

Successful Trends in the Ecological Reserves in the Florida Keys National Marine Sanctuary

US Coral Reef Task Force Steering Committee Meeting



NATIONAL MARINE
SANCTUARIES

Billy D. Causey, Ph.D.
Southeast Regional Director
Office of National Marine Sanctuaries
San Juan, Puerto Rico
November 3, 2009

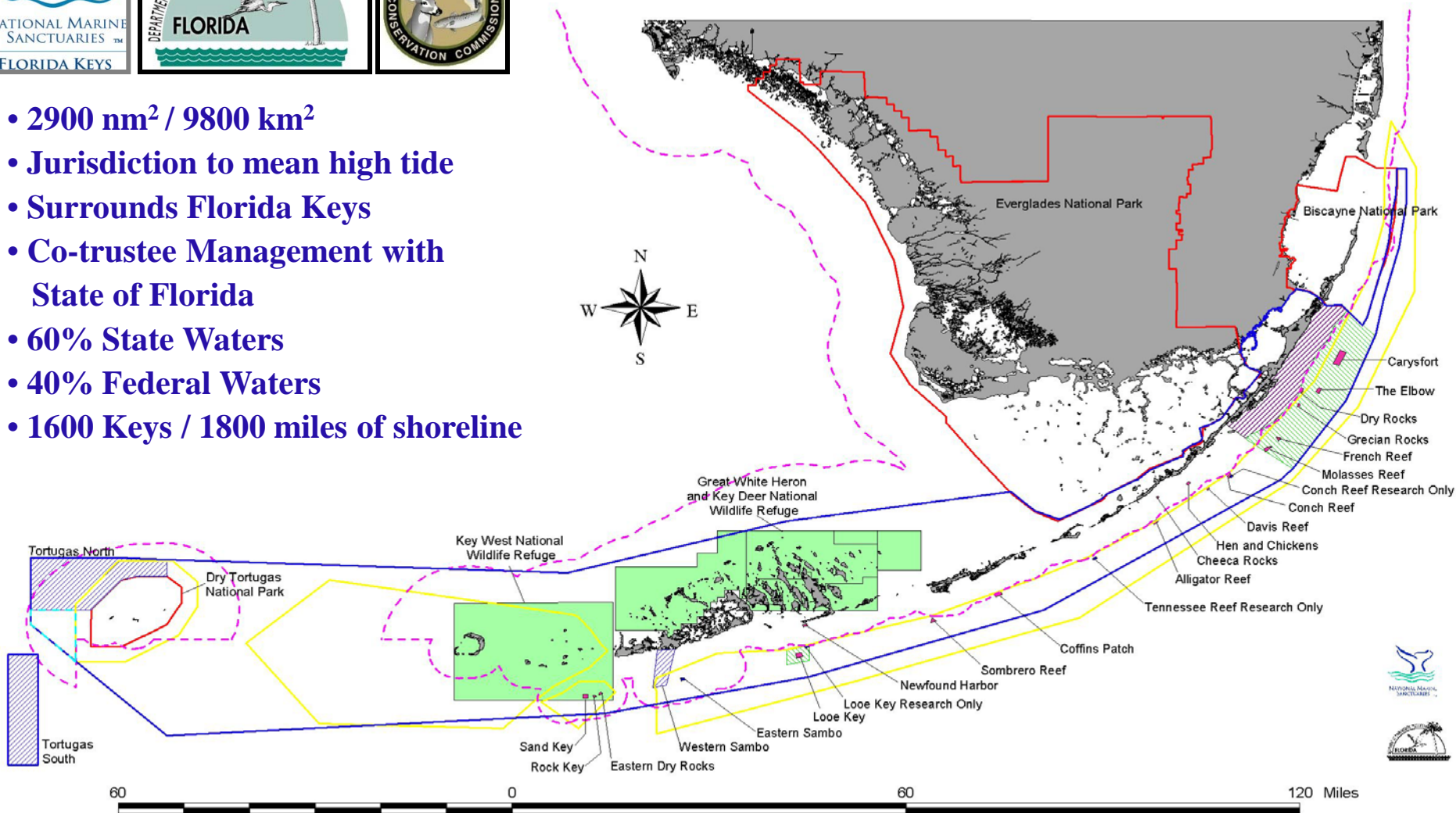




Florida Keys National Marine Sanctuary



- 2900 nm² / 9800 km²
- Jurisdiction to mean high tide
- Surrounds Florida Keys
- Co-trustee Management with State of Florida
- 60% State Waters
- 40% Federal Waters
- 1600 Keys / 1800 miles of shoreline



created by Kevin Kirach 11/13/01



Threats to Coral Reefs



- **Climate Change**
- **Land-based Sources of Pollution**
- **Habitat Loss and Destruction**
- **Overfishing**



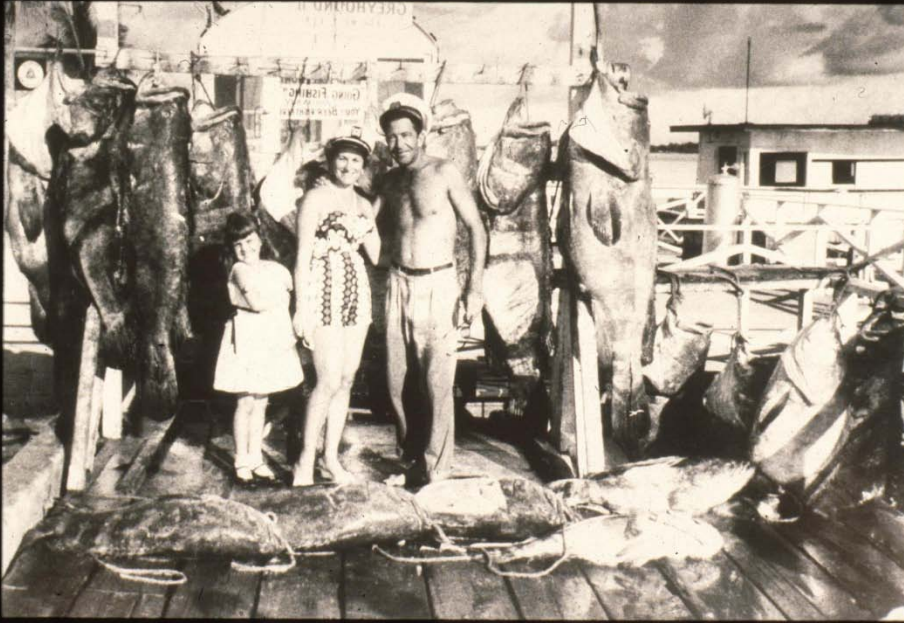
Overfishing

Can be Managed

At

Local Levels

What the Florida Keys reef fishery used to be?



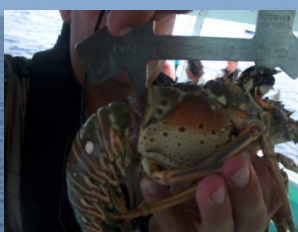
An “average day”
of fishing in the
Florida Keys in
the 1930s-1950s.

Ault et al, 2008





Commercial Fishing



Commercial lobster vessel cited for possession of egg bearing and undersize spiny lobster





Recreational Fishing



Southeast Florida Regional Reef Fish Landings Composition

Reef Fish Landings

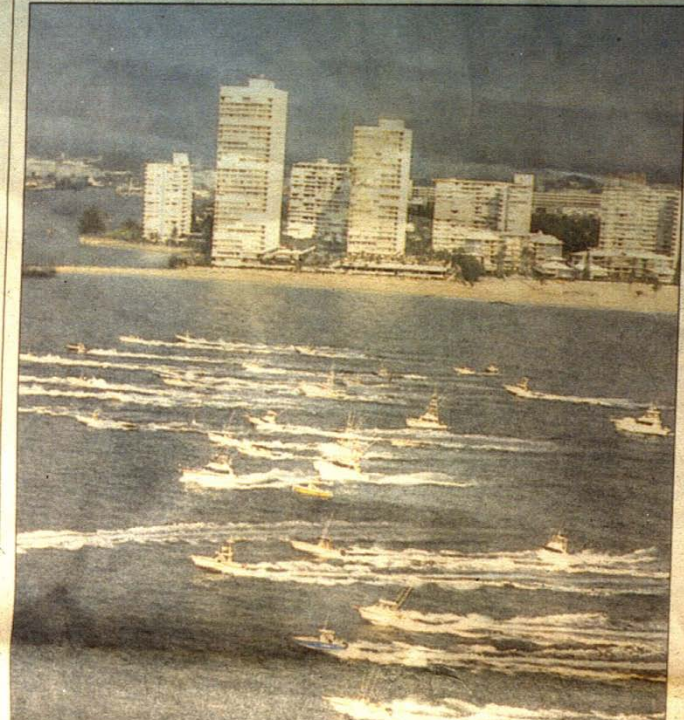
68% **Recreational**

5% **Headboat**

27% **Commercial**

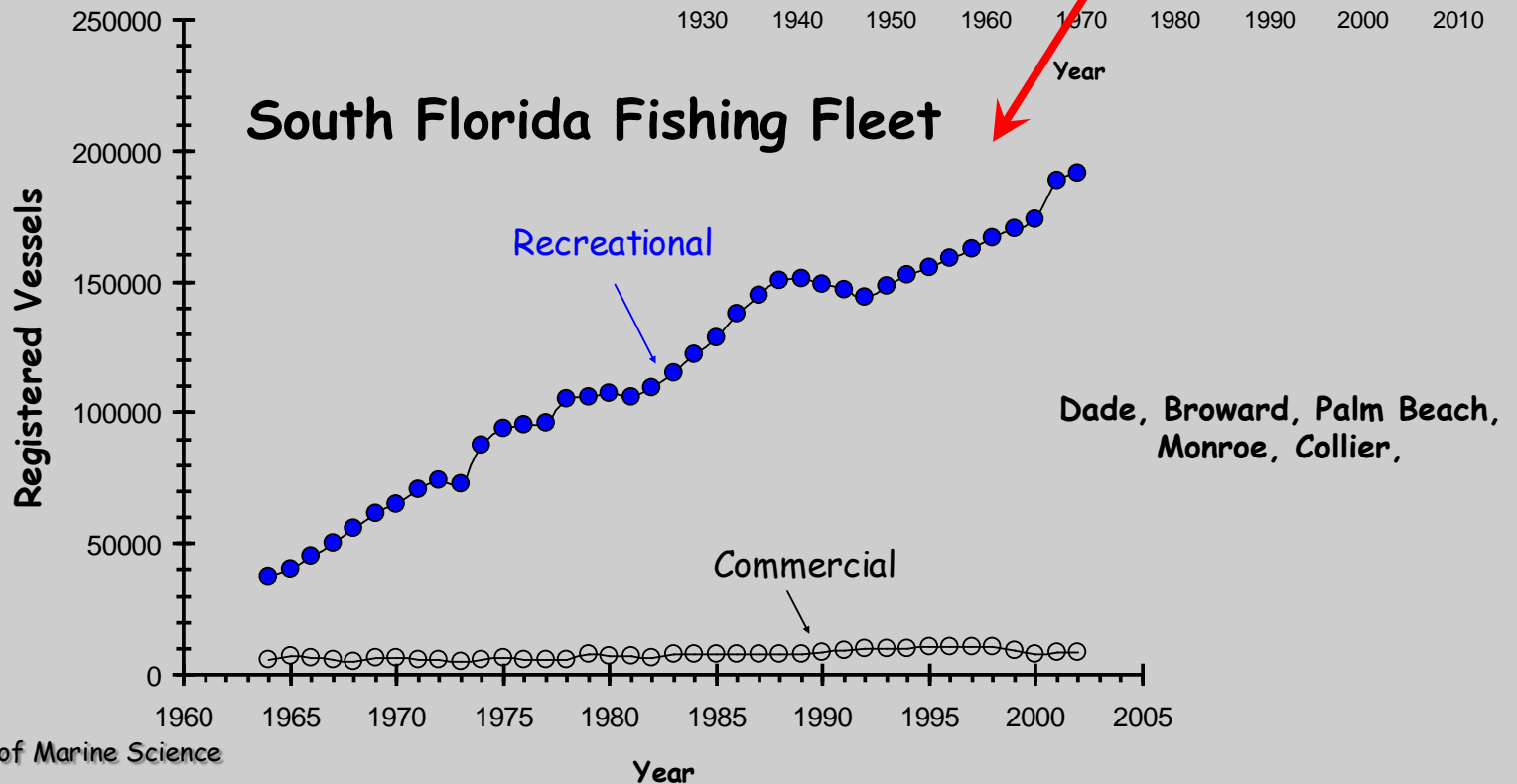
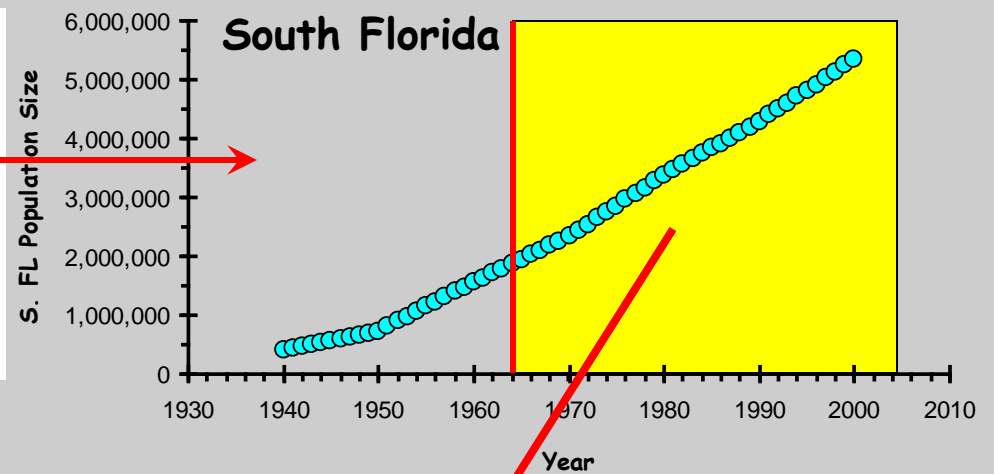
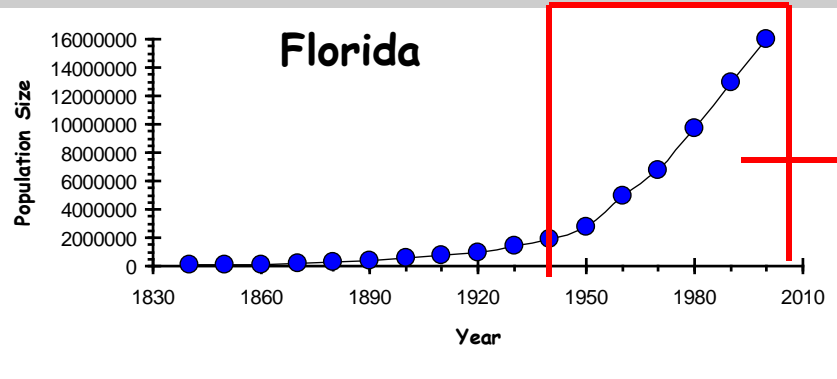
100% **Total**

GONE FISHING

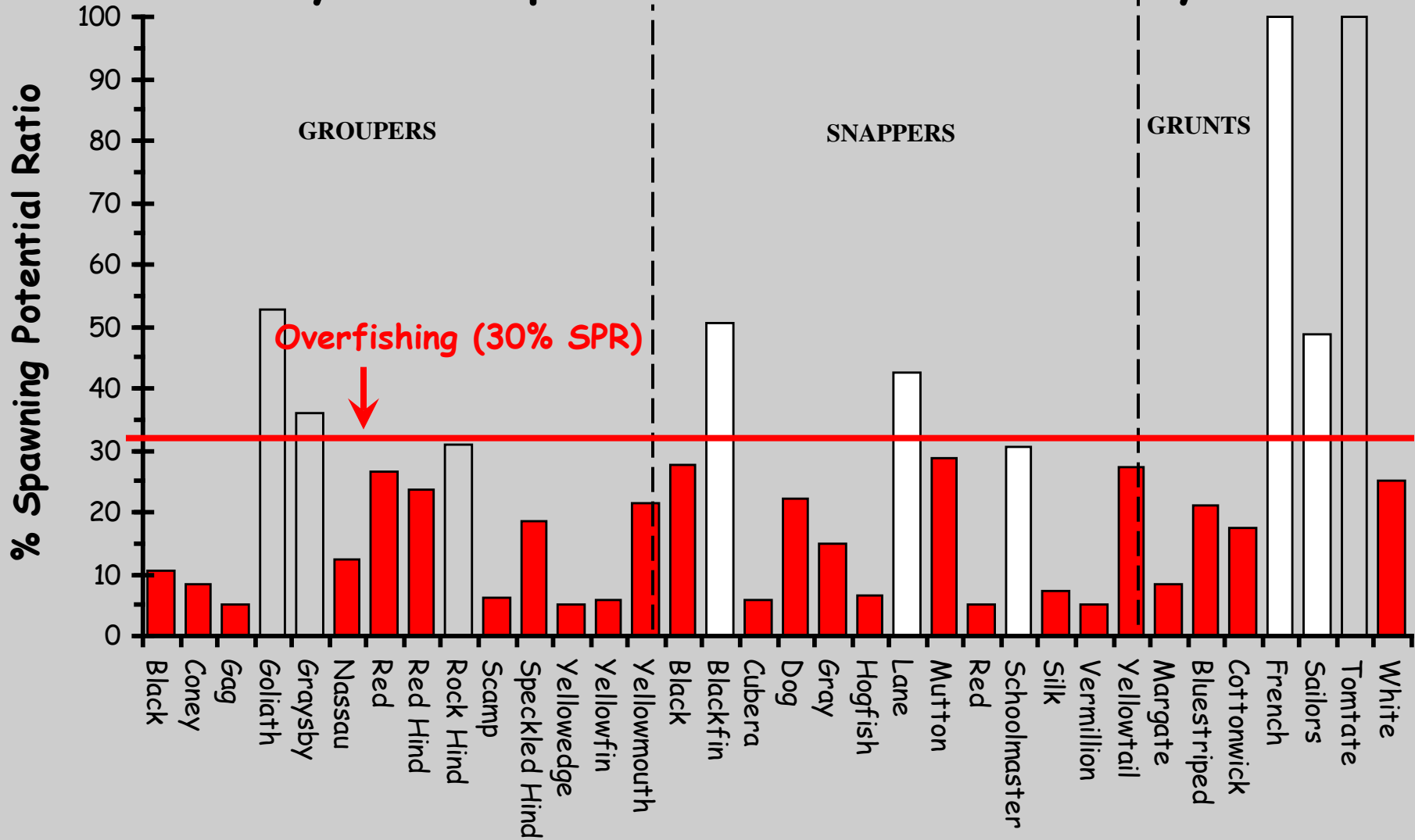


...see story in Sports, Page 1C.

Florida's Human Population Growth Dynamics



Current Management Benchmarks: FL Keys Multispecies Reef Fish Community



Exploited Coral Reef Fishes

Ault, J.S., Bohnsack, J.A., and G.A. Meester. 1998. Fishery Bulletin 96:395-414
 (Best Publication Award in *Fishery Bulletin* & NOAA Certificate of Achievement 2002)
 Ault, J.S., Smith, S.G., and J.A. Bohnsack. 2005. ICES Journal of Marine Science 62:417-423

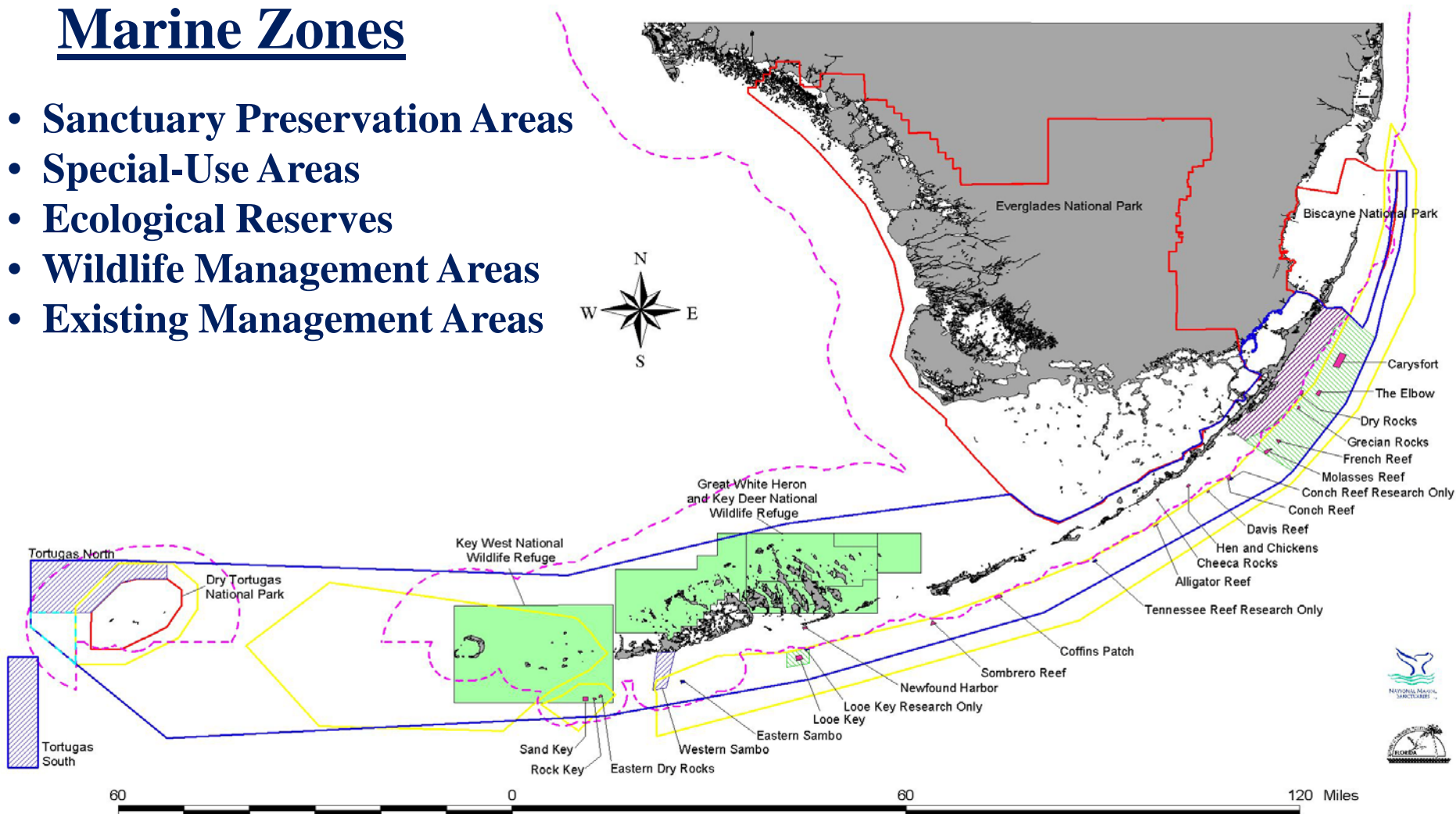


Florida Keys National Marine Sanctuary



Marine Zones

- Sanctuary Preservation Areas
- Special-Use Areas
- Ecological Reserves
- Wildlife Management Areas
- Existing Management Areas



created by Kevin Kirach 11/13/01



FKNMS Marine Zoning Plan



- **18 Sanctuary Preservation Areas**
- **4 Research-Only Areas**
- **2 Ecological Reserves**
(1997 and 2001)



- **27 Wildlife Management Areas**
- **19 Existing Management Areas**



Ecological Reserves



- 2 Areas - 9 snm and 151 snm
- Areas of high habitat and species diversity
- Representative Keys marine ecosystem
- Generally good water quality
- Encompass large enough areas to include a range of habitats
- Provide natural spawning, nursery, and permanent residence areas for the replenishment and genetic protection of marine life
- Protect and preserve all habitats and species particularly those not protected by fishery management regulations.

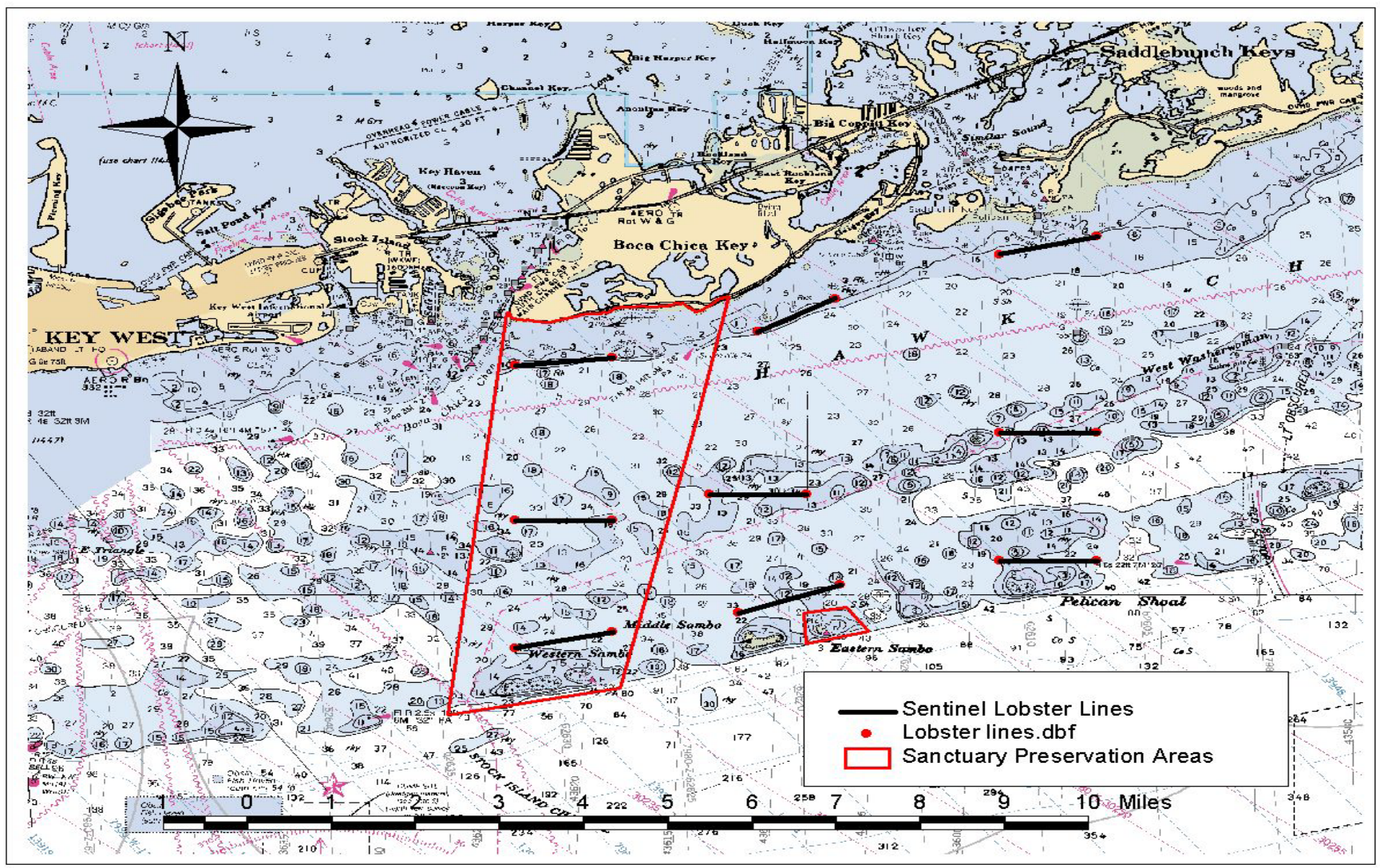






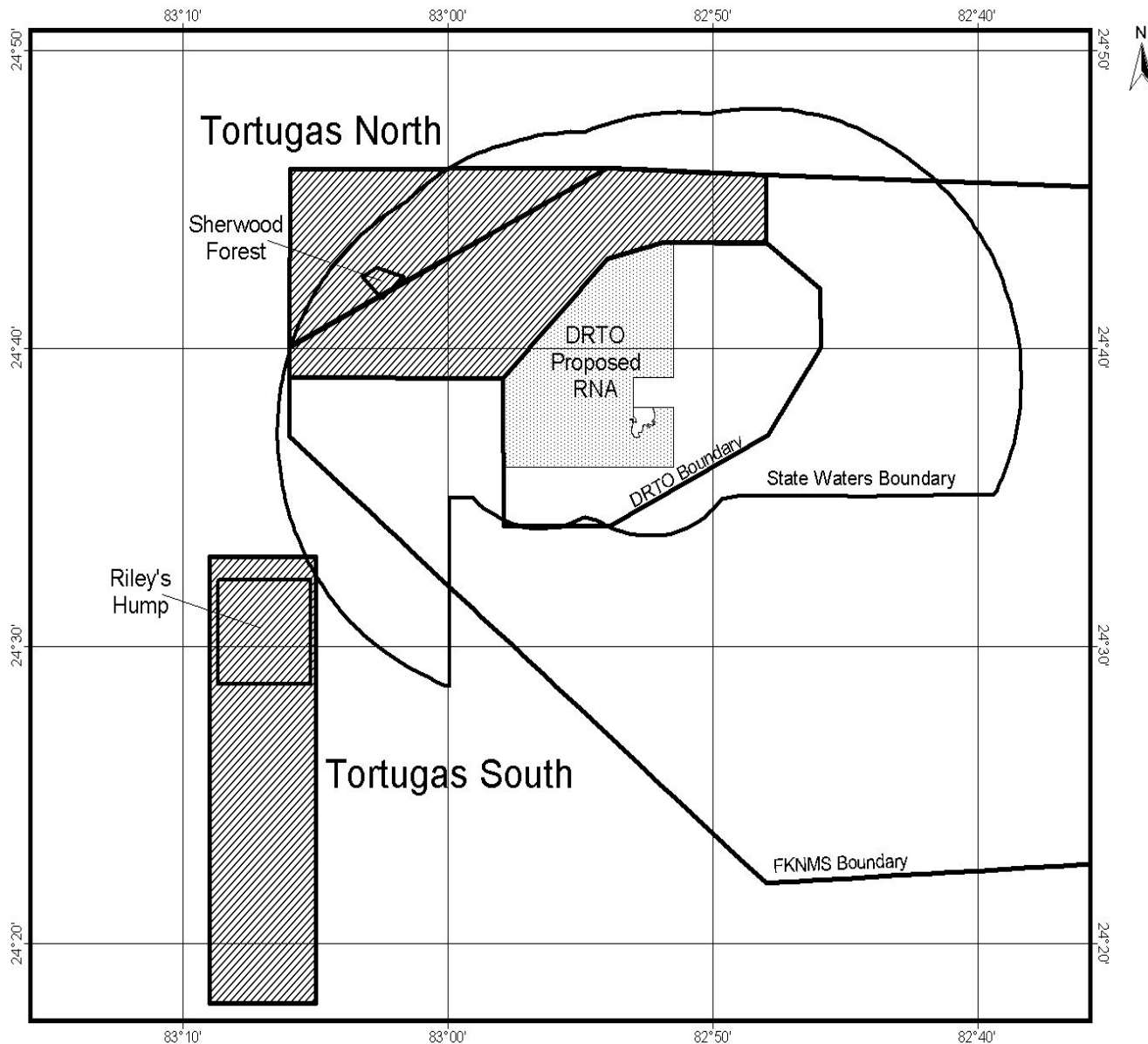
Ecological Reserves

Western Sambo Ecological Reserve - 9 snm





Tortugas Ecological Reserve



Implemented

July 1, 2001

518 sq k

151 sq mi

7 Separate Jurisdictions

- South Atlantic FMC
- Gulf of Mexico FMC
- Highly Migratory FM
- Nat'l Park Service
- Nat'l Marine Sanctuary
- State of Florida – FWC
- State – Gov & Cabinet

Dry Tortugas NP

March 2008

42² nm RNA

Fishery Reserves for Spiny Lobsters: Are they Effective?

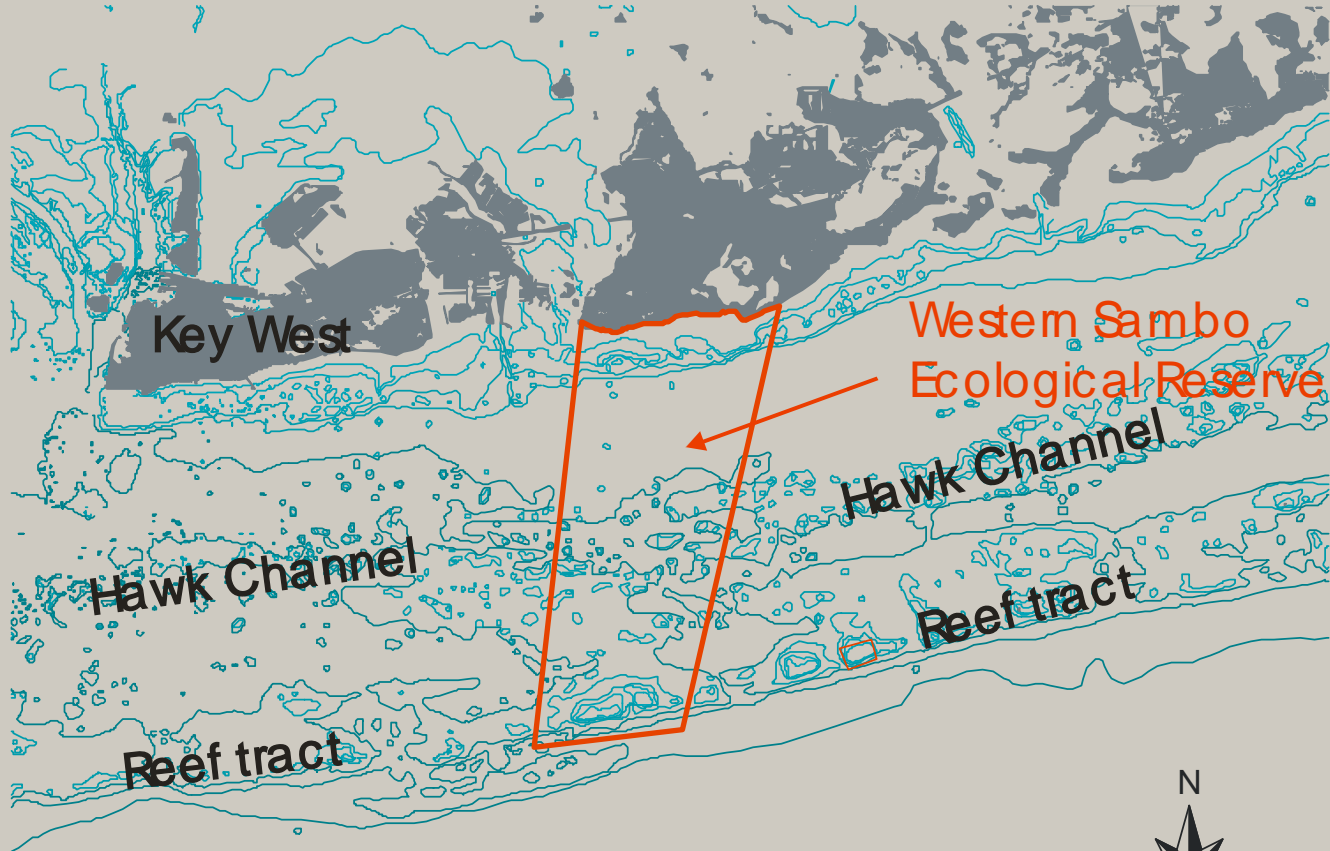
Carrollyn Cox

Florida Fish & Wildlife Conservation Commission
Fish & Wildlife Research Institute





Western Sambo Ecological Reserve

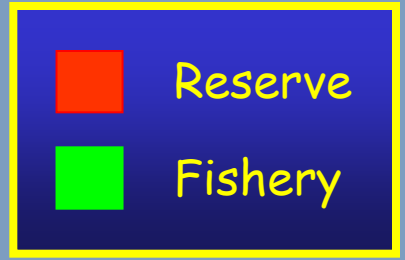
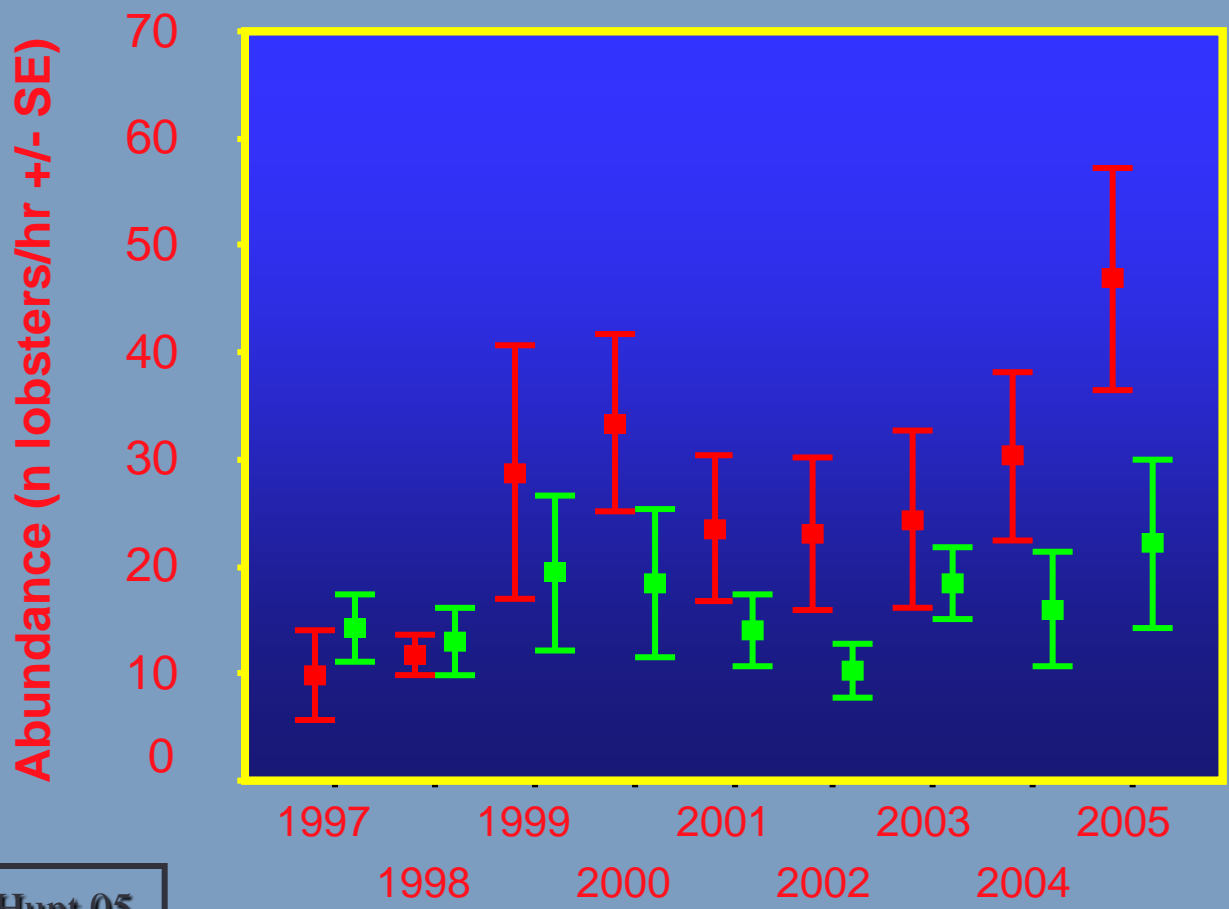


9² nautical mile
32² km



Abundance of legal-sized Lobsters

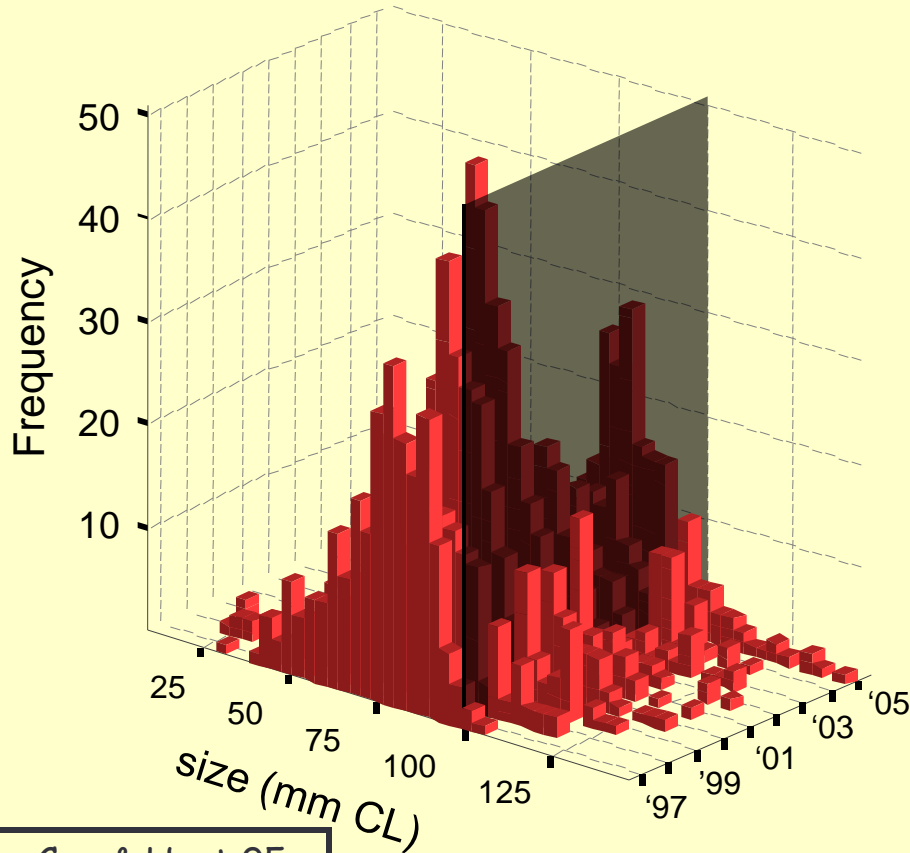
Western Sambo Ecological Reserve



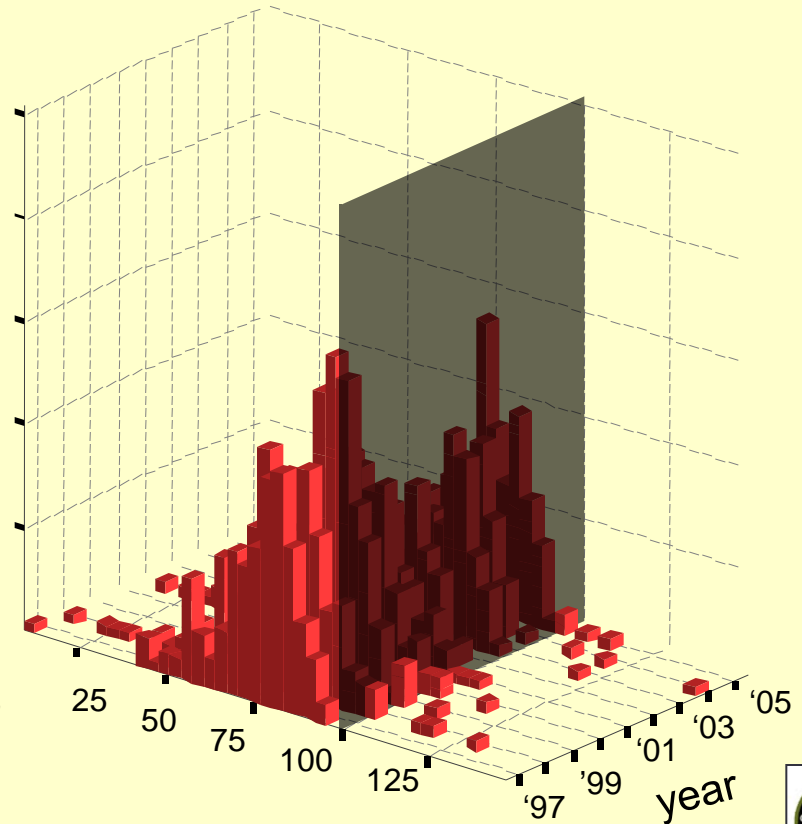
Size-Frequency of Male Spiny Lobsters

Western Sambo Ecological Reserve

Reserve



Fishery

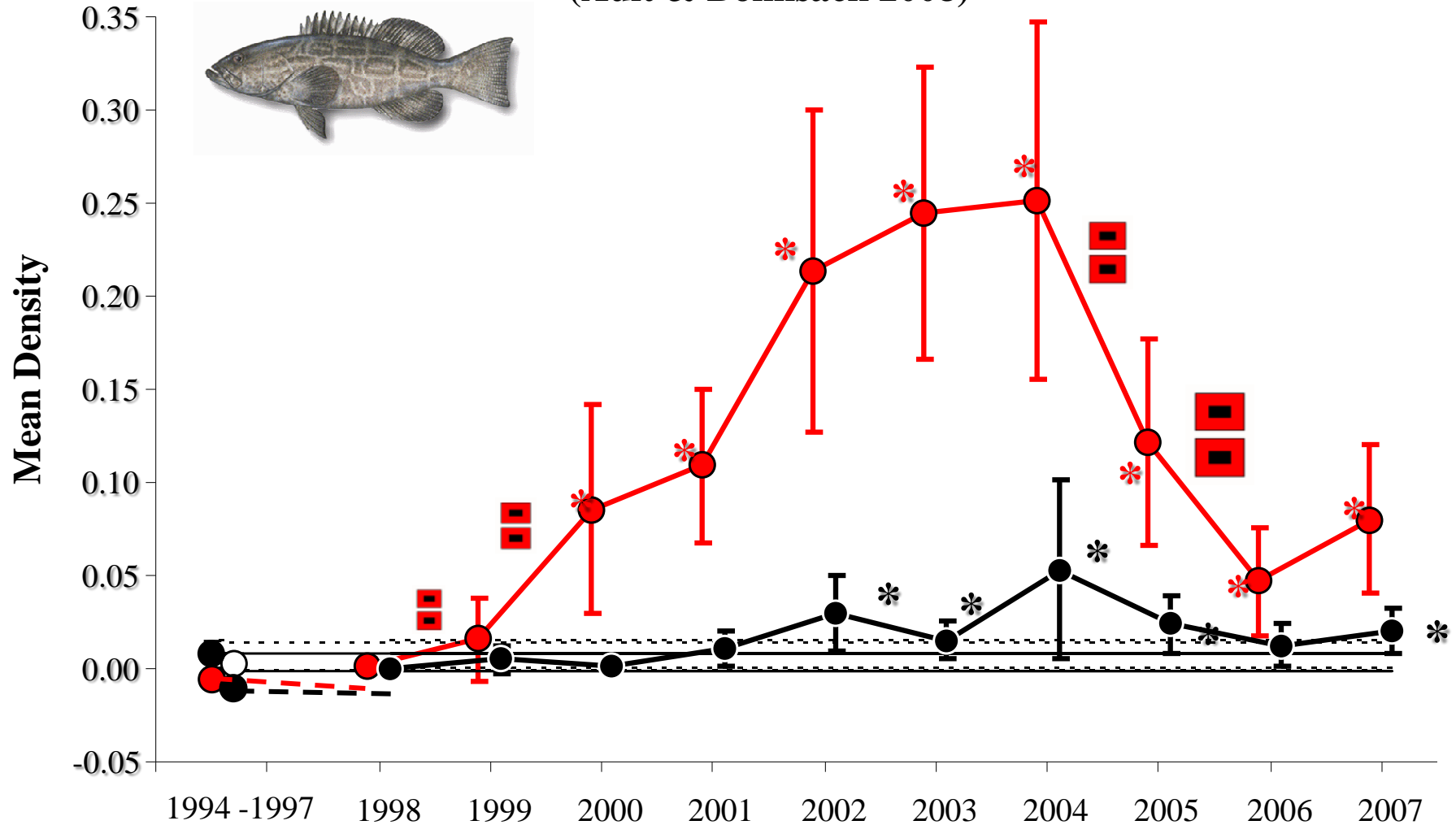
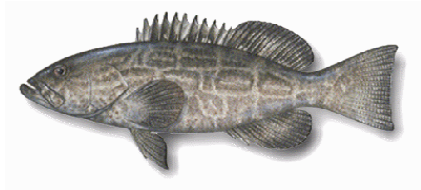


Cox & Hunt 05



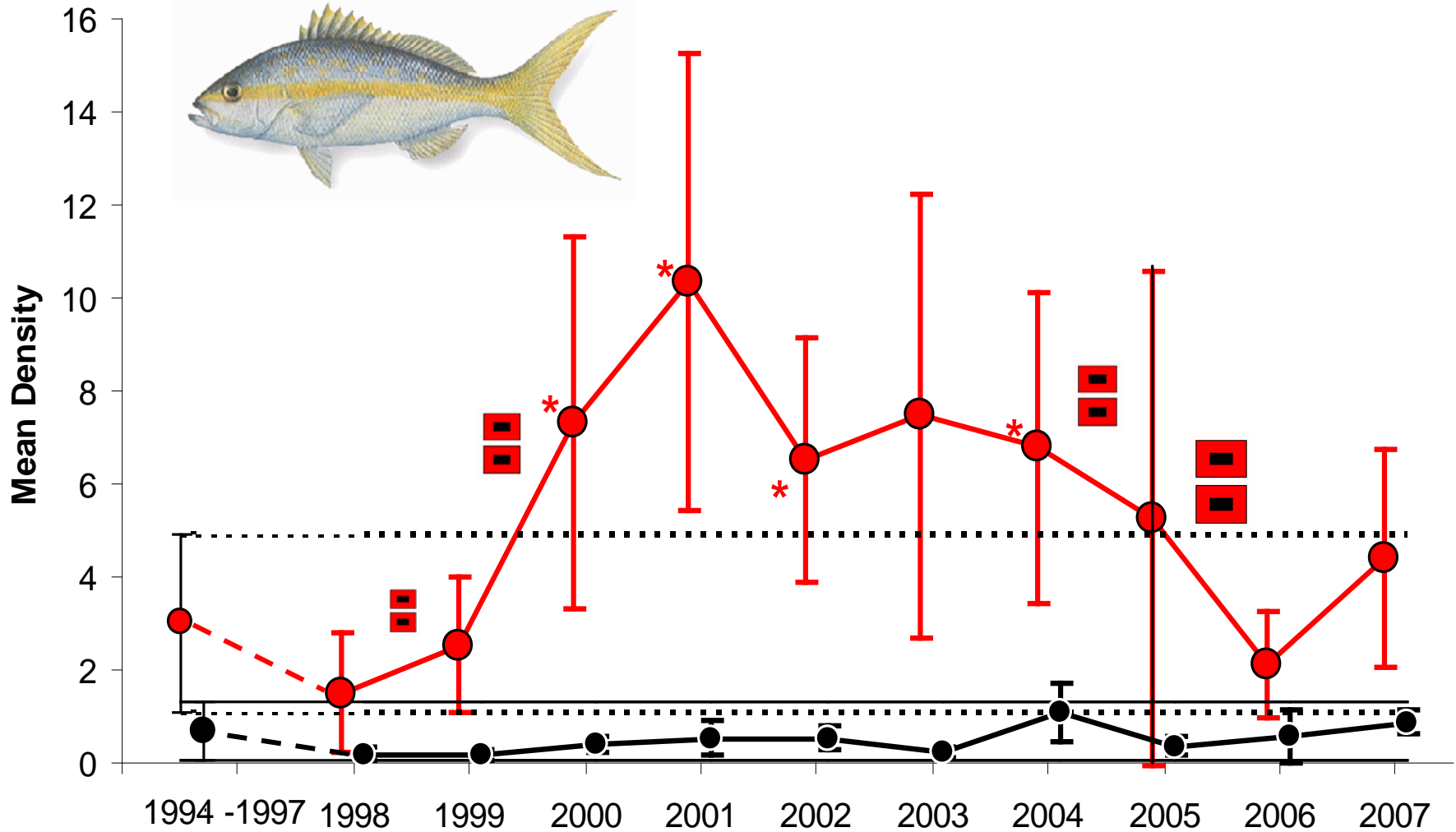
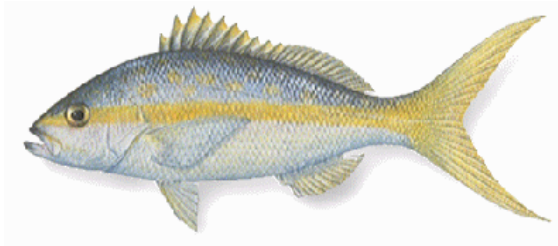
Black Grouper, Exploited, Protected and Fished

(Ault & Bohnsack 2008)



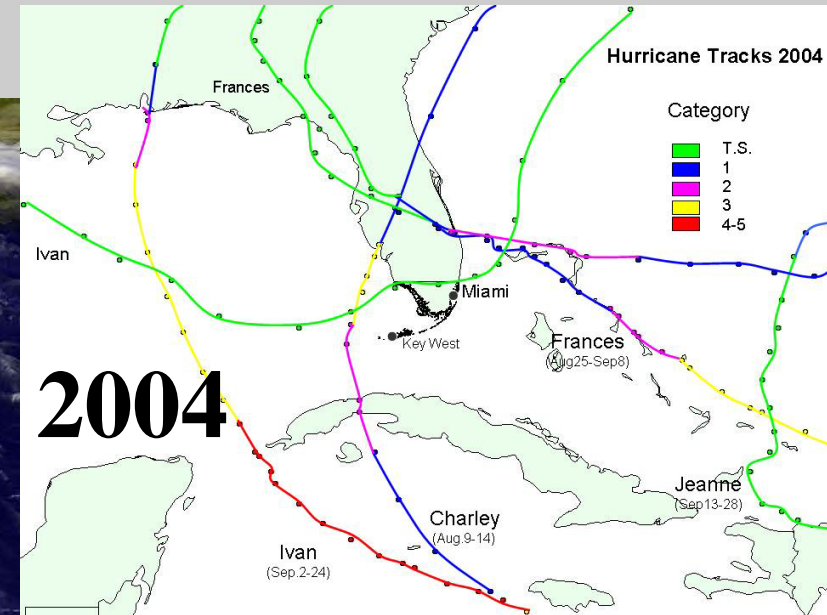
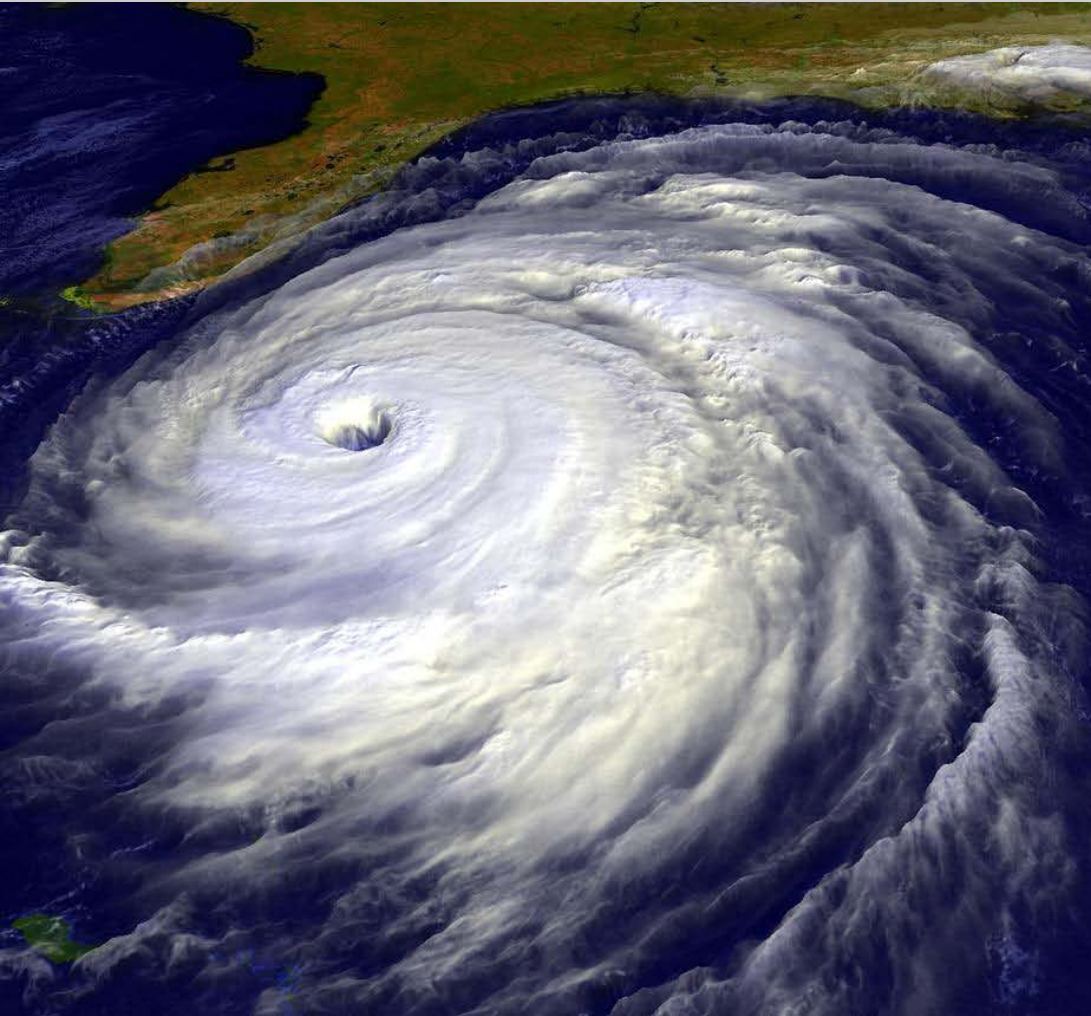
Fishery Regulations minimum length: 1985 - 18", Feb 1990 - 20", Dec 1998-24", Jan 1 2001 - 22"; 1986 - 5/fisher/day

Yellowtail Snapper, Exploited, **Protected** and Fished (Ault & Bohnsack 2008)



Fishery Regulations: 1985 - 12" Minimum length, 1986 - max 10/day

Reef Fisheries, Coral Reef Ecosystems & Hurricanes?



Prepared by:
Dr. Sarah Frias-Torres
University of Miami
NOAA Fisheries

Tortugas Ecological Reserve

24°45' N



0 2 Miles

24°30' N



Building Sustainable Fisheries in Florida's Coral Reef Ecosystem: Positive Signs in the Dry Tortugas

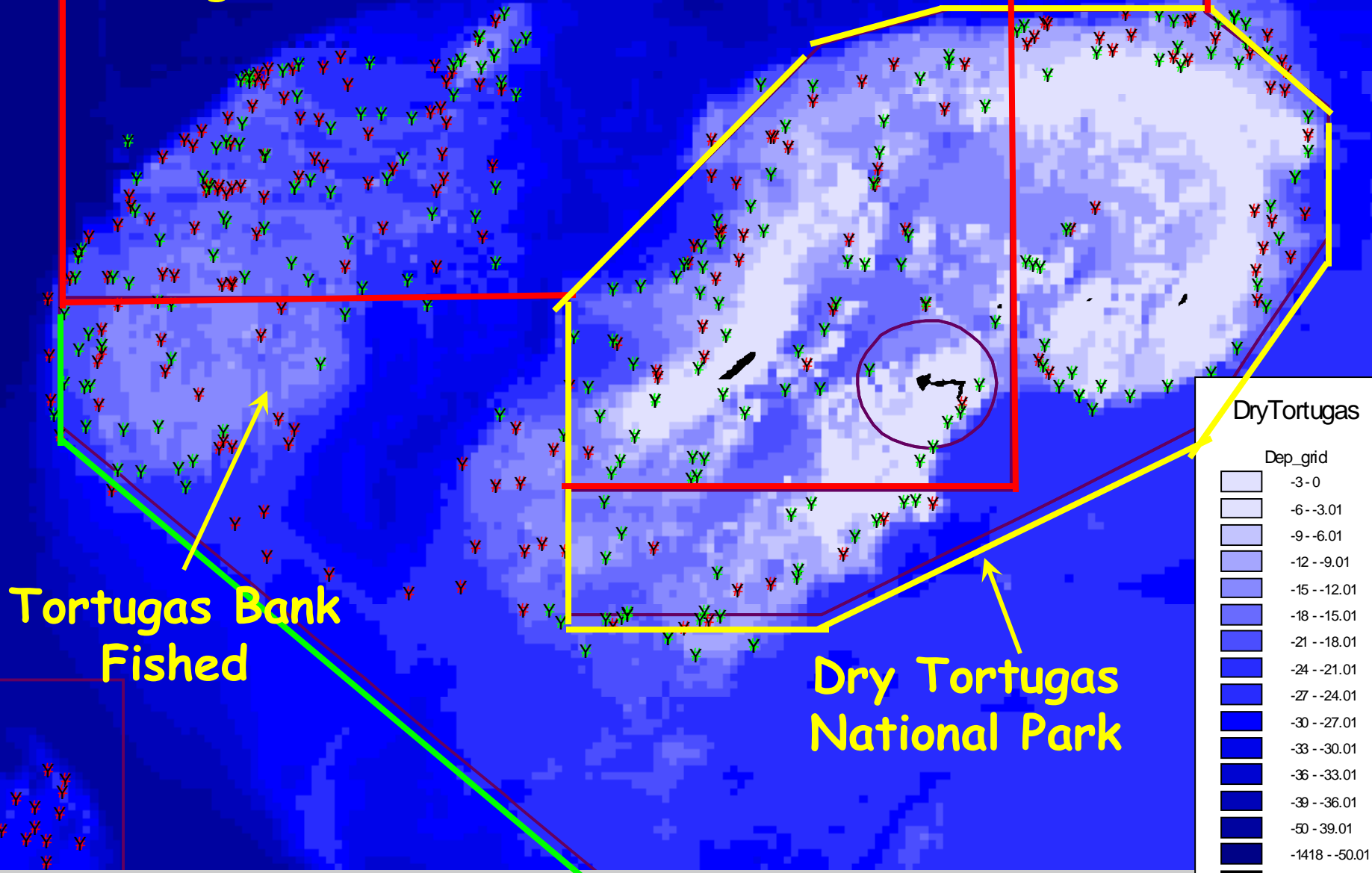
Jerald S. Ault



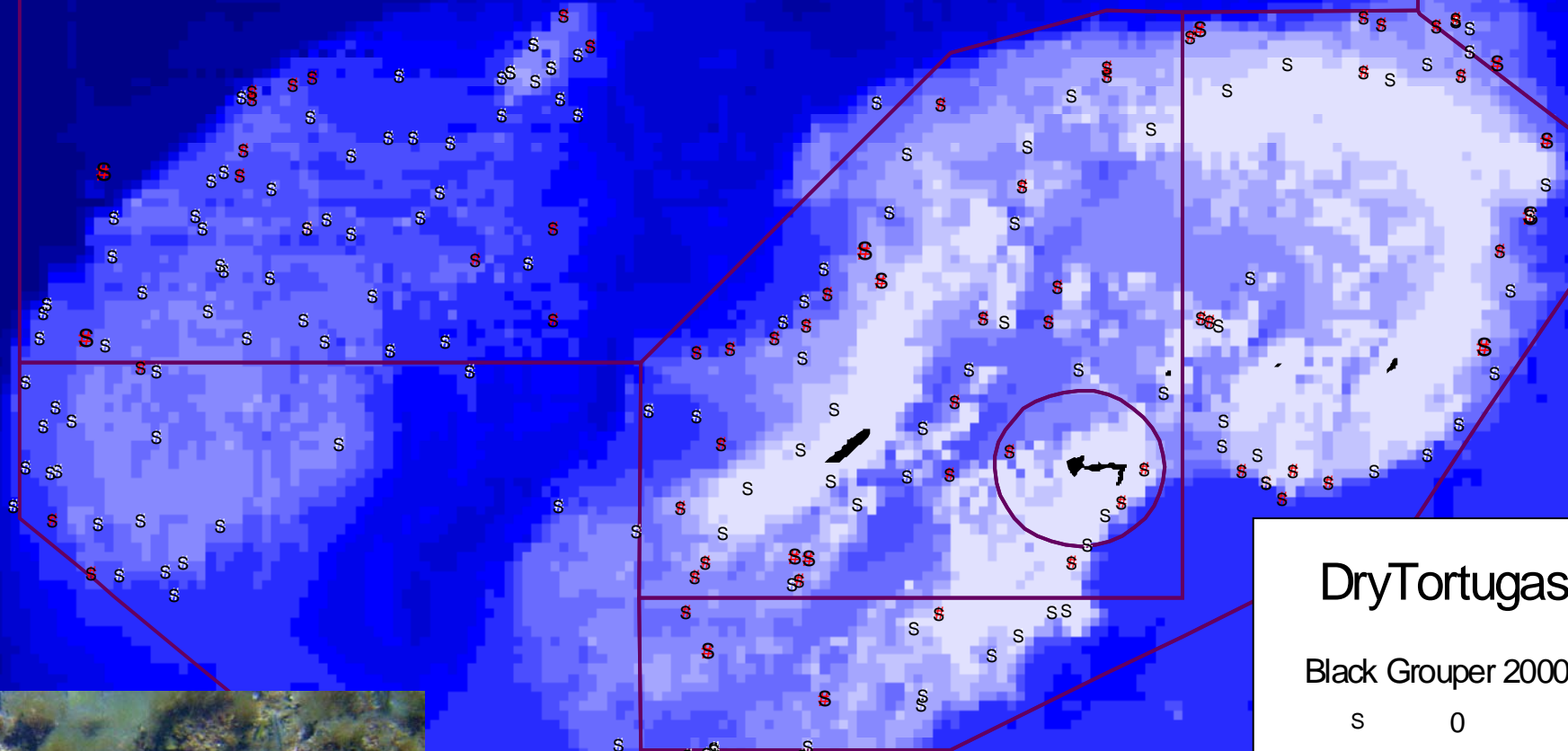
Schooling permit in Tortugas Bank Ecological Reserve, June 2004.

Baseline RVC Surveys: 1999 and 2000

Tortugas Bank NTMR



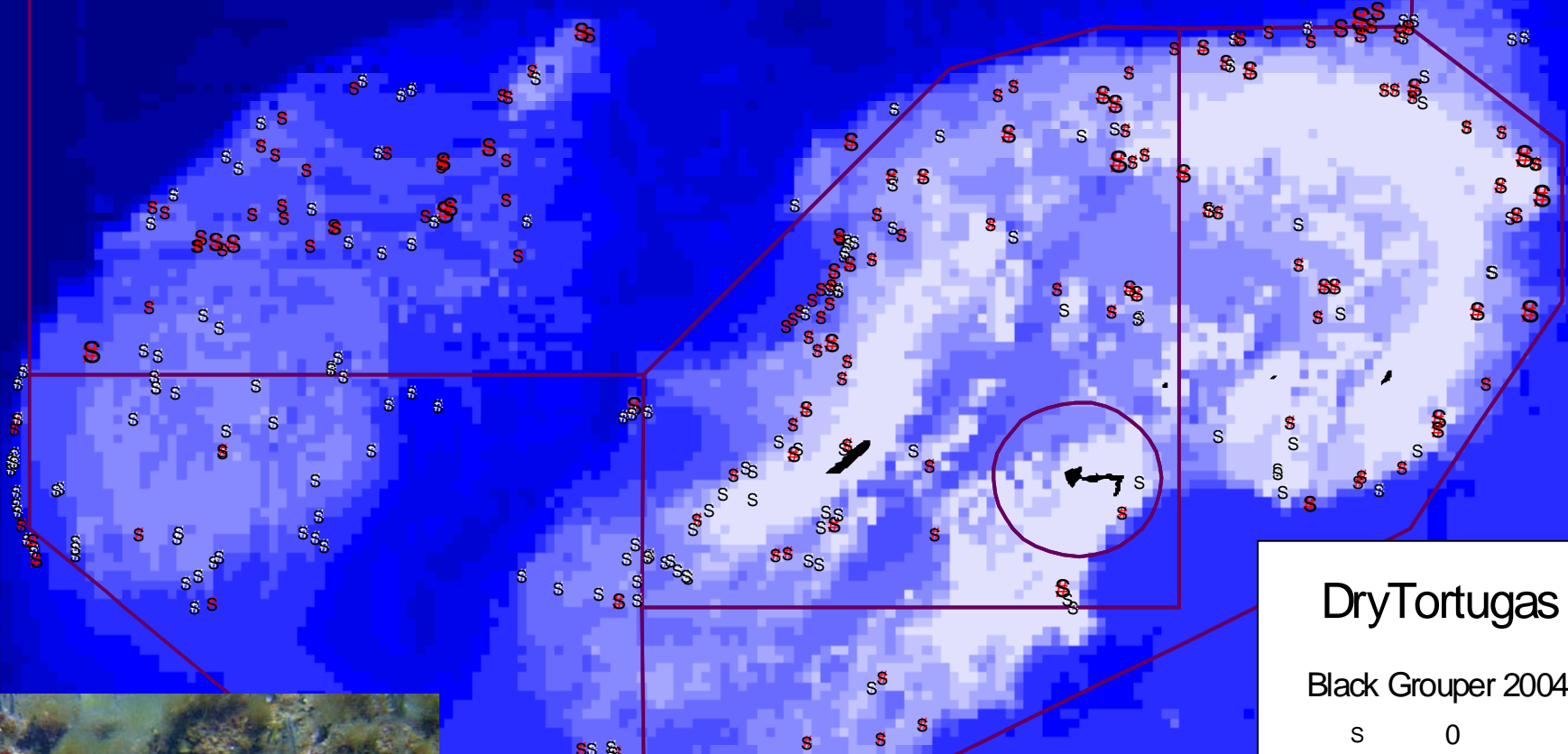
Black Grouper 2000



Dry Tortugas	
Black Grouper 2000	
S	0
Ⓢ	0.001 - 0.75
Ⓢ	0.75 - 1.5
Ⓢ	1.5 - 3
Ⓢ	3 - 5.25
Ⓢ	5.25 - 7.5



Black Grouper 2004



Dry Tortugas	
Black Grouper 2004	
S	0
S	0.001 - 0.75
S	0.75 - 1.5
S	1.5 - 3
S	3 - 5.25
S	5.25 - 7.5

Percentage Population Size Change in 2004 relative to 1999-2000 Baseline Estimates

	Bank Fished	Bank MPA	National Park	Total Domain	Signif.
Black Grouper	+ 84%	+ 120%	+ 128%	+ 124%	***
Red Grouper	- 43%	+ 38%	- 9%	- 2%	ns
Hogfish	- 27%	+ 6%	+ 50%	- 19%	ns
Mutton Snapper	- 45%	+ 303%	+ 142%	+ 109%	***
Yellowtail Snapper	- 19%	+ 367%	+ 132%	+ 181%	*
Gray Snapper	- 96%	- 51%	+ 270%	+ 39%	ns
White Grunt	+ 7%	+ 24%	+ 2%	+ 4%	ns
Bluestriped Grunt	+ 50%	+ 13%	+ 242%	+ 159%	ns
Spotted Goatfish	+ 133%	+ 326%	+ 175%	+ 198%	***
Redband Parrotfish	+ 121%	+ 26%	+ 26%	+ 56%	ns
Foureye Butterfly	+ 86%	- 18%	+ 32%	+ 13%	ns
Purple Reefish	+ 31%	+ 42%	+ 263%	+ 76%	***

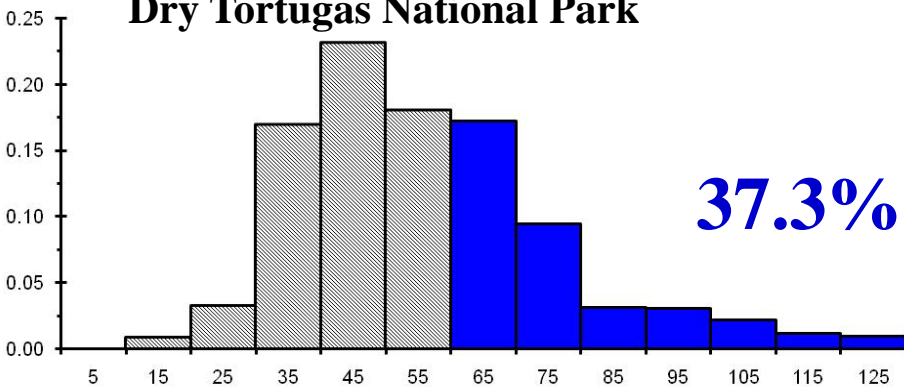
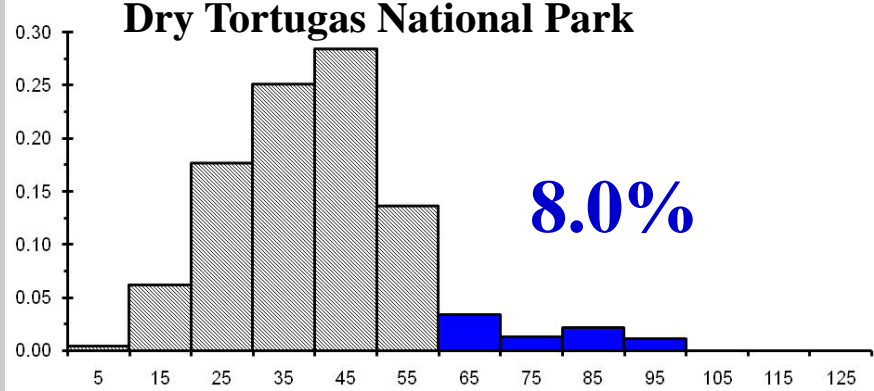
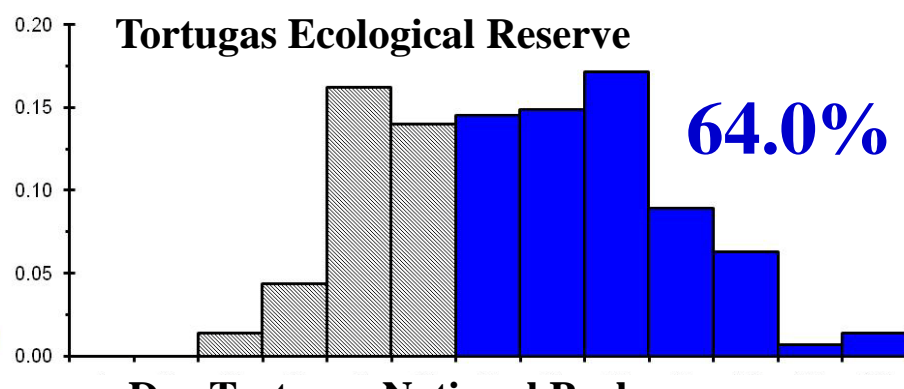
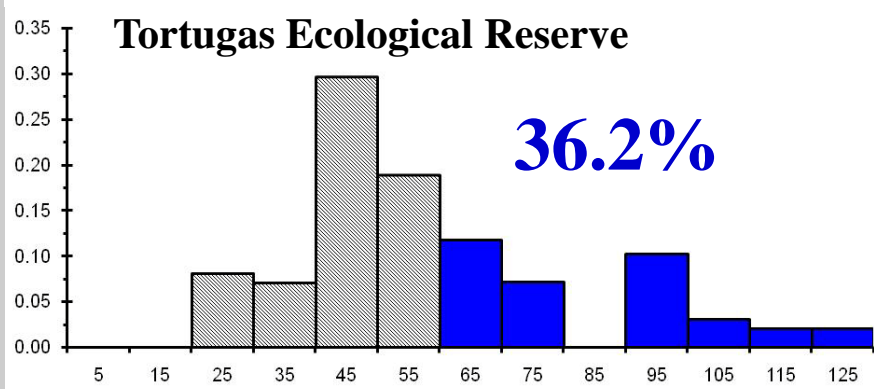
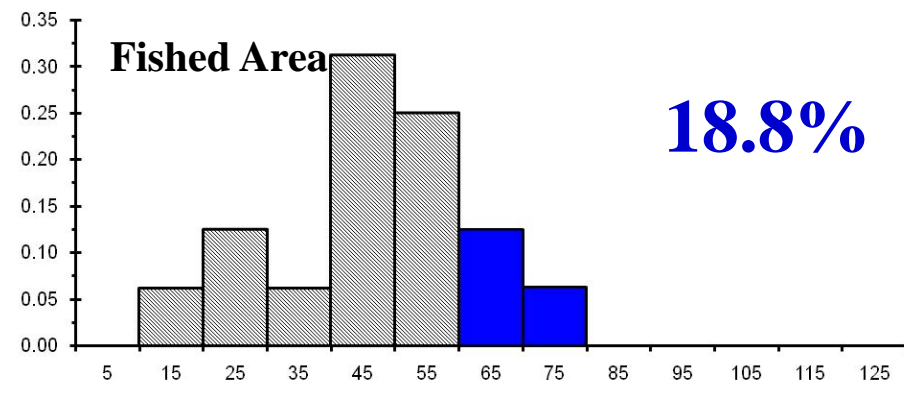
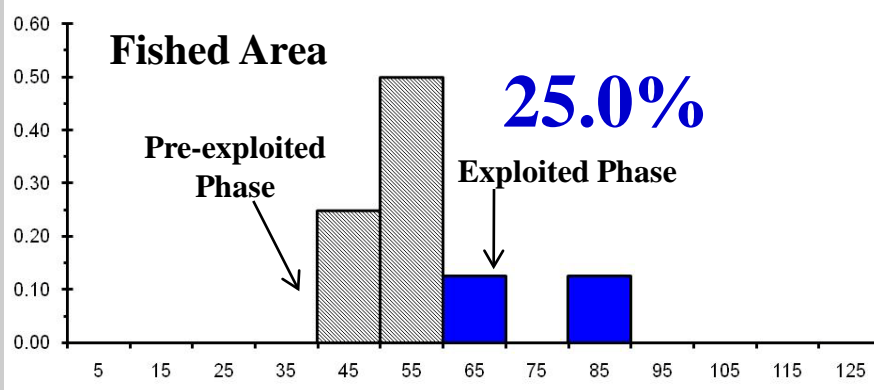
(Ault, et al, 2004)

Response of Tortugas Reserves to Protection

Pre-Implementation: 1999-2000

2008 RVC Survey

Relative Frequency



Fork Length (cm)

2007-2008 Annual Report

Measuring impacts of the Tortugas North Ecological Reserve:

A comparative analysis of differing levels of protection on coral reef and adjacent ecosystems of the Tortugas Banks, FL

Principal Investigators:

John Selden Burke, john.burke@noaa.gov

Shay Viehman, shay.viehman@noaa.gov

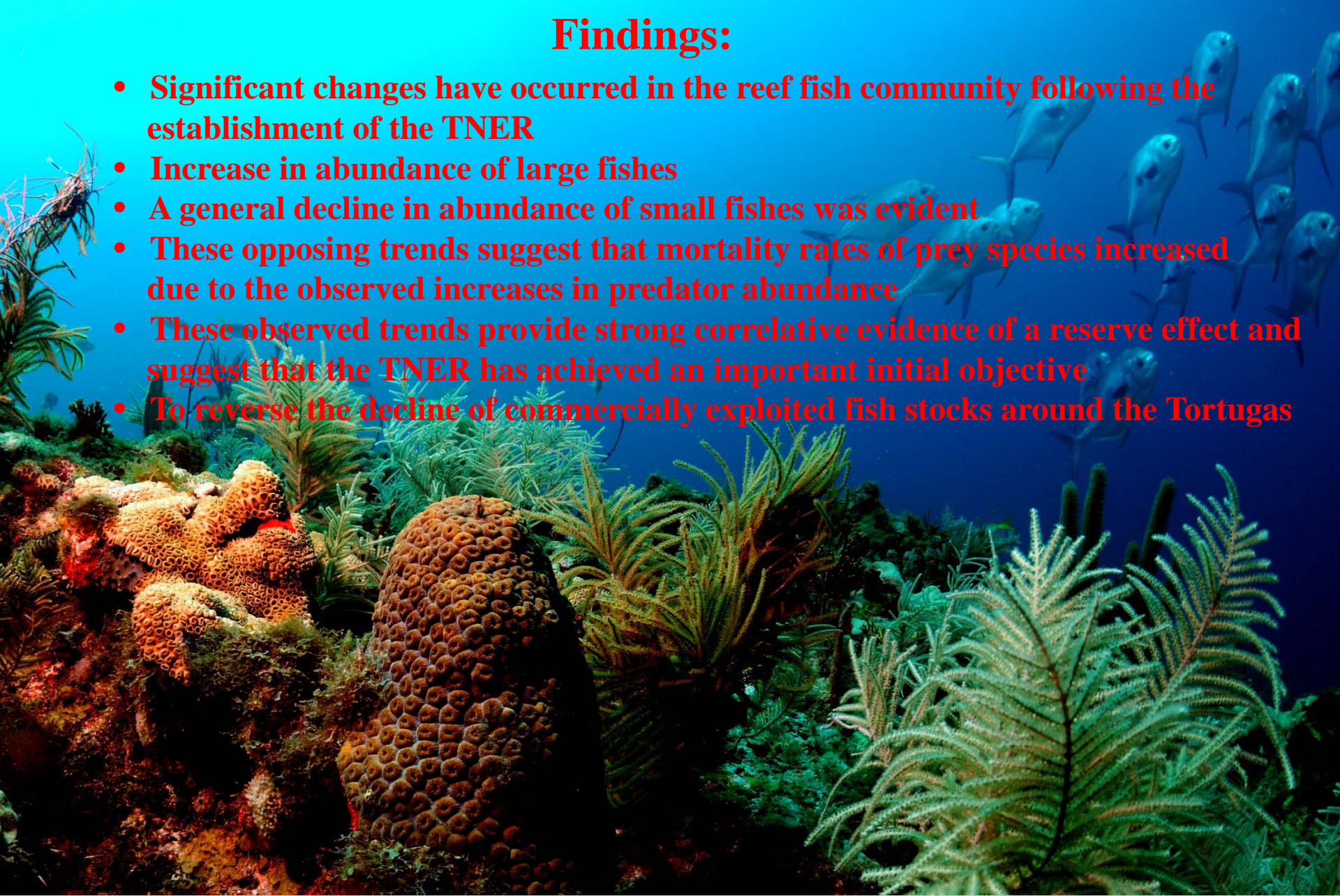
Gregory A. Piniak, greg.piniak@noaa.gov

J. Christopher Taylor, chris.taylor@noaa.gov



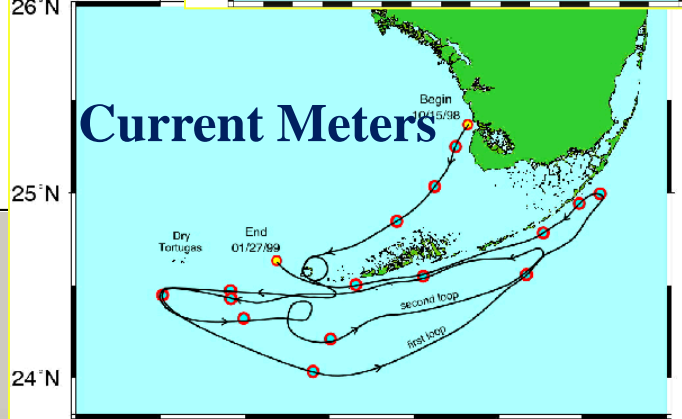
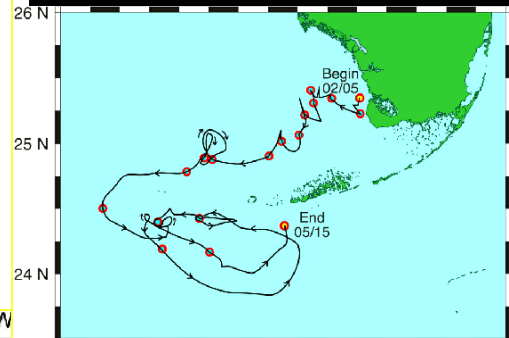
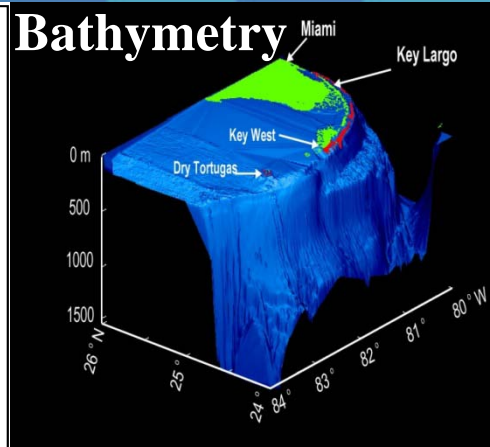
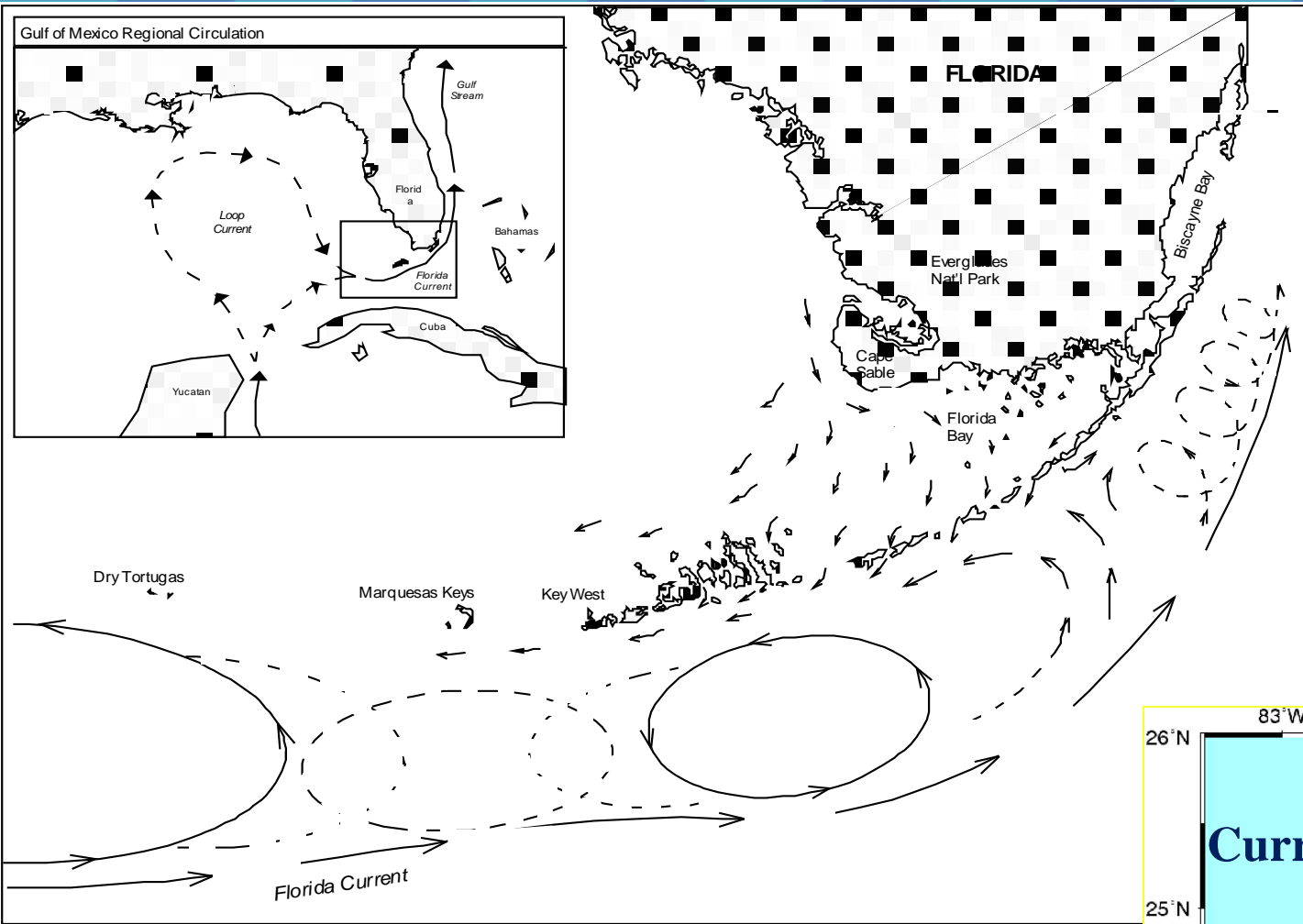
Findings:

- Significant changes have occurred in the reef fish community following the establishment of the TNER
- Increase in abundance of large fishes
- A general decline in abundance of small fishes was evident
- These opposing trends suggest that mortality rates of prey species increased due to the observed increases in predator abundance
- These observed trends provide strong correlative evidence of a reserve effect and suggest that the TNER has achieved an important initial objective
- To reverse the decline of commercially exploited fish stocks around the Tortugas





Currents – Dispersal Highways



(Lee and Williams - Univ of Miami)

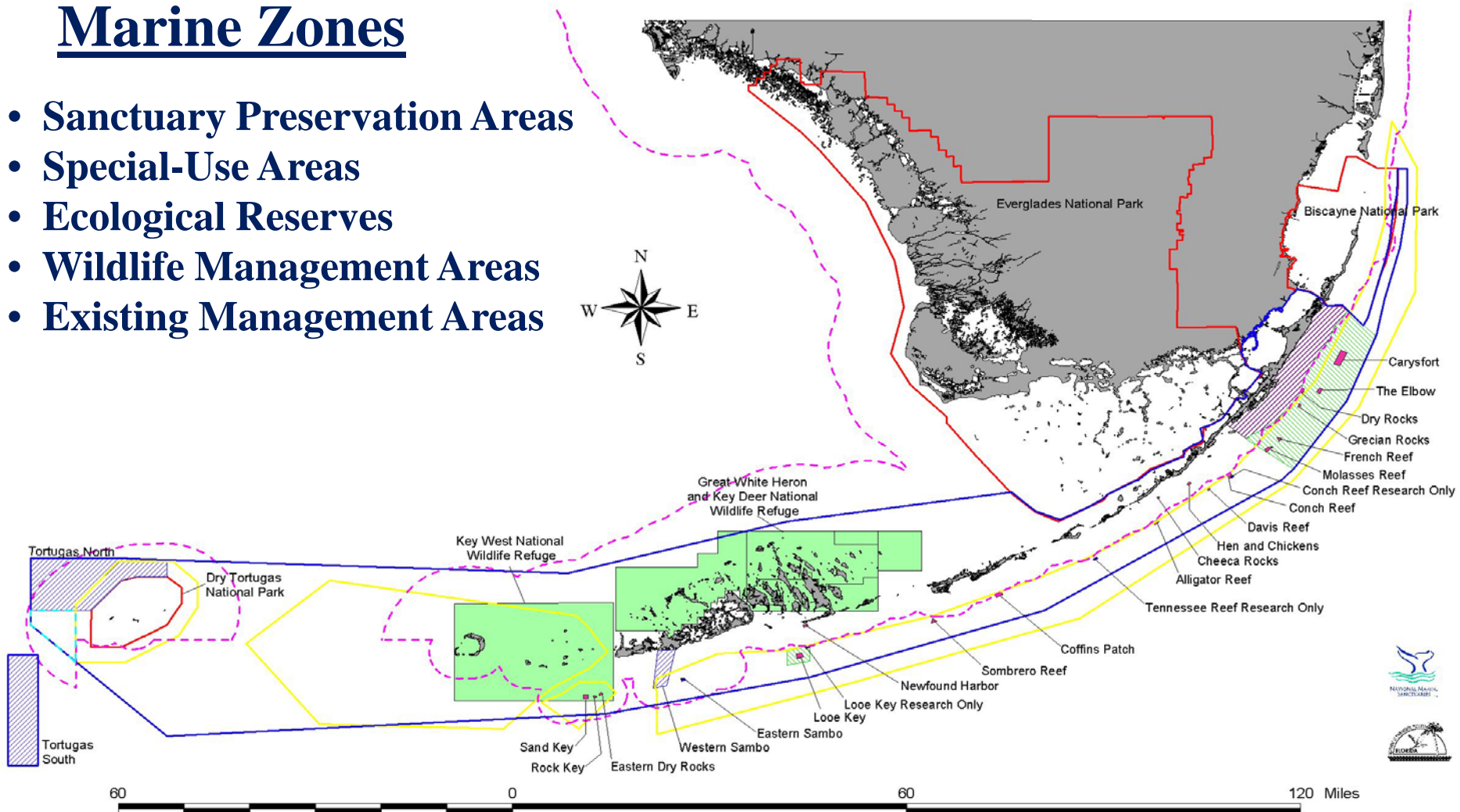


Florida Keys National Marine Sanctuary



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created by Kevin Kirach
11/13/01

Carysfort Reef 1975

Carysfort Reef 1985

Carysfort Reef 1995

Carysfort Reef 2004



South Carysfort Reef – February 13, 2009



Photo: Bill Precht - FKNMS

South Carysfort Reef – February 13, 2009

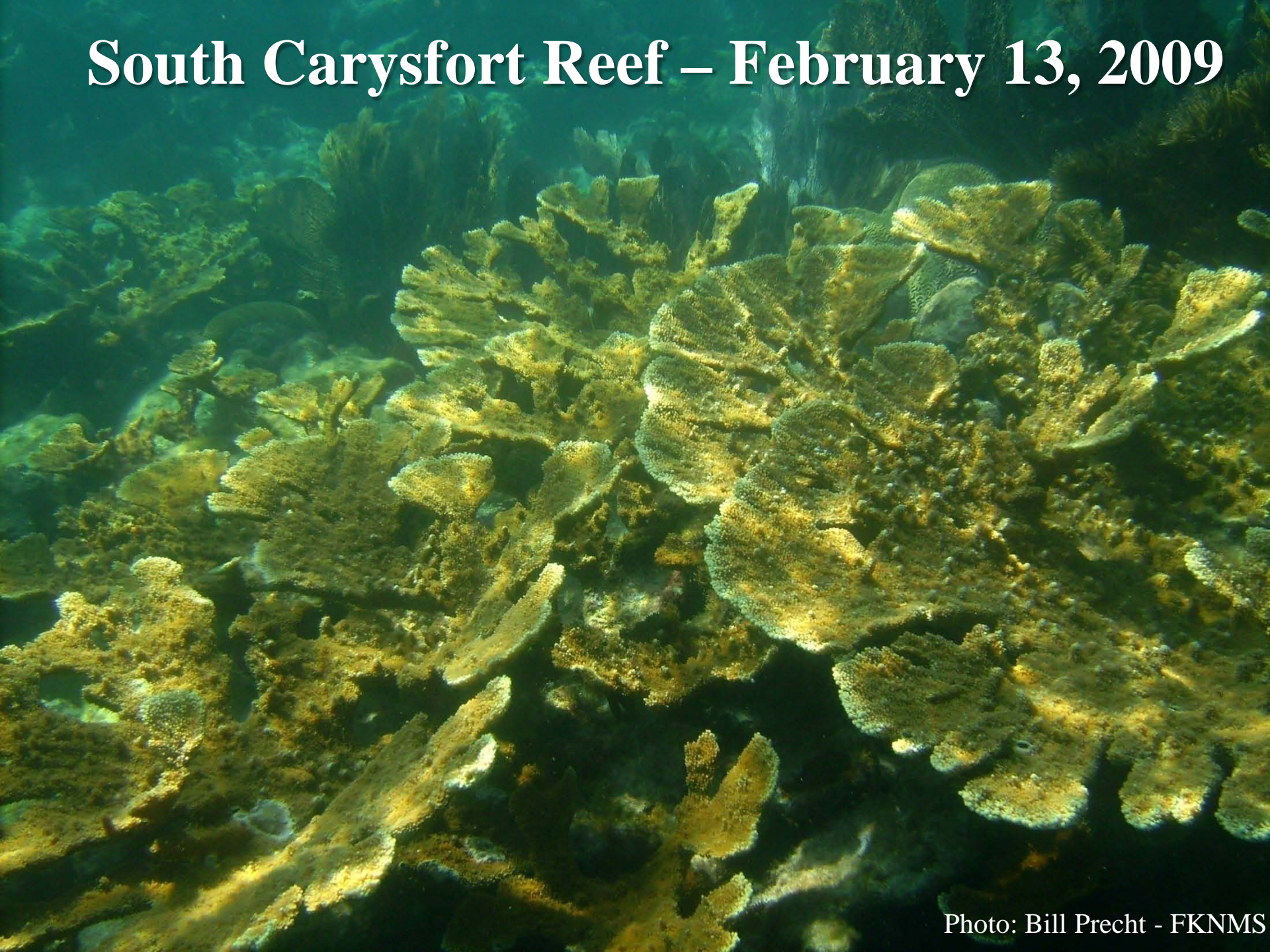


Photo: Bill Precht - FKNMS

Questions?

