Knowledge, Attitudes and Perceptions of Management Strategies and Regulations of the Florida Keys National Marine Sanctuary by Commercial Fishers, Dive Operators, and Environmental Group Members: A Baseline Characterization and 10-year Comparison

EXECUTIVE SUMMARY

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APRIL 17, 2008

NOAA NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION U.S. DEPARTMENT OF COMMERCE

NATIONAL MARINE SANCTUARIES

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Introduction

This research is part of the Socioeconomic Research & Monitoring Program for the Florida Keys National Marine Sanctuary (FKNMS), which was initiated in 1998. In 1995-96, a baseline study on the knowledge, attitudes and perceptions of proposed FKNMS management strategies and regulations of commercial fishers, dive operators and on selected environmental group members was conducted by researchers at the University of Florida and the University of Miami, Rosenstiel School of Atmospheric and Marine Science (RSMAS). The baseline study was funded by the US Man and the Biosphere Program and published by Florida Sea Grant, and sub-components of the study were published in several peer reviewed journals. The study was accepted into the Socioeconomic Research & Monitoring Program at a workshop to design the program in 1998, and workshop participants recommended that the study be replicated every ten years. The 10-year replication was conducted in 2004-05 (commercial fishers) 2006 (dive operators) and 2007 (environmental group members) by the same researchers at RSMAS, while the University of Florida researchers were replaced by Thomas J. Murray & Associates, Inc., which conducted the commercial fishing panels in the FKNMS. Tom Murray is also on the faculty at the Virginia Institute of Marine Science. The 10-year replication study was funded by NOAA's Coral Reef Conservation Program.

The study not only makes 10-year comparisons in the knowledge, attitudes and perceptions of FKNMS management strategies and regulations, but also establishes new baselines for future monitoring efforts. Conditions change, and following the principles of "adaptive management", management has responded with changes in the management plan strategies and regulations. Some of the management strategies and regulations that were being proposed at the time of the baseline 1995-96 study were changed before the management plan and regulations went into effect in July 1997. This was especially true for the main focus of the study which was the various types of marine zones in the draft and final zoning action plan. Some of the zones proposed were changed significantly and subsequently new zones have been created. The details of all these changes can be found in the Introduction of the full report.

Stakeholder Groups Surveyed

The same three user groups surveyed in baseline were surveyed in 10-year replication. However, there were significant changes in the number and make-up of each group over the 10-year period. As some peer reviewers noted, this fact partially explains some of the changes in attitudes and perceptions found in the 10-year comparisons.

Commercial Fishers. In 1995-96, there were 2,430 Saltwater Product License (SPL) holders in Monroe County/Florida Keys. By 2004-05, this number declined to 1,138 or a 53% decline. As a comparison, statewide the number of SPLs declined 38% over the same period. Fishery management regulations due to overfishing and excess capacity (economic overfishing), increased land values and competition with the tourist industry for waterfront access, and higher operating costs have all combined to reduce the number of commercial fishers in Monroe County/Florida Keys.

In addition to the reduction in the overall number of commercial fishers, there were also significant changes in the age and tenure of the commercial fishers. The remaining fishery is more professionalized with older, more experienced fishers, fewer part-time fishermen, more highly capitalized (more boats, equipment and gear—primarily traps), more dependent on fishing for their personal income and more affiliated with group organizations to represent their interests. Commercial fishers were also less dependent on affiliations with fish houses.

Age: In 1995-96, 10.5% of commercial fishers were 18-30 years old versus 6.9% in 2005-05; and, in 1995-96 17.1% of commercial fishers were over 60 years old compared with 27.9% in 2004-05.

Experience: In 1995-96, 17% of commercial fishers had 1-5 years of experience, while this dropped to 5.1% in 2004-05. Commercial fishers with over 20 years of experience increased from 29.5% in 1995-06 to 66.7% in 2004-05.

Income Dependency on Fishing: Commercial fishers were 25% more dependent on commercial fishing for their total personal income over the 10-year period. In 1995-96, commercial fishers received 61% or their total personal income from

commercial fishing. By 2004-05, commercial fishers received 86% of their total personal income from fishing. In 1995-96, 53.2% were full-time commercial fishers. This increased to 75.5% in the 10-year replication. Most of this change came from holders of Saltwater Product Licenses (SPLs) who were classified as Charter or Recreational fishermen, but sell some of their catch. Charter and recreational SPL holders accounted for 35% of commercial fishers in 1995-96, this declined to about 12% in 2004-05. Those who were classified as commercial fishers (not involved in the recreational fisheries) and part-time actually increased slightly from 11% to 12.4%. But overall the percentage of those who spent part-time in the commercial fishery declined significantly.

Group Affiliations: In 1995-96, 24% of commercial fishers were members of the Monroe County Commercial Fishermen (MCCF), in 2004-05 this increased to 34%. In addition, membership in the Organized Fishermen of Florida (OFF) increased from 19% to over 24% over the 10-year period. The MCCF is now the Florida Keys Commercial Fishermen's Association (FKCFA).

Fish House Association. In 1995-96, over 72% of commercial fishers belonged to a fish house compared to 47% in 2004-05. Much of the decline is due to the closing of many fish houses due to competition for waterfront access.

Dive Operators. In 1996, there were 75 dive operators in Monroe County/Florida Keys. This increased to 89 dive operators in 2006. However, some of the dive operators that existed in 1996 have gone out of business or changed ownership and new dive operators have opened since 1996. Only 30 of the 69 dive operators surveyed in 2006 were surveyed in 1996. So the make-up of the dive operators has changed somewhat over the 10-year period. Again, this may partially explain some of the changes in attitudes and perceptions found in the study.

The dive operators (owners/operators) were, on average, older in 2006 versus 1996 and they were, on average, more experienced in the dive industry and the dive businesses had, on average, longer times in existence. So even though the dive business is fairly dynamic with much turnover, there have been a relatively large number of dive operators that were in business in the baseline. Dive operators have also affiliated themselves with more professional and other organizations, both national and local.

Age of Owners/Operators: In 1996, 13% were 18-30 years old compared to 8.5% in 2006, while 5.1% were over 60 years old in 1995-96 compared to 14.5% in 2006.

Years in Diving Industry: In 1996, 40% had been in the dive industry 1-5 years compared to 26% in 2006, while in 1996 8.3% had been in the dive industry over 20 years compared to 14.5% in 2006.

Years Dive Operations in Existence in Monroe County/Florida Keys. In 1996, 34% had been in business in the Florida Keys for 1-5 years compared to 11.6% in 2006, while in 1996 14.9% were in business in the Florida Keys for over 20 years compared to 33.3% in 2006.

Group Affiliations: Of the organizations or type of organizations dive operators were asked about membership, only one showed a decline in membership. Membership in the Florida Association of Dive Operators (FADO) dropped from 40.1% in 1996 to 30.4% in 2006. Membership in the local Keys Association of Dive Operators (KADO) increased from 16.4% in 1996 to 43.5% in 2006. Membership also increased in two other national dive certification groups. Membership in National Association of Underwater Instructors (NAUI) increased from 14.8% in 1996 to 30.4% in 2006 and membership in the Professional Association of Dive Instructors (PADI) increased from 70.5% in 1996 to 81.2% in 2006. Membership in the local chambers of commerce increased from 36.1% in 1996 to 53.5% in 2006, while memberships in environmental groups increased from 13.1% to 26.1% over the 10-year period. Memberships in other local organizations increased from 24.6% to 41.6% over the 10-year period.

Environmental Group Members. Not all environmental groups were included in the baseline 1996 study. Researchers selected three local environmental groups: Reef Relief, Last Stand, and Sanctuary Friends of the Florida Keys. For the 10-year replication, only Reef Relief and Last Stand were included because Sanctuary Friends of the Florida Keys (SFFK) had changed to Friends of the Florida Keys National Marine Sanctuary and did not have a mailing list that could be provided to the research team. So in all comparisons between 1996 and 2007 environmental group members were restricted to members in these two groups. One consequence of this was that a higher percent of the 2007 sample were not residents of the Florida Keys. In the baseline study, 67.8% of members of the three

Research was funded by NOAA's Coral Reef Conservation Program

environmental groups were residents of the Florida Keys, while in the 10-year replication only 40% were Florida Keys residents.

In 2007, Reef Relief, which is a Key West based environmental group, had 3,442 members. Last Stand is also based in Key West and in 2007 had 330 members, primarily living in the Florida Keys. In both the baseline and 10-year replication surveys, it was found that there was considerable cross group affiliation. In the baseline study, 27% of Last Stand and SFFK members were also members of Reef Relief, compared to 8.9% of Reef Relief and SFFK members who were members of Last Stand and less than 1% of Last Stand and Reef Relief members who were members of SFFK.

Environmental group members were older in 2007 than in the baseline study and almost 60% of the 2007 sample had been affiliated with the environmental group for six or more years and thus a majority was most likely familiar with the history of the FKNMS.

Age. The average age of environmental group members was between 41-50 years old in the baseline study while members of the 2007 sample were on average between 51-60 years old.

Environmental Group Affiliation: Fewer respondents (64.3%) in 2007 reported being part of one or more other environmental groups than did the 1996 sample (70.1%). The most popular other environmental groups were The Nature Conservancy (18.7% in 2007), Sierra Club (14.4%) and The Audubon Society (10.9%). However of these three, two had declines in affiliation and only the Sierra Club showed an increase over the 10-year period.

10-year Replication Study Objectives

By reassessing the same stakeholders' use patterns and knowledge, attitudes and perceptions, it is expected that the findings can determine whether (a) stakeholder opinions have shifted in support of the FKNMS in the decade since its establishment, (b) stakeholder perceptions on the FKNMS outcomes have converged over time, and (c) what areas of divergence concerning FKNMS performance have developed across stakeholders that may not have existed in the previous baseline. In addition, the study establishes new baselines for future assessment of new management strategies and regulations that have come into being in management plan revisions.

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KNOWLEDGE

Under knowledge, sources of information used, the usefulness of information used, and the purposes of the various zoning strategies were assessed.

Sources of Information

In the two sampling periods, not all sources of information were listed in the surveys of each user group. Also, different methods were used in ranking sources of information for their usefulness. This complicated the task of comparing changes over the 10-year period. Table ES-1 summarizes the top five sources of information used by each user group. Since user groups differed on their top five sources, both across groups and within groups across time, 12 sources of information are reported. The full report includes more detail for each user group.

"Newspapers", "Rumors/Word of Mouth", and "FKNMS brochures/literature" were the top ranked (in terms of relative proportion of use) sources of information across both user groups and time periods. "FKNMS brochures/literature" increased in relative importance (rank) for all user groups over the 10-year time period and a significantly higher proportion of dive operators and environmental group members used the source. A slightly lower proportion of commercial fishers used this source over the 10-year period.

"FKNMS staff/personnel" was among the top five sources of information used for commercial fishers and dive operators in the baseline study, but dropped out of the top five for commercial fishers in the 10-year replication and entered the top five for environmental group members. For dive operators, this source of information rose in relative ranking over the 10-year time period, but a slightly lower proportion of dive operators used the source (53.2% to 50.7%).

Although "radio" was among the top five sources of information used for commercial fishers and environmental group members in at least one of the time periods, the proportion of those who used the source declined significantly for all three user groups over the 10-year time period. And, although "television" was only among the top five sources of information used in the baseline period for commercial fishers and environmental group members, like "radio" use of this source declined significantly for all three user groups over the 10-year time period.

Table ES-1. **Top 5 Sources of Information Used, By User Group: Baseline versus 10-year Replication (Rank/Percent of Sample Used Source)**

Information Source	Commercial Fisheries		Dive Operations		Environmental Groups	
	1995-96	2004-05	1996	2006	1996	2007
1. FKNMS website	–	8/9.2	–	6/38.8	–	4/25.3
2. FKNMS staff	5/22.6	7/11.2	5/53.2	3/50.7	9/22.4	5/22.1
3. FKNMS Draft Management Plan	–	–	2/69.4	–	5/36.5	–
4. FKNMS brochures/literature	4/28.9	2/26.5	6/43.5	1/65.2	8/29.1	2/45.2
5. FKNMS signage	–	3/22.5	–	5/42.0	–	8/17.6
6. NOAA meetings	–	–	4/56.5	–	7/29.7	–
7. Newspapers	1/75.0	4/19.1	3/66.1	4/49.3	2/78.2	1/52.7
8. Radio	3/45.5	5/14.6	7/40.3	8/23.2	4/48.9	6/21.3
9. Television	3/45.5	6/13.3	7/40.3	9/17.4	4/48.9	7/19.8
10. Rumors/word of mouth	2/66.4	1/27.9	3/66.1	2/59.4	6/30.3	3/39.7

– Not asked, not indicated in 'other' category, or did not exist.

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Top 5 Sources of Information Used, By User Group: Baseline versus 10-year Replication (Rank/Percent of Sample Used Source) - Continued

Information Source	Commercial Fisheries		Dive Operations		Environmental Groups	
	1995-96	2004-05	1996	2006	1996	2007
11. Dive organizations	–	–	1/76.1	–	–	–
12. Own Environmental Group	–	–	–	–	1/87.2	–
13. Other Environmental Groups	–	–	8/38.7	–	3/50.6	–

– Not asked, not indicated in 'other' category, or did not exist.

"Rumors/word of mouth" increased in relative importance (rank) for all three user groups over the 10-year period, but the proportion of use declined significantly for commercial fishers, declined slightly for dive operators, and increased for environmental group members.

An interesting finding is that for environmental group members their "own environmental group" and for dive operators "dive organizations" were ranked number one in the baseline time period, but were not even listed in the 10-year replication. This may be an artifact of survey design (i.e. listed in the questionnaire in the baseline and just recorded/specified by the respondent in the "other" category of the 10-year replication questionnaire).

The FKNMS "website" and FKNMS "signage" did not exist in the baseline time period, but both sources of information were ranked highly in the 10-year replication. The "website" was ranked number four by environmental group members and number six by dive operators, while "signage" was ranked number three by commercial fishers and number five by dive operators. A higher proportion of dive operators used the "website" than environmental group members (38.8% versus 25.3%).

Other sources not in the top five used by any user group in either time period included the FKNMS Advisory Council, Commercial Fishing Groups, Government Fisheries Organizations and Sea Grant. See full report for details.

Usefulness of Information Sources

In the 10-year replication, commercial fishers ranked the usefulness of information sources with the same ranking as proportion of use, suggesting they sought out a more limited set of sources based on usefulness. This is in contrast to the baseline study where commercial fishers used a much larger variety of sources, but rated many of them as not very useful. In the baseline study, the proportion of sources of information used was less correlated with the rankings of usefulness of information.

Dive operators also used a wider source of information in 1996 than in 2006. In both time periods, dive operators ranked (in terms of proportion that found the information source useful) NOAA/FKNMS sources of information as among the top three most useful sources of information. General media sources and other organizations, except "dive organizations", were considered useful by only a small proportion of dive operators (less than 5%, except newspapers at 16%). Although "rumors/word of mouth" ranked highly (in terms of proportion of dive operators who used the information source), this source of information ranked relatively low for usefulness.

In the baseline study, researchers had concluded that "anti-FKNMS groups" were an important factor in explaining ambivalence of support for the FKNMS and the proposed marine zones (even the ones for which dive operators were the direct beneficiaries—SPAs and ERs), but even in the baseline this source of information was ranked very low (4.8% thought the information useful).

Environmental group members relied on the same type of information in both time periods. Although both the 2007 and 1996 samples reported "rumors/word of mouth" as an important source of information, only 8.2% and 4.5% of the 2007 and 1996 samples listed the source as being the most useful, respectively. "Newspapers", "FKNMS brochures/literature", and "FKNMS staff/personnel" were the most useful sources of information reported in the 2007 sample.

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Purposes of the FKNMS Zones

In the baseline study, three purposes of the FKNMS zones were assessed, while five purposes were assessed in the 10-year replication. Also, in the baseline, there was no differentiation by type of zone, while in the 10-year replication three types of zones were assessed: Ecological Reserves (ERs), Sanctuary Preservation Areas (SPAs), and Wildlife Management Areas (WMAs). ERs and SPAs are two different forms of no-take areas. See inset box for definitions.

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%

4. Resolving user group conflicts.

Group	1996	2006		
	All Zones	ERs	SPAs	WMAs
Commercial Fishers	N/A	8.2%	12.9%	8.8%
Dive Operators	N/A	21.7%	40.6%	14.5%
Environmental Groups	N/A	3.9%	22.3%	11.2%

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5. Supporting scientific research.

Group	1996	2006		
	All Zones	ERs	SPAs	WMAs
Commercial Fishers	N/A	22.8%	25.5%	15.0%
Dive Operators	N/A	52.2%	62.3%	37.7%
Environmental Groups	N/A	6.8%	5.7%	6.2%

The percentages show the percent in agreement with each statement but are not comparable across years because in the baseline respondents were simply asked if each of the purposes was the intent of the zones, while in the 10-year replication respondents were asked which one of the five purposes was the main purpose of each type of zone. Thus, no statistical tests for differences were conducted.

Despite the limitations in direct comparisons, one can still make relative comparisons on what each user group believed was the purpose of the zones, or in the 10-year replication, what was the purpose of each type of zone. Here new baselines are also established for future monitoring of the different types of zones.

In the baseline, a majority of dive operators and environmental group members thought that all three purposes for the zones were true, not so for commercial fishers. In addition, the overwhelming majority of dive operators and environmental group members thought it true that the purposes of the zones were "conserving and protecting corals, fish and other marine life" and "increasing overall fish stocks and biomass inside the zones". Even though the majority of dive operators and environmental group members thought that "increasing overall fish stocks and biomass outside the zones" was a purpose of the zones, a significantly lower proportion did not buy the "replenishment effect" argument for the zones. The ERs were first proposed as "Replenishment Reserves" in the Draft Management Plan for the FKNMS that existed at the time of the baseline survey. The purposes and name were changed in the Final Management Plan.

Zone Definitions

Ecological Reserves (ERs) encompass large, contiguous, diverse habitats, in order to protect and enhance natural spawning, nursery, and permanent-residence areas for the replenishment and genetic protection of fish and other marine life. Regulations for Ecological reserves are designed to meet the objectives of these zones by limiting consumptive activities while continuing to allow non-consumptive activities only where such activities are compatible with resource protection. There are currently two Ecological Reserves in the Sanctuary, the Western Sambos Ecological Reserve and the Tortugas Ecological Reserve.

Sanctuary Preservation Areas (SPAs) encompass discrete, biologically important areas and are designed to reduce user conflicts and sustain critical marine species and habitats. Regulations for SPAs are designed to limit consumptive activities while continuing to allow activities that do not threaten resource protection. There are 18 SPAs in the FKNMS.

Wildlife Management Areas (WMAs) include bird nesting, resting, or feeding areas, turtle-nesting beaches, and other sensitive habitats. Regulations are designed to protect these species or the habitat while providing for public use. Access restrictions may include no-access buffers, no-motor zones, idle-speed only/no wake zones, and closed zones. Some restrictions may apply to time periods, others to areas. There are currently 27 WMAs, of which 7 are managed exclusively by the FKNMS (the FKNMS co-manages the others with the US Fish and Wildlife Service).

In the 10-year replication, the user groups were asked to choose the "main" purpose of each type of zone among the five purposes presented. There are some notable shifts in beliefs about the purpose of the zones. A majority of all three user groups thought that 'conserving and protecting corals, fish and other marine life" was the main purpose of the SPAs. SPAs were the only type of zone in either time period for which a majority of commercial fishers thought that one of the purposes of the zones was a true purpose. One explanation for this is that there was very little displacement of fishing effort from the SPAs, except possibly for marine life collectors (aquarium trade).

For ERs, only dive operators had a majority of respondents select "conserving and protecting corals, fish and other marine life" or " increasing overall fish stocks and biomass inside the zones" as a main purpose. However, even among dive operators a majority of respondents did not select "increasing overall fish stocks and biomass outside the zones" as a main purpose of the ERs. This seems to reflect that environmental group members did understand the change in purpose of the ERs as expressed in the change in name of the zones from the baseline. This purpose was just one possible purpose, not the "main" purpose of the ERs.

The main purpose of the SPAs was to resolve conflicts between consumptive and nonconsumptive users. Zoning was used by management to provide a place for each user group to be able to experience the resources of the FKNMS in conditions more suitable for their activities. The dive operators were one of the main beneficiaries of these zones and over 40% of them seemed to recognize that fact selecting this purpose as the "main" purpose of the zones versus resource protection purposes. Of course simple tallying of responses on main purpose does not capture the synergetic effects of management strategies and regulations. By restricting access to consumptive uses, the conditions of the sites improve. This then provides places where nonconsumptive users can have better places to conduct their activities. This then helps solve conflicts between consumptive and nonconsumptive users.

Dive operators were the only user group where a majority of respondents chose "scientific research" as a "main" purpose of the ERs and SPAs. A very small proportion of environmental group members selected "scientific research" as a main purpose of the ERs or SPAs.

The WMAs are not used by the dive operators or the commercial fishers and so these zones are of less interest to these user groups. A high proportion of survey respondents answered "don't know" for most questions about WMAs. About half of the environmental group members participated in bird watching in both the baseline and 10-year replication time periods. So the WMAs would be expected to be important to them even for direct use values. Of course, we would also expect this group to have high values for protecting areas for nonuse values as well. Environmental group members were the only user group for which a majority of respondents indicated that the main purpose of the WMAs were for "conserving and protecting corals, fish and other marine life".

Seven new WMAs have more recently been designed to resolve conflicts between boaters (primarily personal watercraft operators and flats/backcountry fishermen). This will be a more relevant issue for flats/backcountry fishermen and is addressed in the current 10-year replication of the study on recreation-tourism. Results will be available in 2009.

Research was funded by NOAA's Coral Reef Conservation Program

ATTITUDES & PERCEPTIONS

Information on attitudes & perceptions included who were the perceived beneficiaries of the zoning strategies; how each user group viewed the FKNMS processes in developing management strategies and regulations; how each user group viewed outcomes of the FKNMS zones; how each user group viewed the conditions of the natural resources in the FKNMS; and how each user group viewed the performance of the FKNMS and level of support for the FKNMS.

Perceived Beneficiaries of the FKNMS Zones

The study surveys identified four potential beneficiaries of the FKNMS zones and asked survey respondents which of these groups they thought were the beneficiaries of the zones. Again, in the baseline study all types of zones were combined, whereas this was asked for each type of zone in the 10-year replication. The four groups of potential beneficiaries were commercial fishers, recreational/sport fishers, commercial dive operators, and recreational (local & tourist) divers. Commercial fishers and dive operators were asked how their group perceived themselves as benefiting from the zones.

Commercial Fishers. In both time periods, commercial fishers did not think they would be beneficiaries of the FKNMS zones. However, there was a significant shift among commercial fishers in this perception over the ten year period. While only 5.4% of commercial fishers thought they as a group would benefit from the zones, after 10 years 16.3% of commercial fishers thought that they benefited from the ERs and SPAs. In the baseline, a majority of commercial fishers thought that recreational divers would be the main beneficiaries of the zones. In the 10-year replication, a majority of commercial fishers thought this for only the SPAs. In the baseline, dive operators and other recreational divers were lumped together, but they were separated in the 10-year replication. In the 10-year replication, a majority of commercial fishers thought that both dive operators and general recreational divers would be beneficiaries of the SPAs.

1. Commercial fishers (potential beneficiary of zones)

Group	1996	2006		
	All Zones	ERs	SPAs	WMAs
Commercial Fishers	5.4%	16.3%	16.3%	8.8%
Dive Operators	24.2%	27.5%	30.4%	27.5%
Environmental Groups	24.1%	17.4%	11.7%	11.3%

2. Recreational/Sport fishers (potential beneficiary of zones)

Group	1996	2006		
	All Zones	ERs	SPAs	WMAs
Commercial Fishers	32.1%	25.5%	33.7%	19.1%
Dive Operators	35.5%	30.4%	34.8%	15.9%
Environmental Groups	29.0%	17.7%	22.6%	26.9%

3. Commercial Dive Operators (potential beneficiary of zones)

Group	1996	2006		
	All Zones	ERs	SPAs	WMAs
Commercial Fishers	N/A	36.4%	46.9%	23.5%
Dive Operators	N/A	43.5%	59.4%	31.9%
Environmental Groups	37.6%	14.2%	21.3%	7.8%

4. Recreational (local & tourist) divers (potential beneficiary of zones)

Group	1996	2006		
	All Zones	ERs	SPAs	WMAs
Commercial Fishers	67.9%	44.6%	59.5%	27.6%
Dive Operators	38.7%	46.4%	75.4%	35.5%
Environmental Groups	50.3%	42.8%	40.9%	47.1%

Dive Operators. Dive operators identified recreational divers as the group that most benefited from the zones in both the baseline and the 10-year replication. A majority of dive operators indicated that both they and recreational divers in general were the main beneficiaries of the SPAs. Dive operators are major users of the SPAs. SPA use accounted for 69.3% of total trips and 93% of all zone-specific trips taken by the dive operators. Fewer respondents agreed that consumptive users, such as commercial and recreational fishers, had been the primary beneficiaries of the zone closures, and these views were similar in both time periods.

Environmental Group Members. A majority of the baseline sample of environmental group members thought that recreational divers would be the main beneficiaries of the zones. Although less than a majority in the 10-year replication, a high proportion of environmental group members thought that recreational divers would benefit from each type of zone. In both time periods, environmental group members did not think that commercial fishers or sport fishers would be main beneficiaries of the zones. What is surprising is that very few environmental group members thought that dive operators would be beneficiaries of any of the zones.

Views on FKNMS Processes to Develop Management Strategies & Regulations

In both the baseline and 10-year replication, seven survey questions were used to assess the views of the three user groups on FKNMS processes to develop management strategies and regulations. The questions focused on views on whether the processes were fair & just and whether NOAA/FKNMS listened to the concerns of individuals and local and state government or whether individuals were included or could have influence in the process of developing the management strategies and regulations. A five-point agreement scale was used where 1=strongly agree and 5=strongly disagree. A "Don't Know" response was also allowed, but this was not included in statistical tests of changes in mean scores. Statistical tests were done to test whether there were statistically significant changes in these views over the 10-year period. There were several significant changes in views, especially among commercial fishers.

Questions on whether processes were fair and just:

1. The process that NOAA has used to develop rules and regulations for the FKNMS was open and fair to all groups.

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2. The process used by NOAA to develop boundaries and regulations for the FKNMS zones was open and fair to all groups.

3. The procedures that NOAA has established to deal with violations of FKNMS regulations have been fair and just.

Commercial Fishers. In the baseline, a majority of commercial fishers did not think NOAA/FKNMS processes were fair and just. This moderated somewhat over the 10-year time period with statistically significant changes in mean scores for questions 2 & 3 as a higher proportion agreed with the statements. Much of the movement on views on these questions was a move from "Don't Know" in the baseline to "Neutral" in the 10-year replication. Question 3 was the only question where a significant proportion moved to agreement (8.2% in the baseline to 39.9% in the 10-year replication) with a corresponding drop in disagreement (56.9% in the baseline to 30.4% in the 10-year replication).

Dive Operators. A majority of dive operators agreed that the process to develop rules and regulations were fair and just in both periods (Question 1). However, in the baseline, only 39.4% agreed that the process for developing boundaries and regulations for the zones was fair and just (Question 2). But in the 10-year replication a majority of dive operators (52.2%) agreed that the process for developing boundaries and regulations for the zones was fair and just. The proportion that disagreed also correspondingly declined from 29.5% to 17.3%. This is a statistically significant change. There was also a statistically significant movement in agreement with the answer to question 3 on whether the procedures NOAA has established to deal with violations of the FKNMS regulations were fair and just. Agreement went from 26.2% in the baseline to 40.6%. However, there was not a corresponding large shift in disagreement (37.7% in the baseline to 33.4% in the 10-year replication). Most of the movement came from those who answered "Don't Know" in the baseline. Researchers in the baseline study had concluded that anti-FKNMS groups had raised doubts in the minds of dive operators about how the FKNMS would perform, which they argued moderated support for the FKNMS. With 10 years of experience with the FKNMS, many such fears have dissipated. Effectively, dive operators changed their views on the FKNMS processes from wariness to acceptance.

Environmental Group Members. This group appeared to be the most uncertain about processes. A high proportion of this group answered "Don't Know" to all seven of the questions asked about process in both the baseline and 10-year replications (generally in the 30-40 percent range). When we take out the "Don't Knows", as is always done in comparing mean scores, a majority of environmental group members were in agreement with all three questions on whether processes were fair and just. There were no statistically significant changes over the 10-year time period for questions 1 and 2 as the majority in both periods agreed that processes were fair and just. There was a significant change for questions 3, with a significant decline in disagreement (a positive change in view towards FKNMS) from 37.5% in the baseline to 25.2% in the 10-year replication. Most of the change came from respondents that answered "Don't Know". In the baseline, 23.2% responded "Don't Know", while in the 10-year replication 36% responded "Don't Know". Those who agreed with the statement increased from 23% to 25.6%.

Questions on whether NOAA listened to individuals and local and state governments or whether individuals could have influence in the processes.

1. It has not mattered whether the average person participated in the workshops and meetings on the FKNMS because the average person could not influence the final decisions.

2. NOAA has not addressed the concerns of local and state governments in developing rules and regulations for the FKNMS.

3. NOAA has not addressed the concerns of individual citizens in developing rules and regulations for the FKNMS.

4. Once that the FKNMS regulations have been in effect, there has been no way that the average person could voice his/her opinion on the usefulness of the regulations.

Responses of agreement with these four questions indicate a negative view of FKNMS processes, while disagreement indicates a positive view of FKNMS processes.

Commercial Fishers. The overwhelming majority of commercial fishers had negative views of the FKNMS when answering all four questions in the baseline (agreement proportions, in

order of question, were 67.6%, 64.9%, 75.6% and 77.2%). Although the majority of commercial fishers still had a negative view on these processes, there were statistically significant movements toward positive views for three of the four questions (questions 2-4) in the 10-year replication. Agreement with question 1 dropped from 67.6% to 62.8% with disagreement increasing from 18.2% to 24.9%, but the change in mean scores was not statistically significant. Many mentioned the Tortugas process (the process used in developing the boundary alternative for the Tortugas Ecological Reserve) as a major factor in the change of views on FKNMS processes.

Dive Operators. As with FKNMS processes, dive operators were more wary of how the FKNMS would include the concerns of others in developing and implementing management strategies and regulations in the baseline study. In the 10-year replication, dive operators moved toward more positive views on how NOAA/FKNMS listened and acted on the concerns of others. The shifts were statistically significant for questions 3 and 4. Again, after 10 years of experience with NOAA/FKNMS, dive operators have moved from wariness about NOAA/FKNMS to acceptance.

Environmental Group Members. Again it is important to note that over one-third of environmental group members lacked the knowledge on NOAA/FKNMS processes and procedures, as indicated by the high proportion of "Don't Know" responses in these questions. Once we remove the "Don't Know" responses, it is determined that a majority of environmental group members had positive views on whether NOAA/FKNMS listened to and acted on others' concerns on management strategies and regulations in both the baseline and 10-year replication. For question 1, on whether the average person could influence final decisions, there was a statistically significant movement in the positive direction. For all other questions, there was a movement in the positive direction, but the movement was not statistically significant. So this group generally has a positive view of NOAA/FKNMS, but there is a need for more education and outreach.

Views on FKNMS Zone Outcomes

All three user groups were asked a core set of eight questions on their views of zone outcomes both in the baseline and 10-year replication surveys. Dive operators were asked two additional questions in the 10-year replication about whether the conditions in the zones had improved and if their use of the zones increased since establishment. The first two questions of the eight core questions address whether respondents agreed that the zones have achieved various objectives. Five questions address support for the zones across all regions and within each region of the Florida Keys. The last core question asked whether there should be more zones.

Questions on objectives of the zones:

1. FKNMS zones have reduced conflicts between user groups.

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

The tense of these questions was different in the baseline and 10-year replication surveys. In the baseline, the questions were worded such that the zones "will" accomplish the objectives, whereas in the 10-year replication the wording was as above assessing if they have accomplished the objectives. Again, a five-point agreement scale was used where 1=strongly agree to 5=strongly disagree. A "Don't Know" response was also allowed, but was not included in statistical tests for changes in mean scores over the 10-year period. Statistical tests were performed to determine whether there were statistically significant changes in these views over the 10-year period. A "YES" means statistically significant difference with 95% confidence for each pairwise comparison between 1996 and each type of zone in 10-year replication. Tests were done for differences in distributions of percent responses and differences in mean scores. In the summary tables A= percent that strongly and moderately agree and D=percent that strongly and moderately disagree. An * indicates a high proportion of "Don't Know" responses, which were eliminated in comparison of mean scores, but retained in percentage responses.

Research was funded by NOAA's Coral Reef Conservation Program

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 Fishers. In the baseline, an overwhelming majority of commercial fishers disagreed with both statements (questions) 1 and 2, 74.8% and 69.3%, respectively, and thus did not agree that the zones would accomplish either objective. In the 10-year replication, commercial fishers significantly moderated their views on all the zone types for both objectives of the zones. A plurality of commercial fishers still had a negative view on the objectives of the zones, but there was statistically significant movement in the positive direction over the 10-year period (48% - 57.3% disagreed with objective 1 and 46.7% - 49.7% disagreed with objective 2). A majority of commercial fishers (57.3%) still disagreed that the ERs will reduce conflicts between user groups.

Dive Operators. In the baseline, a plurality of dive operators had negative expectations on the zones achieving the two objectives to reduce conflicts between user groups or restore the coral reefs to what they used to be (49.2% and 49.1%, respectively). In the 10-year replication, the negative views moved in a positive direction for both objectives, but the shifts were only statistically significant for reducing conflicts between user groups. A majority (50.7%) believed the SPAs have reduced conflicts between user groups. Again, the dive operators are major users of the SPAs, minor users of the ERs, and do not use the WMAs. The low use of the ERs and WMAs explains the high proportion of "Don't Know" responses for these types of zones.

Environmental Group Members. In the baseline, the environmental group members were optimistic concerning the zones' ability to achieve both objectives of reducing conflicts between users and restoring coral reefs. A majority of environmental group members (63.1%) thought that the zones would help in restoring coral reefs, while a plurality (43.1%) believed the zones would reduce conflicts between users. In the 10-year replication, the views had become more negative on both objectives, but the movement was statistically significant for only the objective of restoring coral reefs. As with some other questions in the survey, the environmental group members had a relatively high proportion of respondents that provided "Don't Know" responses. A little over a

third responded "Don't Know" on the objective of reducing user conflicts and about one-fifth (20%) responded "Don't Know" on the objective of restoring coral reefs. Again, some attention to education and outreach is needed for this group.

Questions (statements) on support for the FKNMS Zones:

1. I support the establishment of FKNMS zones as they are currently established.
2. I support the establishment of FKNMS zones in the Upper Keys.
3. I support the establishment of FKNMS zones in the Middle Keys.
4. I support the establishment of FKNMS zones in the Lower Keys.
5. I support the establishment of zones in the Dry Tortugas.
6. There should be more FKNMS zones in the Florida Keys.

The first four questions (statements) were asked in both the baseline and the 10-year replication, while the last two were only asked in the 10-year replication.

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

2. I support establishment of FKNMS zones in the Upper Keys.

Group	1996		2006						Statistical Difference	
	All Zones	Mean	ERs	Mean	SPAs	Mean	WMAs	Mean	Difference	Mean
Commercial Fishers	65.1%D	(4.00)	44.5%D	(3.17)	43.5%A	(3.01)	41.5%A	(2.97)	YES	YES
Dive Operators	65.5%A	(2.37)	46.4%A*	(2.00)	62.3%A	(1.92)	44.9%A*	(1.85)	NO	NO
Environmental Group	65.6%A	(1.94)	64.0%A*	(1.76)	64.3%A	(1.75)	63.1%A*	(1.75)	NO	NO

3. I support establishment of FKNMS zones in the Middle Keys.

Group	1996		2006						Statistical Difference	
	All Zones	Mean	ERs	Mean	SPAs	Mean	WMAs	Mean	Difference	Mean
Commercial Fishers	71.4%D	(4.18)	45.8%D	(3.25)	42.2%D	(3.04)	39.2%D	(3.06)	YES	YES
Dive Operators	63.9%A	(2.36)	44.9%A	(1.91)	59.4%A	(1.91)	44.9%A	(1.76)	NO	NO
Environmental Group	65.3%A	(1.97)	65.9%A	(1.76)	65.5%A	(1.74)	65.0%A	(1.74)	NO	NO

Research was funded by NOAA's Coral Reef Conservation Program

4. I support establishment of FKNMS zones in the Lower Keys.

Group	1996		2006						Statistical Difference	
	All Zones	Mean	ERs	Mean	SPAs	Mean	WMAs	Mean	Difference	Mean
Commercial Fishers	70.5%D	(4.13)	47.2%D	(3.30)	41.4%A	(3.07)	38.1%A	(3.11)	YES	YES
Dive Operators	70.5%A	(2.26)	46.3%A*	(2.02)	59.4%A	(1.93)	44.9%A*	(1.86)	NO	NO
Environmental Group	66.4%A	(2.00)	68.3%A	(1.77)	67.9%A	(1.77)	68.3%A	(1.75)	YES	NO

Commercial Fishers. In the baseline, the overwhelming majority of commercial fishers did not support the zones as they were initially proposed throughout the FKNMS (86.2% disagreed with statement 1). This was also true, but to a lesser extent for the zones in each region of the FKNMS, as shown in statements 2-4 (65.1% in the Upper Keys; 71.4% in the Middle Keys; and 70.5% in the Lower Keys disagreed with the statements).

These negative views were significantly moderated in the 10-year replication. A plurality was against the zones across all the FKNMS for ERs (48.3% versus 39.6% for the ERs). However, a plurality was now supportive of the SPAs with 45.7% for the SPAs versus 43.4% against the SPAs and 9.3% neutral. For the WMAs, 44.2% were for versus 37.1% against the WMAs and 14.1% neutral. The results were similar in the Upper Keys with a plurality not supporting ERs (44.5% against and 38.3% for ERs with 13.6% neutral) and a plurality supporting the other two types of zones (43.5% for versus 29.1% against SPAs; and 41.5% for versus 38.2% against WMAs). There was also a fairly significant movement to neutrality. In the baseline, across the entire FKNMS zones 3.8% were neutral versus 10.6% for ERs; 9.3% for SPAs; and 14.1% for WMAs in the 10-year replication). The results were similar for the Upper Keys with 7.3% neutral in the baseline versus 13.6% for ERs; 13.7% for SPAs; and 14.7% for WMA in the 10-year replication.

There were also significant movements in the positive direction in views of the Middle and Lower Keys zones, but less than for the Upper Keys zones. In the Middle Keys, a plurality of commercial fishers was supportive for only the SPAs (42.2% for and 39.3% against with 15.3% neutral). For the Lower Keys zones, there was a plurality supportive of the SPAs (41.4% for and 39.8% against with 14.9% neutral) and the WMAs (38.25 for and 30.0% against with 16.2% neutral).

So overall, there was a very significant movement in the positive direction on support for the FKNMS zones among commercial fishers over the 10-year period.

Dive Operators. In the baseline, a plurality of dive operators did not support the FKNMS zones as proposed (42.6% against and 40.9% for). However, when asked about the zones in each region, there was overwhelming support in each region (65.5% for zones in the Upper Keys; 63.9% for zones in the Middle Keys; and 70.5% for zones in the Lower Keys). In the 10-year replication, dive operators moved significantly in a positive direction for zones as currently established with a majority supporting ERs (55.1%) and SPAs (72.5%) and a plurality supporting WMAs (48.8%). Support for zones in each region was maintained with no statistically significant changes.

Environmental Group Members. In the baseline, the plurality of environmental group members did not support the FKNMS zones as proposed: 34.1% were against, 22.4% for, 21.1% were neutral, and 18.7% responded "Don't Know". As with the dive operators, when asked about zones in each region, an overwhelming majority supported the zones (65.6% in the Upper Keys; 65.3% in the Middle Keys; and 66.4% in the Lower Keys. In the 10-year replication, a majority of environmental group members supported each type of zone as currently established and each region.

The last two questions (statements) addressed the support for the zones in the Dry Tortugas and whether there should be more FKNMS zones. Again, these questions were not asked in the baseline study.

5. I support the establishment of FKNMS zones in the Dry Tortugas.

Group	1996		2006					
	All Zones	Mean	ERs	Mean	SPAs	Mean	WMAs	Mean
Commercial Fishers	N/A	N/A	49.3%D	(3.28)	41.0%D	(3.10)	44.4%D	(3.22)
Dive Operators	N/A	N/A	46.3%A*	(2.06)	59.4%A	(2.05)	44.9%A*	(1.88)
Environmental Group	N/A	N/A	69.7%A	(1.69)	68.7%A	(1.69)	69.4%A	(1.66)

6. There should be more FKNMS zones in the Florida Keys.

Group	1996		2006					
	All Zones	Mean	ERs	Mean	SPAs	Mean	WMAs	Mean
Commercial Fishers	N/A	N/A	85.8%D	(4.50)	82.4%D	(4.35)	84.6%D	(4.46)
Dive Operators	N/A	N/A	46.3%A	(2.17)	59.4%A	(2.34)	44.9%A	(2.02)
Environmental Group	N/A	N/A	60.2%A	(1.98)	60.4%A	(1.95)	58.7%A	(1.99)

Commercial Fishers. A plurality of commercial fishers did not support the zones in the Dry Tortugas: 49.3% against and 36.6% for ERs with 10.8% neutral; 41.0% against and 38.6% for SPAs with 14.9% neutral; and 44.4% against and 33.3% for WMAs with 15.0% neutral. There is only one ER in the Dry Tortugas, which is split into two areas, Tortugas North, which allows nonconsumptive uses and Tortugas South, which is research only. The Tortugas ER was the commercial fishers alternative in the Tortugas 2000 process to design the reserve and was adopted by consensus of the Tortugas Working Group and implemented by the FKNMS. So it is a bit curious why commercial fishers have a negative view. Some have interpreted these findings as the commercial fishers recognized a certain inevitability of there being a Tortugas ER and just went for the best deal they could get.

The overwhelming majority of commercial fishers also did not support more FKNMS zones in the Florida Keys: 85.8% did not want more ERs; 82.4% did not want more SPAs; and 84.6% did not want more WMAs.

Dive Operators. A majority of the dive operators supported establishment of SPAs in the Dry Tortugas (59.4%), while a plurality supported ERs (46.3%) and WMAs (44.9%). A high proportion of "Don't Know" responses were provided for ERs and WMAs, this is expected since they only lightly use ERs and don't use WMAs. Also, a moderate percentage of dive operators was neutral across all types of zones in the Dry Tortugas: 8.7% for ERs; 14.5% for SPAs; and 8.7% for WMAs. A relatively small percentage was unsupportive of zones in the Dry Tortugas: 11.6% for ERs; 8.6% for SPAs; and 7.2% for WMAs. So overall, dive operators were very supportive of zones in the Dry Tortugas.

A majority of dive operators were supportive of more SPAs (59.4%), while a plurality supported more ERs (46.3%) and WMAs (44.9%). The percentages of those who did not support more zones were the same as for zones in the Dry Tortugas. So overall, dive operators were supportive of more zones in the Florida Keys.

Environmental Group Members. An overwhelming majority of environmental group members supported the establishment of all types of zones in the Dry Tortugas: 69.7% for ERs; 68.7% for SPAs; and 69.4% for WMAs. In addition, a majority of environmental group members were supportive of more zones in the Florida Keys: 60.2% for more ERs; 60.4% for more SPAs; and 58.7% for more WMAs.

Two additional questions on FKNMS zones for Dive Operators:

1. **FKNMS zones have led to better diving conditions in the Florida Keys, such as healthy coral, more abundant marine life, and clearer water.**
2. **My use of FKNMS zones has increased since their establishment.**

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The first question (statement) was asked in the baseline study, while the second was only asked in the 10-year replication study. In the baseline, a majority of dive operators were optimistic that the zones would improve diving conditions with 54.1% agreeing with the statement in question 1. Views on this became more negative for all zones, except SPAs which the dive operators use extensively. For SPAs there was a small but insignificant positive movement (54.1% to 55.1%).

The second question (statement) returned a result that might suggest to some that dive operators are not supportive of the zones. However, the study actually obtained estimates of use and spatial use throughout the FKNMS, including the zones. The data show significant increases in use of the zones, primarily the SPAs. About 18.5% of all dive operators increased their use of the zones, while 4.6% reported declines in use. But 76.9% did not change their use and they were already significant users of the zones. In the answer to question 2, a plurality of dive operators did indicate that they increased their use of the zones, especially the SPAs (39.1%). The explanation for the apparent difference in results is that the dive operators that account for a larger share of dive use increased their use of the SPAs, while many smaller operations did not.

Views on FKNMS Performance & General Support for FKNMS

FKNMS Performance. There were three survey questions (statements), of which only one (Question 3) was asked in the baseline and the 10-year replication for all three user groups. Environmental group members were asked all three questions in both surveys. As with other survey questions (statements) across time periods, the tenses of the questions (statements) wording were different since in the baseline people were asked about their expectations on how they thought the FKNMS would perform, whereas in the 10-year replication the wording was on how the FKNMS had performed.

As with many of the previous questions (statements), a five-point agreement scale was used and statistical tests for differences in mean scores and percentage distributions in responses were conducted for differences over the 10-year period.

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)	NO	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

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Commercial Fishers. In the 10-year replication, a plurality of commercial fishers (46.5%) thought that the FKNMS had made a positive contribution to the marine environment. Only 29.7% disagreed, 11.9% were neutral and 11.9% responded that they "Didn't Know". A plurality of commercial fishers also thought that the Florida Keys benefited environmentally from the FKNMS (49.5%), while 33.1% disagreed, 9.6% were neutral and 7.9% responded that they "Didn't Know". In the baseline, commercial fishers did not think there would be a net economic benefit to the Florida Keys from establishment of the FKNMS. This view changed significantly in the 10-year replication. Although a plurality of commercial fishers (44.5%) still did not think that the FKNMS has been a net economic benefit to the Florida Keys, there was a statistically significant movement toward agreement with 39.4% in agreement, 7.2% neutral, and 8.9% "Didn't Know".

Dive Operators. An overwhelming majority of dive operators thought that NOAA, through the National Marine Sanctuary Program, has made a positive contribution to the marine environment and that the Florida Keys has benefited environmentally from the FKNMS (88.4% and 82.6%, respectively). Almost two-thirds (65.2%) also believed that there has been a net economic benefit to the Florida Keys from establishment of the FKNMS.

Environmental Group Members. In the baseline and 10-year replication, a majority of environmental group members thought that NOAA, through the National Marine Sanctuary Program, made a positive contribution to the marine environment and that the Florida Keys has benefited environmentally from the FKNMS. In the baseline a majority thought that there would be a net economic benefit to the Florida Keys from establishment of the FKNMS, this softened in the 10-year replication, but the change was not statistically significant.

General Support for FKNMS. Again the five-point agreement scale was used for assessing responses to the statement on support for establishment of the FKNMS.

Research was funded by NOAA's Coral Reef Conservation Program

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

Commercial Fishers. In the baseline, the overwhelming majority of commercial fishers (78.4%) were against the establishment of the FKNMS. This view has significantly changed over the 10-year time period. In the 10-year replication, 42.0% were against the FKNMS, 41.7% were for the FKNMS, 14.3% were neutral and 2.1% responded "Don't Know". Overall, the results suggest that commercial fishers have moved to a neutral position with almost equal numbers for and against the FKNMS.

Dive Operators. Even though in the baseline almost two-thirds (64%) of dive operators supported the establishment of the FKNMS, this support strengthened significantly with 87% supporting the establishment of the FKNMS. Ten years of experience with the FKNMS has dissipated most of the dive operator opposition to the FKNMS.

Environmental Group Members. In both time periods, environmental group members overwhelmingly supported the establishment of the FKNMS. Even though the percentage of supporters slightly declined, the difference was not statistically significant. So environmental group members remain steadfast supporters of the FKNMS.

Views on Resource Conditions

In the 10-year replication, all three user groups were asked to provide their views on how eight resource conditions have changed in the Florida Keys since establishment of the FKNMS. Since dive operators are allowed to operate in the zones, except Tortugas ER South, they were asked for their views on how conditions have changed inside the zones. A 1 to 5 point scale was used where 1= better to 5=worse with allowance for a "Don't Know" response. A mean score below 3.00 indicates conditions have improved, 3-3.99 no change and 4-5 conditions got worse.

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

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Across all three user groups', only two items were rated as having improved ("Mooring buoys" and "Vessel groundings"). The avoidance of vessel groundings was one of the main impetuses of creating the FKNMS. Dive operators and environmental group members rated improved conditions for "Sea grasses" and "Fisheries". Environmental group members also rated "Sea-based pollution/marine debris" as having improved. There were no resource conditions rated as having gotten worse by any of the three user groups. Most items received scores in the neutral or no change status.

Dive Operators Views on Conditions Inside the FKNMS Zones. Dive operators were asked to rate six items for each of the three types of zones using the same five-point scale as above.

Resource	Changes in ERs	Changes in SPAs	Changes in WMAs
1. Water quality	3.00	3.05	3.19
2. Number of fish	2.42	2.28	2.65
3. Types of fish	2.81	2.71	3.05
4. Amount of living coral	3.29	3.48	3.51
5. Other marine life	2.71	2.62	2.83
6. Crowding	3.17	3.76	3.51

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Dive operators rated only two of the six items as having improved across all three zone types since establishment of the FKNMS ("Number of fish" and "Other marine life"). The lowest mean score (highest rating for improvement) was for "Number of fish" in the SPAs followed by "Number of fish" in the ERs. Another key item rated as improved was "Type of fish" both in the SPAs and ERs. The lowest ratings were for "Amount of living coral" and "Crowding", but the mean scores were still in the neutral or no change range. Dive operator perceptions of resource conditions appear to be consistent with the bio-physical monitoring for "numbers and types of fish", "Other marine life" and "water quality" within the zones, but not consistent with the 38% decline noted in the bio-physical monitoring between 1996 and 2006 on the "amount of living coral". The low rating on "Crowding" in the SPAs is a potential future concern as it is approaching the worse condition rating. Future monitoring of this element may be important.

Dive Operator Views on Selected Management Strategies

Dive operators were asked seven additional questions on selected management strategies directed at dive/snorkeling uses of the marine environment. Five of the seven questions were asked in the baseline and 10-year replication. The questions were actually in the form of statements for which dive operators were asked to respond using the five-point agreement scale as was used on many of the items presented on other issues. Statistical tests were performed on differences in mean scores and the distribution of responses between the two time periods.

Questions (statements) addressed Special Use Areas (SUAs), which were areas defined as set aside for research and education and in which no recreational diving would be allowed. Other questions addressed whether diving/snorkeling had any effect on the environment, assessment of mooring buoys as a management strategy and limited entry for dive operators in the Florida Keys.

1. I support the establishment of Special-use Areas (SUAs) in the FKNMS.t

Group	1996		2006		Statistical Difference	
	%	Mean	%	Mean	%	Mean
Dive Operators	54.1 A	2.92	63.8 A	2.11	YES	YES

2. There should be additional SUAs in the FKNMS.

Group	1996		2006		Statistical Difference	
	%	Mean	%	Mean	%	Mean
Dive Operators	55.7 D	3.72	39.1 A	2.71	YES	YES

Special Use Areas. A majority of dive operators supported SUAs in both time periods; however, there was a statistically significant movement towards greater support over the 10-year period. When asked about whether there should be additional SUAs in the FKNMS, in the baseline a majority of dive operators were against it (55.7%), while in the 10-year replication a plurality supported more SUAs (39.1% for, 24.7% against, 20.3% neutral and 15.9% responded "Don't Know"). This represented a statistically significant change in support for more SUAs.

3. Diving and snorkeling have no effect on marine ecosystems or resources.

Group	1996		2006		Statistical Difference	
	%	Mean	%	Mean	%	Mean
Dive Operators	70.5 D	3.79	68.1 D	3.84	NO	NO

Dive & Snorkeling Impacts. An overwhelming majority of dive operators did not think that diving and snorkeling had any effects on the marine environment in either period (70.5% disagreed with the statement in 1996 and 68.5% disagreed with the statement in 2006).

4. Mooring buoys have a positive effect on the marine environment.

Group	1996		2006		Statistical Difference	
	%	Mean	%	Mean	%	Mean
Dive Operators	N/A	N/A	91.3 A	1.39	N/A	N/A

5. There should be a dive/snorkel operator funded mooring buoy program in the FKNMS.

Group	1996		2006		Statistical Difference	
	%	Mean	%	Mean	%	Mean
Dive Operators	67.2 D	3.89	56.4 D	3.51	NO	NO

6. There should be a dive/snorkeler (user) funded mooring buoy program in the FKNMS.

Group	1996		2006		Statistical Difference	
	%	Mean	%	Mean	%	Mean
Dive Operators	42.6 D	3.68	53.4 D	3.35	NO	NO

Mooring buoys. Dive operators were asked three questions (asked to respond to three statements) about mooring buoys. One had to do with the effectiveness of mooring buoys in protecting the environment and two addressed funding of a mooring buoy program. The two questions differed as to who would be asked to fund the program (dive/snorkel operators or dive/snorkeler individual users).

In 2006, over 91% of dive operators thought that mooring buoys had a positive effect on the marine environment. Generally, dive operators were against a mooring buoy program funded by themselves or by individual dive/snorkeler users in both periods.

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7. There should be limited entry for dive/snorkel operations in the Florida Keys.

Group	1996		2006		Statistical Difference	
	%	Mean	%	Mean	%	Mean
Dive Operators	N/A	N/A	50.7 D	3.48	N/A	N/A

Limited Entry. In 2006, dive operators were asked whether there should be limited entry for dive/snorkel operators in the Florida Keys. A majority of dive operators was against this management strategy (50.7% against, 26.1% for and 21.7% neutral with 1.5% "Don't Know" responses).

Access to Full Report

The full report can be cited as follows:

Shivlani, M., Leeworthy V.R., Murray, T.J., Suman, D.O., and Tonioli, F. 2008. Knowledge, Attitudes and Perceptions of Management Strategies and Regulations of the Florida Keys National Marine Sanctuaries by Commercial Fishers, Dive Operators, and Environmental Group Members: A Baseline Characterization and 10-year Comparison. Marine Sanctuaries Conservation Series ONMS-08-06. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of National Marine Sanctuaries, Silver Spring, MD. 170pp.

Available at: http://sanctuaries.noaa.gov/science/conservation/pdfs/kap2.pdf

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