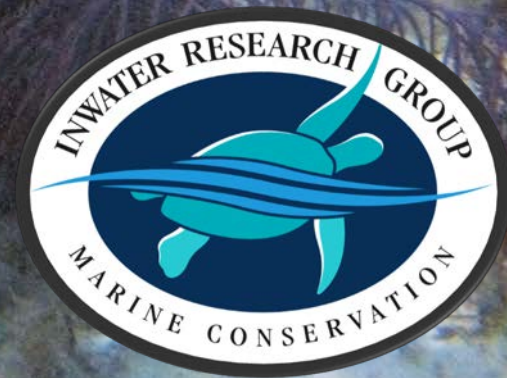
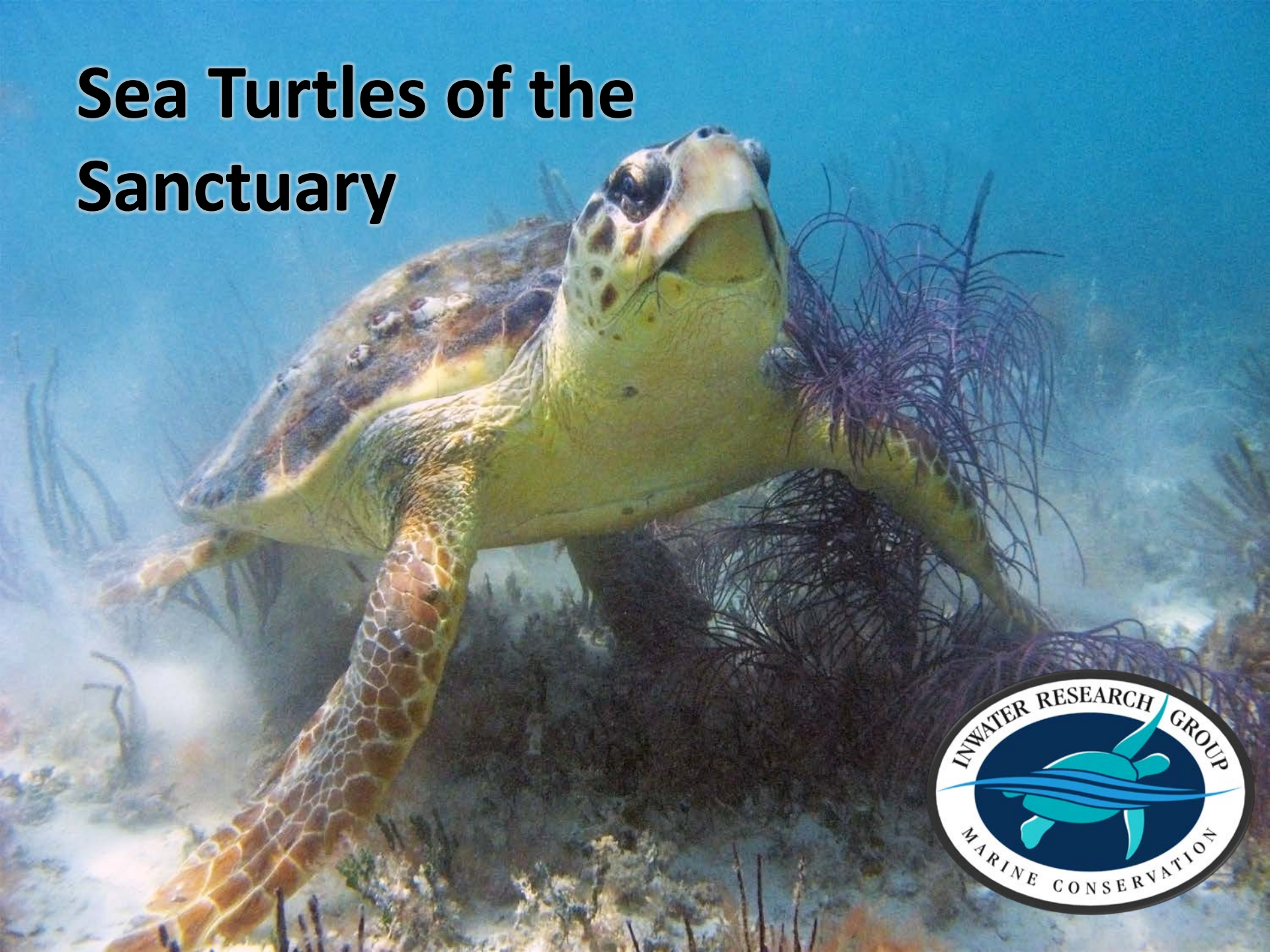


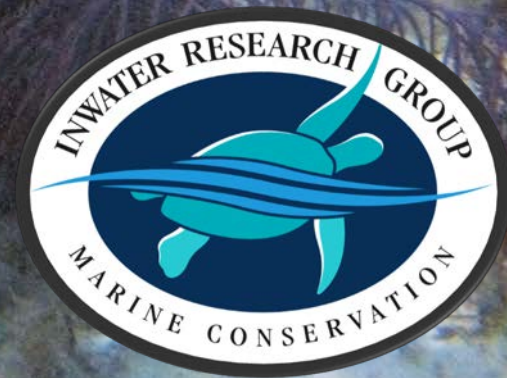
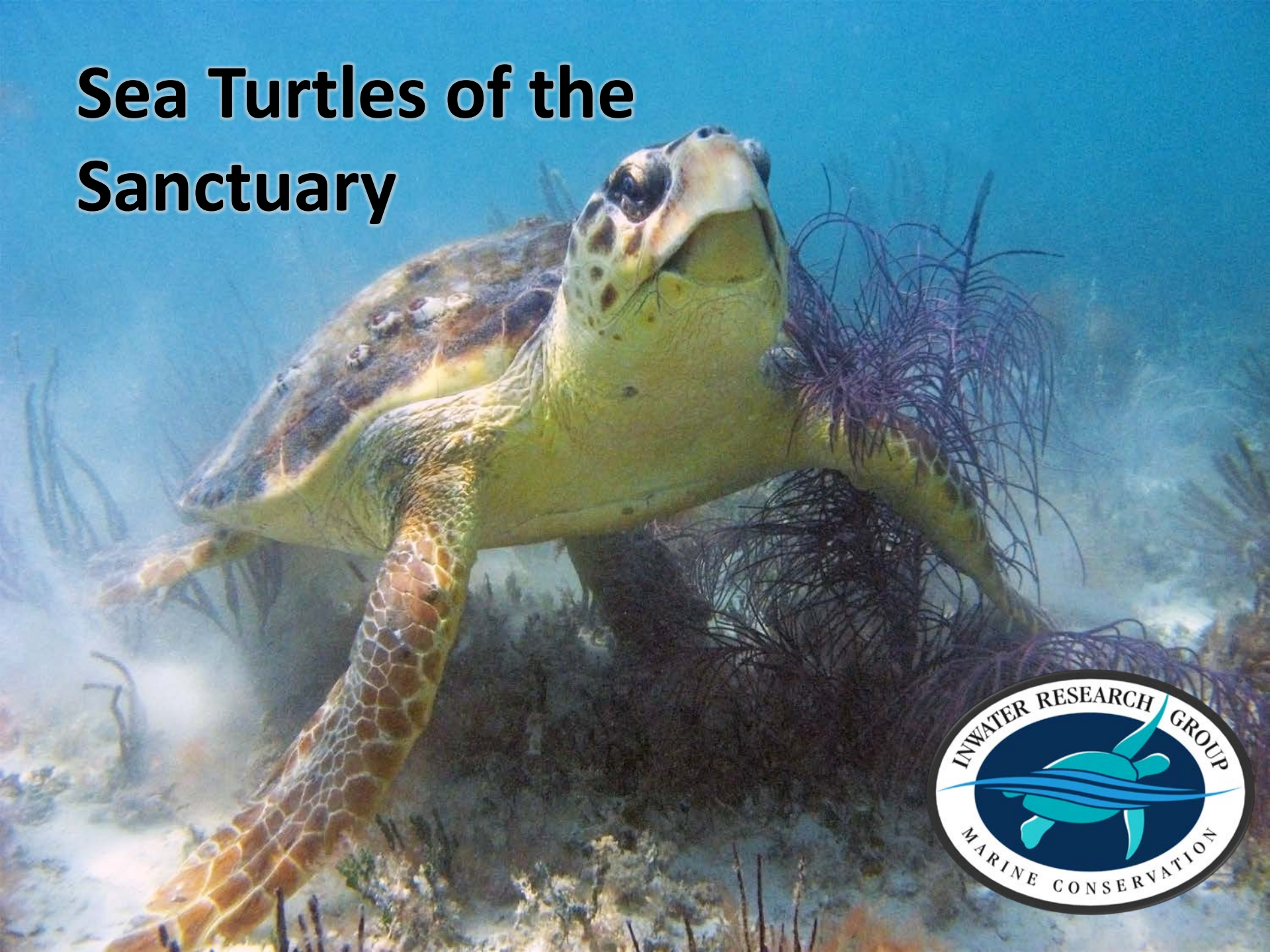
# Sea Turtles of the Sanctuary



**<https://vimeo.com/304205299>**



# Sea Turtles of the Sanctuary



501(c)3 non-profit

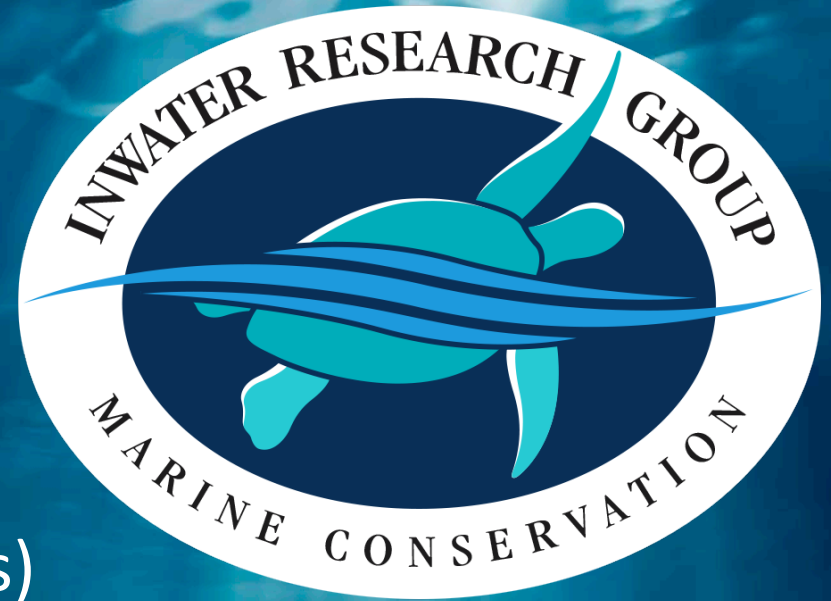
Coastal and marine  
species/habitats

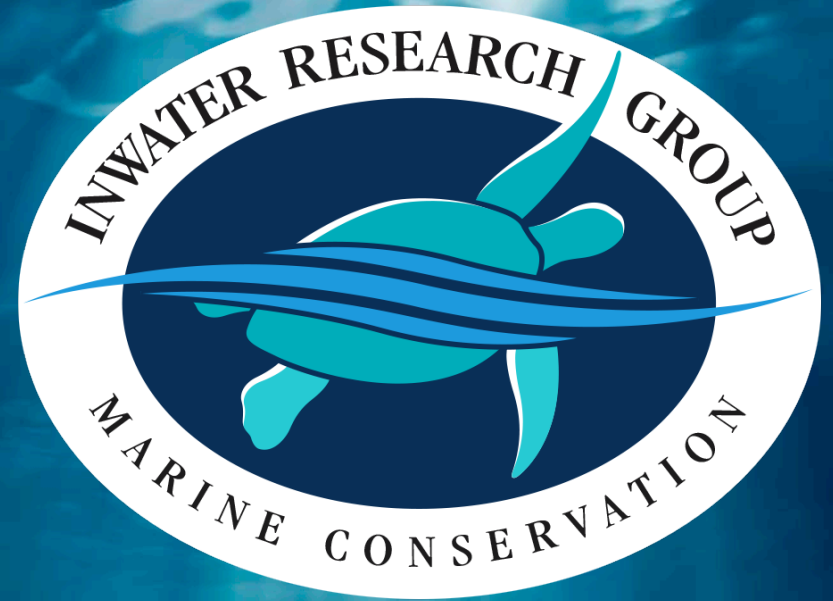
Research (8 long-term studies)

Education (21,808 students reached)

8 staff, 2 research vessels

Funding: ongoing contracts, project grants



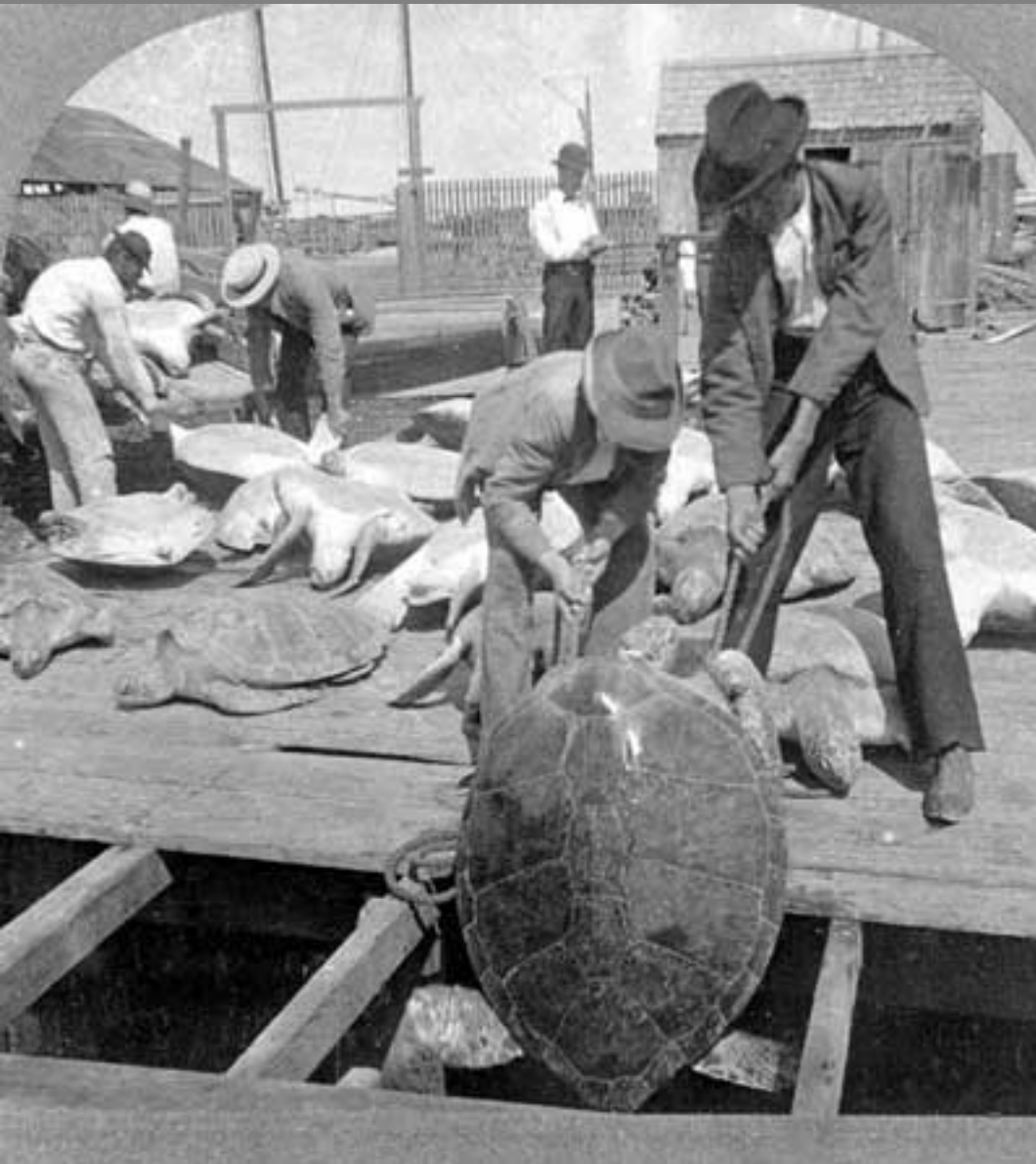


How can we help the Sanctuary's mission?

[www.inwater.org](http://www.inwater.org)



# Then: A Large-Scale Harvest





# Today: Surveys for Distribution and Population Status



HUNTs: Haphazard Unmarked Nonlinear Transects









**Weight, measures**

**Health status**

**Genetic stock**

**Diet (lavage and SIA)**

**Long- term tags**

**Somatic growth**

**Abundance measures  
(Distance transect, CMR)**

**Movements (PTTs and tag recoveries)**

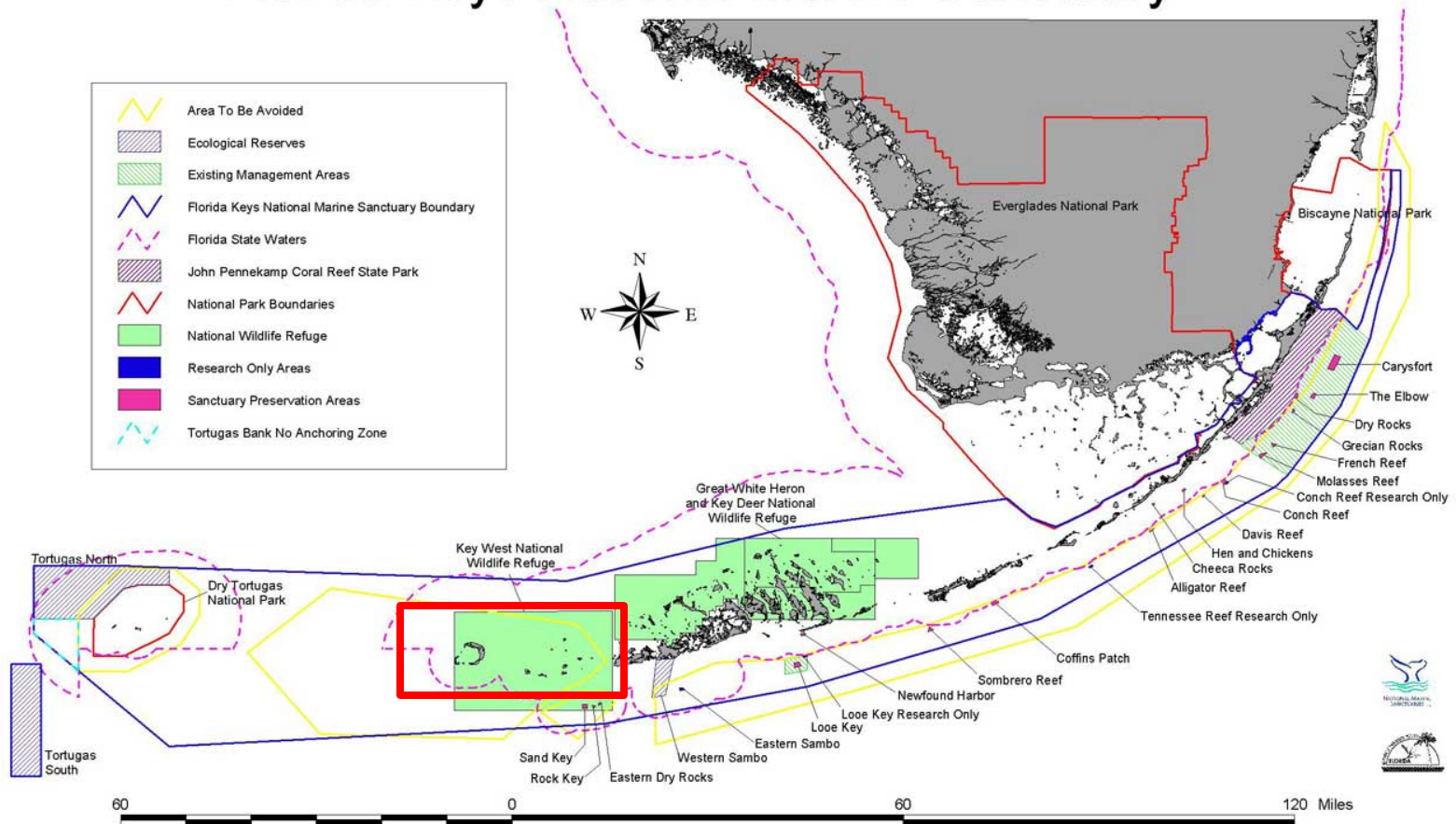
16 July 2005  
TTK 120  
TTK 120  
TTK 120



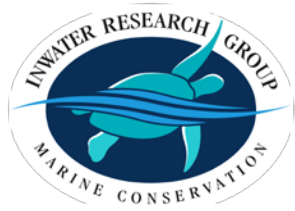




# Florida Keys National Marine Sanctuary

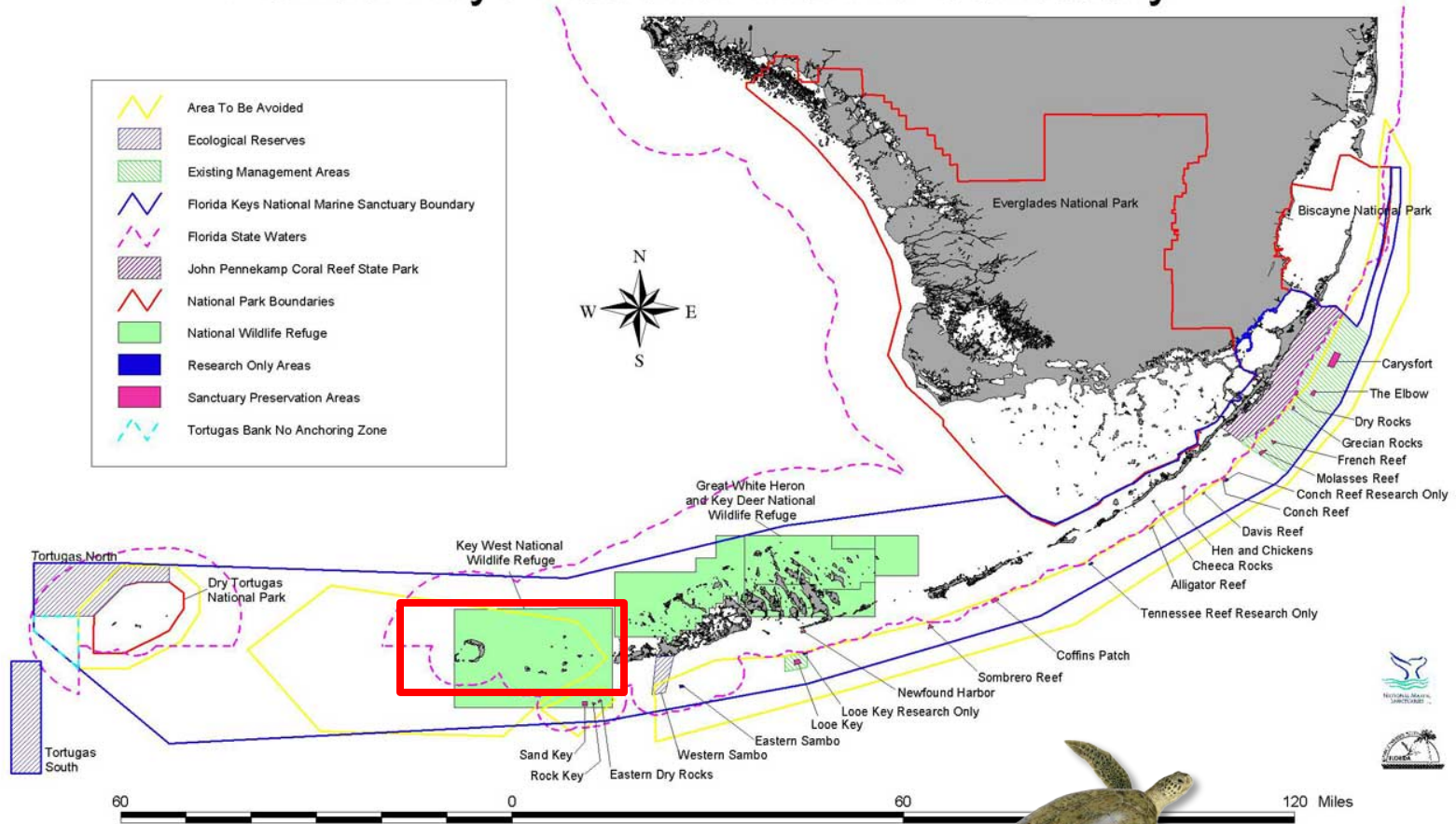


created by Kevin Krach  
11/1/201

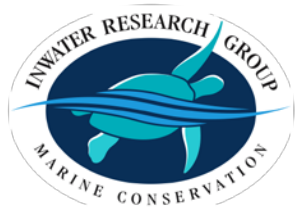


IRG Surveys since 2002 have shown that KWNWR and nearby Sanctuary waters are important foraging areas for three sea turtle species. Four species have been captured.

# Florida Keys National Marine Sanctuary



created by Kevin Krusch  
11/1/201



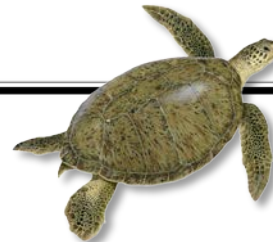
**Sea  
Turtle  
Species:**

Loggerheads

Green Turtles

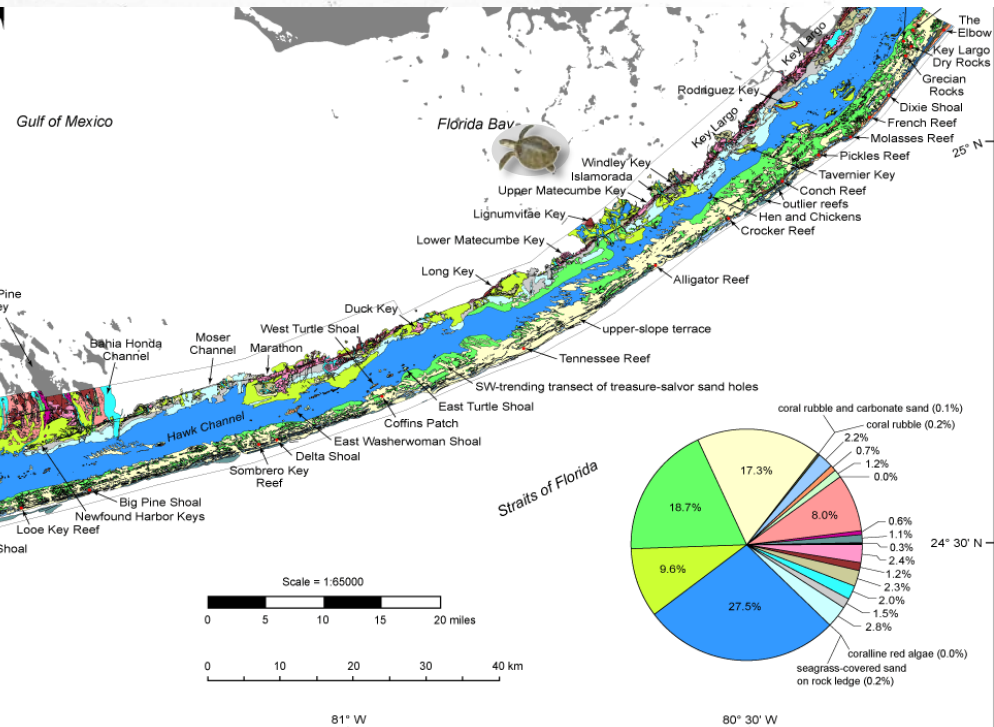
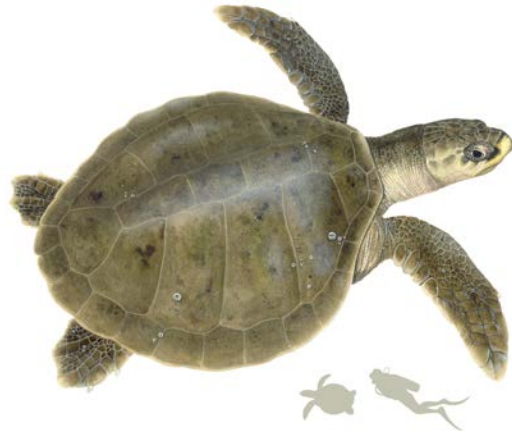
Hawksbills

Kemp's Ridley

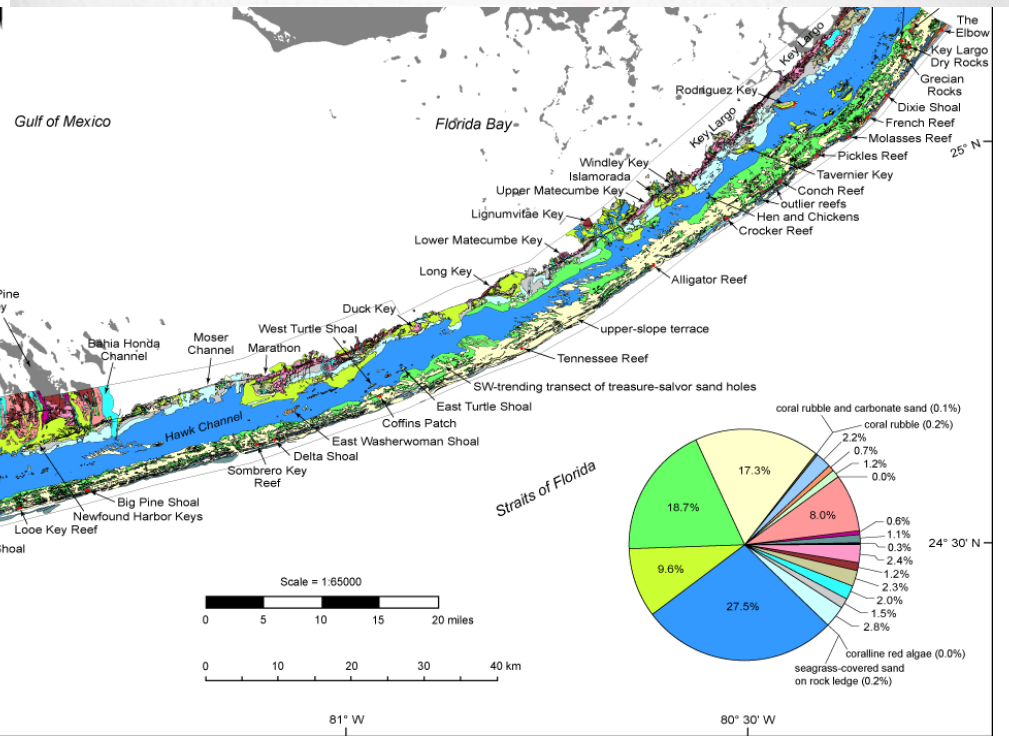




## A large sea turtle, likely a hawksbill, is resting on a white, curved surface, possibly the edge of a boat. The turtle's carapace is dark green with prominent scutes. Its head is extended forward, showing a light-colored snout and a dark eye. The background consists of a dark blue ocean under a bright blue sky with scattered white clouds.

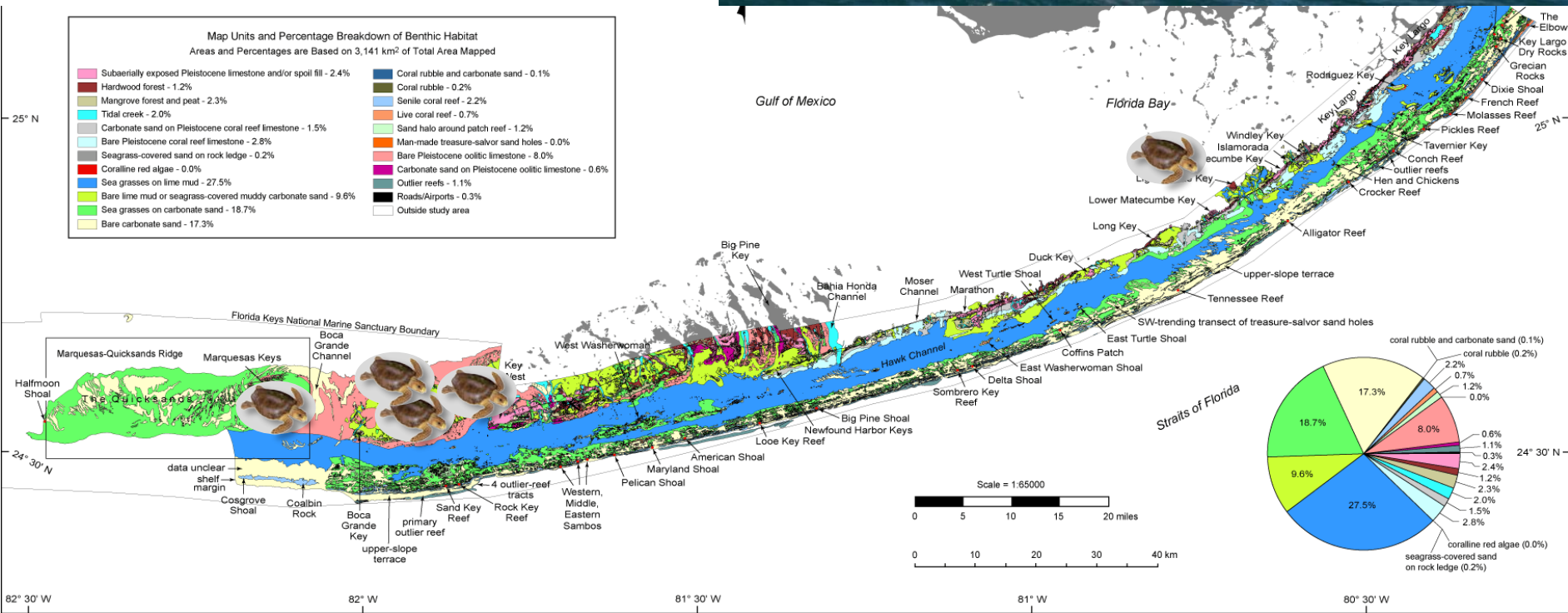


# Hawksbill





## A detailed illustration of a large sea turtle, likely a hawksbill, swimming towards the right. The turtle has a brown and tan patterned shell and flippers. Below the main illustration are two small silhouettes: one of a sea turtle and one of a diver, both facing right.







# SEA TURTLE FORAGING HABITATS

Shallow Mixed Hardbottom  
Community on Oolitic Limestone





# SEA TURTLE FORAGING HABITATS

## Shallow Seagrass on Lime Muds





# SEA TURTLE FORAGING HABITATS

## Patchy Seagrass on Carbonate Sands





# SEA TURTLE FORAGING HABITATS

## Submerged Limestone Jetty (circa 1900)





# SEA TURTLE FORAGING HABITATS

**Inshore Patch Reef  
and Surrounding Hardbottom**



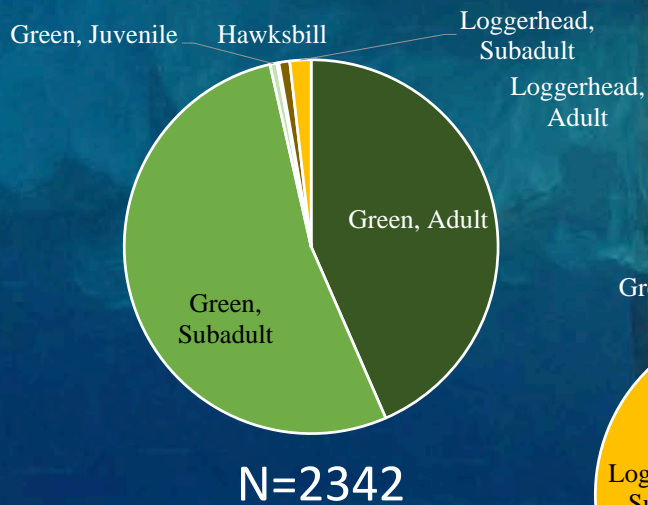
# Areas of Importance For Sea Turtle Foraging in the Lower Keys



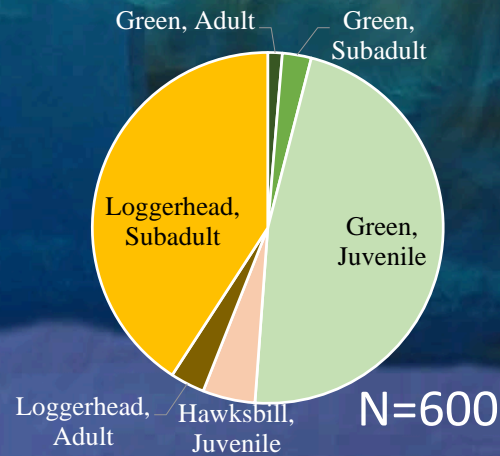


# Areas of Importance For Sea Turtle Foraging in the Lower Keys

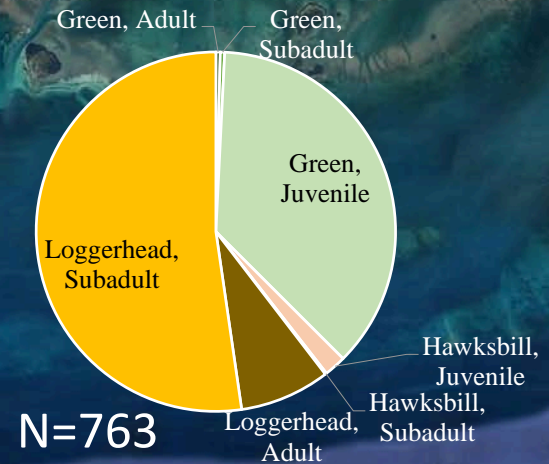
## Quicksands



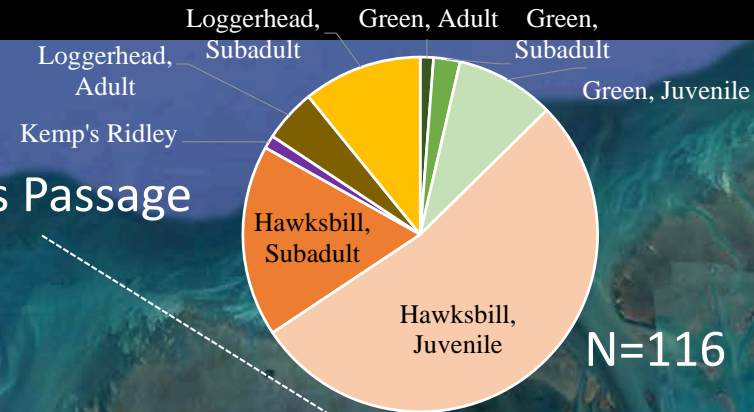
## Mooney Harbor



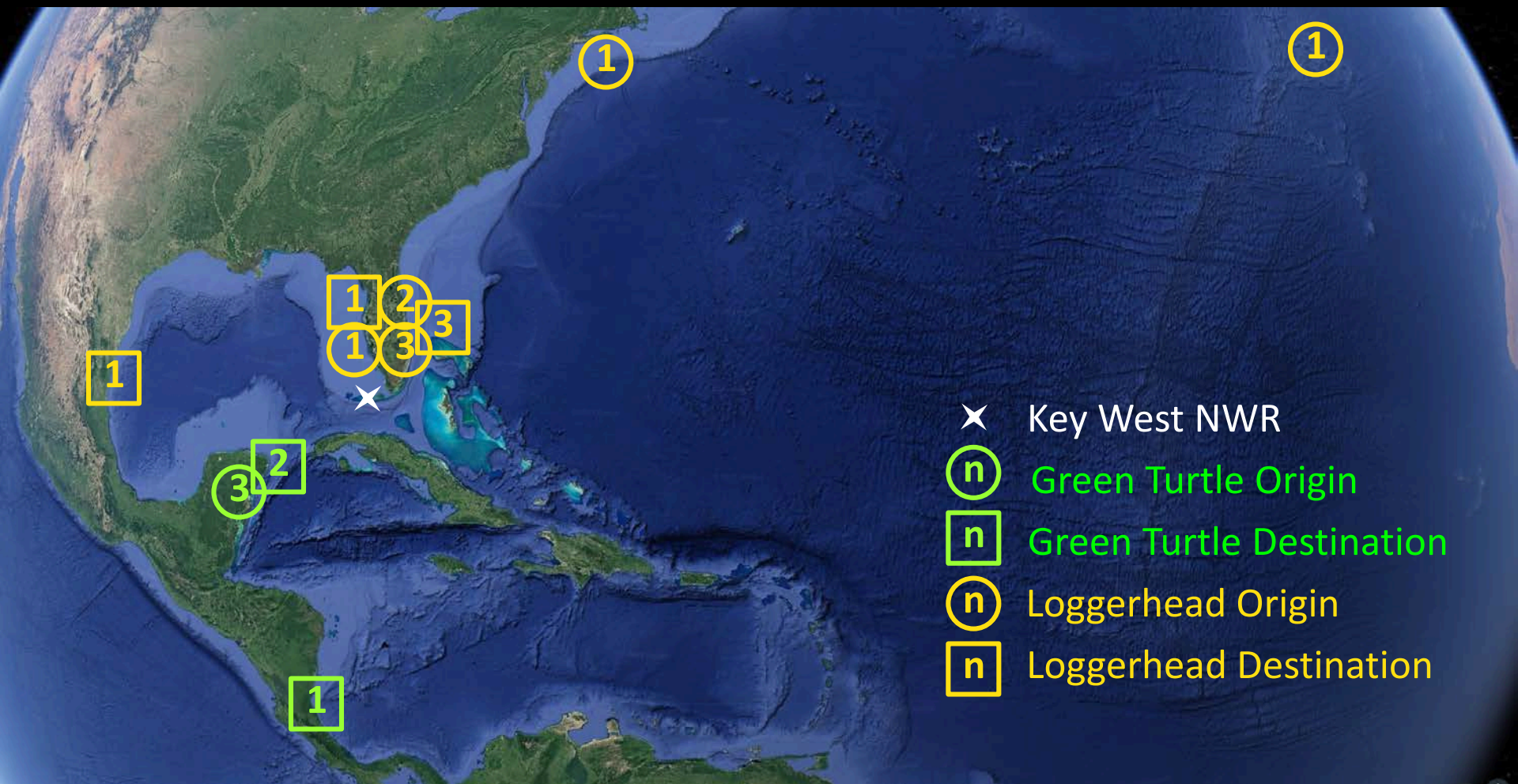
## Lakes Passage



## Cottrell Reef and West Jetty



# Connections

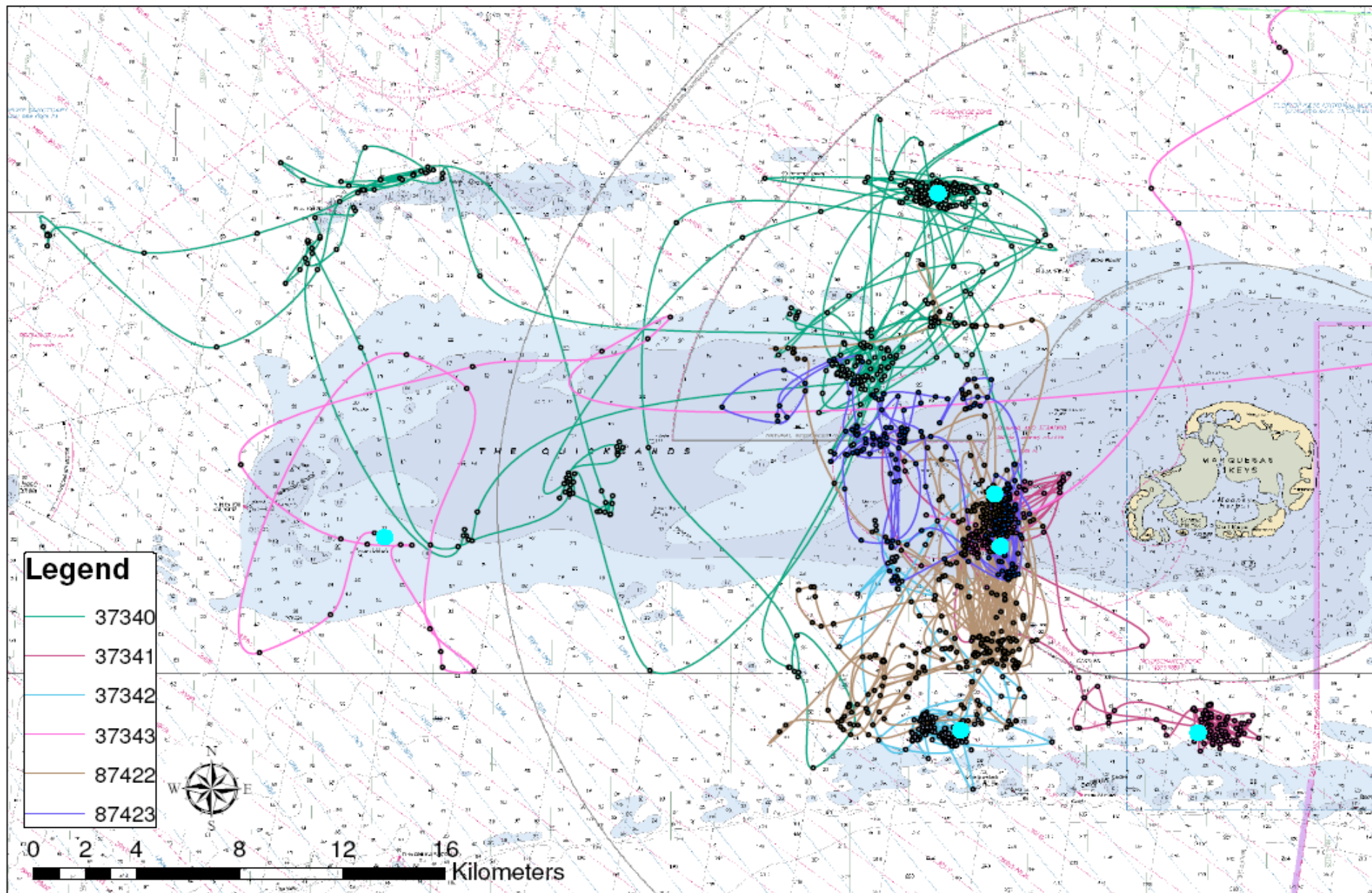




Home Range







# **Key West National Wildlife Refuge Sea Turtle Project**

Fastloc GPS data, 5/6/2008 though 11/12/2008  
Most recent position is highlighted





# Green Turtle Size and Habitat

Vol. 9: 105–116, 2010  
doi: 10.3354/esr00245

ENDANGERED SPECIES RESEARCH  
Endang Species Res

Published online January 11



## Size-class partitioning and herding in a foraging group of green turtles *Chelonia mydas*

Michael J. Bresette<sup>1,\*</sup>, Blair E. Witherington<sup>2</sup>, Richard M. Herren<sup>1</sup>, Dean A. Bagley<sup>1</sup>,  
Jonathan C. Gorham<sup>1</sup>, Steve L. Traxler<sup>1</sup>, Carrie K. Crady<sup>1</sup>, Robert Hardy<sup>3</sup>

<sup>1</sup>Inwater Research Group Inc., 4160 NE Hyline Dr., Jensen Beach, Florida 34957, USA

<sup>2</sup>Florida Fish and Wildlife Research Institute, FWC, 9700 South A1A, Melbourne Beach, Florida 32951, USA

<sup>3</sup>Florida Fish and Wildlife Research Institute, FWC, 100 Eighth Avenue SE, St. Petersburg, Florida 33701, USA

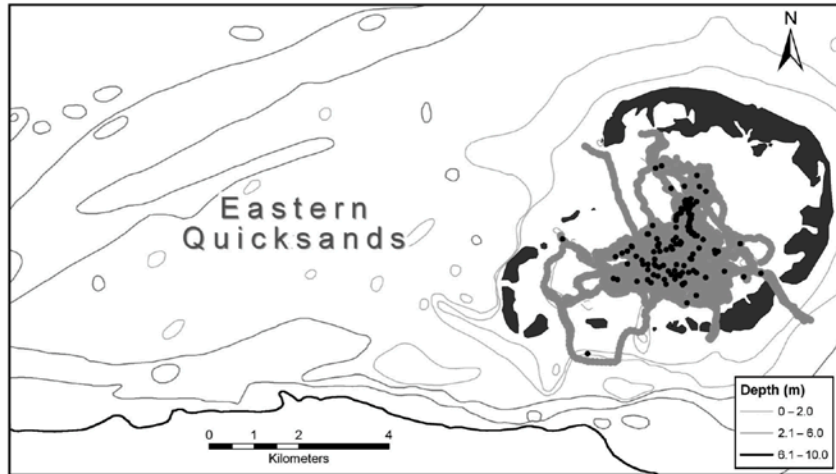


Fig. 2. *Chelonia mydas*. Haphazard, unmarked, non-linear transects (HUNTS) and green turtle observations at Mooney Harbor, Marquesas Keys, Florida, USA, July 2002 to October 2007. Figure represents 190 juvenile-size green turtle observations (black dots) during 309.2 km of transects (grey shading)

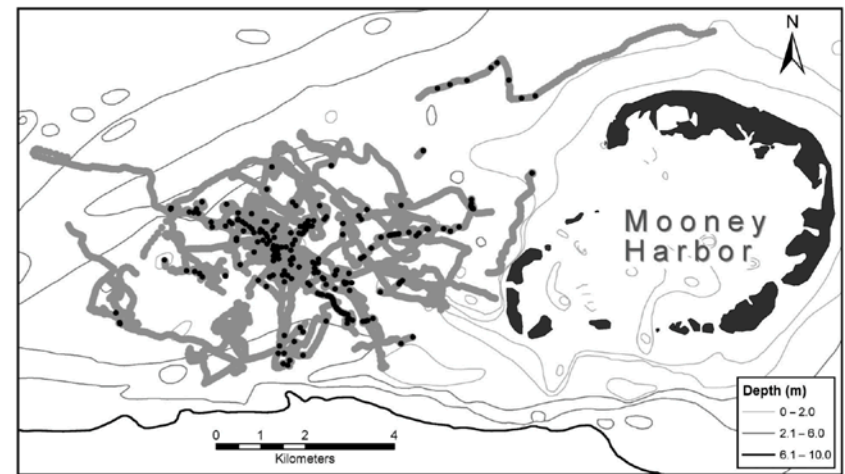


Fig. 3. *Chelonia mydas*. Haphazard, unmarked, non-linear transects (HUNTS) and green turtle observations at eastern Quicksands, Marquesas Keys, Florida, USA, July 2002 to October 2007. Figure represents 153 adult-size, 216 subadult-size, and 1 juvenile-size green turtle observations (black dots) during 266.7 km of transects (grey shading)

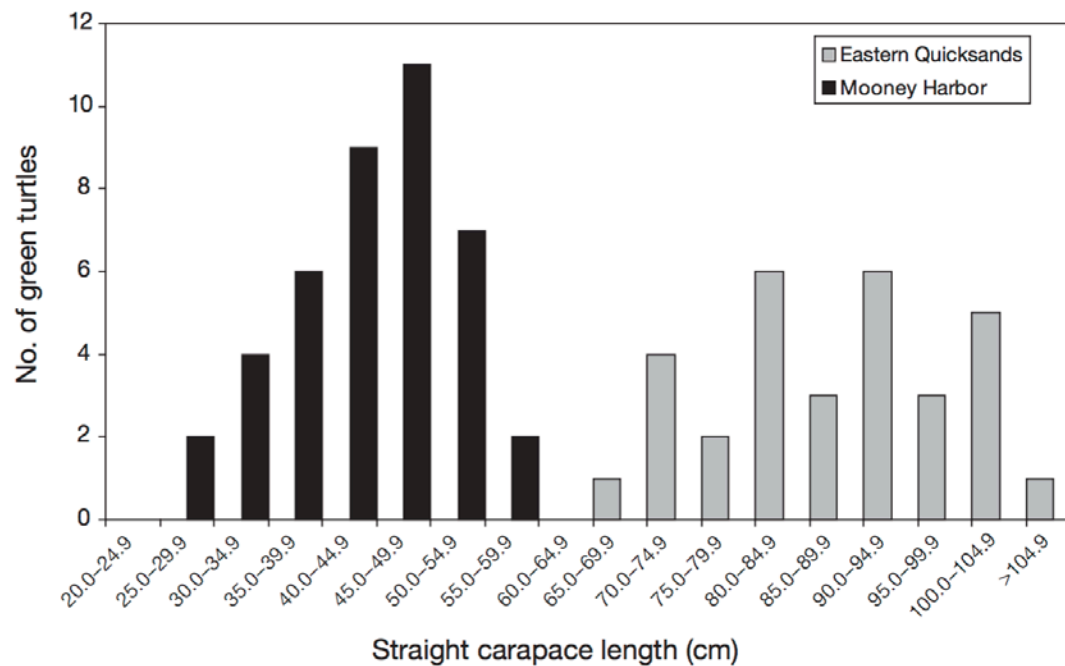


Fig. 9. *Chelonia mydas*. Size frequencies of green turtles captured at the eastern Quicksands (n = 31) and Mooney Harbor (n = 41), Marquesas Keys, Florida, USA (2002 to 2007)



# Sea Turtle Abundance and Distribution

Herpetological Conservation and Biology 13(1):224–239.

Submitted: 10 April 2017; Accepted: 16 March 2018; Published 30 April 2018.

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## SEA TURTLE ABUNDANCE AND DEMOGRAPHIC MEASUREMENTS IN A MARINE PROTECTED AREA IN THE FLORIDA KEYS, USA

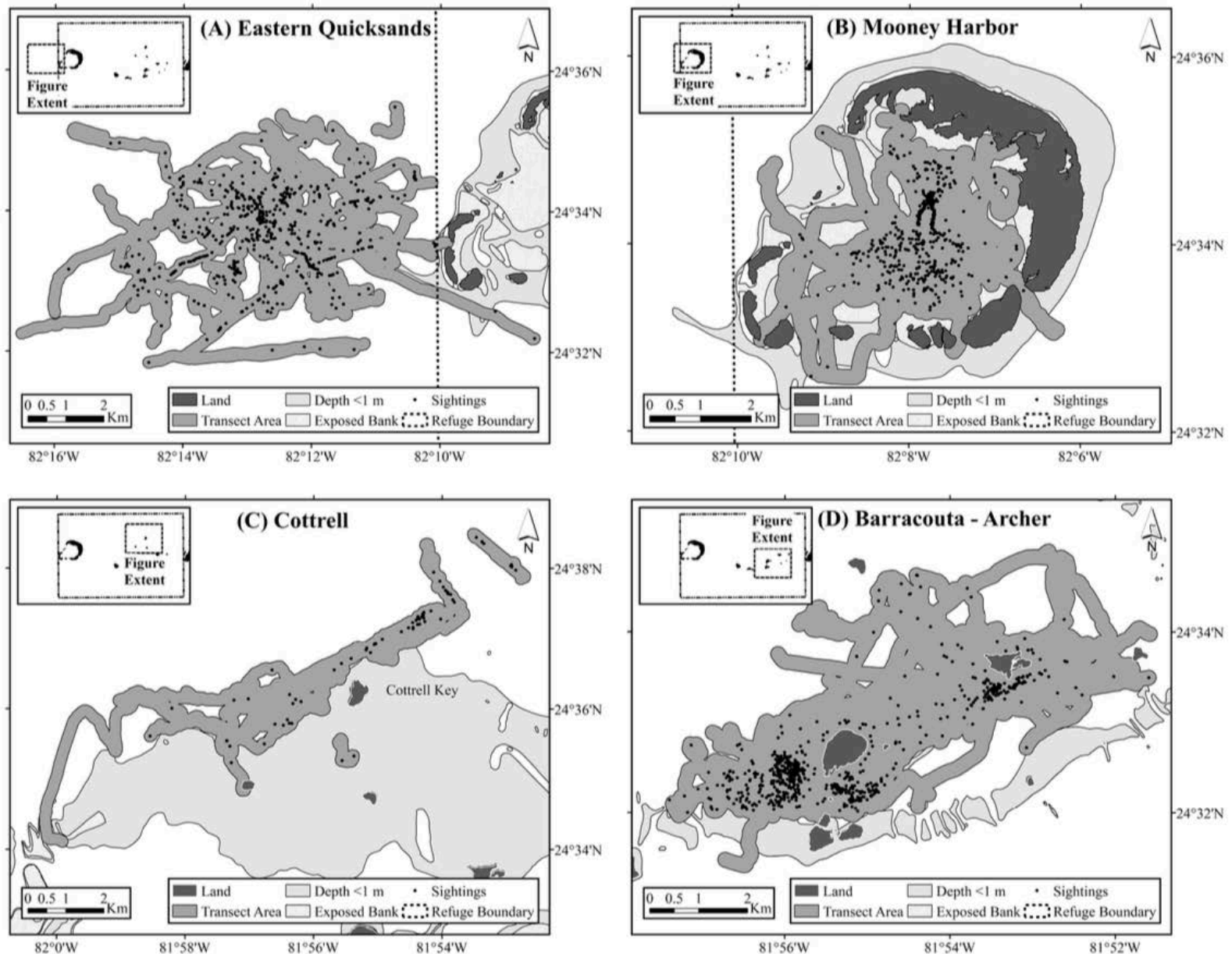
***RICHARD M. HERREN<sup>1,2,4</sup>, DEAN A. BAGLEY<sup>1</sup>, MICHAEL J. BRESSETTE<sup>1</sup>,  
KAREN G. HOLLOWAY-ADKINS<sup>3</sup>, DAVE CLARK<sup>1</sup>, AND BLAIR E. WITHERINGTON<sup>1</sup>***

<sup>1</sup>*Inwater Research Group, Inc., 4160 NE Hyline Drive, Jensen Beach, Florida 34957, USA*

<sup>2</sup>*Department of Wildlife Ecology and Conservation, University of Florida, 110 Newins-Ziegler Hall,  
Gainesville, Florida, 32611, USA*

<sup>3</sup>*East Coast Biologists, Inc., 141 Atlantic Avenue, Indialantic, Florida 32903, USA*

<sup>4</sup>*Corresponding author, e-mail: rherren@ufl.edu*



**FIGURE 2.** Transects and turtle sightings at four core use areas: (A) Eastern Quicksands, (B) Mooney Harbor, (C) Cottrell Key, and (D) Barracouta and Archer Keys. Transect lines were buffered to 150 m and dissolved into a single polygon.

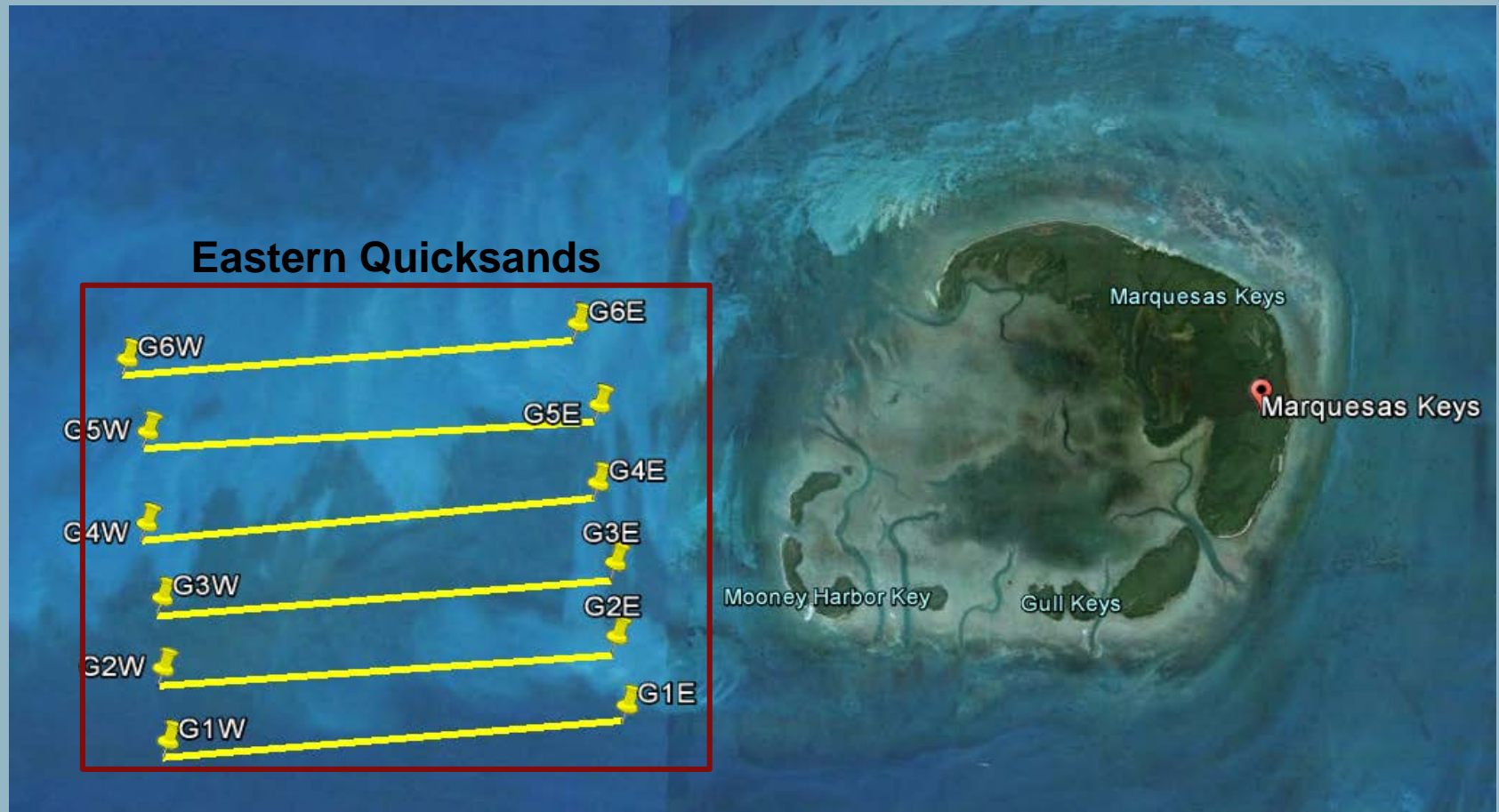


# Standardized Transects

Six transect lines

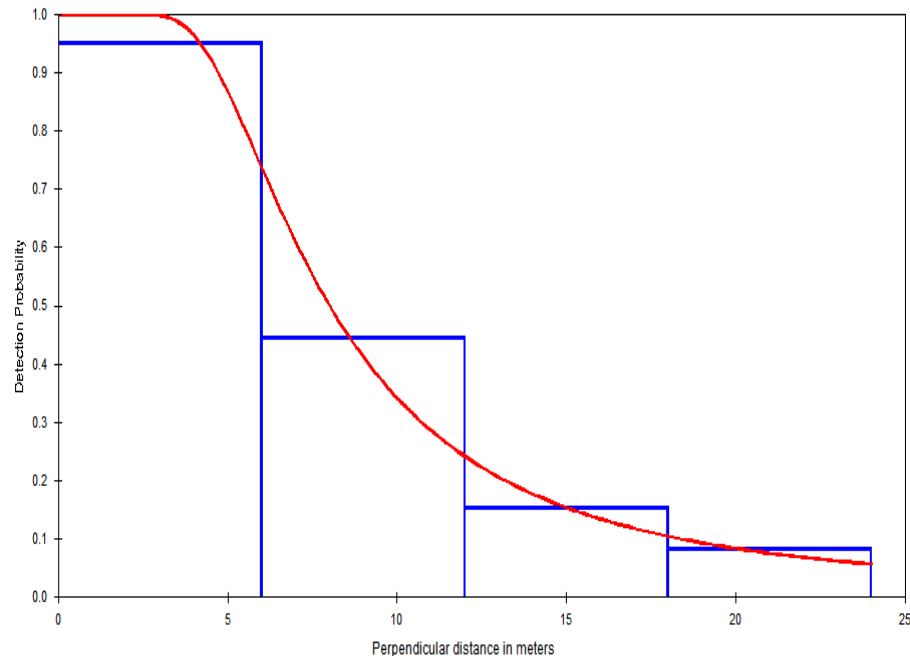
~30 km<sup>2</sup> field site

Transects: 18 times since 2006

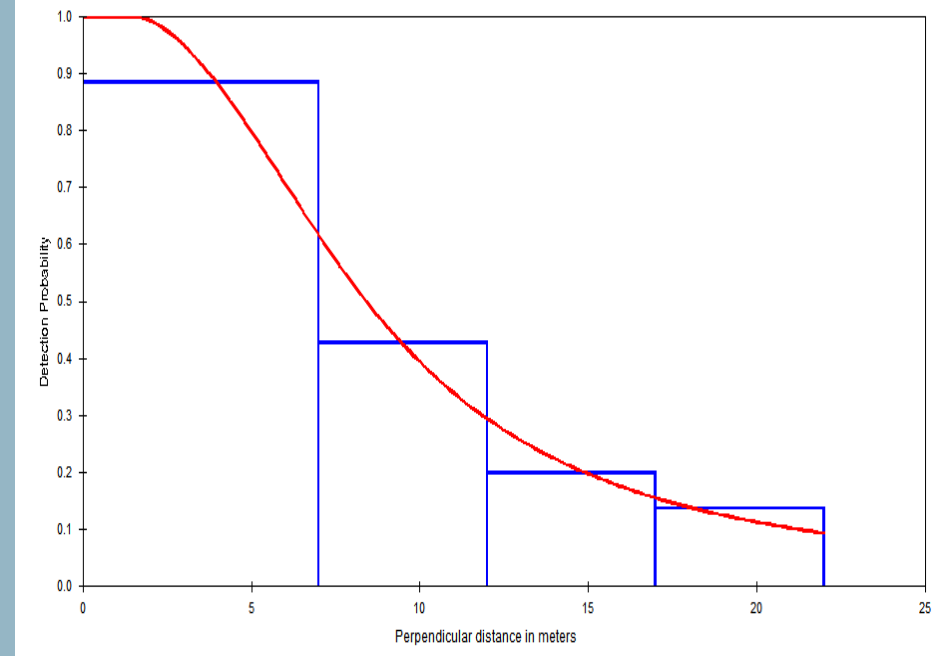


# Distance Sampling

**Subadults**  
**597 Observations**



**Adults**  
**444 Observations**



**Density Surface Models**  
combine these functions with spatial variables:  
**Sightings, Transects, Habitat, Depth**



# Predicted Distributions

Subadult  
Estimated abundance: 2239



Turtles per 50m<sup>2</sup>



1.12

0.001

2

Kilometers

Adult  
Estimated abundance: 1415



Turtles per 50m<sup>2</sup>



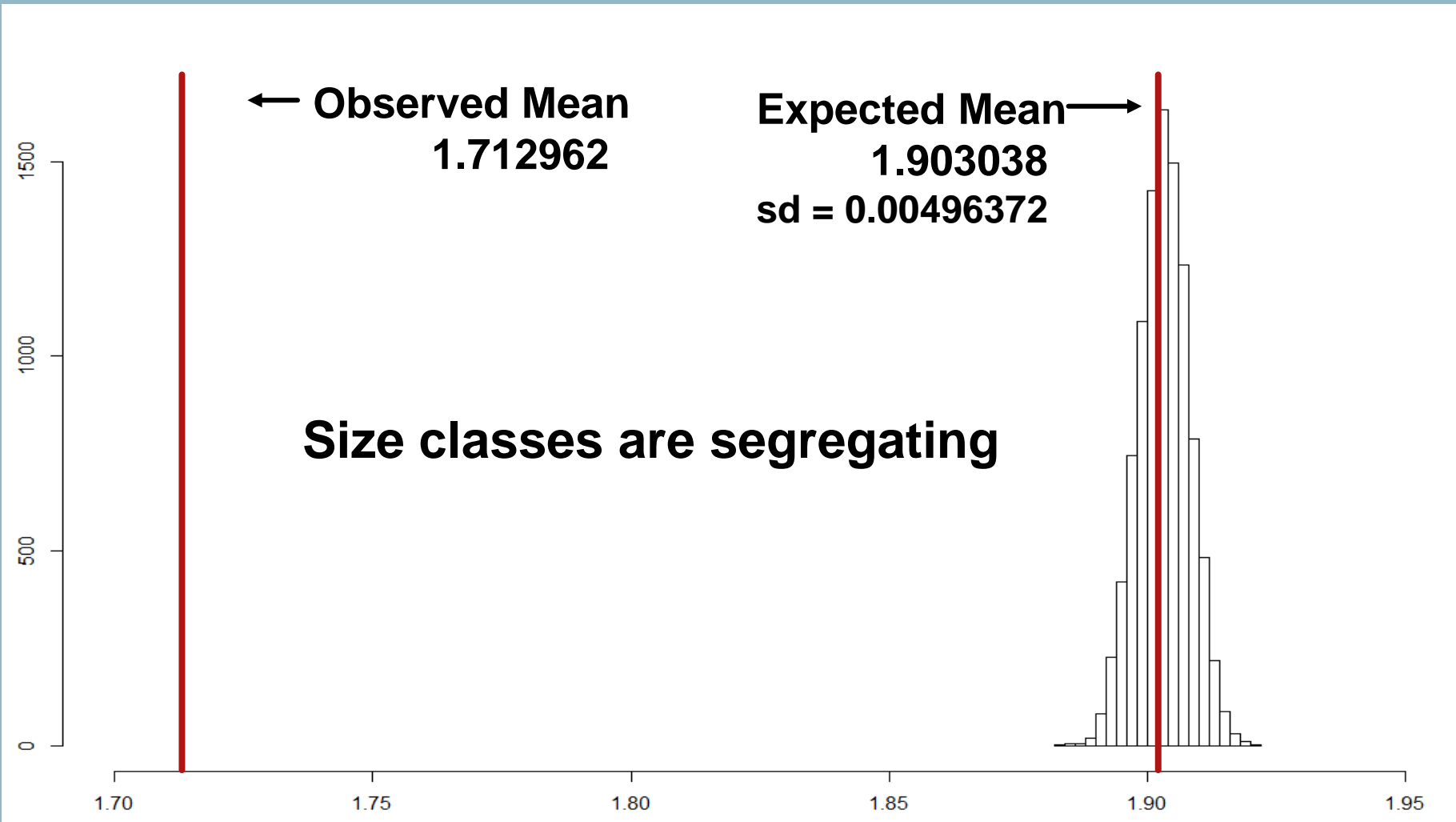
1.12

0.001

2

Kilometers

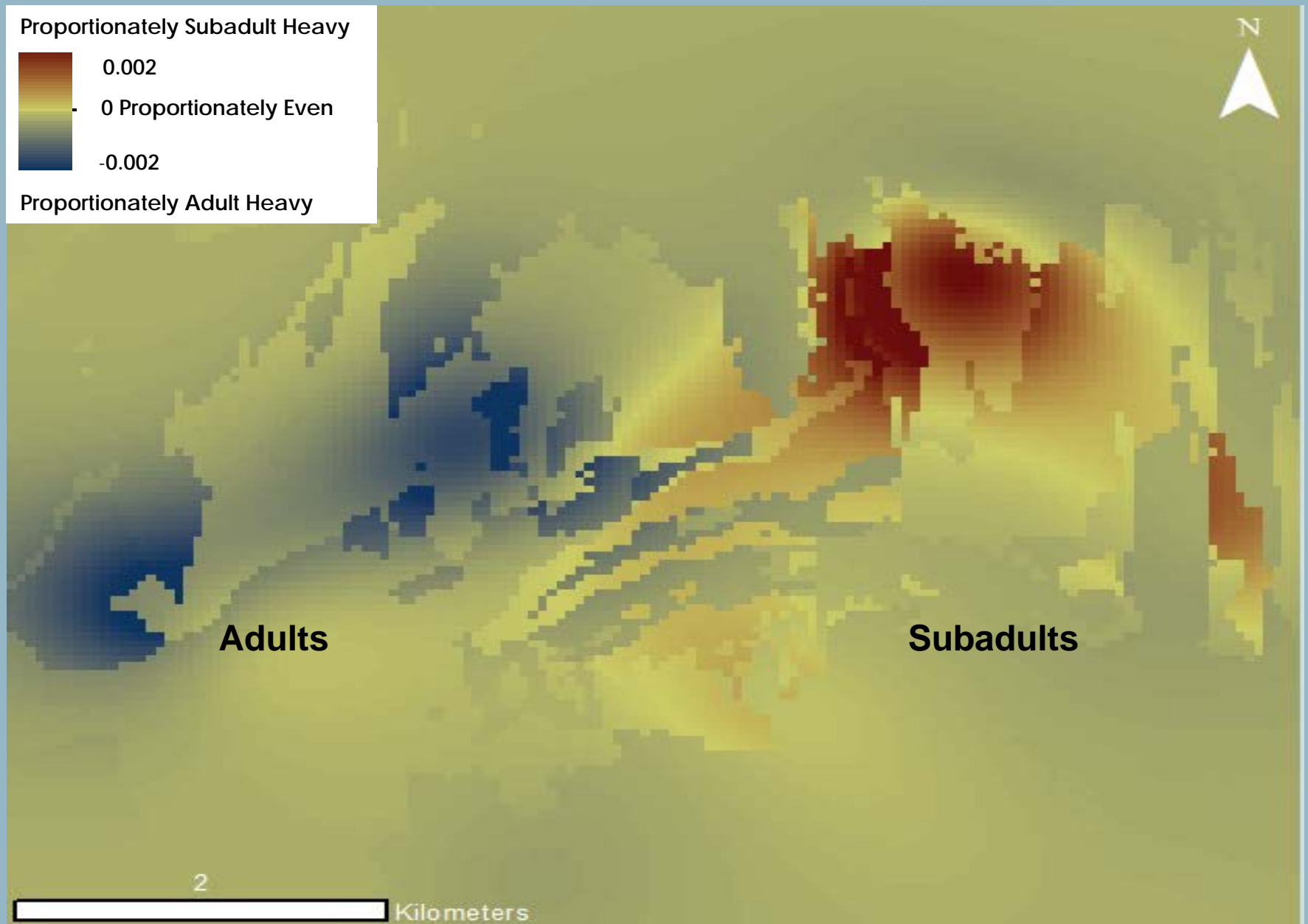
# Null Model Analysis



**Histogram of null model results**



# Size Class Segregation



# Discussion

## Adults

- Shallower water depths
- Preferentially occupying ecotones
  - Bare sand/seagrass/hard bottom

## Subadults

- Focused on seagrass
- Deeper water refugia?

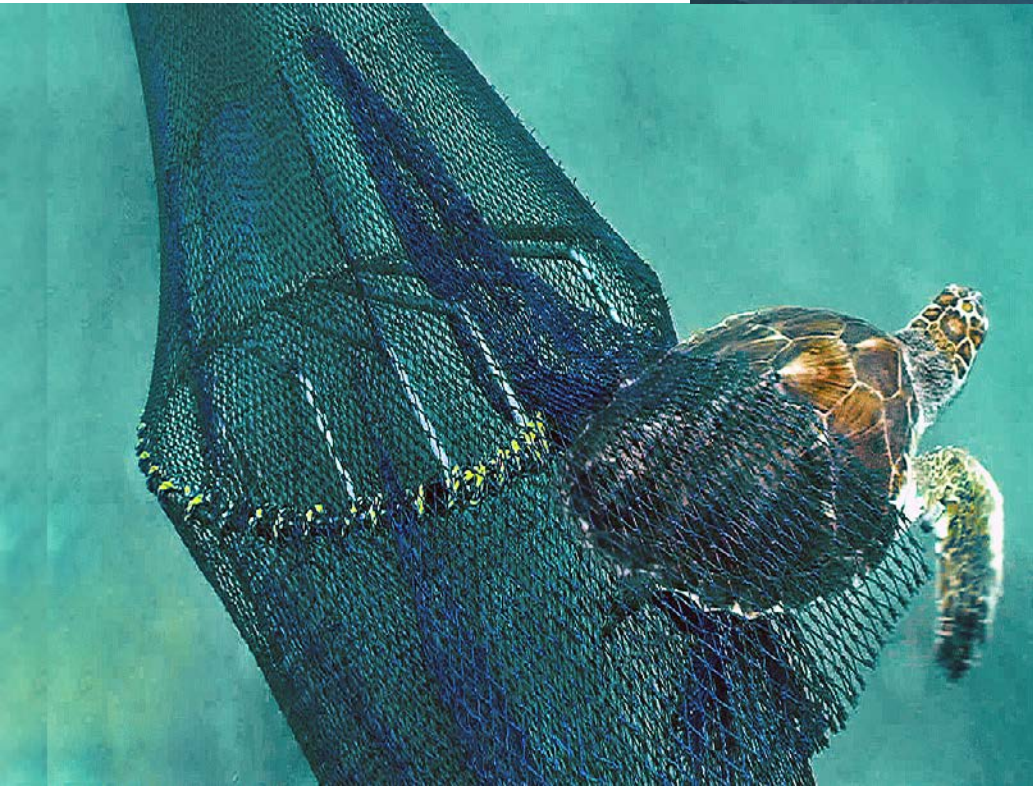
Determining segregation can inform us on further aspects of this species biology:

- Predator avoidance strategies
- Intraspecific competition



# Threats

Fisheries  
Mortality





# Threats

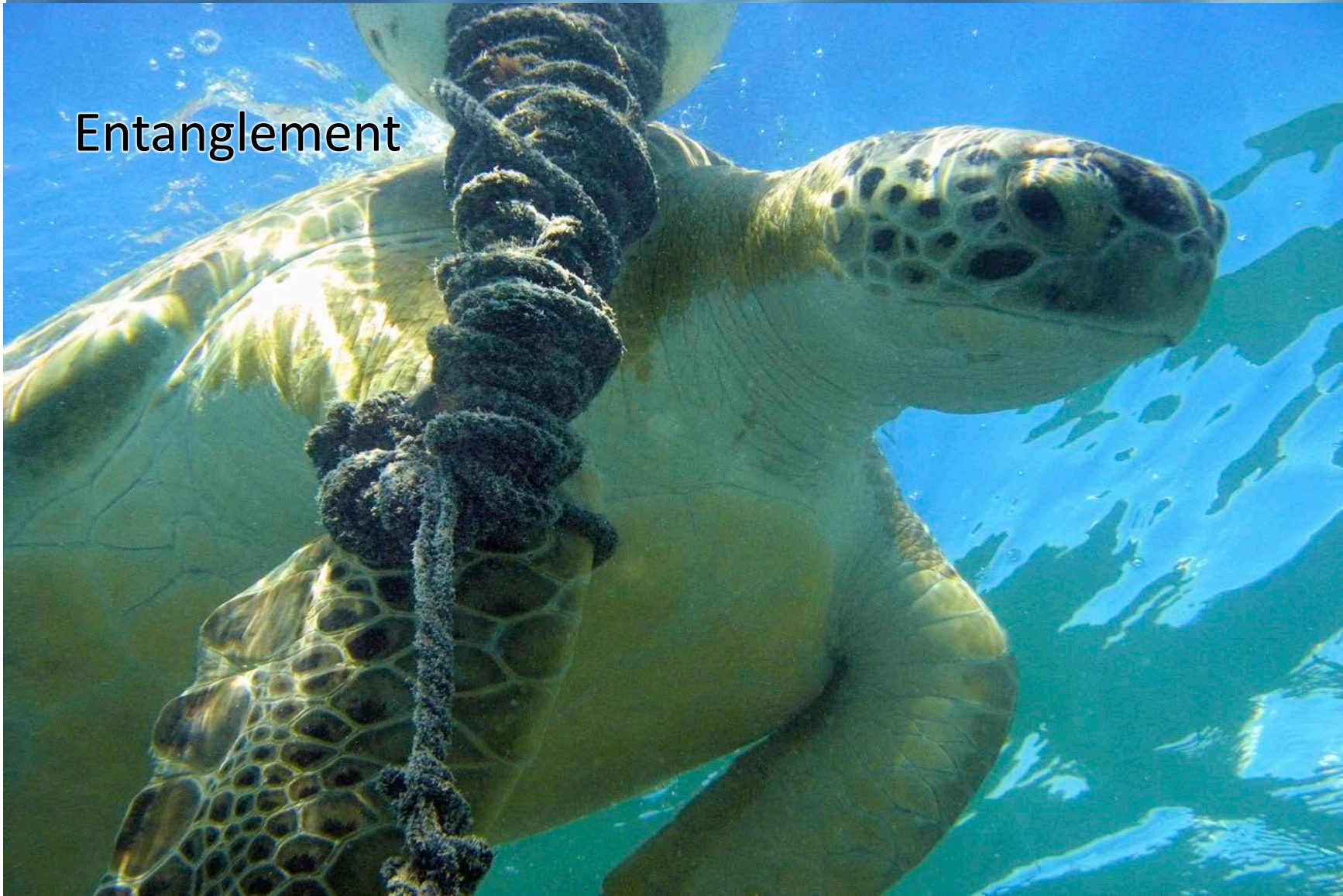
Vessel  
Strikes





# Threats

Entanglement





# Solutions

## Marquesas Post-Michael Cleanup





# On the Horizon

## Lower Keys Sea Turtle Health Assessment





On the Horizon

Additional Areas of  
Importance





*Questions?*

