

SURVEY
OF THE
SOUTH CAROLINA
SHRIMP BAITING FISHERY,
1988

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Abstract

Information on the 1988 shrimp baiting fishery was obtained by means of a mail questionnaire sent to 5509 shrimp baiting license holders. Sport shrimpers were asked to voluntarily provide data on catch, effort, participation, boat ramp usage and locations shrimped. In addition, shrimpers were given an opportunity to comment on the season and shrimp baiting laws.

Overall response rate was 63.3%, with baiters being well represented by returns from all sectors of the legal shrimp baiting population. Estimates derived from survey returns show that 17,749 participants made 35,609 boat trips and caught 1.16 million pounds of whole shrimp during the 60-day season. The average licensed baiter caught 22.12 qts. of heads-on shrimp per trip, made approximately 7 trips during the season and had an average of 2.5 different people helping him while casting over bait.

Most of the shrimp baiting activity in 1988 took place in Charleston county (59.0%), followed by Beaufort County with 34.5%. Launch sites that received the heaviest usage were public boat ramps located adjacent to primary shrimping areas with high population densities in these two counties.

Results obtained in this survey show that both catch rate and participation were lower than estimates derived from the 1987 survey. This may have been due in part to the 48 quart catch limit, \$25.00 license fee and an overall poorer shrimping season. Compared with the 1988/89 commercial shrimping season, there was roughly a 68.5%/31.5% split in the reported landing of white shrimp between commercial shrimpers and recreational shrimp baiters, respectively.

The prevalent concerns and comments voiced by shrimpers responding to the survey pertained to season length, catch limits, law enforcement, numbers of shrimp baiting poles, distance between poles and the selling of shrimp taken over bait. Another category that ranked high was the general comment that the season went well.

Acknowledgements

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Introduction

The history, suspected impact and problems associated with shrimp baiting in South Carolina have been documented in several reports and articles (Theiling, 1988; Fee, 1988; and Whitaker and Wenner 1988). Because of the increasing popularity of this activity and the undetermined impact it was having on a resource already being exploited by commercial trawling efforts, it became necessary to begin documenting various aspects of the fishery. In 1987, survey efforts estimated that 1.7 million pounds of whole shrimp were taken by sport-shrimpers casting over bait in South Carolina. This equated to approximately 29% of the entire white shrimp catch for that year (Theiling, 1988). Participation in the 1987 fishery was believed to exceed 21,700 people that utilized an estimated 6406 boats.

During 1987, a host of problems and controversy surfaced surrounding this practice. Commercial shrimpers viewed baiting as a direct assault on their livelihood and blamed baiters for reduced catches and poor prices due to illegal sales. Shrimp baiters claimed that casting was environmentally more acceptable than trawling, with little damage to the bottom and very small by-catches of other species. However, baiters were often found arguing over baiting territory and in some cases displaying shows of force to hold claim to what they considered prime shrimping areas. Recreational boaters often complained of unattended poles in the waterways, which posed a potential safety hazard and hindered navigation.

To address these problems, establish a set of rules and regulations, and document and control a rapidly expanding consumptive pursuit, the Shrimp Baiting Act of 1988 (Act No. 301) was enacted into law. This act set strict penalties for illegal baiting practices. The legislature placed a 48 quart (heads-on) per boat per day limit on shrimp catch, limited the number of poles (10) that could be used to mark bait and established set distances that could be occupied per boat for baiting purposes. A 60-day shrimp baiting season was established, and the law required at least one participant per boat to possess a state issued license and tags. With the establishment of this licensing system, it then became possible to obtain a more accurate account of participation, and a means was provided to directly access a finite population of resource users.

The purpose of this project was to document certain aspects of the 1988 shrimp baiting fishery. Three objectives were investigated:

1. To estimate the catch, effort and participation of licensed shrimp baiters using boats during the 1988 season.
2. To determine where most shrimp baiting activity took place and which boat ramps/launch sites received the most usage.
3. To obtain input from the shrimp baiting community, which may help fishery managers identify problems and needed changes.

Materials and Methods

Information on catch, effort and participation in the 1988 shrimp baiting fishery was obtained by means of a mail questionnaire (Appendices 1a and 1b). The questionnaire, with a short letter of transmittal printed on one side, was sent to all 1988 shrimp baiting license holders (5509) from 18 November to 21 November 1988, closely following the end of the 1988 season. Each questionnaire was coded with an identification number that was used to check a respondent's mailing address off a master list once the survey form was returned. Recipients were asked to voluntarily provide estimates on the number of baiting trips they had made, estimates of their overall average catch per night, general locations shrimped and boat ramps that were most often used. Shrimpers were also asked to comment on perceived problems and suggest changes that still may be needed.

A follow-up mail survey was conducted approximately two months after the initial survey. The second mail-out was sent to all nonrespondents. The follow-up served as both a reminder to nonrespondents that their input was still needed and provided a means to test the effect of nonrespondent biases on various survey parameters. The questionnaire used for the second mailing asked two additional questions concerning county of residence and age (Appendices 2a and 2b). The cover letter accompanying the second questionnaire was also changed slightly to reemphasize the importance of the survey and to verify confidentiality.

Survey forms were printed on white 70 pound offset paper. Forms and pre-stamped self-addressed No. 9 return envelopes were sent using first-class postage. The use of first-class postage and quality paper have been shown to increase return rates and improve the overall impression recipients have of the project (Linsky, 1975; Dillman, 1978).

Results

Overall Response Rate

The survey was terminated on 26 February 1989, approximately one and one-half months following the second mail-out. Three thousand, four hundred seventy-two (3472) questionnaires were returned, 2493 from the first mail-out and 979 as a result of the second mail-out (Fig 1). Several questionnaires were returned by the postal service due to insufficient address, caused in part by clerical errors. Others were returned due to a change of residency and/or letters that were refused or left unclaimed. Attempts were made to correct addresses and zip codes where possible, and these questionnaires were redistributed as part of the second mail-out; however, a minimum of 26 shrimpers never received the first or second mail-out. Based on these figures, the return rate for this survey (3472 returns out of 5483 delivered questionnaires) was 63.3%.

All returns were thoroughly scrutinized for clarity and accuracy. Returns were discarded if incomplete or if discrepancies were found. A total of 3455 returns were deemed totally or partially usable and were included in the final workup and analysis. Because this survey attempted to measure the catch of lawful shrimp baiters using boats in South Carolina, 15 respondents reporting their baiting activities had been from either a dock or shore were eliminated from further analysis. Their comments were summarized and they were included in the participation estimate as non-boating license holders. Ten (10) dock baiters that reported averaged 7.3 trips during 1988, typically were accompanied by one other helper, and caught an average of 8.6 qts. of heads-on shrimp per trip.

Nonresponse Bias

The failure of some shrimpers to return survey forms may introduce a bias into the sample if respondents do not adequately represent the total population of shrimp baiters. The overall response rate of 63.3% appears to be large enough to minimize the influence of nonresponse. To further test for the effects of nonresponse, responses from the first and second mail-out were treated as independent samples. All survey forms received on the third day following the second mail-out and thereafter were tabulated as a separate file. In actuality only 74 (7.6%) of the responses received after that date were on forms used for the first mail-out. This fact and an evaluation of the trend suggested in Fig 1 lead the authors to believe that most of the survey forms received after 16 Feb 89 would not have been returned if a second mailing had not taken place. A comparison of the main parameters of importance from the first and second mail-out and both mail-outs combined is provided in Table 1. A t-test (SAS, 1979) was used to detect the presence or absence of significant differences in catch rate, numbers of trips and numbers of people helping the licensed baiter between the first

Figure 1. Frequency of Survey Returns by Week.

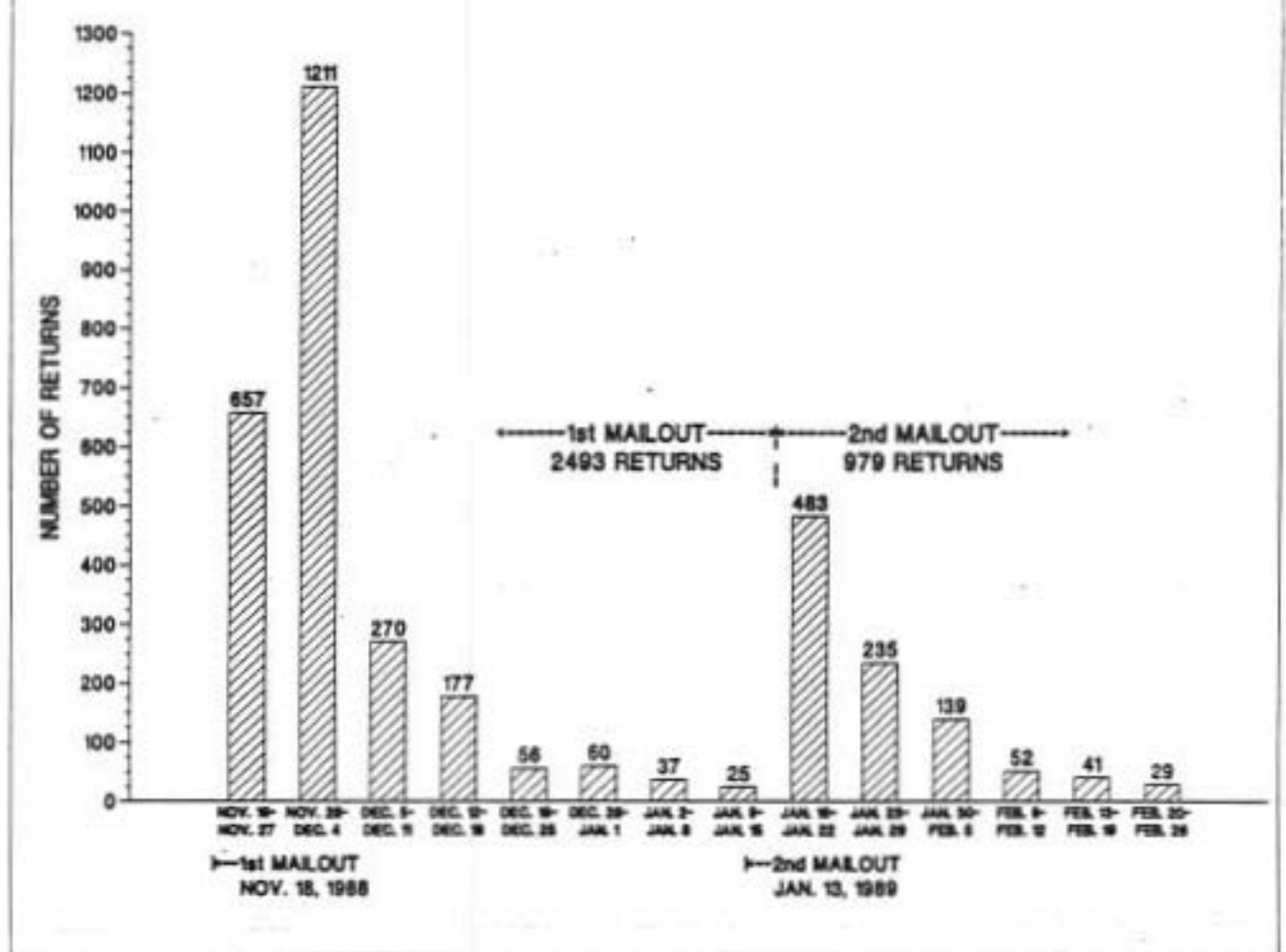


Table 1. Comparison of General Characteristics of the 1988 Shrimp Baiting Survey by Mail-out.

	1st Mail-out	2nd Mail-out	Statistically Significant Difference	Total
No. Usable Returns	2480	975		3455
Number of Trips by Boat				
Mean	6.96	7.08	No	6.99
Range	1-45	1-45		1-45
Number of Participants assisting Licensed Baiter				
Mean	2.57	2.33	Yes	2.50
Range	0-17	0-15		0-17
Average Quarts per Trip for the Season*				
Mean	22.51	21.07	Yes	22.12
Range	0-101	0-50		0-101
Number of times 48 qt. Limit was Reached by Baiters				
Mean	1.52	1.52	---	1.52
Range	0-30	0-30		0-30

* Quarts are reported as heads-on shrimp.

and second mail-out. The means appear to differ little, however, t-tests revealed significant differences between the average catch ($t_s = 2.7203$, degrees of freedom (df) = 3143) and average number of helpers ($t_s = 3.3946$, df = 3171) taken from the first and second mail-outs. Because significant differences were found between mail-outs, each mail-out was treated as a separate unit for analyses.

Residency

The county of residence for 1988 license holders is listed in Table 2, along with the frequency of returns from the first and second mail-outs. Although baiting licenses were purchased by residents from 43 of 46 South Carolina counties, residents from the 9 coastal counties purchased the majority of licenses (82.9%), with 41.2% of all licenses sold to Charleston County residents. The frequency distribution of usable returns typically followed the pattern of license sales, with little exception. Biases associated with a disproportionate response rate from a given sector of the state appear to be small and were not considered further.

It has been shown that differences in catch rate and effort may occur between various segments of the population. This may be particularly true in the case of coastal versus non-coastal residents. Data presented by Theiling (1988) suggest a difference in the mean number of trips between Category I (coastal) and Category II (non-coastal) participants. Comparisons of coastal and non-coastal responses from the 1988 survey reveal slight differences in almost every area (Table 3). Coastal residents averaged more trips than non-coastal residents, but caught less per trip than their non-coastal counterparts. T-tests show significant differences in mean number of trips ($t_s = 9.6418$, df = 3171), mean catch ($t_s = 2.0907$, df = 3143) and average number of helpers ($t_s = 4.9251$, df = 3171). Based on these findings, responses from coastal and non-coastal counties were analyzed and expanded separately.

Catch

Catch, effort and participation statistics appear in Table 4 by mail-out and residency. The overall catch and participation estimates for 1988 were derived by expanding the values in each cell and summing them. The overall mean catch/boat/season was 22.12 qts. of heads-on shrimp. Coastal residents averaged slightly less per trip than non-coastal residents. Reported catches ranged from 0 to 101 qts./night/season. One respondent admitted he consistently took 2-3 limits per night. Most shrimpers averaged 17 to 24 qts./night (Fig 2). Over forty-seven percent (47.2%) of the respondents reported catching the 48 qt./night limit at least once (Fig 3), while approximately 4.2% caught their limit every trip.

Twenty-seven (27) respondents reported that they went shrimping over bait and caught nothing. As a group, these baiters represent approximately 0.8% of the total number of

Table 2. License sales and survey returns by county of residence.

	License Sales		Survey Returns			
	#	%	First Mail-out	%	Second Mail-out	%
Coastal Counties						
Beaufort	568	10.3	271	10.9	103	10.6
Berkeley	517	9.4	206	8.3	132	13.5
Charleston	2271	41.2	958	38.6	357	36.6
Colleton	275	5.0	119	4.8	57	5.8
Dorchester	379	6.9	174	7.0	58	6.0
Georgetown	134	2.4	63	2.5	22	2.3
Hampton	218	4.0	98	4.0	36	3.7
Horry	18	0.3	9	0.4	6	0.6
Jasper	190	3.4	89	3.6	30	3.1
Subtotal	4570	82.9	1987	80.1	801	82.2
Non-Coastal Counties						
Abbeville	8	0.1	3	0.1	2	0.2
Aiken	109	2.0	61	2.5	15	1.6
Allendale	65	1.2	31	1.3	13	1.3
Anderson	9	0.2	3	0.1	1	0.1
Bamberg	84	1.5	43	1.7	11	1.1
Barnwell	73	1.3	37	1.5	18	1.8
Calhoun	23	0.4	17	0.7	7	0.7
Cherokee	1	<0.1	0	0.0	1	0.1
Chester	2	<0.1	2	0.1	0	0.0
Chesterfield	1	<0.1	1	0.0	0	0.0
Clarendon	8	0.1	4	0.2	1	0.1
Darlington	5	0.1	3	0.1	2	0.2
Edgefield	2	<0.1	0	0.0	3	0.3
Fairfield	3	0.1	2	0.1	2	0.2
Florence	10	0.2	4	0.2	1	0.1
Greenville	10	0.2	4	0.2	2	0.2
Greenwood	7	0.1	7	0.3	0	0.0
Kershaw	6	0.1	4	0.2	0	0.0
Laurens	5	0.1	5	0.2	0	0.0
Lexington	137	2.5	64	2.6	25	2.6
McCormick	1	<0.1	0	0.0	0	0.0
Marion	3	0.1	1	0.0	2	0.2
Marlboro	1	<0.1	0	0.0	0	0.0
Newberry	12	0.2	9	0.4	1	0.1
Oconee	1	<0.1	0	0.0	0	0.0
Orangeburg	219	4.0	106	4.3	27	2.8

Table 2 (cont.). License sales and survey returns by county of residence.

	License Sales		Survey Returns			
	#	%	First Mail-out		Second Mail-out	
	#	%	#	%	#	%
Non-Coastal Counties						
Pickens	1	<0.1	1	0.0	0	0.0
Richland	76	1.4	50	2.0	12	1.2
Saluda	1	<0.1	1	0.0	1	0.1
Spartanburg	5	0.1	2	0.1	1	0.1
Sumter	16	0.3	6	0.2	2	0.2
Union	7	0.1	3	0.1	3	0.3
Williamsburg	21	0.4	8	0.3	5	0.5
York	7	0.1	6	0.2	1	0.1
Unknown counties			5	0.2	15	1.6
Out Of State	0	0.0	0	0.0	0	0.0
Subtotal	939	17.1	493	19.9	174	17.8
Total	5509	100.0	2480	100.0	975	100.0

Table 3. Comparison of General Characteristics of the 1988 Shrimp Baiting Survey by Residency.

	Coastal Residents	Non-Coastal Residents	Statistically Significant Difference
No. Usable Returns*	2788	667	
Number of Trips by Boat			
Mean	7.44	5.06	Yes
Range	1-45	1-30	
Number of Participants assisting Licensed Baiter			
Mean	2.58	2.18	Yes
Range	0-17	0-10	
Average Quarts per Trip for the Season			
Mean	21.88	23.13	Yes
Range	0-101	0-50	
Number of times 48 qt. Limit was Reached by Baiters			
Mean	1.61	1.17	---
Range	0-30	0-25	

* For twenty (20) returns, county of residence was not obtained. These data were included as non-coastal residents. Quarts are reported as heads-on shrimp.

Table 4. Comparison of General Characteristics of the 1988 Shrimp Baiting Survey by Mail-out and Residency.

	1st Mail-out	2nd Mail-out
<u>Coastal Residents</u>		
Number of Trips by Boat		
Mean	7.44	7.43
Number of Participants assisting Licensed Baiter		
Mean	2.65	2.38
Average Quarts per Trip for the Season*		
Mean	22.33	20.75
Number of times 40 qt. Limit was Reached by Baiters		
Mean	1.62	1.57
Estimated No. Active License Holders	3035	1181
<u>Non-Coastal Residents</u>		
Number of Trips by Boat		
Mean	4.99	5.28
Number of Participants assisting Licensed Baiter		
Mean	2.23	2.04
Average Quarts per Trip for the Season*		
Mean	23.24	22.78
Number of times 48 qt. Limit was Reached by Baiters		
Mean	1.14	1.23
Estimated No. Active License Holders	644	197

* Quarts are reported as heads-on shrimp.

Figure 2. Distribution of the Recreational White Shrimp Catch Over Bait for 1988.*

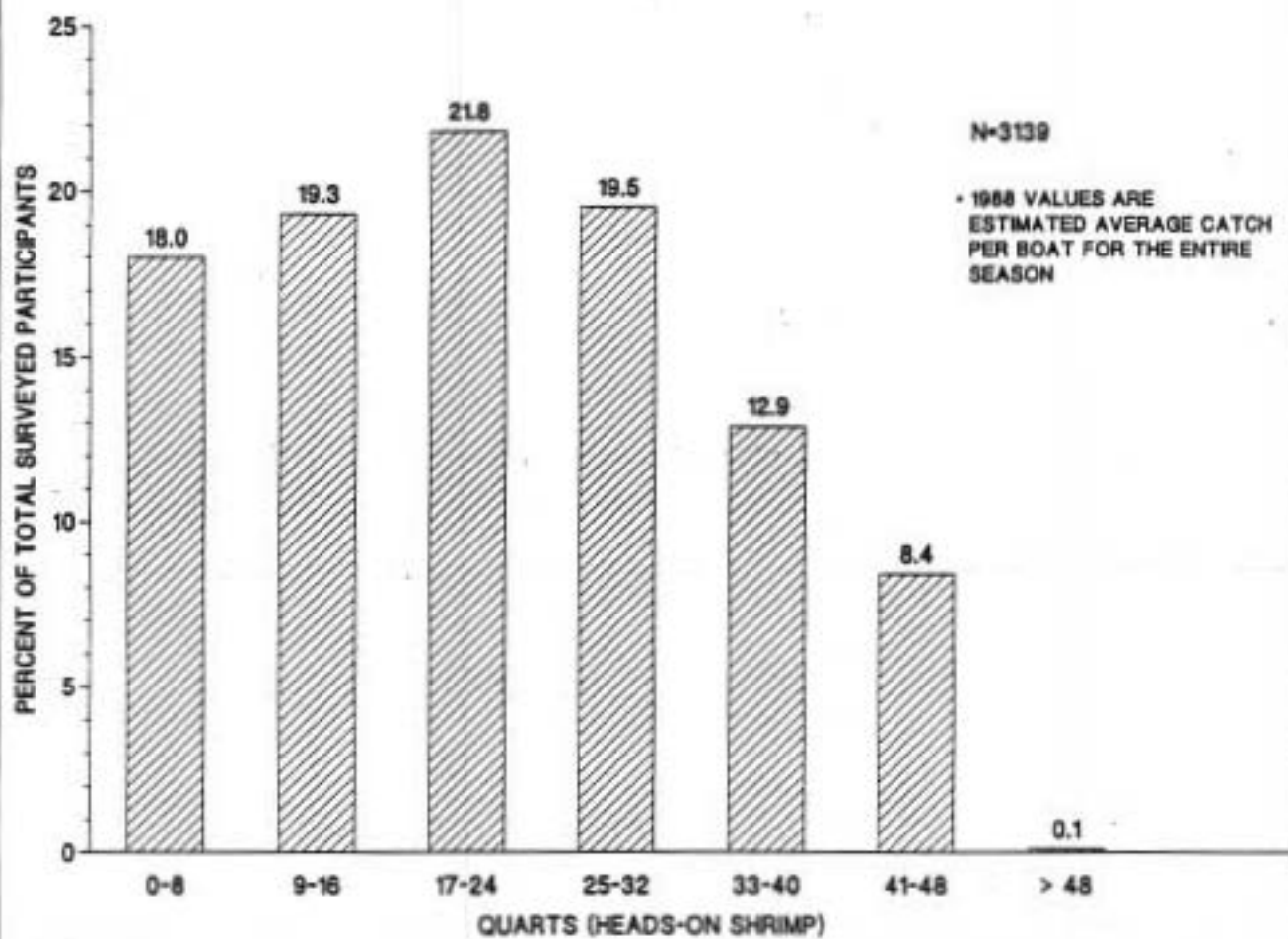
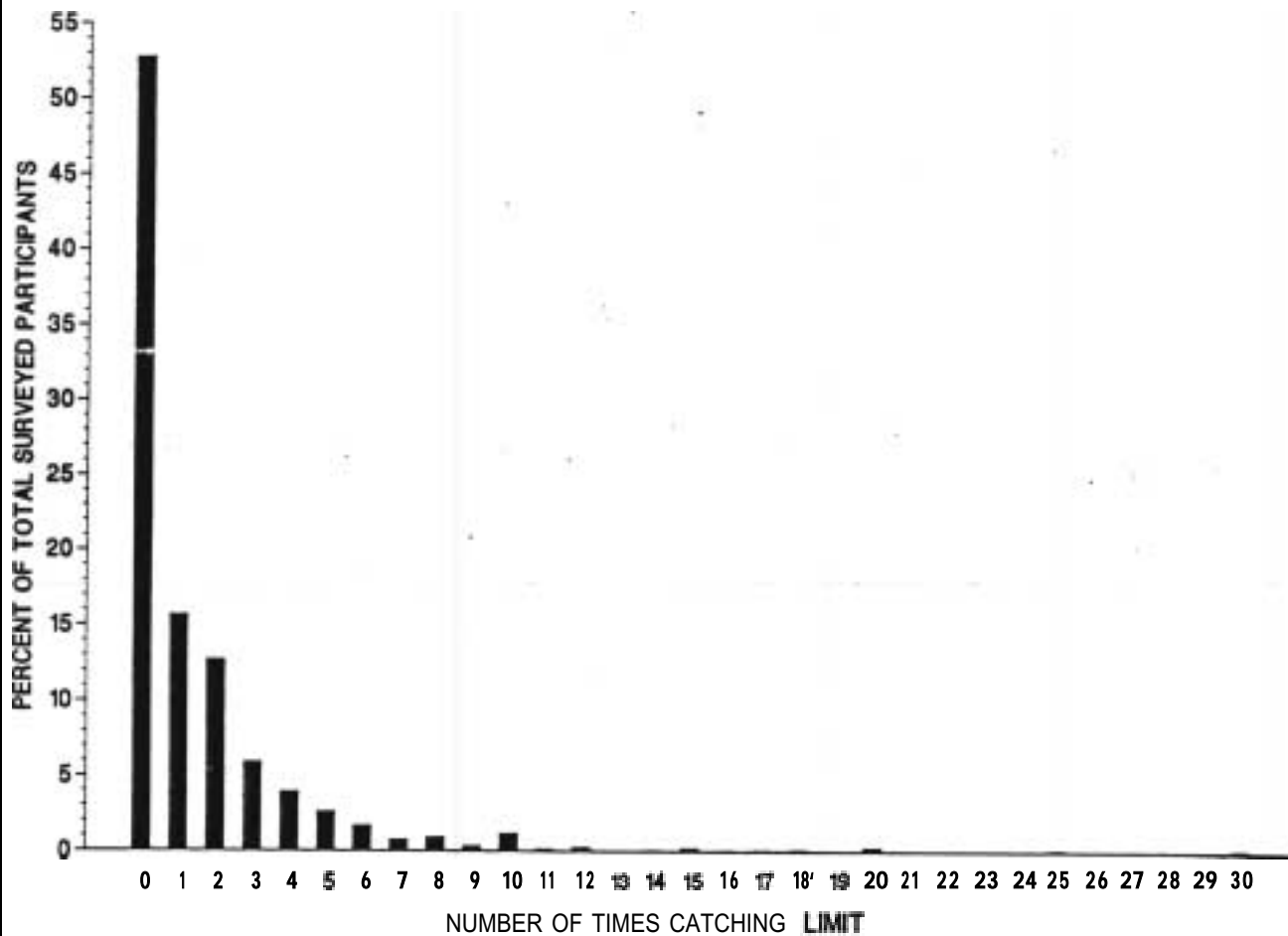


Figure 3. Number of Times Shrimpers Reported Catching the 48 Quart Limit over Bait during the 1988 Season.



respondents. The average number of trips taken by unsuccessful shrimpers was 1.8 with a 1 to 4 trip range. Several (30.0%) of these shrimpers reported that they were inexperienced and still learning, while some from Georgetown County (33.3%) reported little or no shrimp in that area. Zero (0) catches where effort had taken place were included in the final analyses.

The estimated catch of white shrimp from the legal shrimp baiting boat fishery was 784,676 qts. of heads-on shrimp. Using conversion formulas provided in Theiling (1988) this equates to the following:

510,039	quarts, heads-off shrimp
1,161,320	pounds, heads-on shrimp
754,858	pounds, heads-off shrimp.

Participation

The total number of shrimp baiting licenses sold in 1988 was 5509, however not everyone that purchased a license used it. Two hundred and eighty-two respondents (8.2%) reported that they never used their licenses, or never shrimped from a boat. Reasons included change in residency, scheduling problems and/or boating problems. Another group shrimped from shore or a dock and never used a boat. Others bought licenses, but shrimped as guests, using another's license, poles and tags. Based on these figures, 5057 licenses were used to catch shrimp over bait from a boat during 1988. This figure also represents the approximate number of boats that participated in the 1988 shrimp baiting fishery.

As active license holders, most baiters had guests or helpers along with them to assist with casting and boat handling. The number of different people that assisted a license holder during the season varied from 0 to 17 (average = 2.50) (Fig 4). Based on the averages presented in Table 4, the estimated total number of participants (license holders + helpers) shrimping over bait from boats in 1988 was 17,749 people.

The survey also asked 1988 license holders about past and future participation. Over twenty-seven percent (27.2%) of the respondents said they had not shrimped over bait during the previous year (1987). Three and one-half percent (3.5%) claimed they would not buy a license for the 1989 season, while 20.8% were undecided about future license purchases.

Trips

Coastal residents averaged 1.38 more trips per season than non-coastal residents (Tables 3 and 4). The numbers of trips reported by active license holders ranged from 1 to 45, with an overall average of 6.99 (Fig 5). Most shrimpers appeared to make between 2 and 10 trips during the season. An estimate of the overall number of boat trips made to cast for shrimp over bait in 1988 was 35,609.

Figure 4. Numbers of People Assisting the Licensed Baiter during the 1988 Season.

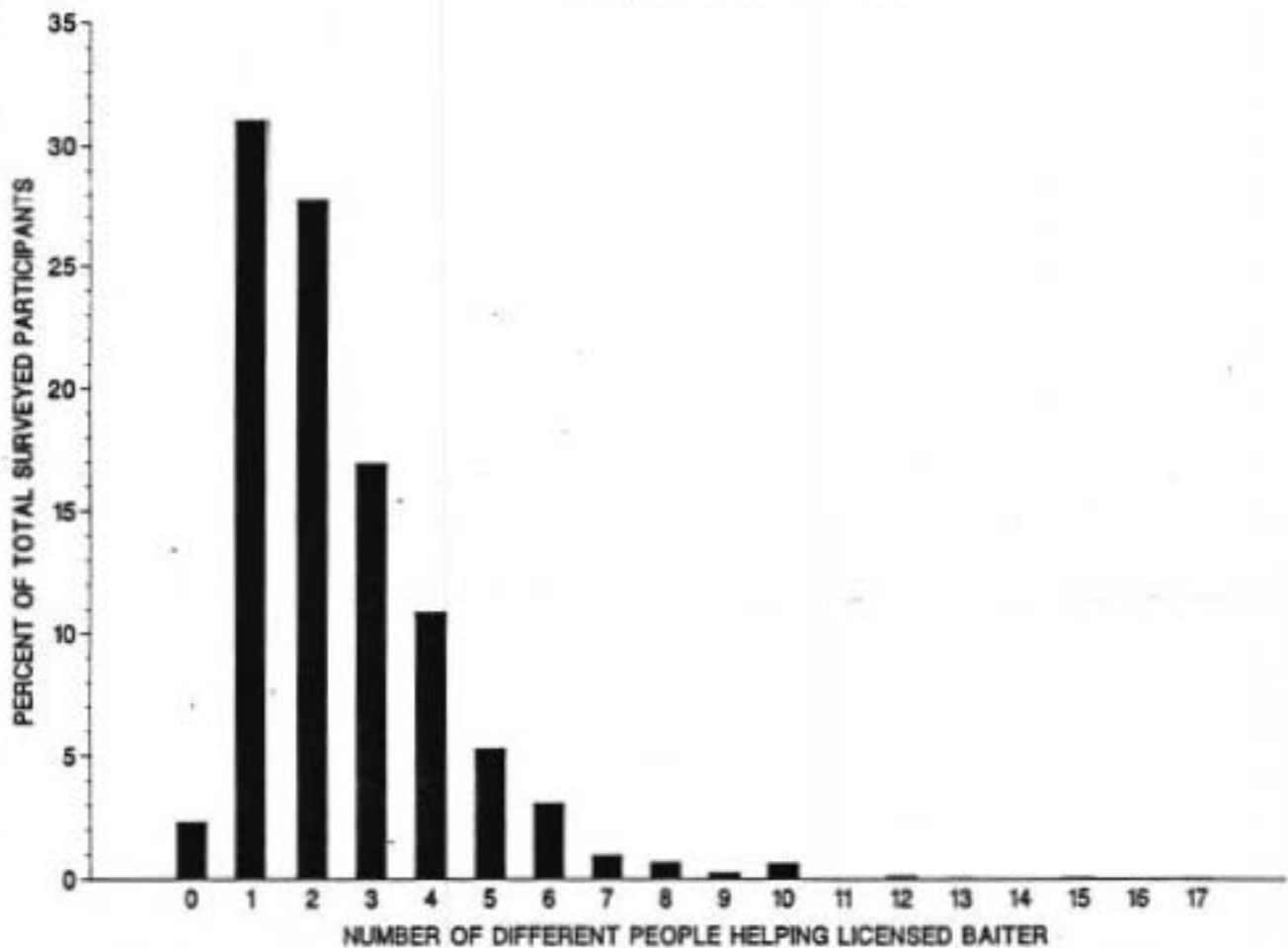
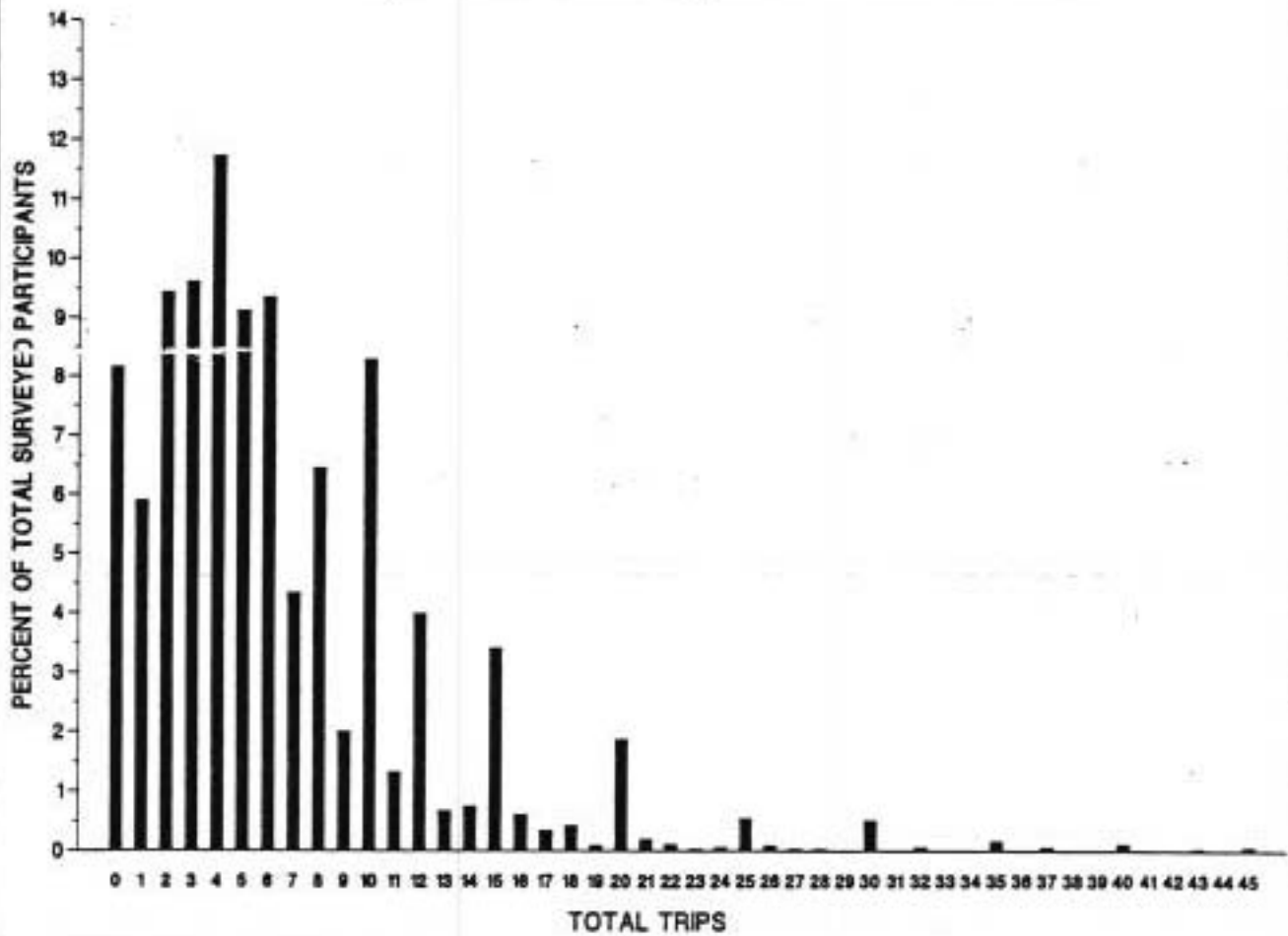


Figure 5. Frequency Distribution of the Number of Shrimp Baiting Trips Taken in Boats by Licensed Baiters in 1988.



Comparison with the Commercial Fishery

Estimates of the June 1988 - January 1989 commercial shrimp catch (Andy Applegate, pers. comm.) and 1988 recreational shrimp baiting catch are provided for white shrimp and all species of shrimp combined below:

	Trawlers	Baiters	Channel Nets	Total
	-----	-----	-----	-----
28 Jun 88 - 31 Jan 89				

Pounds Heads-Off (All species of Penaeid Shrimp)	2,635,918	754,858	16,433	3,288,137
Percent of Total	77.0%	22.0%	<1.0%	
Pounds Heads-Off (White Shrimp)	1,623,205	754,858	11,530	2,389,593
Percent of Total	68.0%	31.5%	0.5%	

These splits appear similar to the 71% trawler/29% baiting catch from the 1987 season reported by Theiling (1988). It appears that both the commercial and recreational catches were down from the 1987 season (Fig 6).

Geographical Distribution of Effort

Primary locations (inlets, rivers, creeks, etc.) used for shrimp baiting and the numbers of reported trips for the 1988 season are listed in Table 5. Most effort took place along the central and southern coast of South Carolina. Only 1.2% of the reported trips occurred in Horry and Georgetown County waters. Approximately 59% of the reported trips were in Charleston County, with the major portion of those (75.5%) confined to the Charleston Harbor estuarine system (including the Ashley R., Cooper R., Wando R. and Charleston Harbor). Areas in Beaufort County that received the heaviest pressure were Broad R., Whale Branch R., Calibougue Sound, Colleton R. and Chechessee R.

Public boat ramps adjacent to primary shrimping locations listed above were the most popular access points (Table 6). In some cases respondents reported launching sites that could not be identified or were listed as private (i.e. private dock, ramp). Approximately 9.8% of the reported trips were made from these unidentified and/or private access points. Ramps receiving the heaviest traffic in Beaufort county were Grays Hill, E. C. Glenn, H. E. Trask, Broad R. Ramp, Sheldon/Paige Point and All Joy Ramp. Charleston County ramps most heavily used were Remley's Point, Wappoo Cut, Charleston City Marina, Ralph M. Hendricks, Shem Creek, J. F. Seignious and the Charleston Naval Base.

Figure 6. Comparison of the White Shrimp Harvest by Commercial Trawlers and Recreational Baiters.

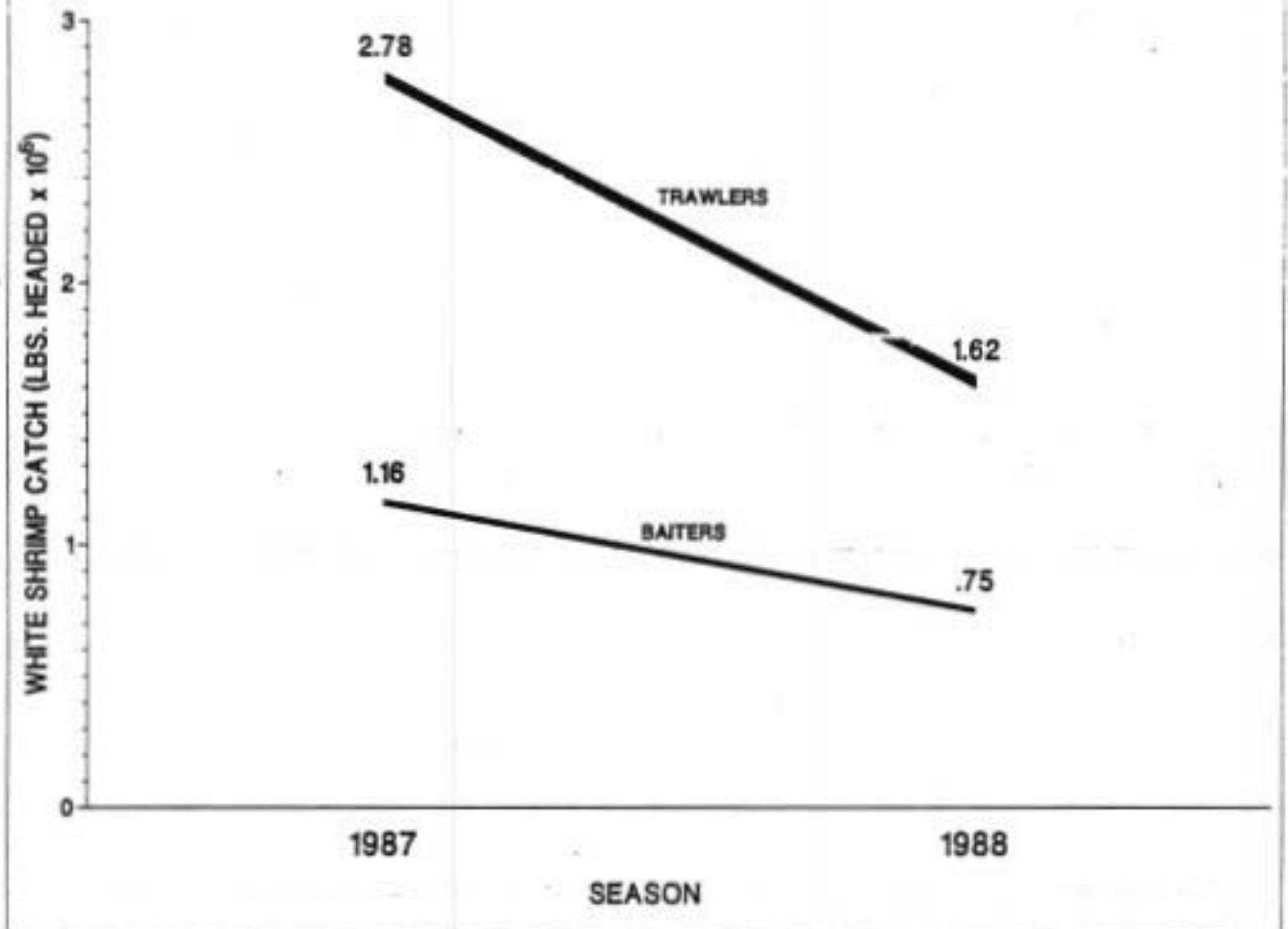


Table 5. Water bodies utilized for shrimp baiting during 1988.

Horry County

Location	No. Trips
Little River	9

Georgetown County

Location	No. Trips	Location	No. Trips
Debidue Cr.	3	Murrells Inlet	9
Muddy Bay	38	North Inlet	20
No. Santee Bay	2	No. Santee R.	3
Santee R.	10	Winyah Bay	167
Unidentified	5		

Charleston/Georgetown Counties

Location	No. Trips
So. Santee R.	2

Dorchester County

Location	No. Trips
Coosaw Cr.	1

Charleston/Berkeley Counties

Location	No. Trips
Halfway Cr.	1

Charleston County

Location	No. Trips	Location	No. Trips
Abapoola Cr.	4	AIWW-McClellanville	1
AIWW-Awendaw	1	AIWW-Bulls Is.	1
AIWW-Capers Inlet	42	AIWW-Fort Moultrie	32
AIWW-Charleston	21	Ashley R.	968
Awendaw Cr.	1	Bailey Cr.	12
Bass Cr.	6	Bohicket Cr.	202
Bull Harbor	2	Bull R.	2
Bulls Bay	69	Cape Romain Harbor	1
Capers Cr.	2	Capers Inlet	10
Captain Sams Cr.	1	Chas. Harbor	3411
Church Cr.	5	Cooper R.	3906
Clark Sound	3	Cow Pen Bay	50
Dawhoo R.	26	Deweese Cr.	15
Deweese Inlet	38	Elliotts Cut	1

Table 5. (cont.). Water bodies utilized for shrimp baiting during 1988.

Charleston County, continued

<u>Location</u>	<u>No. Trips</u>	<u>Location</u>	<u>No. Trips</u>
Ellis Cr.	16	Fishing Cr.	8
Folly Cr.	4	Folly R.	678
Green Cr.	4	Hamlin Cr.	2
Hobcaw Cr.	1	Hog Is. Channel	7
James Is. Cr.	6	Jeremy Cr.	9
Kiawah R.	64	Leadenwah Cr.	48
Lighthouse Cr.	6	Lighthouse Inlet	1
Milton Cr.	3	Morgan Cr.	3
Muddy Bay	15	No. Edisto R.	411
Ocella Cr.	1	Prices Inlet	5
Russel Cr.	55	St. Pierre Cr.	8
Sand Cr.	2	Schooner Cr.	2
Sewee Bay	6	Shem Cr.	58
Shipyard Cr.	17	Steamboat Cr.	216
Stono R.	550	Store Cr.	27
Simmons So.	1	Swinton Cr.	1
Tom Point Cr.	2	Toogoodoo Cr.	280
Town Cr.	/	Wadmalaw R.	23
Wadmalaw So.	70	Wando R.	1770
Wappoo Cr.	17	Westbank Cr.	17
Unidentified	56		

Charleston/Colleton Counties

<u>Location</u>	<u>No. Trips</u>	<u>Location</u>	<u>No. Trips</u>
Big Bay Cr.	84	Edisto R.	64
Scott Cr.	8	So. Edisto R.	96

Colleton County

<u>Location</u>	<u>No. Trips</u>	<u>Location</u>	<u>No. Trips</u>
Ashepoo R.	63	Ashepoo-Coosaw Cutoff	12
Chehaw R.	33	Old Chehaw R.	16
New Chehaw R.	7	Two Sisters Cr.	3
Rock Cr.	46		

Beaufort/Colleton Counties

<u>Location</u>	<u>No. Trips</u>	<u>Location</u>	<u>No. Trips</u>
Combahee R.	235	Coosaw R.	174
St. Helena So.	188		

Table 5 (cont.) Water bodies utilized for shrimp baiting during 1988.

Beaufort County

Location	No. Trips	Location	No. Trips
AIWW-Hilton Head	6	Albergottie Cr.	7
Archers Cr.	8	Battery Cr.	21
Beaufort R.	208	Brickyard Cr.	5
Broad Cr.	32	Broad R.	1511
Bull Cr.	27	Bull R.	42
Calibogue Cr.	6	Calibogue So.	1252
Callawassie Cr.	3	Capers Cr.	1
Chechessee Cr.	2	Chechessee R.	784
Chowan Cr.	19	Coles Cr.	3
Colleton R.	798	Cooper R.	28
Distant Is. Cr.	25	Eddings Pt. Cr.	7
Fripps Inlet	64	Harbor R.	9
Huspah Cr.	248	Jenkins Cr.	17
Johnson Cr.	18	Lucy Pt. Cr.	41
MacCalleys Cr.	21	Mackay Cr.	33
May R.	322	Morgan R.	126
Mungen Cr.	21	Okatee R.	7
Old House Cr.	3	Parrot Cr.	3
Port Royal So.	280	Sawmill Cr.	109
Skull Cr.	14	Station Cr.	25
Story R.	5	Trenchards In.	26
Three Sisters Cr.	2	Village Cr.	2
Whale Branch R.	1264	Williman Cr.	5
Wimbee Cr.	252	Unidentified	83

Beaufort/Jasper Counties

Location	No. Trips	Location	No. Trips
Coles Cr.	3	Euhaw Cr.	10

Jasper County

Location	No. Trips	Location	No. Trips
Boyd Cr.	82	Boyd's Cr.	12
Coosawhatchie R.	13	Pocotaligo R.	6
West Branch Cr.	52	Wright R.	1
Unidentified	4		

Table 6. Launch sites utilized by 1988 shrimp baiters.

Beaufort County

<u>Location</u>	<u>No. Times</u>	<u>Location</u>	<u>No. Times</u>
All Joy Ramp	534	Harbor R. Bridge Ramp	8
Beaufort City Marina	6	Harbor Town Marina	6
Beaufort County Public Boat Ramp	24	H.E. Trask Ramp/ Victoria Bluff	817
Broad Creek Marina	8	Johnson Creek Ramp	7
Broad Creek Ramp	81	Laurel Bay Ramp	94
Broad River Ramp	702	Outdoor Resorts Ramp	15
Brickyard Pt. Ramp	27	Paige Pt./Sheldon Ramp	664
Buckingham Ramp	29	Palmetto Bay Marina	3
Bush Island Ramp	13	Parris Island Marina	60
Capers Ramp	3	Pigeon Point Ramp	48
C.C. Haigh Ramp/ Pinckney Island	250	Port Royal Ramp	269
Downtown Marina of Beaufort	1	Russ Point Ramp	77
E.C. Glenn Ramp/ Chechessee River	1026	Sam's Point Ramp	229
Fort Frederick Ramp	4	South Beach Marina	32
Fripp Island Marina	17	Station Creek Ramp	55
Gray's Hill Ramp	1134	Station Royal Ramp	18
		Steel Bridge Ramp	5
		Wimbee/Dale Ramp	274
		Unidentified	674

Berkeley County

<u>Location</u>	<u>No. Times</u>	<u>Location</u>	<u>No. Times</u>
Bushy Park Ramp	33	Cainhoy Ramp	2

Charleston County

<u>Location</u>	<u>No. Times</u>	<u>Location</u>	<u>No. Times</u>
Battery Island Ramp	259	Limehouse Ramp	89
Benke Lowe Ramp	66	Live Oak Ramp	120
Bohicket Marina	9	Moore's Ramp	2
Buck Hall Ramp	8	Northbridge Ramp	87
Carolina Yacht Club	54	Pierpont Ramp	8
Cast-A-Way Marina	16	Ralph M. Hendricks/ Virginia Avenue	802
Charleston City Marina	942	Remley's Point Ramp	4148
Charleston Naval Base	663	Riply Lights Marina	2
Cherry Point Ramp	350	Riverland Terrace Ramp	230
County Farm Ramp/Duncan's Boat Harbor	283	Robert E. Ashley/McClell- anville City Mar.	58
County Park Ramp/ Folly Beach	3	Sewee Bay Ramp	17

Table 6 (cont.) Launch sites utilized by 1988 shrimp baiters.

Charleston County, continued

Location	No. Times	Location	No. Times
Dawhoo River Ramp	31	Shem Creek Marina	90
Detco Ramp	121	Shem Creek Ramp	712
E. Cooper Outboard Ramp	31	Steamboat Ramp	383
Filbin Creek Ramp	12	Stono Marina	2
Folly Marina	27	Toler's Cove Marina	5
Godman's Ramp	1	Toogoodoo River Ramp	193
Hobcaw Yacht Club	129	Wando Woods Ramp	4
James Island Yacht Club	202	Wappoo Cut Ramp	965
J.F. Seignious Ramp/ Folly River	693	Wild Dunes Marina	96
Kiawah Island Ramp	37	Unidentified	1416

Colleton County

Location	No. Times	Location	No. Times
Bennetts Point Ramp	249	Chehaw Ramp	3
Edisto Marina	77	Fields Point Ramp	204
Flowers Shrimp house Ramp	7	Wiggins Ramp	51
Unidentified	25		

Georgetown County

Location	No. Times	Location	No. Times
Belle Isle Marina	4	Boulevard Ramp	130
Georgetown Landing Marina	3	Murrells Inlet Ramp	9
Pole Yard Ramp	2	South Island Ferry Ramp	115
Unidentified	16		

Horry County

Location	No. Times
Unidentified	5

Jasper County

Location	No. Times	Location	No. Times
Bollen Hall Ramp	13	Dawson's Ramp	28
Salverberg Ramp	243	Tuten's Ramp	33
Unidentified	18		

Problems and Comments about Baiting

The survey solicited opinions on needed changes and perceived problems concerning the 1988 shrimp baiting fishery. Approximately 3022 (87.5%) of the respondents made some type of comment in this section. Because of the large number and variety of comments received, it became necessary to group comments into several categories shown in Table 7. In many cases, individuals listed several different comments on the questionnaire, therefore one respondent could be given acknowledgement for more than one comment. The prevalent concerns and related comments as measured by the number of times they appeared on survey forms were season length, catch limits, law enforcement, numbers of poles, distance between poles, and selling of shrimp taken over bait. In addition, another category that ranked high was the general comment that the season went well and there were no complaints.

As a general overview on the baiting issue, few shrimpers (58) expressed displeasure over the new rules and regulations. Four hundred thirty-nine (439) respondents stated the season went well and should not be changed. An additional small number (61) believed the practice of catching shrimp over bait should be totally or partially prohibited.

Numerous respondents felt that in addition to the present laws, several new amendments or additions should be considered. These included the need to legalize baiting from private docks (101), and the need to legalize the use of drop nets with bait from boats (1). A few baiters (3) noted the need to allow for live shrimp to be taken over bait for the purposes of finfishing year round and/or sale for finfishing by bait dealers. A small number of respondents (29) requested that a minimum mesh size and a maximum net length rule be established. Mesh sizes of one-half inch and net lengths no greater than 6 feet were most commonly suggested.

Most of the respondents, who made comments, thought that some refinements or adjustments should be made to the current shrimp baiting laws. Most of these dealt with specific areas of the law (i.e. season, catch limit, etc.) and are grouped accordingly. More respondents commented on season length than any other topic. Most (979) wanted a longer baiting season. Some thought it should begin earlier, such as in June or August, and include a brown shrimp season, while others wanted it to end later, possibly after Thanksgiving or through December. Only 22 respondents said the season should be shorter and 6 stated it was adequate as is. Several respondents felt that the season should be changed in some other manner. A few wanted it to coincide with the commercial season, while others wanted some type of split season. Others wanted it restricted in some way to reduce the numbers of baiters out on a given night.

Several shrimpers had some type of comment related to the use of poles. The present allowable distance between the first and last pole of a set is 100 yards, with a 25 yard minimum distance between sets. Twenty-one respondents wanted the number of poles decreased or eliminated and 25 thought the number (10 poles per boat) was adequate. Most respondents (167) that

Table 7. Most frequently cited problems and concerns related to the shrimp baiting fishery.

Category	No. of Responses
<u>Shrimp Baiting:</u>	
(General Overviews)	
Adequate/Went well this year.	439
No need for license, season, laws, etc.	58
Baiting should be prohibited.	56
Baiting at night should be prohibited	5
<u>New Changes that are needed:</u>	
Legalize shrimp baiting from docks.	101
Legalize use of drop nets with bait from boats.	1
Put limits on the size and mesh of cast nets.	29
Allow for live shrimp to be taken over bait for finfishing and sale for finfishing year round.	3
<u>Refinements needed to existing laws:</u>	
<u>Season</u>	
Shorten the baiting season.	22
Season is adequate.	6
Extend baiting season.	
Start season earlier.	410
End season later.	121
Longer season in general.	448
Totals	979
Change season structure.	
Season should coincide with commercial season.	15
Season should be based on the number of licenses sold and number of shrimp available.	2
Season should be split.	23
Season should be split based on odd/even license numbers and odd/even dates.	5
Eliminate season altogether.	3
Eliminate shrimp baiting on weekends.	2
Eliminate baiting after midnight (i.e. set hours).	3
Other changes.	21

Table 7 (cont.). Most frequently cited problems and concerns related to the shrimp baiting fishery.

Category	No. of Responses
<u>Poles</u>	
Decrease number and/or eliminate poles.	21
Number of poles adequate.	25
Increase the number of poles that can be used.	167
Increase the distance between first and last pole and decrease distance between sets.	180
Need better method to replace lost tags and poles.	61
Reflective tape (problems).	70
Increase diameter requirement for poles.	60
Pole Violations.	59
<u>Catch Limit (48 qts.)</u>	
Decrease the catch limit.	53
Limit adequate.	28
Increase the catch limit.	
48 qts. per license.	300
48 qts. per head of household.	56
Others.	182
Total.	538
<u>Change Limit Structure</u>	
Provide for a yearly/seasonal limit per person.	21
Determine limit based on number of baiters and availability of shrimp.	2
Have no limit for non-baiters.	1
Catch Limit Violations.	98
<u>License</u>	
<u>Resident license fee</u>	
Increase fee.	20
Fee adequate.	8
Decrease fee.	114
Decrease fee of senior citizens/handicapped.	16

Table 7 (cont.). Most frequently cited problems and concerns related to the shrimp baiting fishery.

Category	No. of Responses
<u>License (cont.)</u>	
Out-of-State license fee	
Increase fee.	8
Decrease fee.	25
Provide for temporary out-of state license at reduced price.	17
Change fee structure	
Fee for everyone in the boat.	3
Fee for head of household only.	7
Fee on a per trip basis.	1
Limited entry.	27
Would like to know what the license money is being used for?	15
<u>Law Enforcement:</u>	
Need better enforcement.	466
Enforcement adequate.	4
Need stricter laws/fines.	29
Fine too high/laws too strict.	11
Better public education/Communication.	64
Problems or complaints about enforcement officers.	4
Enforcement officers need approved 48 qt. measure to catch violators.	1
<u>Sale of Shrimp taken over bait:</u>	
Need better enforcement to stop sales.	132
Stop roadside shrimp sales/check more often.	14
Higher fines for selling shrimp taken over bait.	2
Legalize sale of shrimp taken over bait/establish commercial license.	10

Table 7 (cont). Most frequently cited problems and concerns related to the shrimp baiting fishery.

Category	No. of Responses
<u>Sale of Shrimp taken over bait (cont.)</u>	
Sale of shrimp taken over bait slower this year.	1
Shrimp sale violations.	122
<u>Conflicts between Baiters:</u>	
Conflicts appear to be less in 1988.	30
Reported having a problem or conflict.	24
<u>Commercial Shrimping:</u>	
Commercial shrimp trawl fishery needs more controls/restrictions/laws.	34
Keep sounds and bays closed to trawling.	26
Eliminate sale of baiting licenses to commercial shrimpers.	4
Commercial trawling does more damage than baiting.	25
Baiting hurts commercial shrimping.	1
Commercial shrimpers have too much influence on baiting laws and Wildlife Dept decisions.	26
<u>Non-Baiting Related Problems/Comments:</u>	
Better enforcement of boating laws (esp. lights on boats).	49
Better/more boat ramps.	87
Better/more lights at boat ramps.	12
Do not close ramps during shrimp baiting season.	2
Outlaw boating while intoxicated.	4

commented on pole number wanted to see an increase. Common suggestions were 10 poles per license holder or 20 poles per boat. Several shrimpers also wanted to see the distance between the first and last pole increased and/or some change in the distance between sets. Distances from 125 yards to 300 yards between first and last pole and 20 yards between sets were suggested. Several shrimpers reported having problems obtaining and replacing lost tags and licenses and securing legally required reflective white tape. Many noted a need for distribution centers for replacing tags other than the Charleston office. Problems with white reflective tape included the fact that it was hard to find and expensive. Some suggested that reflective tape of other colors be allowed and/or having the tags made of reflective material. Sixty (60) respondents noted that the 1 inch maximum diameter of poles was too restrictive. The most common suggestion was to increase it to 1.5 inches so larger bamboo or cane poles could be used. A number of respondents (59) reported having heard of or seen some type of violation involving the pole law. Common complaints were unattended poles, poles greater than 100 yards apart and not enough distance between sets of poles.

The 48 quart catch limit was the second most discussed issue by shrimp baiters. A few (28) thought the limit was adequate, 53 wanted it decreased (24 and 36 quarts per license were common suggestions), while most who commented (538) wanted some type of increase. Increasing the limit to 48 quarts per license holder or 48 quarts per head of household with a two limit per boat cap were the most common suggestions. Suggested increases ranged from 96 quarts per person to no limit at all. Several baiters suggested that there be a seasonal or yearly limit per person. Ninety-eight respondents reported that they knew, or had heard of someone who had taken over the limit.

License fee structure was another item that received several comments. Most of the respondents commenting on this felt the fee of \$25 was too high and should be reduced. A few thought the price should be in line with other fishing licenses, such as the freshwater licence. Only 8 said the fee was adequate, while 20 wanted it increased, one as high as \$100 per license. A few thought that senior citizens, the handicapped and residents under 16 should receive some type of reduced cost or free license. Most people that commented on the out-of-state license believed the fee was too high. Most said they could not afford to take visiting friends and relatives from out-of-state shrimping and would therefore like to see a reduced license fee or temporary license. A few people suggested changing the entire structure of the license itself. Common suggestions were a fee for everyone in the boat, a fee for the head of household only, or a fee on a per trip basis. Twenty-seven respondents wanted to see the number of licenses or number of participating boats per year limited in some way. Their main concern appeared to be that it was too crowded on the water and hard to find a good shrimping spot. A small number of respondents commented that they would like to know what the license money was being used for.

A category that also received a large number of comments was

law enforcement. The most common comment was the need for better enforcement.' A recurring complaint was the fact that respondents never saw a law enforcement officer while they were shrimp baiting. They thought more officers should be at ramps checking catches or on the water checking boats. Only 4 baiters thought law enforcement had been adequate during the 1988 season. Twenty-nine shrimpers thought the laws and fines should be **stiffer**, while 11 wanted fines reduced and laws relaxed. A few respondents cited a need for better communication and/or public education. Common suggestions were clearer laws, toll free numbers to report violators, some type of advisory board to act as a liaison between baiters and the Wildlife Department and general information on how, where and when to shrimp. One individual noted the need for law enforcement officers to be equipped with a standard, approved unit of measure to catch **baiters over the limit that** could stand up in court.

Regarding the sale of shrimp taken over bait, 122 respondents reported that they knew or suspected that shrimp taken over bait was sold during 1988. Only one respondent felt that the sale of shrimp had been reduced this year, while 132 shrimpers thought there should be better enforcement to stop illegal shrimp sales. A few baiters felt that the sale of **shrimp** at roadside stands should be eliminated or checked more often, while 10 baiters felt the sale of shrimp taken over bait should be legalized and a commercial baiting license developed.

One of the major concerns and a driving force in the establishment of the 1988 shrimp baiting laws was the need to control and reduce the number of conflicts between shrimp baiters and establish some guidelines and rules. Although the survey did not specifically ask baiters about conflicts on the water, 24 respondents reported having some type of problem during 1988, while 30 thought that conflicts on the water and problems had been reduced during 1988.

Another area that received input from several baiters was perceptions of commercial shrimpers. Thirty-four respondents felt that the commercial shrimp trawl fishery should be more tightly controlled, with more rules and regulations. Twenty-six baiters wanted the sounds and bays to be closed and/or remain closed to trawling and another 25 felt that trawling did more damage to the environment than shrimp baiting did. Only one respondent commented that baiting hurt commercial shrimping and baiters felt that the baiting licenses should not be sold to commercial shrimpers. Twenty-six respondents' made the comment that commercial shrimpers had too much influence on baiting laws and Wildlife Department decisions. 4

Non-baiting problems and comments included a need for better enforcement of boating laws, especially requiring proper lights on boats at night and prohibiting boating while intoxicated. A fair number of respondents noted a need for better and more boat ramps, more lights at ramps and better scheduling of ramp closures.

Discussion

Survey Biases

The mail questionnaire technique employed for this project proved to be an extremely useful and successful tool in obtaining information on the 1988 shrimp baiting fishery. The high response rate can be attributed in part to the controversial nature of the fishery and the heightened publicity it has received in recent years. The opportunity for shrimpers to voice their opinions and concerns about the 1988 season and laws may have also stimulated return rates. Shrimp baiters from all sectors of the state were well represented by survey returns.

The weakest feature of the survey was our reliance on the shrimper's memories to recall information on activities that took place several months prior to the study. In surveys such as this, where sportsmen are asked to recall information over a certain period of time, it has been found that both the recall period and type of information sought may bias results. According to Deuel (1980), fishermen in the U. S. can accurately recall and report numbers of fishing trips for a two month period. However, they could not accurately report numbers and sizes of each finfish species caught. In cases where the recall period is too long, there is a tendency to omit events, resulting in an underestimate of the true value. Since the timing of the second mail-out was well over two months after the 1988 season, the authors believe that differences detected between the first and second mail-out are recall problems and not associated with non-response biases.

The fact that response rate was so high and baiters were well represented by returns from all over the state lead us to conclude that survey results represent a good cross section of the entire lawful shrimp baiting population.

Catch, Effort and Participation

Our estimates of total participation and of the average number of shrimp baiting trips appear to be fairly realistic. The licensing system provided an accurate count of license holders, which was adjusted to take into account license non-use, as obtained from the survey. The average number of trips made during 1988 was very consistent with values obtained in a similar survey conducted in 1987 (Theiling, 1988). The first several questions on the survey form asked trip information in three different ways. This, hopefully, forced the respondent to think more carefully about his effort during the season and resulted in a more accurate estimate.

The average estimated seasonal catch per trip of 22.21 quarts (heads-on) appears low. As noted above, recall may become a factor when people are asked to estimate catch after a two month period. The controversial nature of the fishery may have also caused some people to provide conservative estimates of catch, due to a fear that the information would be used to impose additional restrictions on the fishery. An added complication is the fact that the 1988 shrimping season catch was down from 1987,

a fact easily seen in the commercial fishery. This would have also caused a reduced catch rate for baiters. Future surveys should be planned in a way that will reduce the duration for which shrimpers are required to recall information. A time limit or deadline for the submission of survey returns should also be considered. On-site survey methods, as a means of verifying catch rates and obtaining length frequency information should also be employed.

Comparison with 1987 Estimates

Comparisons with 1987 shrimp baiting estimates are extremely limited, due to the very different methodologies and situations involved. In the absence of a license file, the 1987 survey targeted a subsample of registered boat owners in South Carolina to obtain effort and participation data and used an on-site creel survey to obtain catch information. The 1988 effort utilized a mail questionnaire, sent to known, licensed baiters, shrimping in a fishery that had just been levied with several new and very different rules and restrictions. Because of these differences, both surveys essentially stand alone on their own merits, demonstrating both the positive and negative sides of very different techniques of data collection. Direct comparisons of the estimated catch rate, effort, and participation between these two years are not wholly valid. This fact strongly demonstrates the need for future efforts to be thoroughly coordinated in terms of methodologies and procedures to make valid comparisons possible in the years to come.

As a general overview, the results of this survey suggest two things. First, catch rates in 1988 appear to be lower than in 1987. This may have been due in part to the 48 quart catch limit and in part to a poorer overall shrimping season, a fact that is reflected in the commercial landings data (Fig 6). Secondly, overall participation in the shrimp baiting fishery appears to have been reduced somewhat, possibly due to the \$25.00 license requirement.

Geographical Distribution

The 1988 shrimp baiting fishery was concentrated mainly in Charleston County. This observation can be made by looking at license sales, reported trips to various locations and boat ramp usage. Charleston County waterways accounted for about 59% of effort (reported trips) and Beaufort County accounted for around 34.5%. This is surprising, since the practice of baiting for shrimp is believed to have been first introduced to South Carolina in Beaufort County. The pattern of effort seen in 1988 corresponds with areas that serve as primary nursery grounds for white shrimp, and heavily populated areas that have a large number of registered boat owners who can take advantage of the fishery. Low effort in the northern part of the state appears to have resulted from the previous winter's severity in the northern part of the state and to heavy rains that occurred during the early part of the season that drove most shrimp out of inland

waters. Future surveys should monitor the somewhat localized nature of the fishery.

Problems and Comments

An evaluation of the resource users' opinions and perceptions has been of use to fishery managers, especially when the objective is to determine success of a particular program or to determine management policy for increased user enjoyment (Duttweiler, 1976; Smith, 1983). Most respondents took the opportunity to make comments regarding shrimp baiting and/or new laws regulating the fishery. As a general overview, most baiters appeared to be satisfied with the overall intent of the 1988 shrimp baiting laws. However, most respondents felt some adjustments were still needed and/or desired.

A few baiters noted a need to limit the mesh size and diameter/radius of cast nets to reduce removal of undersized shrimp. Work done in Georgia shows that this can be a very effective method. Woodward (1989) found that 60% of the shrimp caught by a 1/4-inch mesh net were under 3 inches (75mm). This was reduced to 7% for cast nets with a 1/2-inch mesh. Although there is no set standard of separation, Whitaker (pers. comm.) reports that white shrimp <85 mm and brown shrimp <80 mm are generally considered "bait shrimp." Shrimp of this size are commonly discarded by recreational shrimpers. We now know that shrimp bait is not selective for large shrimp (Whitaker and Wenner, 1988). In years when shrimp are abundant and sizes small, mesh restrictions may prove a useful method of selecting commercial grades of shrimp and eliminating the removal of smaller "bait sized" shrimp.

Season length was the major concern of respondents, most wanting some type of extended season. Presently, the South Carolina shrimp baiting season runs for 60 days during the period of September 1 and November 15. During 1988 the average number of baiting trips taken by license holders was 6.99. During 1987, when there was no season, the average number of trips was 6.33. The establishment of a 60-day season did not appear to have reduced or restricted effort, only concentrated it in a period of time when larger shrimp are most available. The timing of the season, at least in 1988, appeared to coincide closely with peak shrimp availability inshore. Based on 1987 and 1988 figures, it is doubtful that an extended season would improve shrimping success or decrease effort or congestion on the water. Another advantage of a limited defined season is that it allows law enforcement officers to plan, coordinate and concentrate their activities in areas where they are needed.

Another matter that received a good deal of attention was the catch limit. In 1988 the daily catch limit was reduced to 48 quarts of whole shrimp or 29 quarts of headed shrimp per boat per day. Many respondents wanted to see some type of increase to this limit. License holders in 1988 reported an average seasonal catch of 22.12 quarts of whole shrimp per trip. This value multiplied by the average number of trips (6.99) made by license holders means that about 154.6 quarts of whole shrimp were taken

by each license holder in 1988. This equals about 228.8 pounds of whole shrimp with an approximate value of \$3.00/lb, providing the average license holder with shrimp equaling a market value of about \$686.51. It is granted some baiters caught less, while some caught more, and realizing that more than one person per boat was involved, we can recalculate these figures. In 1988, one baiting license equaled 3.5 participants. This means that the average participant ended up with about 44.2 quarts of whole shrimp (65.1 lbs., approx. market value = \$192.20). This is slightly less than one catch limit per participant. This is certainly within the limits of what would be considered a recreational catch, taken as part of a sporting activity. Survey results show that less than one-half (47.2%) of the respondents were able to catch the 48 quart limit, while 4.2% caught the limit on every trip. A limit increase would not improve shrimping success for most of the people, but would allow a few people to harvest considerably more than a reasonable/fair recreational share.

Respondents had a fair number of complaints concerning pole number and distances between poles and sets. An examination of the 1987 data (Theiling, pers. comm.) shows that there is absolutely no correlation between pole number and catch. In 1987, shrimpers with 5 poles were able to catch just as much shrimp as those with 50 poles. The primary reason for limiting the numbers of poles and distances they can occupy is to eliminate claim staking, territoriality and reduce the potential risk to navigation. A common complaint among respondents was that maneuverability was restricted in some cases when 10 poles were crowded within a 100 yard distance. The 10 pole limit is a maximum number that can be used. Reducing the number of poles and spacing them further apart within the 100 yard limit should eliminate boat handling problems, without decreasing shrimping success.

Another suggestion made by several respondents was that the pole diameter should be increased to 1.5 inches to allow for the use of larger bamboo and cane poles. Bamboo and cane can be used now as long as they meet the 1 inch pole diameter requirements. There is no reason why pole diameter cannot be increased to 1.5 inches, however at the present time a change of this nature is not being considered for the 1989 season. The use of iron reinforcing rods as bait markers is dangerous and should be avoided.

The requirement of marking each pole with white reflective tape also received criticism. White tape was picked in an effort to reduce any hazard to navigation. In many cases can and nun buoys are marked with red or green reflective tape that can only be seen at night with a spotlight. In an effort to reduce the chance of a bait pole being mistaken as an aid to navigation, red and green tapes were not considered. However, because of the scarcity of white reflective tape, a Department ruling allowed for the use of any color for the 1988 season, as long as it was reflective. No legislation was formally introduced that would actually change the wording of the law to allow for any color tape. Baiters should check with law enforcement offices prior to

each season to see if a variance in tape color will be allowed that year. The cost involved in making tags out of reflective material prohibits their use as an alternative to reflective tape.

Availability of license applications and difficulty in replacing lost tags were other areas of some concern. License applications are available at various bait and tackle shops, marinas, docks and commercial license agents throughout the state. Licenses may be purchased in person or by mail after 1 August from the S.C. Wildlife and Marine Resources Department in Charleston and Columbia. Lost tags may be replaced in person or by mail at the Charleston and Columbia offices.

There have been no proposed changes in the fee or fee structure for the 1990 season. Funds collected from baiting licenses are mandated by law to be used for the purposes of administration and enforcement of recreational shrimping and shrimp baiting laws and regulations. The expenditure of 1988 funds was roughly divided into the following categories: administration/licensing, 43.6%; enforcement, 50.6%; and 1988 Shrimp Baiting Survey, 5.8%.

Another concern was a need for better enforcement of baiting laws. During the 1988 season there were only 23 coastal enforcement employees (McKenzie, pers. comm.). These included 18 field officers and 5 desk positions. Because of state restrictions regarding employee work time, only 9 officers were routinely available on any given day to cover the entire coast. Much of the enforcement effort over the last two seasons has centered around a sting operation in Beaufort County. This operation culminated in 52 arrests on 151 warrants. At other times, enforcement officers worked in other parts of the state checking on baiting activity. The Department presently plans to add three new coastal officers per year for the next several years in order to beef up efforts in this area. In addition, officers will respond to any report or tip of illegal baiting activity. Such reports can be made by phoning Operation Game Thief (1-800-922-5431).

The large number of reports and complaints concerning the illegal sale of shrimp taken over bait indicated that this issue was a major concern of a large number of baiters. Shrimp caught over bait cannot be sold commercially. Catching and convicting black market shrimpers is one of the most difficult and time consuming jobs facing law enforcement. The laws pertaining to the sale of seafood and seafood dealer licenses were amended in 1987 in an effort to protect consumers and insure that fishery landings are documented. The sale of shrimp from roadside stands and transient dealers must go through proper channels before it reaches the consumer. Roadside dealers are considered retail dealers and must buy a license from the S.C. Tax Commission. These dealers must receive or purchase their seafood products only from a licensed primary wholesale dealer or other retailer, unless they are also licensed primary wholesale dealers themselves. The illegal sale of any seafood products poses a potential health hazard to the consumer, especially if products are not properly stored. This practice also decreases the

Department's ability to manage the fishery, since these landings go unreported and represent an unknown portion of the total harvest.

Summary

During 1989, the Marine Advisory Board of the South Carolina Wildlife and Marine Resources Department drafted a resolution urging the General Assembly to amend shrimp baiting laws to allow people with licenses to catch shrimp by drop net or by cast nets over bait from private or public dock, pier or other structure affixed to high land during open season. A change in the language of the law has also been recommended that would make it clear the 48 quart limit of whole shrimp applies to each boat rather than set of poles or license holder.

Shrimp baiting remains a controversial issue. An advisory referendum held in Beaufort County resulted in 60% of the voters casting their ballots to ban baiting in that county. Voters opposed to baiting outnumbered supporters 11,850 to 7974 (Rapport, 1988). The overall impact that baiting has had on the resource will only be known after the fishery stabilizes in terms of participation and several years of catch data have been evaluated. Each baiting season will probably be different in some way and may require flexible management policies. As the demand on the marine environment increases, it will ultimately be up to the resource user himself to monitor his activities and assist fishery managers in the wise use and conservation of these limited resources. In a single species fishery such as this, with a fixed season, shrimpers are encouraged to keep trip and catch records. This will ultimately lead to a more accurate and precise data base from which to follow trends and base management decisions.

Footnotes

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APPENDIX

Appendix 1a. Survey Instrument used during the first mail-out showing front side, cover letter.



*South Carolina
Wildlife & Marine
Resources Department*

James A. Timmerman, Jr., Ph.D.
Executive Director
Paul A. Sandifer, Ph.D.
Director of
Marine Resources Division

EQUAL OPPORTUNITY AGENCY

WILL YOU HELP US TO BETTER MANAGE THE RECREATIONAL SHRIMP
BAITING FISHERY IN SOUTH CAROLINA ?

In order for us to find out if new regulations and management strategies are working to provide equitable shrimping opportunities for all, while protecting the resource for future generations, we need information including: How many shrimp were caught? How many people shrimp? How often do people shrimp over bait? No one can tell us this information better than the shrimpers that do it.

You have been selected from our shrimp baiting license files to take part in this study. Will you help? All we ask you to do is to fill out the questionnaire on the back and mail it to us in the self-addressed, prepaid envelope provided. Please answer honestly, giving your best estimates to each question. Answer questions based only on the shrimping you did with your permit, tags and poles. Respond even if you were unable to shrimp over bait during the 1988 season. Thank you for your help.

S.C. Wildlife and Marine Resources Department

* P.O. Box 12559 * Charleston, South Carolina 29412 * Telephone: 803-795-6350

Appendix 2a. Survey Instrument used during the second mail-out showing front side, cover letter.



*South Carolina
Wildlife & Marine
Resources Department*

James A. Timmerman, Jr., Ph.D.
Executive Director
Paul A. Sandifer, Ph.D.
Director of
Marine Resources Division

EQUAL OPPORTUNITY AGENCY

A REMINDER ABOUT SHRIMP BAITING...

Have you completed and returned the shrimp baiting survey form sent in November? As of today we have not yet received your completed survey form. Take a minute now to answer the questions on the back of this page and return them as soon as possible. This is your opportunity to provide input into the management and conservation of this valuable resource. You may be assured of complete confidentiality. Your name will never be matched up to your completed questionnaire. We need your help now!

Please answer questions based only on the shrimping you did with your permit and tags. Answer honestly. Give your best estimates to each question. Return this form to us in the prestamped envelope provided. Respond even if you were unable to cast over bait during the 1988 season. Thank you for your help.

S.C. Wildlife and Marine Resources

* P.O. Box 12559 * Charleston, South Carolina 29412 * Telephone: 803-795-6350

Appendix 2b. Survey Instrument used during the second mail-out showing reverse side, survey questionnaire.

1988 SHRIMP BAITING SURVEY

1. How many shrimp baiting trips did you make in a boat during 1988 using your permit number and tags? _____
2. In what rivers, creeks, sounds, bays etc. did you do most of your shrimp baiting from a boat and how many times?
LOCATIONS # TIMES

3. What boat landings or launch sites did you use most frequently for shrimp baiting and how many times?
BOAT RAMP/LAUNCH SITE # TIMES

4. How many different people accompanied you in a boat during the 1988 season while you were using your tags and permit? _____
5. What was the average catch of shrimp per boat trip using your permit and tags during the 1988 season? Select one unit of measure that best describes your catch.
(Fill in only one blank)

_____ QUARTS HEADS ON _____ POUNDS HEADS ON

_____ QUARTS HEADS OFF _____ POUNDS HEADS OFF
6. How many times did you catch your limit (48 quarts heads on, 29 quarts heads off) from a boat using your permit and tags during the 1988 season? _____
7. Did you shrimp over bait during 1987? _____ YES _____ NO
8. Do you plan to buy a permit for 1989?
_____ YES _____ NO _____ UNDECIDED
9. What county of South Carolina do you live in? _____
10. What is your age? _____
11. What problems or changes do you feel still need to be addressed or made concerning the shrimp baiting fishery?

