



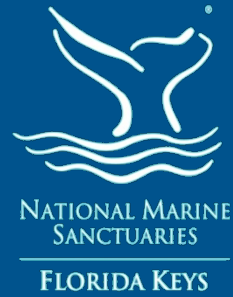
# Florida Keys National Marine Sanctuary Condition Report 2011

*Ecosystem Protection Working Group  
April 4, 2013  
Marathon Garden Club*

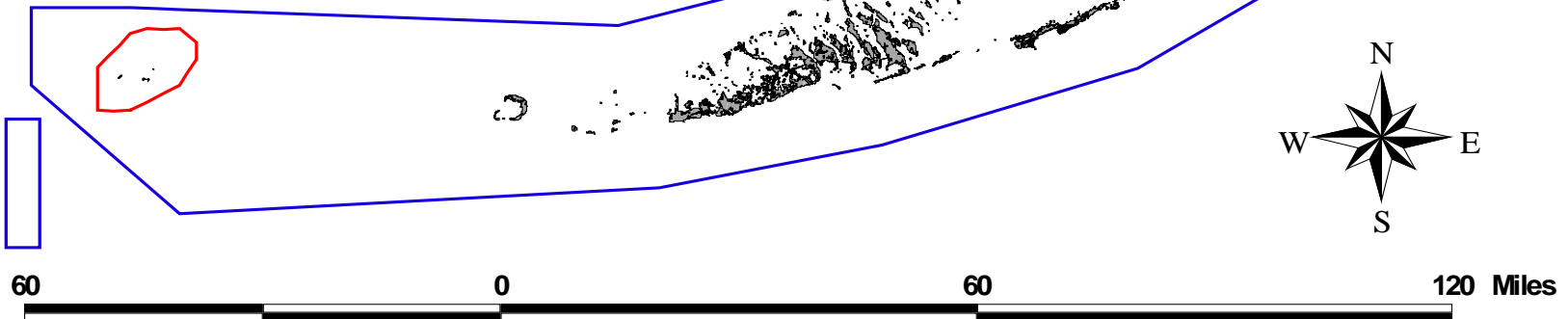
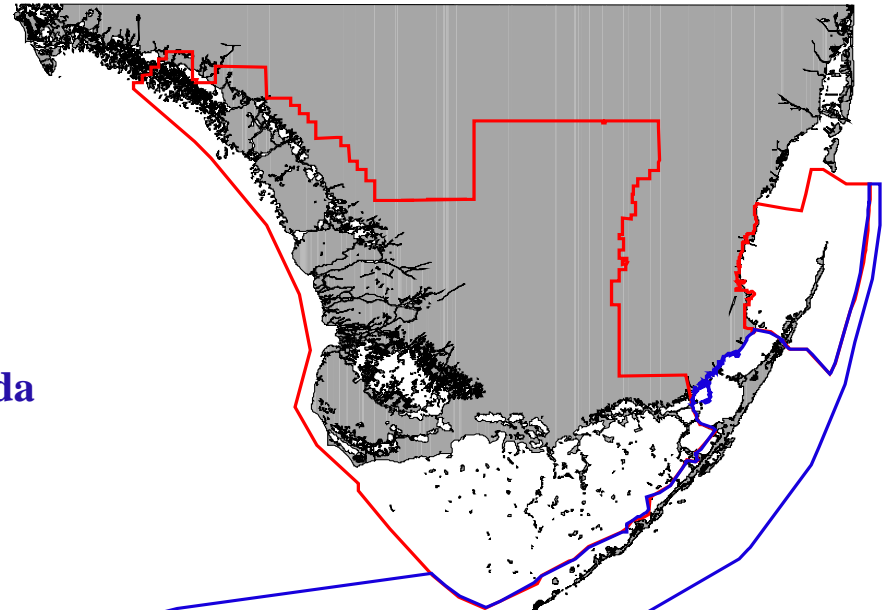
Scott Donahue, Joanne Delaney, Brenda Altmeier, Billy Causey, Sarah Fangman, Brian Keller, Kathy Broughton, Steve Gittings, Vernon R. Leeworthy, Michelle Johnston

<http://floridakeys.noaa.gov/scipublications/condition.html>

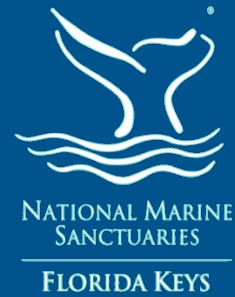
# Florida Keys National Marine Sanctuary and Protection Act – 1990 (Passed By US Congress)



- **2900 nm<sup>2</sup>**
- **Jurisdiction to mean high tide**
- **Surrounds Florida Keys**
- **Co-trustee Management with State of Florida**
- **60% State Waters**
- **40% Federal Waters**
- **Management Plan implemented in 1997**
- **1600 Keys / 1800 miles of shoreline**

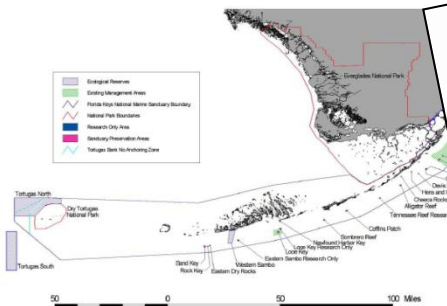


# FKNNMS Condition Report was the logical progression from existing reporting tools



Florida Keys National Marine Sanctuary

*Comprehensive Science Plan*



*Florida Keys National Marine Sanctuary Zone Performance Report – Year 1*  
**NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION**  
**FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION**  
**FLORIDA KEYS NATIONAL MARINE SANCTUARY**

**The State of Coral Reef Ecosystems of the United States and Pacific Freely Associated States: 2008**



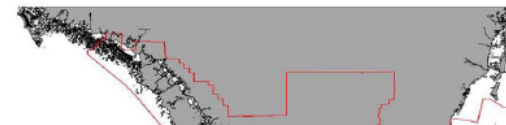
**National Oceanic and Atmospheric Administration**  
**Florida Keys National Marine Sanctuary**

**U.S. Environmental Protection Agency**

**State of Florida**

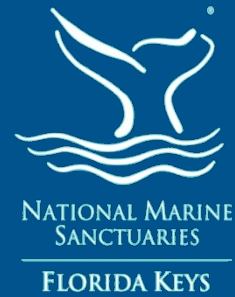
***2002-03 Sanctuary Science Report:  
 An Ecosystem Report Card  
 After Five Years of Marine Zoning***

Gulf of Mexico



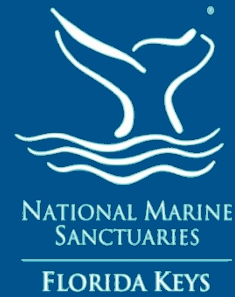
Miami

# General details of the report



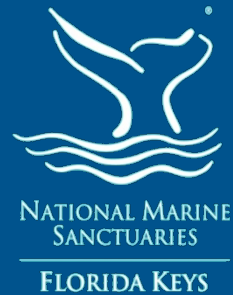
- Executive-level summary
- 17 questions standard among all sanctuaries
- Workshops with experts to answer questions
- Formal review process
- Revisited prior to Management Plan updates (~ 5 years)

# 17 Standard Questions



- 1 Are specific or multiple stressors, including changing oceanographic and atmospheric conditions, affecting water quality?
- 2 What is the eutrophic condition of sanctuary waters and how is it changing?
- 3 Do sanctuary waters pose risks to human health?
- 4 What are the levels of human activities that may influence water quality and how are they changing?
- 5 What is the abundance and distribution of major habitat types and how is it changing?
- 6 What is the condition of biologically-structured habitats and how is it changing?
- 7 What are the contaminant concentrations in sanctuary habitats and how are they changing?
- 8 What are the levels of human activities that may influence habitat quality and how are they changing?
- 9 What is the status of biodiversity and how is it changing?
- 10 What is the status of environmentally sustainable fishing and how is it changing?
- 11 What is the status of non-indigenous species and how is it changing?
- 12 What is the status of key species and how is it changing?
- 13 What is the condition or health of key species and how is it changing?
- 14 What are the levels of human activities that may influence living resource quality and how are they changing?
- 15 What is the integrity of known maritime archaeological resources and how is it changing?
- 16 Do known maritime archaeological resources pose an environmental hazard and is this threat changing?
- 17 What are the levels of human activities that may influence maritime archaeological resource quality and how are they changing?

# Standardized Question Ratings



## Living Resources Biodiversity

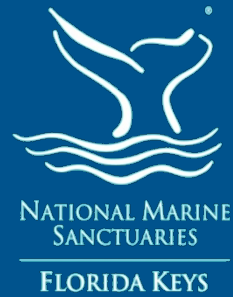
### 9. What is the status of biodiversity and how is it changing?

This is intended to elicit thought and assessment of the condition of living resources based on expected biodiversity levels and the interactions between species. Intact ecosystems require that all parts not only exist, but that they function together, resulting in natural symbioses, competition, and predator-prey relationships. Community integrity, resistance and resilience all depend on these relationships. Abundance, relative abundance, trophic structure, richness, H' diversity, evenness, and other measures are often used to assess these attributes.

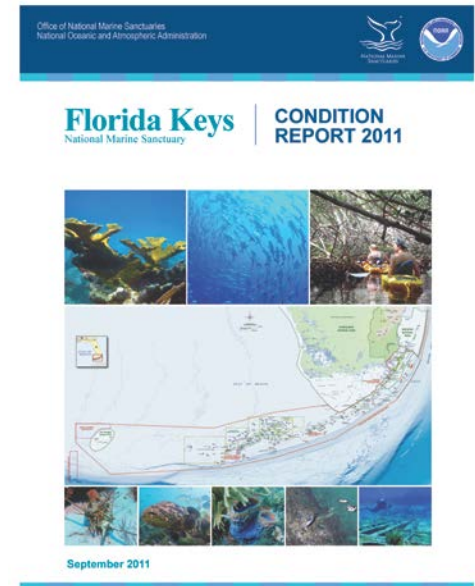
- **Good** Biodiversity appears to reflect pristine or near-pristine conditions and promotes ecosystem integrity (full community development and function).
- **Good/Fair** Selected biodiversity loss has taken place, precluding full community development and function, but it is unlikely to cause substantial or persistent degradation of ecosystem integrity.
- **Fair** Selected biodiversity loss may inhibit full community development and function, and may cause measurable but not severe degradation of ecosystem integrity.
- **Fair/Poor** Selected biodiversity loss has caused or is likely to cause severe declines in some but not all ecosystem components and reduce ecosystem integrity.
- **Poor** Selected biodiversity loss has caused or is likely to cause severe declines in ecosystem integrity.

TRENDS:	Improving to the next category .....	▲	
	Not Changing .....	—	Undetermined ..... ?
	Declining to the next category .....	▼	Not applicable ..... N/A

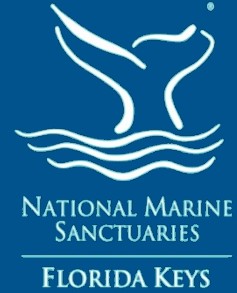
# Condition Report Layout



- Overview
- Site History & Resources
- Pressures (Stressors & Issues) on the Sanctuary
- Status & Trends (State) of Sanctuary Resources
- Sanctuary's Response to Pressures
- Literature Cited
- Appendices - Explanation of Questions and Process to develop report



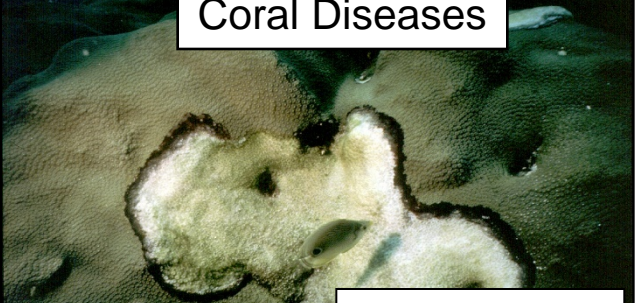
# Pressures on Resources



Habitat Destruction



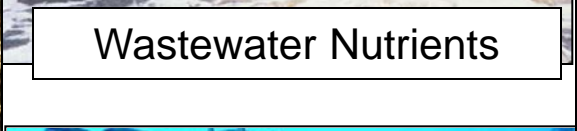
Nutrients from Pollution



Coral Diseases



Intense Coastal Development



Wastewater Nutrients



Overfishing



Massive Algal Blooms



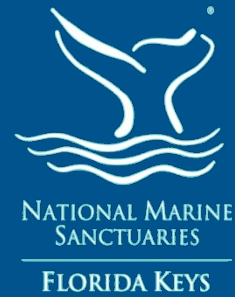
Introduction of Marine Exotics



Stormwater Runoff

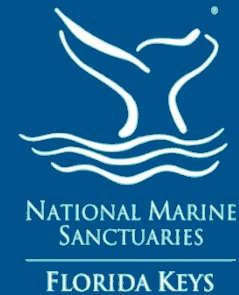


# Pressures to FKNMS Resources



- Point Sources of Pollution
- Non-point Sources of Pollution
- Swimming Activities
- External Inputs
- Harmful Algal Blooms
- Marinas and boats
- Live-Aboard Vessels
- Mosquito Control
- Cruise Ships
- Fishing Pressures
- Coral Bleaching
- Climate Change
- Diseases of Marine Organisms
- Coastal Development
- Non-Indigenous Species
- Marine Debris
- Military Use
- Artificial Reefs
- Weather Disturbances
- Poaching
- Treasure Hunting

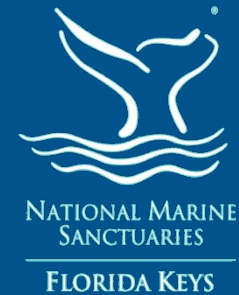
# State of Water Quality (focus of Water Quality Protection Program)



<b>STATUS:</b>	<b>GOOD</b>	<b>GOOD/ FAIR</b>	<b>FAIR</b>	<b>FAIR/ POOR</b>	<b>POOR</b>	<b>UNDETERMINED</b>
<b>TRENDS:</b>	Improving ..... ▲		Not Changing ..... —		Declining ..... ▼	
				Undetermined ..... ?	Not applicable ..... N/A	

Question	Status and Trends	Basis for Judgment
Stressors	▼	Large-scale changes in flushing dynamics over many decades have altered many aspects of water quality; nearshore problems related to runoff and other watershed stressors; localized problems related to infrastructure.
Eutrophic Condition	—	Long-term increase in inputs from land; large, persistent phytoplankton bloom events, many of which originate outside the sanctuary but enter and injure sanctuary resources.
Human Health	—	Rating is a general assessment of “all waters” of the sanctuary, knowing that in very specific locations, the rating could be as low as “poor.” Increased frequency of HABs and periodic swim advisories.
Human Activities	▲	Historically, destructive activities have been widespread throughout the Florida Keys, but many recent management actions are intended to reduce threats to water quality.

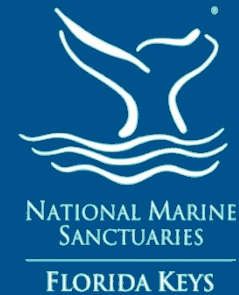
# State of Maritime Archaeological Resources (not the focus of this Working Group)



<b>STATUS:</b>	<b>GOOD</b>	<b>GOOD/ FAIR</b>	<b>FAIR</b>	<b>FAIR/ POOR</b>	<b>POOR</b>	<b>UNDETERMINED</b>
<b>TRENDS:</b>	Improving ..... ▲		Not Changing ..... —		Declining ..... ▼	
				Undetermined ..... ?	Not applicable ..... N/A	

Question	Status and Trends	Basis for Judgment
Integrity	▼	Resources are non-renewable and are subject to deterioration or loss resulting from looting, chemical processes, shifting sediments, marine life, fishing gear entanglement and vessel groundings (the last two are increasing in frequency).
Threat to Environment	—	Movement of sunken vessels during storm threatens nearby resources.
Human activities	▼	Reports of looting and vessel grounding cases involving potential resources are increasing.

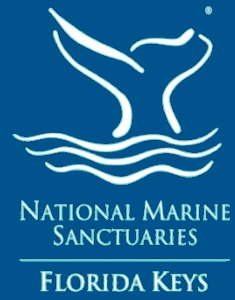
# State of Habitat (focus of this Working Group)



<b>STATUS:</b>	<b>GOOD</b>	<b>GOOD/FAIR</b>	<b>FAIR</b>	<b>FAIR/POOR</b>	<b>POOR</b>	<b>UNDETERMINED</b>
<b>TRENDS:</b>	Improving ..... ▲		Not Changing ..... —		Declining ..... ▼	
				Undetermined ..... ?	Not applicable ..... N/A	

Question	Status and Trends	Basis for Judgment
Abundance/Distribution	—	In general, mangrove and benthic habitats are still present and their distribution is unchanged, with the exception of the mangrove community, which is about half of what it was historically. The addition of causeways has changed the distribution of nearshore benthic habitats in their vicinity.
Structure	▼	Loss of shallow (<10 meters) <i>Acropora</i> and <i>Montastreae</i> corals has dramatically changed shallow habitats; regional declines in coral cover since the 1970s have led to changes in coral-algal abundance patterns in most habitats; destruction of seagrass by propeller scarring; vessel grounding impacts on benthic environment; alteration of hard-bottom habitat by illegal casitas.
Contaminants	?	Few studies, but no synthesis of information.
Human Activities	▼	Coastal development, highway construction, vessel groundings, over-fishing, shoreline hardening, marine debris (including derelict fishing gear), treasure salvaging, increasing number of private boats, and consequences of long-term changes in land cover on nearshore habitats.

# Habitat



Abundance/Distribution

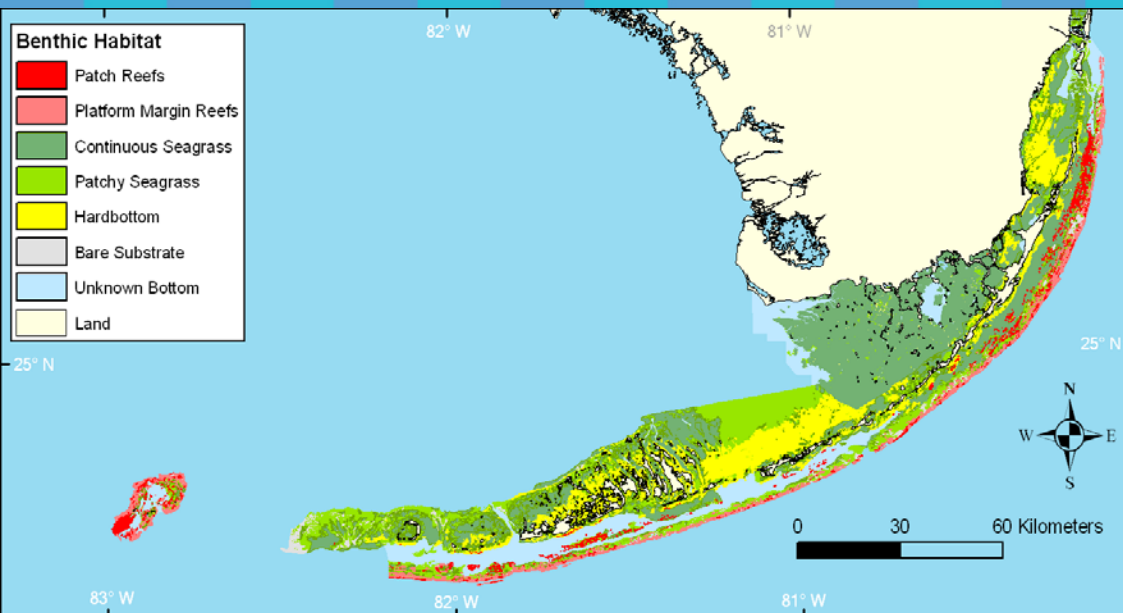
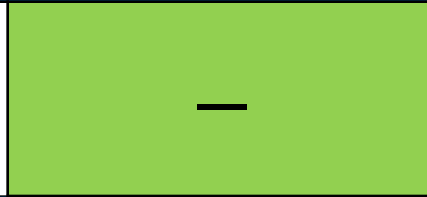
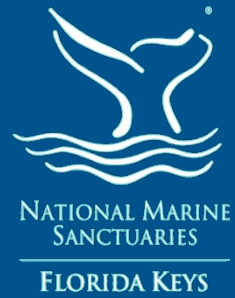


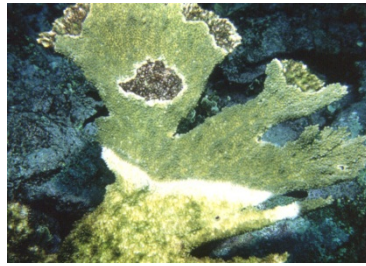
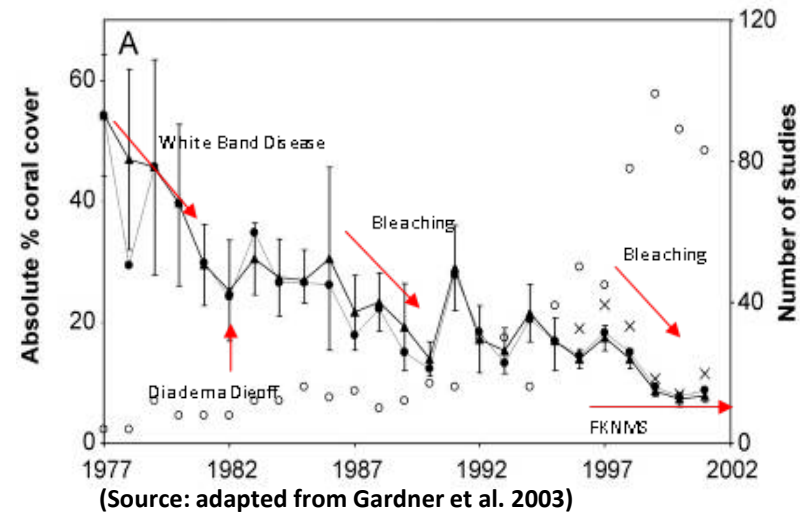
Photo:FWC



# Habitat



Structure

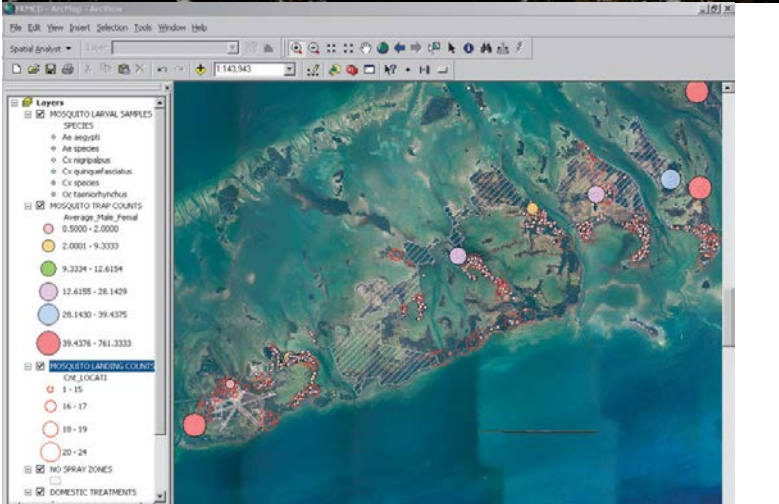


# Habitat



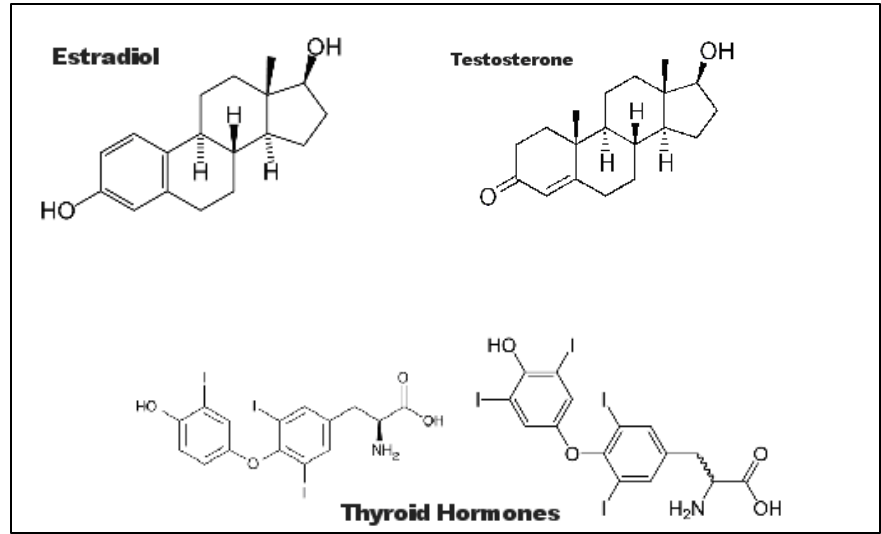
Mosquito control?

<http://keysmosquito.org/aerial-operations/>



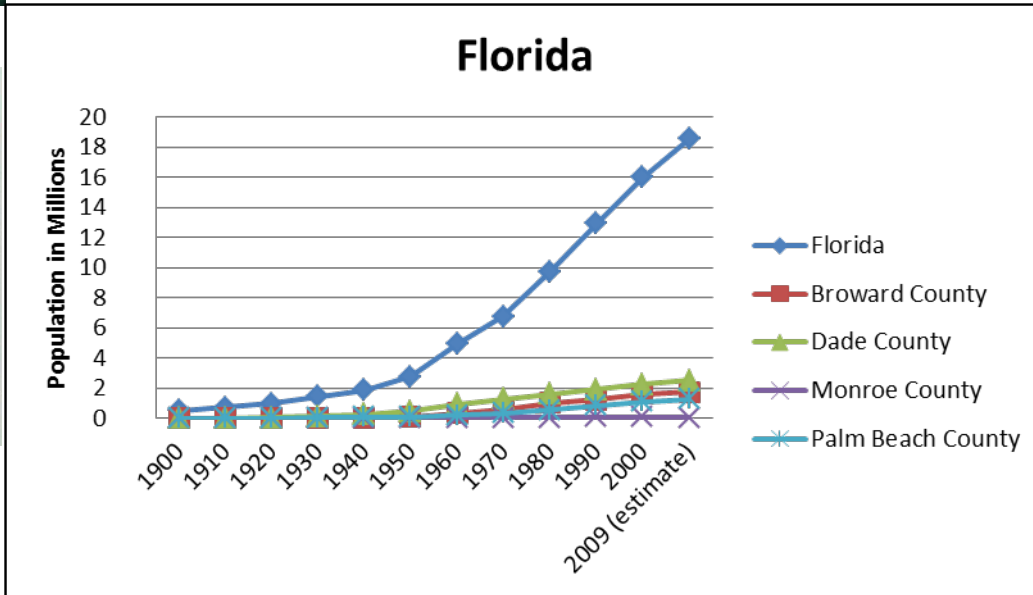
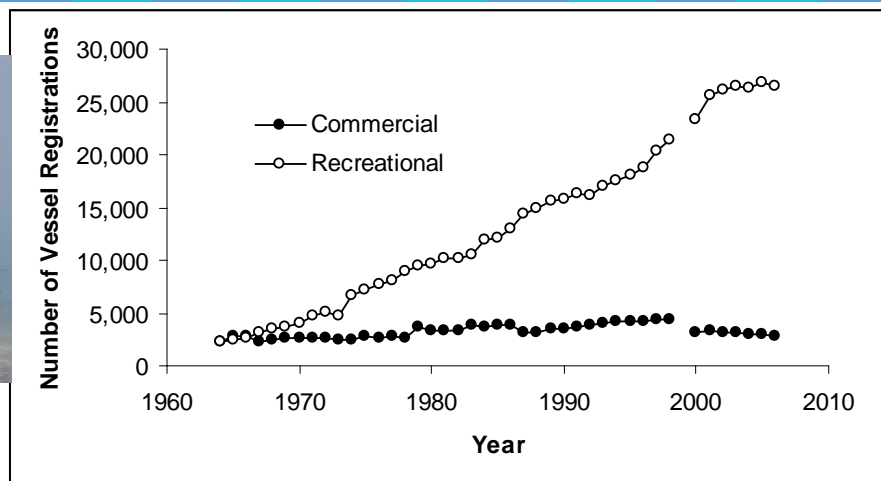
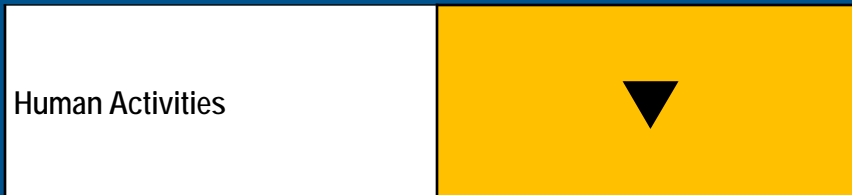
<http://www.esri.com/news/arcnews/winter0506articles/winter0506gifs/p24p2-lg.jpg>

## Pharmaceuticals and other Endocrine Disruptors?



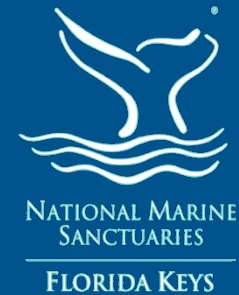
<http://www.esri.com/news/arcnews/winter0506articles/winter0506gifs/p24p2-lg.jpg>

# Habitat





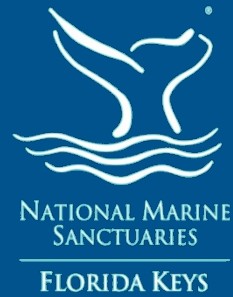
# State of Living Resources (focus of this Working Group)



<b>STATUS:</b>	<b>GOOD</b>	<b>GOOD/ FAIR</b>	<b>FAIR</b>	<b>FAIR/ POOR</b>	<b>POOR</b>	<b>UNDETERMINED</b>
<b>TRENDS:</b>	Improving ..... ▲		Not Changing ..... —		Declining ..... ▼	
				Undetermined ..... ?		Not applicable ..... N/A

Question	Status and Trends	Basis for Judgment
Biodiversity	▼	Relative abundance across a spectrum of species has been substantially altered, with the most significant being large reef-building corals, large-bodied fish, sea turtles, and many invertebrates, including, the long-spined sea urchin. Recovery is questionable.
Environmentally Sustainable Fishing	?	Historical effects of recreational and commercial fishing and collection of both targeted and non-targeted species; it is too early to determine ecosystem effects of new fishery regulations and new ecosystem approaches to fishery management.
Non-indigenous species	▼	Several species are known to exist; lionfish have already invaded and will likely cause ecosystem level impacts; impacts of other non-indigenous species have not been studied.
Key species	—	Reduced abundance of selected key species including corals (many species), queen conch, long-spined sea urchin, groupers and sea turtles.

# State of Living Resources - continued (focus of this Working Group)



<b>STATUS:</b>	<b>GOOD</b>	<b>GOOD/ FAIR</b>	<b>FAIR</b>	<b>FAIR/ POOR</b>	<b>POOR</b>	<b>UNDETERMINED</b>
<b>TRENDS:</b>	Improving .....	▲				
	Not Changing .....	—		Undetermined .....	?	
	Declining .....	▼		Not applicable .....	N/A	

Question	Status and Trends	Basis for Judgment
Health of Key Species	▼	Hard coral and gorgonian diseases and bleaching frequency and severity have caused substantial declines over the last two decades; long-term changes in seagrass condition; disease in sea turtles; sponge die-offs; low reproduction in queen conch; cyanobacterial blooms; lost fishing gear and other marine debris impacts on marine life.
Human Activities	—	Despite the human population decrease and overall reduction in fishing in the Florida Keys since the 1990s, heavy recreational and commercial fishing pressure continues to suppress biodiversity. Vessel groundings occur regularly within the sanctuary. Annual mean number of reported petroleum and chemical spills were around 150 during that time period, with diesel fuel, motor oil, and gasoline representing 49% of these incidents collectively. Over the long term, localized direct impacts may be overwhelmed by the adverse and wide-ranging indirect effects of anthropogenic climate change resulting in sea level rise, abnormal air and water temperatures, and changing ocean chemistry.

# Living Resources

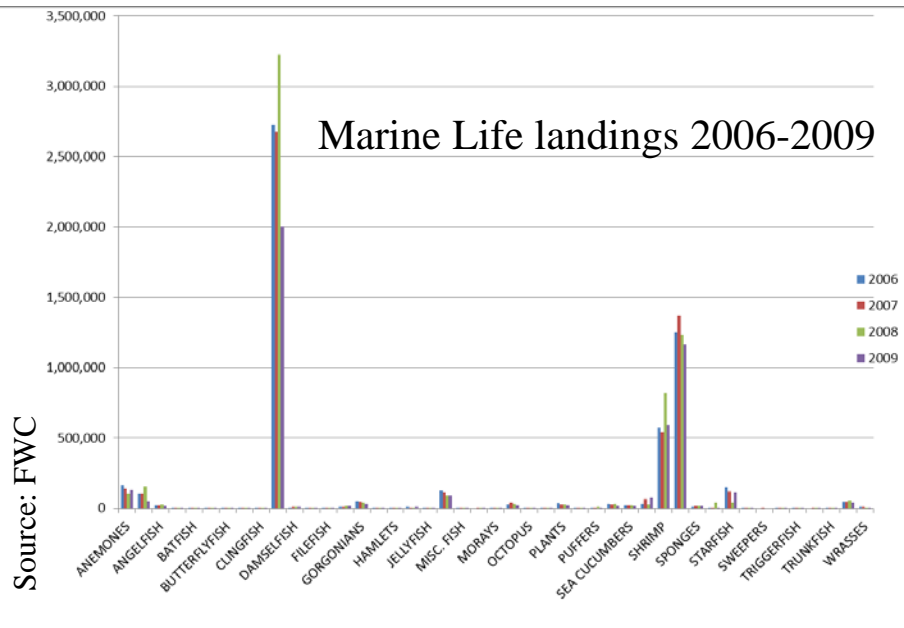


NATIONAL MARINE  
SANCTUARIES  
FLORIDA KEYS

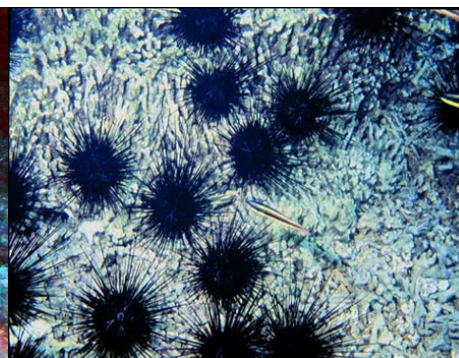
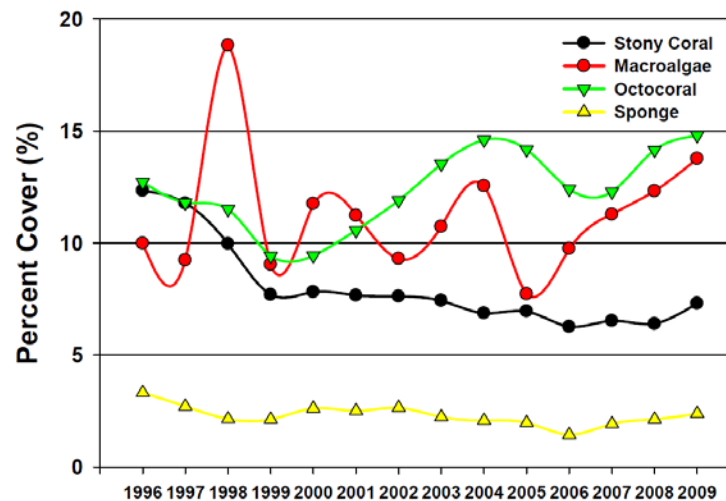
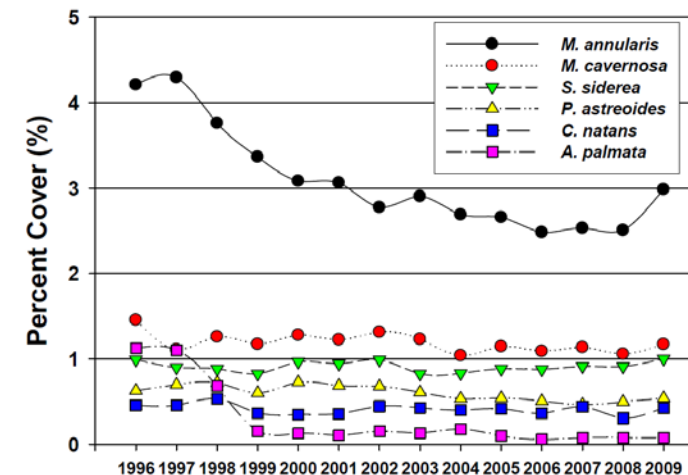
Biodiversity



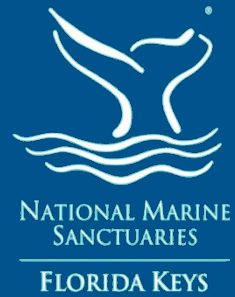
## Marine Life landings 2006-2009



CREMP 2010 Executive Summary



# Living Resources



Environmentally Sustainable  
Fishing

?

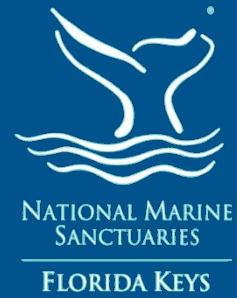
5/18/2011 – Fishers on spawning aggregation off Western Dry Rocks



Credit: FWC

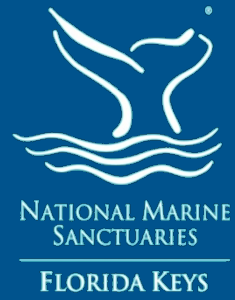
# Living Resources

Non-indigenous species



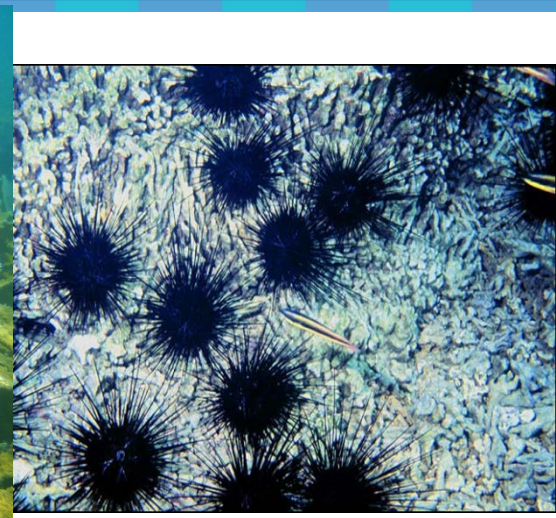
*Photo by J. Randall, Bishop Museum*

# Living Resources

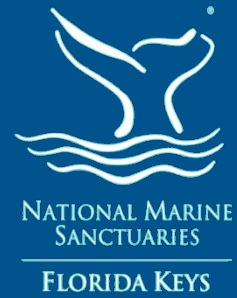


Key species

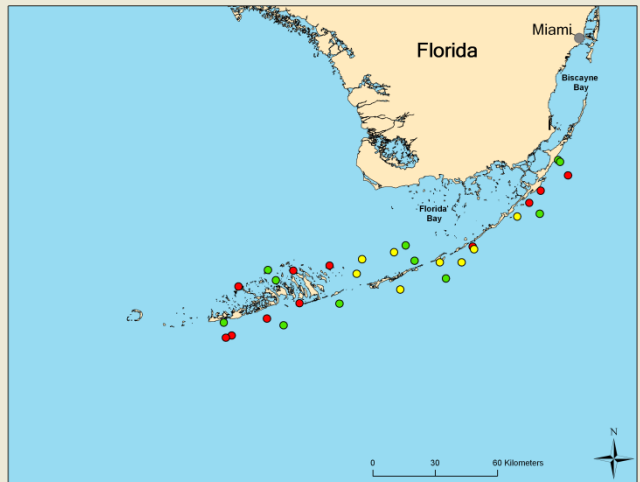
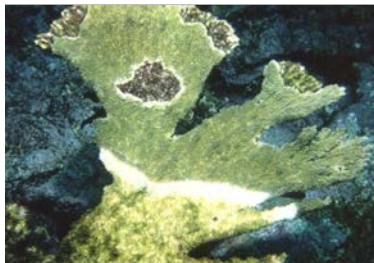
—



# Living Resources

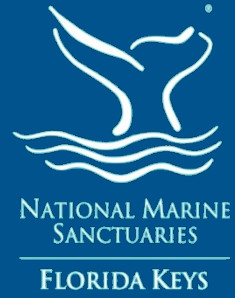


Health of Key Species



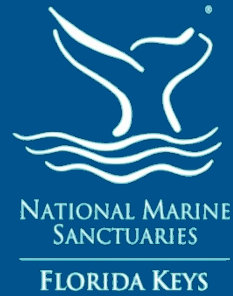
# Living Resources

Human Activities





# Responses to Pressures



## Appendix A - The National Marine Sanctuaries Act

*Title 16, Chapter 32, Sections 1431 et seq. United States Code  
As amended by Public Law 106-513, November 2000*

*Florida Keys National Marine Sanctuary final Revised Management Plan*

## Appendix B - The Florida Keys National Marine Sanctuary and Protection Act

Public Law 101-605 (H.R. 5909)

*Florida Keys National Marine Sanctuary final Revised Management Plan*

## Appendix C - FKNMS Regulations

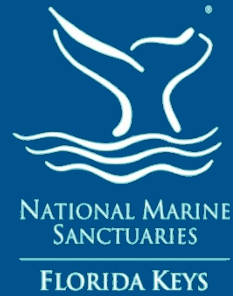
15 CFR part 922, subpart P – Florida Keys National Marine Sanctuary

Source: 62 FR 32161, June 12, 1997, unless otherwise noted.

§ 922.160 Purpose  
(a) The

The banner features a background image of a sailboat on the water. It includes several logos: the U.S. Environmental Protection Agency (EPA), the U.S. Fish and Wildlife Service (USFWS), the Florida Fish and Wildlife Conservation Commission (FWC), the Florida Department of Sport Fish Restoration, and the National Oceanic and Atmospheric Administration (NOAA). The text on the banner reads: "Florida Keys National Marine Sanctuary Water Quality Protection Program". Below the logos, there are links for "Home", "Water Quality Protection Program", "Florida Keys National Marine Sanctuary", "Water Quality Monitoring Project", "Seagrass Monitoring Project", "Coral Reef Evaluation and Monitoring Project", "Special Projects", and "CIS Data". At the bottom, it says "Welcome to the Florida Keys National Marine Sanctuary Water Quality Protection Program Data Integration System" and "Web Page Contact: Daniel Kiermaier Project Manager".

# Responses to Pressures



## Florida Keys National Marine Sanctuary Revised Management Plan



December 2007

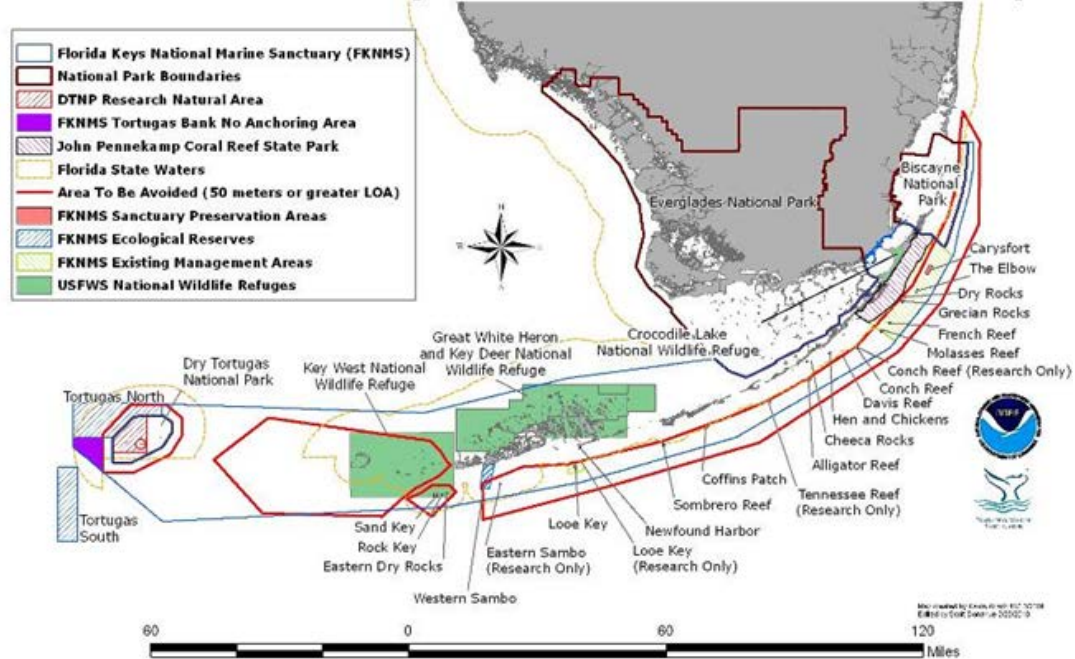
U.S. Department of Commerce

National Oceanic and Atmospheric Administration

National Ocean Service

National Marine Sanctuary Program

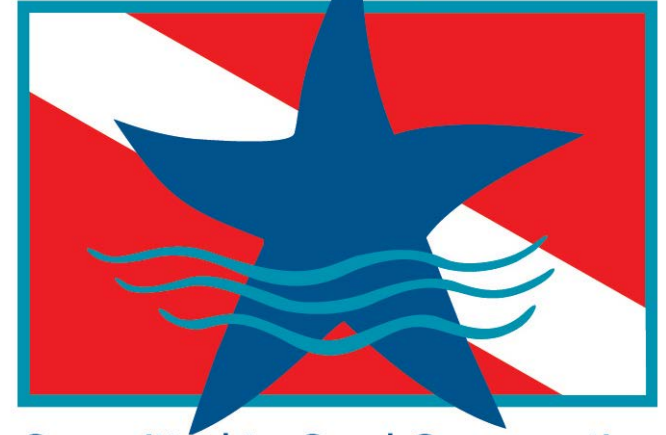
## NOAA's Florida Keys National Marine Sanctuary



# Responses to Pressures



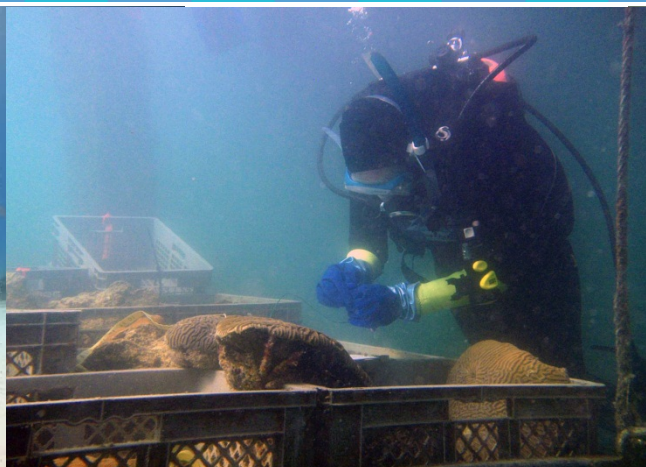
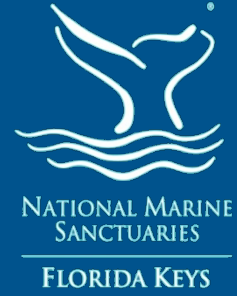
## Blue Star Operator



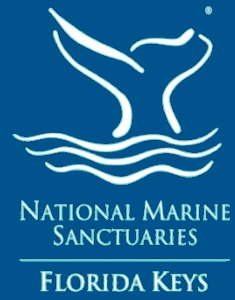
Committed to Coral Conservation



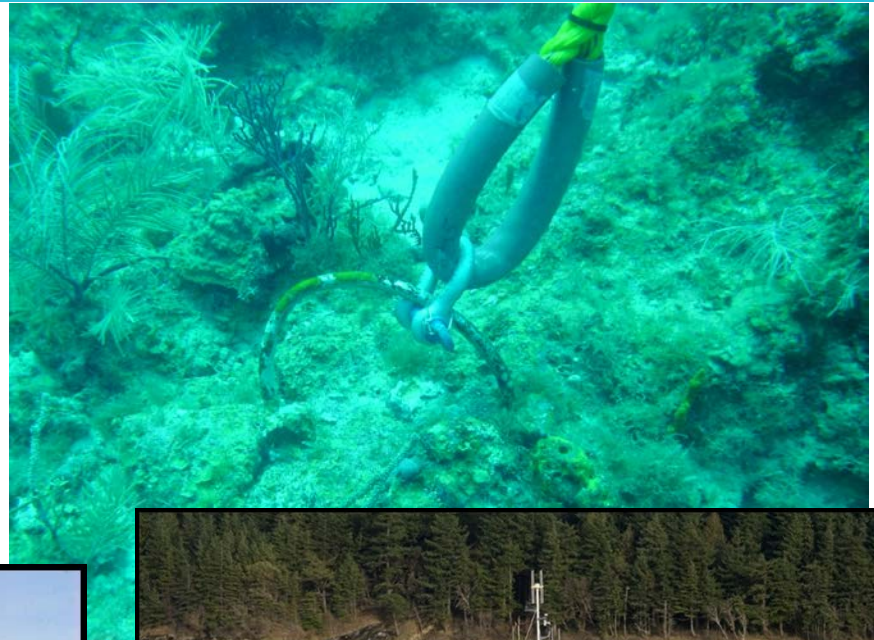
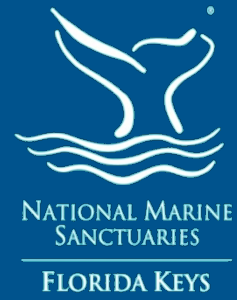
# Responses to Pressures



# Responses to Pressures



# Responses to Pressures

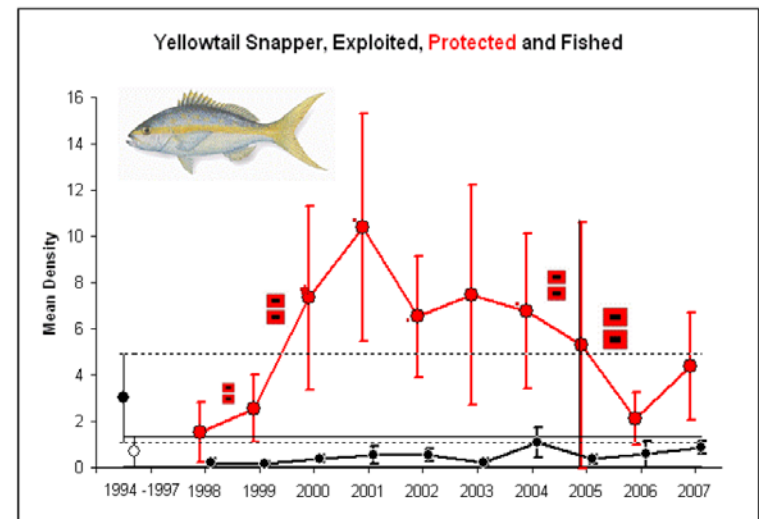
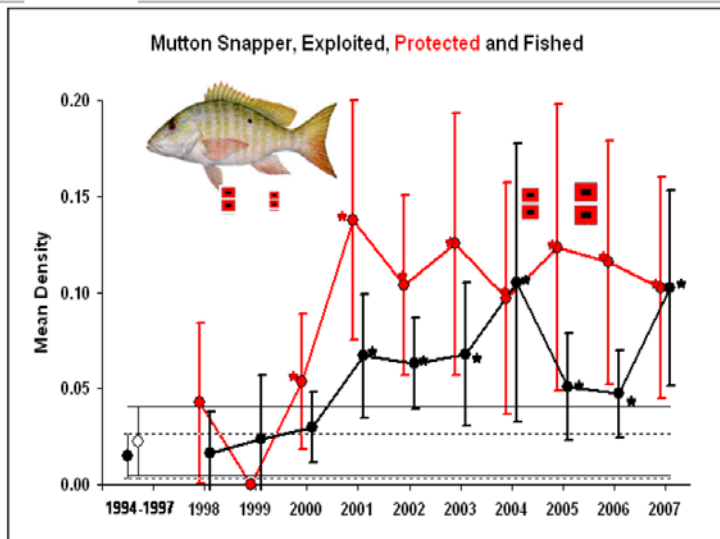
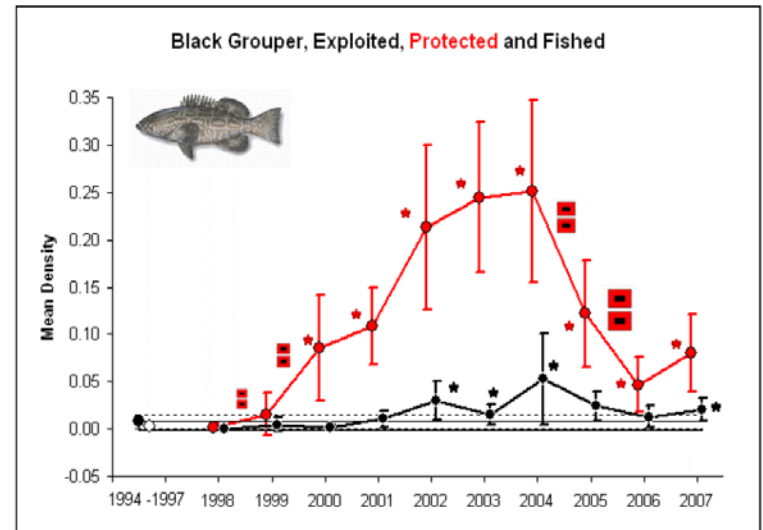
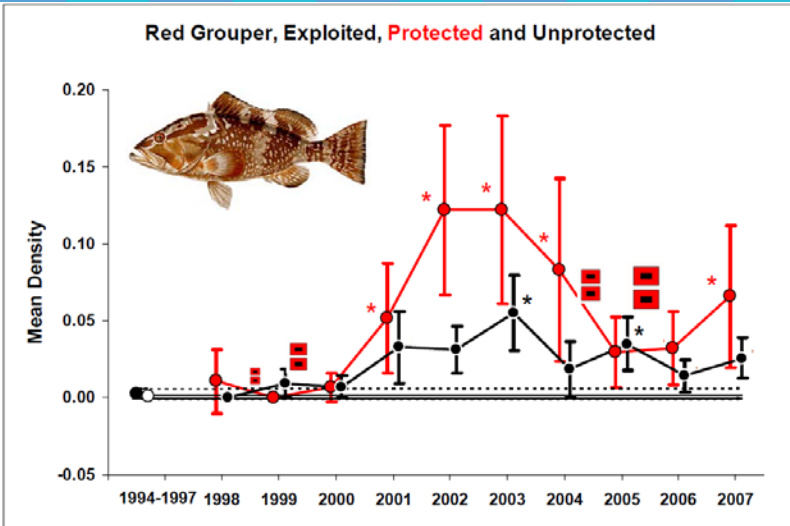
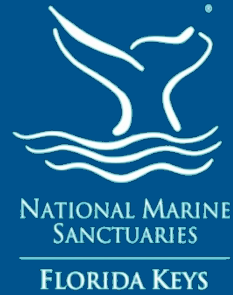


# Responses to Pressures



- **Water Quality Protection Program**
- **Marine Zoning**
- **Regulations Prohibiting Discharge Sanctuary-wide**
- **PSSA designation (2002)**
- **Florida's "Healthy Beaches"**
- **MEERA**
- **Law Enforcement**
- **Mooring Buoys**
- **Education and Outreach**
- **Marine Debris Removal**
- **Habitat Restoration**
- **Prohibition of Mineral & Hydrocarbon Exploration**
- **Large Ship Navigation Beacons**
- **Permitting Program**
- **Bleach Watch**
- **Dolphin SMART**
- **Blue Star**
- **Spill Preparedness Drills**
- **Florida Reef Resilience Program Partner**
- **Vessel Grounding Assessments and Coral Rescue**
- **ATBA**
- **Advanced Wastewater Treatment for Monroe County by 2015**
- **Changing Fishing Regulations**

# Responses to Management



Bohnsack et al., 2009



# Responses to Management

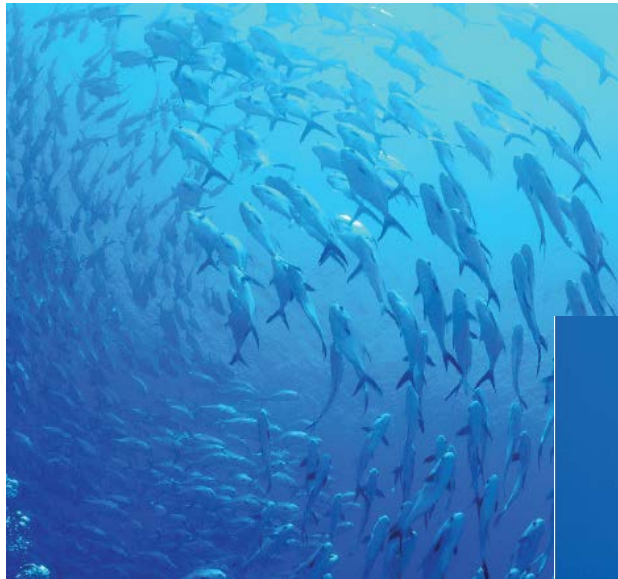
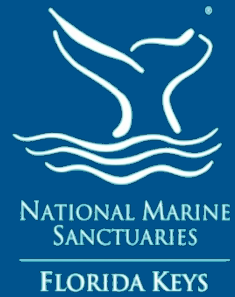


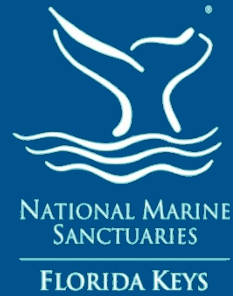
Photo: J. Luo



Photo: C. Parsons



# Summary



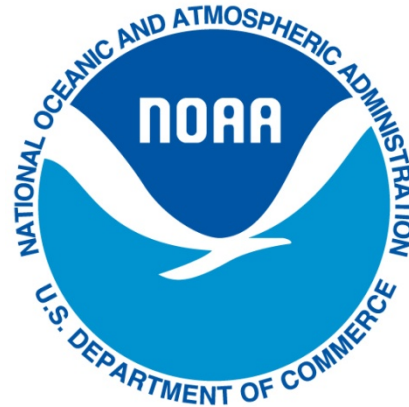
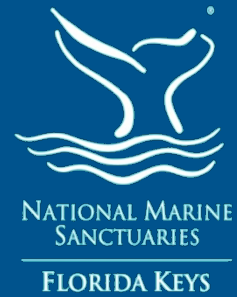
- This is the first Condition Report for the FKNMS.
- The status and trends of FKNMS resources reflect it inherited a compromised ecosystem from more than a century of pressures.
- There are many successes in the relatively short time frame of management.
- We still have a long way to go...

If we want to succeed, these have to change...



Abundance/Distribution	—
Structure	▼
Contaminants	?
Human Activities	▼

Biodiversity	▼
Environmentally Sustainable Fishing	?
Non-indigenous species	▼
Key species	—
Health of Key Species	▼
Human Activities	—



<http://floridakeys.noaa.gov>



NATIONAL MARINE  
SANCTUARIES

FLORIDA KEYS