Gray's Reef National Marine Sanctuary
Research Area Process
and
Spearfishing Activities

NOAA Gray's Reef NMS Research Area

Background

Gathering information on the status and natural variability of fish communities, habitat and ecological systems is essential for informed management of Gray's Reef National Marine Sanctuary. In order to fill in these gaps in our and the public's knowledge about the overall health of the Sanctuary and the living communities it supports, Gray's Reef needs a control area within the Sanctuary where it can take baseline measurements over time. That is why Gray's Reef is considering a research or control area within the Sanctuary.

The Questions We Want To Answer

- What impacts do extractible activities have on the reef and living marine resources?
- What would the fish populations and invertebrate communities look like in the absence of fishing impacts?
- What impacts would the removal of targeted species have on the more "resident" fish?
- How does one scientifically contrast community structure between "natural" reefs and reefs that have been influenced by human activities?
- What are the spatial and temporal dynamics of fish communities in a natural population?
- What variability in the natural system is inherent and what are results of human impact?
- How well is NOAA conserving the resources of Gray's Reef National Marine Sanctuary?

The Public Process

The concept of a research area within the Sanctuary has been under discussion since 1999. During the recent management plan review process, the Gray's Reef Sanctuary Advisory Council, with approval of the sanctuary superintendent, formed a broad-based working group to further consider the concept of a research area within the Sanctuary. The conclusion of the Research Area Working Group was that significant research questions exist at GRNMS that can only be addressed by establishing a research (control) area. As a result of the findings of this working group, GRNMS adopted this concept and recommendations in a strategy of the Management Plan released in 2006.

In October 2007, the Research Area Working Group met to further refine the selection criteria for a research area and narrowed the possible 31,000 boundary options down to 5 scenarios each with several boundary options. The 5 scenarios were presented to the SAFMC in December 2007 and at the January 31, 2008 meeting of the Gray's Reef Sanctuary Advisory Council. Economists also presented a socioeconomic assessment of the 5 scenarios in January (see below). A sixth scenario was suggested by a fisherman and will be assessed for socioeconomic impacts and reviewed at the March SAFMC meeting. The next phase of the public process is scoping for a draft environmental impact statement (DEIS). Scoping is expected to begin by the last week in February and extend into the first week in April. Public meetings are scheduled for late March. It is anticipated that a DEIS may be released in the fall of 2008 with more public comment to follow.

Preliminary Economic Analysis of Recreational Fishing in the Proposed GRNMS Research Area

Georgia Saltwater Fishing Statistics 2006

146,000 Georgia Saltwater Anglers
1,707,000 Georgia Saltwater Fishing Days

Total Economic Impact of Saltwater Fishing in Georgia in 2006:

Total Expenditures	**$119,250,000**
Total Impact – Sales	**$153,361,000**
Total Impact – Income	**$63,021,000**
Total Impact – Employment	**1,892**

Sources:

American Sportfishing Association, Sportfishing in America, January 2008
US Fish and Wildlife Service, 2006 National Survey of Fishing, Hunting and Wildlife Associated Recreation, 2006
NOAA, NMFS, Marine Angler Expenditures in the Southeast Region, 1999
NOAA, NMFS, The Economic Importance of Marine Angler Expenditures in the United States, 2004

Methodology and Assumptions

GRNMS boat location data sources: multiple sources including aerial photography and on water DNR patrol boat records.

Boat location data spans 1999 to 2007. 1,266 boat locations identified.

Approximately 50 percent of these occurred on fishing tournament days. No difference in spatial distribution of kingfish tournament days compared with non-tournament days.

Statistical analysis of boat location data estimated a typical year of person days of fishing within GRNMS.

Assumptions for GRNMS fishing analysis:
All boats identified are fishing
Average of 4 fishers per boat
Trip expenditure profile of charter boats used for trip expenditure profile of tournament boats
50 percent private/rental and 50 percent charter/tournament
95 percent Georgia resident and 5 percent non-resident

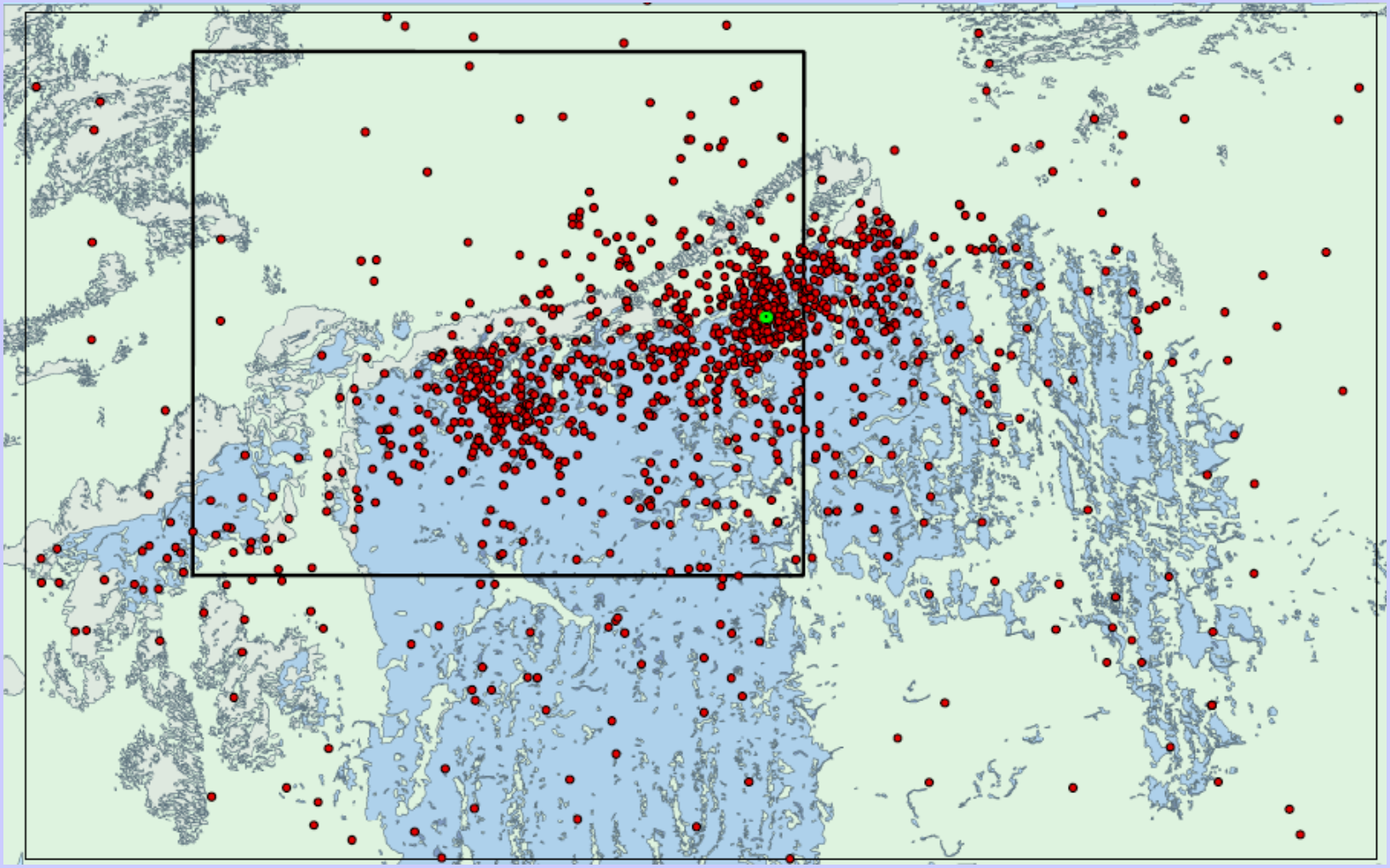
This analyses assumes that all economic value associated with the areas closed are lost. Any factor that could mitigate or off-set the level of impact is not addressed. The estimated impacts are thought of as "maximum potential losses" because humans have proven to be very adaptive, resilient and quite ingenious in responding to changes and rarely does society fail to at least mitigate or off-set most losses.

GRNMS Fishing Expenditures

4,694 person days = $2,017,340 total fishing expenditures

GRNMS		Average Person Day Expenditures		Total Expenditures	
Trip Expenditures	**Mode**	**Resident Spenders ($)**	**Nonresident Spenders ($)**	**Resident Spenders ($)**	**Nonresident Spenders ($)**
Private Transportation	Charter	17	7	36,799	805
	Private/Rental	7	10	15,324	1,142
Food	Charter	30	25	66,907	2,946
	Private/Rental	14	35	31,862	4,135
Lodging	Charter	55	41	122,295	4,792
	Private/Rental	301	27	670,368	3,168
Public Transportation	Charter	15	110	34,371	12,897
	Private/Rental		41	-	4,814
Boat Fuel	Private/Rental	13	13	54,103	2,686
Charter Fees	Charter	178	144	397,559	16,899
Access/Boat Launching	Charter	6	7	12,896	821
	Private/Rental	6	4	12,788	439
Equipment Rental	Charter	193	77	429,718	9,059
	Private/Rental		11	-	1,306
Bait	Charter	13	16	28,031	1,835
	Private/Rental	11	8	25,090	947
Ice	Charter	2	4	4,344	481
	Private/Rental	2	3	5,396	318
Total	**Charter**	**508**	**431**	**1,132,919**	**50,535**
	Private/Rental	**355**	**151**	**814,931**	**18,954**

Research Area Scenario 1

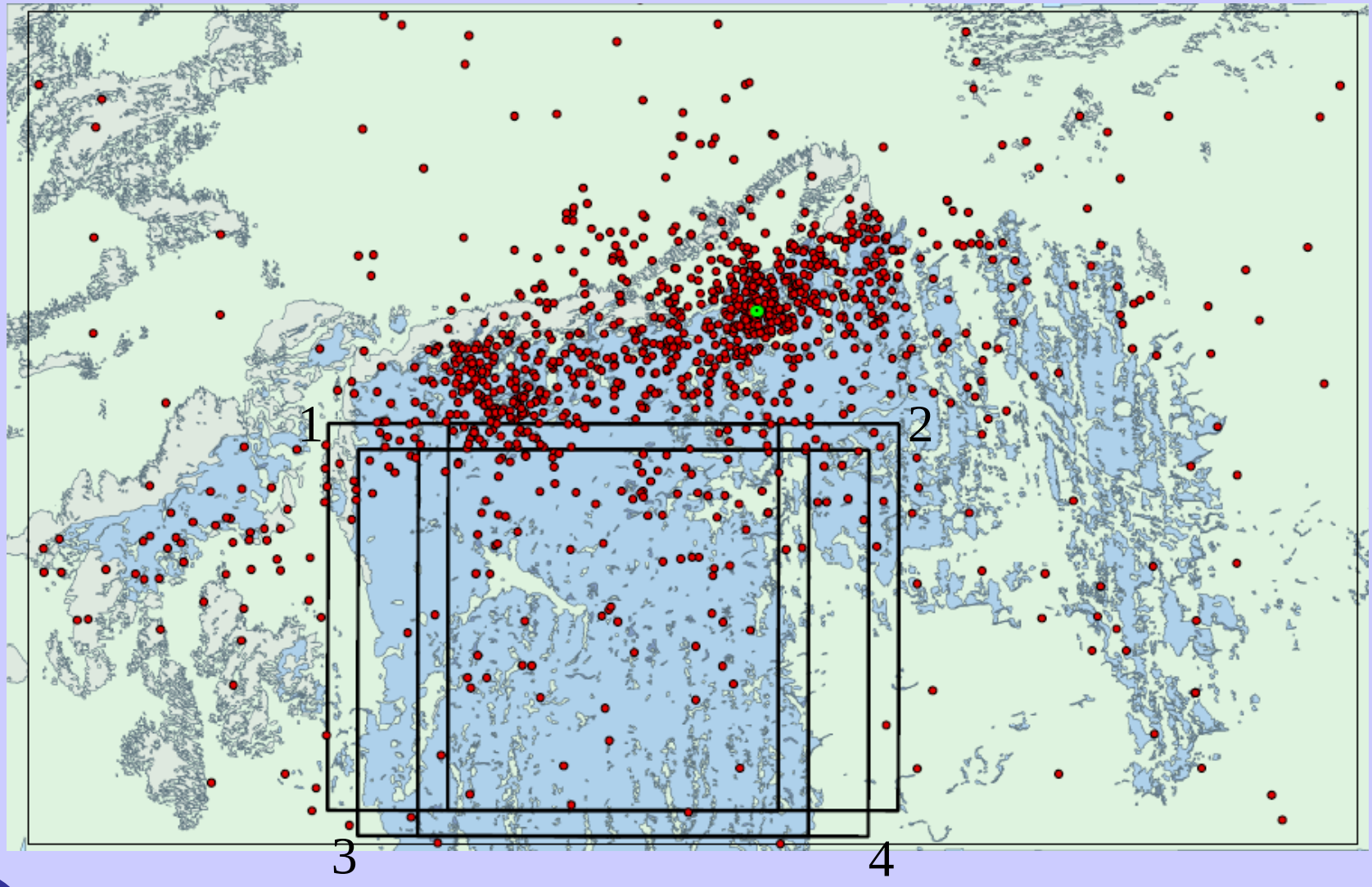


Scenario 1 Impacts to Fishing Expenditures

67.0 percent of fishing impacted = $1,351,651

GRNMS		Expenditure Impacts Scenario 1	
Trip Expenditures	**Mode**	**Resident Spenders ($)**	**Nonresident Spenders ($)**
Private Transportation	Charter	24,656	539
	Private/Rental	10,267	765
Food	Charter	44,829	1,974
	Private/Rental	21,348	2,770
Lodging	Charter	81,940	3,211
	Private/Rental	449,158	2,123
Public Transportation	Charter	23,029	8,641
	Private/Rental	-	3,225
Boat Fuel	Private/Rental	36,250	1,799
Charter Fees	Charter	266,371	11,322
Access/Boat Launching	Charter	8,640	550
	Private/Rental	8,568	294
Equipment Rental	Charter	287,918	6,070
	Private/Rental	-	875
Bait	Charter	18,781	1,229
	Private/Rental	16,811	635
Ice	Charter	2,910	323
	Private/Rental	3,615	213
Total	**Charter**	**759,075**	**33,860**
	Private/Rental	**546,017**	**12,699**

Research Area Scenario 2

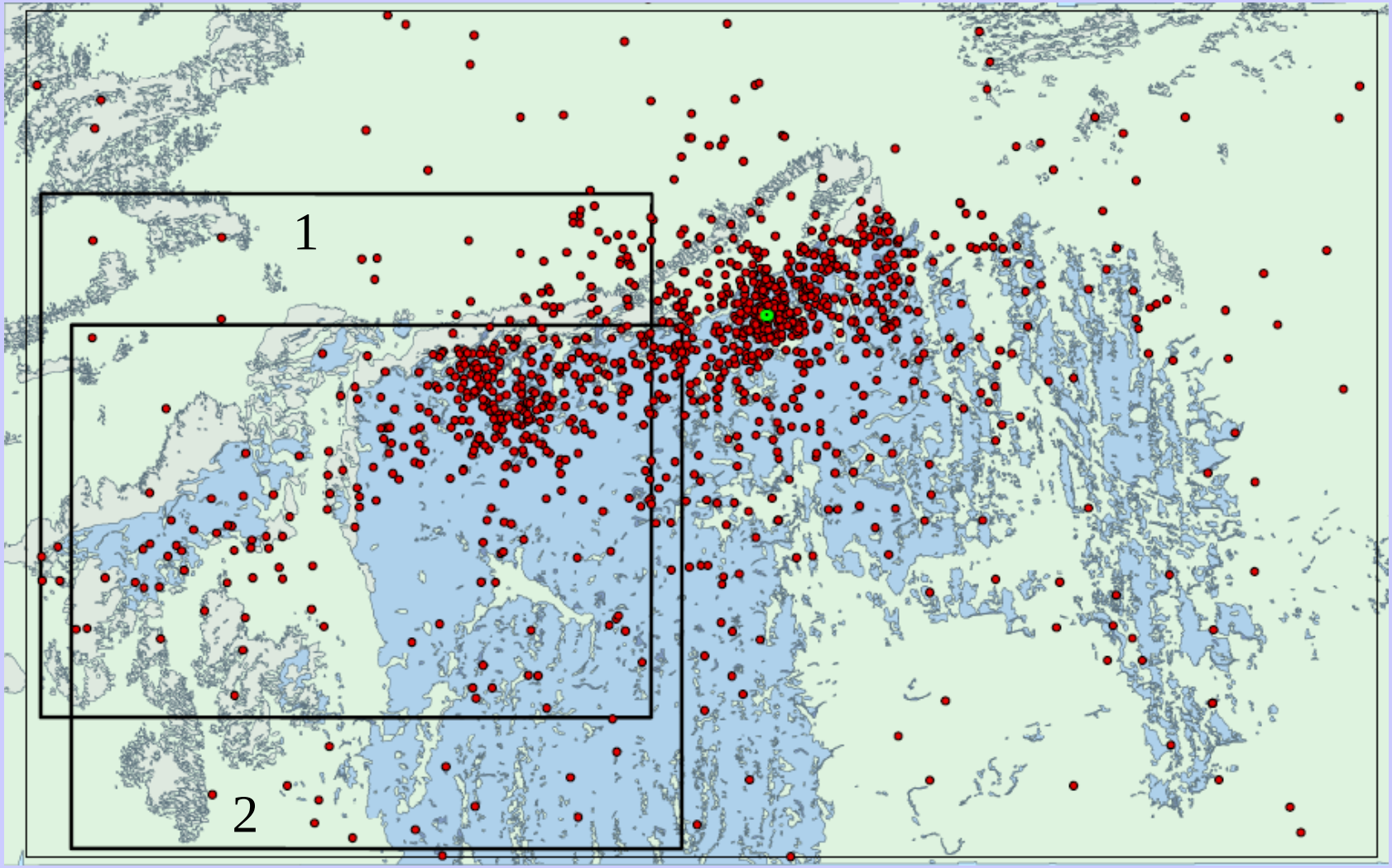


Scenario 2 Impacts to Fishing Expenditures

Boundary 1: 12.4 percent of fishing impacted = $250,055
Boundary 2: 12.2 percent of fishing impacted = $246,676
Boundary 3: 8.8 percent of fishing impacted = $177,404
Boundary 4: 8.7 percent of fishing impacted = $175,715

GRNMS		Expenditure Impacts Scenario 2, Boundary 1		Expenditure Impacts Scenario 2, Boundary 2		Expenditure Impacts Scenario 2, Boundary 3		Expenditure Impacts Scenario 2, Boundary 4	
Trip Expenditures	**Mode**	**Resident Spenders ($)**	**Nonresident Spenders ($)**	**Resident Spenders ($)**	**Nonresident Spenders ($)**	**Resident Spenders ($)**	**Nonresident Spenders ($)**	**Resident Spenders ($)**	**Nonresident Spenders ($)**
Private Transportation	Charter	4,561	100	4,500	98	3,236	71	3,205	70
	Private/Rental	1,899	142	1,874	140	1,348	100	1,335	99
Food	Charter	8,293	365	8,181	360	5,884	259	5,828	257
	Private/Rental	3,949	513	3,896	506	2,802	364	2,775	360
Lodging	Charter	15,159	594	14,954	586	10,755	421	10,652	417
	Private/Rental	83,094	393	81,971	387	58,952	279	58,391	276
Public Transportation	Charter	4,260	1,599	4,203	1,577	3,023	1,134	2,994	1,123
	Private/Rental	-	597	-	589	-	423	-	419
Boat Fuel	Private/Rental	6,706	333	6,616	328	4,758	236	4,712	234
Charter Fees	Charter	49,279	2,095	48,613	2,066	34,961	1,486	34,628	1,472
Access/Boat Launching	Charter	1,598	102	1,577	100	1,134	72	1,123	71
	Private/Rental	1,585	54	1,564	54	1,125	39	1,114	38
Equipment Rental	Charter	53,265	1,123	52,545	1,108	37,789	797	37,429	789
	Private/Rental	-	162	-	160	-	115	-	114
Bait	Charter	3,475	227	3,428	224	2,465	161	2,442	160
	Private/Rental	3,110	117	3,068	116	2,206	83	2,185	82
Ice	Charter	538	60	531	59	382	42	378	42
	Private/Rental	669	39	660	39	475	28	470	28
Total	**Charter**	**140,429**	**6,264**	**138,531**	**6,179**	**99,629**	**4,444**	**98,680**	**4,402**
	Private/Rental	**101,013**	**2,349**	**99,648**	**2,318**	**71,665**	**1,667**	**70,982**	**1,651**

Research Area Scenario 3

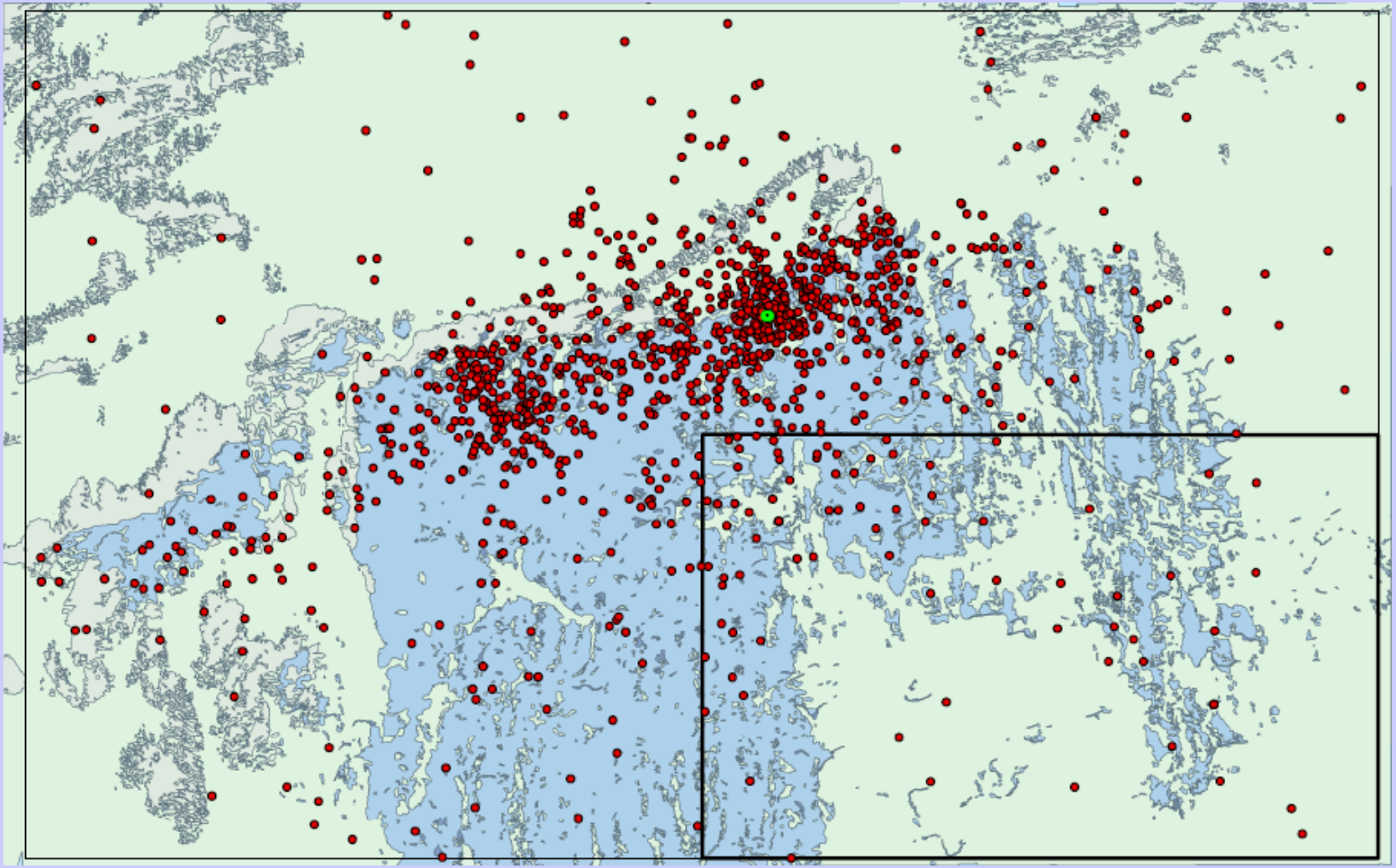


Scenario 3 Impacts to Fishing Expenditures

Boundary 1: 35.9 percent of fishing impacted = $724,823
Boundary 2: 34.6 percent of fishing impacted = $697,790

GRNMS		Expenditure Impacts Scenario 3, Boundary 1		Expenditure Impacts Scenario 3, Boundary 2	
Trip Expenditures	**Mode**	**Resident Spenders ($)**	**Nonresident Spenders ($)**	**Resident Spenders ($)**	**Nonresident Spenders ($)**
Private Transportation	Charter	13,222	289	12,729	278
	Private/Rental	5,506	410	5,300	395
Food	Charter	24,040	1,059	23,143	1,019
	Private/Rental	11,448	1,486	11,021	1,430
Lodging	Charter	43,940	1,722	42,301	1,658
	Private/Rental	240,861	1,138	231,878	1,096
Public Transportation	Charter	12,349	4,634	11,889	4,461
	Private/Rental	-	1,730	-	1,665
Boat Fuel	Private/Rental	19,439	965	18,714	929
Charter Fees	Charter	142,842	6,072	137,514	5,845
Access/Boat Launching	Charter	4,633	295	4,461	284
	Private/Rental	4,595	158	4,423	152
Equipment Rental	Charter	154,396	3,255	148,638	3,134
	Private/Rental	-	469	-	452
Bait	Charter	10,071	659	9,696	635
	Private/Rental	9,015	340	8,679	328
Ice	Charter	1,561	173	1,502	166
	Private/Rental	1,939	114	1,866	110
Total	**Charter**	**407,054**	**18,157**	**391,872**	**17,480**
	Private/Rental	**292,802**	**6,810**	**281,882**	**6,556**

Research Area Scenario 4

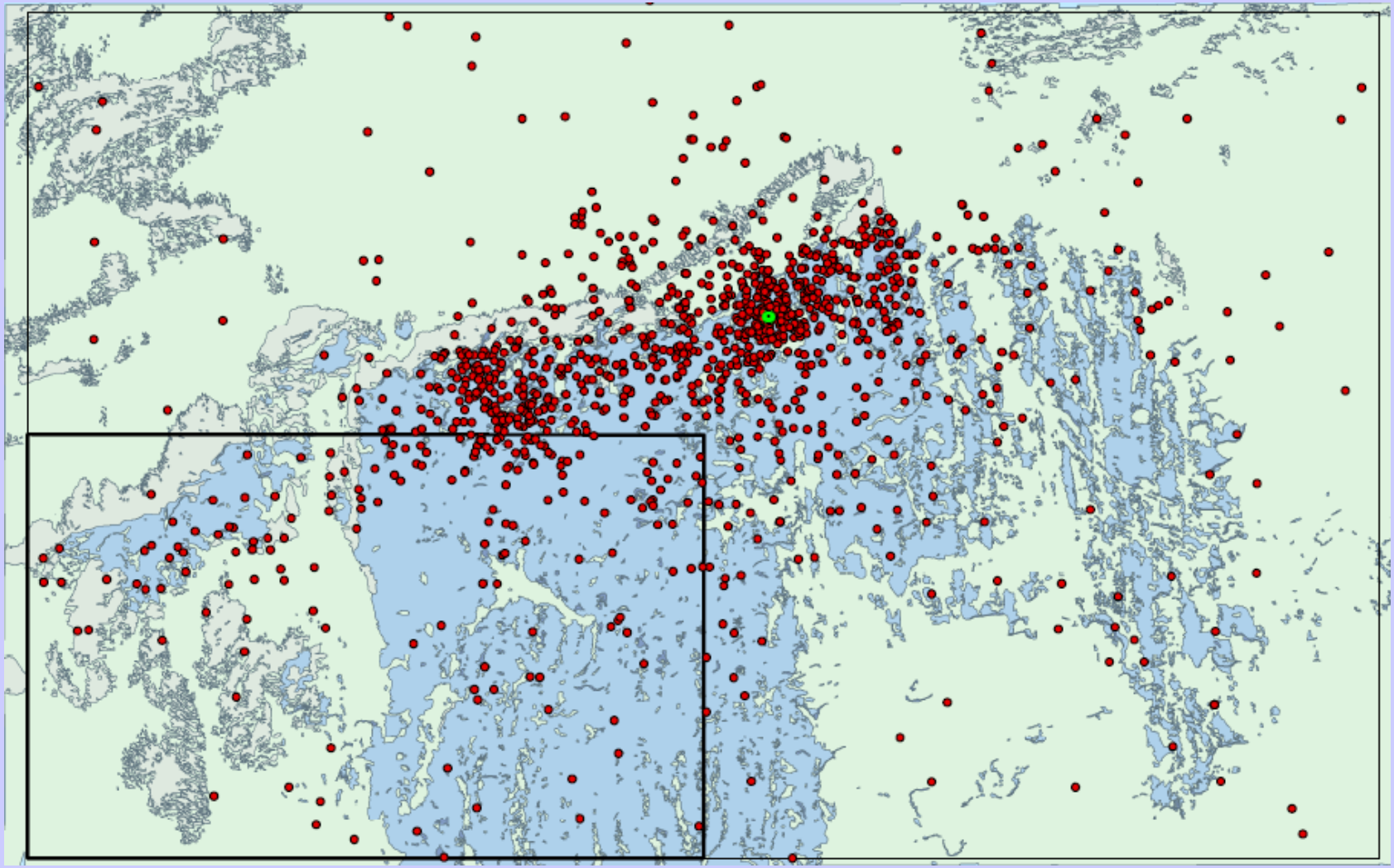


Scenario 4 Impacts to Fishing Expenditures

6.7 percent of fishing impacted = $135,165

GRNMS		Expenditure Impacts Scenario 4	
Trip Expenditures	**Mode**	**Resident Spenders ($)**	**Nonresident Spenders ($)**
Private Transportation	Charter	2,466	54
	Private/Rental	1,027	76
Food	Charter	4,483	197
	Private/Rental	2,135	277
Lodging	Charter	8,194	321
	Private/Rental	44,916	212
Public Transportation	Charter	2,303	864
	Private/Rental	-	323
Boat Fuel	Private/Rental	3,625	180
Charter Fees	Charter	26,637	1,132
Access/Boat Launching	Charter	864	55
	Private/Rental	857	29
Equipment Rental	Charter	28,792	607
	Private/Rental	-	88
Bait	Charter	1,878	123
	Private/Rental	1,681	63
Ice	Charter	291	32
	Private/Rental	362	21
Total	**Charter**	**75,907**	**3,386**
	Private/Rental	**54,602**	**1,270**

Research Area Scenario 5



Scenario 5 Impacts to Fishing Expenditures

14.5 percent of fishing impacted = $292,295

GRNMS		Expenditure Impacts Scenario 5	
Trip Expenditures	**Mode**	**Resident Spenders ($)**	**Nonresident Spenders ($)**
Private Transportation	Charter	5,332	117
	Private/Rental	2,220	165
Food	Charter	9,694	427
	Private/Rental	4,617	599
Lodging	Charter	17,719	694
	Private/Rental	97,130	459
Public Transportation	Charter	4,980	1,869
	Private/Rental	-	697
Boat Fuel	Private/Rental	7,839	389
Charter Fees	Charter	57,603	2,448
Access/Boat Launching	Charter	1,868	119
	Private/Rental	1,853	64
Equipment Rental	Charter	62,262	1,313
	Private/Rental	-	189
Bait	Charter	4,061	266
	Private/Rental	3,635	137
Ice	Charter	629	70
	Private/Rental	782	46
Total	**Charter**	**164,150**	**7,322**
	Private/Rental	**118,076**	**2,746**

Summary

It is estimated that the economic impact of a research area on Georgia recreational fishing will be between 0.11% (scenario 4) and 1.13% (scenario 1) of statewide saltwater fishing expenditures. This is considered to the maximum potential loss. Rarely does society fail to at least mitigate or off-set most losses.

Scenario #	Boundary #	% GRNMS Impacted	Impacted GRNMS Person Days	Impacts to GRNMS Saltwater Fishing Expenditures	% Impact to GA Person Days of Saltwater Fishing	% Impact to GA Total Saltwater Fishing Expenditures
1	1	67.0%	3,145	$1,351,651	0.18%	1.13%
2	1	12.4%	582	$250,055	0.03%	0.21%
2	2	12.2%	574	$246,676	0.03%	0.21%
2	3	8.8%	413	$177,404	0.02%	0.15%
2	4	8.7%	409	$175,715	0.02%	0.15%
3	1	35.9%	1,687	$724,823	0.10%	0.61%
3	2	34.6%	1,624	$697,790	0.10%	0.59%
4	1	6.7%	315	$135,165	0.02%	0.11%
5	1	14.5%	680	$292,295	0.04%	0.25%

Socioeconomic Assessment of Georgia Offshore Spearfishing

Rod Ehler, Economist
NOAA National Marine Sanctuary Program
February 2008

Spearfishing was considered for regulation during the original 1981 GRNMS designation and again during the management plan review from 1999 until 2006. Spearfishing with powerheads was prohibited in 1981 and, although a prohibition on all spearfishing in the sanctuary was proposed with the draft revised management plan, no changes were made in the 2006 final plan. The sanctuary concluded, instead, that there was little data on the actual level of spearfishing at GRNMS and the sanctuary would, therefore, gather additional socioeconomic information on this activity in GRNMS and review the issue again in two years.

Results from the socioeconomic study indicate that no dive charters made spearfishing trips to GRNMS in recent years and none plan to in the future. A scuba club reported one spearfishing trip (1 day, six divers) a year to GRNMS. A small amount (no more than 1 percent of all fishing) of private boat based spearfishing at GRNMS can be assumed, but has not been documented. The combination of no charter spearfishing activity at GRNMS and the abundant substitution opportunities lead to the conclusion that a prohibition on spearfishing at GRNMS would result in no measurable economic impact.

Dive Charter Interviews

In September 2007, in-person interviews were conducted with all businesses and organizations offering scuba diving trips along the Georgia coast. Four charter scuba diving operations and one scuba diving club were identified and interviewed. The interviews gathered information that included operating profiles, preferred diving locations and methods, detailed business data (revenue and costs), and general opinions of the current state of scuba diving and spearfishing off the Georgia coast. A total of 10 businesses offering scuba diving charter trips at some point during the past 5 years off the Georgia coast were identified. Of these, only 4 currently remain in business. Three are associated with dive shops and one is charter boat only. The 6 others have either gone out of business, moved away from the area, or are dive shops that no longer operate charter trips.

Findings

Person-Days of Scuba Diving

Dive charters reported a total of 1,747 person-days of scuba diving off the Georgia coast in 2007. Approximately 55 percent of these person-days were non-consumptive (no spearfishing) person-days, 44 percent were consumptive (spearfishing) person-days, and the remaining 1 percent was sightseeing/sportfishing. None of these person-days occurred at GRNMS.

One scuba club reported a total of 24 person-days of scuba diving off the Georgia coast with 6 of these person-days spent at GRNMS.

A person-day is defined as one person undertaking an activity for any part of a day or a whole day.

Revenue and Operating Costs

The table below summarizes the revenue and operating costs of the Georgia offshore scuba diving charter fleet as of 2007. Charter operations appear to be a break even business with most stating that they use it to get customers in the dive shop. It is important to note that major variable and unexpected costs are not factored in to the table. These variable costs typically include major engine repair or replacement and equipment repair or replacement.

Table 1. Revenue and Operating Costs of the Georgia Offshore Scuba Diving Charter Fleet, 2007

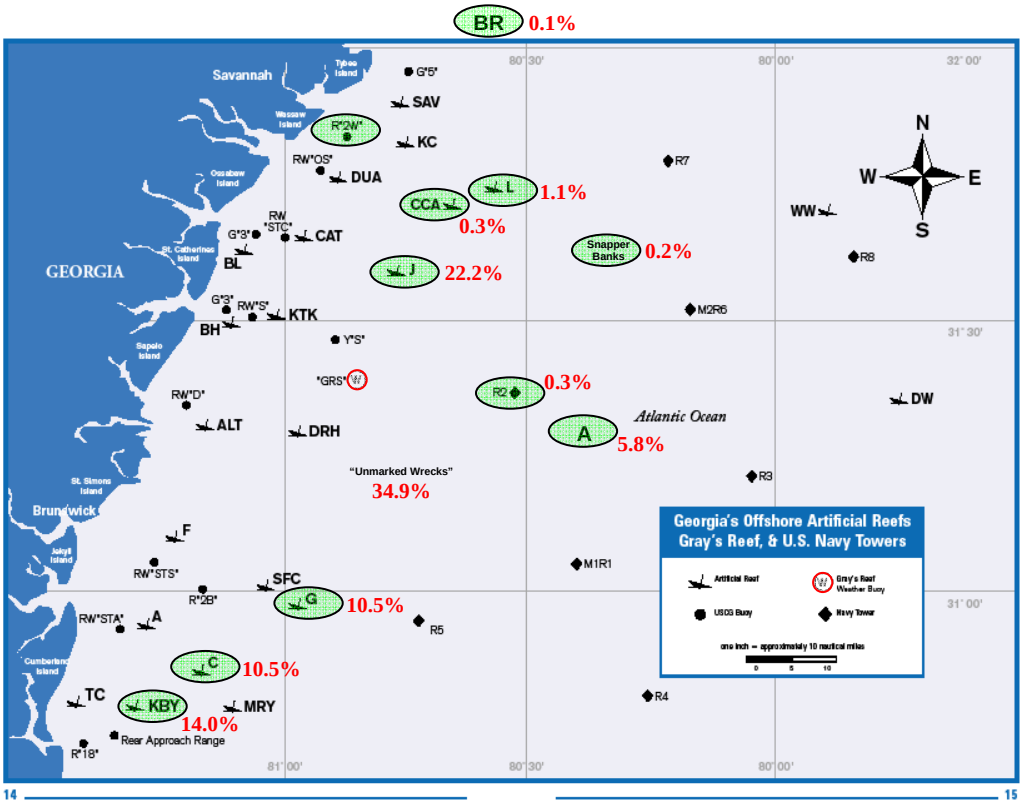
Gross Revenue from Charter Diving	**100,000**
Operating Costs	
Wages, Salaries and Benefits	3,500
Fuel	21,180
Repair & Maintenance	6,200
Equipment Rental and Leasing	41,920
Dock	7,200
Insurance	6,800
Interest Payments	15,600
Total Operating Costs	**101,800**
Loss from Charter Diving	**(1,800)**

Preferred Spearfishing Locations

Figure 1 below is a map of Georgia's offshore artificial reefs, US Navy towers and Gray's Reef NMS. The spearfishing locations mentioned during the interviews are indicated with green ovals, the percentage of reported visitation is indicated with red numbers, and GRNMS is marked with a red circle. The map demonstrates the extensive substitution opportunities for scuba diving and spearfishing that exist off the Georgia coast. Even if there were significant levels of spearfishing activity reported at GRNMS, the network of other locations would significantly decrease any economic impact. The single most popular site is J Reef. "Unmarked wrecks" are where the majority of trips are made.

GRNMS's location, 17.5 nautical miles off Sapelo Island and more than 30 nautical miles from Savannah and Brunswick, makes accessing the sanctuary difficult. The map below demonstrates the multitude of spearfishing opportunities that exist closer to the primary access points of Savannah and Brunswick.

Figure 1. Georgia Preferred Scuba Diving Locations as Reported by Dive Charters and One Scuba Diving Club.



Comments and Opinions from the Interviews

The interviewees expressed comments and opinions concerning spearfishing at GRNMS. Below is a summary of these comments and opinions.

I haven't been to GRNMS in two years
Don't plan on going back to GRNMS
Not enough reef at GRNMS, too patchy
Drift dive only at GRNMS, too difficult for most divers
The better spots are Snapper Banks and J Reef
I don't trust people diving at GRNMS
Too many sharks at GRNMS
Visibility not reliable at GRNMS
GRNMS is valuable for advertising to out of state
customers, then we take them to better locations
Make no money running dive charter business in GA,
it just gets customers into the store

Private Boat Based Spearfishing at GRNMS

A formal study of private boat based spearfishing at GRNMS has not been undertaken. A small amount (no more than 1 percent of all fishing) of private boat based spearfishing at GRNMS can be assumed, but has not been documented. This is based on on-water observations from fishermen, scuba divers, and researchers. As mentioned above, any potential economic cost would likely be absorbed by the multiple substitution opportunities off the Georgia coast.

A formal economic study of private boat based spearfishing would be difficult and cost prohibitive to complete. A telephone survey would not be feasible due to the extremely high number of calls that would be required to identify spearfishers who visit GRNMS. A statistically valid sample would be nearly impossible to obtain. Only a very small fraction of calls would result in a spearfisher who visits GRNMS. On-water surveys are also not feasible due to the open ocean weather conditions. Additionally, surveys would be opportunistic with no valid sampling method.