The Shallow-Water Habitats of the Florida Keys National Marine Sanctuary: Their Ecological Importance and Sponge Restoration Efforts

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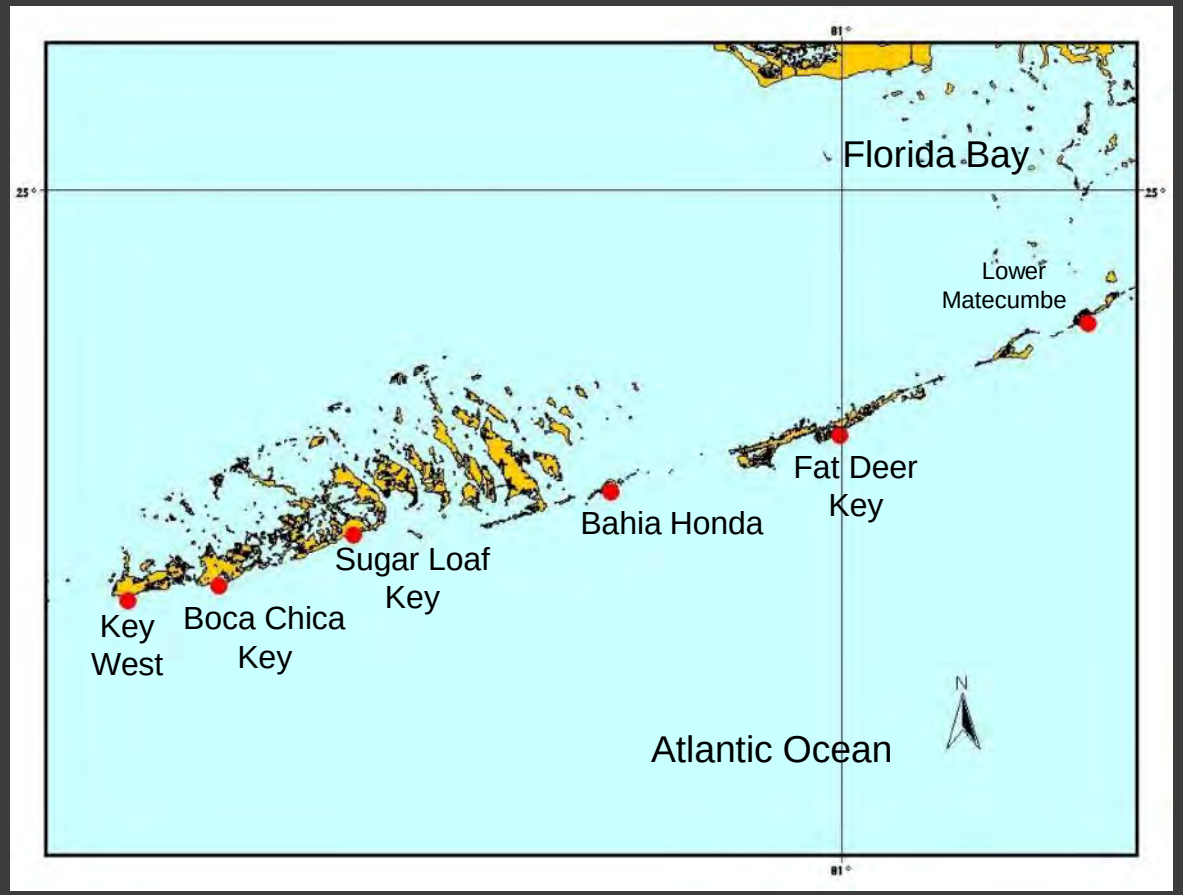
Overview

- Shallow water within FKNMS composed of different habitats important to fish and invertebrates many of which are commercially and recreationally valuable
- Habitat types include beaches, seagrass beds and nearshore hardbottom
- Talk will highlight the ecological importance of these habitats

Oceanside Beaches

Sand Habitat

Location of the beachside sampling sites in the lower and middle Florida Keys Sites were sampled from July 1994 to July 1997



Beaches are an important settlement habitat, 120 species including bonefish, snappers, & permit

Three species groups

Summer-recruiting species: snappers, grunts, & mojarras

Winter-recruiting species: bonefish, mullets, & drums

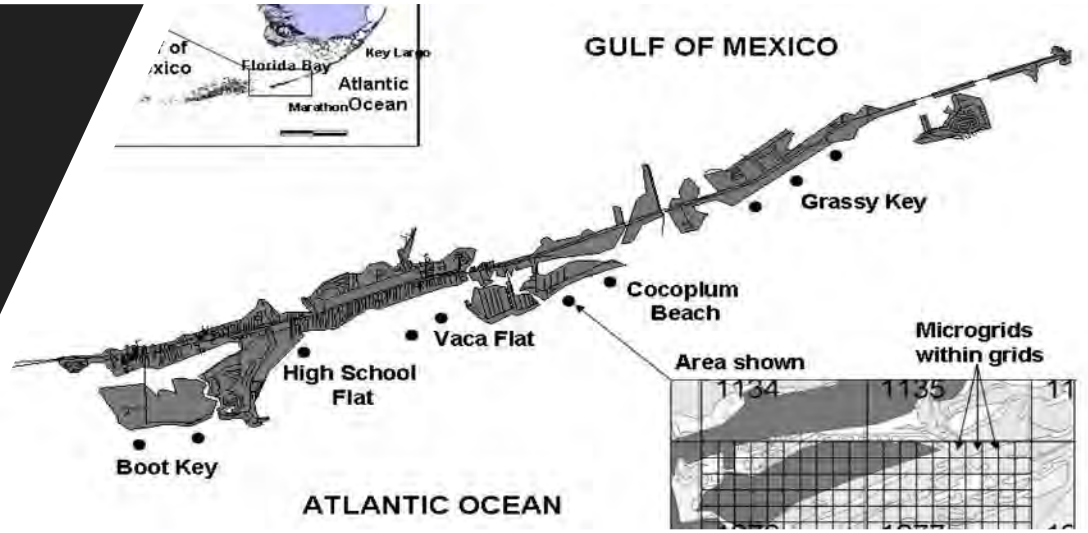
Nearshore pelagics: anchovies & herrings

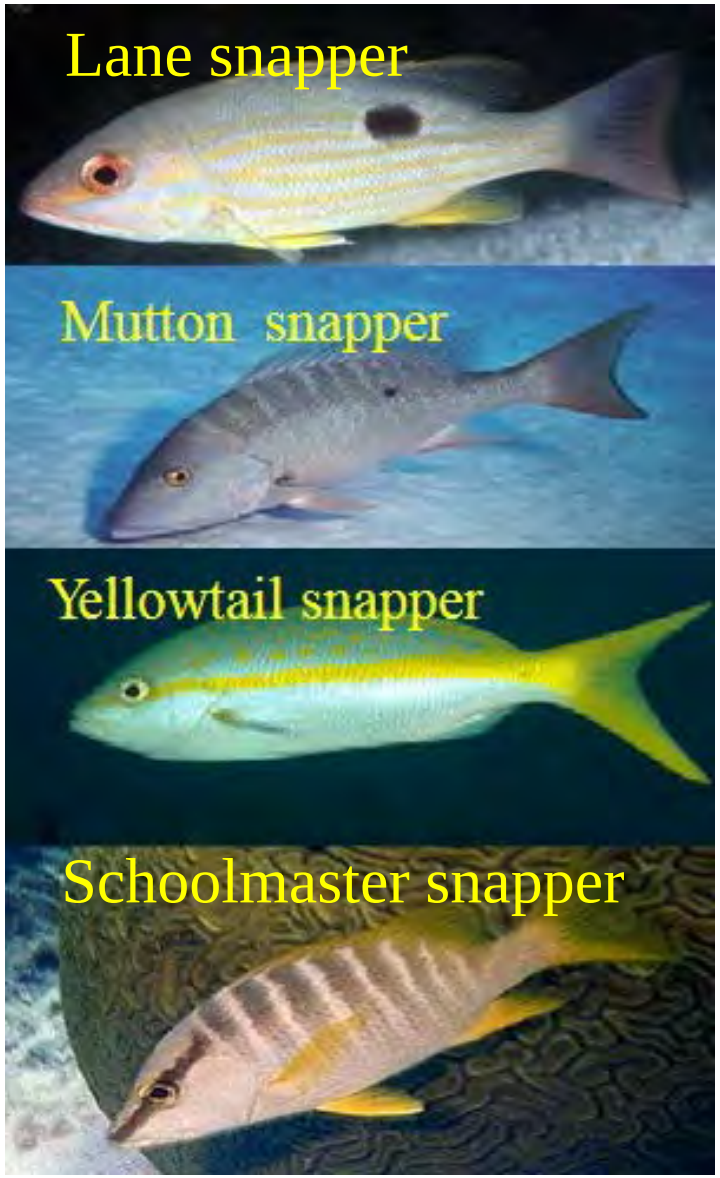
Snodgrass, D and C. W. Harnden. 2009. Composition of Fish Species on Ocean-side Beach Habitats in the Florida Keys. Florida Scientist. Vol 72 #2 147-152

Beach-Side Seagrass Beds

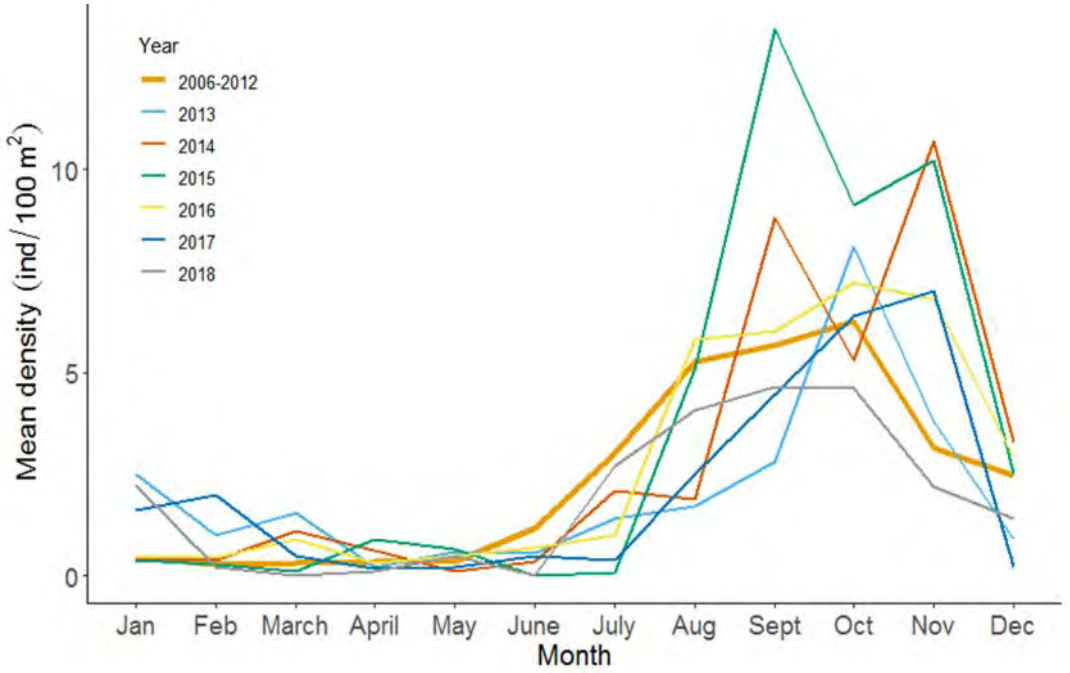
Seining in Nearshore Seagrass Beds of the Middle Florida Keys

- Monthly since 2006
- Determine abundance & distribution of settlement-stage and juvenile snappers in shallow, nearshore seagrass beds in the middle Florida Keys



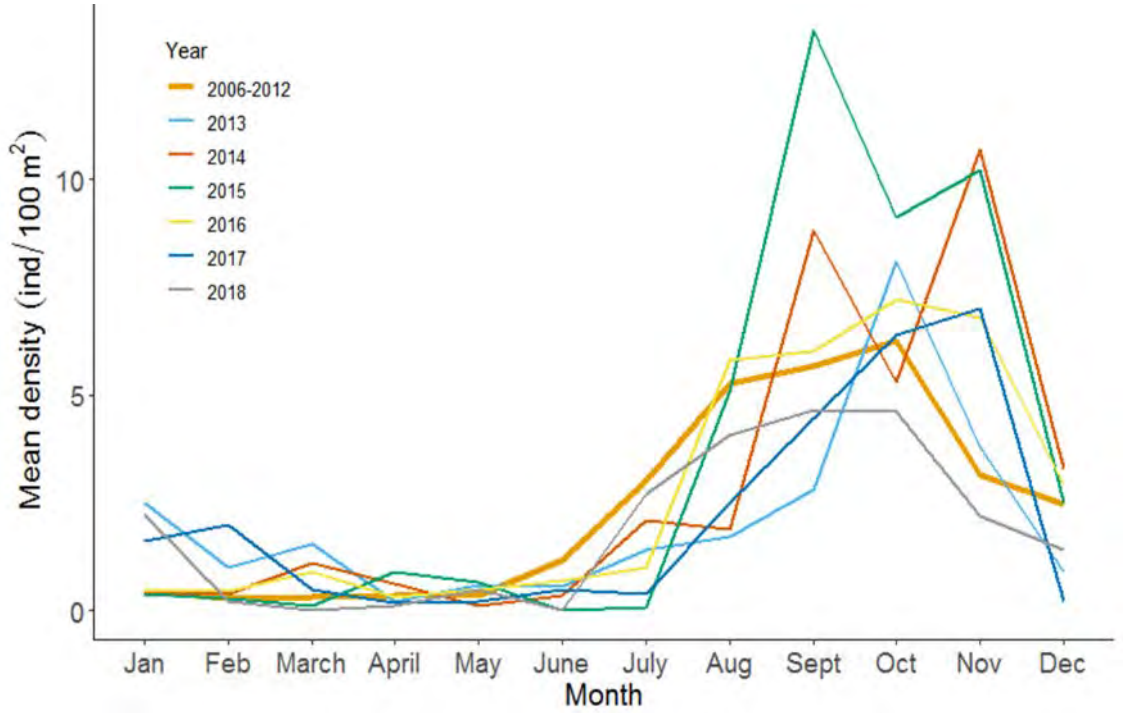


Snappers



Recruitment pulses for young-of-the-year snappers peak in late summer/fall, after the spawning season in spring and early summer

Grunts

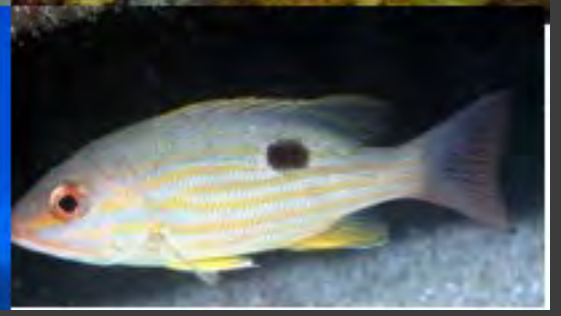


Highest young-of-the-year densities observed during the fall following the peak spawning season (April-Jun)

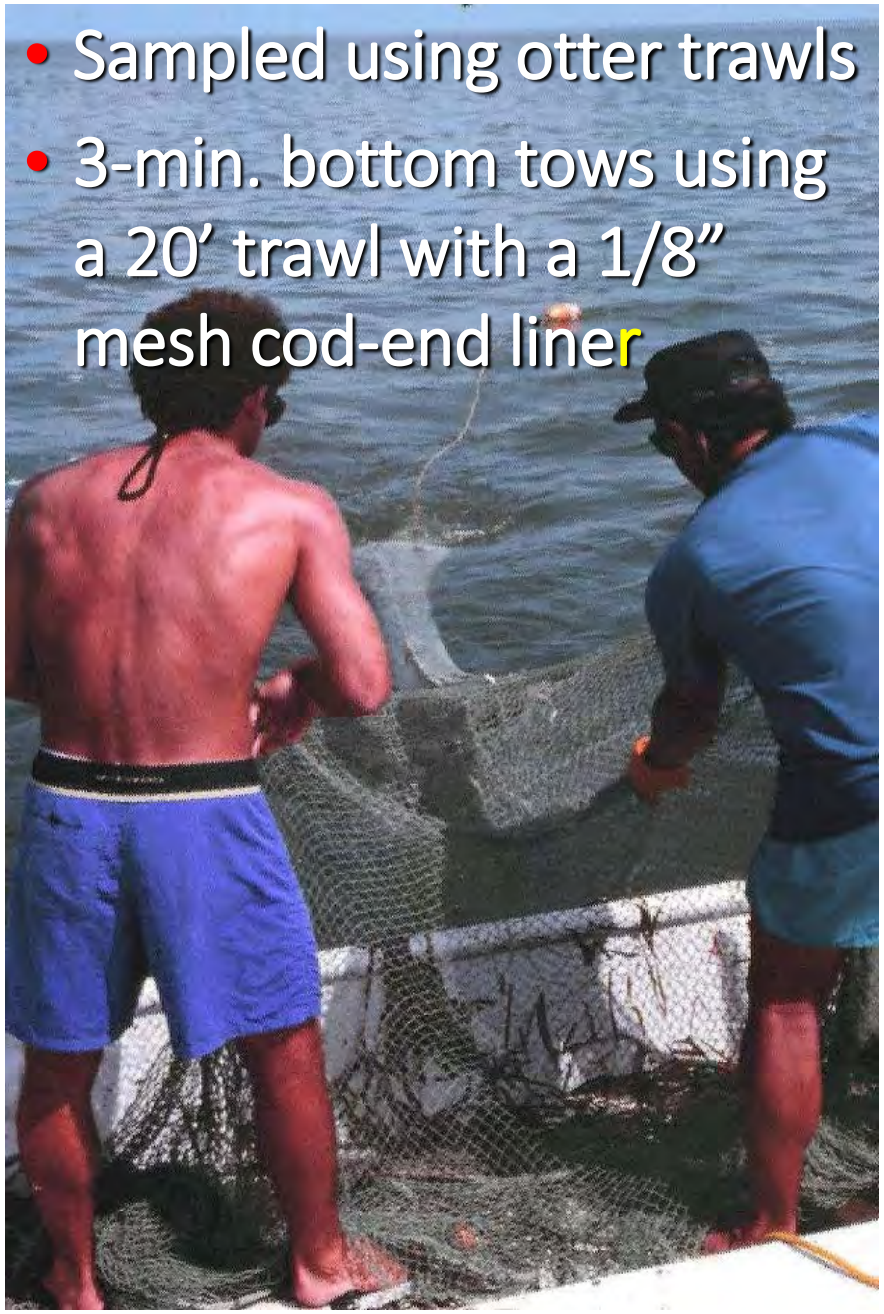

Near-Shore
Seagrass
Beds Are
Diverse!

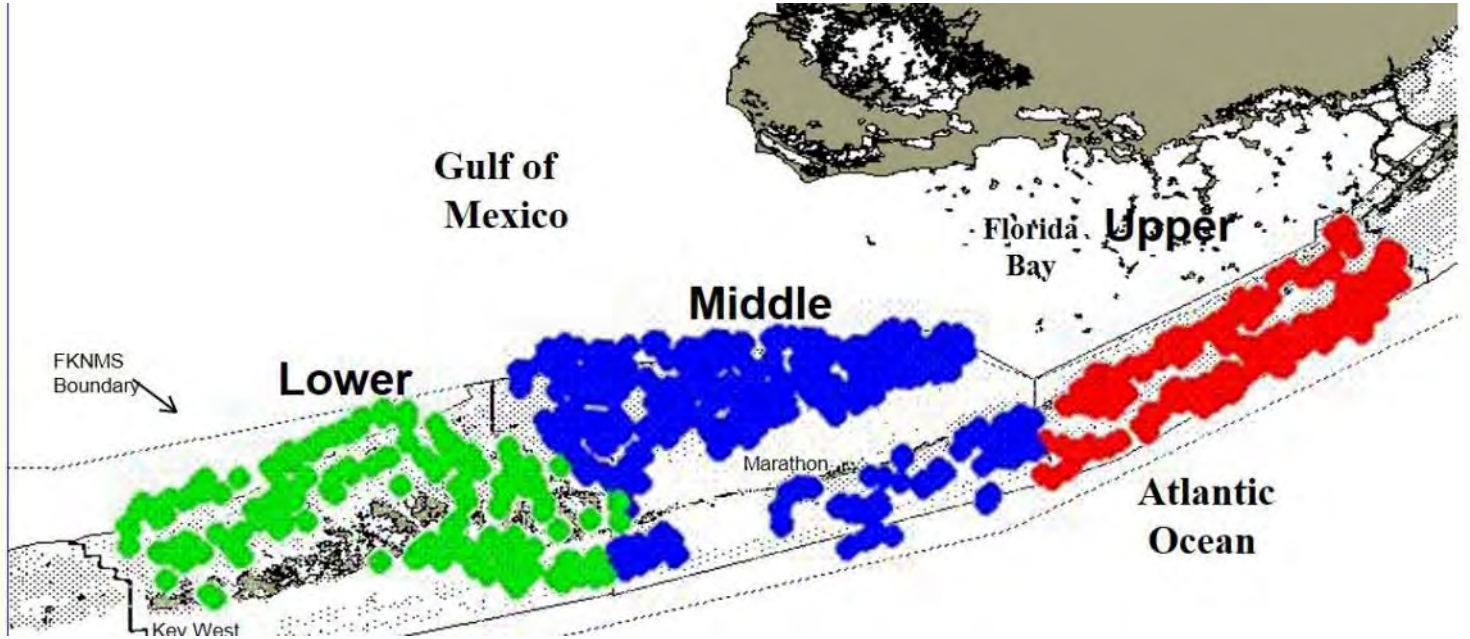
- Noticeable shift in density among several species
- Permit & Bonefish more commonly in sand
- Snapper & Grunts more commonly in seagrass

SPECIES	TOTAL DENSITY (#/100M^2)	
	SAND	SEAGRASS
Anchovies	50.2	**15.11**
Mojarras	11.4	**8.98**
Herrings/clupeids	11.2	**5.42**
Mullets	7.9	0.01
Permit	7.7	**0.01**
Bonefish	0.7	**0.01**
Schoolmaster snapper	0.5	0.40
White grunt	0.5	**8.70**
Frillfin goby	0.3	0.00
Grey snapper	0.2	**0.72**
Pinfish	0.2	1.66
Bluestripped grunt	0.2	**3.08**
Lane snapper	0.1	0.24
Yellowtail snapper	0	0.32
Mutton snapper	0	0.14



Shallow-Water Seagrass Beds



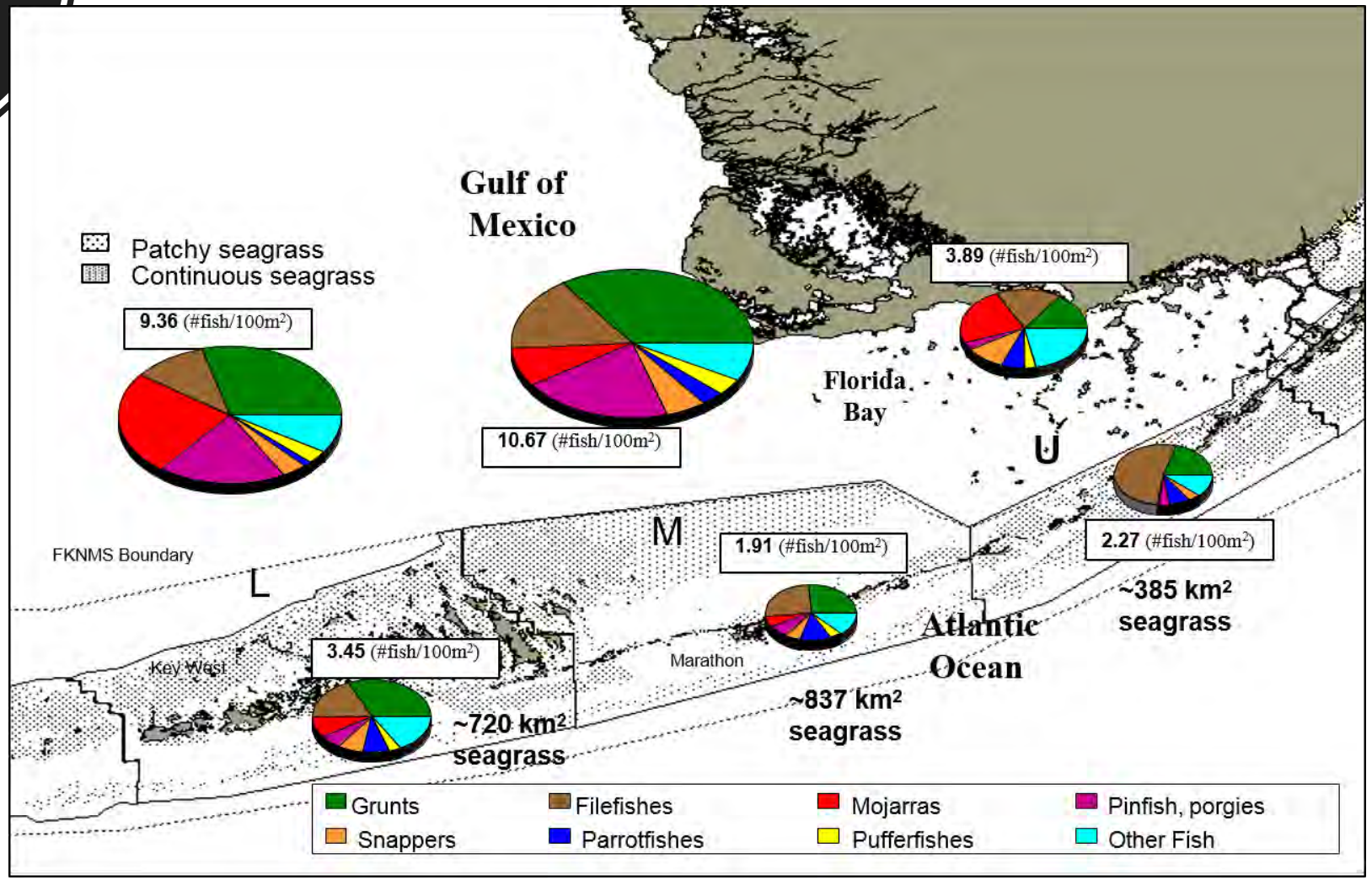


Study area and sampling sites by zone (n =855)

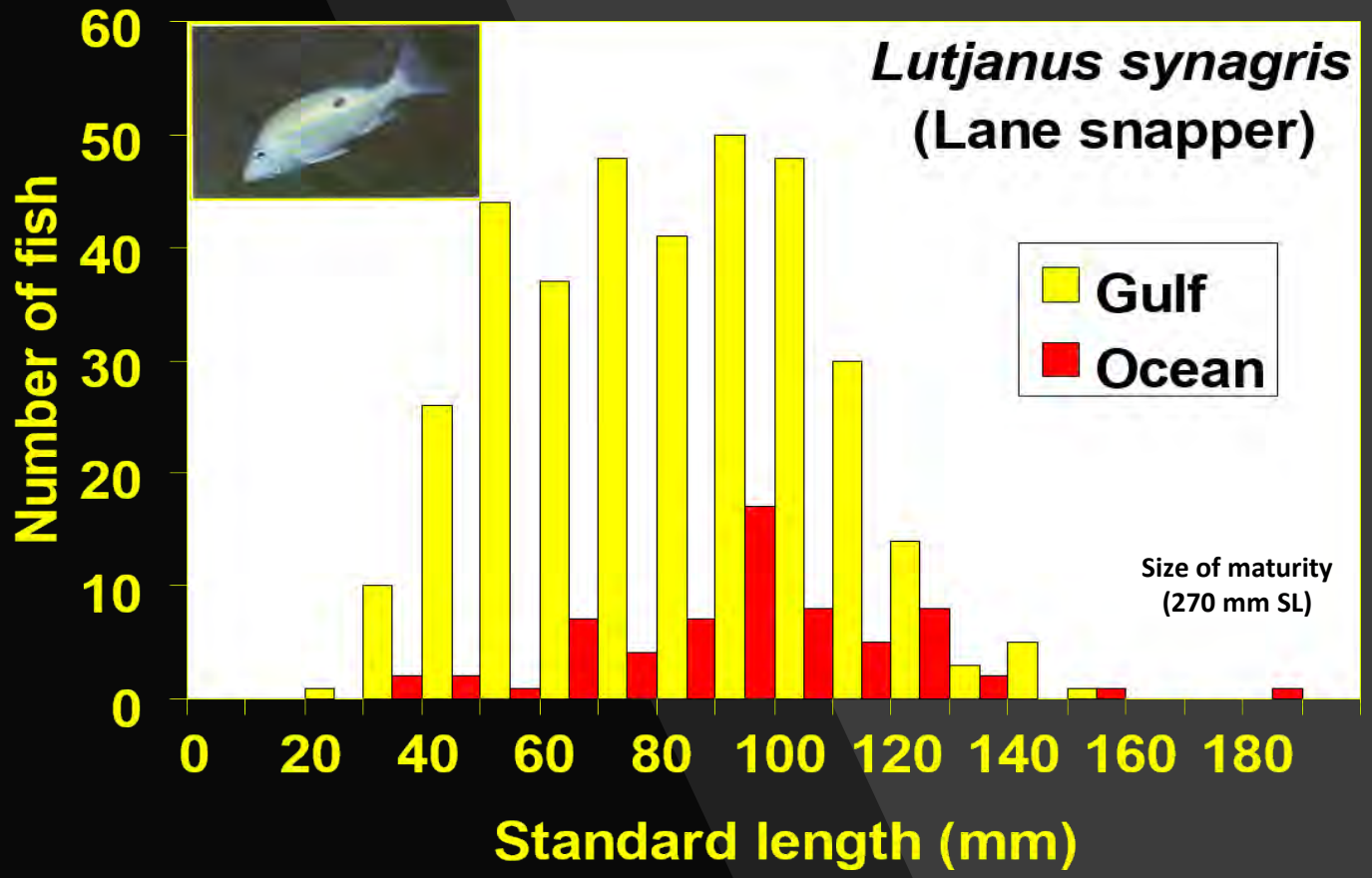
Red: Upper Keys (Gulf = 94, Ocean = 142)
Blue: Middle Keys (Gulf = 324, Ocean = 102)
Green Lower Keys (Gulf = 194, Ocean = 42)

Acosta A, Bartels C, Colvocoresses J, and Greenwood MFD. 2007.

Fish assemblages in seagrass habitats of the Florida Keys, Florida: Spatial and Temporal Characteristics. Bulletin of Marine Science, 81(1): 1–19

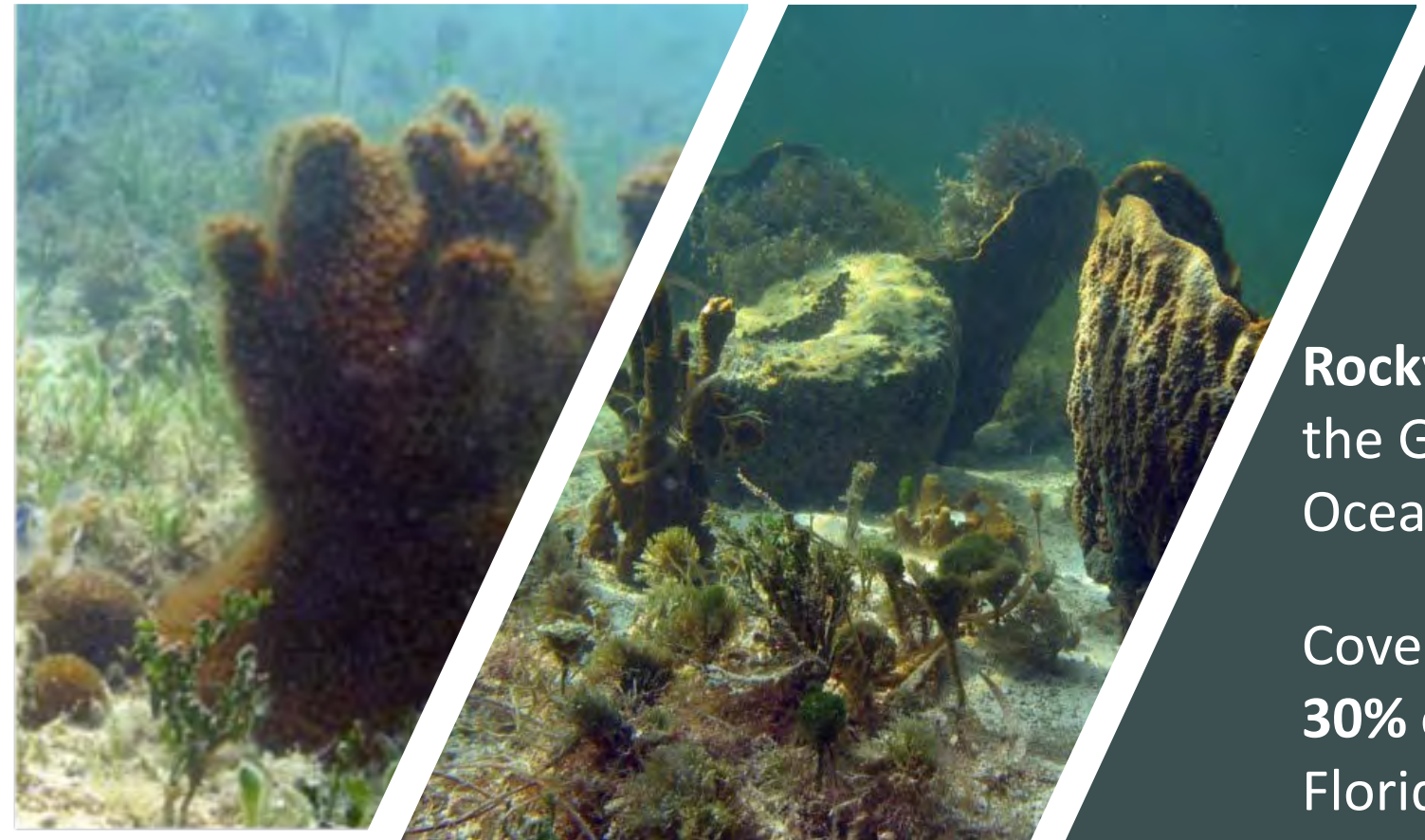


Lane Snapper



- Shallow water seagrass beds are an important habitat for lane snapper
- Lane Snapper -- Primarily juvenile habitat

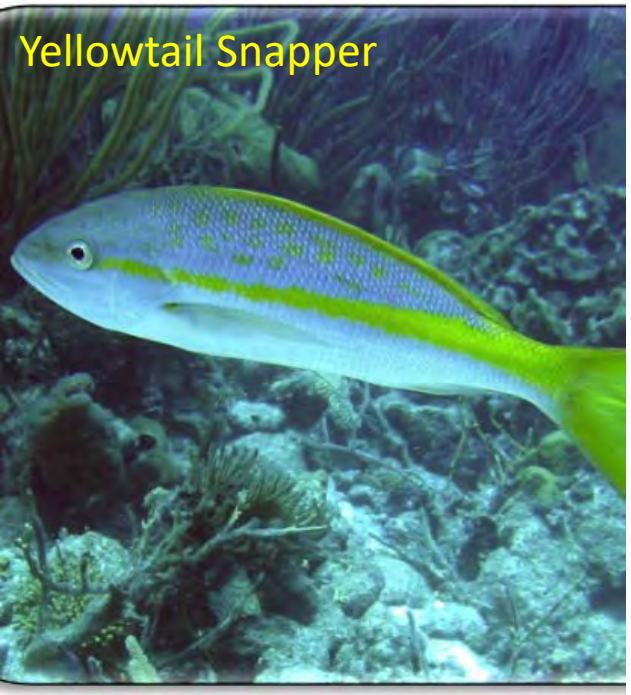
Hard-Bottom Habitat

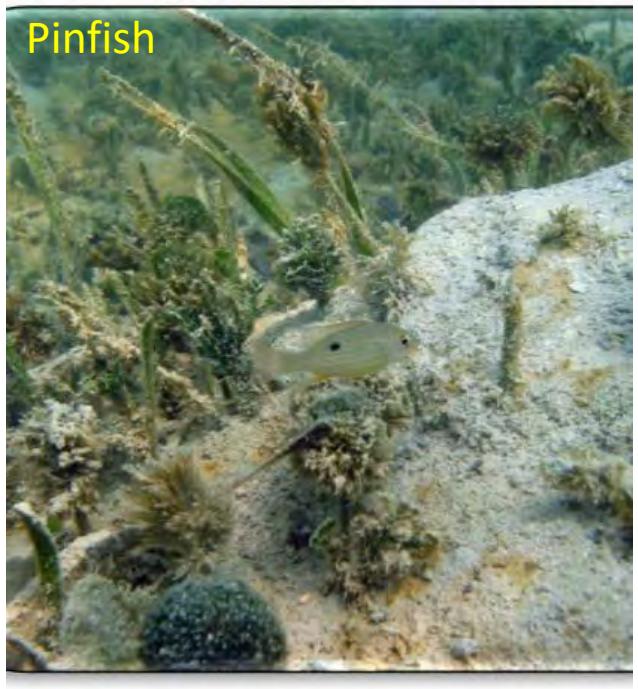


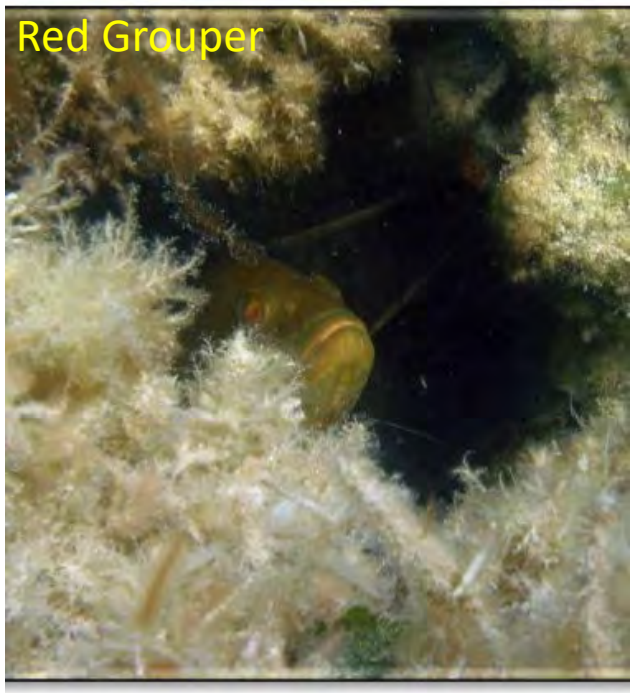
Near-Shore Hard-Bottom Habitat

Rocky bottom within 2 km of the shore on the Gulf and Florida Bay side or the Oceanside of the Florida Keys.

Covers about **67,000 ha** or a little more than **30% of the entire nearshore habitat** in the Florida Keys Marine Ecosystem.



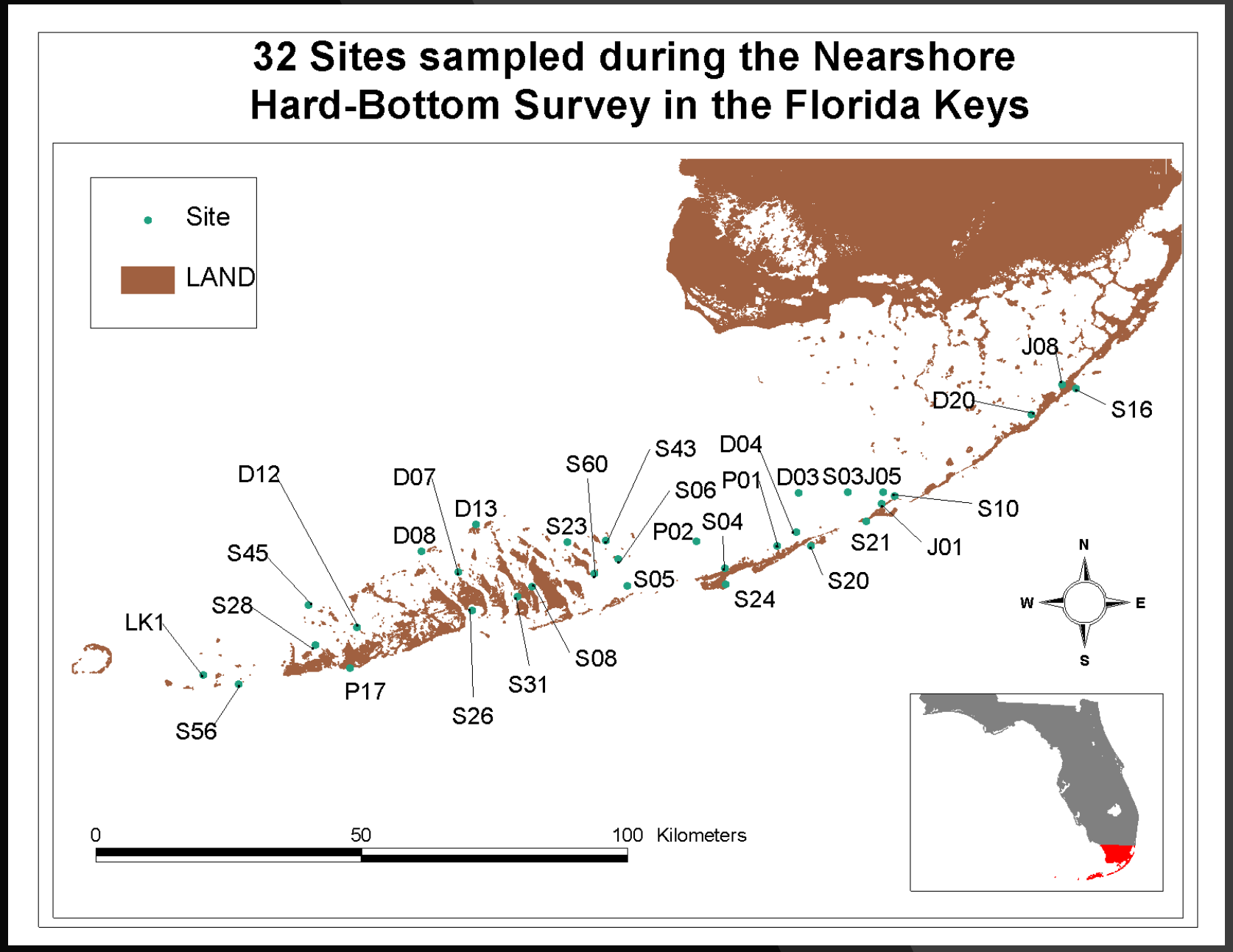


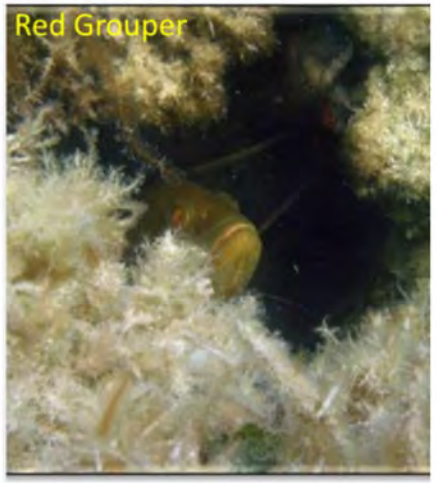


Essential Fish Habitat

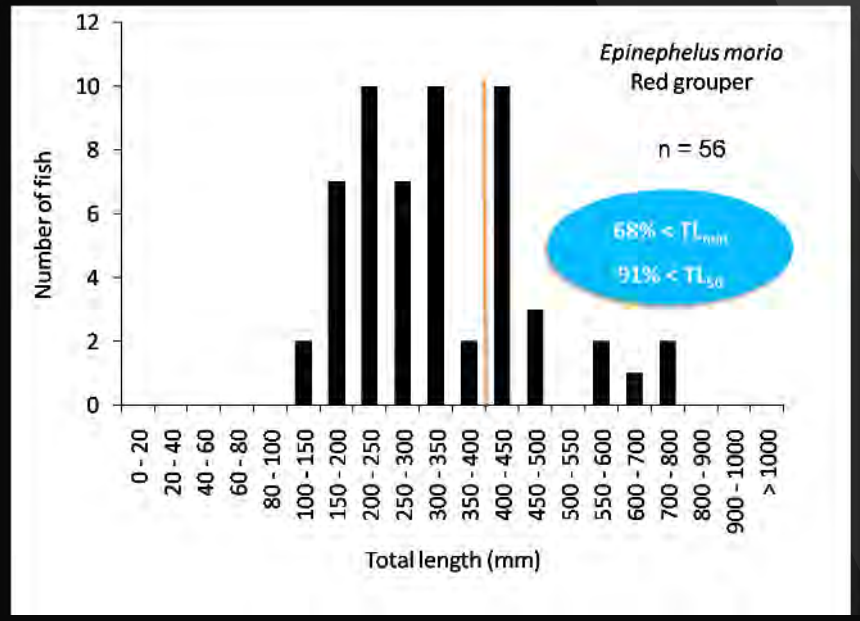
- We have identified 186 species of finfish
- Nursery habitat for many species of reef fish

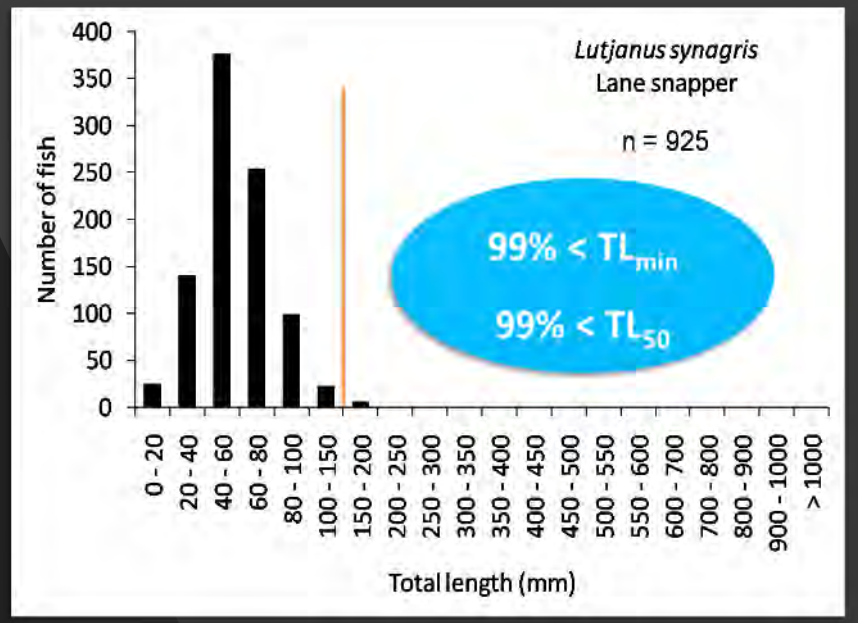
Near-Shore Hard-Bottom Survey

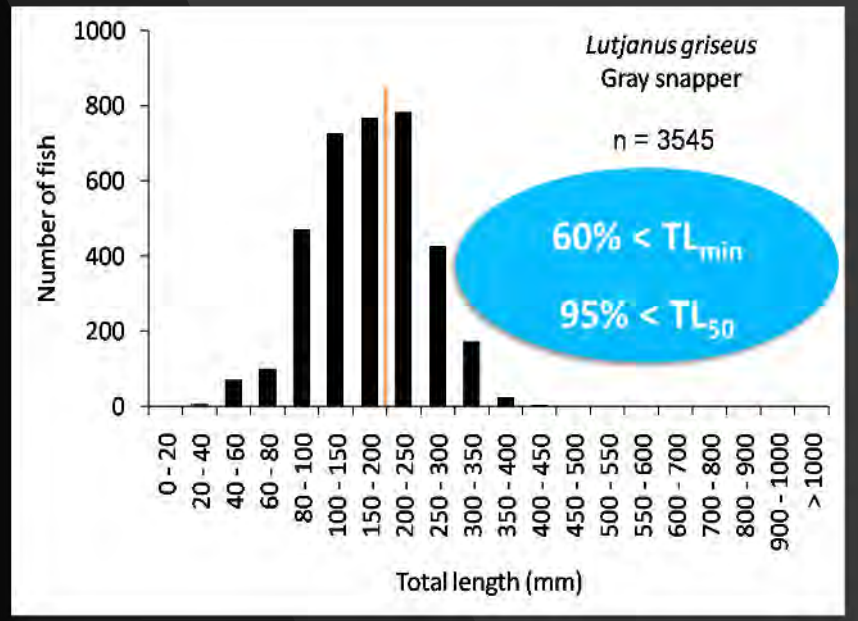


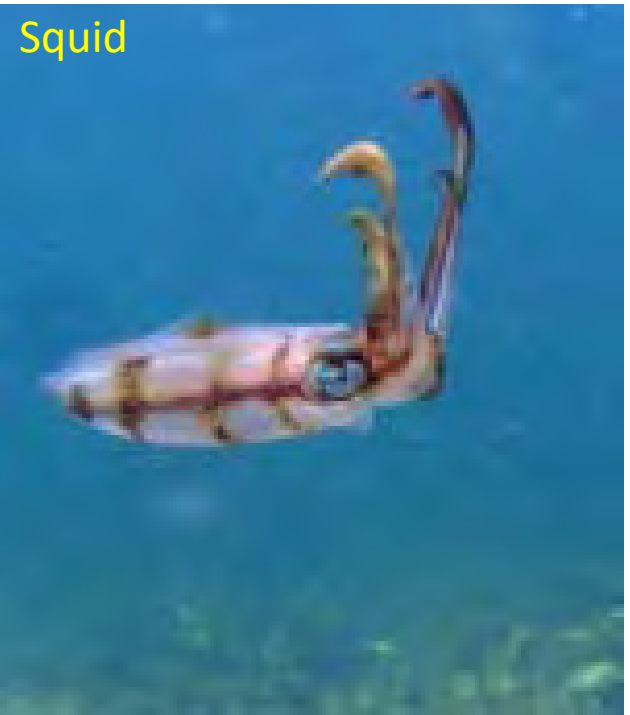


Shallow water hard-bottom, a critical habitat for juvenile fish in the Florida Keys

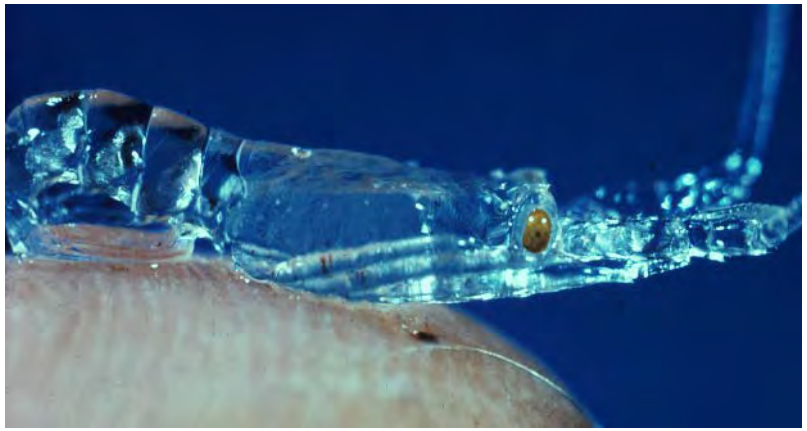


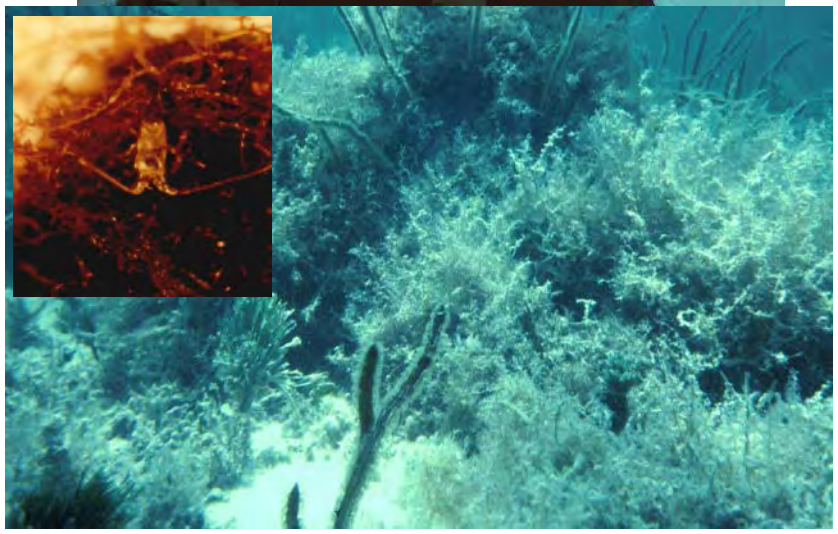






Many Invertebrate Species





Nursery Habitat For Spiny Lobster

Spiny Lobster Nursery

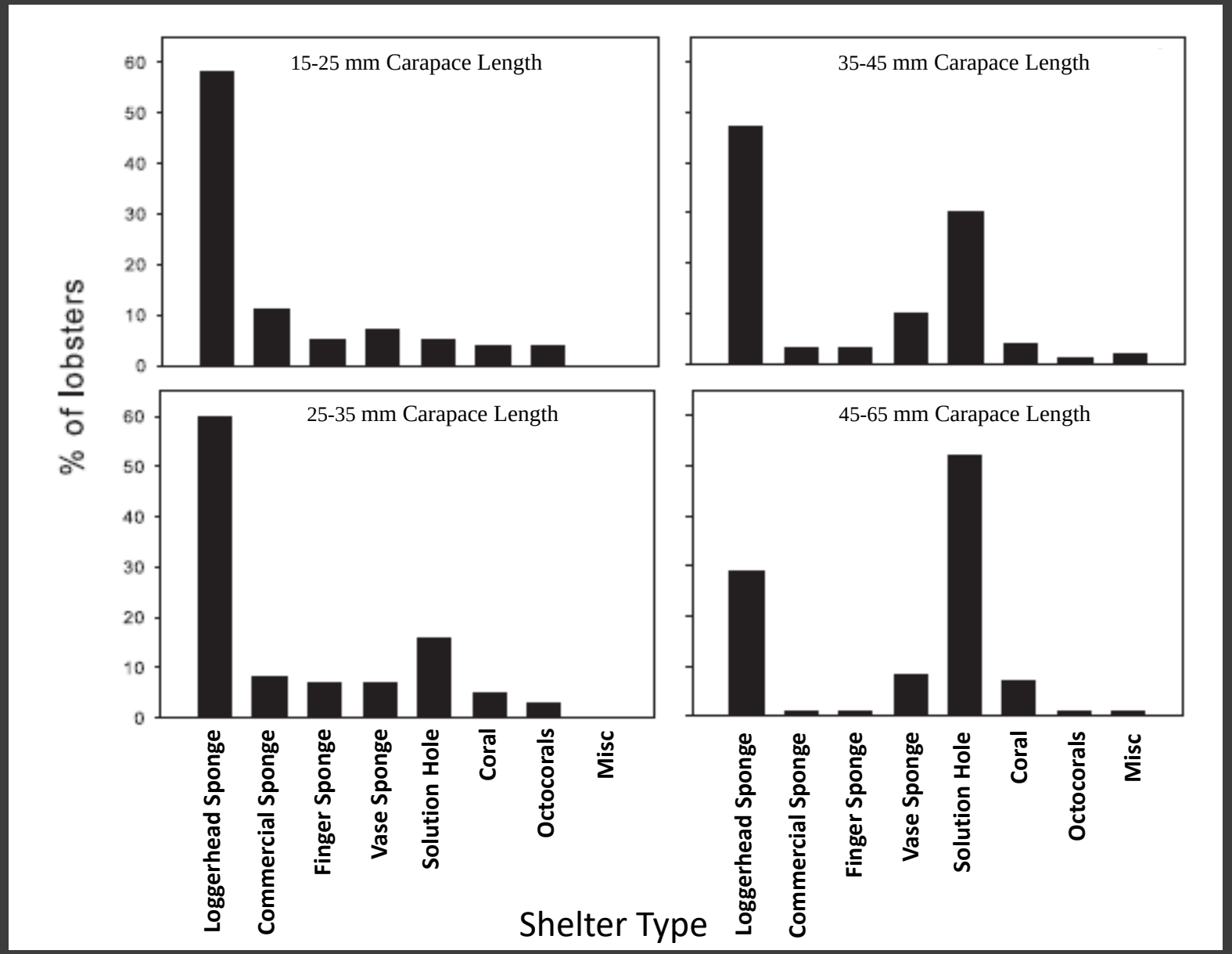
Post-larvae preferentially settle into red algae that is abundant in the nearshore hard-bottom habitat

Spiny Lobster Nursery

Larger juvenile lobsters use many different shelter types abundant in the hard-bottom habitat; sponges, coral heads, rock ledges, & solution holes

Spiny Lobster Nursery Habitat

- Preferred structures are sponges, especially loggerhead sponges
- Larger juvenile lobsters begin using solution holes before moving to reefs as they mature

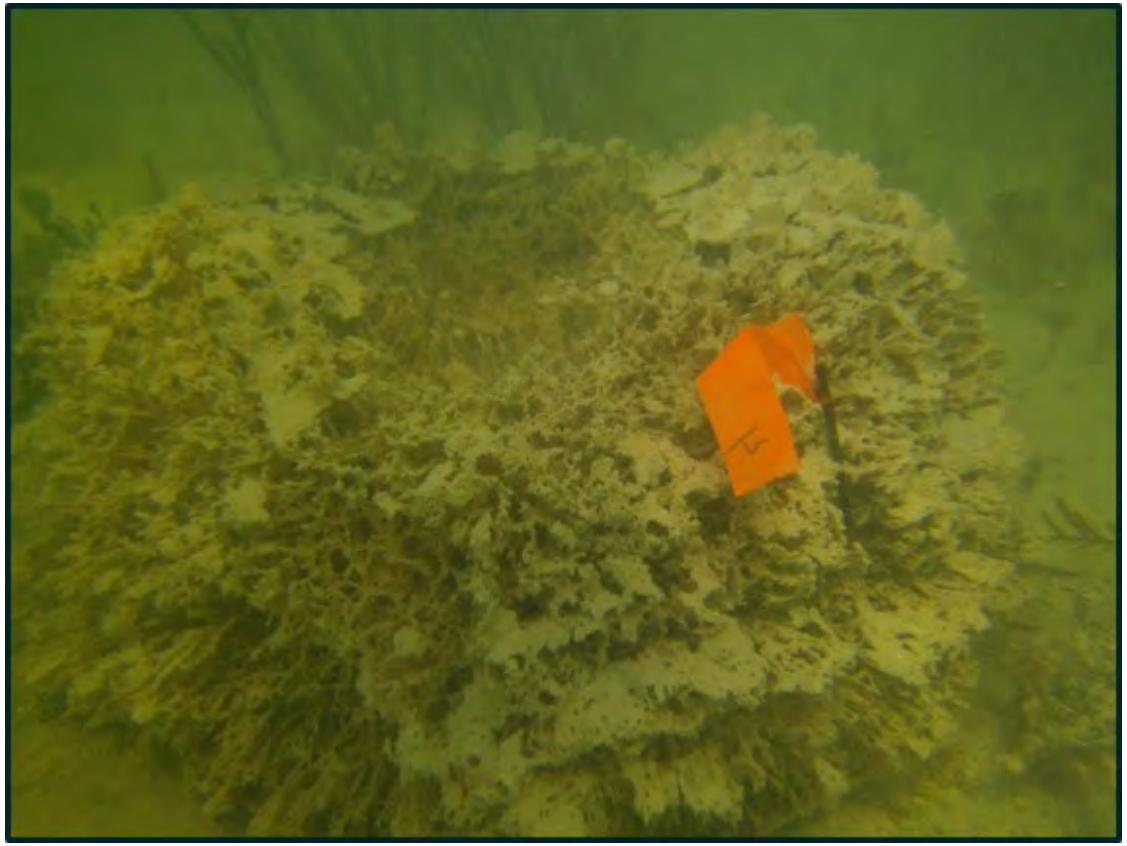


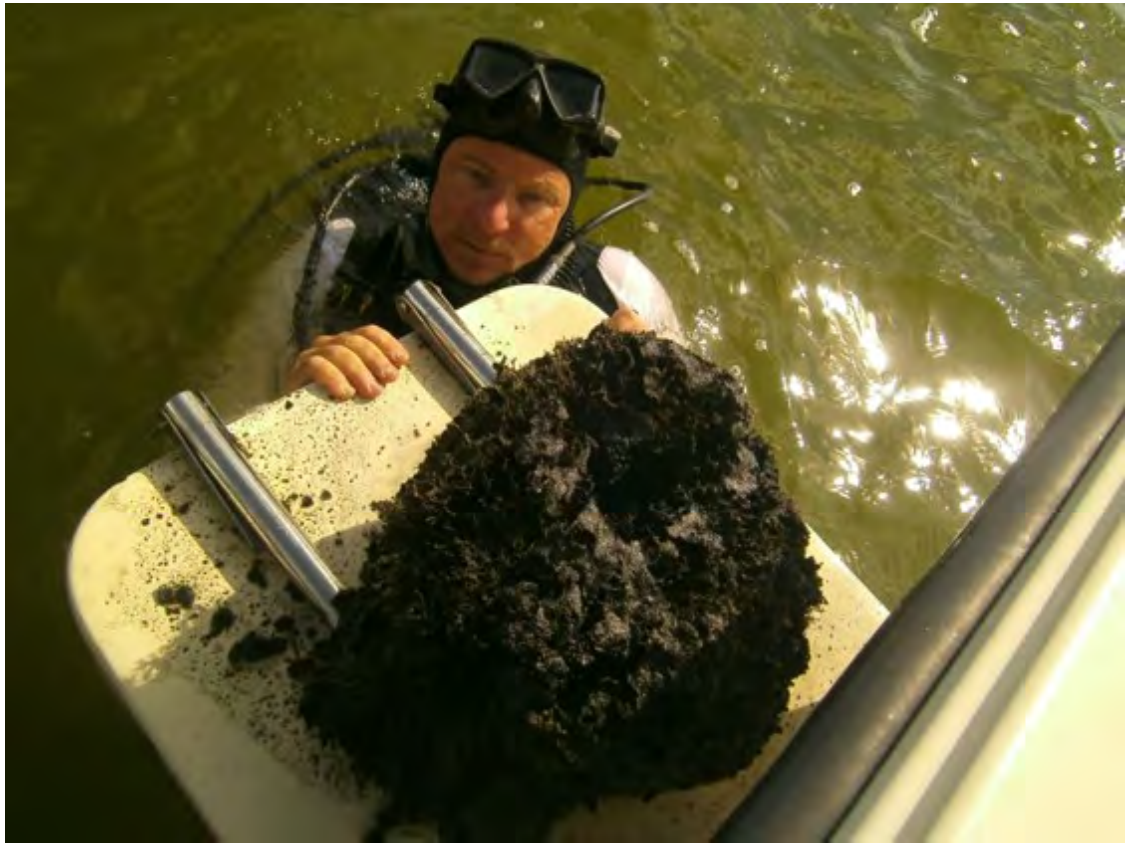
Sponges – Critical to the Coral Reef Ecosystem of the Florida Keys

Importance of Sponges

- Sponges have associations with many microorganisms that produce chemical transformations in the water as it is pumped through their tissues
- Habitat for animals that live around sponges
- Habitat for many commensal animals
  - Shrimps, Worms, Brittle stars

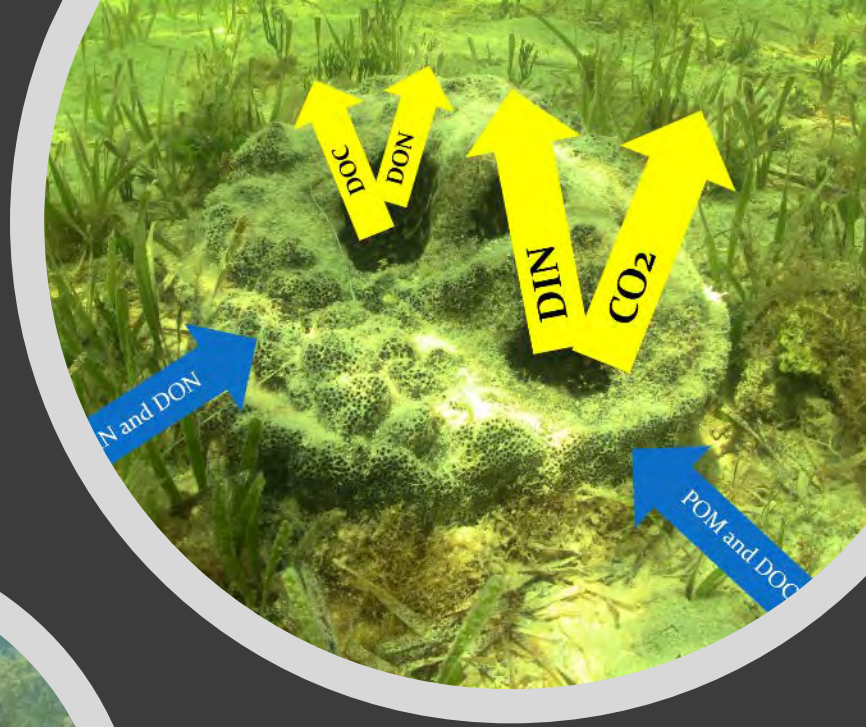
Algae Blooms and Florida Bay's Sponge Community

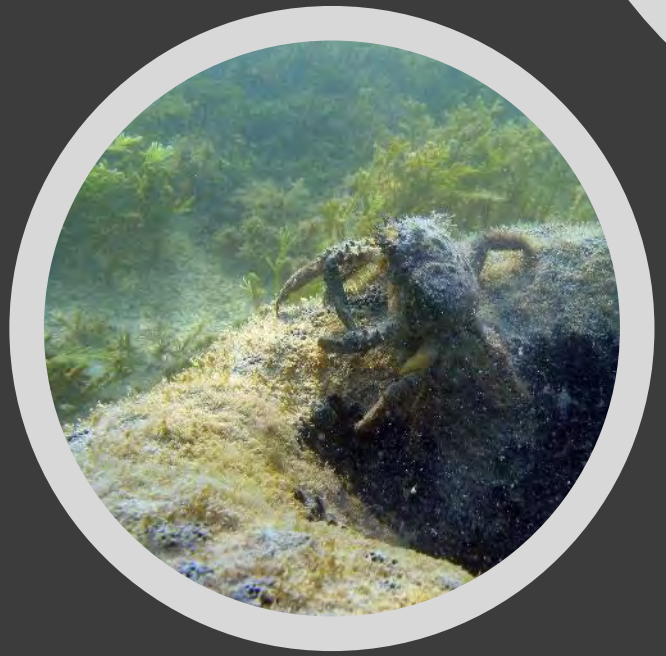


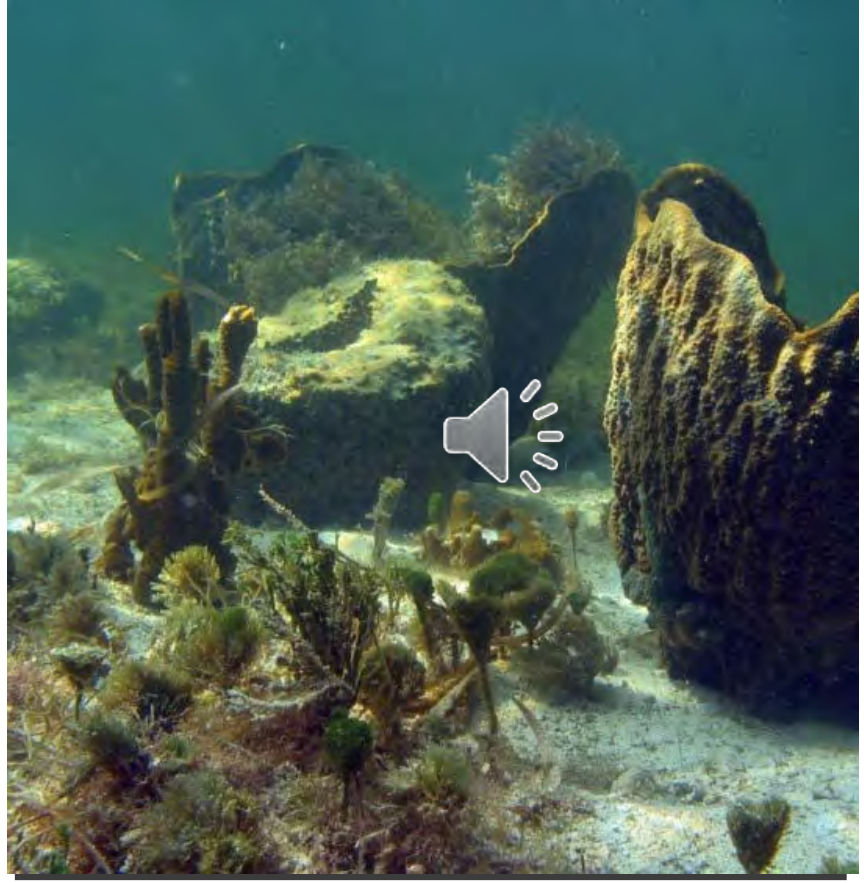


Cyanobacteria blooms (blue-green algae) have caused sponge die-offs in an area ~500km2 in south-central Florida Bay in 1991, 2007, 2013, 2016

Loss of Ecosystem Function







Loss of Hard-Bottom Soundscape

Sponge Restoration

Sponge Community Restoration

Sponges communities are a key component of the Florida Keys and Florida Bay nearshore marine environment. Unfortunately, these communities have become severely degraded in recent decades. Researchers with the Florida Fish and Wildlife Conservation Commission(FWC) are now testing the efficacy of sponge nurseries to support large-scale sponge community restoration…and you can help!

Yellow sponges growing in a nursery near Marathon, FL

Volunteer Riet Steinmetz holds up a vase sponge that will be used for restoration

Join FWC biologists for a day on the water and take part in the effort to restore Florida Bay's sponge community. (see reverse side for more info)

A healthy sponge community in Florida Bay

For more info and to be a part of sponge restoration, contact:
Elliot Hart, FWC Biologist
(305) 676-3231
John.hart@myfwc.com

This project is a collaboration between FWC, Florida Sea Grant, and Old Dominion University and is funded in part by The Nature Conservancy, US Environmental Protection Agency, Bonefish Tarpon Trust, and the Florida Keys Environmental Fund. This project is being conducted under Florida Keys National Marine Sanctuary Permit # FKNMS-2015-131-A1.

Goal: Late 2019, 15,000 Sponges to Outplant

Volunteers Welcome

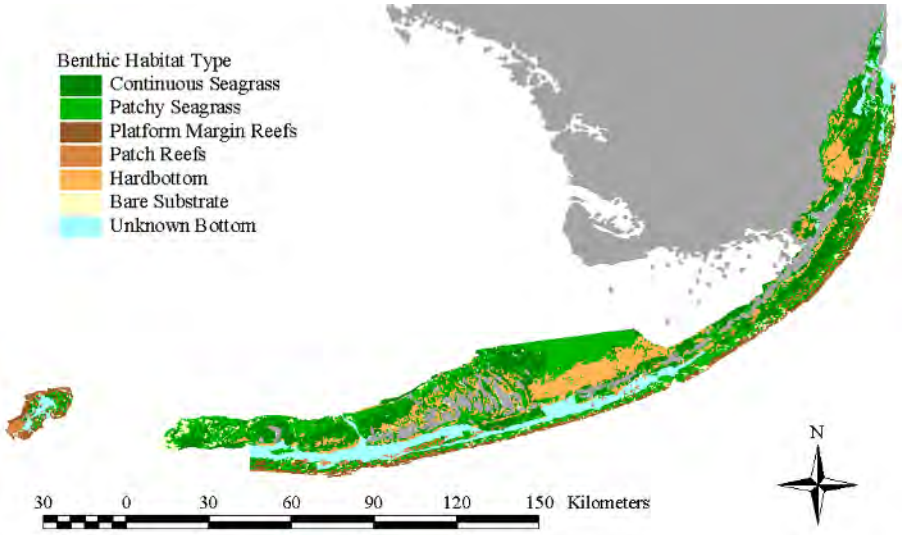
Summary

Beaches: Important settlement habitat for many fishes including snappers & permit

Shallow Water Seagrass Beds: Important habitat for a diverse array of fishes, including juvenile snappers

Shallow Water Hardbottom: Essential juvenile habitat for many fishes, including many species of reef fishes and crustaceans

- Loss of sponge communities reduce their ecological function
- Larger-scale sponge restoration effort scheduled for 2019


Benthic Habitat Type
Continuous Seagrass
Patchy Seagrass
Platform Margin Reefs
Patch Reefs
Hardbottom
Bare Substrate
Unknown Bottom
N
30 0 30 60 90 120 150 Kilometers

Questions