

Pulley Ridge Habitat and Community Structure



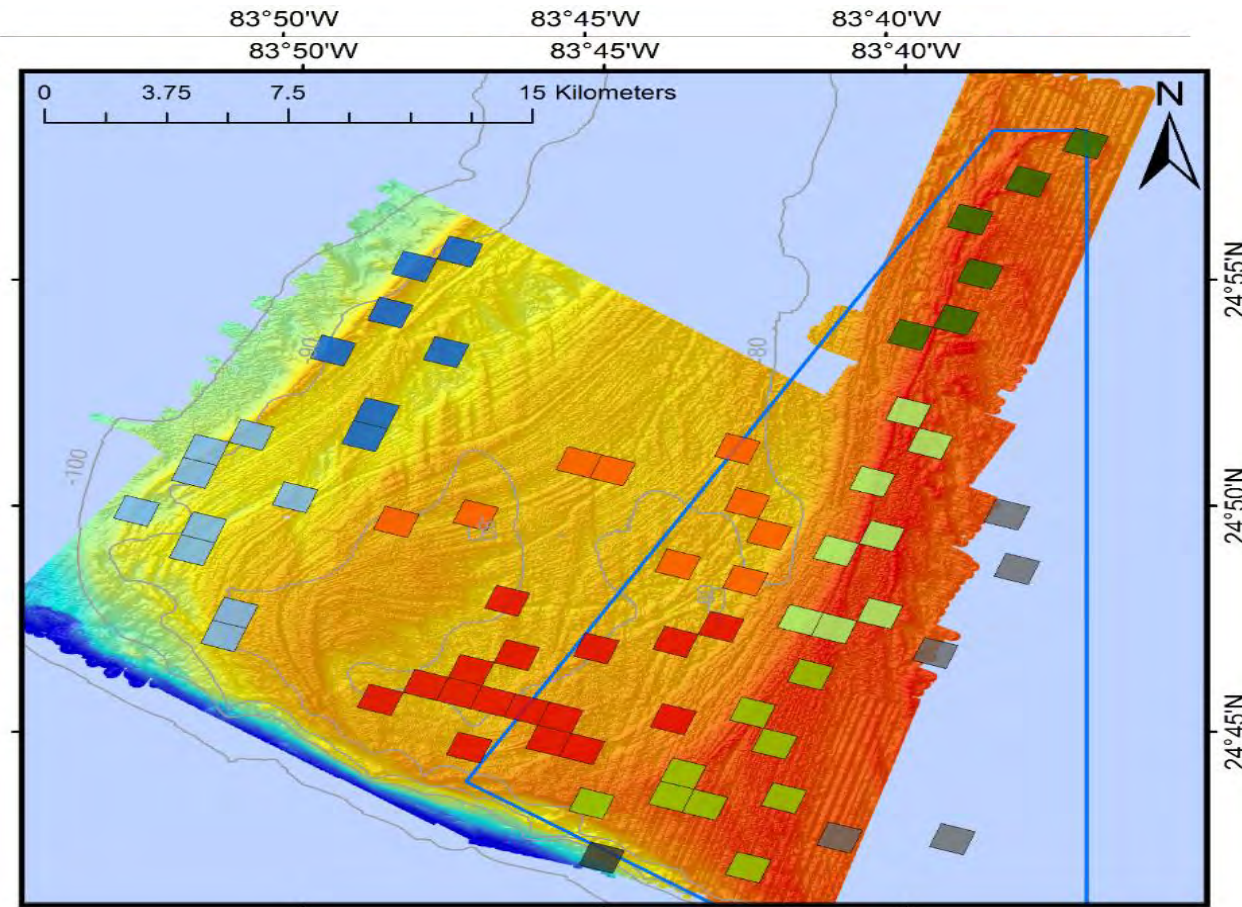
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Purpose

Quantify benthic habitat and benthic community
at Pulley Ridge and the Dry Tortugas deep shelf
(outside the reserve boundaries)





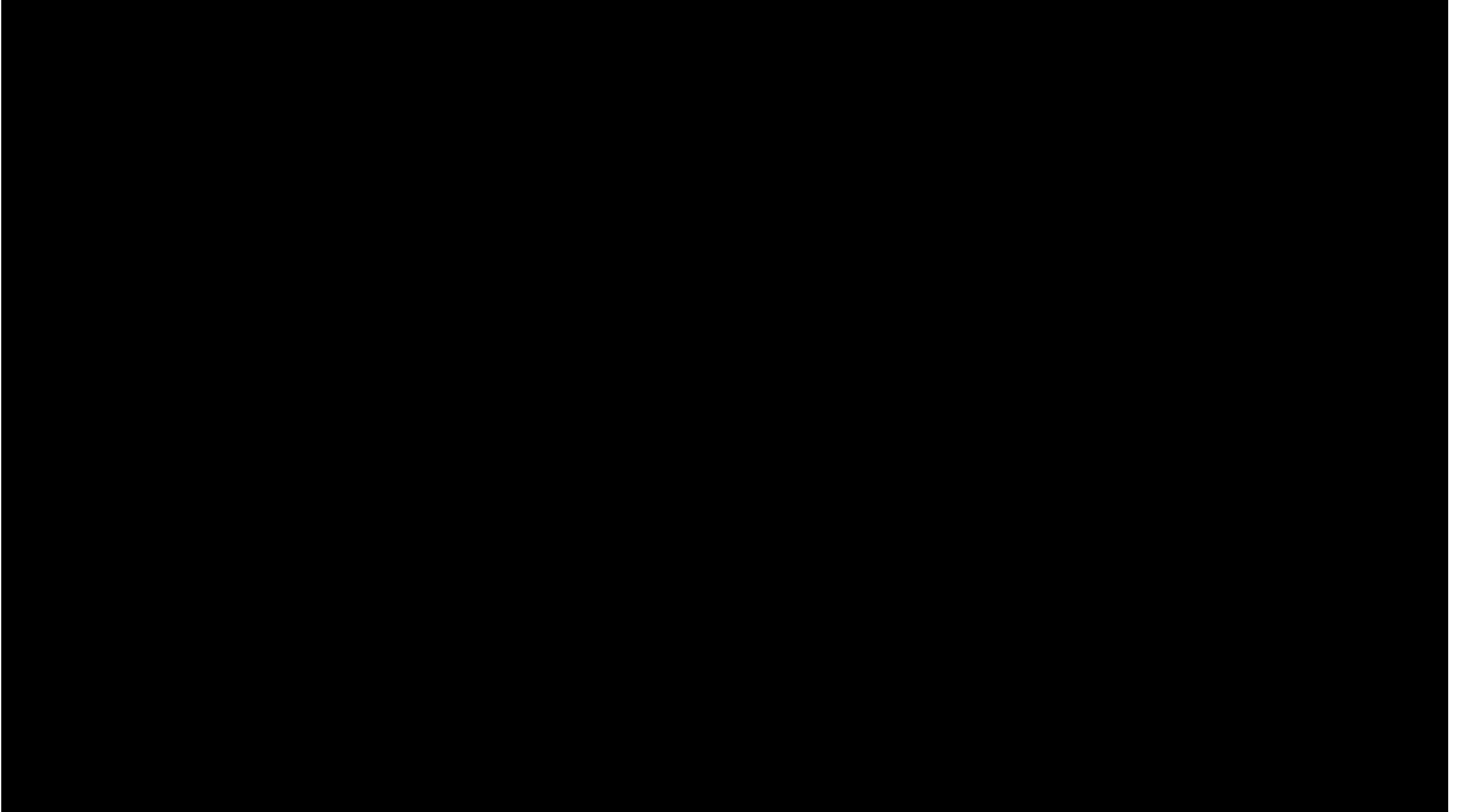
- 9 zones defined
- 91 ROV dives
- PR: 68 1-km² blocks
- TER: 23 1-km² blocks
- Each random block was surveyed with five 100-m ROV transects, taking downward still pictures every ~30 sec
- 17,888 digital photos
- 16,071 photos for quantitative analysis of % cover of habitat and benthic biota
- 237 hours of video for analysis of fish densities

Quantification of Benthic Community

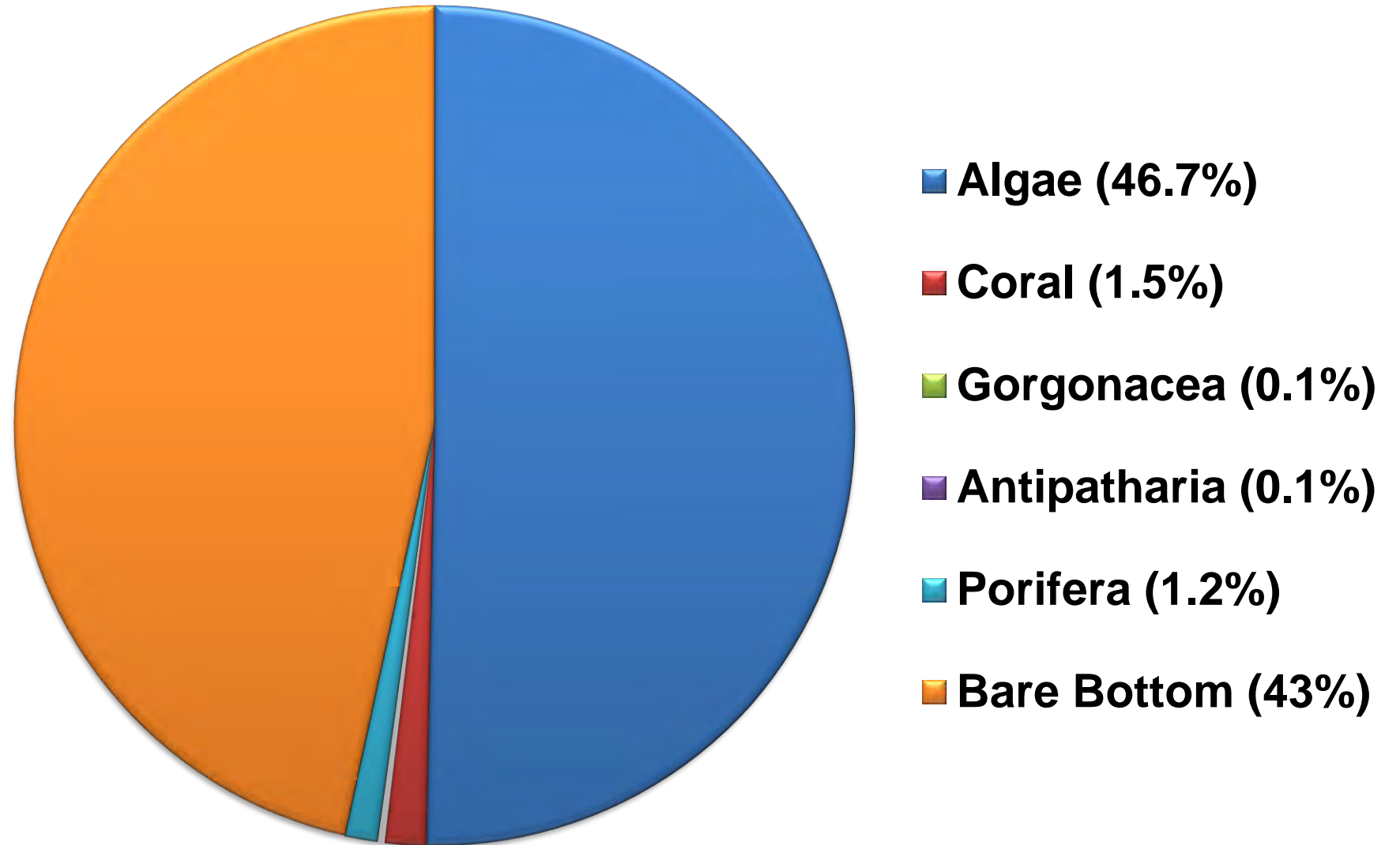


Benthic macrobiota (usually >1 cm) identified to the lowest taxa level possible

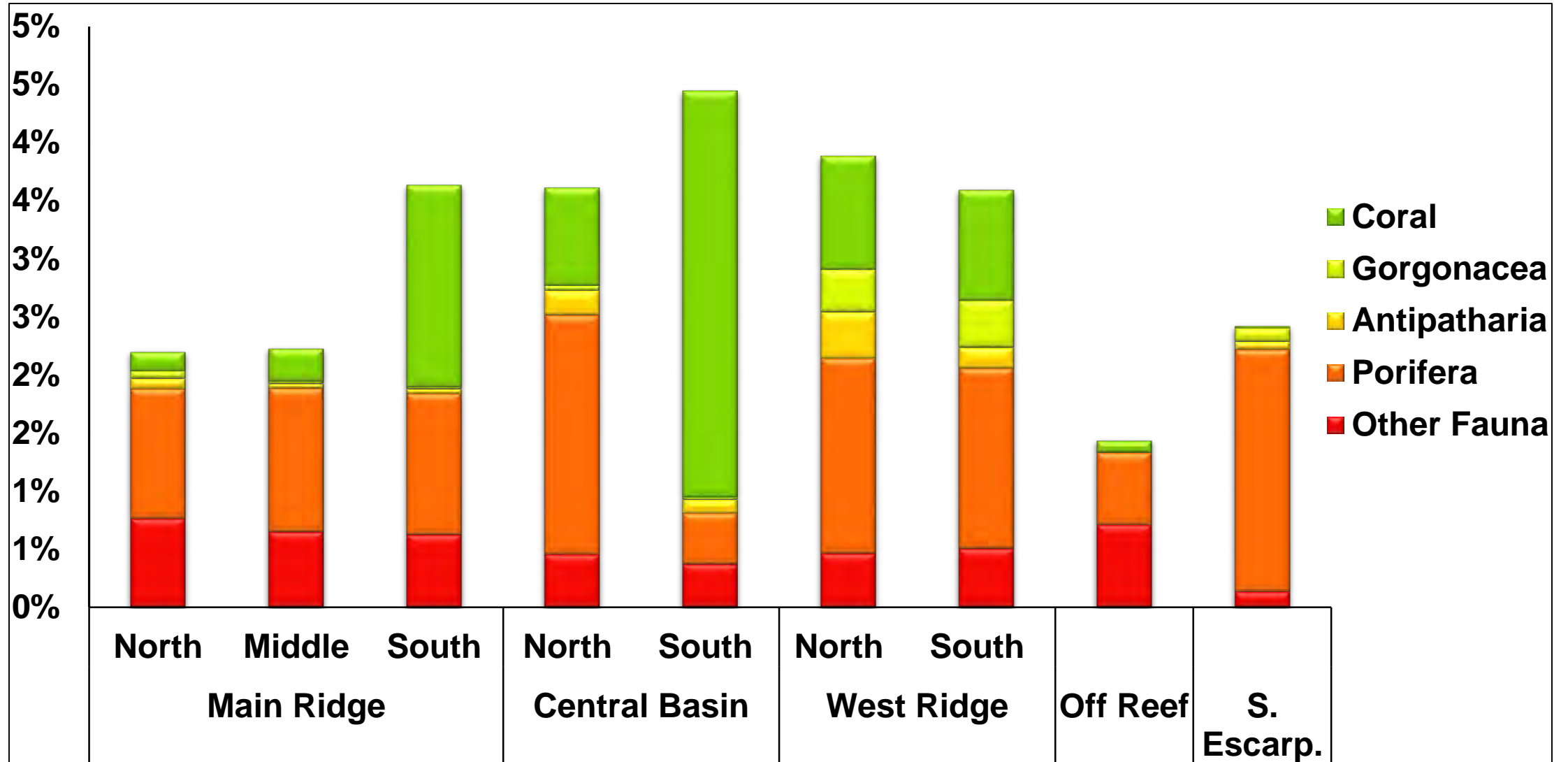
A Short Video



Pulley Ridge: Overall Benthic Biota



Pulley Ridge: Benthic Fauna



Pulley Ridge: Algal Community

- Previous list of known taxa – 27 species (Hine et al. 2008)
- Examination of all previous samples and photosamples reveals at least 95 species:
 - Rhodophyta – 60
 - Chlorophyta – 25
 - Ochrophyta – 10
- The average benthic macroalgae cover = 47%
 - 35% of this is red algae
- Red algae dominated by crustose coralline algae (29% average cover)
- Green algae more common on Main Ridge, the shallowest region, than the other areas
 - *Anadyomene menziesii*, unique to Pulley Ridge, was the most common green alga (average 8%)



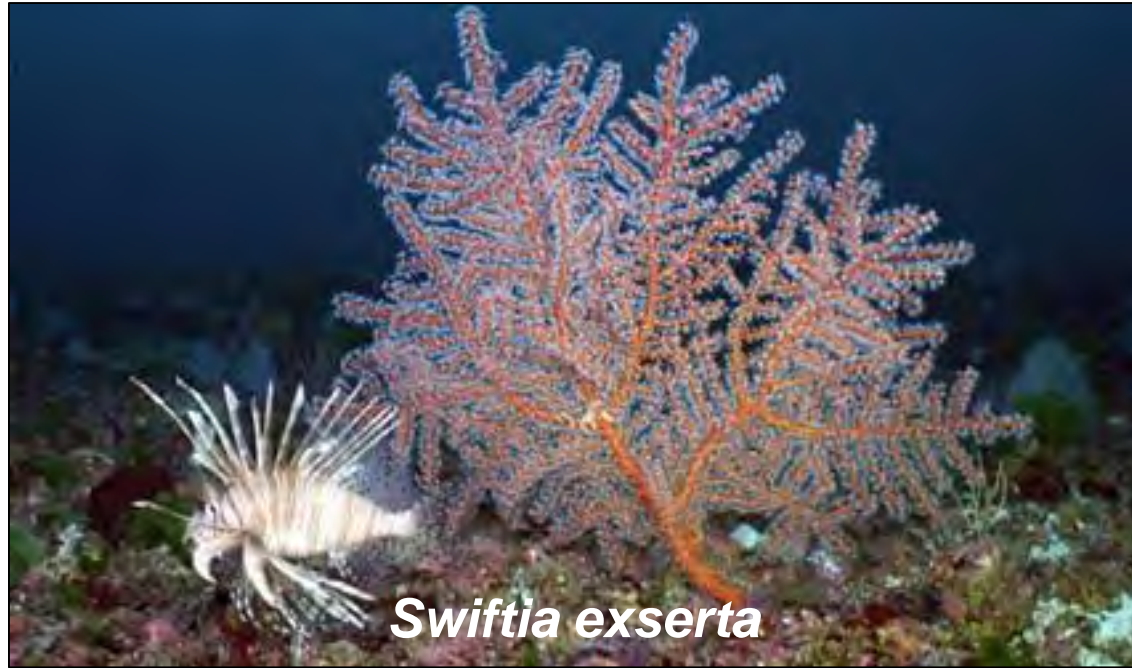
Hard Corals – 16 species

- The average hard coral cover is 1.5%
 - Agariciidae plate corals (*Agaricia* spp. and *H. cucullata*) – 0.9%
 - *Madracis* spp. – 0.5%
 - *Montastrea cavernosa* – 0.01%
- Coral cover on the Main Ridge within the HAPC averaged 0.9%
- Coral cover was highest in the Central Basin outside of the HAPC (average = 2.5%)



Other Invertebrates

Gorgonian octocorals – 15 species



Sponges – 102 species



Fish Community (86 species)

- Most abundant species:
 - Grunts (Haemulidae)
 - Striped Grunt (*Haemulon striatum*)
 - School Bass (*Schultzea beta*)
 - Cardinal Fish (*Apogon* spp.)
 - Purple Reeffish (*Chromis scotti*)



Striped Grunt
(*Haemulon striatum*)



School Bass
(*Schultzea beta*)



Cardinalfish
(*Apogon* sp.)

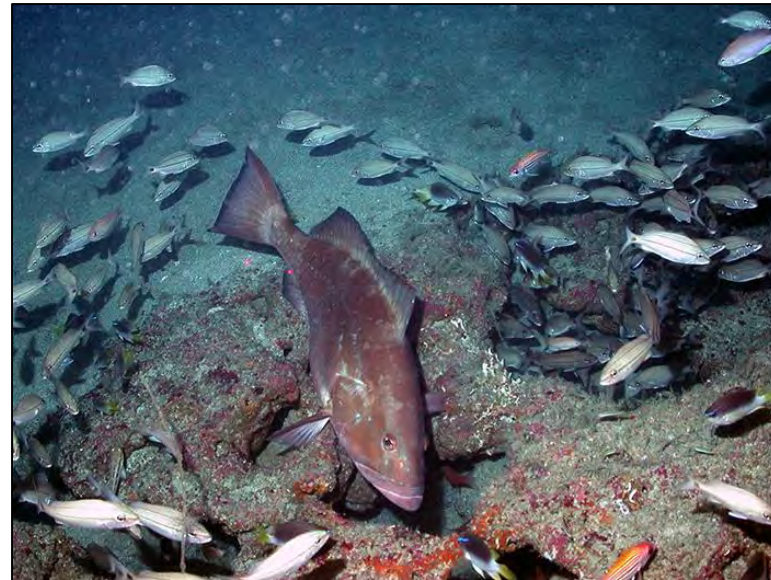


Purple Reeffish
(*Chromis scotti*)

Red Grouper & Lionfish

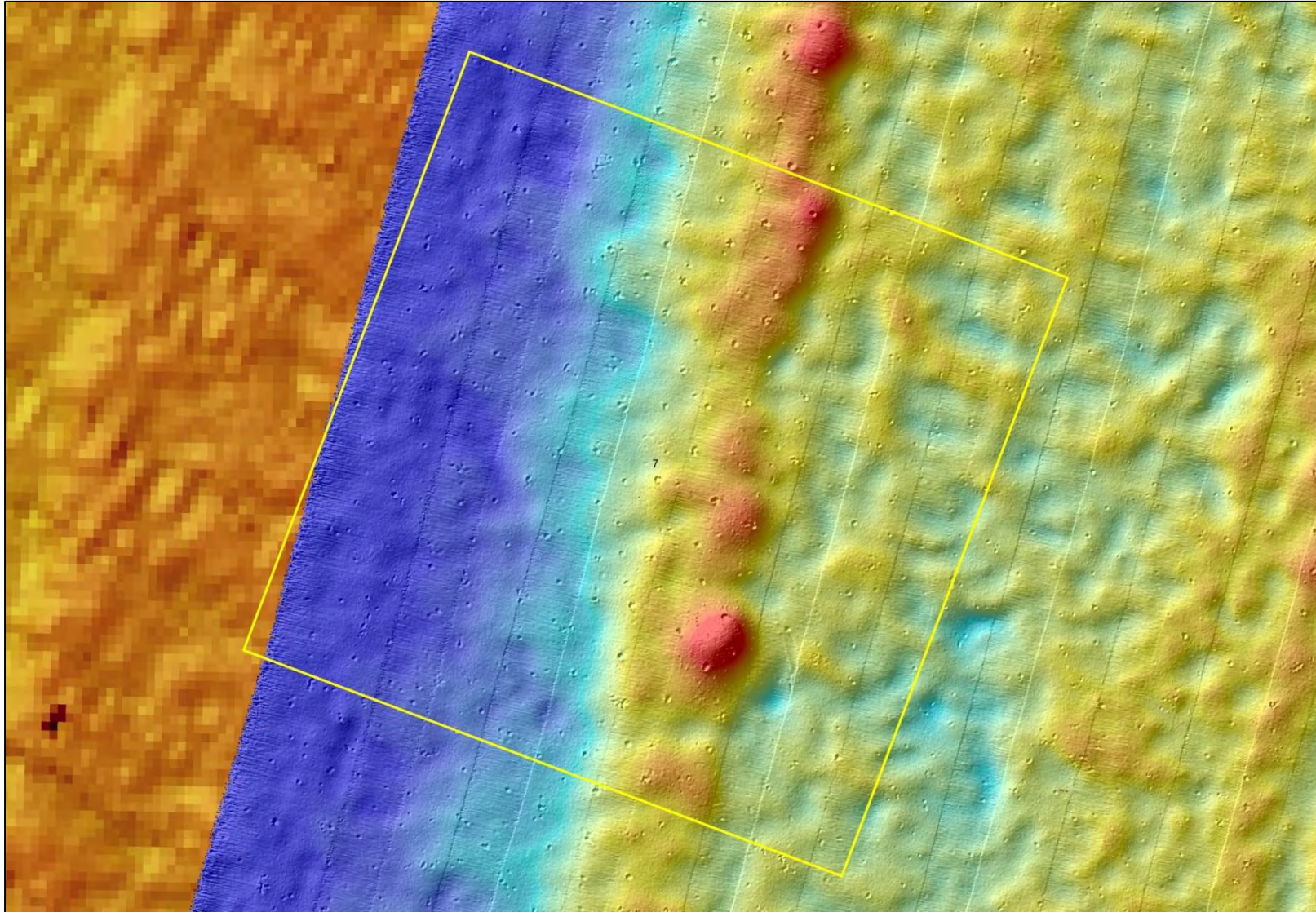


Epinephelus morio (Red Grouper)



Pterois (Lionfish)

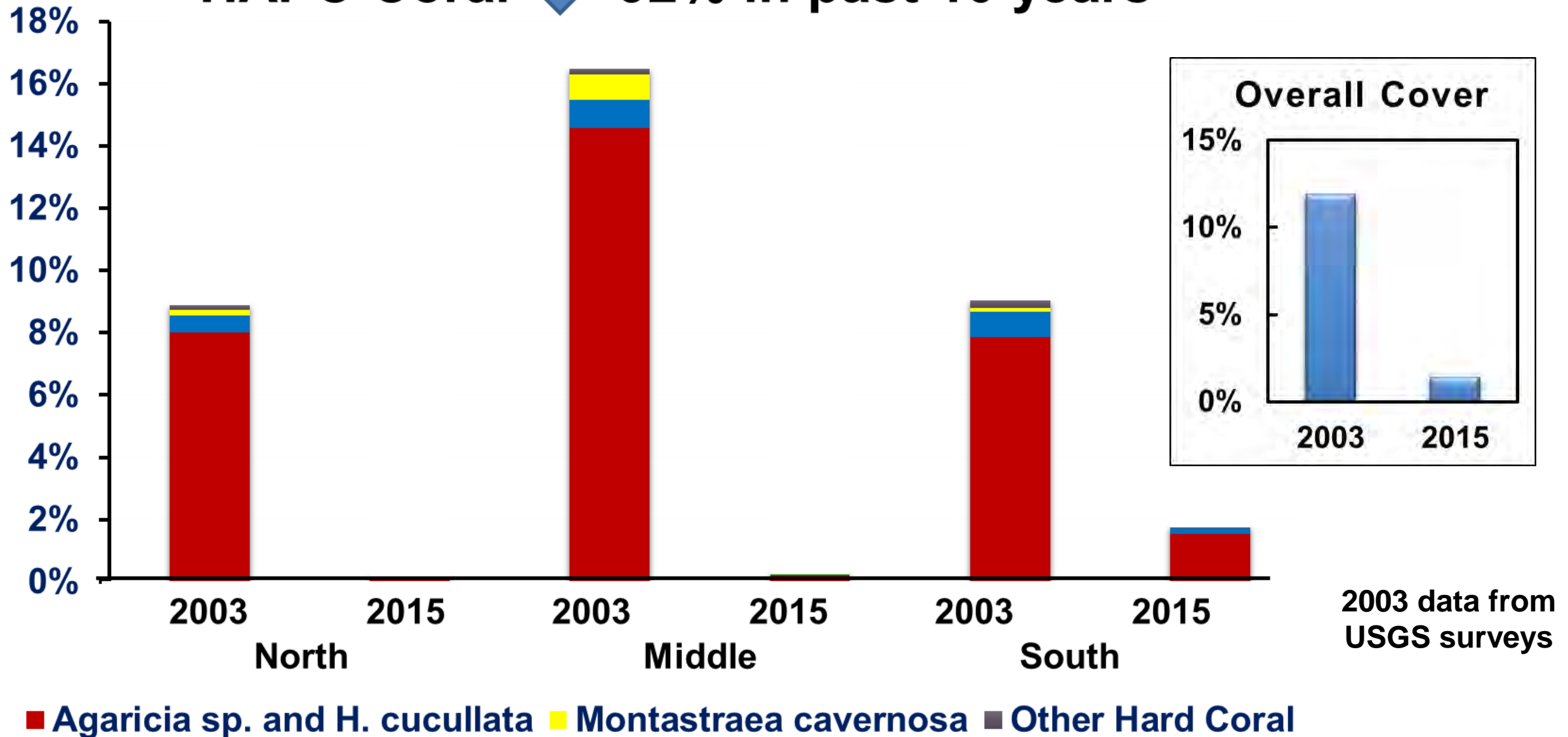
Multibeam Sonar Map Showing Red Grouper Burrows (10-m diameter) at Pulley Ridge HAPC



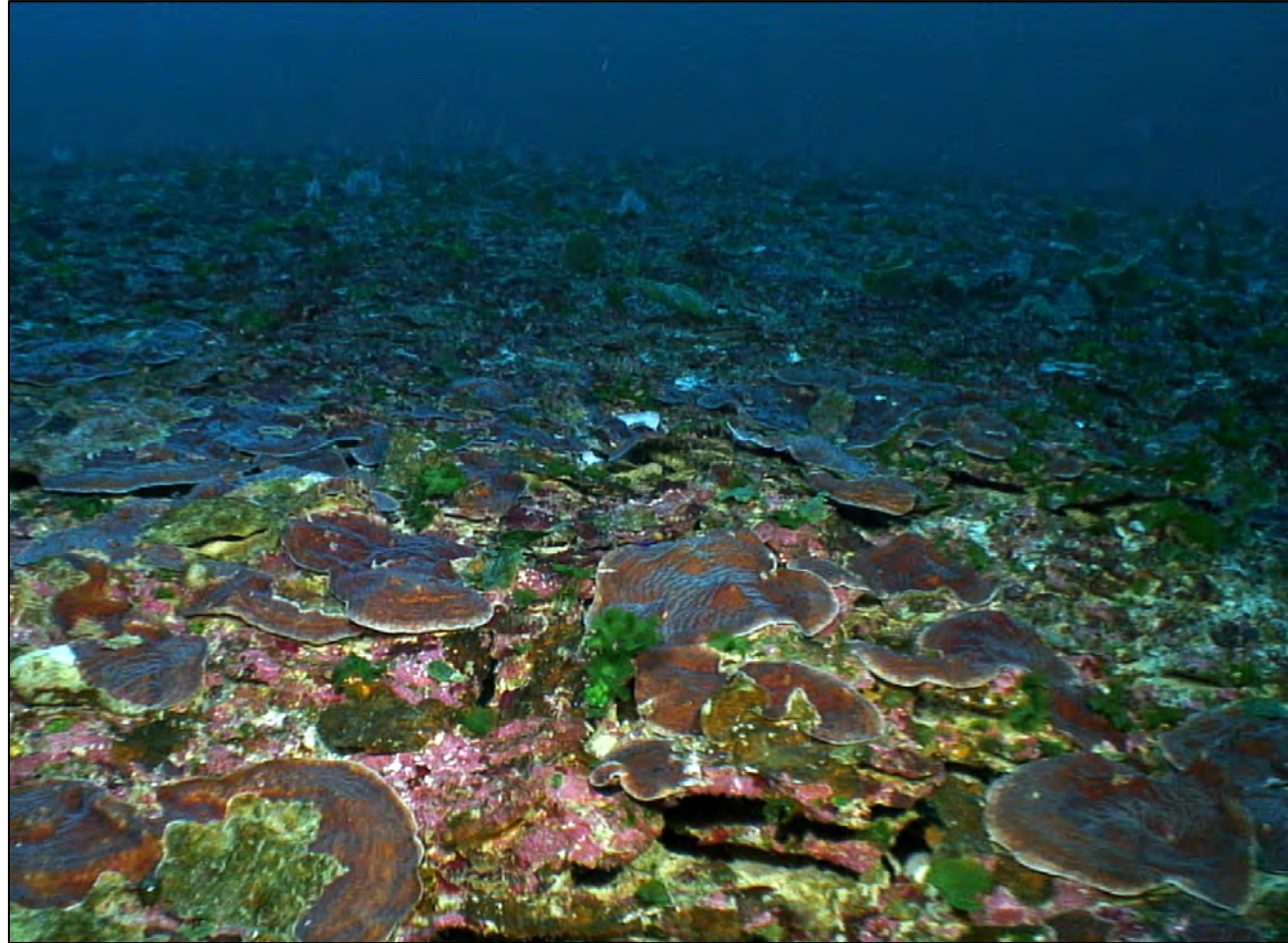
Estimated Number of Grouper
Burrows = 155,490

Pulley Ridge – What We Know Now

HAPC Coral ↓ **92% in past 10 years**



But there is good news in the Central Basin!

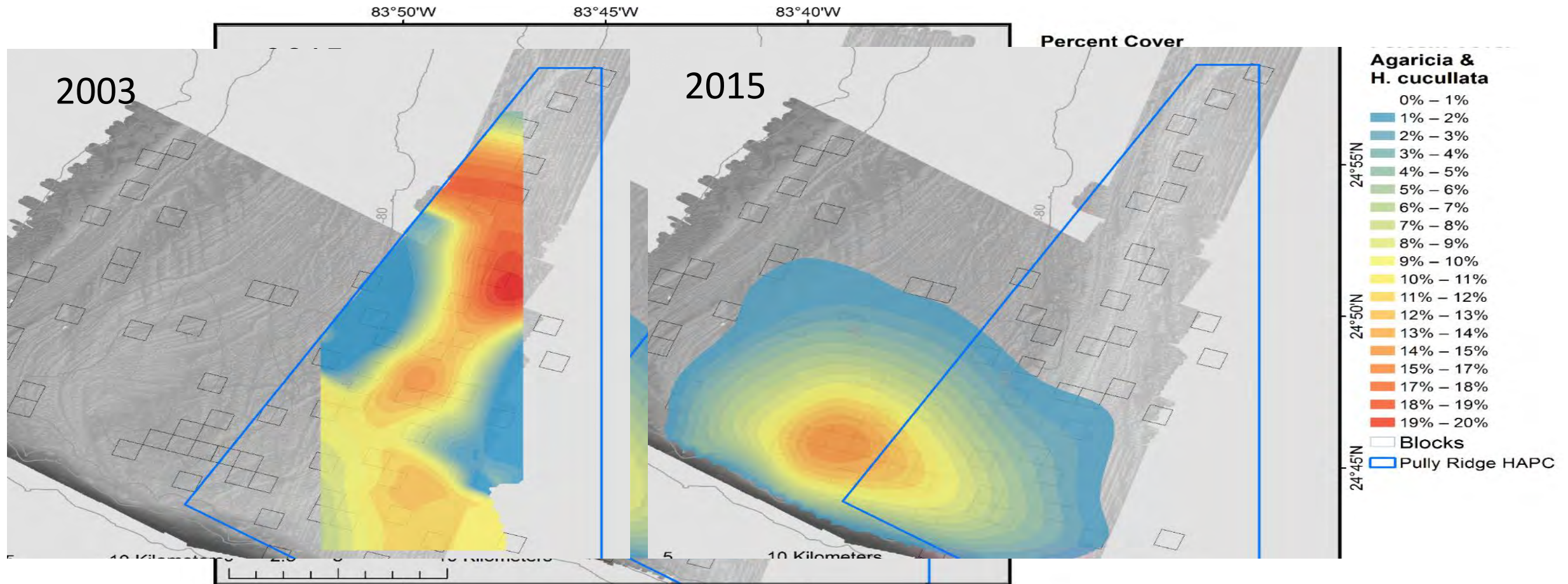


In 2014 and 2015, we discovered vast fields of plate coral – outside of the Pulley Ridge protected area!

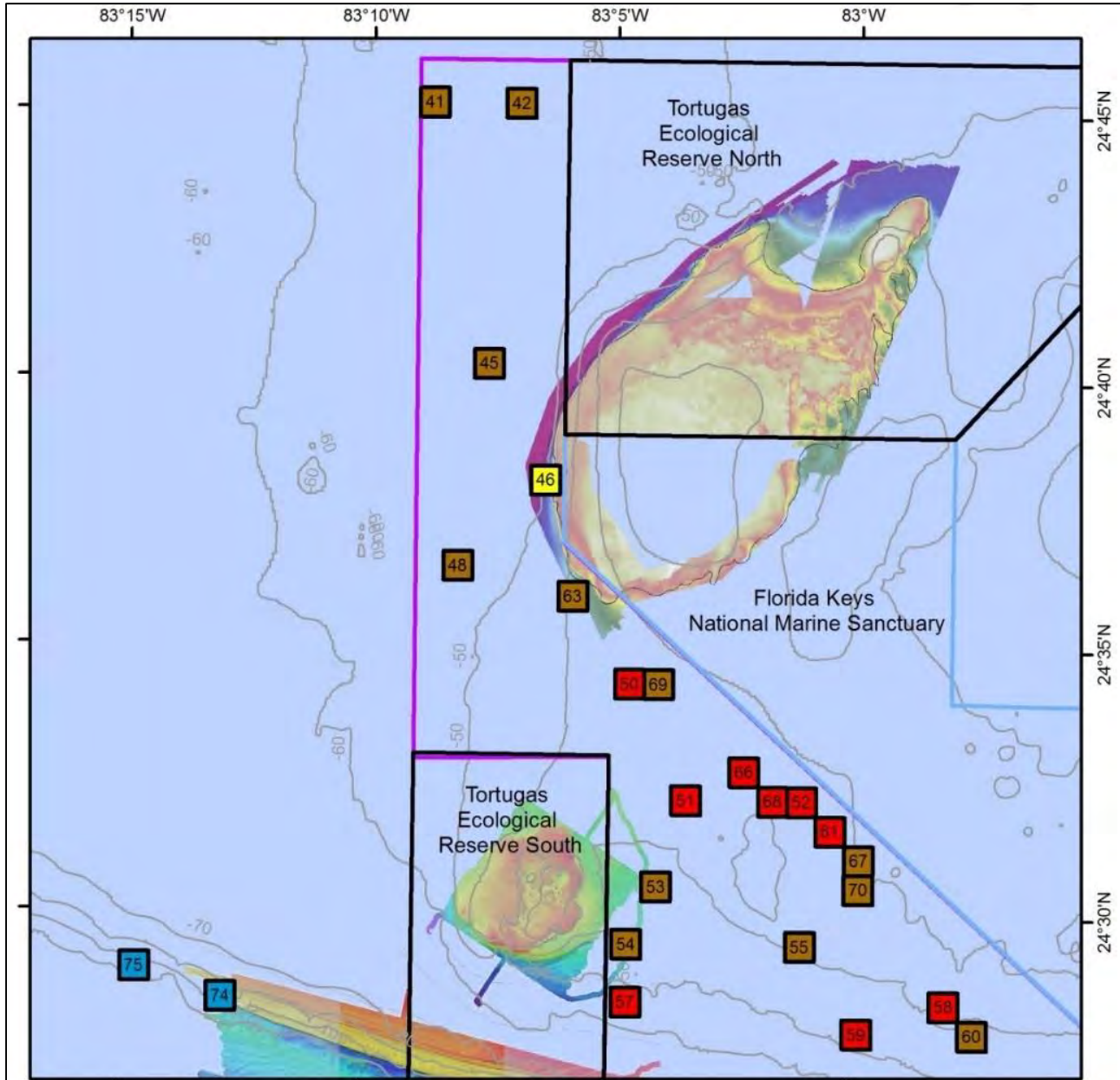


Agaricia plate corals extended tens of meters in diameter outside of the HAPC.
Coral densities averaged 17 colonies/m² (ranging from 3-77 colonies/m²)

Coral: % Cover Over Time



Dry Tortugas – 2013-2014 Sites



Surveyed 23 1-km² random blocks adjacent to Tortugas Ecological Reserves (TER) using ROV.

The Pulley Ridge sites were primarily at deep mesophotic depths (59-94 m), whereas the patch reefs and fringing reef sites at the Tortugas were comparatively shallow (23-55 m)

Dry Tortugas: Hard Corals – 19 species

- The average hard coral cover (all sites) was 1.3%
- Hard coral cover was highest on the fringing reefs (4%)
- Assemblage of typical Florida Keys species
- Most abundant coral is *Montastrea cavernosa*

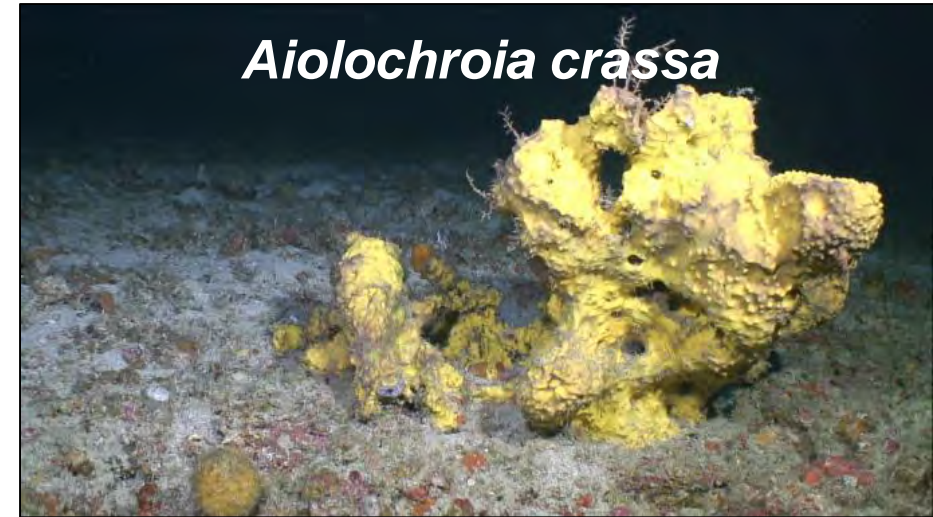


Dry Tortugas: Other Invertebrates

Gorgonian octocorals – 16 species



Sponges – 57 species



Fish Community (96 Species)

- Most abundant
 - Yellowtail Reeffish (*Chromis enchrysurus*)
 - Bicolor Damselfish (*Stegastes partitus*)
 - Purple Reeffish (*Chromis scotti*)
- 17 managed species; most abundant:
 - Yellowtail Snapper (*Ocyurus chrysurus*)
 - Dog Snapper (*Lutjanus jocu*)
 - White Grunt (*Haemulon plumieri*)

Lionfish are much less abundant in the Tortugas:

- 1,814 were observed at Pulley Ridge vs. 71 at Dry Tortugas



Yellowtail Reeffish
(*Chromis enchrysurus*)



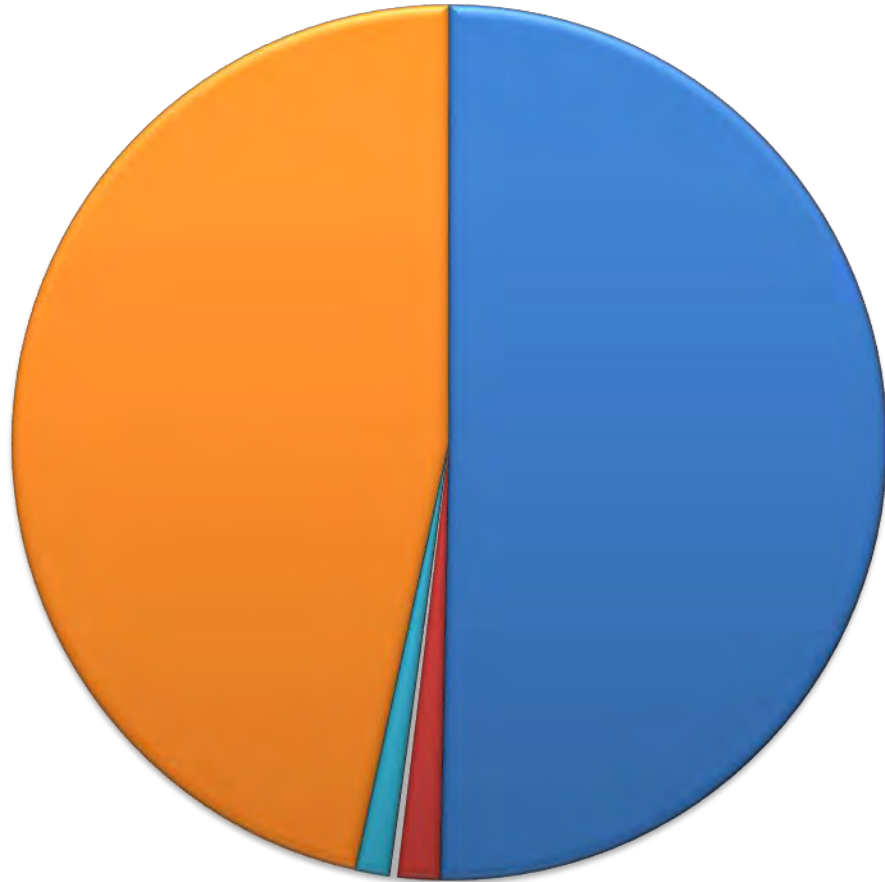
Bicolor Damselfish (*Stegastes partitus*)



Purple Reefis (*Chromis scotti*)

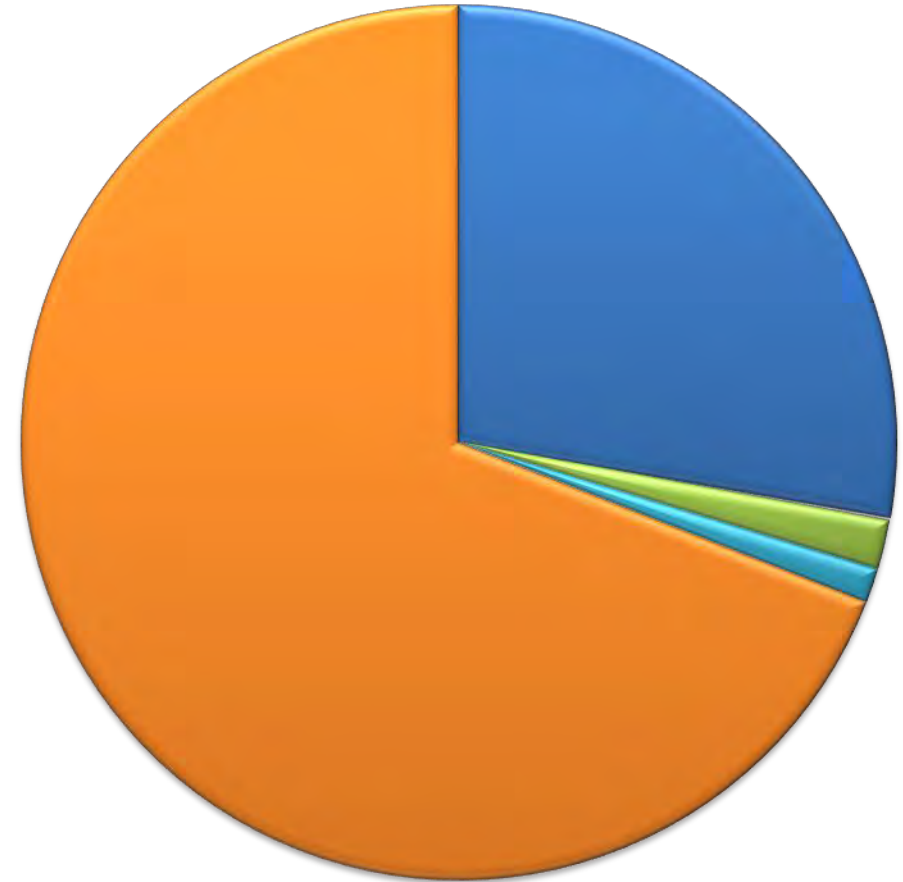
Pulley Ridge vs. Dry Tortugas – Percent Cover

Pulley Ridge



■ Algae (46.7%)
■ Gorgonacea (0.1%)
■ Porifera (1.2%)
■ Coral (1.5%)
■ Antipatharia (0.1%)
■ Bare Bottom (43%)

Tortugas



■ Algae (26.0%)
■ Gorgonacea (1.7%)
■ Porifera (1.2%)
■ Coral (0.1%)
■ Antipatharia (0%)
■ Bare Bottom (64.5%)

Acknowledgements



- Taxonomy:
 - Porifera: C. Diaz, S. Pomponi, P. Cardenas
 - Cnidaria: S. Cairns, P. Etnoyer, C. Messing, J. Voss, M. Nuttall, D. Opresko, C. Moura, R. Turner, J. Thoma, J. Lang
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