

Performance Evaluation of the Western Sambo Ecological Reserve: Groupers and Snappers



**FKNMS Advisory Council
Tuesday, April 16, 2019**



**Florida Fish and Wildlife Conservation Commission
Fish and Wildlife Research Institute**

Project Overview

- **Purpose:**

- Evaluate the efficacy of no-take zones for protecting groupers and snappers

- **Two Research Approaches:**

- 1) **Underwater Fish Counts**

- Examine population structure

- 2) **Acoustic Telemetry**

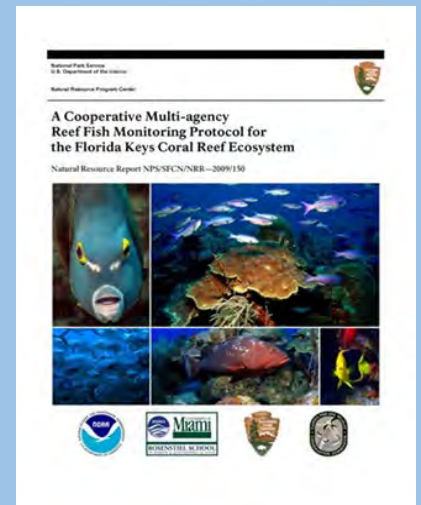
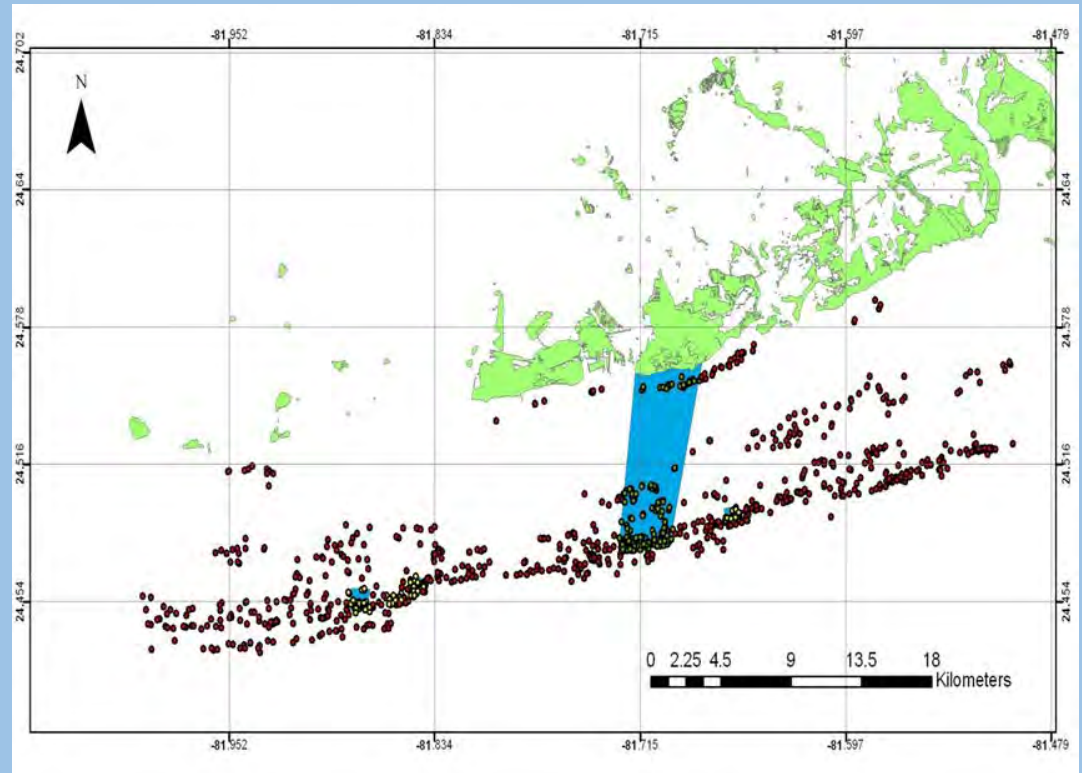
- Estimate home range



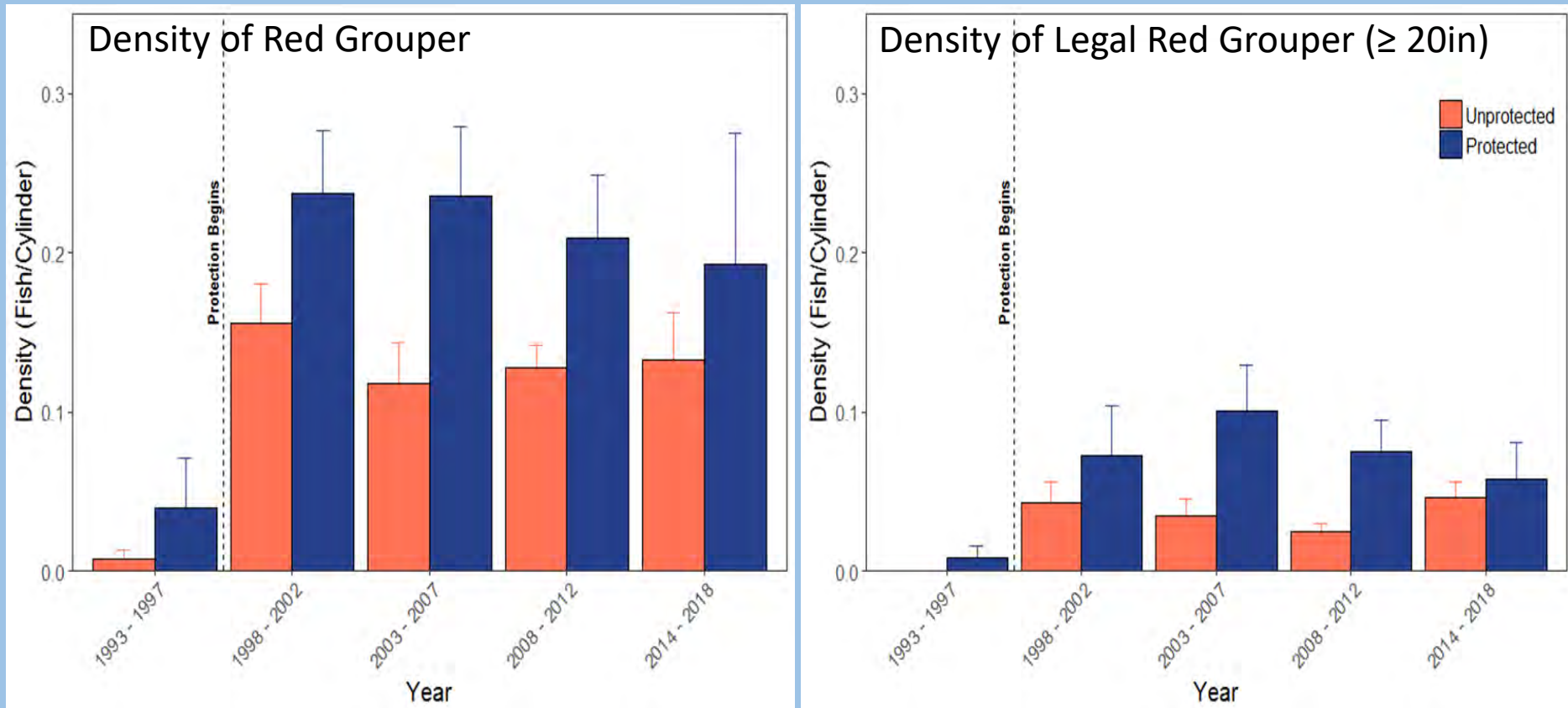
Fish Surveys

Reef-fish Visual Census (RVC)

- Stationary point count
 - All species for ~15 minutes
 - Species, length, and number
- Stratified Random Sampling
 - Seven habitat types
 - Two Protection levels
- Population structure
 - Fish density
 - Length Frequency

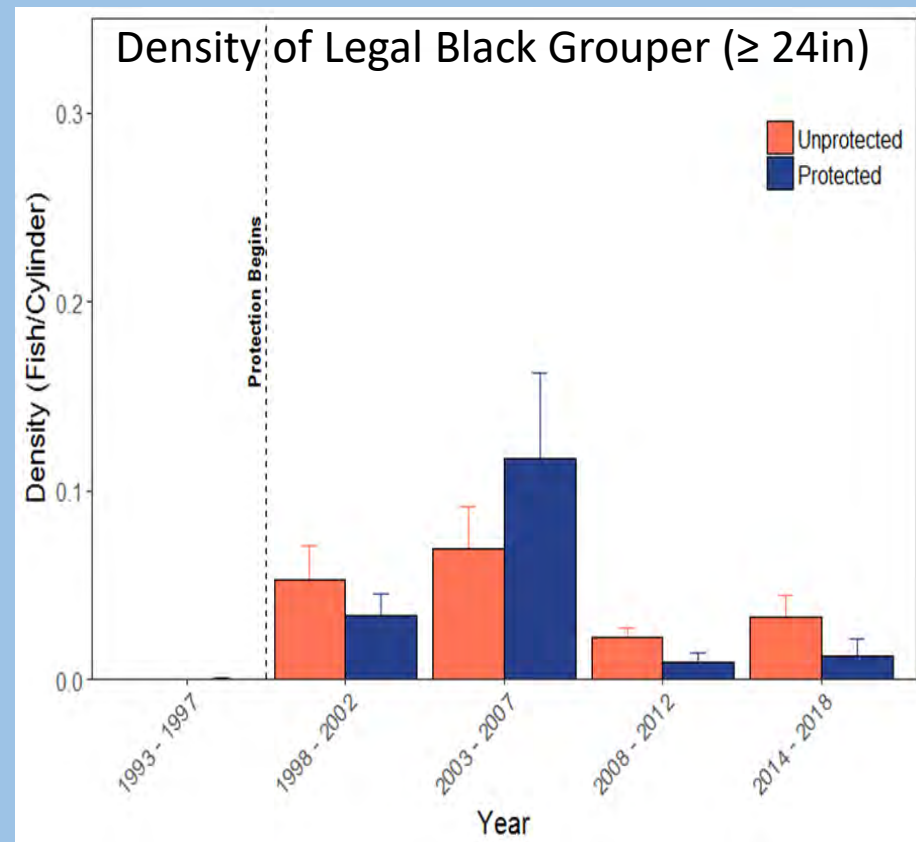
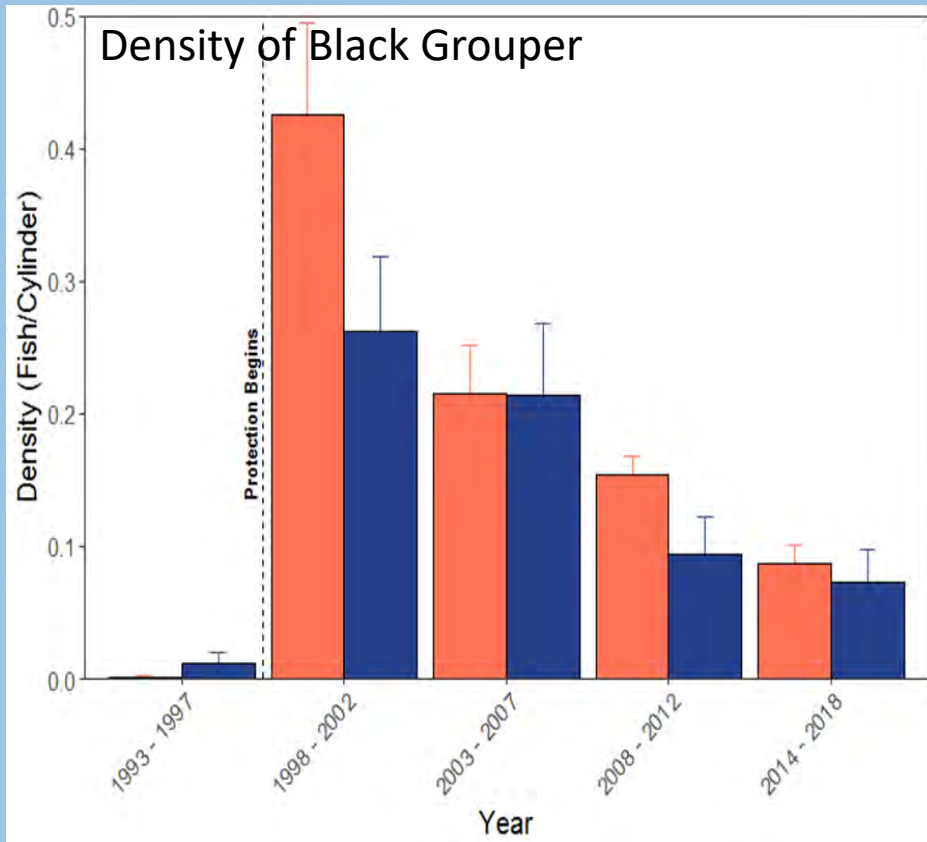


Density of Red Grouper observed in the Western Sambos and Lower Keys from Visual Census Data from 1993- 2018



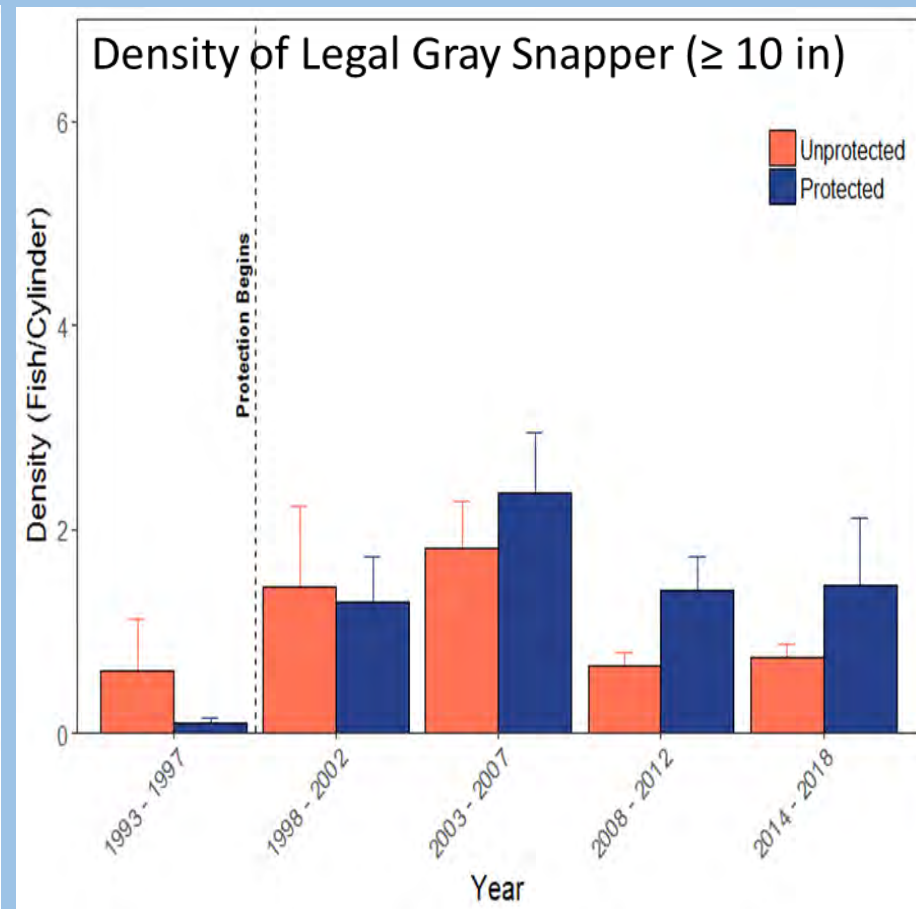
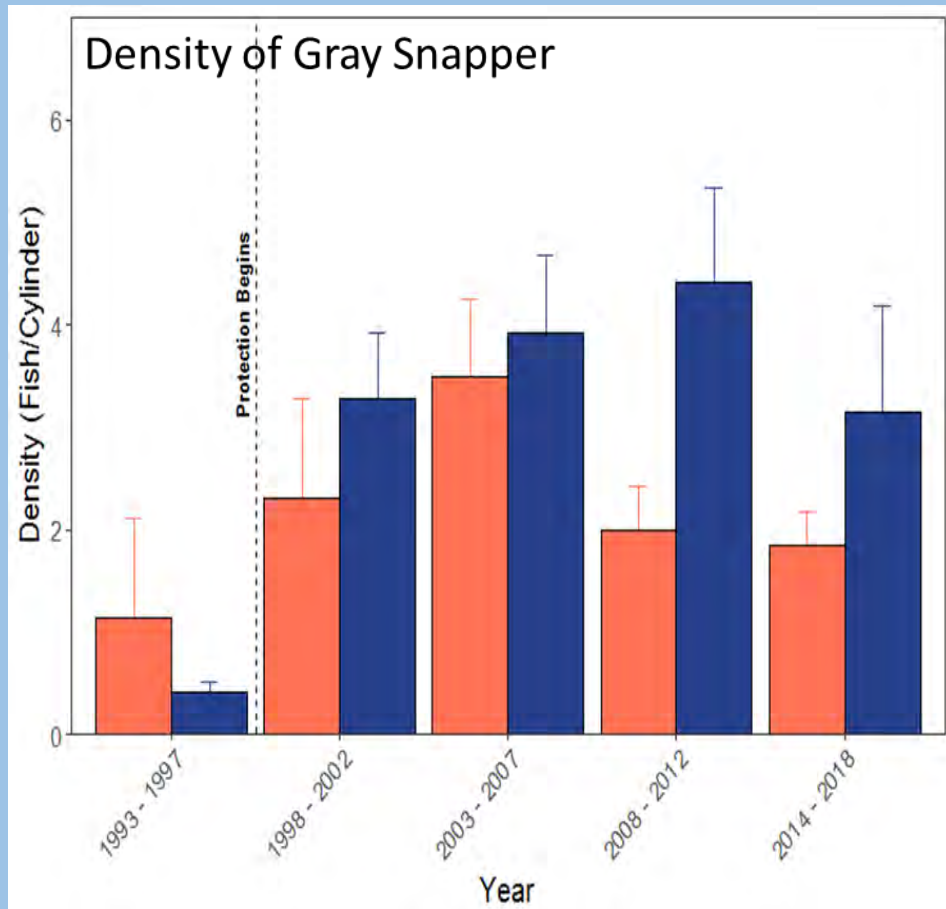
- Substantial reserve effect
- WSER habitats provide protection for sub-adult and adult red grouper

Density Black Grouper observed in the Western Sambos and Lower Keys from Visual Census Data from 1993- 2018



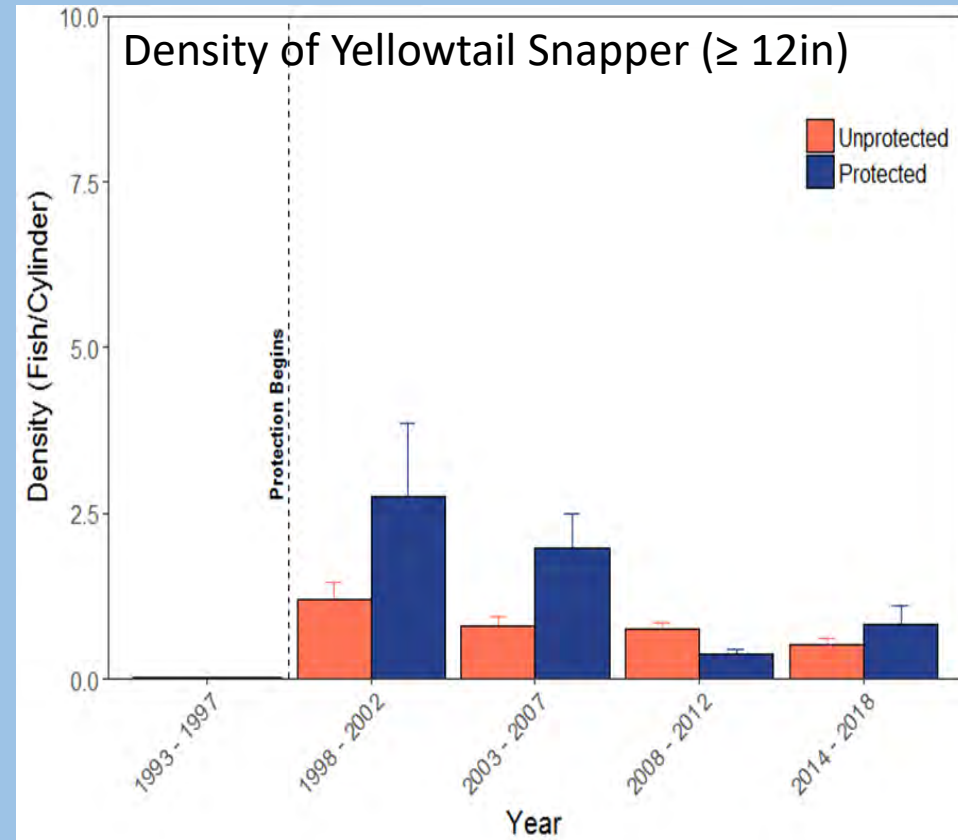
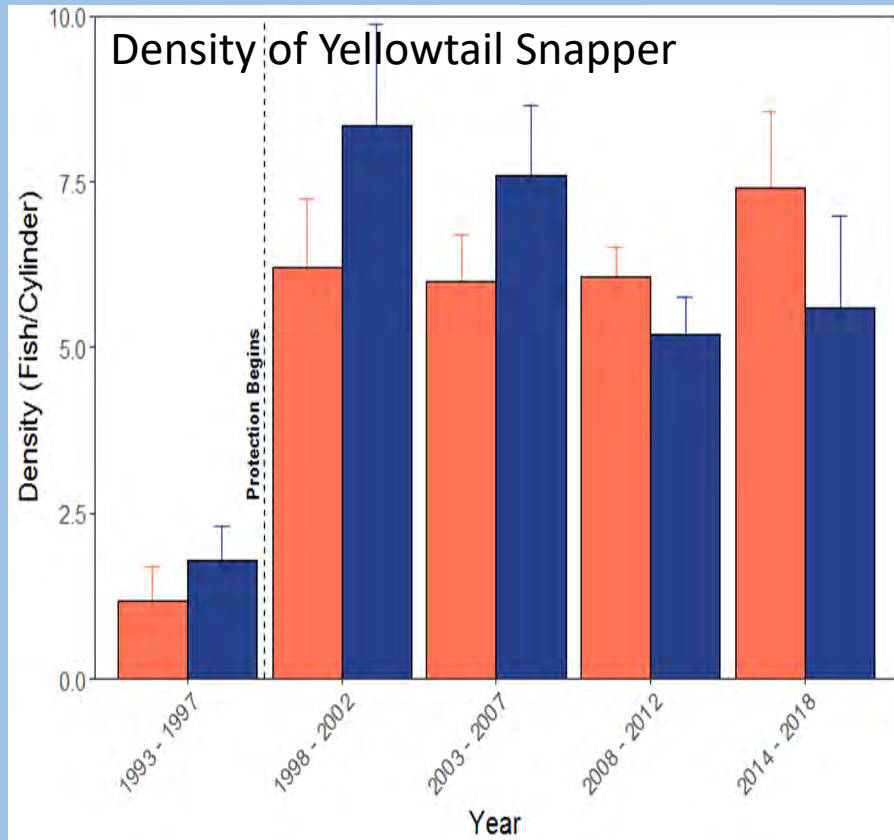
- No detectable reserve effect
- Black grouper more transient than red grouper as sub-adults and adults
- Adult black grouper typically found in deeper water beyond the boundary of WSER

Density Gray Snapper observed in the Western Sambos and Lower Keys from Visual Census Data from 1993- 2018



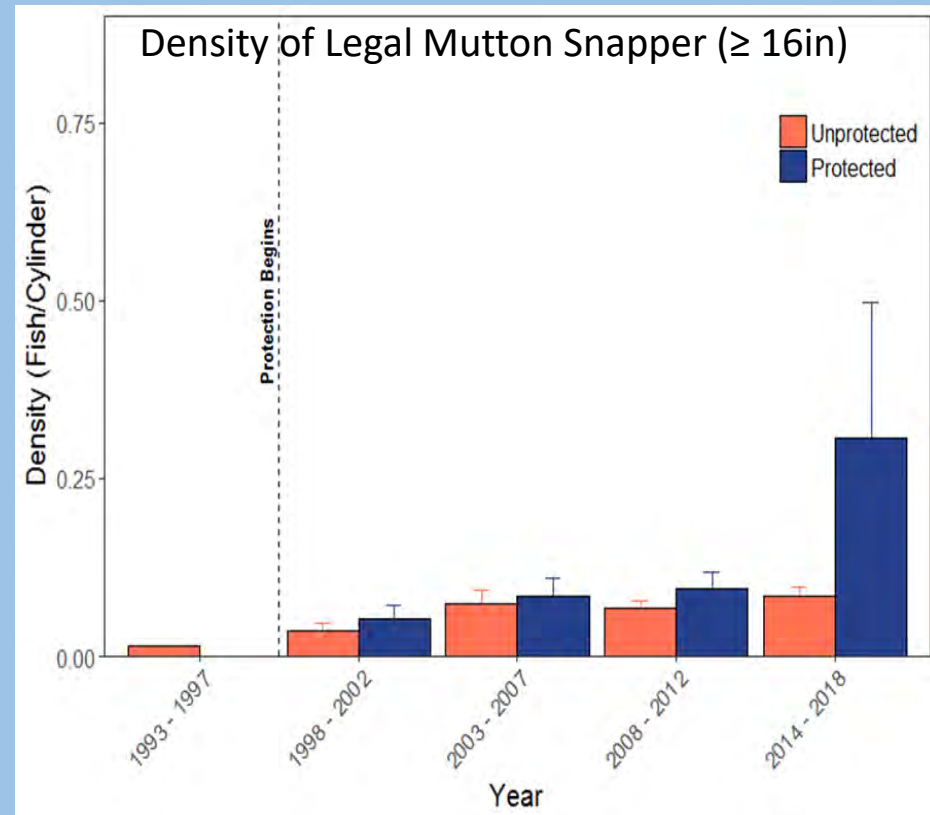
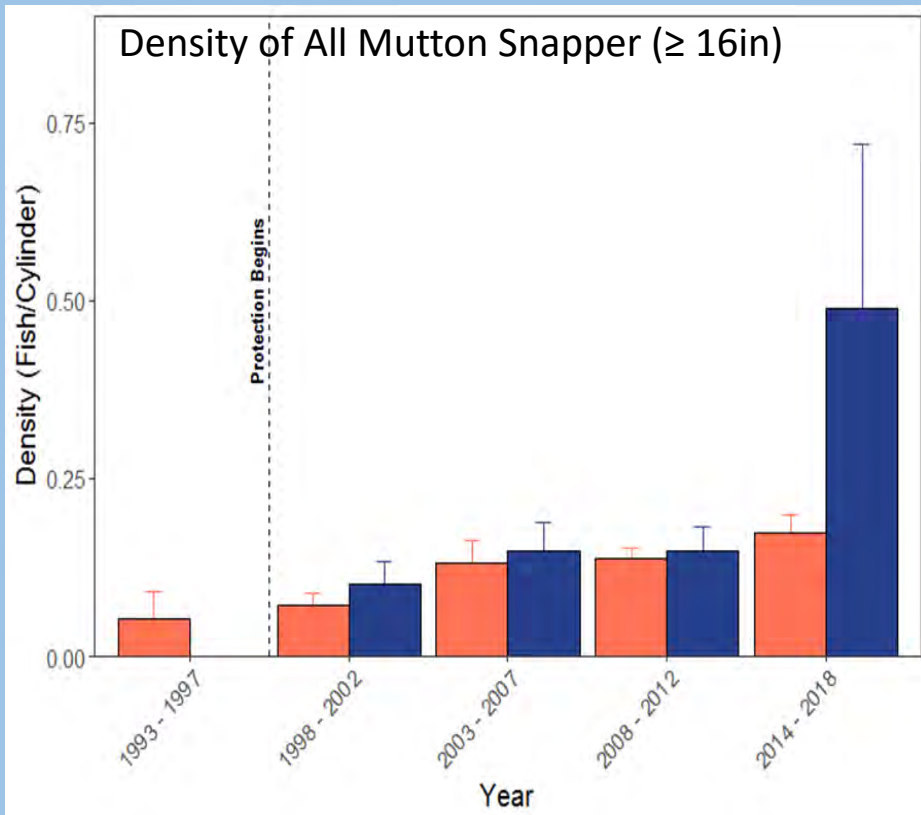
- Substantial reserve effect
- WSER habitats provide protection for entire gray snapper life history

Density Yellowtail Snapper observed in the Western Sambos and Lower Keys from Visual Census Data from 1993- 2018



- Moderate reserve effect
- WSER patch reefs and seagrass beds provide high-quality sub-adult habitat
- Adults typically farther offshore than boundary of WSER

Density Mutton Snapper observed in the Western Samboos and Lower Keys from Visual Census Data from 1993- 2018



- No detectable reserve effect
- Do not form large groups except during spawning
- Adults migrate from residence areas to spawning sites

Acoustic Telemetry Approach

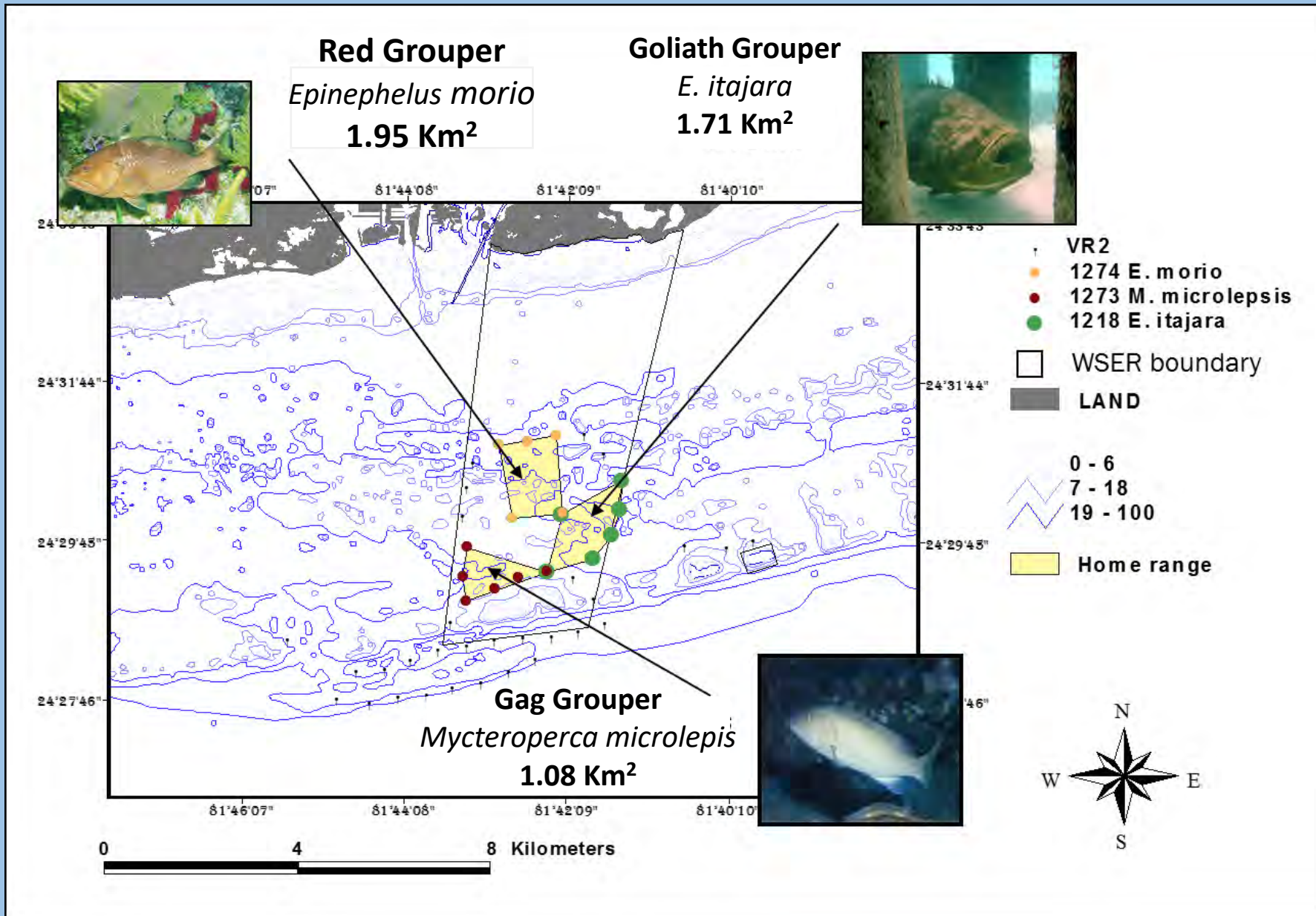
To estimate average home range of groupers

Acoustic Tagging

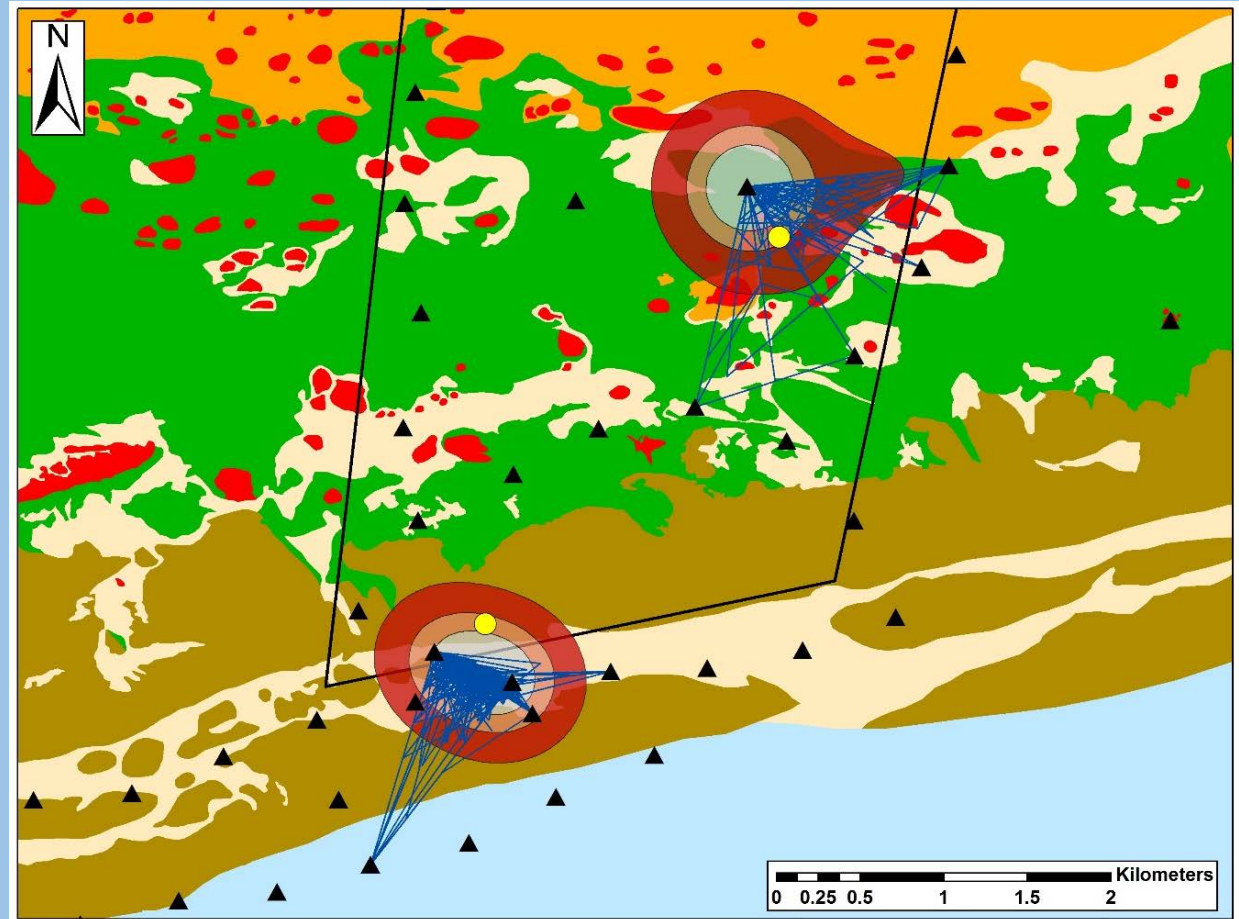
- 36 Groupers were tagged
 - Red grouper
 - Black grouper
 - Nassau grouper
 - Goliath grouper
 - Gag grouper
- Gear: Hook and Line or Fish Traps
 - Inside and outside no-take zone
- Surgically implanted at surface



Groupers Home Range



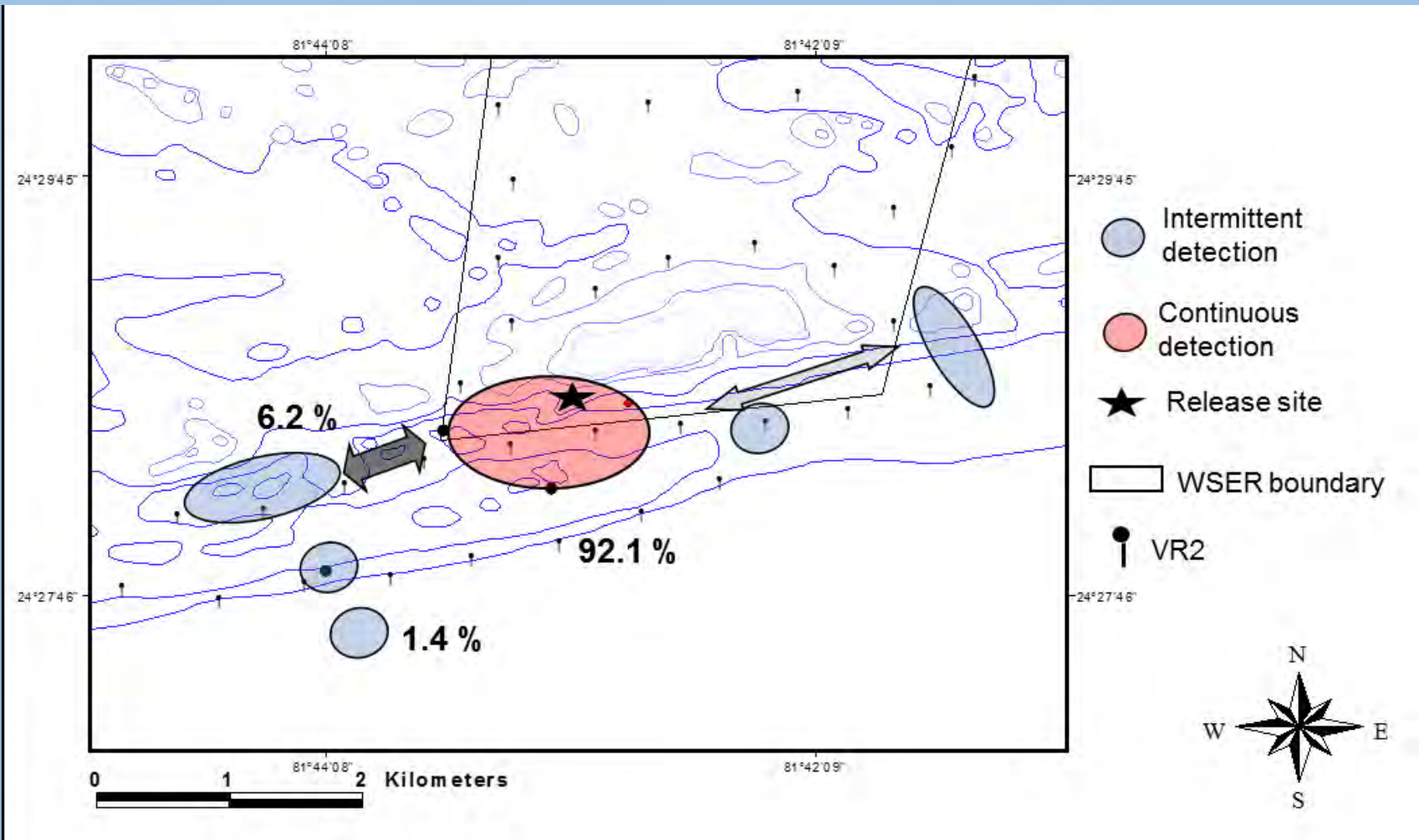
Red Grouper Home Range



- Mean Red Grouper home range was $2.00 \pm 0.42 \text{ km}^2$
 - Reef Tract: $1.64 \pm 0.60 \text{ km}^2$
 - Patch Reefs: $2.28 \pm 0.60 \text{ km}^2$
- No difference in home range by habitat ($p = 0.45, n = 14$)

Black Grouper Habitat use

- Black grouper exhibit less site fidelity than red grouper
- Adult black grouper typically found in deeper water beyond the boundary of WSER



SUMMARY

- Moderate or no reserve effects were detected for:

Mobile species: yellowtail snapper, mutton snapper, and black grouper

- Substantial reserve effects detected for:

Resident fish (sedentary): red grouper

Species that utilized different habitat/depth combination: gray snapper

- Level of protection provided by the WSER for fish was directly related to reserve size, configuration, habitat, and the life history
- Understanding the movement behavior and home range of an exploited species is critical for effective spatial management.

Thank You



Acknowledgements

