

**ECONOMIC ANALYSIS OF THE PROPOSED
GRAY'S REEF NATIONAL MARINE SANCTUARY
RESEARCH AREA
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Introduction

NOAA Gray's Reef National Marine Sanctuary (GRNMS) began developing a proposal to establish a research area in GRNMS in 2004 when a working group was convened to explore the concept. The purpose of a research area would be to increase the opportunity to discriminate scientifically between natural and human-induced change to species populations in the sanctuary. This analysis was produced in 2008 to assess the social and economic effects of a research area.

Economic Analysis of Private Boat Recreational Fishing in the Proposed GRNMS Research Area (April 2008)

Rationale:

- Determine the economic impact of private boat based saltwater fishing in Georgia, and prorate it based on estimated angler activity in Gray's Reef National Marine Sanctuary.

Georgia Saltwater Fishing Statistics 2006¹:

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

Total Economic Impact of Saltwater Fishing in Georgia in 2006¹:

- | | |
|-----------------------------|---------------|
| • Total Expenditures | \$119,250,000 |
| • Total Impact – Sales | \$153,361,000 |
| • Total Impact – Income | \$ 63,021,000 |
| • Total Impact – Employment | \$ 1,892 |

Methodology and Assumptions:

- Multiple GRNMS boat location data sources were used, including aerial photography and on water GADNR patrol boat records.

¹ 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

- Boat location data span 1999 to 2007. 1,266 boat locations were identified.
- Approximately 50 percent of these boat sightings 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 to be 4,694. A person day is equivalent to one person engaging in the activity for any portion of one day.
- Total expenditures = average person day expenditures x total person days x % private/tournament x % GA resident/non-resident.
- Assumptions for GRNMS fishing analysis:
 - All boats identified are fishing
 - Average of 4 fishers per boat
 - Trip expenditure profile of tournament boats provided by Georgia DNR
 - Trip expenditure profile of private boats provided by NMFS
 - 50 percent of boats are private or rental and 50 percent boats participating in a tournament
 - 95 percent of boaters are Georgia residents and 5 percent are non-resident
- This analysis also assumes that all economic value associated with the area closed is 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.

Table 1: GRNMS Fishing Expenditures

GRNMS		Average Person Day Expenditures		Total Expenditures	
Trip Expenditures	Mode	Resident Spenders (\$)	Nonresident Spenders (\$)	Resident Spenders (\$)	Nonresident Spenders (\$)
Private Transportation	Tournament	13	13	28,985	1,526
	Private	7	10	15,324	1,142
Food	Tournament	6	6	13,378	704
	Private	14	35	31,862	4,135
Lodging	Tournament	100	100	222,965	11,735
	Private	301	27	670,368	3,168
Public Transportation	Tournament			-	-
	Private		41	-	4,814
Boat Fuel	Tournament	50	50		
	Private	24	23	54,103	2,686
Tournament Entry Fee	Tournament	100	100	222,965	11,735
Access/Boat Launching	Tournament	6	6	13,378	704
	Private	6	4	12,788	439
Equipment Rental	Tournament			-	-
	Private		11	-	1,306
Bait	Tournament	19	19	42,363	2,230
	Private	11	8	25,090	947
Ice	Tournament	6	6	13,378	704
	Private	2	3	5,396	318
Total	Tournament	300	300	668,895	35,205
	Private	365	162	814,931	18,954

(4,694 person days = \$1,537,985 total fishing expenditures)

The total annual recreational fishing expenditures for the entire GRNMS in 2006 is estimated to be \$1,537,985. The following is an explanation of the methodology for estimating total expenditures. First, each of the itemized expenditures must be calculated by multiplying the itemized average person day expenditures by total person days by percent private/tournament by percent Georgia resident/nonresident.

Total expenditures = (average person day expenditures) x (total person days) x (% private/tournament) x (% GA resident/non-resident)

For example, in the table above, private transportation expenditures for tournament resident spenders is estimated to be \$28,985. The calculation for this is:

$$\$28,985 = 13 \times 4,694 \times .50 \times .95$$

The totals at the bottom of the above table simply sum the itemized expenditures for tournament/private and resident/nonresident. Finally, total fishing expenditures are the sum of the four total expenditures for mode and resident status.

Optimal Scientific Option Boundary Economic Analysis:

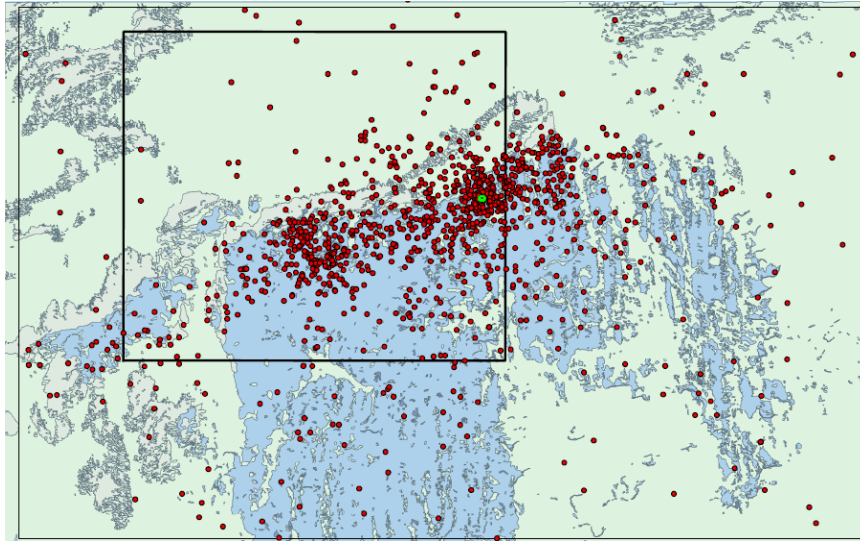


Table 2: Optimal Scientific Option Boundary Impacts to Fishing Expenditures

GRNMS		Expenditure Impacts Scenario 1	
Trip Expenditures	Mode	Resident Spenders (\$)	Nonresident Spenders (\$)
Private Transportation	Tournament	19,421	1,022
	Private	10,267	765
Food	Tournament	8,963	472
	Private	21,348	2,770
Lodging	Tournament	149,390	7,863
	Private	449,158	2,123
Public Transportation	Tournament	-	-
	Private	-	3,225
Boat Fuel	Tournament		
	Private	36,250	1,799
Tournament Entry Fee	Tournament	149,390	7,863
Access/Boat Launching	Tournament	8,963	472
	Private	8,568	294
Equipment Rental	Tournament	-	-
	Private	-	875
Bait	Tournament	28,384	1,494
	Private	16,811	635
Ice	Tournament	8,963	472
	Private	3,615	213
Total	Tournament	448,171	23,588
	Private	546,017	12,699

67.0 percent of fishing impacted = \$1,030,476

The total annual impact to recreational fishing expenditures of the Optimal Scientific Option Boundary in 2006 is estimated to be \$1,030,476. This estimate was calculated using the same methodology as described above for total estimated expenditures, with the addition of multiplying each of the itemized expenditures for mode and resident status by the percent of fishing impacted.

Minimal User Displacement Option Boundary Economic Analysis

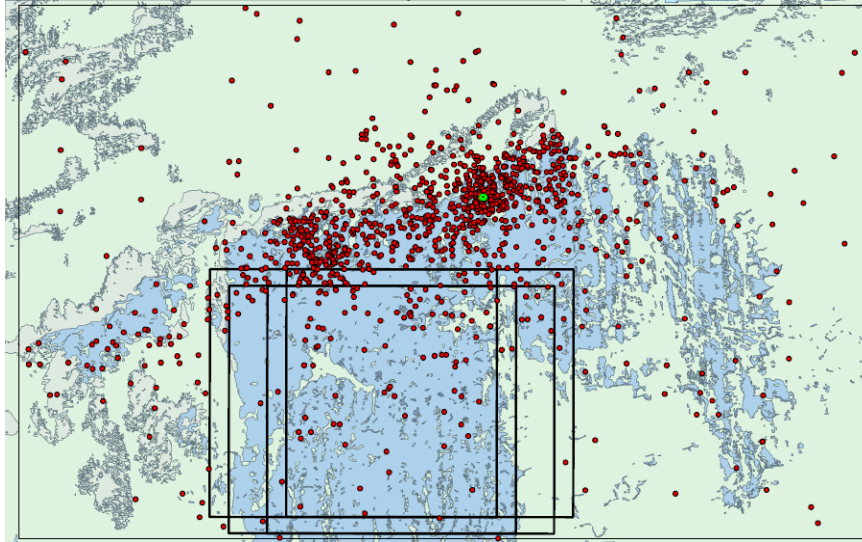


Table 3: Minimal User Displacement Option Boundary Impacts to Fishing Expenditures

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	Tournament	3,593	189	3,544	187	2,549	134	2,525	133
	Private	1,899	142	1,874	140	1,348	100	1,335	99
Food	Tournament	1,658	87	1,636	86	1,176	62	1,165	61
	Private	3,949	513	3,896	506	2,802	364	2,775	360
Lodging	Tournament	27,637	1,455	27,264	1,435	19,607	1,032	19,421	1,022
	Private	83,094	393	81,971	387	58,952	279	58,391	276
Public Transportation	Tournament	-	-	-	-	-	-	-	-
	Private	-	597	-	589	-	423	-	419
Boat Fuel	Tournament	-	-	-	-	-	-	-	-
	Private	6,706	333	6,616	328	4,758	236	4,712	234
Tournament Entry Fee	Tournament	27,637	1,455	27,264	1,435	19,607	1,032	19,421	1,022
Access/Boat Launching	Tournament	1,658	87	1,636	86	1,176	62	1,165	61
	Private	1,585	54	1,564	54	1,125	39	1,114	38
Equipment Rental	Tournament	-	-	-	-	-	-	-	-
	Private	-	162	-	160	-	115	-	114
Bait	Tournament	5,251	276	5,180	273	3,725	196	3,690	194
	Private	3,110	117	3,068	116	2,206	83	2,185	82
Ice	Tournament	1,658	87	1,636	86	1,176	62	1,165	61
	Private	669	39	660	39	475	28	470	28
Total	Tournament	82,912	4,364	81,791	4,305	58,822	3,096	58,262	3,066
	Private	101,013	2,349	99,648	2,318	71,665	1,667	70,982	1,651

Boundary 1: 12.4 percent of fishing impacted = \$190,638

Boundary 2: 12.2 percent of fishing impacted = \$188,062

Boundary 3: 8.8 percent of fishing impacted = \$135,250

Boundary 4: 8.7 percent of fishing impacted = \$133,962

The total annual impact to recreational fishing expenditures of the Minimal User Displacement Option Boundaries in 2006 is estimated to be between \$133,962 and \$190,638. These estimates were calculated using the same methodology as described above for total estimated expenditures, with the addition of multiplying each of the itemized expenditures for mode and resident status by the percent of fishing impacted.

Compromise Option Boundary Economic Analysis:

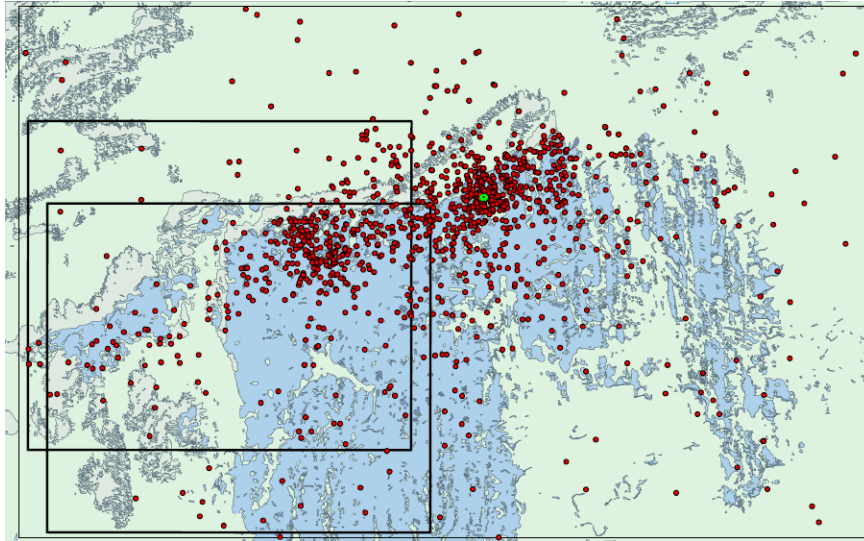


Table 4: Compromise Option Boundary Impacts to Fishing Expenditures

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	Tournament	10,414	548	10,026	528
	Private	5,506	410	5,300	395
Food	Tournament	4,807	253	4,627	244
	Private	11,448	1,486	11,021	1,430
Lodging	Tournament	80,111	4,216	77,123	4,059
	Private	240,861	1,138	231,878	1,096
Public Transportation	Tournament	-	-	-	-
	Private	-	1,730	-	1,665
Boat Fuel	Tournament	19,439	965	18,714	929
	Private	80,111	4,216	77,123	4,059
Tournament Entry Fee Access/Boat Launching	Tournament	4,807	253	4,627	244
	Private	4,595	158	4,423	152
Equipment Rental	Tournament	-	-	-	-
	Private	-	469	-	452
Bait	Tournament	15,221	801	14,653	771
	Private	9,015	340	8,679	328
Ice	Tournament	4,807	253	4,627	244
	Private	1,939	114	1,866	110
Total	Tournament	240,332	12,649	231,368	12,177
	Private	292,802	6,810	281,882	6,556

Boundary 1: 35.9 percent of fishing impacted = \$552,593

Boundary 2: 34.6 percent of fishing impacted = \$531,983

The total annual impact to recreational fishing expenditures of the Compromise Option Boundaries in 2006 is estimated to be between \$531,983 and \$553,593. These estimates were calculated using the same methodology as described above for total estimated expenditures, with the addition of multiplying each of the itemized expenditures for mode and resident status by the percent of fishing impacted.

Southern Option Boundary Economic Analysis

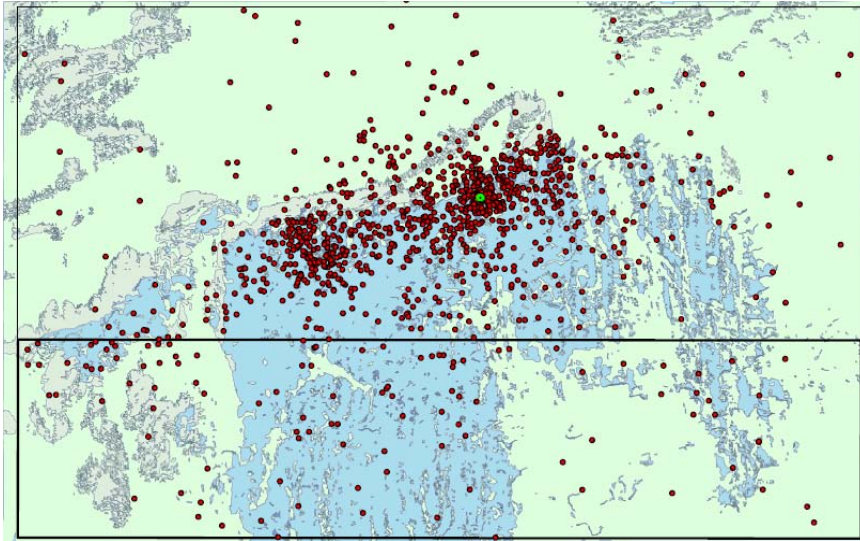


Table 5: Southern Option Boundary Impacts to Fishing Expenditures

GRNMS		Expenditure Impacts Southern Expansion	
Trip Expenditures	Mode	Resident Spenders (\$)	Nonresident Spenders (\$)
Private Transportation	Tournament	2,670	141
	Private	1,412	105
Food	Tournament	1,232	65
	Private	2,935	381
Lodging	Tournament	20,541	1,081
	Private	61,759	292
Public Transportation	Tournament	-	-
	Private	-	443
Boat Fuel	Tournament	-	-
	Private	4,984	247
Tournament Entry Fee	Tournament	20,541	1,081
Access/Boat Launching	Tournament	1,232	65
	Private	1,178	40
Equipment Rental	Tournament	-	-
	Private	-	120
Bait	Tournament	3,903	205
	Private	2,311	87
Ice	Tournament	1,232	65
	Private	497	29
Total	Tournament	61,623	3,243
	Private	75,077	1,746

9.2 percent of fishing impacted = \$141,690

The total annual impact to recreational fishing expenditures of the Southern Option Boundary in 2006 is estimated to be \$141,690. This estimate was calculated using the same methodology as described above for total estimated expenditures, with the addition of multiplying each of the itemized expenditures for mode and resident status by the percent of fishing impacted.

Summary of Economic Analyses of Private Boat Recreational Fishing in the Proposed GRNMS Research Area:

It is estimated that the economic impact of a research area on Georgia private boat based recreational fishing may be between 0.11% and 0.86% of statewide saltwater fishing expenditures. This is considered to the maximum potential loss.

Table 6: Summary of Economic Analyses of Private Boat Recreational Fishing in the Proposed GRNMS Research Area

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	\$1,030,476	0.18%	0.86%
2	1	12.4%	582	\$190,638	0.03%	0.16%
2	2	12.2%	574	\$188,062	0.03%	0.16%
2	3	8.8%	413	\$135,250	0.02%	0.11%
2	4	8.7%	409	\$133,962	0.02%	0.11%
2	<i>Average</i>	<i>10.5%</i>	<i>495</i>	<i>\$161,978</i>	<i>0.025%</i>	<i>0.135%</i>
3	1	35.9%	1,687	\$552,593	0.10%	0.46%
3	2	34.6%	1,624	\$531,983	0.10%	0.45%
3	<i>Average</i>	<i>35.3%</i>	<i>1,656</i>	<i>\$542,288</i>	<i>0.10%</i>	<i>0.455%</i>
4	1	6.7%	315	\$103,048	0.02%	0.09%
5	1	14.5%	680	\$222,840	0.04%	0.19%
Southern Option Boundary	-	9.2%	432	\$141,690	0.03%	0.12%

Economic Analysis of Charter Boat Based Recreational Fishing in the Proposed GRNMS Research Area 2008

In 2002, a survey of charter fishing boat owners/operators was completed. This survey identified 15 charter boats that utilize GRNMS as one of their fishing locations. It was estimated that their 2001 total gross revenue was \$1,029,000 and their total operating expense was \$582,000 with total profit of \$447,000. Converting these values to 2008 dollars using the consumer price index results in gross revenue of \$1,251,264, total operating expenses of \$707,712, and total profit of \$543,552. The survey found that approximately 40 percent of their fishing activity took place in GRNMS, thus the analysis below is based on gross revenue of \$500,506, and total profit of \$217,421.

Economic impact by proposed alternative can be estimated by combining results from the 2002 survey with boat location analysis completed in 2008. This produces the following results, which are summarized in Table X below. The Southern Option Boundary (preferred) impacts 9.2 percent of recreational fishing resulting in impacts of \$46K to total gross revenue and \$20K to total profit. The Optimal Scientific Boundary Option impacts 67 percent of recreational fishing resulting in impacts of \$335K to total gross revenue and \$146K to total profit. The Minimal User Displacement Option Boundary impacts 10.5 percent of recreational fishing resulting in impacts of \$75K to total gross revenue and \$32K to total profit. Compromise Boundary Option impacts 35.3 percent of recreational fishing resulting in impacts of \$177K to total gross revenue and \$77K to total profit.

This analysis assumes that all economic value associated with the area closed is 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.

Table 7: Estimated Economic Impacts to Recreational Charter Fishing Businesses by Alternative, 2008 \$

Alternative	Percent Impact	Total Impact to Gross Revenue (\$)	Total Impact to Profit (\$)
No Action	0%	-	-
Southern Option Boundary (preferred alternative)	9.2%	46,047	20,003
Optimal Scientific Option Boundary	67%	335,339	145,672
Minimal User Displacement Option Boundary	10.5%	52,553	22,829
Compromise Option Boundary	35.3%	176,679	76,097

Summary of Total Economic Impacts to Fishing by Boundary Alternative

The impact to charter fishing gross revenue is considered to be equivalent to charter fishing customer expenditure. This assumption allows for combining the charter fishing economic analysis with the private boat fishing analysis for an overall look at the economic impact of the various alternatives. The economic impact estimate equates to an economic loss.

Table 8: Summary of Total Economic Impact to Fishing by Boundary

Alternative	Impact (loss) to GRNMS private boat and tournament recreational fishing expenditures (\$)	Impact from GRNMS charter customer expenditures (\$)	Total Economic Impact (loss) (\$)
No Action	-	-	-
Southern Option Boundary (preferred alternative)	141,690	46,047	187,737
Optimal Scientific Option Boundary	1,030,476	335,339	1,365,815
Minimal User Displacement Option Boundary	161,978*	52,553	214,531
Compromise Option Boundary	542,288**	176,679	718,967

*Average of 4 boundary considerations in option (see Figure 24. Summary of Economic Analyses of Private Boat Fishing above)

**Average of 2 boundary considerations in option (see Figure 24. Summary of Economic Analyses of Private Boat Fishing above)

Table 9: Summary of Total Economic Impact (loss) to Fishing by Boundary and Fishing Alternatives

Fishing Alternative	Southern Option Boundary	Optimal Scientific Option Boundary	Minimal User Displacement Option Boundary	Compromise Option Boundary
Prohibit all fishing	\$187,737	\$1,365,815	\$214,531	\$718,967
Allow fishing for pelagic species*	\$141,690	\$1,030,476	\$161,978	\$542,288
Allow fishing for pelagic species during tournament**	\$64,866	\$471,759	\$74,155	\$248,263

*Assumes participants are private and tournament fishermen only; no charter fishing

**Assumes participants are tournament fishermen only (average of only tournament impacts from each of the boundary option tables); no private or charter fishing