

## **SPAs and ERs: Baseline Estimates of Use, Importance-Satisfaction Ratings, Economic User Value, and Comparative Socioeconomic Profiles of Users and Non-Users, 2000-01**

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### ***Goals***

The primary goal of socioeconomic monitoring is to detect and document resultant changes in Sanctuary resource utilization patterns and their impact on market and nonmarket economic values of Sanctuary resources. Toward that goal, a major objective is to monitor the spatial pattern and intensity of on-water recreational use, especially with regard to activities inside Sanctuary Preservation Areas (SPAs) and Ecological Reserves (ERs). Another major objective is to monitor and assess visitor and resident knowledge of Sanctuary management strategies and regulations, and their attitudes and perceptions regarding their appropriateness and effectiveness. Here we establish baselines of SPA and ER use, economic user value, and user perceptions of conditions of SPAs and ERs.

### ***Methods***

Baseline measurements for the Recreation and Tourism component of the Socioeconomic Research and Monitoring Program for the FKNMS were obtained in a 1995-96 study entitled “Linking the Economy and Environment of the Florida Keys/ Florida Bay.” However, in our baseline year of 1995-96, SPAs and ERs, also referred to as “no-take” zones, were not yet in existence. Funding was not available to replicate this study once the boundaries of the SPAs and ERs were known to establish baselines before SPA and ER regulations went into effect. The information presented here was obtained from a multi-agency partnership project entitled “Socioeconomic Study of Reefs in Southeast Florida, 2000-2001” (see Johns et al. 2003a, b). We were able to add several modules of questions to the 2000-01 surveys about use of SPAs and ERs. From the broader survey, we were also able to produce comparative socioeconomic profiles of SPA- and ER-users versus non-users, comparative importance and satisfaction scores, and estimates of economic user value. Nineteen SPAs and ERs, which were open to nonconsumptive recreation activities, and four Special Use Areas, which were closed to recreational activities, went into effect on July 1, 1997. The Tortugas Ecological Reserve went into effect on July 1, 2001. The “Socioeconomic Study of Reefs in Southeast Florida” was for the period June 2000 through May 2001. Therefore, the Tortugas Ecological Reserve was not part of the 2000-01 survey results.

### **Findings**

#### ***SPA and ER Use***

In 2000-01, 57.8% of resident reef users used SPAs and/or ERs versus 44.3% of all visitor reef users. For visitors, a fairly high proportion (16.5%) didn't know whether they used a SPA or ER.

In the 2000-01 reef study, three types of use were measured in SPAs and ERs: 1) snorkeling, 2) scuba diving, and 3) glass-bottom boat rides. Glass-bottom boat rides were limited to visitors. All three activities were measured in terms of person-days of use, where a person-day included a whole day or any part of a day. Numbers of dives were also measured for snorkeling and scuba

diving. Here, person-days are reported to relate SPA and ER use to total reef use for both residents and visitors.

In 2000-01, over 1.24-million person-days were spent in SPAs and ERs. This represented 45% of all reef use (natural and artificial) in the FKNMS, and 63% of all natural reef use in the FKNMS.

Visitors accounted for over 649,000 person-days of activity in SPAs and ERs (52% of all person-days in the SPAs and ERs), while residents accounted for over 593,000 person-days of activity in SPAs and ERs (Table 1).

There were almost 1.2-million person-days of snorkeling and scuba diving in SPAs and ERs and 58,540 glass-bottom boat rides. Resident and visitor snorkeling and scuba diving person-days were almost equal, with residents spending an estimated 593,000 person-days versus 590,000 person-days for visitors (Table 1).

**Table 1.** Sanctuary Preservation Area and Ecological Reserve use (person-days) in the FKNMS: 2000-2001.

	Person-Days			Total	% of Total
	<u>Snorkeling and Scuba Diving</u>	<u>Glass-bottom Boat Rides</u>			
Residents	593,400	N/A		593,400	47.75
Visitors	590,700	58,500		649,200	52.25
Total	1,184,100	58,500		1,242,600	100.00

Although 57.8% of residents used a SPA or ER, they only spent 36.3% of their total snorkeling and scuba diving person-days in the FKNMS inside SPAs and ERs. By contrast, 44.3% of visitors used a SPA or ER, but 50.9% of their snorkeling and scuba diving took place in SPAs and ERs, and 72.7% of visitor glass-bottom boat rides were in SPAs and ERs.

If we restrict our view to natural reef use, residents spent 56.2% of their snorkeling and scuba diving person-days on natural reefs inside SPAs and ERs. Visitors spent 64% of all their snorkeling and scuba diving person-days on natural reefs inside SPAs and ERs. Visitors also spent 82% of their glass-bottom boat rides on natural reefs inside the SPAs and ERs.

### *Comparative Socioeconomic Profiles*

#### Users versus Non-Users of SPAs and ERs

In the 2000-01 reef study, we obtained socioeconomic profiles of users including such variables as age, sex, race/ethnicity, education level, household income, membership in fishing or diving clubs, years of experience boating in south Florida, use of artificial or natural reefs, and party size. These variables were obtained for both resident and visitor samples. For residents (all were boating residents that used artificial or natural reefs), we also obtained boat size. For visitors, we identified whether they owned their boat; many visitors use charter/party boats or guide services.

When comparing SPA- and ER-users to non-SPA- and non-ER-users, statistical tests were used. For discrete variables or categorical variables, a nonparametric test for differences in distribution (Kolmogorov-Smirnoff two-sample test) was used. For continuous variables, like age or experience, a t-test for differences in means, and a Kolmogorov-Smirnov two-sample test for

differences in empirical distribution (whether the bar charts are showing significant differences) were used. A 0.05 level of significance was used as the cut-off point (i.e., 95% confidence level).

Generally, there were few differences between SPA- and ER-users and non-SPA- and non-ER-users. Significant differences were found for age, party size, and type of reef use. See Leeworthy et al. (2004) for full profile results.

#### Age

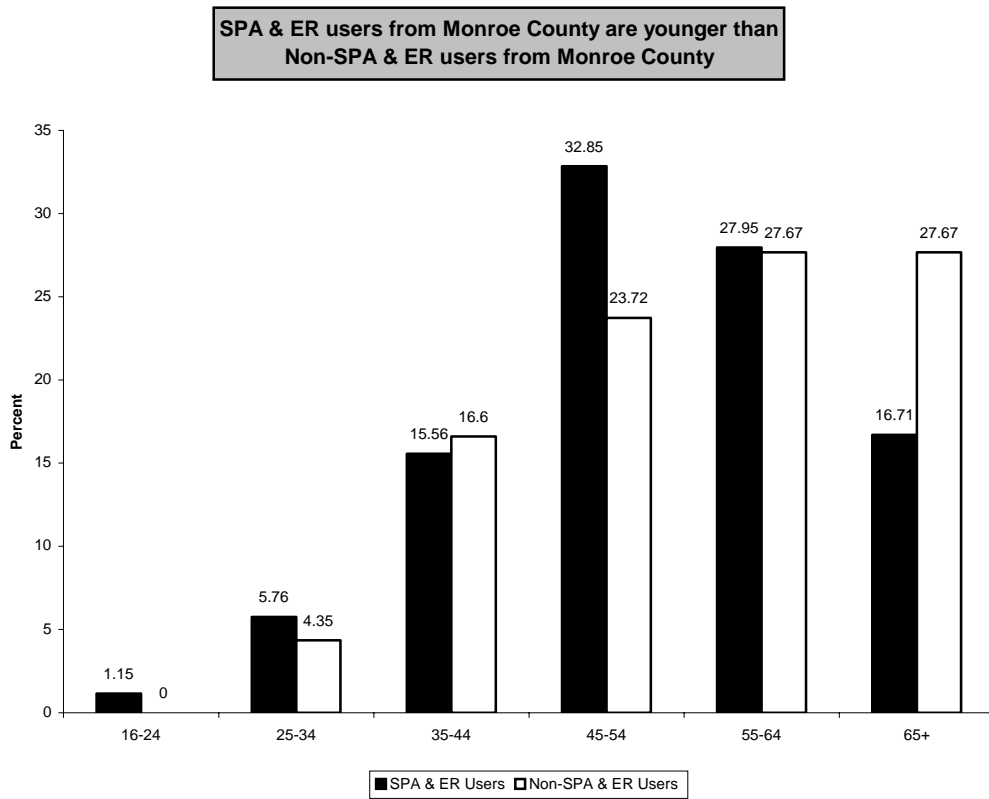
For both residents and visitors, SPA- and ER-users were, on average, younger than non-SPA- and non-ER-users (Fig. 1 and 2).

#### Party Size

Visitor SPA- and ER-users had slightly larger party sizes than non-SPA- and non-ER-using visitors. For residents there were no differences in party size between SPA- and ER-users and non-SPA- and non-ER-users (Fig. 3).

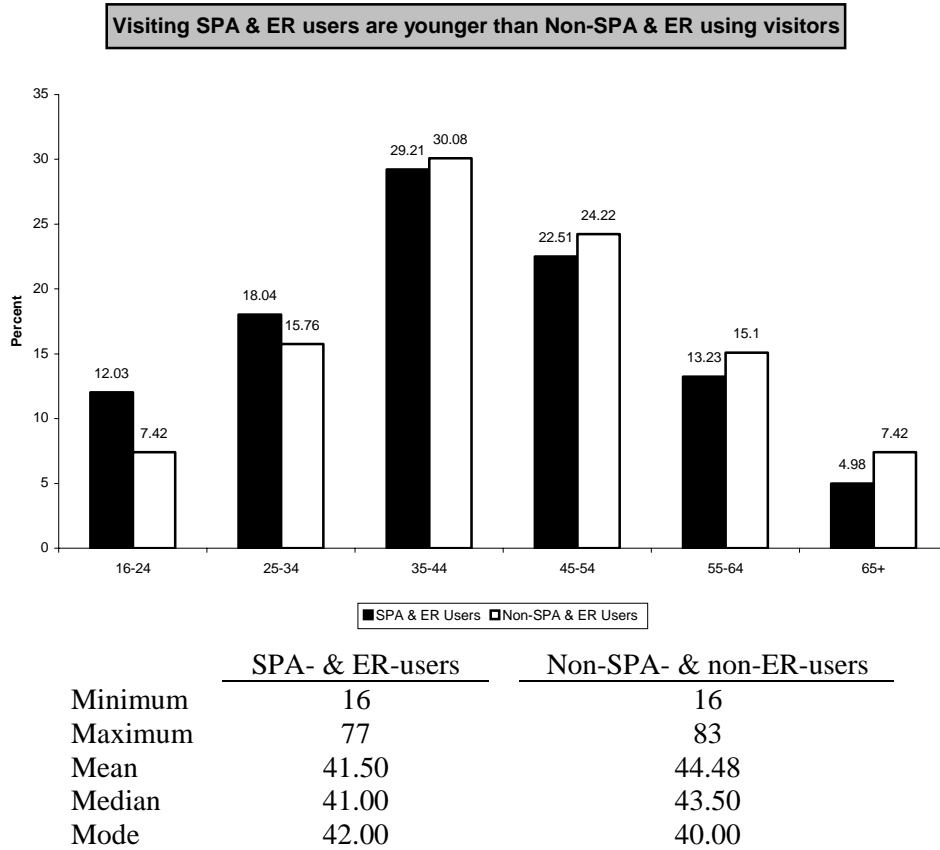
#### Type of Reef Use

Resident SPA- and ER-users had a higher likelihood of using artificial reefs than non-SPA- and non-ER-using residents. For visitors, SPA- and ER-users had a higher likelihood of using natural reefs than non-SPA- and non-ER-using visitors (Fig. 4 and 5).

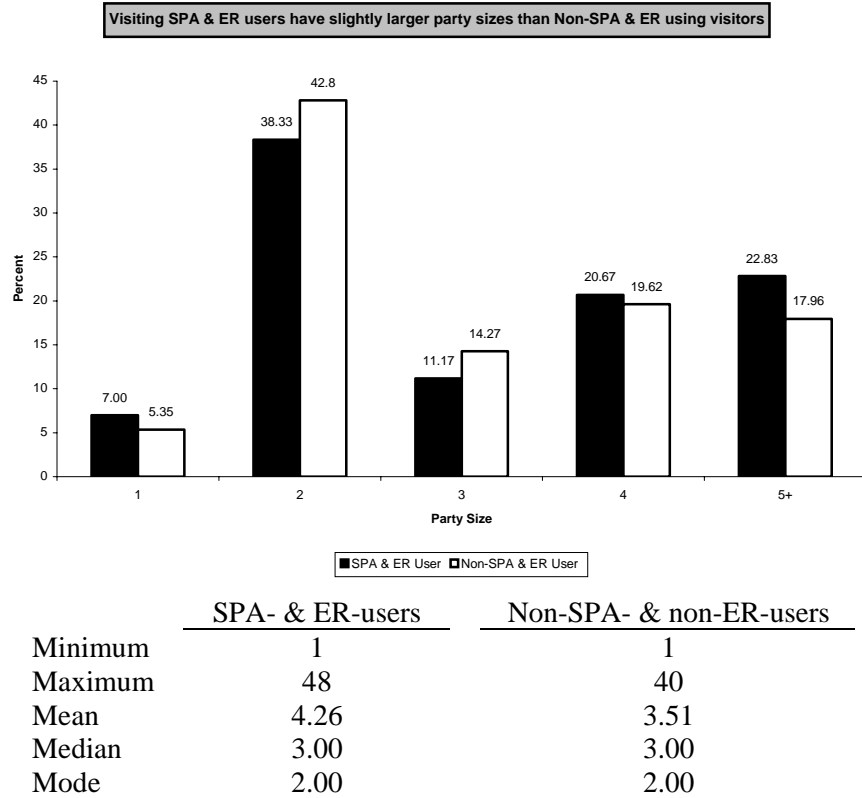


	<u>SPA- &amp; ER-users</u>	<u>Non-SPA- &amp; non-ER-users</u>
Minimum	17	12
Maximum	81	85
Mean	52.67	55.67
Median	53.00	57
Mode	46	57

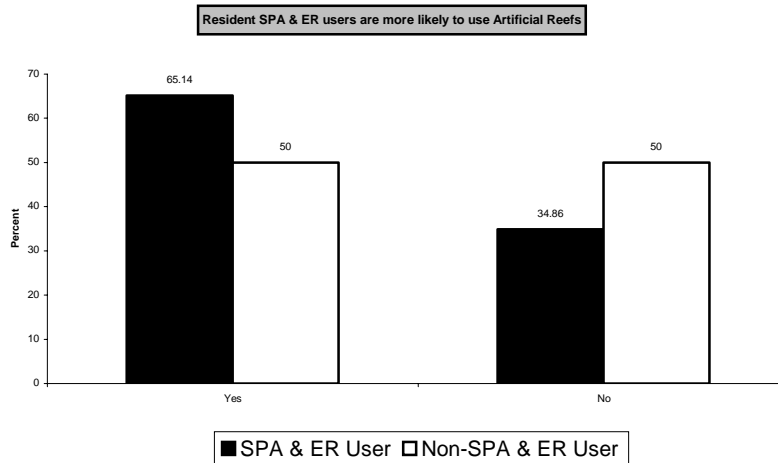
**Figure 1.** Age: comparison of resident SPA- and ER-users with non-users.



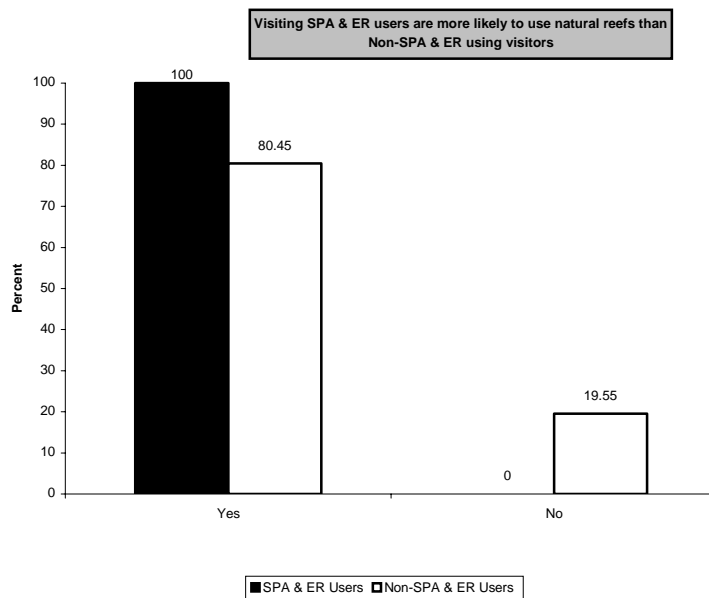
**Figure 2.** Age: comparison of visiting SPA- and ER-users with non-users.



**Figure 3.** Party size: comparison of visiting SPA- and ER-users with non-users.



**Figure 4.** Artificial reef use: comparison of resident SPA- and ER-users with non-users.



**Figure 5.** Natural reef use: comparison of visiting SPA- and ER-users with non-users.

*Economic User Value*

Economic user values (consumer’s surplus – value over and above what users pay for reef use) were estimated for each visitor and resident in the 2000-01 samples (see Johns et al. 2003a, b) and compared between SPA- and ER-users and non-users.

Visitors

Visitor SPA- and ER-users had significantly higher economic user values for artificial reefs, natural reefs, and all reefs combined than non-SPA- and non-ER-using visitors, when measured on a per-party, per-trip basis. However, because visitor SPA- and ER-users had significantly larger party sizes than non-SPA- and non-ER-users, there was no difference in economic user values when normalized on a per-person-trip or per-person-day basis.

Using a weighted average of user value per person-day for snorkeling and scuba diving from Johns et al. (2003) for natural reef use and multiplying by the number of person-days of diving by visitors in SPAs and ERs yielded an estimated total annual user value of diving in SPAs and ERs of about \$11.5 million. Following the same procedure for glass-bottom boat rides yielded an annual user value of \$1.3 million; visitors had a total annual user value of SPAs and ERs of about \$12.8 million (Table 2).

Residents

There were no statistically significant differences between resident SPA- and ER-users and non-SPA- and non-ER-using residents.

Using a weighted average of user value per person-day for snorkeling and scuba diving from Johns et al. (2003) for natural reef use and multiplying by the number of person-days of diving by residents in SPAs and ERs yielded an estimated total annual user value of diving in SPAs and ERs of about \$5.5 million (Table 2).

Visitors and Residents

For all diving use by both visitors and residents, SPAs and ERs generated almost \$17 million annually in economic user value and another \$1.3 million for glass-bottom boat rides; SPAs and ERs had a total annual user value of \$18.3 million (Table 2). Capitalizing this \$18.3 million in annual user value using a discount rate of 3% and assuming this annual flow of value continues in perpetuity, we can derive an estimate of the asset value of SPAs and ERs. Asset value represents what someone would be willing to pay today for the right to own SPAs and ERs if they could charge a price for their use. The asset value was estimated to be \$610 million (\$18.3 million divided by 0.03).

Both annual user value and the asset value are likely under-estimates of economic user value because SPAs and ERs are probably not used to full capacity and future use is likely to increase. Also, it is likely that user value per unit of use (per person-day) will also increase in the future as demand for their use increases relative to the world supply of coral reefs.

In addition, total use value is an under-estimate of total economic value because it is highly likely that some people have non-use economic value or passive economic value for SPAs and ERs. Non-use or passive economic use values include willingness of people to pay some amount simply to know that SPAs and ERs will be maintained in a certain condition, even though they never intend to use SPAs and ERs (existence value) or their willingness to pay to ensure that SPAs and ERs are maintained for future generations to enjoy (bequeath value). Another type of non-use value not accounted for here is “option value” or the amount people would be willing to pay to ensure that SPAs and ERs would be maintained in a condition suitable for their use some time in the future, even though they currently have not had a chance to use them. This latter value is like that of an insurance policy on future use, where there is uncertainty both about future use and future supply of the resource.

**Table 2.** SPA and ER use value: 2000-01.

Type of User	User Value Per Person-day (\$)	Annual Person-days of Use	Annual Use Value (Millions \$)
<b>Visitors</b>			
Diving <sup>1</sup>	\$19.46	590,700	\$11.495
Glass-bottom boat rides	\$22.53	58,500	\$1.318
<b>Total</b>	<b>\$19.74</b>	<b>649,200</b>	<b>\$12.813</b>
<b>Residents</b>			
Diving <sup>1</sup>	\$9.25	593,400	\$5.489
<b>Visitors &amp; Residents</b>			
Diving <sup>1</sup>	\$14.34	1,184,100	\$16.984
Glass-bottom boat rides	\$22.53	58,500	\$1.318
<b>Total</b>	<b>\$14.73</b>	<b>1,242,600</b>	<b>\$18.302</b>

1. Diving includes snorkeling and scuba diving.



*Comparative Importance-Satisfaction Ratings: SPA- and ER-Users vs. Non-Users*

In the 2000-01 reef study, importance/satisfaction ratings were obtained for 25 natural resource attributes, facilities, and services. Here we compare measurements taken in 2000-01 for both residents and visitors; we further disaggregated these groups into SPA- and ER-users versus non-SPA- and non-ER-users. We did this for eight of the 25 items that are more directly or indirectly related to SPAs and ERs. The eight items included six natural resource attribute items and two natural resource facility items (Table 3).

Importance Scores: Visitors

Visiting SPA- and ER-users had higher mean importance scores than non-SPA- and non-ER-users for four of the eight items:

- A. Clear Water (high visibility)
- C. Many different kinds of fish and sea life to view
- H. Parks and specially protected areas
- K. Mooring buoys near coral reefs

Visiting SPA- and ER-users had a lower mean importance score than non-SPA- and non-ER-users for:

- D. Many different kinds of fish and sea life to catch

This is as expected because catching fish and sea life is prohibited in SPAs and ERs.

Importance Scores: Residents

Resident SPA- and ER-users had higher mean importance scores than non-SPA- and non-ER-users for seven of the eight items, all except:

- D. Many different kinds of fish and sea life to catch

Again, this is expected because catching fish and sea life is prohibited in SPAs and ERs. The difference from the result for visitors was that mean scores for item (D) were lower for SPA- and ER-users than non-SPA- and non-ER-users, but the difference was not statistically significant.

Satisfaction Scores: Visitors

Visiting SPA- and ER-users had higher mean satisfaction scores than non-SPA- and non-ER-users for three of the eight items:

- C. Many different kinds of fish and sea life to view
- F. Large numbers of fish
- H. Parks and specially protected areas

All other differences were not statistically significant.

Satisfaction Scores: Residents

Resident SPA- and ER-users had a lower mean satisfaction score than non-SPA- and non-ER-users for only one item:

D. Many different kinds of fish and sea life to catch

*All other differences were not statistically significant.*

**Table 3.** Comparison of 2000-01 importance/satisfaction scores: SPA- and ER-users versus non-SPA- and non-ER-users.

Item	Visitors		Residents	
	Importance	Satisfaction	Importance	Satisfaction
<i>Natural Resource Attributes</i>				
A. Clear Water (high visibility)	+•	+	+•	ND
B. Amount of living coral on reefs	+	+	+•	-
C. Many different kinds of fish and sea life to view	+•	+•	+•	-
D. Many different kinds of fish and sea life to catch	-•	+	-	-•
E. Opportunity to view large wildlife (manatees, whales, dolphins, sea turtles)	-	+	+•	-
F. Large number of fish	-	+•	+•	-
<i>Natural Resource Facilities</i>				
H. Parks and specially protected areas	+•	+•	+•	+
K. Mooring buoys near coral reefs	+•	+	+•	+

- = statistically significant difference in mean scores at 0.05 or lower level of significance
- + = higher mean score, not statistically significant
- = lower mean score, not statistically significant
- +• = higher mean score and statistically significant at 0.05 or lower
- = lower mean score and statistically significant at 0.05 or lower
- ND = no difference

**Conclusions: Importance-Satisfaction Ratings**

For most of the key attributes, both visitor and resident SPA- and ER-users had significantly higher importance scores than non-users. Visiting SPA- and ER-users had generally higher satisfaction scores than non-users with statistically significant higher scores for three key items: 1) Many different kinds of fish and sea life to view, 2) Large numbers of fish, and 3) Parks and specially protected areas. Resident SPA- and ER-users, however, had a mix of lower and higher satisfaction scores than non-users, but none of the differences was statistically significant.

Even though the SPAs and ERs have been in existence for a relatively short period, it appears that visitors already perceive them as relatively higher-quality areas. As of 2000-01, residents do not seem to perceive a difference in the SPAs and ERs versus the open areas of the FKNMS.

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