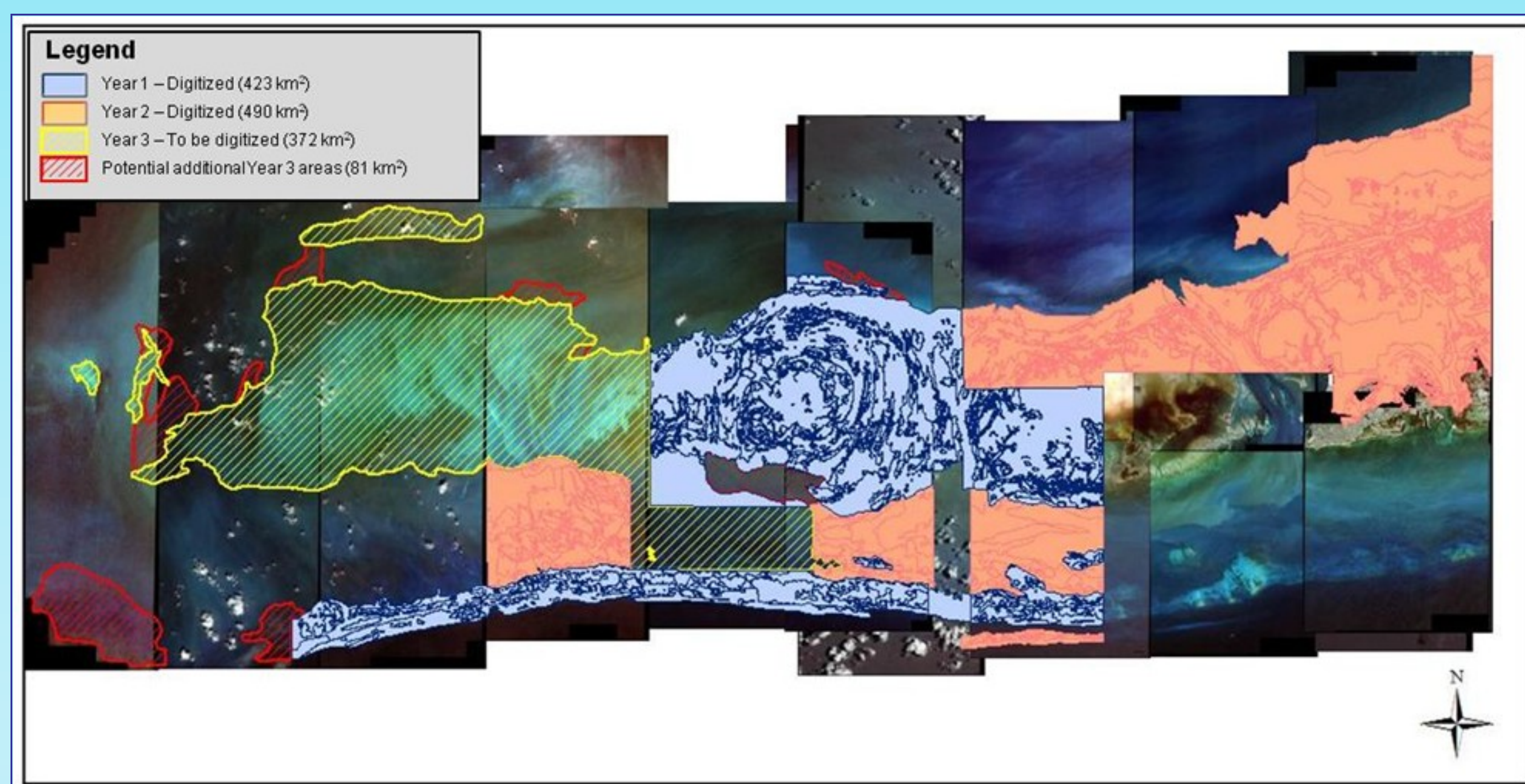


Figure 1: Mapping areas. Year 1 and 2 areas have been digitized and investigated in the field.

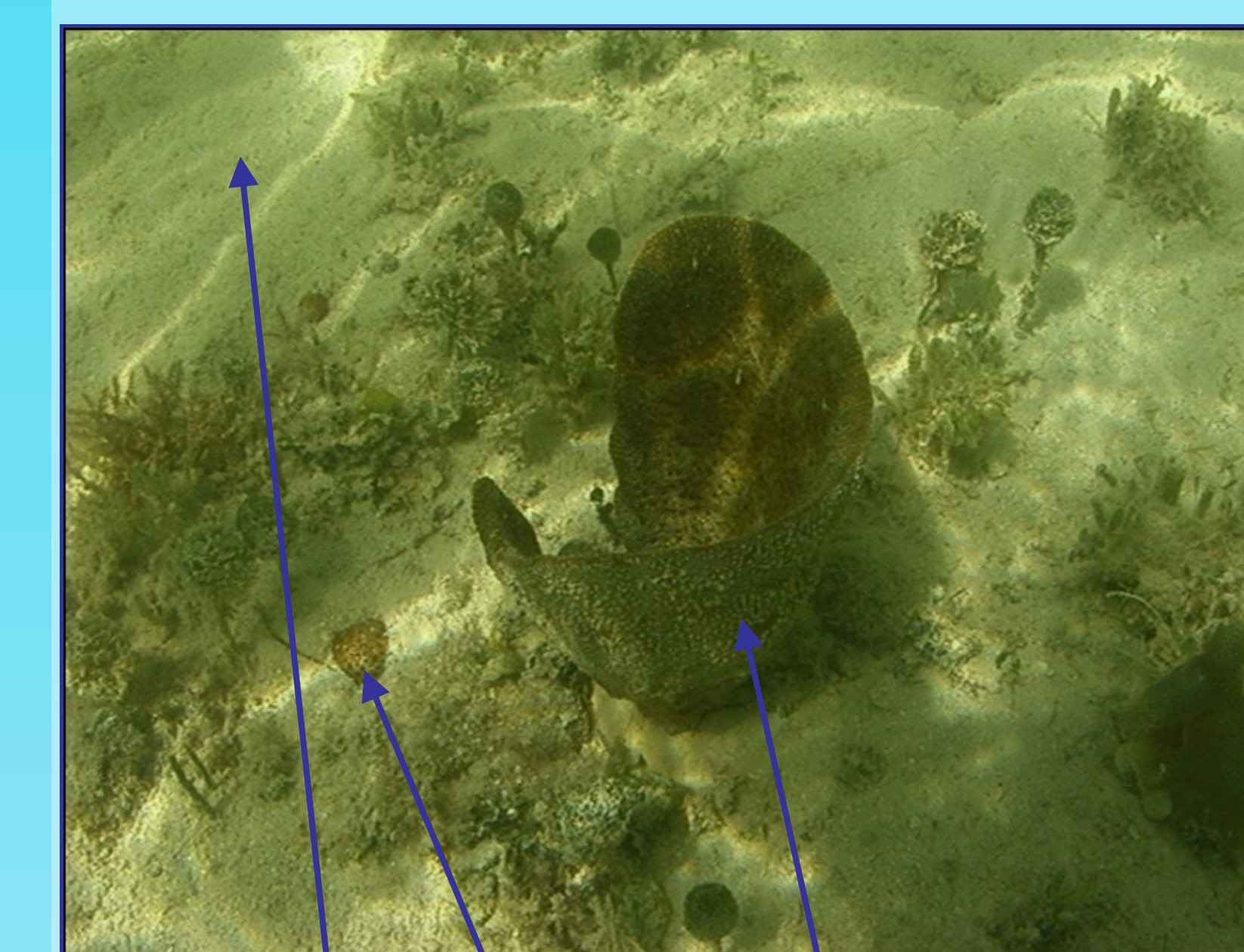
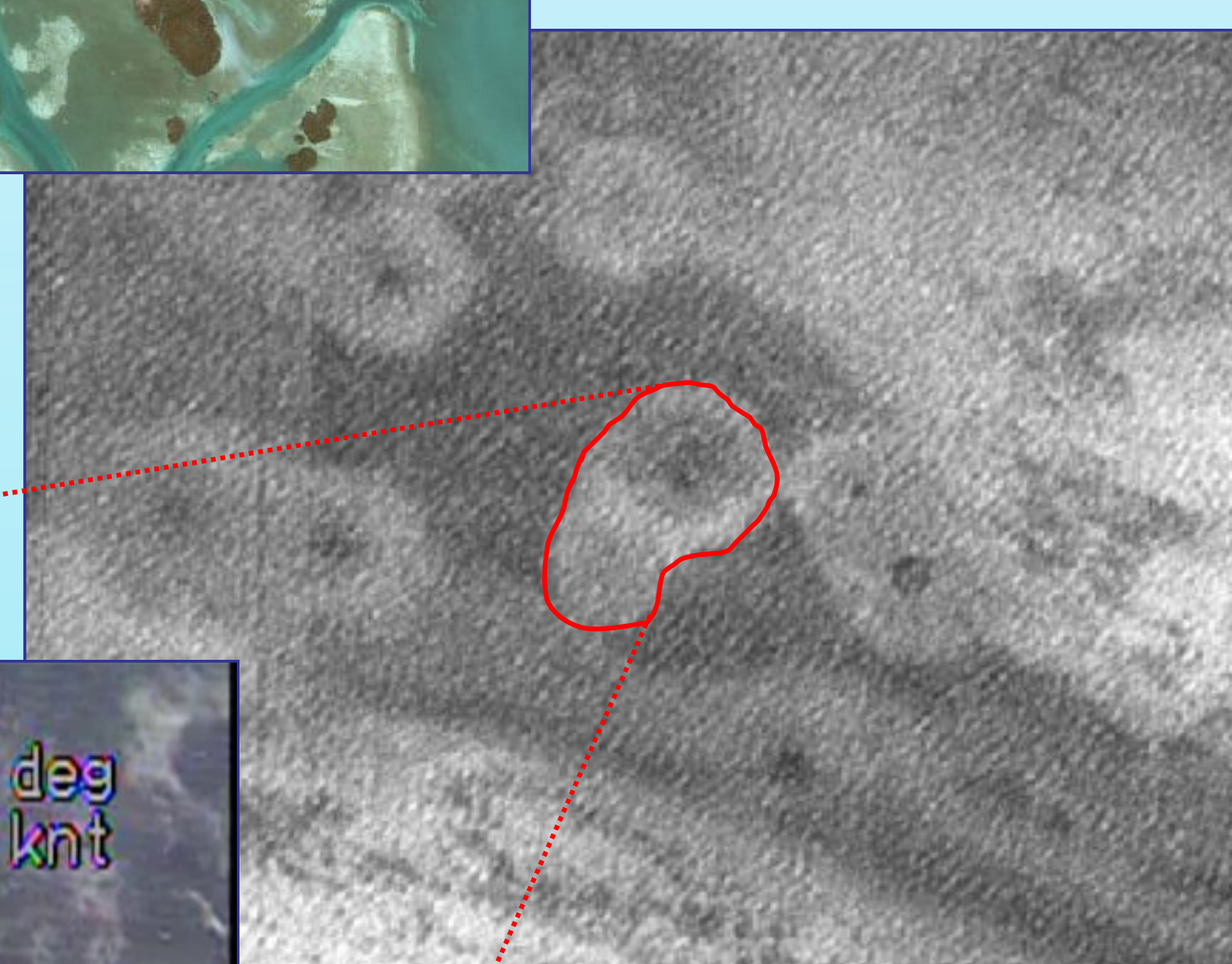
## METHODS

- Digitization of habitats using high-resolution, pan-sharpened, color IKONOS imagery
- ArcGIS10<sup>®</sup> software for visual interpretation
- Mapped coral reefs, hardbottoms, seagrass beds, mangrove keys, and other habitats using National Ocean Service (NOS) classification scheme for mapping south Florida coral ecosystems
- Ground validation (GV):
  - Year 1 field work conducted in June of 2009, mapped 423 km<sup>2</sup>
  - Year 2 field work conducted in September 2010, mapped 490 km<sup>2</sup>
  - GV points loaded into HYPACK
  - Navigate to points using HYPACK/DGPS
  - Investigate seafloor using GPS-integrated drop-camera video
  - Secondary investigation in areas not clear from video:
    - SCUBA
    - Snorkel
    - Finger-test



## RESULTS

- To date, a total of 913 km<sup>2</sup> have been mapped, 423 km<sup>2</sup> in Year 1 and 490 km<sup>2</sup> in Year 2. Year 3 area will be mapped in February of 2011.
- Observed habitats include:
  - expansive seagrass beds
  - patch reefs
  - aggregate reefs
  - pavement
  - reef rubble
  - sand bottoms
  - mangrove wetlands
- Seagrass is the most abundant habitat in shallow areas
- Patch reefs within Hawk Channel support the highest relief and corresponding coral cover
- Offshore reefs in the area are typically low-relief with sparse coral cover
- No active spur-and-groove formations were observed offshore of Marquesas Key



Deep Sand  
Coral  
Reef Sponge

## ISSUES

Several areas were observed to support a mixture of benthic habitats that made classification difficult. Areas of flat hardbottom, mostly classified as pavement, were intermixed with areas of seagrass. This indicates two substrates: unconsolidated sediment, and coral reef and hardbottom. Measurements of sediment depths ranged from less than 1 cm to over 5 cm in a small area. Pavement supported a benthic community of mostly macroalgae, but also a sparse distribution of scleractinian corals and octocorals, as well as sponges, indicating a reef-like community. In some areas, octocorals and reef sponges were visible above a seagrass canopy. These areas are mixed on a very small scale; neither hardbottom nor seagrass areas were typically large enough to satisfy the Minimum Mapping Unit (MMU), and the features are not typically visible in the satellite imagery. The Marquesas-Quicksands area may benefit from modifications to the existing NOAA classification system that would more accurately represent the benthic communities there.



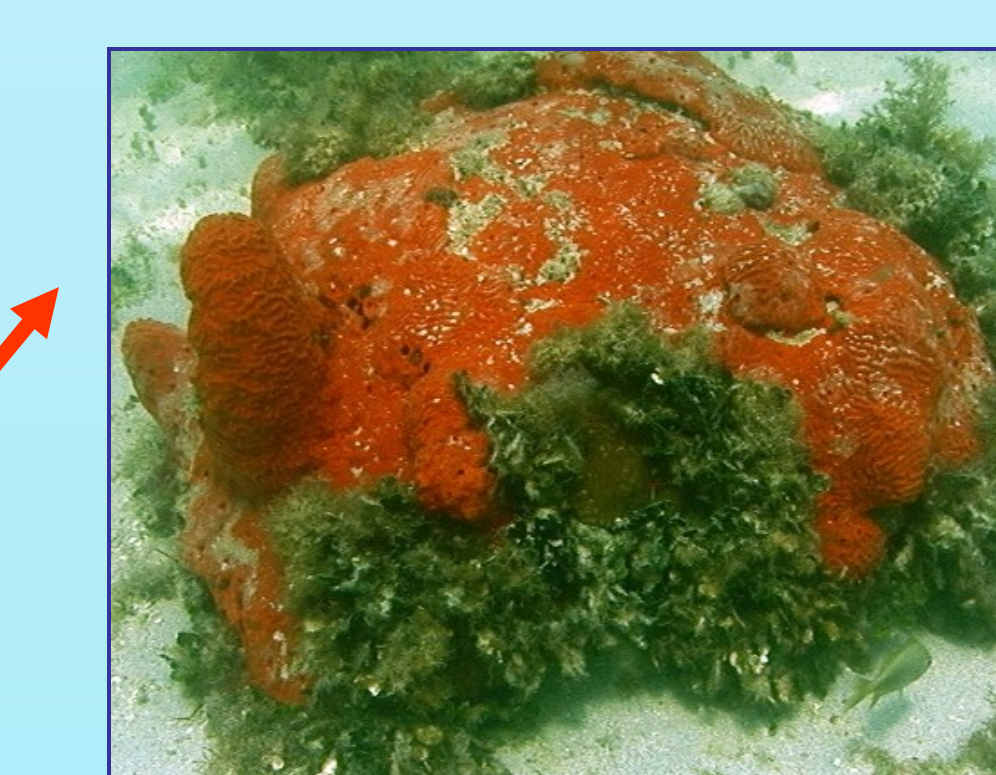
Octocoral  
Reef Sponge  
Seagrass

## MANAGEMENT IMPLICATIONS

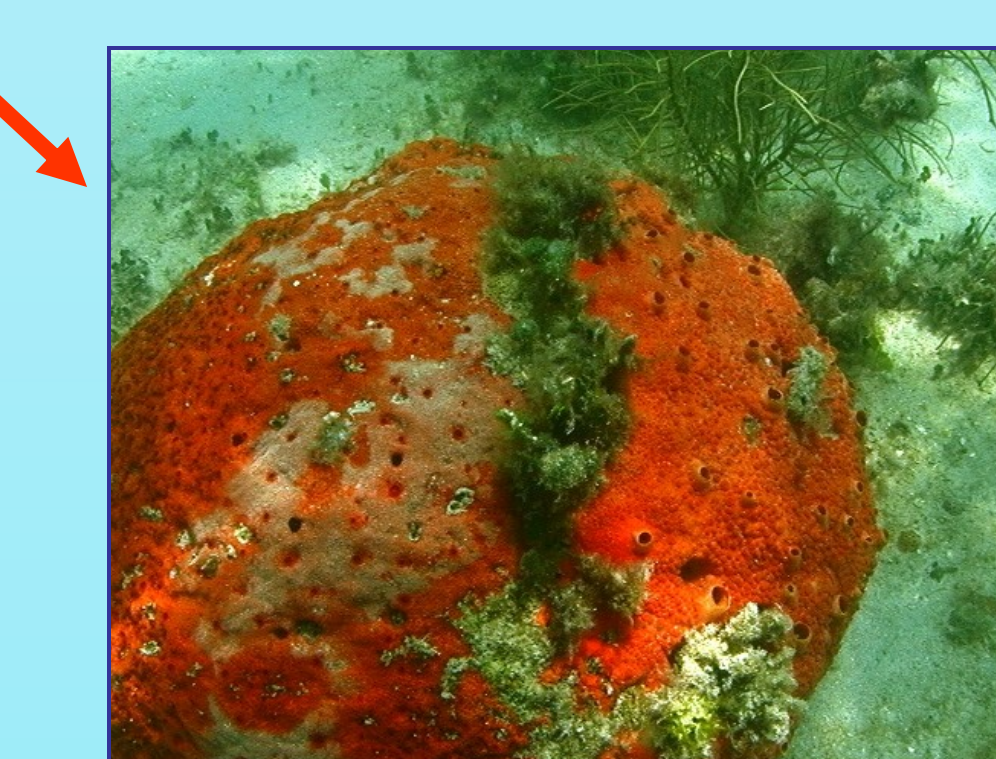
- Provide large-scale habitat maps for utilization by regional managers
- Monitor for changes in benthic communities
- Monitor coral health:
  - Bleaching
  - Mortality
- Cold snap-induced mortality and overgrowth by Clionoids?



Healthy coral



Corals with boring sponge infestation (*Peone lampa* and *Cliona delitrix*)



## REFERENCES:

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- NOAA, 2008. A classification scheme for mapping the shallow-water coral ecosystems of southern Florida, v. 3.2. NOAA Coral Reef Conservation Program, June 20, 2008
- Walker, B.K., and G. Foster, 2009. Accuracy assessment and monitoring for NOAA Florida Keys mapping AA ROI-1 (Hawk Channel near American Shoal). Final Report to NOS/NOAA Office of Marine Sanctuaries. NCR1: Dania Beach, FL