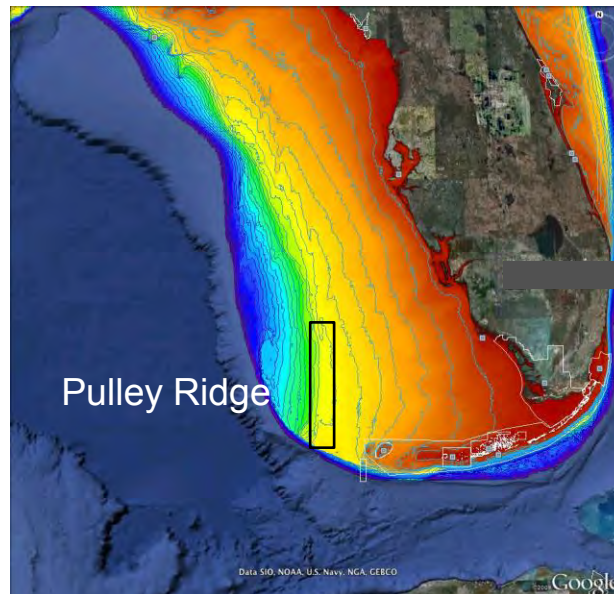




Gulf of Mexico Mesophotic Reef Species Connectivity to FKNMS Shallow and Deeper Reefs (the Pulley Ridge Project)

Dr. Robert Cowen and Dr. Peter Ortner (UM/RSMAS)



Project Objective

The goal of this 5 year study is to provide information on the Pulley Ridge ecosystem and its potential connectivity to the FKNMS (Including the Dry Tortugas) other coral ecosystems to resource managers to enable proactive development of strategies to manage and protect shallow and mesophotic coral ecosystems.

Funded by NOAA/NOS/NCCOS/CSCOR

Project Overview

Approach –

- Combine modeling (physical oceanography and larval dispersal), population genetics and population dynamics to **estimate and validate population connectivity** across a suite of benthic and fish species
- Evaluate the abundance and diversity of organisms associated with the Pulley Ridge environment to provide a first order **assessment of benthic community structure**
- Synthesize knowledge of the PR-DT/FK ecosystem and its ecological and human connections to **develop a bio-economic model of biological and economic ecosystem level indicators** to inform managers of trade-offs resulting from alternative management options considered for the PR
- Outputs from the project will be integrated into a variety of **Decision Support Tools for managers**, including user-friendly, searchable databases and graphic illustrations of physical, biological and economic information pertinent to the Pulley Ridge-Florida Keys system (e.g. maps of species distribution and species connectivity pathways).

Participating Institutions

Principal Investigator Institutions:

- Univ. of Miami,
RSMAS/CIMAS/CCS
- FAU, CIOERT/HBOI
- NOVA SE Univ.
- FIU
- FSU
- UF
- California Academy of Sciences
- NOAA/AOML

Collaborator Institutions:

- CUNY
- UNC Wilmington
- Univ of British Columbia
- FL FWC
- NOAA/NMFS/SEFSC

Work Groups and Leads

- Program Management Team – Bob Cowen, Peter Ortner, Shirley Pomponi
- Physical Oceanography – Villi Kourafalou
- Bio-Physical Modeling – Su Sponaugle/Claire Paris
- Population Dynamics – Jerry Ault/Felicia Coleman
- Population Genetics – Mahmood Shivji
- Community Structure – Dennis Hanisak
- Bio-economics – David Die
- Decision Support Tool – Chris Mader

- NOAA/CSCOR Program Manager – Kimberly Puglise

Stakeholder Advisory Board

Member	Affiliation
Mr. Gregory Boland	Bureau of Ocean Energy Management, Environmental Sciences Division
Dr. Steve Bortone, Executive Director	Gulf of Mexico Fishery Management Council
Dr. James Byrne, Marine Science Program Manager	The Nature Conservancy
Mr. Billy Causey, Southeast Regional Director	NOAA Office of National Marine Sanctuaries
Dr. Roy E. Crabtree, Regional Administrator	NOAA National Marine Fisheries Service, Southeast Regional Office
Dr. Alyssa Dausman, Science Coordination Team Co-Lead	Gulf Coast Ecosystem Restoration Task Force
Dr. Todd Gedamke, Division Chief	NOAA National Marine Fisheries Service, Southeast Fisheries Science Center, Demersal Fisheries
Mr. Dan Kimball, Superintendent	National Park Service, Everglades National Park/Dry Tortugas National Park
Mr. John McDonough, Deputy Director	NOAA Office of Oceanic and Atmospheric Research, Ocean Exploration and Research
Mr. Gil McRae, Director	Florida Fish and Wildlife Research Institute
Mr. Roger Pugliese, Senior Fish Biologist	South Atlantic Fishery Management Council
Ms. Cathy Tortorici	NOAA National Marine Fisheries Service, Southeast Regional Office

2012 Pulley Ridge Cruise



R/V Walton Smith – Cruise No. WS1213
August 14-25, 2012

Cruise Objectives/Priorities

Aug 2012

1. Mooring placement – 3 physical oceanography moorings
 - DT (2 moorings)
 - PR (1 mooring)
2. Deploy 2 larval light trap moorings w/ day/night light trap sets
3. ROV work – conduct survey transects to quantify benthic habitat and organisms, and identify suitable specimen collection sites.
4. Technical diving – initiate specimen collection.

Specimen Collection

Target sample size per species (n = 60)

- Coral
 - *Agaricia* spp.
 - *Montastraea cavernosa*
 - *Porites asteroides*
- Fish
 - *Stegastes partitus* (bicolor damselfish)
 - *Thalassoma bifasciatum* (bluehead wrasse)
 - Grouper (red - *M. morio*; gag and/or scamp)*
- Sponge
 - *Xestospongia muta*
- Alga
 - *Halimeda* sp.

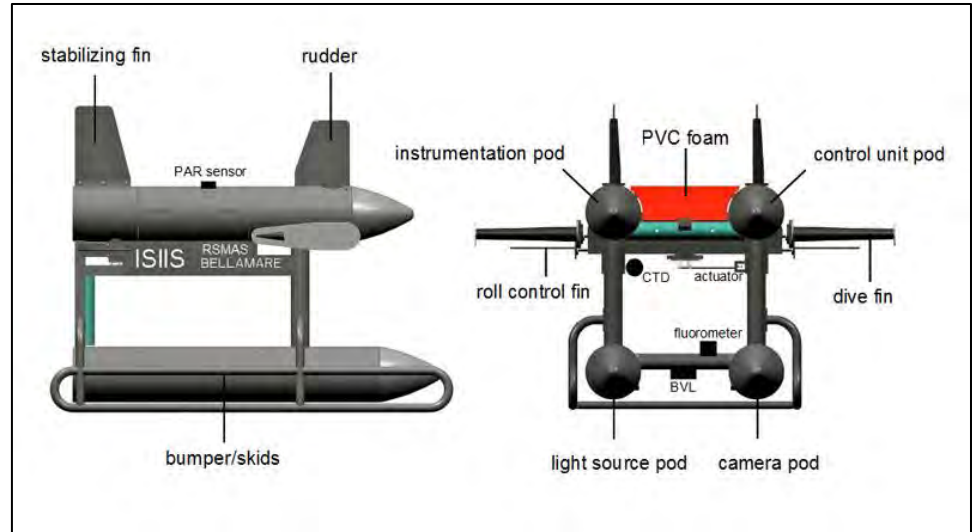
Cruise Objectives/Priorities

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4. Technical diving – initiate specimen collection.
5. (Time Available) Deploy ISIIS on a time available basis (day or night)
6. (Time Available) Deploy MOCNESS on a time available basis (day or night).

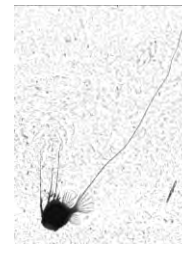
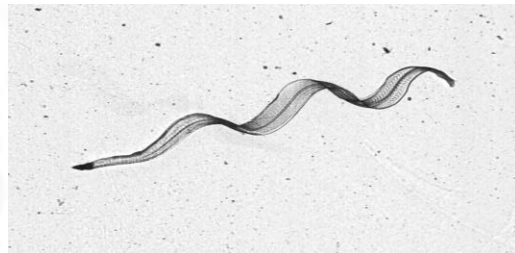
ISIIS

In Situ Ichthyoplankton Imaging System



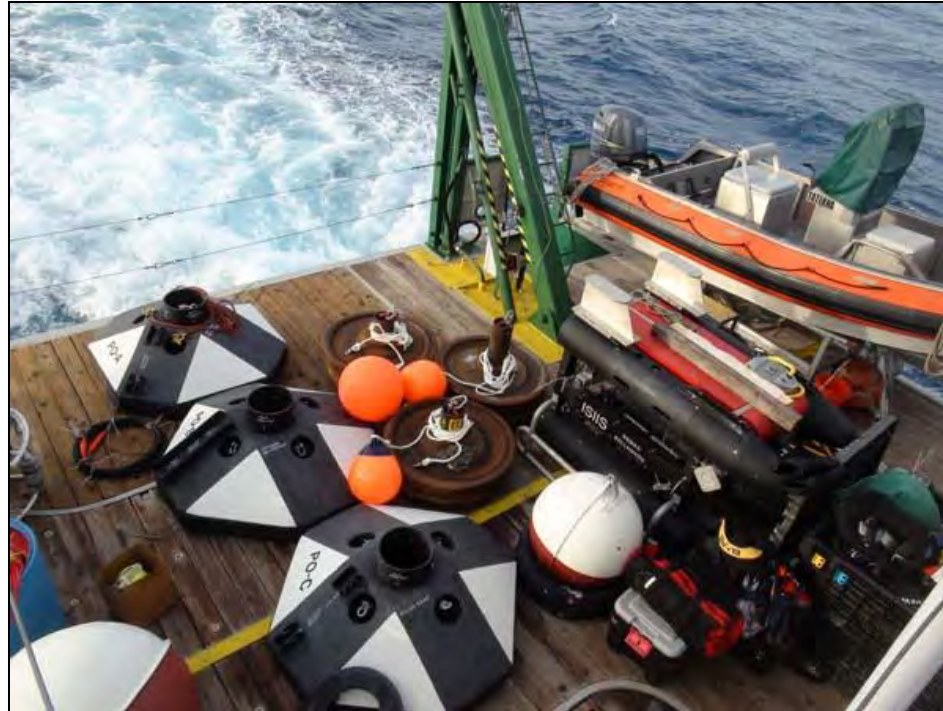
<http://yyy.rsmas.miami.edu/groups/larval-fish/isiis%20website/isiispage1.htm>

Task: Deploy ISIIS on a time available basis



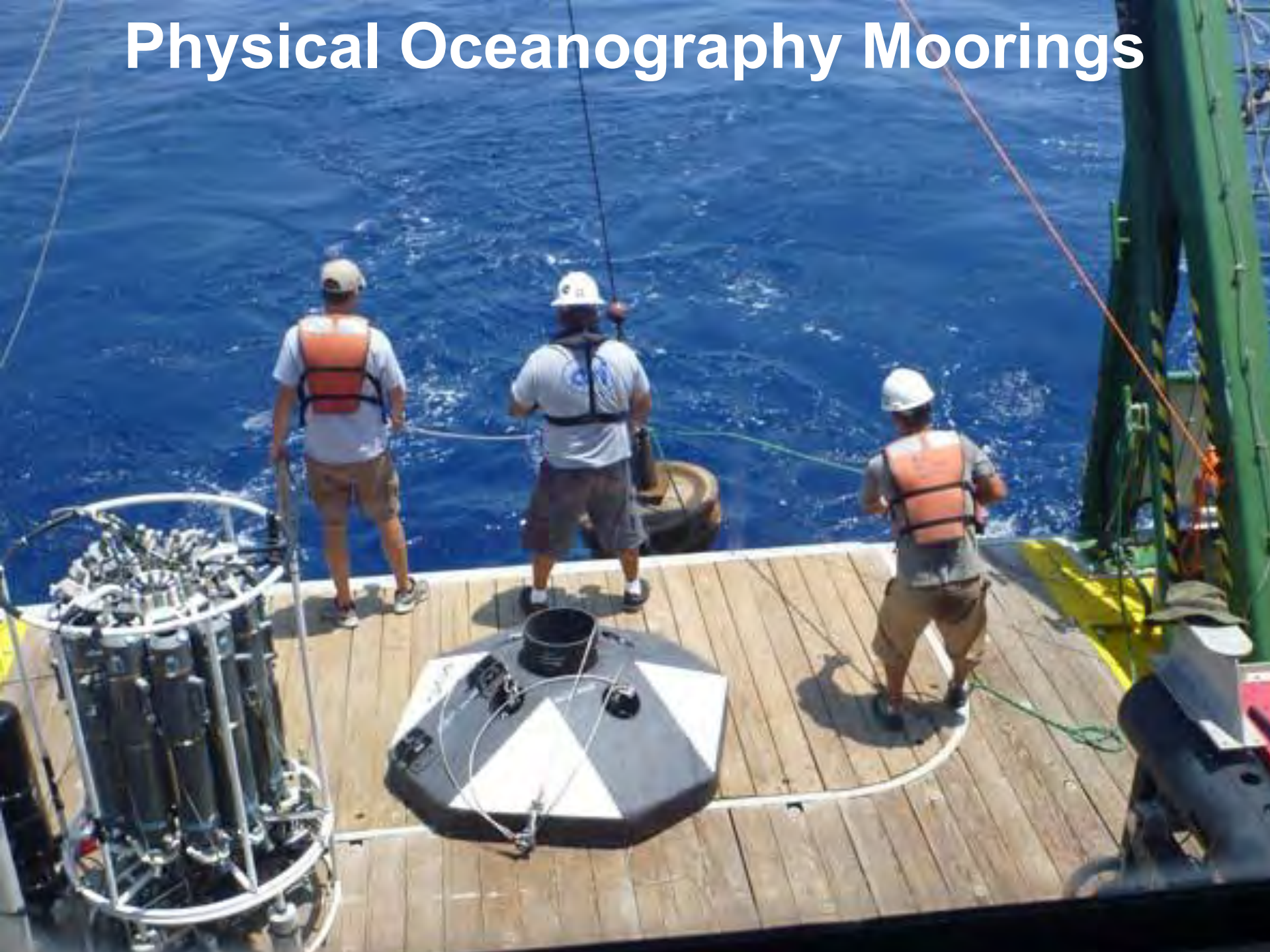
Physical Oceanography Moorings

Task: Deploy three physical oceanography moorings at designated locations

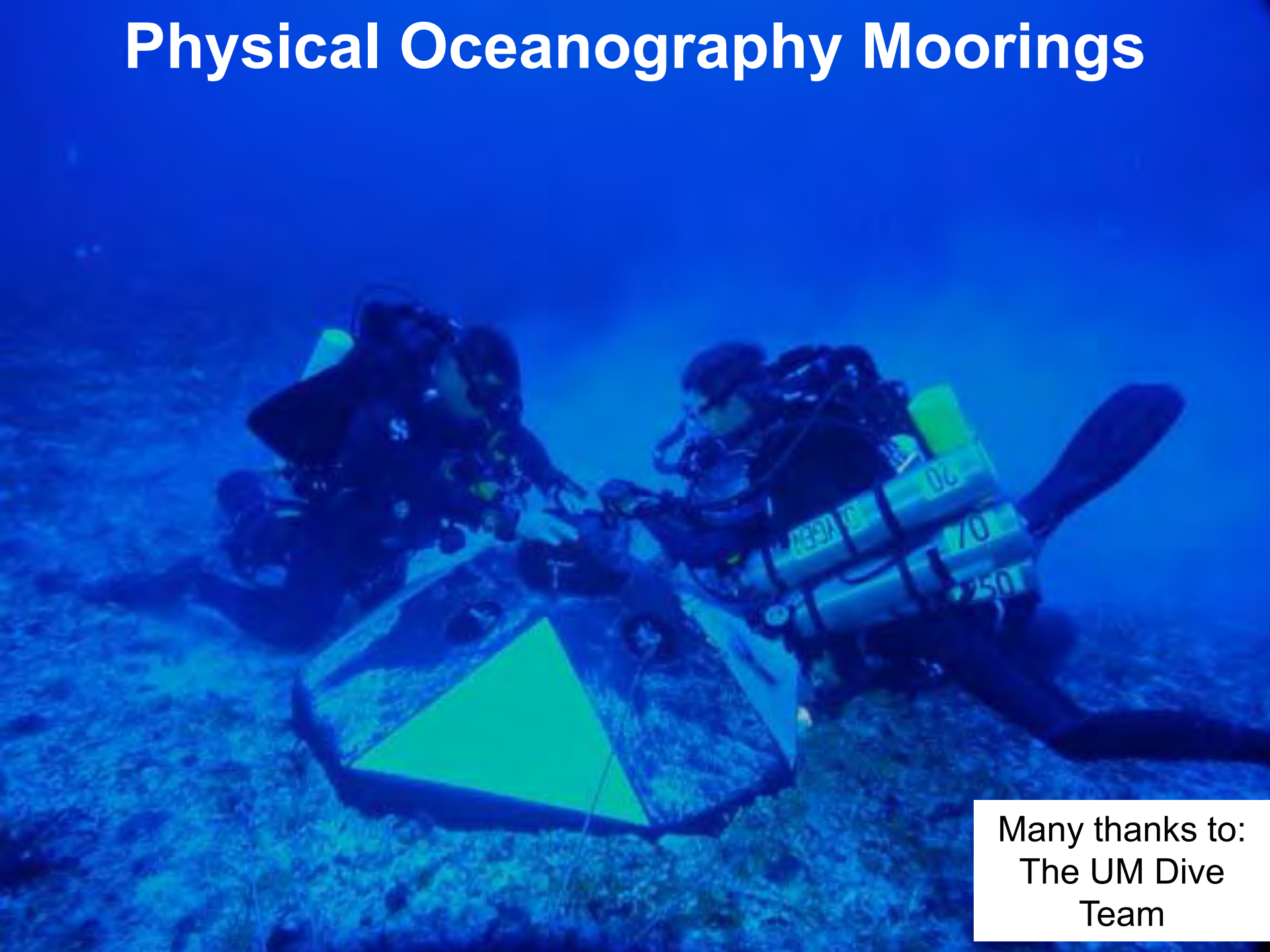


- 2 moorings in vicinity of the Dry Tortugas: north Tortugas site (TERN) and south Tortugas site (TERS)
- 1 mooring east of Pulley Ridge (PR)

Physical Oceanography Moorings



Physical Oceanography Moorings



Many thanks to:
The UM Dive
Team

Physical Oceanography Moorings



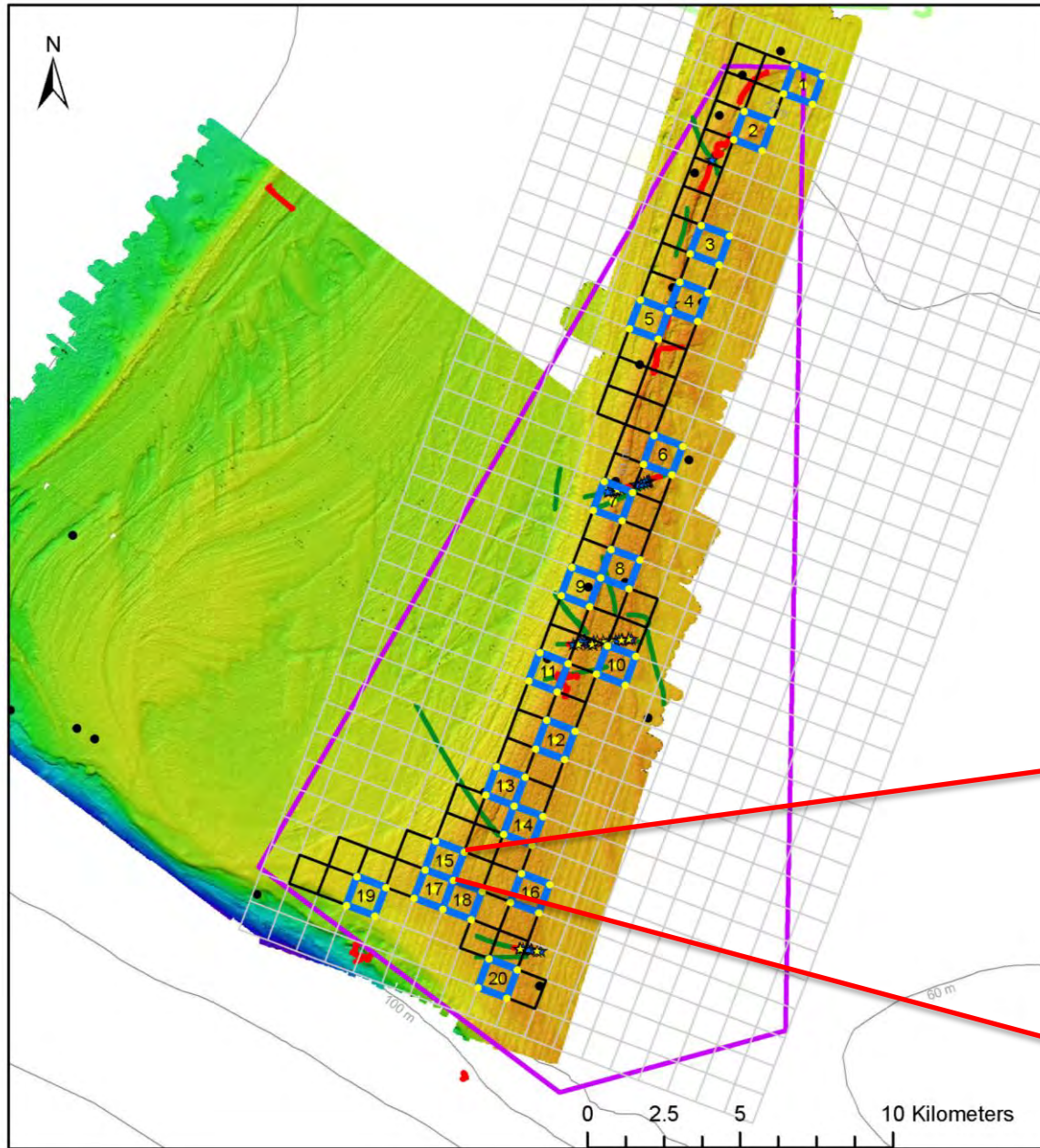
- 2 moorings (TERN and PR) were successful deployed and instrumented
- Third mooring (TERS) deployed but instruments need to still be added due to conditions that prevented success by the Tech Diving team

Benthic Surveys

1. Conduct survey transects by ROV to quantify benthic habitat and organisms and identify suitable specimen collection sites
2. Conduct video transects (100 m) to estimate fish abundance and diversity

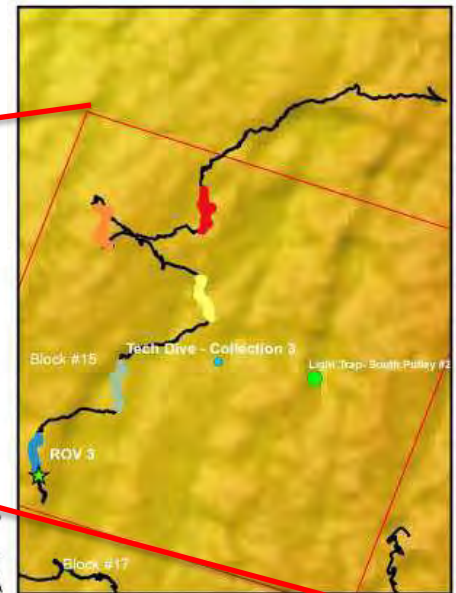
Pulley Ridge – Aug 2012 Sampling Plan

Conduct survey transects by ROV to quantify benthic habitat and organisms and identify suitable specimen collection sites



- 2012 ROV sites - points
- 2012 Random Target ROV Sites
- 2012 Pully Ridge On Ridge
- 2012 Pully Ridge Fishnet Grid
- ★ Agaricia
- ★ Montastraea
- NOAA Fisheries ROV Sites (A. David 2007 & 2009) = black dot
- HBOI (2010, 2011 ROV and JSL) Sites = red lines
- USGS SEABOSS Sites (2005) = green line
- PullyRidgeMPA

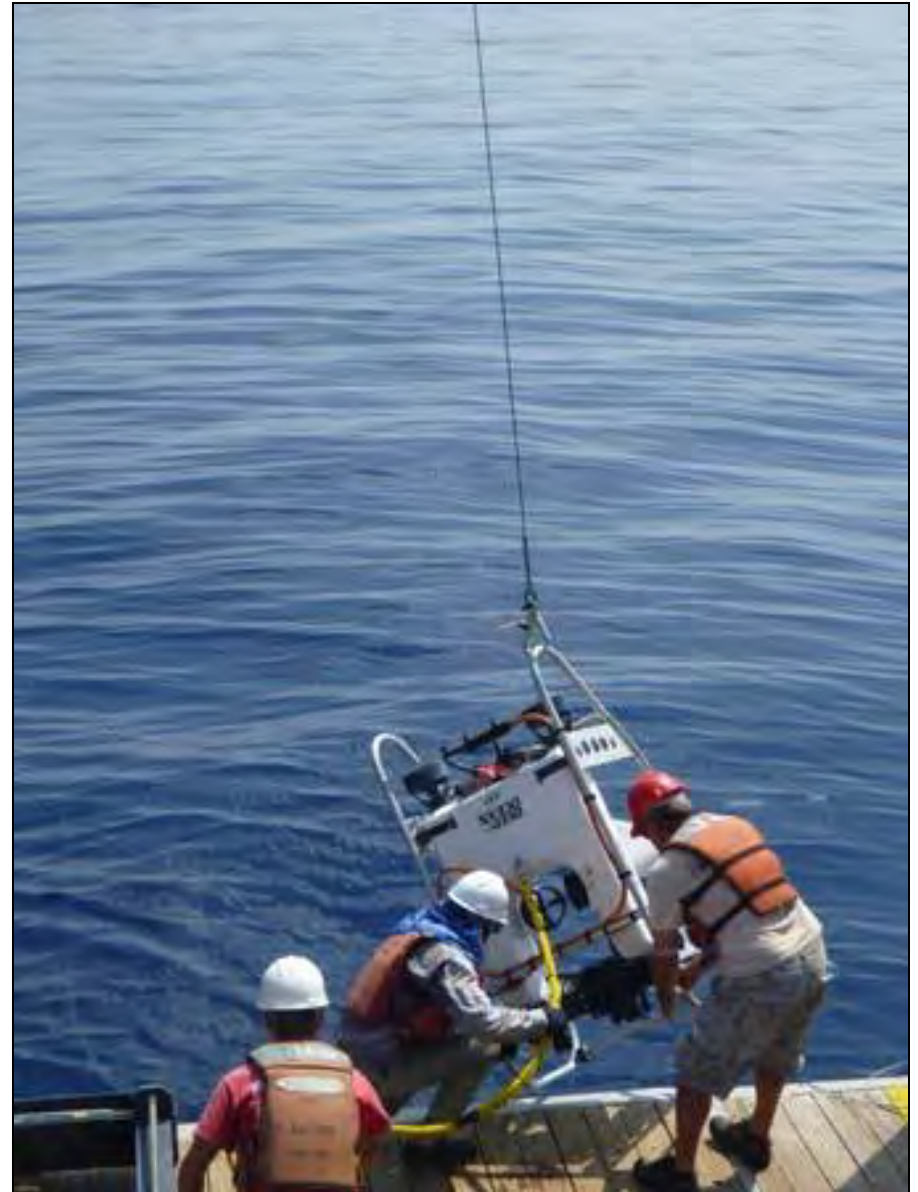
- 201208182 - Transect 001
- 201208182 - Transect 002
- 201208182 - Transect 003
- 201208182 - Transect 004
- 201208182 - Transect 005
- ★ ROV
- Tech Dive
- CTD
- Light Trap
- MOCNESS
- ▲ Physical Oceanographic Buoy
- Drifter
- Random Block
- Pulley Ridge HAPC



0 0.045 0.09 0.18 Nautical Miles

Benthic Surveys

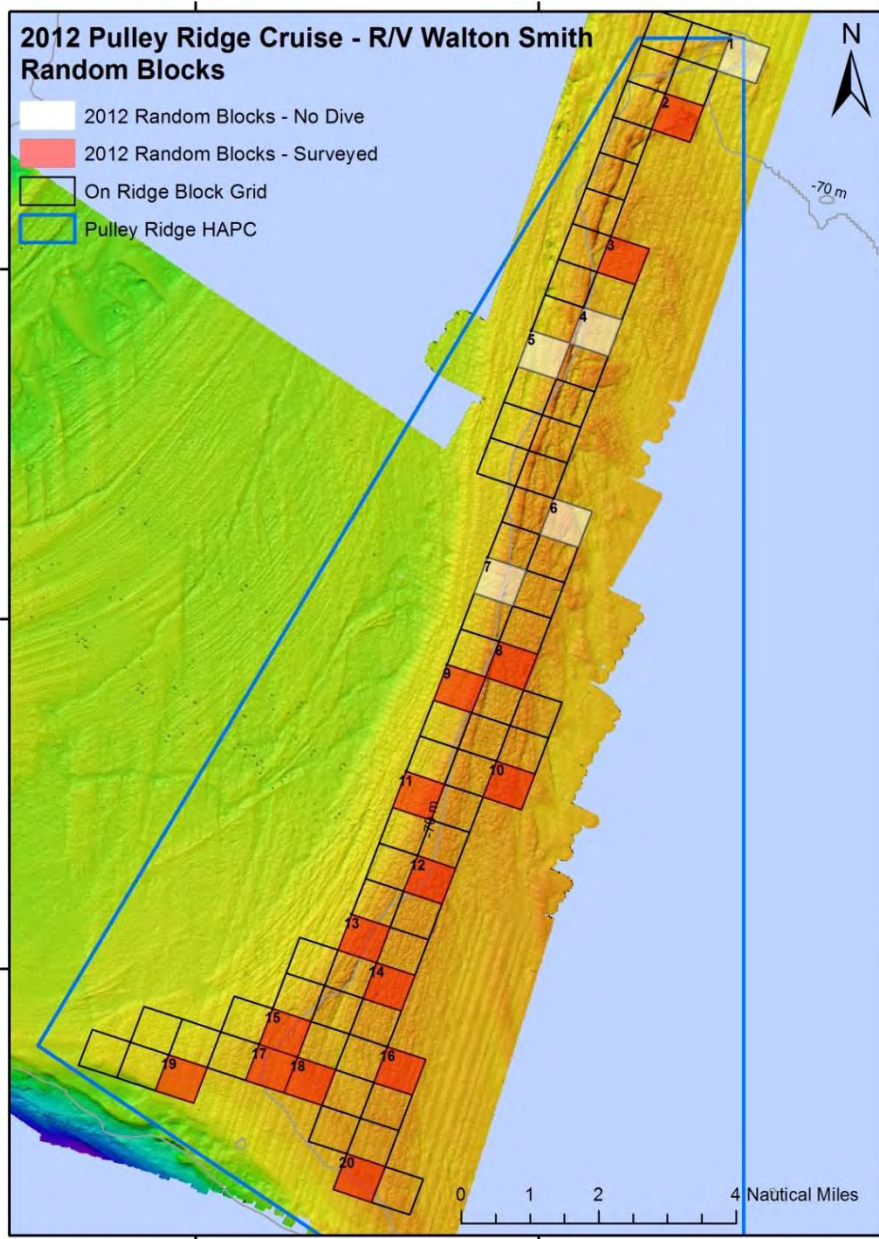
SuperPhantom II ROV (UNCW)



Benthic Surveys



Benthic Surveys



- 2 ROV dives per op day for 7 days, completing 14 of the random boxes
- Within each sampling box (“site”), we conducted five 100-m ROV transects

Benthic Surveys



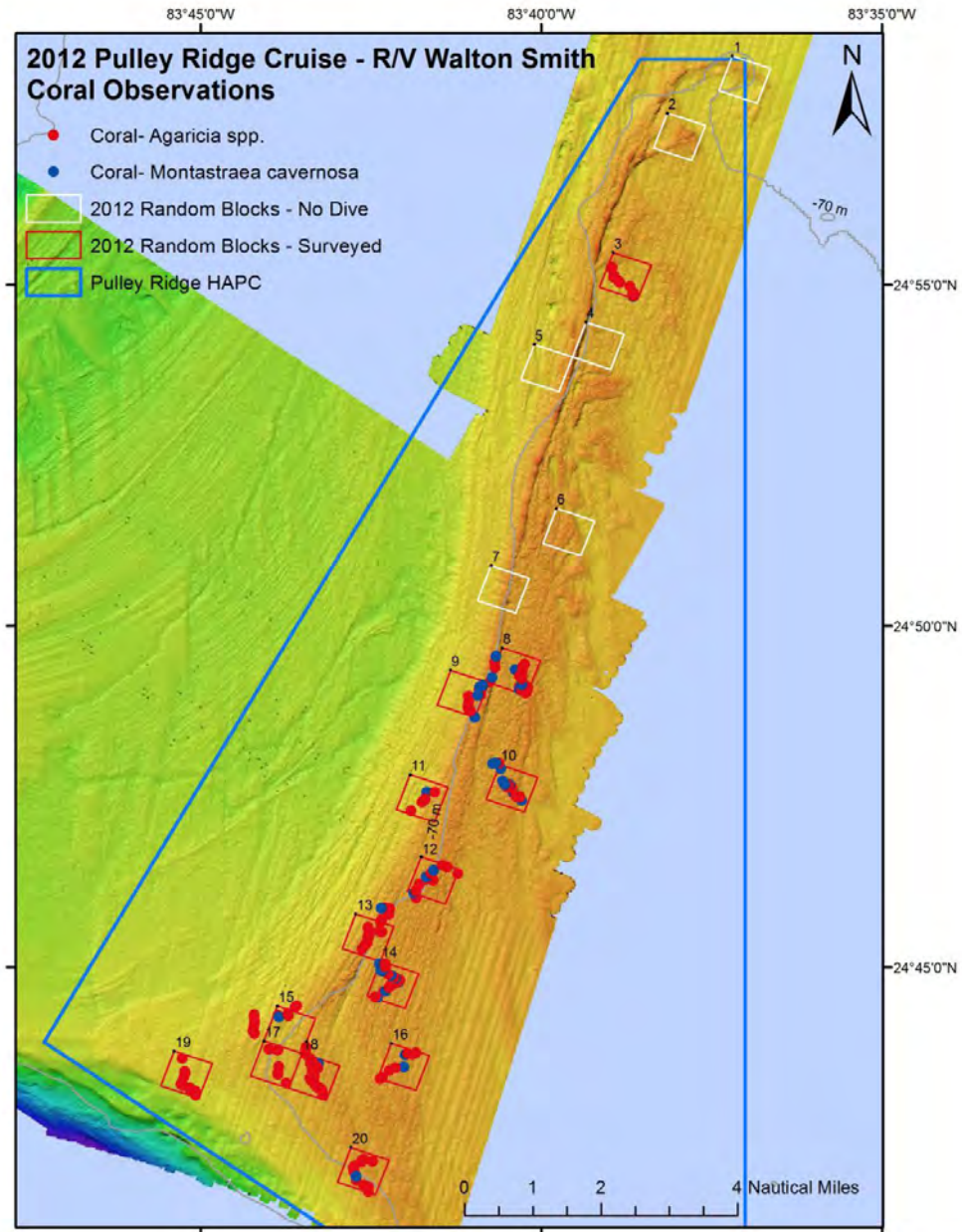
- PR is dominated by macroalgae:
 - *Anadyomene menziesii* (Chlorophyta)
 - Coralline and peyssonnelioid crusts (Rhodophyta)

Benthic Surveys

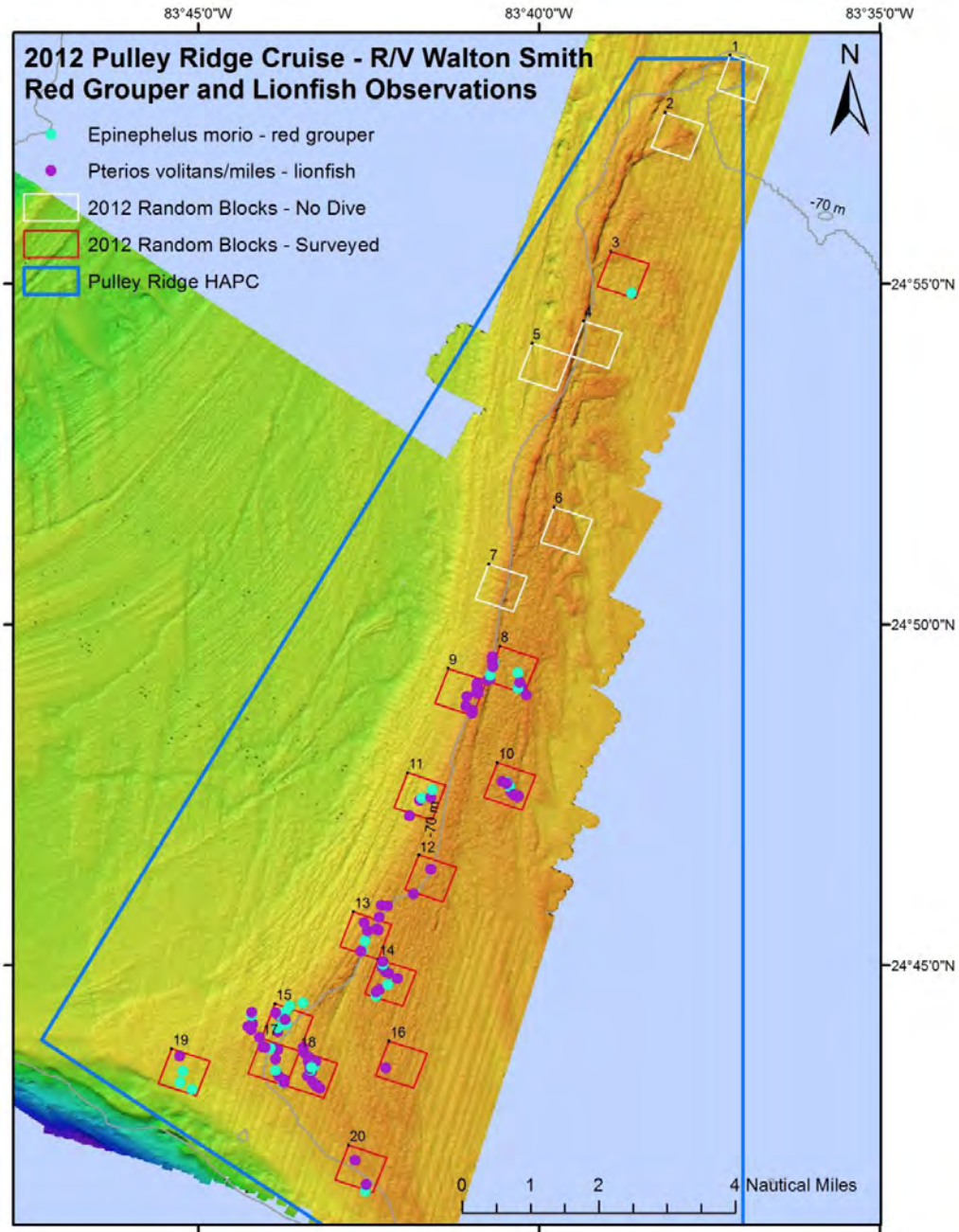


- We saw much more coral than in the 2010 and 2011 FLoSEE Cruises conducted by CIOERT (but nothing near the findings of Jarrett *et al.* 2005)
- Distribution of the corals remains patchy (both among and within boxes)

Corals



Red grouper and Lionfish



Fish Transects



- A large increase in lionfish, since our first report of this exotic species on PR in 2010
- During all 2012 ROV dives, our total lionfish count = 332 individuals

Specimen Collection



Task: Initiate specimen collection by technical diving

Specimen Collection



- 2 tech dives per day for 7 days
- Collections and processing went well, improving as the cruise progressed
- Total benthic samples for target species = 133

Cruise Ended Early: Hurricane Isaac



Questions?

Sundown on Pulley Ridge, 24 August 2012