

# Human Dimensions and the Florida Keys National Marine Sanctuary (FKNMS): Reflections of Two Decades of Change in the Wider Socioeconomic Environment and Stakeholders in the Florida Keys

Manoj Shrivani, Lead Coordinator  
Center for Independent Experts  
Northern Taiga Ventures, Inc.



The Center for Independent Experts



Linking Science to Management: A Conference & Workshop on the Florida Keys  
Marine Ecosystem. October 19-22, 2010

# Timeline to the implementation of the FKNMS

1990

- \* The Florida Keys National Marine Sanctuary and Protection Act, an act of Congress, effectively designates the FKNMS

**The Florida Keys National Marine Sanctuary and Protection Act**

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

1995

- \* The FKNMS Draft Management Plan is released

1996

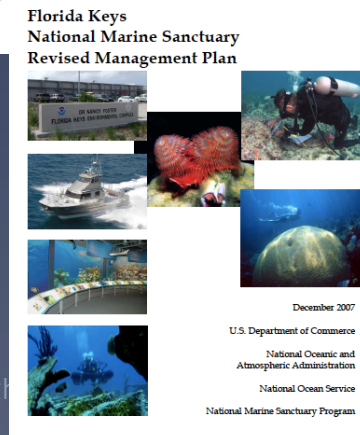
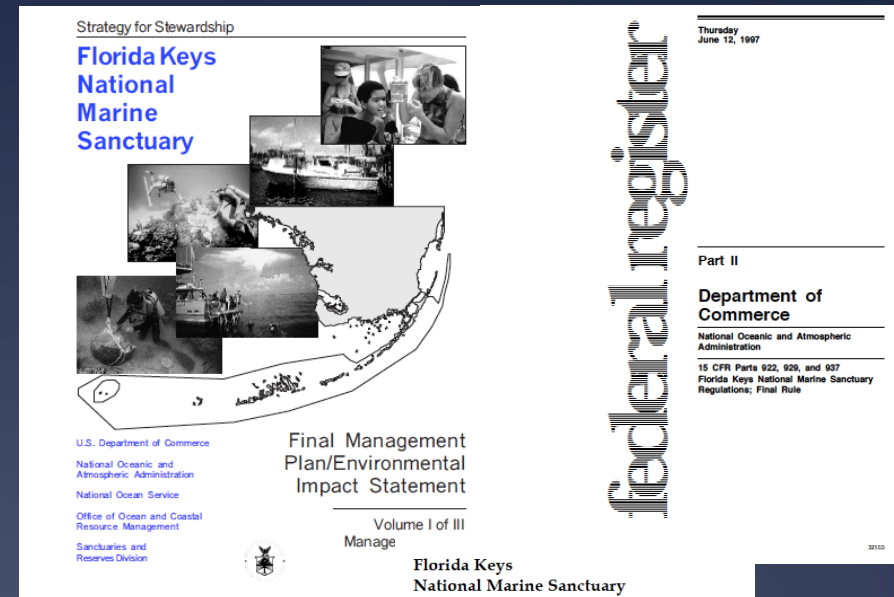
- \* The FKNMS Final Management Plan is released

1997

- \* The FKNMS is implemented

2007

- \* The FMP is revised and released



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# Stakeholder views on FKNMS management during the designation process

Figure 26. Zoning Scheme for Alternative II

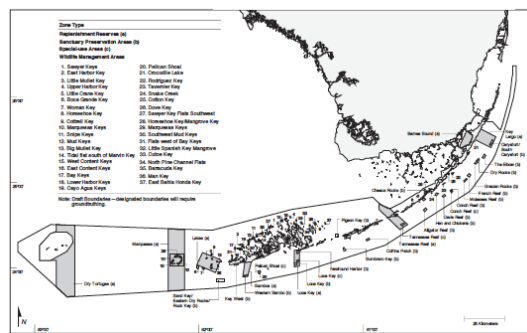


Figure 27. Zoning Scheme for Alternative III

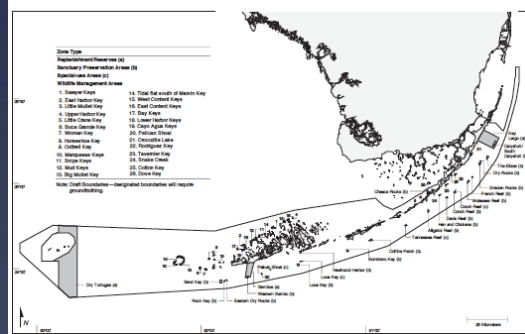
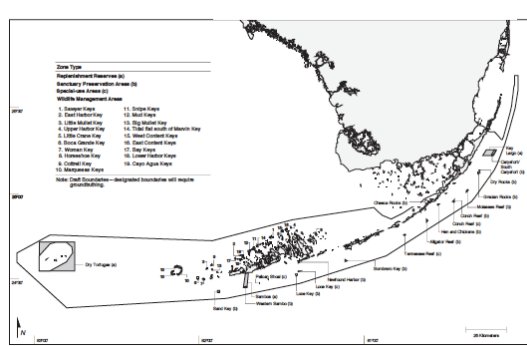


Figure 28. Zoning Scheme for Alternative IV



- \* As the FKNMS opened to a public process in 1995, it encountered opposition from certain stakeholder groups
  - \* 1. Organized opposition to various aspects of FKNMS management, esp. zoning
    - \* Victims of NOAA
    - \* Conch Coalition
  - \* 2. Concerns among larger set of stakeholders on the extent of FKNMS management on their daily activities
    - \* 1996 Referendum

# So, what has happened to stakeholders since the implementation of the FKNMS?

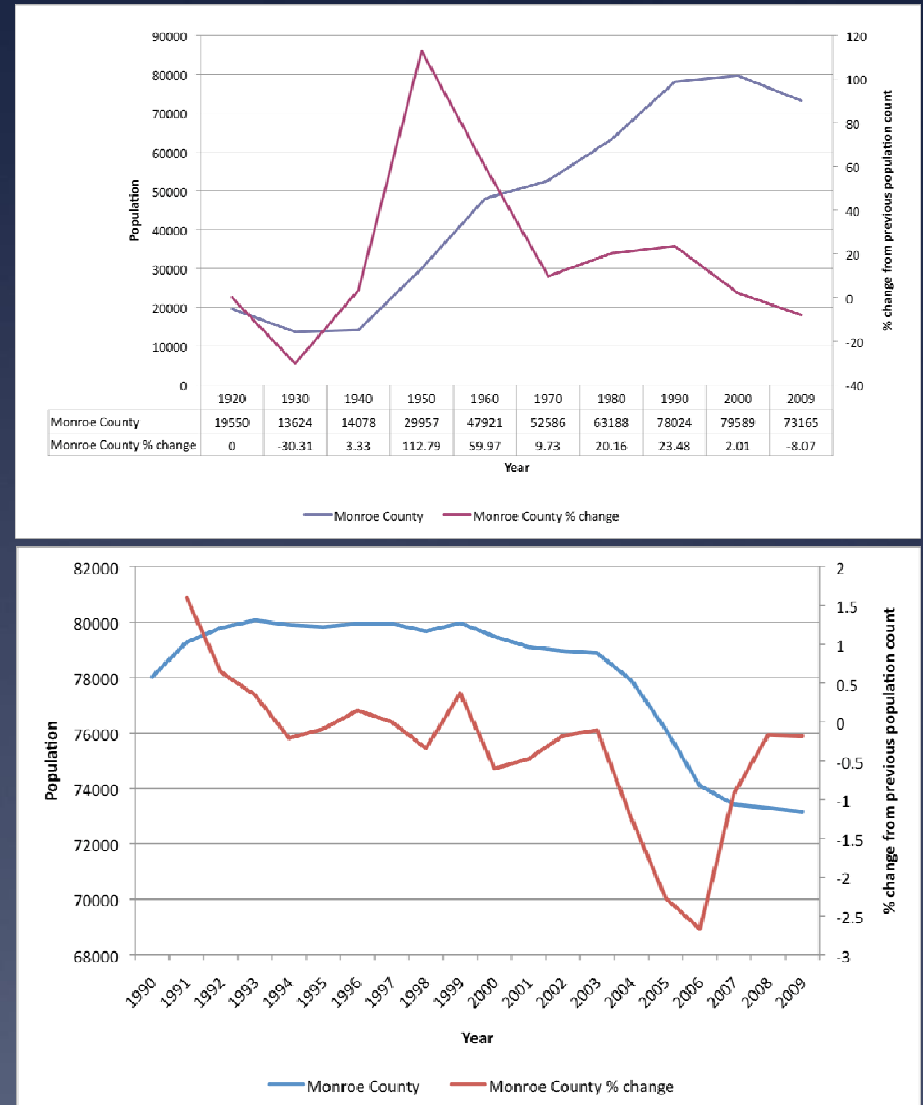
- \* After 20 years since the FKNMS was designated and almost 15 years after the contentious process that in part culminated in the referendum vote against the FKNMS, what has happened?
- \* Put more prosaically, exactly how has the socioeconomic environment changed – in the uses of and attitudes towards the FKNMS since its establishment in 1997?
- \* Furthermore, what new challenges will the FKNMS face in terms of socioeconomic demands and pressures in the coming years and what opportunities exist for meeting those challenges?

# So, what has happened to stakeholders since the implementation of the FKNMS?

- \* Over the past two decades since the designation of the FKNMS, the Florida Keys socioeconomic environment has changed dramatically, in terms of:
  - \* Demography
  - \* Economy
  - \* Stakeholders' uses and use patterns and demands
  - \* Stakeholders' attitudes, beliefs, and perceptions
- \* Effectively, the socioeconomic environment that FKNMS and the Florida Keys marine ecosystem face a generation since FKNMS designation is completely transformed

# Demographic shifts

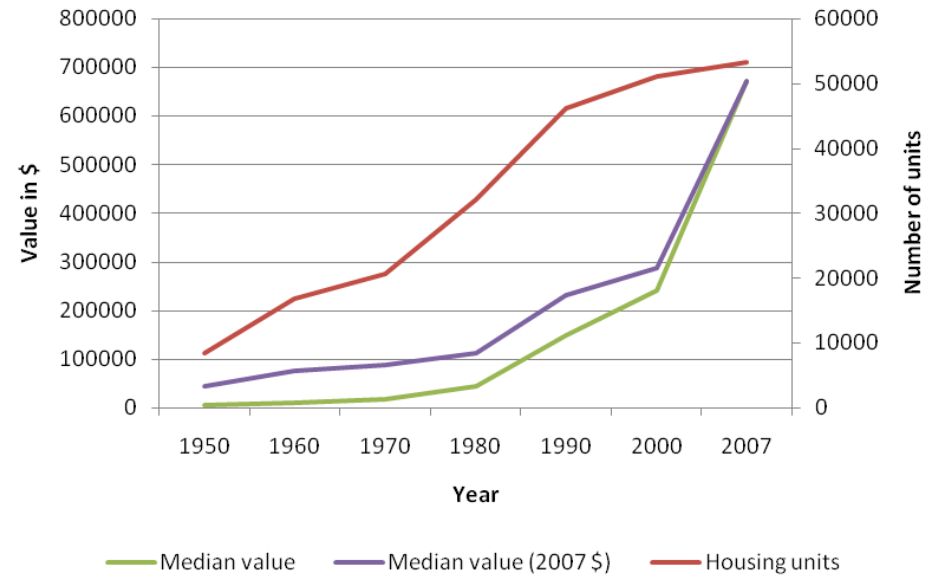
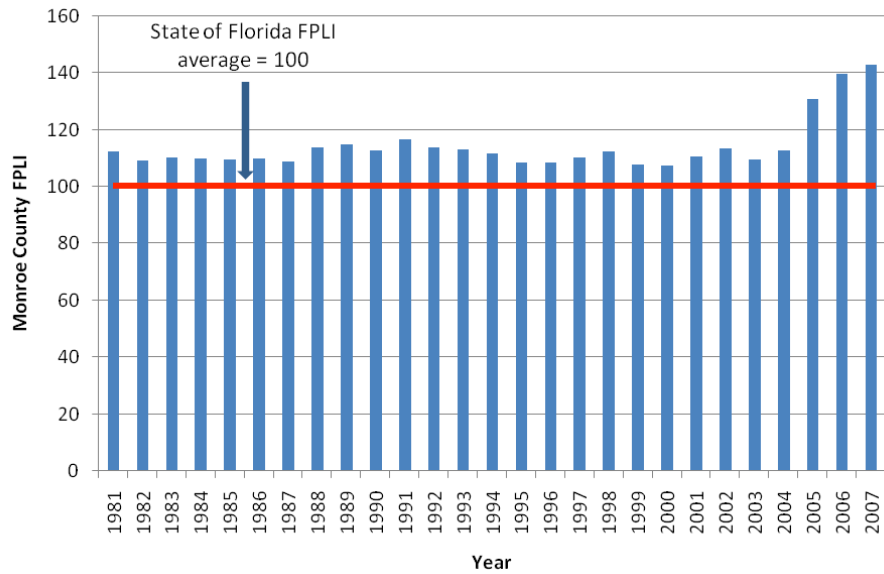
- \* In 1990, the Florida Keys consisted of almost 80,000 residents
  - \* The population increased from 1940 to 2000 (and through the mid-2000s)
- \* But by 2009, the resident population **had actually declined**, to just over 73,000 residents
  - \* The decline represented a shift in the long-term growth and **IMPORTANTLY** in the composition of the residents themselves



# Demographic shifts

- \* So, what caused the demographic shift and what effects did it have on the population?
  - \* 1. Cost of living increases and housing costs
  - \* 2. Regulatory changes
  - \* 3. Alternate economic/employment opportunities
- \* Effectively, the population not only contracted over time but the types of residents, their relationships with the Florida Keys ecosystem, and their ties to the Florida Keys economy also changed over the past two decades

# Cost of living increases



- \* The Florida Keys have always been expensive to live in, due to the need to bring in a majority of the population's needs
  - \* But overall costs increased considerably since 1990, especially in the sectors of housing, water, and fuel, outpacing other Florida counties
  - \* By 2007, single family homes in Key West exceeded \$700,000 in median value and \$670,000 in the Florida Keys
- \* Per capita and household incomes rose by 13.8% and 7.8% from 2000 to 2008, respectively

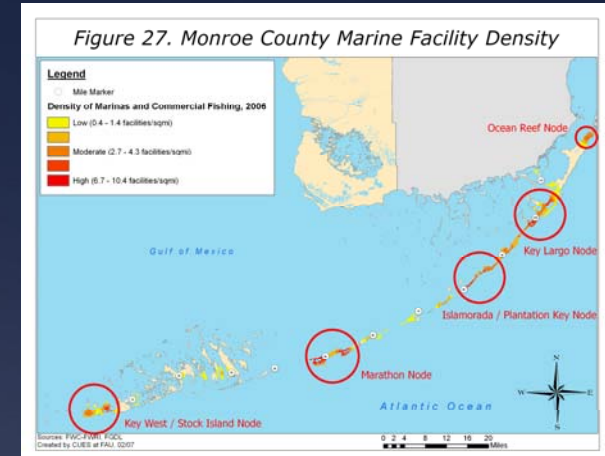


# Cost of living increases

## \* Gentrification

- \* In the 2000s, the Florida Keys experienced a shift in the use of waterfront space from commercial purposes for mainly non-waterfront purposes
  - \* In part, this was fueled by the changing demography of the region
- \* Large loss in commercial fishing waterfront across the Florida Keys in the 2000s
  - \* Loss of slips and gear storage

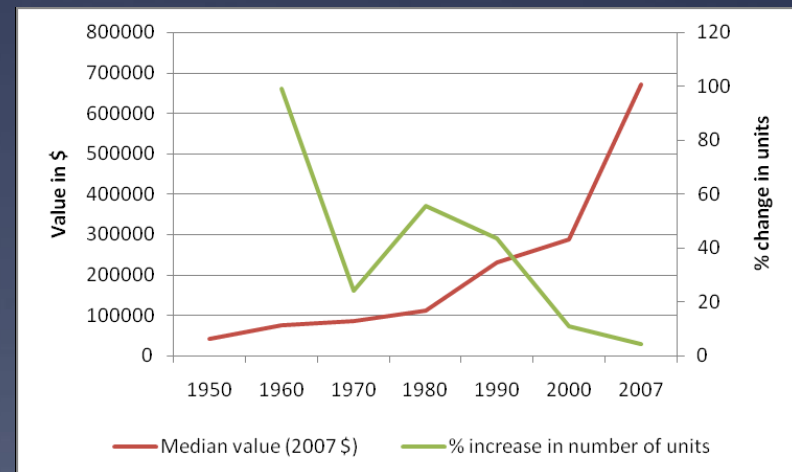
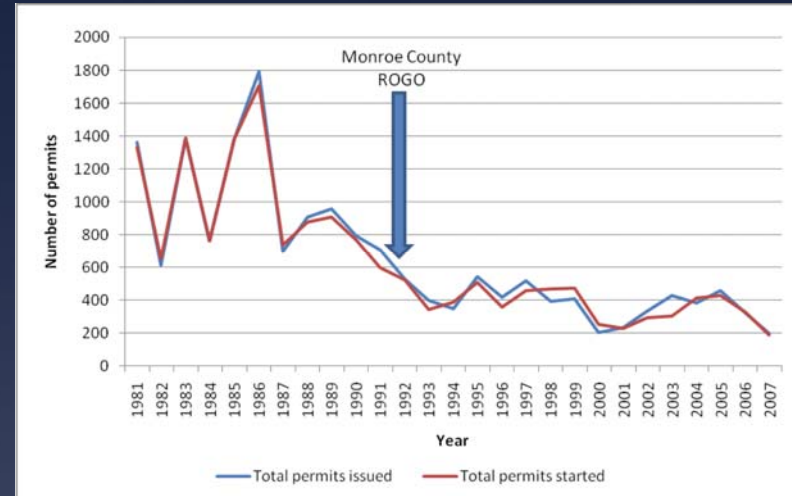
Source: CUES, 2007



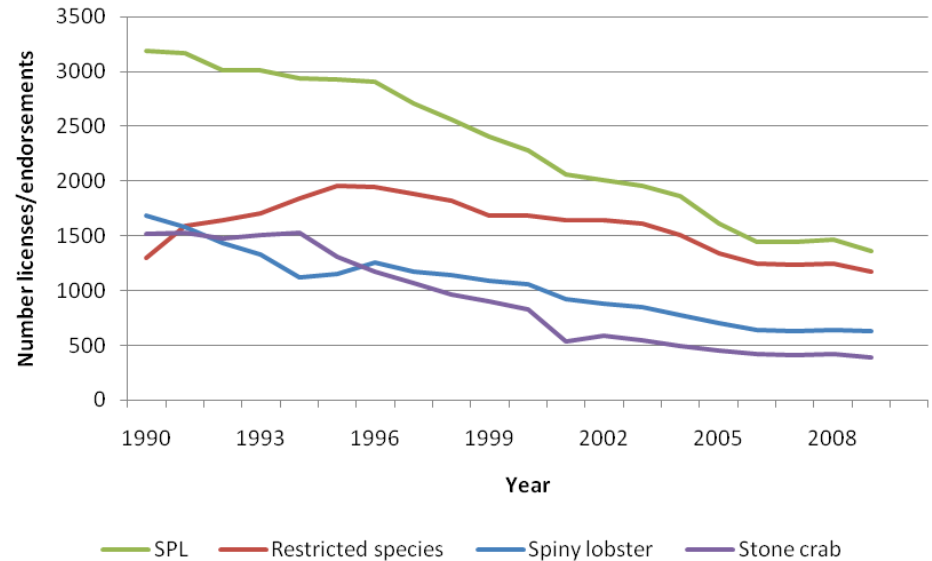
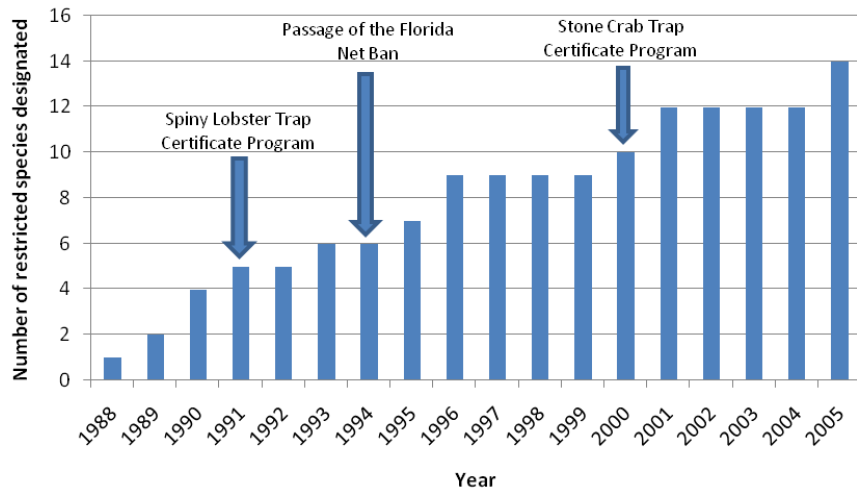
Source: <http://picasaweb.google.com/lh/photo/8l1Lp55z6SLlx4zu7mn5tg>

# Regulatory changes

- \* Regulatory changes in the Florida Keys in the 1990s had profound effects on the demography of the region
- \* One example is that of the implementation of the rate of growth ordinance (ROGO) and its effects on the availability of housing stock and, in part, affordable housing

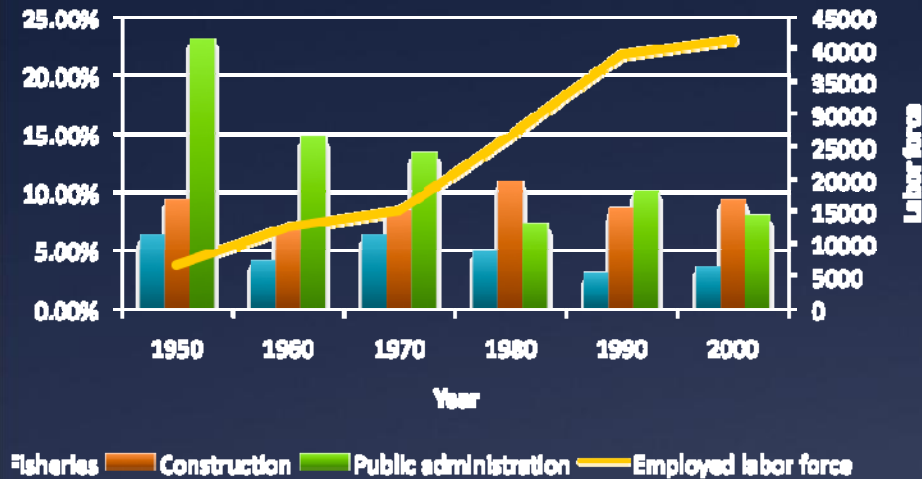


# Regulatory changes



- \* Another example of regulatory changes that affected demography (and part of the labor force) was the implementation of stricter fishery management measures, especially from the 1990s onward
  - \* Limited entry and increased operating costs had a profound impact on participation
  - \* In part, the exit of over half of the region's fishery participants opened up the waterfront to alternate uses

# Alternate economic opportunities



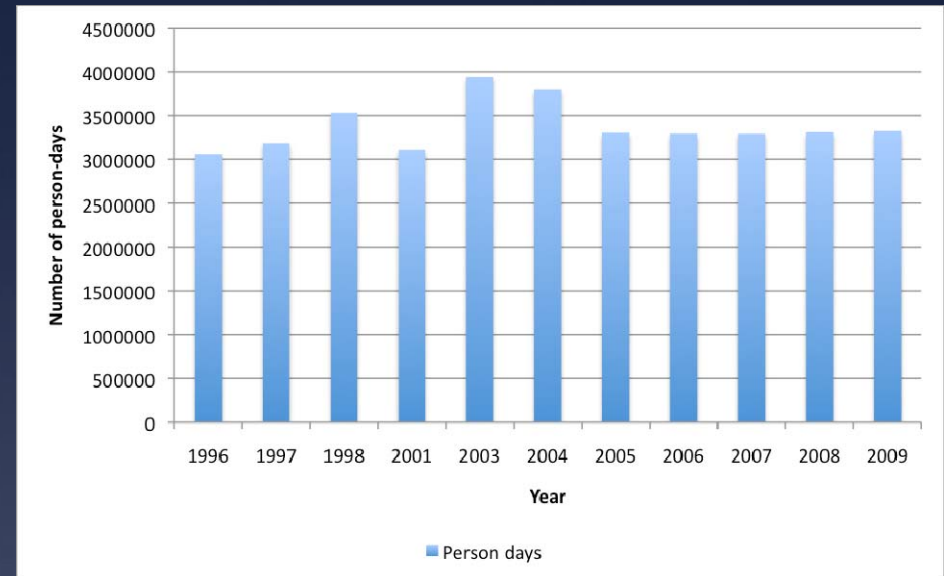
- \* Over the 1980s but especially from the 1990s onward, the labor force shifted dramatically to accommodate the burgeoning tourism industry
  - \* In the 2000s, jobs related to the services sector led all occupations, at over 1/5<sup>th</sup> of the county's workforce
  - \* Over the same period, a decreasing percentage of the Florida Keys' residents earned income from the county itself, decoupling the resident population from the region's economy

# Changes in the Florida Keys economy since the FKNMS designation

- \* As previously stated, the major changes since the designation of the FKNMS in the region's economy has been an ever greater reliance on a single economic driver: tourism
- \* Other economic interests have largely waned, including construction in general since ROGO and in particular after the 2007-08 recession
- \* In particular, the economic contribution of commercial fisheries has declined considerably

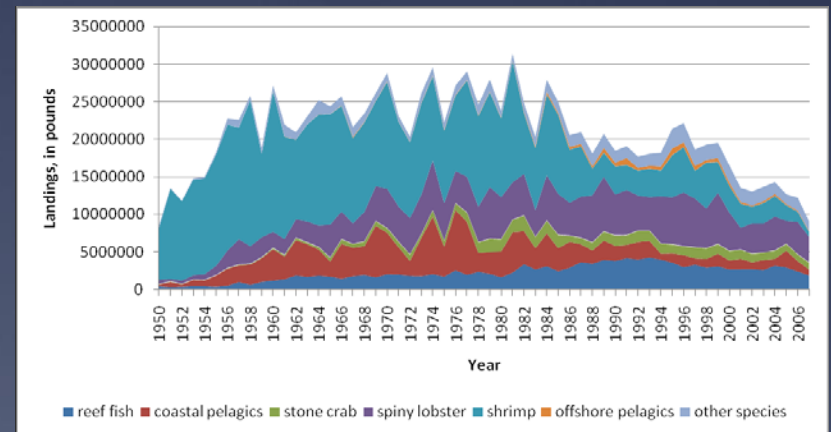
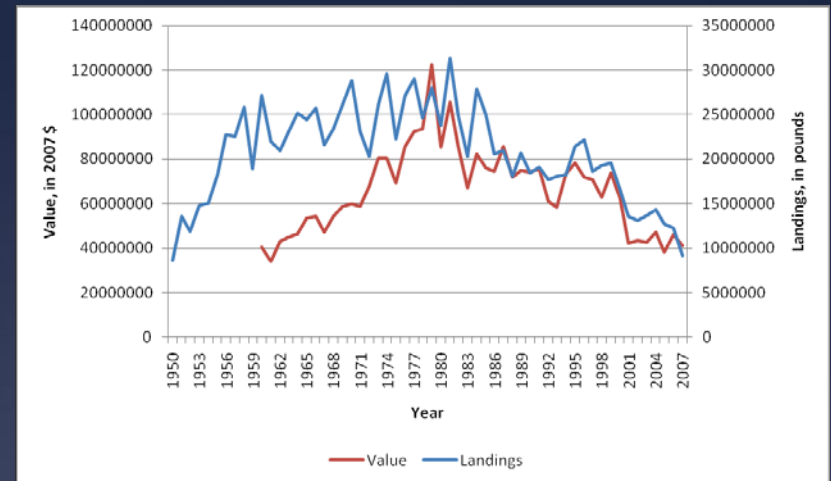
# The rise of tourism

- \* Since the 1950s, tourism was and remains the dominant industry in the Florida Keys
  - \* But tourism has increased considerably over the years following the FKNMS designation
- \* 2.4 million visitors in 1990, and over 3 million visitor-days from 1996 onwards
  - \* Cruise tourism took off in Key West in the 1990s, with over 1 million cruise passengers visiting the island and its environs in the early 2000s
- \* The economic contribution by visitors in 2000-01 was estimated at \$1.35 billion in output and sales and \$611 million in income
  - \* The tourism industry supported 33,188 jobs
  - \* Overall the tourism industry accounted for 42% of the county's income by place of work and 61% of its employment



# The decline of the commercial fishery sector

- \* Commercial fisheries, which had once represented almost 10% of the labor force, declined to less than 3% of the labor force since 1990
- \* Fishery production dropped from a peak of 30 million pounds in the 1970s to less than 10 million pounds in 2007
- \* Once major fisheries, such as shrimp, declined to only a handful of participants and minor totals



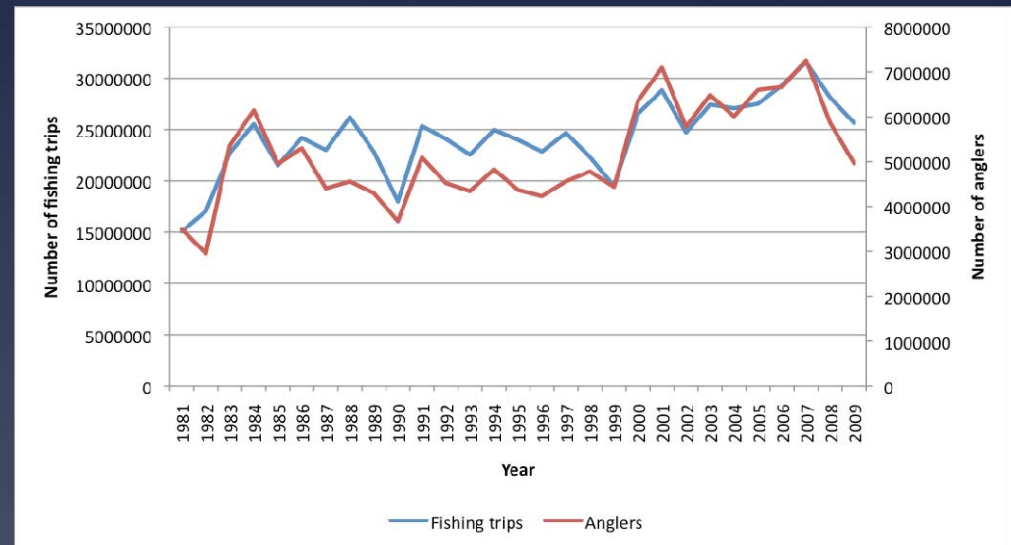
# Changes in uses and demands for Florida Keys resources

- \* Since the designation of the FKNMS, demand for and uses of Florida Keys resources, namely the coral reefs and fisheries, changed considerably
  - \* Recreational reef use and fisheries continued or increased since 1990
    - \* In 1995-96, a third of the over three million visitors reported participating in a water-based activity in the Florida Keys
  - \* Extractive uses, especially commercial fisheries, declined since 1990
    - \* Commercial fishing trips in 2007 reached their lowest levels since the early 1950s

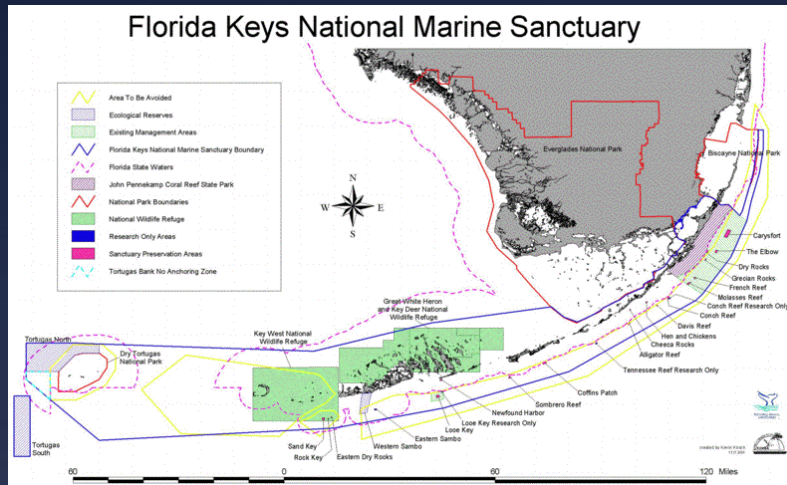


# Recreational fishing in the Florida Keys

- \* Overall, the number of anglers and fishing trips in the State of Florida increased considerably over the past two decades
- \* Johns et al. (2003) reported that almost half of the 5.46 million visitor days spent in Florida Keys reefs in 2001 consisted of fishing trips (2.62 million visitor days)
- \* Recreational divers caught an average of 24% of the spiny lobster harvest from 1994-2008, a majority of which is landed in the Florida Keys
- \* Registration of recreational vessels in Monroe County increased by 8.7% over the 2000-07 period, or from 23,340 vessels to 25,370 vessels



# Recreational diving and snorkeling in the Florida Keys



\* By 1997, the FKNMS FMP reported that 80-85% of all diving and snorkeling in the Florida Keys occurred within Sanctuary Preservation Areas (SPAs)

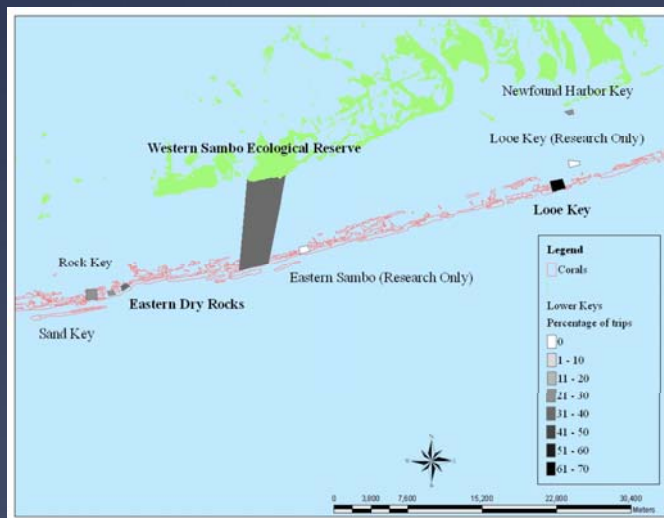
\* Reliance on SPAs by dive operators did not change much from 1995 to 2005 (ex. Looe Key SPA remained very important)

\* Johns et al. (2003) determined that 2.84 million person days were spent on Florida Keys coral reefs in 2001

\* 1.87 million snorkeling

\* 0.89 million diving

\* 0.07 million glassbottom boating

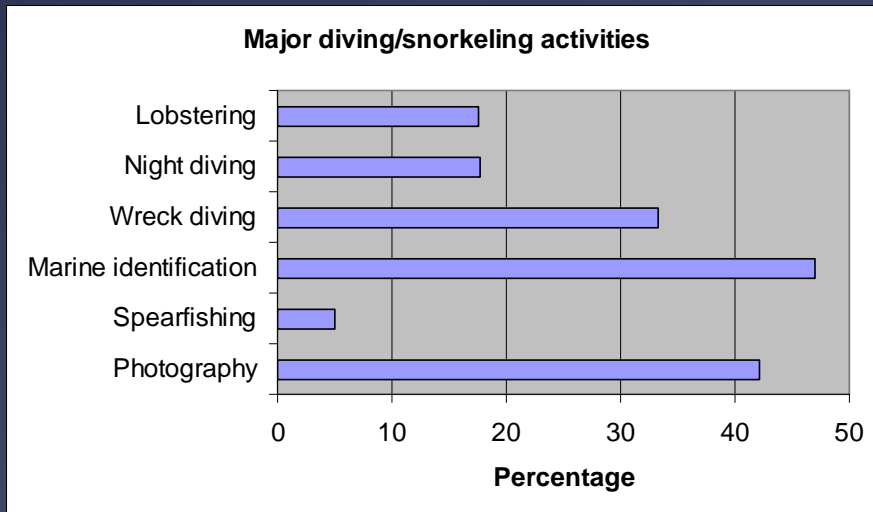


# Changes in demand for Florida Keys' resources



[http://myfwc.com/WILDLIFEHABITATS/saltwaterfish\\_bonefish\\_more.htm](http://myfwc.com/WILDLIFEHABITATS/saltwaterfish_bonefish_more.htm)

- \* Changes occurred over the past two decades in the demand for fisheries
- \* Certain fisheries (game fish) became worth more alive than per pound
  - \* Ault et al. (2009) reported that a single bonefish in south Florida can be worth \$75,000 over its lifetime to the regional economy
- \* Demand for nonconsumptive activities such as underwater photography and fish ID increased
  - \* Related demand for mega fauna among divers and snorkelers



# Changes in attitudes, perceptions, and beliefs concerning the FKNMS

- \* Since the designation of the FKNMS in 1995, stakeholders' views of the Sanctuary, the Florida Keys marine ecosystem, and the future of the region have also shifted
- \* A representative sample of three stakeholder groups – commercial fishermen, dive operators, and environmental group members – were tracked in two baseline studies
  - \* The first study was in 1995-96
  - \* The second study was in 2005-06
- \* Findings suggest that as in almost every other aspect of the socioeconomic environment, views on the FKNMS and the Florida Keys marine ecosystem changed considerably over the 20 years since FKNMS designation.

# Stakeholders' views on the purpose of

## 1. Increasing overall fish stocks and biomass inside the zones.

Group	1996	2006		
	All Zones	ERs	SPAs	WMAs
Commercial Fishers	44.3%	40.5%	35.4%	16.7%
Dive Operators	83.9%	56.2%	60.9%	39.0%
Environmental Groups	71.9%	22.7%	11.6%	14.3%

## 2. Increasing overall fish stocks and biomass outside the zones.

Group	1996	2006		
	All Zones	ERs	SPAs	WMAs
Commercial Fishers	23.1%	22.5%	26.2%	15.0%
Dive Operators	59.7%	43.5%	37.7%	34.8%
Environmental Groups	56.4%	18.9%	8.2%	9.6%

## 3. Conserving and protecting corals, fish and other marine life.

Group	1996	2006		
	All Zones	ERs	SPAs	WMAs
Commercial Fishers	39.0%	42.9%	51.4%	25.5%
Dive Operators	83.9%	56.2%	60.9%	39.0%
Environmental Groups	85.1%	46.5%	51.5%	57.7%

- \* Stakeholders in 1996 generally agreed that the FKNMS zoning strategy was to conserve and protect marine life in the zones
- \* By 2006, that view still held and replenishment outside the zones is still not perceived as an objective

# Stakeholders' views on FKNMS outcomes

## 1. FKNMS zones have reduced conflicts between different user groups.

Group	1996		2006						Statistical Difference	
	All Zones	Mean	ERs	Mean	SPAs	Mean	WMAs	Mean	Difference	Mean
Commercial Fishers	74.8%D	(4.39)	57.3%D	(3.73)	48.4%D	(3.45)	48.0%D	(3.45)	YES	YES
Dive Operators	49.2%D	(3.44)	33.8%A	(2.12)	50.7%A	(2.44)	30.4%A*	(2.52)	YES	YES
Environmental Group	43.1%A	(2.69)	26.7%A	(2.74)	28.8%A	(2.57)	29.0%A*	(2.61)	YES ER only	NO

## 2. FKNMS zones have been effective in restoring coral reefs in the Florida Keys to what they used to be.

Group	1996		2006						Statistical Difference	
	All Zones	Mean	ERs	Mean	SPAs	Mean	WMAs	Mean	Difference	Mean
Commercial Fishers	69.3%D	(4.10)	49.7%D	(3.42)	46.7%D	(3.28)	48.2%D	(3.50)	YES	YES
Dive Operators	49.1%D	(3.33)	33.3%D*	(3.16)	43.5%D	(3.11)	27.4%A*	(2.52)	NO	NO
Environmental Group	63.1%A	(2.29)	40.7%D*	(3.49)	39.5%D	(3.43)	38.8%D*	(3.49)	YES	YES

- \* Commercial fishermen and dive operators expressed more support in 2006 for the view that FKNMS zones had reduced conflicts between user groups
- \* Fewer environmental group members agreed in 2006 that FKNMS zones had been effective in restoring coral reefs in the region
  - \* By contrast, fewer commercial fishermen in 2006 disagreed that the zones had achieved that objective

# Stakeholders' support for FKNMS zones

## 1. I support the establishment of FKNMS zones as they are currently established.

Group	1996		2006						Statistical Difference	
	All Zones	Mean	ERs	Mean	SPAs	Mean	WMAs	Mean	Difference	Mean
Commercial Fishers	86.2%D	(4.66)	48.3%D	(3.23)	45.7%A	(2.98)	44.2%A	(2.91)	YES	YES
Dive Operators	42.6%D	(3.11)	55.1%A*	(1.90)	72.5%A	(1.84)	48.8%A*	(1.91)	YES	YES
Environmental Group	34.1%A	(2.81)	51.4%A*	(2.17)	51.9%A	(2.17)	50.9%A*	(2.16)	YES	YES

- \* Support for the existing FKNMS zoning strategy increased among all three stakeholder groups
  - \* In 1996, 86.2% of the commercial fishermen did not support the zoning strategy, and in 2006, less than half did not support it
  - \* 72.5% of dive operators in 2006 supported the SPA zoning strategy in , up from 43% in 1996
  - \* Over half of the environmental group members supported the zoning strategy, up from 34.1% in 1996

# Stakeholders' views on FKNMS benefits

## 1. NOAA has made a positive contribution to the marine environment via the National Marine Sanctuary Program.

Group	1996		2006		Statistical Difference	
	%	Mean	%	Mean	%	Mean
Commercial Fishers	N/A	N/A	46.5 A	(2.81)	N/A	N/A
Dive Operators	N/A	N/A	88.4 A	(1.71)	N/A	NO
Environmental Group	50.9 A	(2.18)	61.5 A	(1.91)	60.4 A	YES

## 2. The Florida Keys have benefited environmentally from the FKNMS.

Group	1996		2006		Statistical Difference	
	%	Mean	%	Mean	%	Mean
Commercial Fishers	N/A	N/A	49.5 A	(2.81)	N/A	N/A
Dive Operators	N/A	N/A	82.6 A	(1.73)	N/A	N/A
Environmental Group	70.3 A	(1.97)	67.8 A	(1.81)	NO	NO

## 3. There has been a net economic benefit to the Florida Keys from establishment of the FKNMS.

Group	1996		2006		Statistical Difference	
	%	Mean	%	Mean	%	Mean
Commercial Fishers	69.7 D	(4.14)	44.5 A	(3.12)	YES	YES
Dive Operators	52.4 A	(2.63)	65.2 A	(2.14)	YES	YES
Environmental Group	58.4 A	(1.89)	49.7 A	(1.65)	NO	NO

- \* Almost half of the commercial fishermen and large majorities of the other stakeholder groups felt that NOAA has made a positive contribution to the region's marine environment and that the Florida Keys have benefitted environmentally from the FKNMS
- \* Environmental group members by contrast were less likely in 2006 than in 1996 to perceive a net economic benefit to the Florida Keys from the FKNMS



# Stakeholders' views on resource conditions

Resource	User Group (mean scores)		
	Commercial Fishers	Dive Operators	Environmental Group Members
1. Water quality	3.69	3.22	3.02
2. Land-based pollution/sewage	3.58	3.31	3.15
3. Sea-based pollution/marine debris	3.23	3.04	2.90
4. Coral reefs	3.49	3.37	3.17
5. Sea grasses	3.21	2.70	2.75
6. Fisheries	3.30	2.82	2.72
7. Mooring buoys	2.19	1.82	1.97
8. Vessel groundings	2.83	2.68	2.41

- \* Stakeholders' views on resource conditions since the establishment of the FKNMS revealed that all felt that mooring buoys maintained by the FKNMS and controlling vessel groundings had been areas of FKNMS success (mean <3)
- \* By contrast, all groups felt that water quality, pollution, and coral reefs had deteriorated or worsened since the establishment of the FKNMS
  - \* It should be noted that the stakeholders did not blame the FKNMS for the conditions

# Stakeholders' support for FKNMS

## 1. I generally support the establishment of the FKNMS.

Group	1996		2006		Statistical Difference	
	%	Mean	%	Mean	%	Mean
Commercial Fishers	78.4 D	(4.38)	42.0 D	(2.81)	YES	YES
Dive Operators	64.0 A	(2.23)	87.0 A	(1.63)	YES	YES
Environmental Group	74.9 A	(1.85)	71.7 A	(1.65)	NO	NO

- \* Support for the FKNMS improved among commercial fishermen and dive operators and remained strong among environmental group members
- \* **In 1996, almost 4/5ths of the commercial fishing industry opposed the establishment of the FKNMS; by 2006, opposition had declined to 42%**
- \* Support for the FKNMS was strong in 1996 among dive operations, and that support increased significantly, to 87% in 2006

# A summary of changes in the two decades since FKNMS establishment

- \* There has been a considerable shift in the demographic nature and economic configuration in the Florida Keys
- \* Uses and demands have changed, some of which may increase the stress on the region's coastal and marine resources
  - \* Especially recreational fishing and diving
- \* Support for the FKNMS and its zoning strategy has strengthened among stakeholder groups that were wary of or in complete opposition to the FKNMS a decade earlier
  - \* A convergence of views on the FKNMS

# Challenges and opportunities

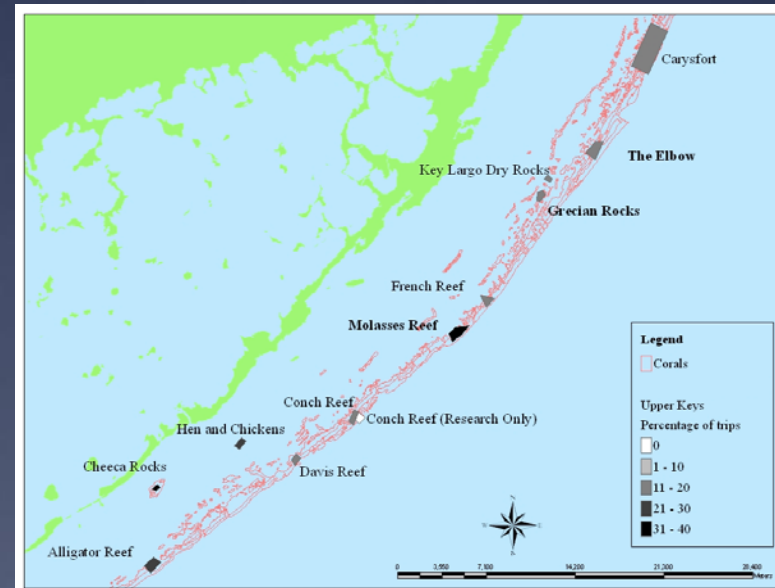
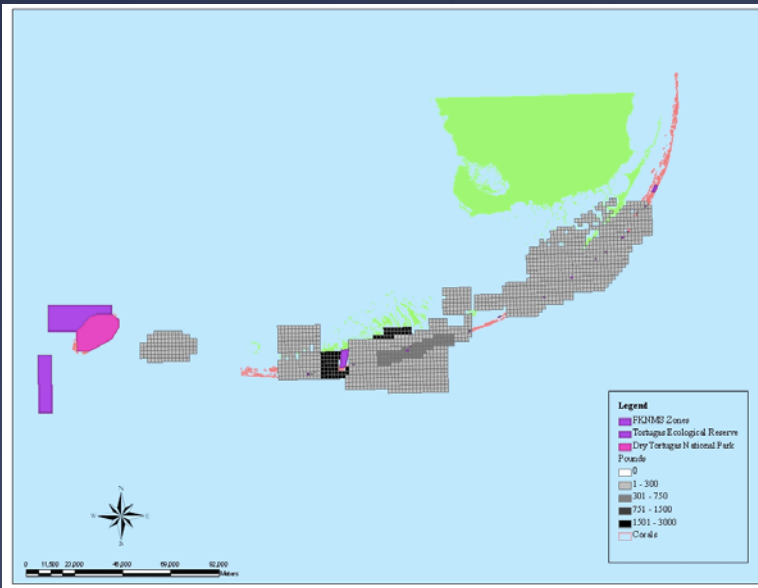
- \* There is a continued need to educate the changing population on FKNMS objectives and achievements
  - \* This is particularly the case for those residents who do not work in the Florida Keys and thus decoupled from the region in terms of income
  - \* This is also true for environmental group members who support the FKNMS but represented the least informed group in the stakeholder studies
  - \* In terms of resource conditions, stakeholder results demonstrate the need for the FKNMS to highlight efforts and achievements in these areas

# Challenges and opportunities

- \* Tourism relies extensively on the Florida Keys' natural resources
  - \* The effects of tourism activities on the natural resources need to be monitored
    - \* Studies on views on visitor satisfaction on natural resources, as conducted by Leeworthy and others, should be continued
  - \* Dive operator support for the FKNMS has increased considerably, and they would serve as excellent partners in monitoring impacts

# Challenges and opportunities

- \* Under-studied activities such as recreational fishing need to be fully characterized to understand the demographics, use patterns, and views of this important stakeholder group
- \* Use patterns as shown below for commercial fishermen and dive operators can be very useful in determining changes in areas and intensities of use, and impacts of resources, and in marine spatial planning



# Conclusion

- \* Over time, the FKNMS has become increasingly accepted as a permanent part of the Florida Keys landscape

- \* Some who in the past expressed their displeasure have now come to appreciate the FKNMS and even (especially) Billy Causey!



Source: Billy Causey



Source: Billy Causey

# Acknowledgement

In the memory of a dear colleague and friend, Brian, who with Fiona, encouraged me in my research since we first met 12 years ago at a Tortugas 2000 workshop.