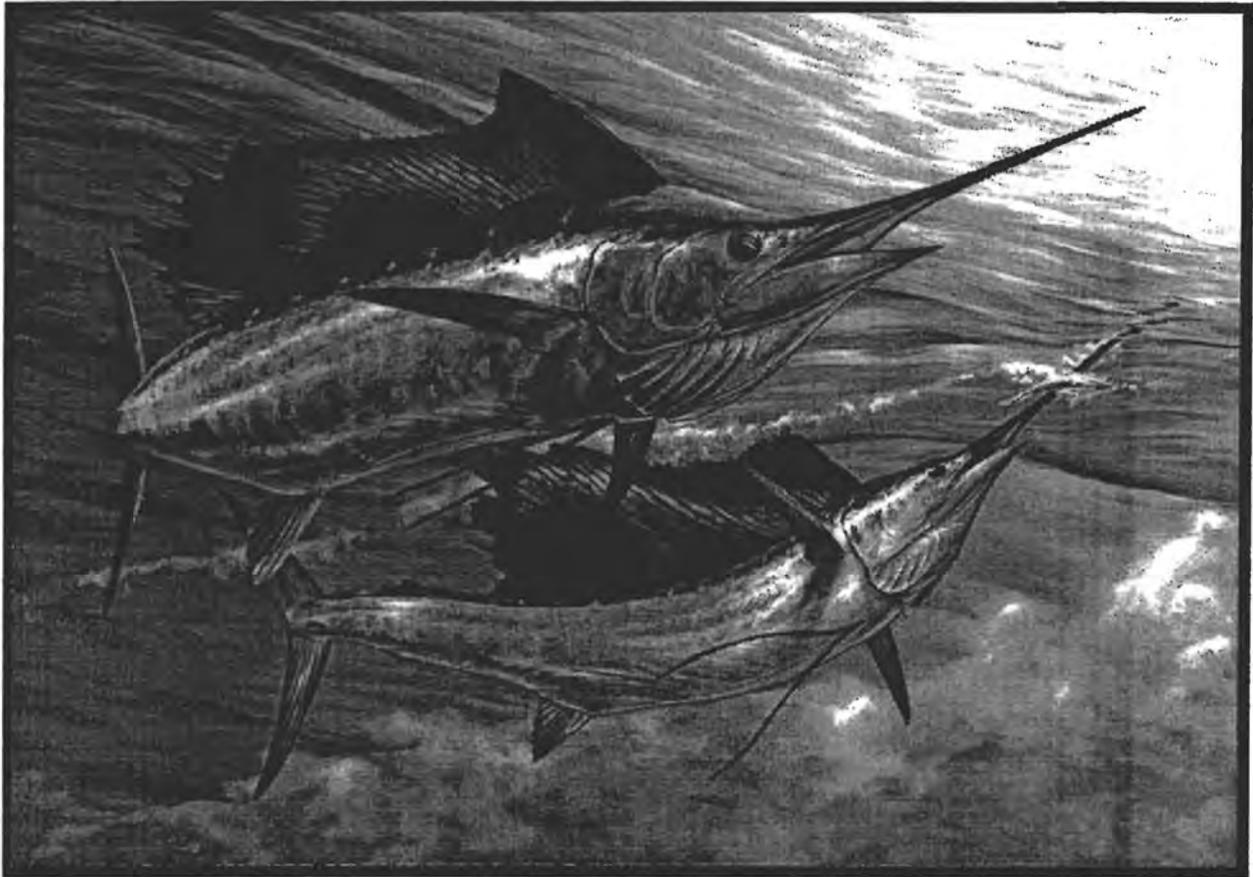


Survey of Marine Recreational Fisheries Stampholders in South Carolina, 1996



Data Report Number 28

**prepared by
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INTRODUCTION

Modern fisheries management is primarily the management of fishermen rather than of fish. This approach recognizes that fishing is significantly influenced by economic, social, legal, and political factors, in addition to biological, resource-related elements.

The need for public involvement in the management process is obvious. Commercial fishermen, while all wanting to make money, often do so using different gears and methods. Recreational anglers have various ambitions. Some want to catch the biggest fish, others the most, still others an exotic species or perhaps just in exotic surroundings. Many people are mainly interested in catching something to eat. There are also people who are not interested in catching fish for any purpose, but want to view them in their natural surroundings (such as divers).

Managers should obtain opinions of a representative cross-section of the fishing public, so that each group's needs and desires are recognized. To promote credibility and facilitate analysis, it is important to receive such input as data. Information is most useful in the form of "hard numbers" that can be used in statistical evaluations, such as those that compare the responses of one group to those of another.

For example, the ability to retain fish is a fundamental aspect of recreational fishing. The size, number, and kind of fish caught are important to many anglers, though to different degrees. Some anglers attach greater importance to consuming their catch than do others. The percentage of anglers in each category can be assigned and orders of preference determined.

Catch retention is a function of the size of the fish (minimum/maximum size limits), number (daily bag limit), date of capture (season closure), location of capture (area closure), and the type (designated species, e.g. game fish or protected). Managers therefore need to evaluate fishermen's responses to catch controls that are context-specific, in addition to reactions to generalized concepts.

The use of opinion polls for public involvement in resource management is an accepted concept recently employed by the South Carolina Department of Natural Resources (DNR). The practicality of this

approach is determined by the ability to define the appropriate population to be surveyed. The Recreational Fisheries Conservation and Management Act (effective July, 1992) provided a suitable mechanism for that purpose, the marine recreational fisheries stamp required of individuals gathering shellfish or fishing from privately owned boats.

METHODS

There were 75,262 resident South Carolina stampholders on file as of November, 1995 (Table 1). A survey package was mailed in April, 1996 to a randomly selected sample of 9,858. The percentage by county in the sample was identical to that in the overall stampholder population. After adjustment for non-deliverables, the effective mailout was 8,836 units. The overall return rate was approximately 25%.

The survey package consisted of an introductory statement, questionnaire (Appendix I), and return-addressed, postage-paid envelope mailed first class. The questionnaire had four sections. The first solicited demographic information needed to categorize the respondent, a market segmentation approach. The second section requested information on marine fishing experience and interest in order to further classify the respondent. The third section sought views on generic types of fisheries management. The fourth section had a context-specific approach and offered definitive scenarios of alternative catch controls for priority inshore species of recreational importance. Respondents were asked to rank these in order of preference.

The population of respondents was divided into coastal and noncoastal segments (Fig. 1). Residential categories were composed of counties as follows:



Figure 1. Residence categories.

Table 1. Resident South Carolina stampholders, November 1995.

County	Number	% of total	Mailout	Non-del.	Total
Abbeville	42	< 0.1	6	0	6
Aiken	1,698	1.8	222	5	217
Allendale	322	0.3	42	4	38
Anderson	500	0.5	66	4	62
Bamberg	552	0.6	72	9	63
Barnwell	881	0.9	115	8	107
Beaufort	7,114	7.5	932	144	788
Berkeley	6,820	7.2	893	104	789
Calhoun	431	0.5	56	1	55
Charleston	16,786	17.8	2,199	215	1,984
Cherokee	178	0.2	23	1	22
Chester	138	0.1	18	0	18
Chesterfield	374	0.4	49	2	47
Clarendon	519	0.6	68	6	62
Colleton	2,272	2.4	298	42	256
Darlington	1,395	1.5	183	27	156
Dillon	674	0.7	88	7	81
Dorchester	2,504	2.7	328	28	300
Edgefield	121	0.1	16	2	14
Fairfield	134	0.1	18	1	17
Florence	2,582	2.7	338	40	298
Georgetown	4,858	5.2	636	63	573
Greenville	1,546	1.6	203	17	186
Greenwood	214	0.2	28	2	26
Hampton	1,012	1.1	133	7	126
Horry	7,533	8.0	987	126	861
Jasper	925	1.0	121	6	115
Kershaw	399	0.4	52	3	49
Lancaster	209	0.2	27	6	21
Laurens	193	0.2	25	2	23
Lee	152	0.2	20	3	17
Lexington	2,751	2.9	360	23	337
McCormick	27	< 0.1	4	2	2
Marion	522	0.6	68	13	55
Marlboro	193	0.2	25	2	23
Newberry	237	0.3	31	0	31
Oconee	207	0.2	27	3	24
Orangeburg	1,314	1.4	172	12	160
Pickens	296	0.3	39	6	33
Richland	2,543	2.7	333	33	300
Saluda	112	0.1	15	1	14
Spartanburg	900	1.0	118	12	106
Sumter	661	0.7	87	5	82
Union	69	0.1	9	0	9
Williamsburg	686	0.7	90	2	88
York	726	0.8	95	6	89
Unknown	940	-	123	17	106
Total	75,262		9,858	1,022	8,836

South Coast	Central Coast	North Coast	Non-coastal
Allendale	Berkeley	Dillon	Other
Bamberg	Charleston	Florence	
Beaufort	Clarendon	Georgetown	
Colleton	Dorchester	Horry	
Hampton	Orangeburg	Marion	
Jasper		Williamsburg	

The sample distribution was as follows:

	South Coast	Central Coast	North Coast	Non-coastal	All
Total population	12,197	27,943	16,855	18,267	75,262
Adjusted mailout	1,386	3,295	1,956	2,199	8,836
Respondents	375	884	454	546	2,259
Percentage	27.1	26.8	23.2	24.8	25.5
Percent of sample	16.6	39.1	20.0	24.2	
Percent of population	16.2	37.1	22.4	24.3	

Since the distribution of the sample closely approximated that of the total population, no adjustments for geographic size differences were necessary when using data from several areas.

RESULTS

Section 1- Demographic characteristics

Residency history

The residency history of respondents by county group is shown in Fig. 2. There were appreciable differences. The Central Coast was the only area where the majority (63%) of the respondents indicated a predominantly urban background. Nearly 72% of the South Coast respondents had predominantly rural histories, while there was roughly an even split in the other areas. Most respondents were long-term residents of South Carolina with the average length of in-state occupancy exceeding 30 years in every area.

Age and gender distribution

Age distribution of respondents is illustrated in Fig. 3. There was very little difference between areas. The 41-50 year old group dominated with the average age being either 45 or 46 in each area. The

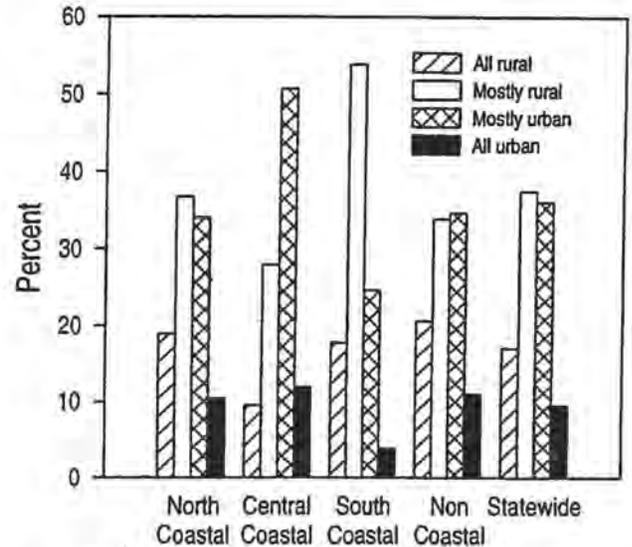


Figure 2. Residency history of respondents.

majority (88%) of the respondents were male.

Section 2- Marine fishing experience and interests

Marine fishing experience

The profile of the respondent population is shown in Fig. 4. Commensurate with their age, most respondents were experienced marine anglers with a statewide average of 25 years individual experience. There was little difference in this characteristic between residence areas, although noncoastal respondents tended to have slightly less experience.

Average annual effort

Average numbers of days fished/year by residence category are indicated in Fig. 5. There was little difference in annual fishing effort among coastal respondents. Roughly half of the noncoastal respondents expended ten days or less per year and the percentage of these residents fishing >35 days was much lower than in the coastal areas.

Tournament participation

Regardless of their location, the vast majority of respondents (82% statewide) did not participate in marine fishing tournaments. Participation rates were slightly higher in the Central and South Coast areas than elsewhere. Statewide, 14% of the respondents indicated that they fished in 1-2 contests per year with <5% participating in more than that.

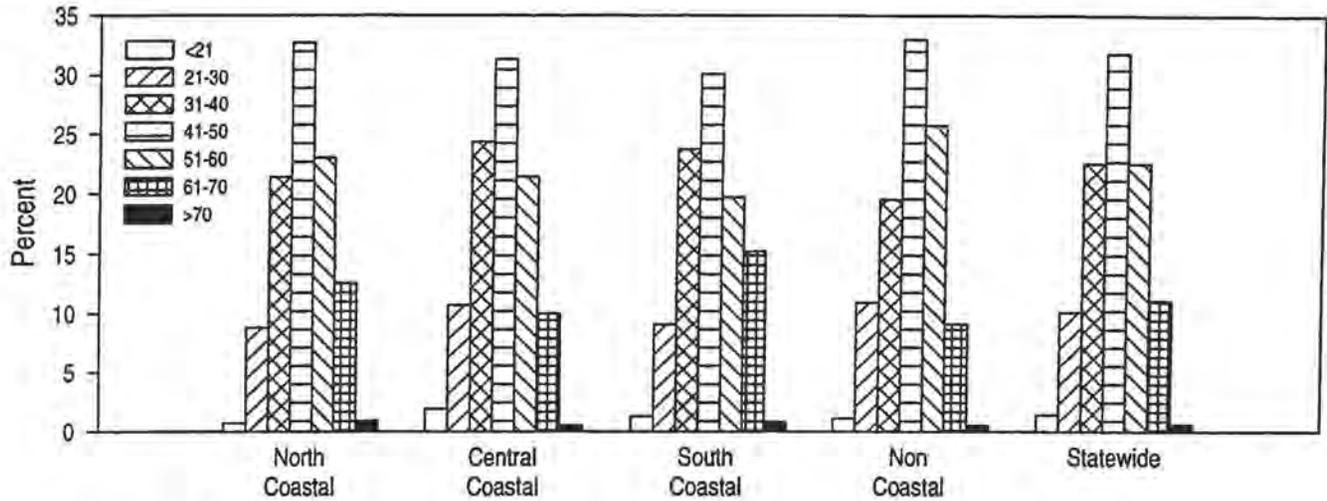


Figure 3. Age distribution of respondents.

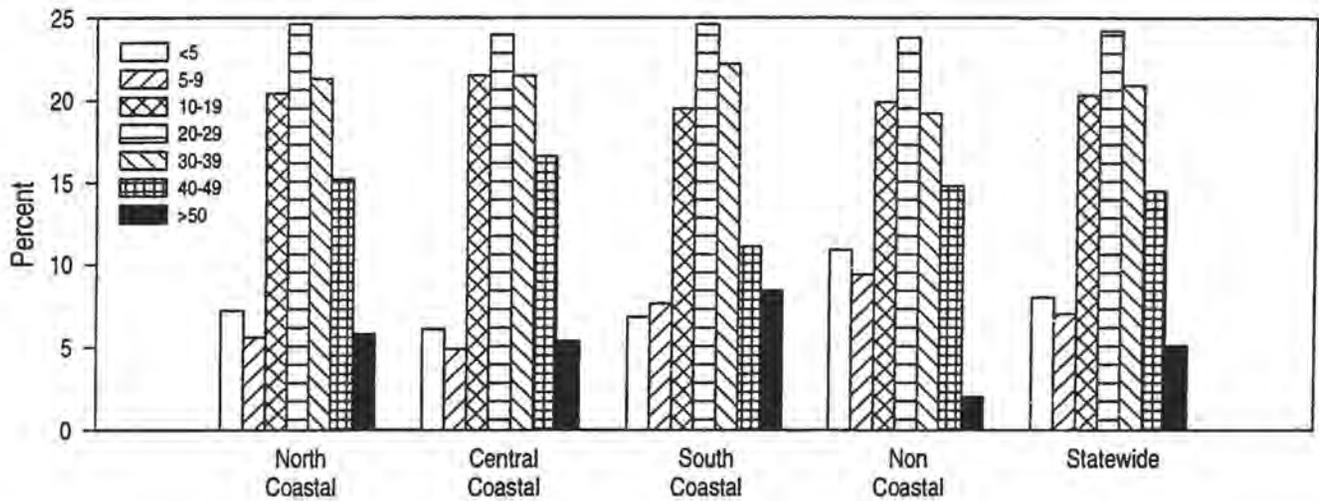


Figure 4. Marine fishing experience (years) of respondents.

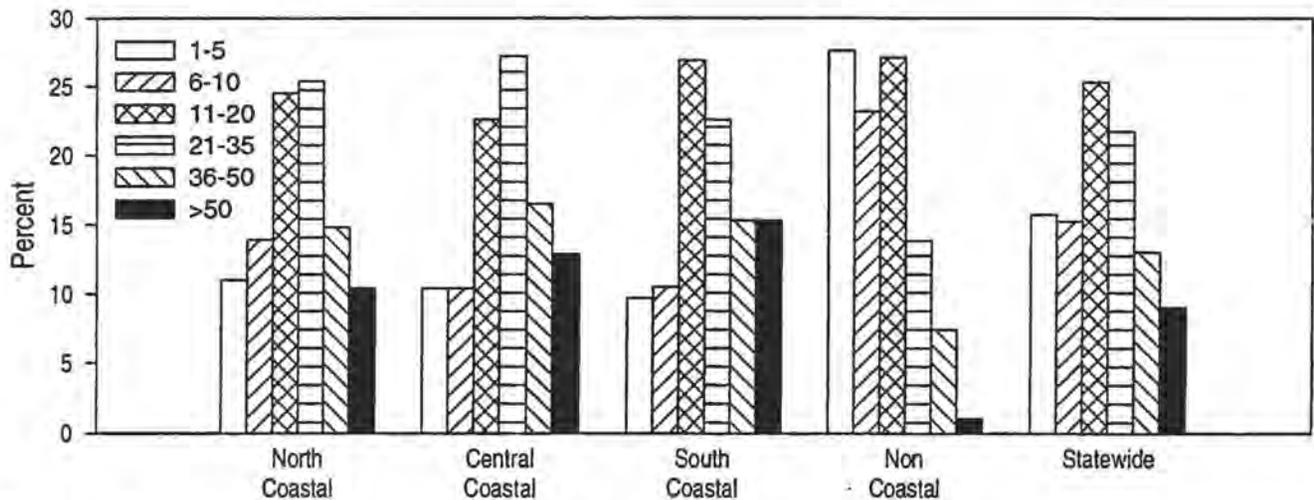


Figure 5. Yearly effort (days fished) of respondents.

Organization membership

Nine percent of the respondents statewide stated that they belonged to a marine fishing club or organization. Membership levels were highest in the Central Coast (12.1%) and North Coast (10.6%) areas.

Subscription rates

There are a fairly large number of national and regional publications devoted to marine recreational fishing, although there is no widely circulated one of local origin. Statewide, about 26% of the survey population indicated that they subscribed to at least one salt water fishing publication with the highest positive rate in the Central Coast area (31%). At least 20% of the respondents in each area reported getting at least one publication.

Section 3- Opinions on generic management measures

Regulatory authority

Respondents were first asked to express their preference as to the extent of regulatory authority that should be vested in the DNR. Under the current legislative system, most fishery laws are statutes enacted by the General Assembly and cannot be modified by the DNR. An alternative would be to grant the DNR the authority to set seasons, size limits, bag limits, and gear restrictions. Responses were as follows:

	South Coast	Central Coast	North Coast	Non-coastal
Retain legislative control	25.6%	26.1%	22.6%	17.9%
Grant regulatory authority to DNR	52.5%	54.2%	55.1%	63.6%
Undecided/no opinion	21.9%	19.7%	22.3%	18.5%

The statewide results are shown in Fig. 6 with respondents preferring DNR control by more than a 2:1 margin over legislative control.

Types of catch controls

Respondents were asked to indicate their relative level of support for four generic types of catch controls. Responses were ranked from 5 to 1 in order of descending level of support (i.e., 1 equalled least support). The values shown below were the average

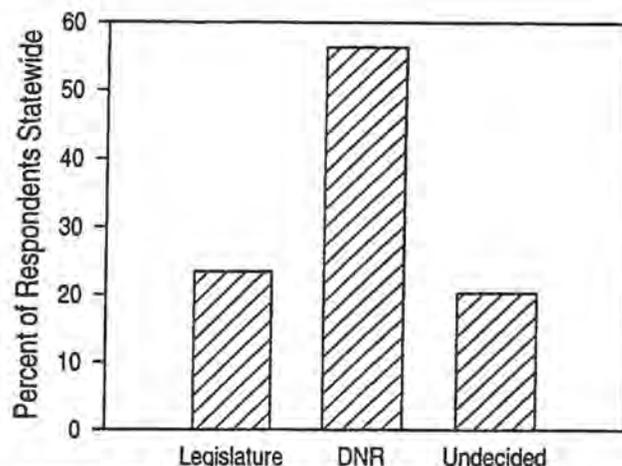


Figure 6. Preference for regulatory authority.

rankings for each category.

	South Coast	Central Coast	North Coast	Non-coastal
Catch control				
Bag limit	4.48	4.57	4.41	4.47
Size limits	4.40	4.58	4.39	4.39
Restricted areas	3.60	3.77	3.75	3.64
Closed seasons	3.51	3.57	3.51	3.60

With 3.00 the neutral point, all measures received positive support ratings in all residential categories, generally with the same order of ranking within each area. Fig. 7 illustrates the statewide results. The two currently used forms of control, i.e., bag and size limits, received the most support.

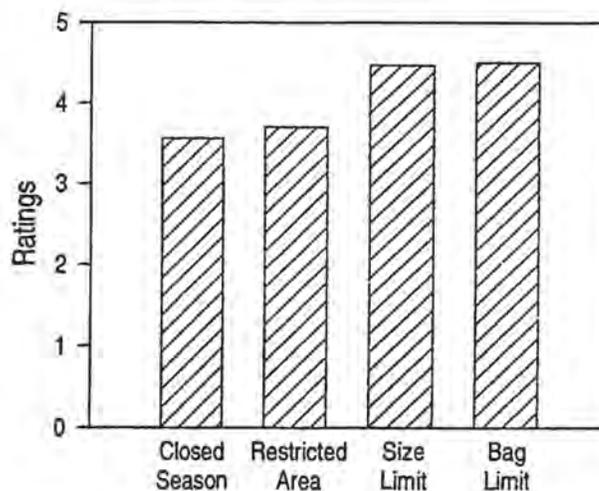


Figure 7. Preference ratings of catch controls. (1=least preferred, 5=most preferred)

Motivation factors

The next aspect evaluated was the relative contribution of various factors to the fishing experience with four options available (not important - 1, mildly important - 2, moderately important - 3, and very important - 4). The values shown are averages for the respective categories:

Factor	South Coast	Central Coast	North Coast	Non-coastal
Catching fish to eat	2.92	2.83	3.00	2.90
Catch and release	2.63	2.82	2.66	2.63
Type of fish caught	2.68	2.65	2.84	2.70
Catching large fish	2.61	2.62	2.75	2.79
Catching lots of fish	2.10	2.14	2.20	2.25
Catching trophy fish	1.83	1.88	1.99	2.05

Catching fish for consumption was the most important objective in each residential category. Closely ranked in relative importance in most areas were catch and release, type caught, and catching large fish. Catching lots of fish was fairly unimportant, ranking fifth in all areas. Trophy catches apparently meant little to most anglers and were the least important aspect in each area. The relative status of statewide responses is shown in Fig. 8.

Size and bag limits

Since size and bag limits have been the two major controls used to date in state waters, the next question sought to determine the level of preference for each. Although most respondents made a selection, an appreciable number indicated no preference. Results

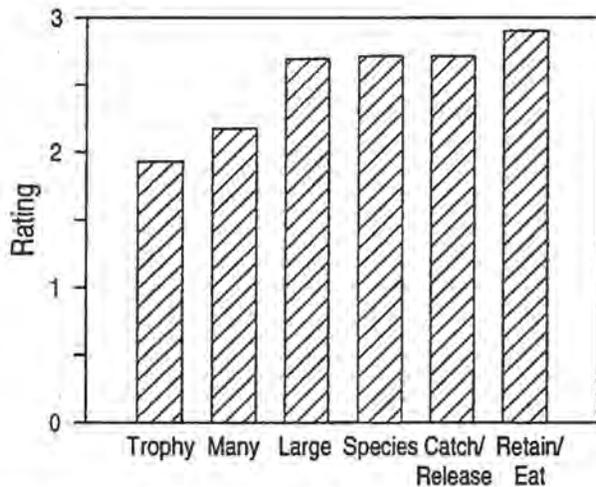


Figure 8. Preferred catch characteristics. (1=not important, 4=very important)

were as follows in percentages of respondents who did make a choice:

Control type	South Coast	Central Coast	North Coast	Non-coastal	All
Minimum size limit	49.6	46.8	59.0	50.8	50.8
Bag limit	50.4	53.2	41.0	49.2	49.2

With the exception of the North Coast respondents, there was no clear preference.

When offered the choice of combinations of these controls, a preference was more obvious:

Control type	South Coast	Central Coast	North Coast	Non-coastal	All
Larger size limit with higher bag limit (%)	69.2	64.1	73.0	69.9	68.2
Smaller size limit with lower bag limit (%)	30.8	35.9	27.0	30.1	31.8

Most catch controls in effect in South Carolina combine size and bag limits. The sample population clearly preferred a larger minimum size limit with more fish allowed in a generalized situation.

Allowable gear

This question asked, "Should hook and line be the only allowable recreational gear for catching fish (except cast netting for bait)?" Responses were as follows:

Residence category	% Yes	% No	% Undecided
South Coast	60.1	30.2	9.7
Central Coast	63.1	28.3	8.6
North Coast	65.4	25.8	8.8
Noncoastal	67.1	23.0	9.9
All	64.0	26.9	9.1

The indication is that a substantial majority of the respondents favor the elimination of non hook-and-line gear, such as gill nets, seines, and gigs. A more accurate interpretation may be that the constituency is simply against the use of gill nets. The recent media attention has focused on this gear and many anglers may either have been unaware of the gig fishery or just

overlooked it: some respondents specifically indicated their desire to exempt gigging as a prohibited category. Responses to the later questions on flounder appear to indicate substantial support for the retention of gigging as a legal activity.

Sale of fish

This question was motivated primarily by the interstate differences of opinion regarding sale of species covered by the regional snapper/ grouper management plan. Some states (e.g. Georgia) favor allowing recreational anglers to sell fish taken subject to bag limits if they have the proper state permits (in South Carolina, a land and sell license). Opposition is based on a number of factors, including philosophical views about what constitutes "recreational harvest" and pragmatic concerns about public health, quality control, marketing, and quota monitoring.

There was roughly a 2 to 1 majority in favor of no sale with relatively minor differences between residence areas:

Residence category	% Yes	% No	% Undecided
North Coast	29.0	60.7	10.3
Central Coast	31.7	59.0	9.3
South Coast	25.8	63.3	10.9
Noncoastal	26.8	65.5	7.7
All	29.0	61.6	9.4

Most respondents fish primarily in inland waters and presumably were thinking mainly of inshore species. Some anglers noted that they thought sale of offshore species (e.g. dolphin, tuna, king mackerel, and bottomfish) should be permissible, since all are recognized commercial products.

Trends in abundance

Respondents were asked for their opinion on stock status of popular inshore species during the last five years. Options were "increasing" (rank = 3), "decreasing" (1), "not much change" (2), or "don't know" (0). The numbers of observations for each option were multiplied by the appropriate rank value and these figures divided by the numbers of observations to derive relative indices of abundance.

The implicit assumption is that residents of an area did most of their fishing for the species in that area,

so it can be inferred that the relative abundance ratings refer to the areas indicated. Since their evaluations could not be assigned to specific areas, the results for noncoastal residents were included in the "all" category only. Respondents were most inclined to comment on the status of red drum (the most targeted species) and least forthcoming on sheepshead (the least popular of the four).

Results are shown graphically for red drum (Fig.9), spotted seatrout (Fig. 10), flounders (Fig. 11), and sheepshead (Fig. 12). Results of the ranking procedure are summarized below. In their interpretation, a value of 2.00 is equivalent to a stable situation (i.e., no change). An index >2 implies an upward or increasing trend in stock status, while a figure <2 indicates a decline.

Species	South Coast	Central Coast	North Coast	All
Red drum	2.30	2.27	1.97	2.15
Sheepshead	2.11	1.95	1.74	1.91
Spotted seatrout	1.84	1.82	1.65	1.77
Flounders	1.82	1.64	1.75	1.69

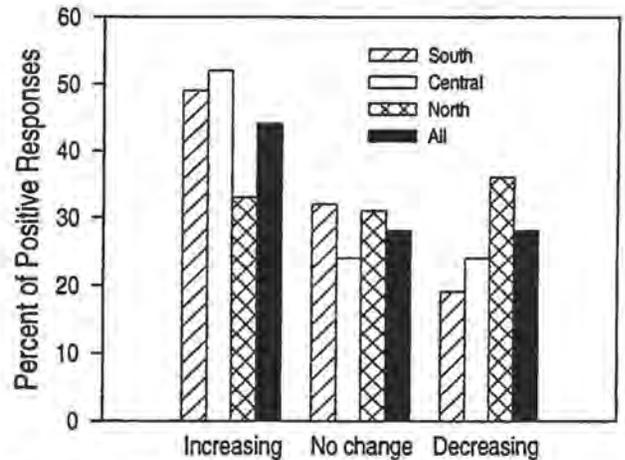


Figure 9. Perceived status of red drum.

Indices for all species were generally lowest in the North Coast area and highest for the South Coast. Distribution of responses by abundance category tended to be fairly consistent between areas for most species. Relatively small percentages of respondents in each residence category indicated "increasing" for spotted seatrout, flounders, and sheepshead. For spotted seatrout and flounders, those choosing "no change" and "decreasing" were about evenly divided. About

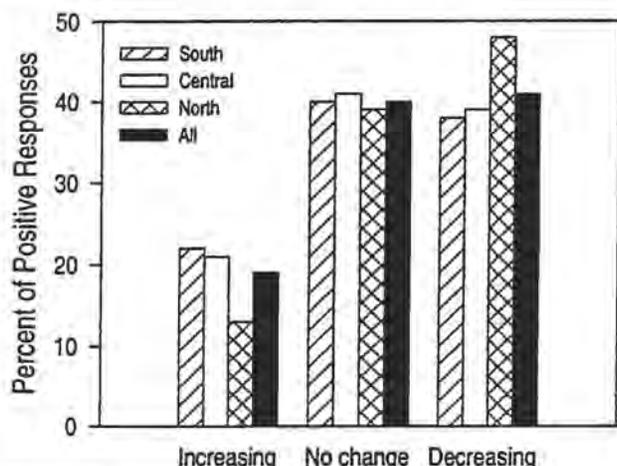


Figure 10. Perceived status of spotted seatrout.

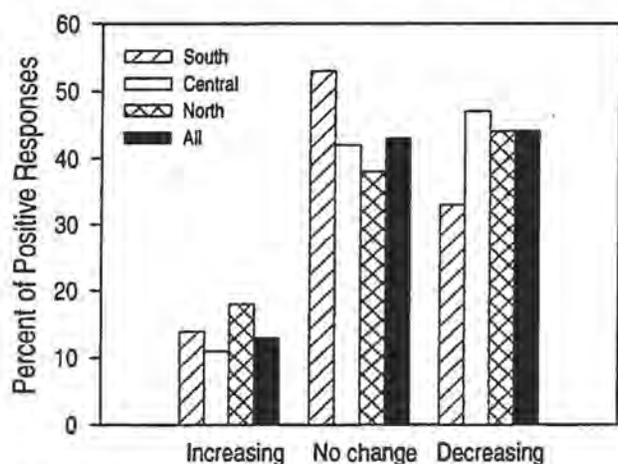


Figure 11. Perceived status of flounders.

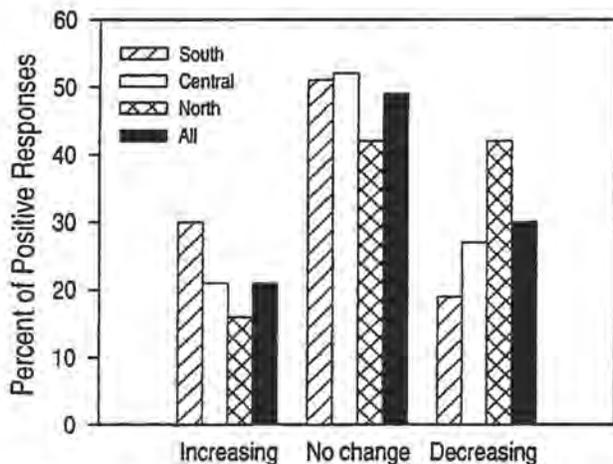


Figure 12. Perceived status of sheepshead.

half of the respondents offering an opinion on sheepshead selected "no change."

Red drum was the only species receiving an overall assessment of increasing abundance. The overall status of sheepshead was essentially one of no change, while declines appeared to be the dominant impressions for spotted seatrout and flounders. Statewide, 41% of the respondents indicated that they thought spotted seatrout stocks were decreasing and 44% selected this description for flounders

Section 4- Specific management options

The final series of questions dealing with finfish offered specific regulatory scenarios for consideration.

Red drum

This species is regulated under plans developed by the Atlantic States Marine Fisheries Commission (ASMFC) for state waters and the South Atlantic Fishery Management Council (SAFMC) for federal waters. The latter prohibits retention of any red drum caught in ocean waters >3 miles offshore. The ASMFC plan allows two options:

- 1) an 18 inch TL minimum/27 inch TL maximum size limit and 5-fish bag limit that can include one fish >27 inches
- 2) a 14 inch minimum/27 inch maximum size limit and 5-fish bag limit with no oversize exemption

Nearly all of the northern states adopted the first option, while South Carolina and Georgia selected the second.

The recent abundance of large red drum has led to requests to reconsider the current South Carolina regulation. The poll gave respondents three options, two of which would allow retention of one large red drum:

- 1) 14-27 inches with 5 fish, 0 exemption (the current regulation, ASMFC option 2)
- 2) 18-27 inches, 5 fish with 1 >27 inches (ASMFC option 1)
- 3) 14-27 inches, 4 fish with 1 >27 inches

Results were as follows with the percentages shown

being those of the respondents who selected the indicated option as their first or only choice:

Option	South Coast	Central Coast	North Coast	Non-coastal
14-27 inches, 5 fish, 0 >27	53.0	42.0	40.0	33.5
14-27 inches, 4 fish, 1 >27	31.4	34.6	35.0	32.3
18-27 inches, 5 fish, 1 >27	15.6	23.4	25.0	34.2

The statewide results are illustrated in Fig. 13.

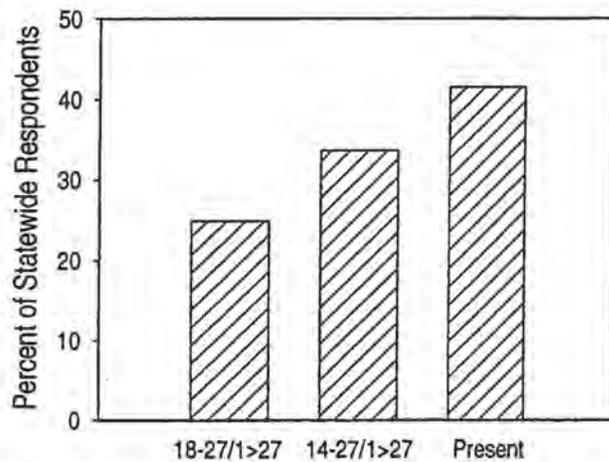


Figure 13. Preferences for red drum limits.

Results were also calculated as rank indices based on the procedure described above. The neutral point is 2.0 with a higher value indicating more support and a lower figure less support.

The rank indices were distributed as summarized below.

Option	South Coast	Central Coast	North Coast	Non-coastal	All
14/27, 5 fish, 0 >27	2.42	2.27	2.21	2.18	2.27
14/27, 4 fish, 1 >27	2.22	2.28	2.29	2.26	2.27
18/27, 5 fish, 1 >27	1.70	1.88	1.97	2.06	1.91

The statewide (all) index values can be derived in several ways with all producing a virtual tie between the two 14 inch minimum size measures. The provision

with an 18 inch minimum size limit was clearly the least preferred.

Spotted seatrout

Respondents were asked to indicate their preferences for the following options: 1) 12 inches minimum size with 9 fish bag limit, 2) 13 inches with 10 fish, and 3) 14 inches with 15 fish. First or only choice percentages were as follows.

Option	South Coast	Central Coast	North Coast	Non-coastal
12 inches/9 fish	42.0	46.2	42.4	37.0
13 inches/10 fish	26.2	27.5	31.1	33.2
14 inches/15 fish	31.8	26.3	26.5	29.8

Distribution of rank indices is shown below.

Option	South Coast	Central Coast	North Coast	Non-coastal
12 inches/9 fish	2.33	2.36	2.36	2.26
13 inches/10 fish	2.31	2.37	2.45	2.50
14 inches/15 fish	2.04	1.91	2.03	2.05

Most respondents indicated their preferences in a direct progression, e.g. 12/9 - first choice, 13/10 second choice, and 14/15 last choice (or the reverse order). The statewide results are shown in Fig. 14. Although the 13 inch/10 fish option was the intermediate preference in one-on-one selection, it received the highest overall rating in a grouped selection process, because of relatively few strongly negative evaluations.

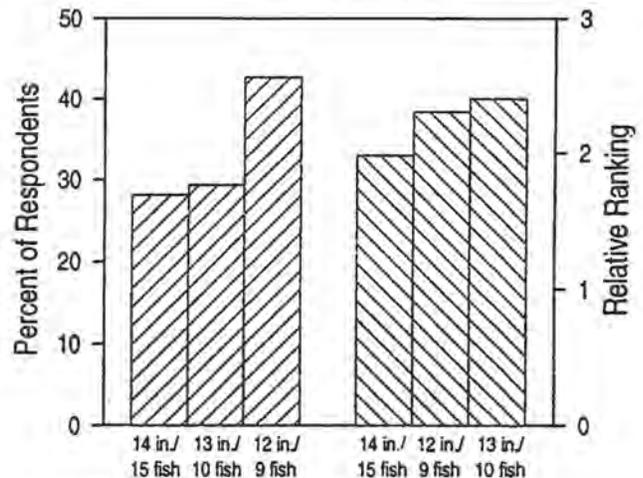


Figure 14. Preferences for spotted seatrout limits. Left side - percent of respondents statewide with option as first choice. Right side - relative ranking

Flounders

South Carolina's current regulations are a 12 inch TL minimum size limit and 20 fish bag limit for all gears. The options offered were based on the presumption that the minimum size limit would remain at 12 inches. This measure applies in most other southern states with flounder regulations and is appropriate for the reproductive biology of southern flounder (the dominant species in our landings).

The most probable near-term change would be a reduction in the bag limit. Several Gulf states have recently adopted a 10 fish limit and the current Florida regulation is 12 inches/10 fish. Respondents were given three options: 1) 12 inch minimum size for hook and line, no minimum size for gigging, 10 fish bag limit; 2) 12 inch minimum size for all gears with 10 fish bag limit; and 3) 12 inch minimum size and 10 fish bag limit with hook and line only allowed.

Results were as shown below. The percentages are for those respondents who selected the indicated option as their first or only choice.

Option	South Coast	Central Coast	North Coast	Non-coastal	All
12 H&L, 0 Gig/10 fish	33.3	28.6	26.5	30.4	29.4
12 all gears/ 10 fish	49.9	47.8	45.3	42.3	46.4
12/10 fish, no gigging	16.8	23.6	28.2	27.3	24.3

Distribution of rank indices was as follows.

Option	South Coast	Central Coast	North Coast	Non-coastal	All
12 H&L, 0 Gig/10 fish	2.19	2.11	2.05	2.09	2.11
12 all gears/ 10 fish	2.55	2.53	2.55	2.47	2.51
12/10 fish, no gigging	1.56	1.71	1.87	1.82	1.74

The option with the prohibition on gigging was the least popular in all areas and received a particularly low rating by South Coast residents. The majority of the respondents preferred to retain gigging. The most popular option was the 12 inch minimum size limit and 10 fish bag limit for all gears. Less than a

third of the respondents supported elimination of the size limit for gigging (i.e., as their first choice).

Sheepshead

There currently are no catch controls on this species in South Carolina, nor is it included in any regional management measures. Florida has a 12 inch TL minimum size limit and 10 fish bag limit. Respondents were presented with three options: 1) no minimum size limit with 10 fish bag limit, 2) 10 inch TL minimum size and 15 fish bag limit, and 3) 12 inch TL minimum size and 20 fish bag limit.

The respondents' opinions are summarized as follows. The distribution of first preferences (in percentages) was as shown below.

Option	South Coast	Central Coast	North Coast	Non-coastal	All
0 size/ 10 fish	41.4	39.7	38.8	34.9	38.7
10 inches/ 15 fish	37.6	39.7	35.5	39.2	38.4
12 inches/ 20 fish	21.0	20.6	25.7	25.9	22.9

Preferences as measured in ratings were as follows:

Option	South Coast	Central Coast	North Coast	Non-coastal
0 size/10 fish	2.08	2.06	2.08	2.00
10 inches/15 fish	2.43	2.45	2.39	2.44
12 inches/20 fish	1.81	1.82	1.94	1.96

The first two options received nearly the same numbers of first preference selections. The 10 inch/15 fish measure had very few votes in the lowest support classification, while respondents tended to be either strongly supportive of or strongly opposed to the 0 minimum size provision. As a consequence, the intermediate measure (10 inch/15 fish) received the highest overall index value, as shown in Fig. 15.

Inshore bottomfish (spot, croaker, whiting)

In South Carolina, spot are perennially the most abundant species in the recreational catch. Although also common, croaker are small compared to their size range in the more northern states and much of the catch is released or discarded. Anglers tend to catch large numbers of both species when bottomfishing with

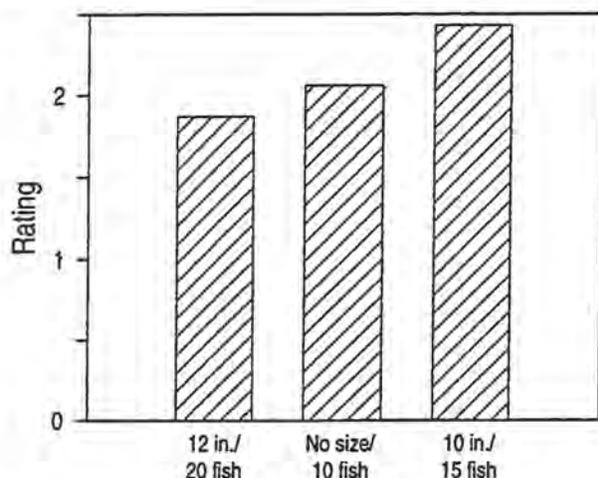


Figure 15. Preference ratings for sheepshead limits.

suitable techniques. The size range of whiting (kingfish) is more variable and they usually are taken in fewer numbers than the other species.

Given these characteristics, a simple catch control would probably be the most appropriate. Anglers often confuse spot and croaker, depleting the effectiveness of species-specific measures to some extent. Respondents were asked to choose between a minimum size limit only and a daily bag limit only. Results were very similar in all areas with 36% in favor of the minimum size and 64% supporting the bag limit.

Closed seasons and area-specific regulations

These questions referred specifically to the management of spotted seatrout. This species is vulnerable to winter kills and the rationale for a temporary closed season during spawning is to enhance spawning potential by protecting the brood stock that survived a cold winter. Responses to the season question were as follows.

	South Coast	Central Coast	North Coast	Non-coastal	All
Closed season					
Percent in favor	83.3	86.7	86.1	90.9	87.0
Percent opposed	7.4	6.5	4.1	2.9	5.3
Undecided	9.3	6.8	9.8	6.2	7.7

The area-specific option is based on the fact that spotted seatrout populations are restricted to limited areas with little or no intermixing and could therefore

be managed as discrete stock units in order to maximize benefits. Respondents replied as indicated below.

Area	South Coast	Central Coast	North Coast	Non-coastal	All
Percent in favor	56.6	55.3	52.6	58.3	55.7
Percent opposed	24.3	24.3	25.2	21.5	23.8
Undecided	19.1	20.4	22.2	20.2	20.5

DISCUSSION

Basic demographic characteristics of the sample population were very similar. With the exception of residency history (i.e., rural vs urban), there appeared to be very little difference in the parameters between residence categories. This has also been noted for shrimp baiting permit holders. Baiting permit holders comprise a subgroup of the fishing stampholder population, since about 78% also have a marine recreational fisheries stamp or equivalent.

The typical stampholder is a male between 40 and 55 years of age (average 46), a long-term (> 30 years) resident of this state, and an experienced (> 20 years) marine angler. By inference from baiting permit holder survey results, about 85% are members of households with 2-4 individuals. Most have moderate household incomes (70% in 1989 reported <\$50,000/year) and are employed in professional/technical, tradesman/manufacturing, and managerial/proprietor occupations.

Most stampholders (80%) own fishing boats. Roughly half might be classified as casual marine anglers (< 20 days fished/year) and relatively few participate in group activities such as tournaments (18%) and fishing clubs (10-15%). Roughly one-fourth (26%) subscribe to publications devoted to their sport.

A majority of the respondents in all areas indicated support for granting authority to the DNR to set seasons, size limits, bag limits, and gear restrictions. About one-fourth favored retention of the current legislative, statutory form of management and 20% were either undecided or had no opinion. The constituents therefore perceived of the more flexible, dynamic pro-

cess offered by such authorization as a positive change.

Of the generic types of catch controls most widely used in the management of marine recreational fisheries, the respondents preferred bag and size limits by substantial margins to restricted areas and closed seasons. This to some extent might have reflected familiarity, since size and bag limits (but not the other measures, to any extent) have been in effect in South Carolina since 1986. It is possible that the relative novelty of closed areas and seasons in local management conferred some negative bias among a constituency noted for its conservatism.

In a generalized setting, respondents in all areas except the North Coast showed no clear preference for minimum size vs bag limits with both measures receiving nearly equal support statewide. When these controls were combined in various options, the respondents opted for a larger minimum size limit/larger daily bag limit combination by a 2 to 1 margin. When confronted with species-specific, definitive regulatory scenarios, however, there was much less uniformity of opinion and results sometimes contradicted those from the generalized situation.

Before being asked to evaluate catch control options for individual species, the respondents were solicited for their appraisals of the recent stock status of each. Their consensus opinions were interesting when compared to the trends indicated by creel census data, media accounts, and anecdotal information.

The recovery of red drum since the early 1990's has been given wide recognition in regional stock assessments, the media, and by fishermen. This was the only species recognized by the respondents as increasing in abundance in the last five years. This evaluation concurred with that based on trends in total catch shown in Fig. 16. Catch data are from the Marine Recreational Fishery Statistics Survey or MRFSS conducted annually by the MRD and National Marine Fisheries Service. Trends in catch per unit of effort (CPUE) data (from the MRFSS and MRD creel census) also are upward, as shown in Fig. 17.

Sheepshead are not as popular a target species as the others listed and tend to be pursued by a specialized group of anglers. Respondents were much less inclined, as a result, to offer an opinion on the status

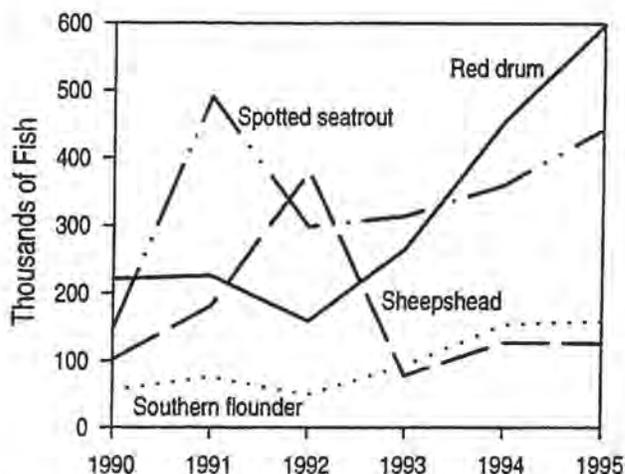


Figure 16. Trends in estimated catches.

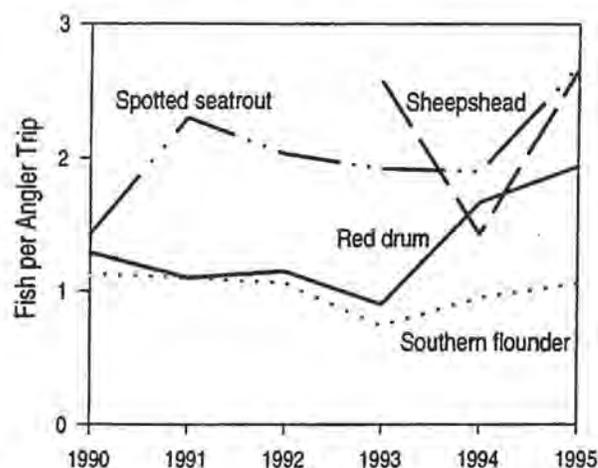


Figure 17. Trends in estimated CPUEs.

of this species. Those that did reach a consensus of not much change. The fishery-dependent data for sheepshead are less complete and less reliable than for the other species with no clear trend evident from those available.

Constituents were most inclined to a decreasing evaluation regarding the abundance of flounders, in spite of the apparent improvement reflected in estimated catches for recent years. The trend in CPUE is somewhat more consistent with their assessment, showing a slight decline.

Spotted seatrout presented a paradox. Responding anglers tended toward a negative evaluation with <20% of those statewide indicating a perceived increase in abundance, compared to 41% seeing a de-

cline. A moderate upward trend, however, is apparent in both the catch and CPUE data and anecdotal information from charterboat captains and anglers supports the impression of relatively high abundance in 1994/1995.

The abundance of large red drum has prompted requests to modify current regulations in order to permit limited retention (e.g. one per angler per day) of fish >27 inches. Many tournaments no longer include this species and some anglers have reported difficulty in obtaining certification for potential records without having the fish available for verification. The most recent Atlantic stock assessment indicated a strong recovery in progress with the spawning stock now well above the initial target level, but still well short of the ultimate objective.

MRD creel census data indicate that the smallest average size and highest CPUE for red drum consistently occur in the South Coast area. It therefore was not surprising that South Coast residents indicated the most support for the current regulation with its emphasis on maximum retention of small fish. Although this measure is satisfactory with most anglers statewide, the first preference of a majority (58.5%) would be an option that permits retention of one fish >27 inches. Of the two offered, the clear preference was for a 14-27 inch slot limit with one fish >27 inches permitted within a 4 fish bag limit. The ASMFC-sanctioned option with an 18 inch minimum size limit was much less popular. The operative element appeared to be the minimum size limit with South Carolina anglers obviously supportive of a 14 inch minimum regardless of bag limit provisions.

The responses of anglers vis-a-vis spotted seatrout catch controls were also somewhat contradictory. In a generalized context, there was a clear preference for a smaller minimum size and lower bag limit. Given specific choices, an intermediate (13 inch, 10 fish) option received the highest overall approval rating.

This may have reflected several factors. The 12 inch minimum size has been in effect since 1986 and some of its support may simply be attributable to familiarity. The creel census data have clearly shown that very few fishermen targeting this species catch more than five fish per trip on average, so the difference between 9 and 15 fish bag limits may well be

immaterial to many fishermen. A third contributory factor might be that the prevailing size range of retained fish has consistently been 12-14 inches regardless of year and area. Respondents may have realized that they would be allowed to retain significantly fewer fish with minimum size limits above 12 inches. Since respondents indicated that catching fish to eat was their most important motivation, the prospect of keeping substantially fewer future meals may have been a delectable one.

Despite the limited support for closed seasons as a generic measure, this option received strong support in the context of management of spotted seatrout. The underlying principle, protection of limited surviving brood stock from a winter kill, is the same as that routinely applied in the state's management of white shrimp. The supportive argument is straightforward and intuitively appealing to a conservative audience. This probably was a significant factor in the widespread support indicated for this option.

Support for area-specific regulations for spotted seatrout was much more restrained with a relatively high percentage of undecided respondents. A bare majority supported this concept and this presumably would decline in accordance with the NIMBY theory if specific applications were offered. Confusion and related enforcement problems were issues raised by some respondents. This approach also is not very compatible with the static, statutory type of management system currently in force in South Carolina.

Anglers have questioned the practicality of a minimum size limit for flounder taken by gigging, since it is frequently difficult to determine the length of the fish before striking and the survival rate of undersized fish is low. A related issue is whether gigging should be permitted, since some anglers view it as unsporting, and the practice is difficult to enforce. During shrimp baiting season, spatial competition between shrimpers and giggers is reputed to be a problem in some areas (particularly the South Coast).

The mean length of southern flounder from creel census data has been at least 14 inches in most years. From a reproductive strategy perspective, the current 12 inches appears to provide sufficient protection for southern flounder under present conditions.

The most likely change would be a reduction in the present 20 fish bag limit: the trend in other states has been to ten fish. The CPUE in South Carolina for hook and line anglers is typically about one fish per angler-trip. Even an appreciable reduction would therefore impact very few fishermen on very few occasions. The database for the gig fishery is very limited and the potential impacts associated with various bag limits is therefore unknown. The majority of the respondents favored the retention of giggering, but subject to the same minimum size and bag limits as for hook and line fishermen.

There presently are no minimum size and bag limit regulations for sheepshead. Few other states have measures, although there is a 12 inch/10 fish control in Florida. A wide size range has been observed in South Carolina creel inspections, although the annual mean size has always been >12 inches TL. Relatively few anglers fish selectively for this species and those that do tend to catch large numbers of them. Respondents tended to either strongly favor or strongly oppose the option with no minimum size, while the option with a 12 inch minimum size was the least preferred choice of nearly half of the respondents. The intermediate proposal (10 inches/15 fish) received the most overall support in the rating system.

South Carolina is subject to the ASMFC plans for spot and croaker (there is none for kingfish), but at present there are no compliance requirements and the state has no catch controls. The croaker plan encourages states with minimum size limits to retain them. The spot plan offers no recommendations, but its objectives include maintenance of spawning stock sufficient to prevent recruitment failure and optimization of yield per recruit. The first objective can be met with a minimum size above that of first spawning, while the second would typically be addressed through a minimum size limit comparable to the optimal size for greatest average weight.

In South Carolina, few croaker attain a size suitable for retention in the judgment of most anglers and they are seldom seen in creel inspections. Spot below 7 inches are not retained by most anglers other than for use as bait. Fishermen generally retain only the largest individuals caught of either species. A minimum size limit for either species received comparatively little support from the constituents. A large

majority supported the exclusive use of a bag limit if a harvest control was needed.

The final topic for discussion is the relative importance of motivational factors to the constituents participating in recreational fishing. People fish for many reasons, including those not addressed in this survey, and the contribution of these various elements to satisfaction from the experience is a complex mechanism. The following comments can be offered on the basis of the superficial examination performed here. Catching fish to eat was the most important objective for respondents in every residence category. In most categories, the following received similar ratings: 1) catch and release, 2) type of fish caught, and 3) catching large fish. Much less important to most respondents were catching lots of fish and catching trophy fish.

There are several implications applicable to the determination of appropriate catch controls. The option of allowing participants to keep what they consider to be acceptable numbers of fish to eat should be given primary consideration if the species (or size range) is recognized as a food source. Obviously, this objective conflicts with the "catch and release" practice that is also important to a substantial number of participants. Providing anglers with the opportunity to retain significant numbers of smaller fish to eat is not compatible to achieving the objective of providing the potential for anglers to catch many larger fish or, particularly, those of trophy status.

The balancing of different and competing recreational interests is a significant challenge for contemporary fisheries managers. The solutions will come from public involvement in the management process and the study of human dimensions, not fisheries biology. As a noted fisheries manager, Peter Larkin, observed, "To be successful, sport fisheries managers of the future will have to become even better students of human nature than the managers of today."

APPENDIX I

ANGLER OPINION POLL

First, we need to know a few things about you so that we can place you in the appropriate response group:

1. What county do you live in? _____
2. How would you describe your residency background?
 all rural mostly rural mostly urban all urban
3. How many years have you lived in South Carolina? _____
4. What are your age and gender?
 Age _____ Gender (circle one): Male Female
5. Does anyone in your household own a fishing boat?
 Yes _____ No _____

Second, we'd like to know something about your marine fishing experience and interests:

6. How many years have you been fishing in salt water? _____
7. In an average year, how many days do you go fishing in salt water in South Carolina? (please check only one)
 1-5 6-10 11-20 21-35 36-50 more
8. Do you participate in marine fishing tournaments?
 no 1-2 per yr 3-5 per yr more
9. Do you belong to any salt water fishing clubs, groups, or organizations (such as ACCA, SCSSA, etc.):
 Yes _____ No _____
10. Do you subscribe to any salt water fishing magazines, newsletters, etc. (such as Salt Water Sportsman)?
 Yes _____ No _____

Next, we'd like to know how you feel about fisheries management in general.

11. Presently, most fisheries laws must be enacted by the General Assembly and cannot be modified by the Department of Natural Resources (DNR). Another approach would be to grant authority to the DNR to establish seasons, size limits, bag limits, and gear restrictions. Which system would you prefer?

keep the present legislative system grant regulatory authority to the DNR
 undecided/no opinion

12. The following are some commonly used fishery management measures. Please indicate your degree of preference for each:
- | | strongly oppose | mildly oppose | neutral | mildly support | strongly support |
|---------------------|-----------------|---------------|---------|----------------|------------------|
| Fishing reserves | _____ | _____ | _____ | _____ | _____ |
| Closed seasons | _____ | _____ | _____ | _____ | _____ |
| Minimum size limits | _____ | _____ | _____ | _____ | _____ |
| Daily bag limits | _____ | _____ | _____ | _____ | _____ |

13. Please indicate the relative importance of each of the following to you when you go fishing:
- | | not important | mildly important | moderately important | very important |
|-------------------------|---------------|------------------|----------------------|----------------|
| catching lots of fish | _____ | _____ | _____ | _____ |
| catching large fish | _____ | _____ | _____ | _____ |
| catching a kind of fish | _____ | _____ | _____ | _____ |
| keeping fish to eat | _____ | _____ | _____ | _____ |
| catch and release | _____ | _____ | _____ | _____ |
| catching "trophy" fish | _____ | _____ | _____ | _____ |

14. Given a choice between the following, which do you prefer most?
 ___ no size limit, but a limit on numbers of fish kept
 ___ no limit on numbers kept, but a minimum size limit
 ___ no preference

15. Given a choice of the following two, which do you prefer?
 ___ smaller minimum size limit with fewer fish allowed
 ___ larger minimum size limit with more fish allowed
 ___ no preference

16. Should hook and line be the only allowable recreational gear for catching fish (except cast netting for bait)?
 Yes ___ No ___ Undecided ___

17. Should sport fishermen be allowed to sell recreationally caught fish (except for game species like red drum, spotted seatrout, and striped bass)?
 Yes ___ No ___ Undecided ___

18. What do you think about the numbers of fish in South Carolina in the last five years? Please check one under each fish.

	Spottail bass	Spotted seatrout	Flounders	Sheepshead
Increasing	_____	_____	_____	_____
Decreasing	_____	_____	_____	_____
Not much change	_____	_____	_____	_____
Don't know	_____	_____	_____	_____

Finally, we're interested in your opinions on some specific management options:

Please keep in mind that a larger size limit does not necessarily mean that there will be more larger fish to catch!

19. Which regulation would you prefer the most for spottail bass (rank 1-2-3 with 1 your most preferred choice):

- ___ 14 inch minimum size limit, 27 inch maximum size limit, 5 fish daily bag limit
 ___ 18 inch minimum size limit, one fish over 27 inches allowed within a 5 fish daily bag limit
 ___ 14 inch minimum size limit, one fish over 27 inches allowed within a 4 fish daily bag limit

20. Which regulation would you prefer the most for spotted seatrout?

- ___ 12 inch minimum size limit with a 9-fish bag limit
 ___ 13 inch minimum size limit with a 10-fish bag limit
 ___ 14 inch minimum size limit with 15-fish bag limit

21. After a cold winter has killed many adult spotted seatrout, would you support a temporary closed season (on seatrout) to protect the remaining fish during spawning?

- Yes ___ No ___ Undecided ___

22. Which regulations would you prefer the most for flounders (rank 1-2-3) with 1 your most preferred choice):

- ___ hook and line-12 inch minimum size limit with 10-fish daily bag limit; gigging- no minimum size limit with 10-fish bag limit
 ___ 12 inch minimum size limit with 10-fish bag limit (for hook and line and gigging)
 ___ 12 inch minimum size limit with 10-fish bag limit for hook and line, no gigging allowed

23. Which regulation would you prefer the most for sheepshead (rank 1-2-3 with 1 your most preferred choice):
___ no minimum size with 10-fish daily bag limit
___ 10 inch minimum size limit with 15-fish daily bag limit
___ 12 inch minimum size limit with 20-fish daily bag limit

24. If regulations are enacted for spot, croaker, and/or whiting, which would you prefer the most?
___ minimum size limit only ___ daily bag limit only

25. Some species such as spotted seatrout occur as localized populations with no mixing with fish from other areas. Regulations suitable for one population may not be needed elsewhere (such as size limits). Would you support different regulations (such as size limits) for different areas?
Yes ___ No ___ Undecided ___

That does it! Thanks very much for your participation!