

A Statewide Survey of Boatowners in Texas and Their Saltwater Fishing Activity

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TAMU-SG-83-205
June 1983
\$2

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Texas A&M University



Sea Grant College Program

College Station, TX 77843

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TAMU-SG-83-205

Partially supported through Institutional Grant NA81AA-D00092

to Texas A&M University

by the Office of Sea Grant

National Oceanic and Atmospheric Administration

U.S. Department of Commerce

Price: \$2

Order from

Marine Information Service
Sea Grant College Program
Texas A&M University
College Station, Texas 77843

R/F-20
TAMU-SG-83-205
300 June 1983

ABSTRACT

The saltwater fishing patterns of the statewide population of pleasure boatowners were investigated. Data were obtained through a survey of registered boatowners in Texas. First, a sample of boatowners was interviewed by telephone to determine whether or not they had used their boats to fish in salt water during the previous year. When saltwater boat fishermen were identified, they were mailed a questionnaire to complete and return. The total usable response rate for the questionnaire was 66 percent. Throughout the report, sample findings were extrapolated to the statewide population of boatowners.

More than 60 percent of the registered boatowners in Texas used their boats for fishing during the study year. However, only 14 percent of all Texas boatowners (approximately 529,000) fished salt water (bays or offshore). Approximately 3 percent (16,000) of Texas boatowners accounted for more than 120,000 fishing trips offshore (U.S. Territorial Sea and the Fishery Conservation Zone).

The Galveston Bay area, with almost one-half of all bay boat fishing activity and more than one-third of all offshore fishing activity, was identified as the state's center of marine recreational boatfishing. Port Aransas was the second leading offshore recreational fishing port with almost 25 percent of all offshore trips.

Boat fishermen were asked to estimate the distance they traveled offshore on an average fishing trip. Most offshore fishermen fished within 10 miles of shore (U.S. Territorial Sea waters); few ventured beyond 30 miles. Use of the U.S. Fishery Conservation Zone offshore Texas generally was limited to less than one-half the offshore boat fishing population, or slightly more than one percent of the population of Texas boatowners.

ACKNOWLEDGEMENTS

This research was funded by the Texas Agricultural Experiment Station and the Texas A&M University Sea Grant College Program. We sincerely thank the many individuals who helped us complete this effort. The following persons were of particular assistance to us: Bill Anderson and Gary Matlock of the Texas Parks and Wildlife Department; project staff members Mick Matheusik, Sheryl Druggan, Ed Hodney and Mark Bonn, who are graduate students in the Department of Recreation and Parks at Texas A&M. Their efforts in behalf of this project are greatly appreciated.

This project would not have been completed without the tireless dedication of our undergraduate telephone interviewers. We wish to recognize and extend our appreciation to Debra Barnes, Barbara Clinger, Danise Davis, Heather Hodney, Peggy Holland, George Isaacson, Jr., Ann Lautenzenheiser, Carl Shafer, Susan Sparks and Lou Tompkins. Appreciation is extended to Hope Peart for typing the manuscript.

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CONTENTS

ABSTRACT	iii
ACKNOWLEDGEMENTS	v
INTRODUCTION	1
METHODS	8
Study Design	8
Study Population	8
Sampling Design	9
Pretest	13
Sampling Procedure	13
Data Collection	14
Calculation of Population Estimates	16
RESULTS	19
Boat Owner Fishing Participation	19
Bay Fishing	23
Number and Distribution of Fishermen	23
Offshore Fishing	31
Number and Distribution of Fishermen	31
Distance Traveled Offshore	39
CONCLUSIONS AND IMPLICATIONS	43
REFERENCES	48
APPENDIX A: Telephone Interview Survey	51
APPENDIX B: Mail Questionnaire Survey Instrument	52
APPENDIX C: Number of Bay Boat Fishermen in the Sample by County of Residence and Bay System Fished	61

APPENDIX D: Number of Offshore Boat Fishermen in the Sample
by County of Residence and Port of
Departure 64

LIST OF TABLES

1.	Texas Counties less than 100 Miles Inland	11
2.	Texas Counties 100 Miles or more Inland	12
3.	Number of Interviews Conducted and Mail Survey Responses for Coastal and Inland Strata	16
4.	Estimates of the Number of Fishermen and Number of Trips Made to Texas Bay Systems by Texas Boat Fishermen	24
5.	Distribution of the Total Number of Bay Fishermen and Trips by Bay System for the Coastal and Inland Strata	26
6.	Estimates of the Number of Fishermen and Number of Trips Made to Texas Bay Systems by Coastal Strata Boat Fishermen (n=1062)	28
7.	Estimates of the Number of Fishermen and Number of Trips Made to Texas Bay System by Inland Strata Boat Fishermen (n=75)	30
8.	Number of Bay Boat Fishermen Residing in Coastal Counties as Defined	31
9.	Estimates of the Number of Fishermen and Number of Trips Made from Texas Ports to Offshore Waters by Texas Boat Fishermen	32
10.	Distribution of the Total Number of Offshore Fishermen and Trips by Port of Departure for the Coastal and Inland Strata	35
11.	Estimates of the Number of Fishermen and Number of Trips Made to Offshore Waters by Coastal Stratum Boat Fishermen (n=227)	36
12.	Estimates of the Number of Fishermen and Numbers of Trips to Offshore Waters by Inland Stratum Boat Fishermen (n=22).	37
13.	Number of Offshore Boat Fishermen Residing in Coastal Counties as Defined	39
14.	Average Distance Traveled Offshore by Texas Boat Fishermen	41
15.	Farthest Distance Traveled Offshore by Texas Boat Fishermen	41

LIST OF FIGURES

1. Survey Sample Design 10

2. Distribution of general fishing locations for the population
of Texas boat owners 20

3. Distribution of general fishing locations for the population
of Texas boat owners by coastal and inland strata 22

INTRODUCTION

Historically, fisheries research throughout the United States has focused on commercial fisheries. As a result, much of the available data concerning the biological, economic and social impacts of fisheries pertains only to the commercial fishing industry.

This narrow focus is beginning to change, however. In recent years, marine recreational fishing has received increased recognition in fisheries research, decision-making and development. One reason is that marine recreational fishing can no longer be considered an inconsequential use of fisheries resources because of the growing number of saltwater anglers (U.S Heritage Conservation and Recreation Service, 1977; U.S. Fish and Wildlife Service, 1961, 1966, 1972, 1977; Deuel, 1973), the sizable annual harvests (Merriner, 1976; Stroud, 1973; Deuel, 1978), and the significant economic impacts generated (Centaur Management Consultants, 1977).

Another reason for the emerging interest in Marine Recreational Fisheries is the Magnuson Fishery Conservation and Management Act of 1966, which mandates "comprehensive fisheries management" with equitable treatment of both sport and commercial interests. Such management involves the concept of optimum sustainable yield, which is sensitive to social, economic and political considerations, as well as to traditional biological aspects of fisheries management. Before marine recreational fisheries can be accurately and fully considered in fisheries

allocations and management plans, there is a need for greater understanding of recreational boat fishermen, the extent and distribution of their saltwater fishing activity, fishing demand, catch per unit effort, and much more. National studies, such as those being conducted by the National Marine Fisheries Service (NMFS), can increase understanding of many of these points but cannot generate all the data and analyses needed for state, regional and local decision-making. There is a need to supplement the NMFS national catch-and-effort surveys with studies that will yield understanding of related social and economic variables (Centaur Associates, Inc., 1978). Also, more detailed studies, conducted at the state level, should complement understanding derived from studies at the national level.

Progress in attaining insight and knowledge about the extent, nature and patterns of saltwater boat fishing has been gradual. However, fisheries management agencies now seem to recognize that social and economic data are as important as biological information in effective management of marine fisheries under the Magnuson Act. Knowledge of fishery stocks is limited, but even less is known about the extent of fisheries utilization by recreational fishermen. The void in social and economic understanding of marine recreational fishing is reflected in the fact that NMFS contracted with Human Sciences Research, Inc. and Centaur Associates, Inc. to hold a workshop in 1979 to establish "the social and economic information requirements for management of marine recreational fisheries". (Human Sciences Research, Inc., 1979). This research recognized these information requirements

and was designed to complement ongoing NMFS national studies and state creel surveys.

The Gulf of Mexico Fishery Management Council, in cooperation with the Gulf states, has partially implemented a vessel enumeration system to identify recreational boaters fishing in the Fishery Conservation Zone (FCZ), thereby establishing a sampling frame for future surveys (Schmied, 1980). Findings reported in this paper should provide a useful prototype for collection of such data by the Gulf states if sampling frames are established through the boat registration process. Findings relative to the extent to which the 200 mile FCZ is used for recreational fishing and where this activity is concentrated should be valuable to the Gulf Council in developing and implementing fishery management plans, and to the Minerals Management Service (formerly the U.S. Bureau of Land Management-Outer Continental Shelf Office) in assessing impacts of development of the outer continental shelf.

Green et al. (1981) stated "the management of any fishery for optimum yield requires information on the numbers and activity of all fishermen within each user group (commercial and recreational) harvesting the resource." General recreational fishing license data from Texas do not reveal where recreational fishermen fish (freshwater, saltwater or both), which bay systems and port areas are used, nor how often.

The Texas Parks and Wildlife Department (TPWD) completed two creel surveys to understand the distribution of saltwater fishermen and their harvests (Breuer et al., 1977; Heffernan et al., 1975). These surveys

of finfish harvests in eight selected Texas bays showed that more than 95 percent of saltwater anglers were Texans. They also showed that local fishermen accounted for less than 50 percent of the fishing days on San Antonio and Aransas Bays. "Locals" were defined as those residing in counties directly adjacent to the bay. On the remaining six bays, locals accounted for 72 to 94 percent of fishing days. These surveys sampled all saltwater anglers and made no distinction based on mode or location of fishing.

Several statewide surveys have investigated the number, distribution and characteristics of saltwater fishermen. From household surveys, Belden Associates (1958, 1960) estimated the total number of saltwater fishermen during 1958 and 1960 (748,000 and 665,000, respectively). NMFS (1980) estimated the number of saltwater fishermen in Texas for calendar year 1979 to be approximately 1,319,000. Green et al. (1981), in a household survey, estimated that there were approximately 940,000 resident saltwater fishermen. Ditton and Albers (1983), applying Belden Associates' (1960) finding that 7 percent of the population engaged in saltwater fishing to an estimated 1979 state population of 13,462,300, found that approximately 942,361 Texans fished in saltwater. Thus, depending upon the figures used, saltwater fishing participation increased between 25 and 50 percent from 1960 to 1980.

Because of a managerial interest in the extent of recreational fishing in the FCZ and because of our incremental approach to the study of marine recreational fishing and its participants (Ditton and Jarman, 1974), a boat fishing focus was adopted for this study. This is a

subset of the total number of state residents who fish variously in saltwater environments. Boat fishermen are a useful study population for examining saltwater fishing patterns because in most Texas bays, they account for 30 to 50 percent of the annual saltwater fishing effort and 66 to 81 percent of the annual recreational finfish harvest (Heffernan et al., 1977; Breuer et al., 1977). Therefore, virtually all offshore recreational fishing in Texas waters, excluding charter and party boat fishing, should be accounted for by Texas boat fishermen, but this assumption has not been examined empirically.

The National Marine Recreational Fishery Statistics Survey (NMFS, 1980) estimated the number of saltwater fishermen in each state and number of fishing trips by marine recreational fishermen by mode (i.e., beach/bank, party/charter boat, and private/rental boat) for the Gulf of Mexico. However, it did not estimate the number of fishermen by mode, nor did it allow for a state-by-state analysis of fishing trips by mode. NMFS officials say that these analyses may be completed later using data already collected for the 1980 report.

When this study began, no in-depth study of the boat fishing constituency in Texas had been done. Subsequently, Green et al., (1981) conducted a household survey to establish the number of Texas residents fishing in fresh and salt water, as well as the numbers and proportions of residents using different access methods (pier, wade-bank, boat, etc.). They could not establish the size of the "boat access" population because residents who used two or more saltwater access methods were put in a "combined method" category, which accounted for

the majority of responses. Further analysis of TPWD data (Matlock, 1982) revealed that 480,000 (51 percent) saltwater fishermen fished from a boat at least once during the year.

The objectives of this statewide survey of boatowners were to (1) identify the general distribution of fishermen within the state boatowner population; (2) identify the distribution of fishing participation within the saltwater environment (bay, offshore, or both); (3) identify the extent of resident boat fishing activity associated with each Texas bay system and offshore area; (4) investigate the distribution of bay and offshore fishermen according to their place of residence in Texas to show how saltwater boat fishermen are distributed statewide; (5) identify the extent to which offshore fishermen travel seaward and use the Fishery Conservation Zone, which extends from the edge of state jurisdiction to a distance of 200 miles off the U.S. coast; and (6) develop implications of study findings for fisheries management and recreation and tourism development.

Improved understanding of the size and distribution of the sport fishing constituency gained from this study should allow for comparisons between sport and commercial fishing in fisheries decision making. Knowledge of coastal fisheries interests offers the potential for increased state funding of fish propagation and other expansions in fisheries management. Also, as a result of the study, coastal fisheries may be able to share increasingly in Dingell-Johnson fishery enhancement funds, which should result in increased public enjoyment of marine fisheries resources. Study results should also be beneficial to the

private sector. For example, the distribution and volume of saltwater boat fishermen by geographic location should be useful input into investment decisions related to marina developments, retail outlets for saltwater fishing and boating equipment, and other businesses servicing the fishing community.

METHODS

Study Design

An area-wide survey of the Texas boat fishing population was used to obtain the data needed to meet the study objectives. Although there are several ways to study a fishing population, the area-wide survey offers several advantages. First, it is useful in determining the extent and character of fishing participation of a particular regional population, or in this case, the statewide population. This is in contrast to the creel survey and field intercept study, which are limited to identifying fishing effort at specified locations. Also, the area-wide survey gives a complete cross-section of the population, eliminating "on-site" bias because it includes avid and casual fishermen as well as non-fishermen. Finally, because the survey population is clearly defined in this approach, sample findings can be extrapolated to estimates of the entire population with known probabilities of error.

Study Population

Saltwater fishing in Texas coastal bays and offshore waters is greatly dispersed. Surf, pier, wade/bank and boat fishermen use many access points along the 360 miles of Gulf beaches and 2,500 miles of bay shoreline to fish for a variety of species (TPWD, 1976).

To explore the nature of saltwater fishing activity on a statewide basis, and because not all persons fishing in Texas are required by law

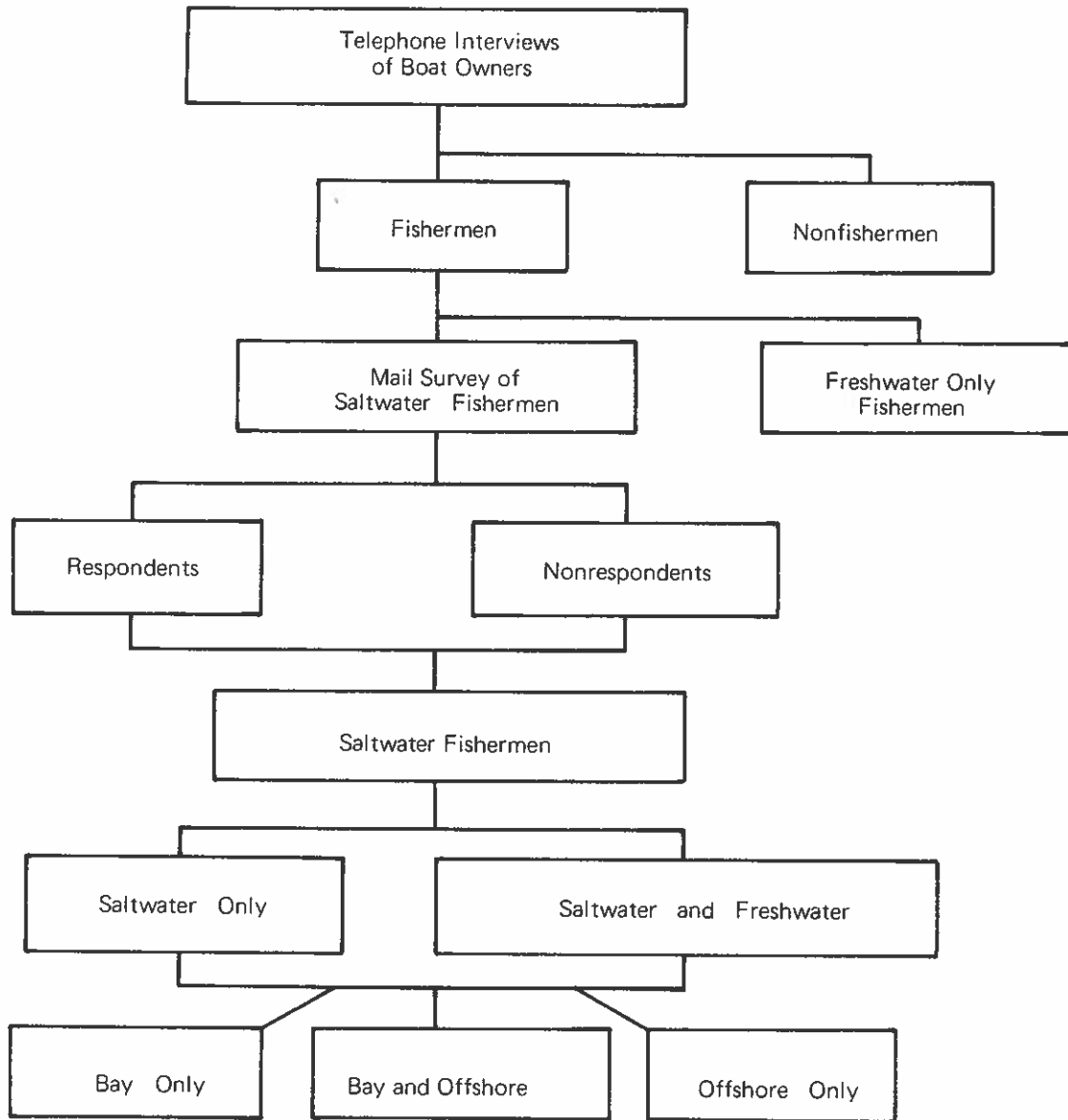
to have a fishing license, a means was needed to access this specific fishing population. Because TPWD does not record and store Texas sportfishing license receipts in a manner amenable to sampling and analysis, the computerized boat registration file compiled and maintained by TPWD was used.

Sampling Design

On August 30, 1980, 528,819 pleasure boats were registered in Texas. However, some boats are not used for fishing, and of those that are, some are used for freshwater fishing. Figure 1 shows the sub-groups or types of respondents in a sample of boatowners. Previous studies of Texas boatowners identified the main source of attrition from the overall sample to be nonfishermen, approximately 34 percent of the boatowners with boats less than 26 feet (Ditton and Graefe, 1978). Boatowners who fish only fresh water also comprised a substantial portion of the sample (approximately 45 percent of the boatowners with boats less than 26 feet).

Any estimate of fishing effort must consider the distribution of all saltwater boat fishermen throughout the state. Only in this way can changes in effort be anticipated and predicted. Of particular concern in this study was the distribution of saltwater boat fishermen who reside in inland areas of Texas. The frequency relationship between the distance from saltwater and saltwater fishing was important. Belden Associates (1960) found that about 22 percent of the households within 100 miles of the coast had members who had fished in saltwater during the previous year. They also found that four to five percent of the

Figure 1: Survey Sample Design



households in the inland area of the state (i.e., more than 100 miles from the coast) had members that had fished in saltwater during the previous year.

Thus, in this study Texas was divided into coastal and inland strata to achieve greater efficiency in locating saltwater fishermen. The coastal stratum consisted of 46 counties within 100 miles of the coast (Belden, 1960). These counties are listed in Table 1. The remaining 208 counties were classified as inland counties and are listed in Table 2.

TABLE 1

Texas Counties less than 100 Miles Inland

(Coastal County Stratum)

Cameron	McMullen	Lavaca	Montgomery
Hidalgo	Live Oak	Fayette	San Jacinto
Starr	Bee	Colorado	Liberty
Willacy	Refugio	Wharton	Jefferson
Brooks	Aransas	Matagorda	Hardin
Jim Hogg	Karnes	Brazoria	Tyler
Kenedy	Goliad	Fort Bend	Jasper
Jim Wells	Gonzales	Austin	Orange
Duval	DeWitt	Waller	Newton
Kleberg	Victoria	Harris	Polk
Nueces	Calhoun	Galveston	
San Patricio	Jackson	Chambers	

TABLE 2

Texas Counties 100 Miles or more Inland

(Inland County Stratum)

Anderson	Dickens	Kendall	Red River
Andrews	Dimmit	Kent	Reeves
Angelina	Donley	Kerr	Roberts
Archer	Eastland	Kimple	Robertson
Armstrong	Ector	King	Rockwall
Atascosa	Edwards	Kinney	Runnels
Bailey	Ellis	Knox	Rusk
Bandera	El Paso	Lamar	Sabine
Bastrop	Erath	Lamb	San Augustine
Baylor	Falls	Lampasas	San Saba
Bell	Fannin	La Salle	Schleicher
Bexar	Fisher	Lee	Scurry
Blanco	Floyd	Leon	Shackelford
Borden	Foard	Limestone	Shelby
Bosque	Franklin	Limpscomb	Sherman
Bowie	Freestone	Llano	Smith
Brazos	Frio	Loving	Somervell
Brewster	Gaines	Lubbock	Stephens
Briscoe	Garza	Lynn	Sterling
Brown	Gillespie	McCulloch	Stonewall
Burleson	Glasscock	McLennan	Sutton
Burnet	Gray	Madison	Swisher
Caldwell	Grayson	Marion	Tarrant
Callahan	Gregg	Martin	Taylor
Camp	Grimes	Mason	Terrell
Carson	Guadalupe	Maverick	Terry
Cass	Hale	Medina	Throckmorton
Castro	Hall	Menard	Titus
Cherokee	Hamilton	Midland	Tom Green
Childress	Hansford	Milan	Travis
Clay	Hardeman	Mills	Trinity
Cochran	Harrison	Mitchell	Upshur
Coke	Hartley	Montague	Upton
Coleman	Haskell	Moore	Uvalde
Collin	Hays	Morris	Val Verde
Collingsworth	Hemphill	Motley	Van Zandt
Comal	Henderson	Nacogdoches	Walker
Comanche	Hill	Navarro	Ward
Concho	Hockley	Nolan	Washington
Cooke	Hood	Ochiltree	Webb
Coryell	Hopkins	Oldham	Wheeler
Cottle	Houston	Palo Pinto	Wichita
Crane	Howard	Panola	Wilbarger

Table 2 continued

Crockett	Hudspeth	Parker	Williamson
Crosby	Hunt	Parmer	Wilson
Culberson	Hutchinson	Pecos	Winkler
Dallam	Irion	Potter	Wise
Dallas	Jack	Presidio	Wood
Dawson	Jeff Davis	Rains	Yoakum
Deaf Smith	Johnson	Randall	Young
Delta	Jones	Reagan	Zapata
Denton	Kaufman	Real	

Pretest

A random sample of 500 coastal stratum boatowners and 500 inland stratum boatowners was selected to pretest the telephone interview schedule. The telephone interviews identified 162 coastal and 18 inland saltwater fishermen (32.4 and 3.6 percent, respectively, of all subjects interviewed). Each saltwater fisherman was then mailed a survey questionnaire. Another copy of the questionnaire was mailed three weeks later to those saltwater fishermen who had not responded. Coastal respondents numbered 118 (72.8 percent), and inland respondents numbered 15 (83.3 percent). As a result of the pretest, the wording of questions asked in telephone interview and mail questionnaire was changed slightly, but content remained the same.

Sampling Procedure

Personnel from the TPWD's Data Processing Division divided the state boat registration file into coastal and inland strata based on the Texas county of registration. A simple random sample of 14,000 boatowners was selected from the 186,034 registered boats in the 46

coastal counties, and a sample of 8,000 boatowners was selected from the 343,034 boats registered in the 208 inland counties. In each sample one of the first four boatowners was randomly selected to be the initial sample subject. Thereafter, every fourth boat owner was selected from each sample file for this study. This systematic sampling with a random start resulted in sample sizes of 3,500 coastal and 2,000 inland boatowners.

Data Collection

Boatowners in each sample were interviewed by telephone (Appendix A) during October and November 1980 (Field, 1973; Metze, 1977). If a boatowner's telephone number was unavailable through the telephone information service, the next boatowner listed in the working file was selected as a replacement. If the respondent had not used his boat in the previous year, he was asked why, and the interview was terminated.

Instead of asking respondents about their fishing activity during the previous calendar year, fishermen were asked in October and November about their most recent fishing activities, which could be recalled more easily. The study year was October 1979 through September 1980. The effective recall period however, was eight to nine months because resident saltwater fishing activity decreases during winter (Ditton and Graefe, 1978; Ditton et al., 1980).

The methodology study conducted by Human Sciences Research, Inc. (Brown, 1977) pointed to the need for designs that avoid "problems of recall." In their contract work for NMFS, Hiett and Worrall (1977) concluded that "recall of specific fishing dates is poor, although the

total number of fishing trips may be reasonably accurate." Because the present study is concerned with general patterns of recreational activity rather than having respondents recall specific trip dates with related mode of fishing, daily expenditure and hours of effort, we feel that recall was not a problem for our study design.

Respondents who reported using their boats were asked questions as to the nature of their boating activity. If saltwater fishing was not reported, the freshwater and saltwater boating activities reported were recorded, and the interview was terminated.

Boatowners who had used their boats for saltwater fishing during the study year were asked where and how often they had fished. Then they were asked to complete and return a questionnaire (Appendix B) to supply further information on their fishing activities and personal characteristics. Mailing addresses were also verified.

A cover letter explaining the need for further fishing and social information and a questionnaire were mailed first class to all boatowners who reported saltwater fishing during the study year. A postage-paid return envelope was included. If a questionnaire had not been returned two weeks after it was mailed, a second one was mailed with a letter reminding the respondent to complete and return his questionnaire.

The number of telephone interviews, number of saltwater fishermen, and questionnaire response rates for each stratum and for the total sample are shown in Table 3. The total usable response rate for the questionnaire was 66 percent. Unusable responses included incomplete

questionnaires, responses received after the cut-off date for analysis, and questionnaires that were undeliverable by the U.S. Postal Service.

TABLE 3

Number of Interviews Conducted and Mail Survey Responses for Coastal and Inland Strata

Type of Survey Response	Coastal Stratum		Inland Stratum		Total	
	N	%	N	%	N	%
<u>Telephone Survey</u>						
Telephone Interviews	3,500	100.0	2,000	100.0	5,500	100.0
Saltwater Fishermen	1,105	31.6	79	4.0	1,184	21.5
<u>Mail Survey</u>						
Questionnaires Mailed	1,105	100.0	79	100.0	1,184	100.0
Undeliverable Questionnaires	18	1.6	2	2.5	20	1.7
Nonreturned Questionnaires	339	30.7	16	20.3	355	30.0
Unusable Questionnaires	19	1.7	3	3.8	22	1.9
Usable Questionnaires	729	66.0	58	73.4	787	66.4

Calculation of Population Estimates

Sample findings often were extrapolated to the statewide population of boatowners. The coastal sample size of 3,500 from a population size of 186,034 represents a sampling fraction of 1.88 percent. The inland sample size of 2,000 from a population size of 342,034 represents a sampling fraction of 0.58 percent. Dividing these ratios into sample frequencies yields estimates of frequencies for the coastal and inland

population of boatowners, respectively. The coastal and inland population estimates can then be combined to produce estimates for the entire population of Texas boatowners. For example, 1,105 saltwater fishermen in the coastal sample of 3,500 yields 58,733 saltwater fishermen in the coastal boatowner population.

Such extrapolations are the best estimates available from the data, but they are subject to error. Estimates probably would differ slightly if survey findings were applied to a different sample. Sampling error is minimized as sample size increases and as the distribution under consideration becomes more skewed (towards zero or 100 percent). The closer a given frequency is towards zero or 100 percent, the greater the accuracy of the estimate.

To understand the accuracy of the frequency distributions and corresponding population estimates, one must consider sample sizes (n). Sample sizes for different variables vary slightly because some respondents did not answer all questions. In addition, sample size decreases as sub-groups of the sample are isolated for analysis. The 95% confidence intervals were calculated as $p \pm 2\sqrt{p(1-p)/n}$, where p is the proportion within a given response category, and n is the sample size. For example, if 40 percent of a sample of 300 fishermen used a particular bay system, the confidence interval would be $2\sqrt{(.4)(.6)/300} = .057$, which means that, with 95% confidence, the percentage of saltwater boat fishermen in the entire population using that bay system lies in the range of 40 ± 5.7 percent. This procedure can be utilized to determine the accuracy of any of the percentages given in this report.

Because sample sizes were so large in this survey, most confidence intervals are less than $\pm 5\%$ and, therefore are not reported in the tables.

RESULTS

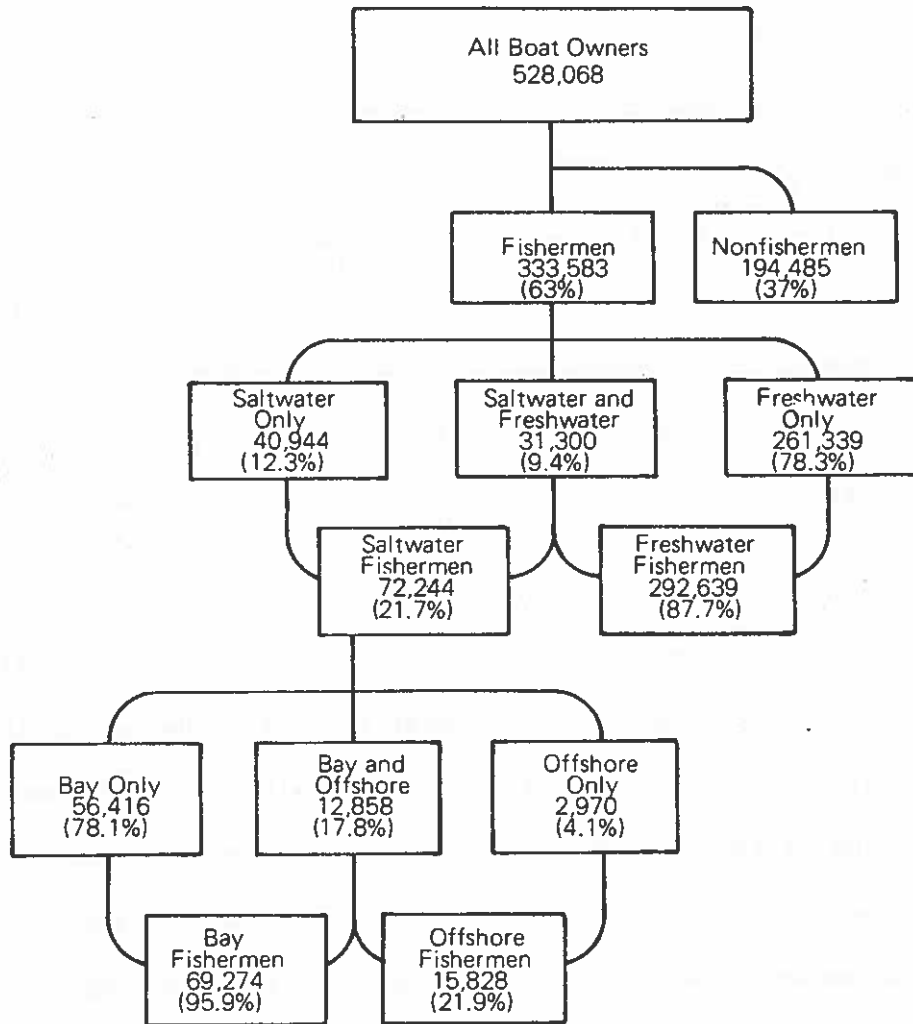
This section includes findings relative to fishing patterns of Texas pleasureboat owners. First, the general distribution of fishermen within the boatowner population is presented. Also, we examine the distribution of fishing participation across fresh and salt water and the location of saltwater fishing activity (bay or offshore). Next, fishing activity relative to the eight Texas bay systems is presented in terms of 1) number of fishermen using each bay; 2) number of trips made to each system; and 3) residence of fishermen using each bay. The same approach is applied to offshore fishing for nine major Texas port areas.

Boat Owner Fishing Participation

More than 60 percent of the Texas boatowners used their boats for fishing during the study year. The number of boat fishermen in the state and their distribution across fresh and saltwater environments, as well as bay and offshore locations, are shown in Figure 2. More than 75 percent of the boat fishermen fished only in fresh water, and slightly more than 12 percent fished only in saltwater. The remaining nine percent fished in both fresh and salt water.

Overall, 22 percent of the boatowners who fished during the study year fished in salt water, and most of them (96 percent) fished in at least one of the eight Texas bay systems. Only 22 percent reported offshore fishing. Less than 3,000 (four percent) fished exclusively offshore.

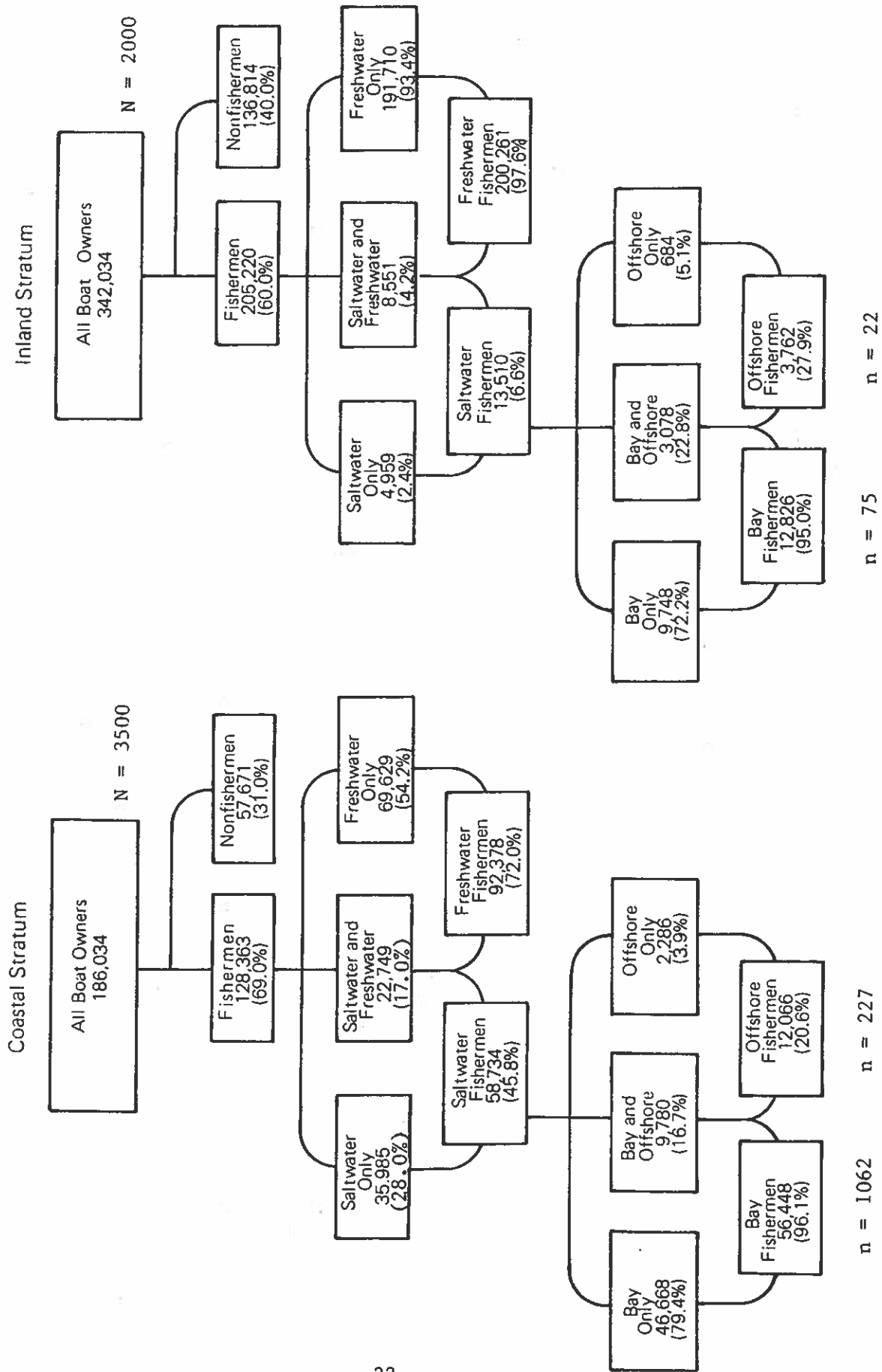
Figure 2: Distribution of general fishing locations for the population of Texas boat owners.



To determine the spatial distribution of saltwater boat fishermen throughout Texas, fishermen were grouped into two strata by county of residence. The coastal stratum included the 46 counties within 100 miles of the coast, and the inland stratum included the remaining 208 counties. Figure 3 shows the number of boatowners, fishermen and saltwater fishermen, and their distribution by fishing environment and location, for each stratum. Most of the fishermen resided in the inland stratum, but more boatowners from the coastal stratum fished. Almost 70 percent of the coastal boatowners used their boats to fish, compared to 60 percent of the inland boatowners.

Coastal and inland boat fishermen also differed in their fishing patterns. Although most fishermen from both strata fished in fresh water, 46 percent of the fishermen from the coast reported some boat fishing in saltwater (bay and offshore), compared to seven percent of the inland boat fishermen. This is reflected in the fact that 81 percent of all Texas boatowners who reported fishing in at least one Texas bay system resided in the county area. Likewise, more than 76 percent of all offshore fishermen resided in the coastal counties. Relatively few (five percent or less) fishermen from either stratum fished only offshore. Most offshore fishermen also fished in bay waters.

Figure 3: Distribution of general fishing locations for the population of Texas boat owners by coastal and inland strata



Bay Fishing

Number and Distribution of Fishermen

An estimated 69,274 Texas boatowners fished in at least one saltwater bay system during the study year (Table 4), of which, 8,860 (about 13 percent) fished in more than one bay system. Therefore, most fishermen concentrate their fishing in a single bay system. Boat fishermen made 814,066 trips to the eight bay systems during the study year.

Nearly one-half of all bay boat fishermen fished in Galveston Bay. Only three other bays were used by more than 10 percent of the fishermen in the study year. Nearly two-thirds of the fishermen fished in either Galveston or Matagorda Bays.

The average number of fishing trips in each bay was about the same. Boat fishermen in the upper Laguna Madre and Aransas Bay systems fished slightly less frequently than those using the other bays. On the average, boat fishermen made 11 bay fishing trips during the study year. More than 60 percent of all bay fishing trips were made to Galveston and Matagorda Bays, probably a result of the large population and number of boats in the Houston/Galveston area.

Bay boat fishermen were classified into coastal and inland strata. The vast majority of bay fishermen, with the exception of those fishing in the Aransas Bay system, resided in the coastal county stratum (Table 5). Overall, 80 percent of the bay fishermen were from the coastal county stratum. For Aransas Bay, 70 percent of the anglers were from the inland stratum.

Table 4: Estimates of the Number of Fishermen and Number of Trips Made to Texas Bay Systems by Texas Boat Fishermen

Bay System	Number of Boat Fishermen	Percent of Boat Fishermen	Mean Number of Trips	Total Number of Trips	Percent of Trips
Sabine	5,262	7.9	10.1	53,146	6.6
Galveston	31,817	47.6	11.6	369,191	45.3
Matagorda	11,915	17.8	11.7	139,356	17.1
San Antonio	2,202	3.3	10.7	23,547	2.9
Aransas	8,761	13.1	8.9	77,711	9.5
Corpus Christi	7,030	10.5	10.1	70,984	8.7
Upper Laguna	3,547	5.3	8.8	31,108	3.8
Lower Laguna	4,044	6.1	12.1	49,023	6.0
TOTAL	74,578*		10.9	814,066	100.0

*This total is larger than the actual number of bay boat fishermen (N=69,274) because a fisherman may have fished more than one bay system.

Coastal residents also accounted for almost 90 percent of the bay fishing trips made by boat fishermen (Table 5). Coastal stratum residents accounted for a minority of boat fishing trips to Aransas Bay. Thus, the extensity and intensity of boat fishing participation in Texas bays by inland residents was minor except for Aransas Bay.

Tables 6 and 7 summarize data for coastal and inland boat fishermen, respectively. Several comparisons can be made relative to the distribution of boat fishermen and their bay fishing patterns. First, more than one-half of the coastal stratum boat fishermen fished in the Galveston Bay system at least once during the study year. Comparatively few coastal strata fishermen used any of the remaining bay systems (Table 6). More than 70 percent of all coastal boat fishermen fished in either Galveston Bay or Matagorda Bay. This contrasts sharply with the inland stratum of boat fishermen, most of whom fished in Aransas and Corpus Christi Bays (Table 7). Also, no boat fishermen from the inland stratum used Sabine Lake during the study year.

Second, the mean number of bay fishing trips taken by coastal stratum fishermen was consistent across all bay systems (Table 6). Fishermen from the inland stratum fished in Texas bays less than half as frequently as coastal fishermen. Inland boat fishermen, using Aransas and Matagorda Bays, averaged more trips per year than those using other bays (Table 7).

Third, the Galveston/Matagorda Bay area on the upper coast and the Aransas/Corpus Christi Bay area on the central coast were the major

Table 5: Distribution of the Total Number of Bay Fishermen and Trips by Bay System for the Coastal Inland Strata

Bay System	Bay Fishermen		Bay Trips			
	Number	% Coastal	% Inland	Number	% Coastal	% Inland
Sabine	5,262	100.0	0.0	53,146	100.0	0.0
Galveston	31,817	93.6	6.4	369,191	97.6	2.4
Matagorda	11,915	85.6	14.4	139,356	92.3	7.7
San Antonio	2,202	84.5	15.5	23,547	96.4	3.6
Aransas	8,716	29.9	70.1	77,711	38.2	61.8
Corpus Christi	7,030	63.5	36.5	70,984	85.5	14.6
Upper Laguna	3,547	61.4	38.6	31,108	78.5	21.5
Lower Laguna	4,044	78.9	21.1	49,023	93.0	7.0
TOTAL	74,578	79.8 (n=1062)	20.2 (n=75)	814,066	89.1	10.9

centers of bay boat fishing. Most of the fishermen on the upper coast were coastal residents, they also accounted for most of the trips. In the middle coast, boat fishermen using Corpus Christi Bay were primarily coastal residents, while Aransas Bay fishermen were mostly inland residents (Table 5). This latter point is important in light of increasing travel costs associated with fishing and other outdoor recreation activities. Boat fishing in Aransas Bay may be subject to more fluctuations than other Texas bay systems because the primary user population is from inland areas.

This consideration of out-of-area fishermen was further investigated using data shown in Appendix C. Local boat fishermen were defined as those who resided within two counties inland of the bay in which they fished. This procedure accounted for other coastal fishermen from outside their immediate area who travel to the bay system as well as some inland fishermen. Local boat fishermen were in the majority at all bays except Aransas Bay (Table 8), where only 18 percent of all fishermen were local residents (as defined). Sabine Lake and Galveston Bay drew fishermen almost entirely from the surrounding local areas.

Appendix C shows the number of boatowners in the sample who fished various bay systems, by county of residence. First, the number of counties contributing fishermen to each bay system (last line of Appendix A) was not proportional to the number of fishermen using the bay. For example, Galveston Bay fishermen, who were the most numerous, represented 25 different counties. Matagorda and Aransas Bays, with

Table 6: Estimates of the Number of Fishermen and Number of Trips Made to Texas Bay Systems by Coastal Strata Boat Fishermen (n=1062).

Bay System	Number of Boat Fishermen	Percent of Boat Fishermen	Mean Number of Trips	Total Number of Trips	Percent of Trips
Sabine	5,262	9.6	10.1	53,146	7.3
Galveston	29,765	54.1	12.1	360,162	49.7
Matagorda	10,205	18.6	12.6	128,583	17.7
San Antonio	1,860	3.4	12.2	22,692	3.1
Aransas	2,604	4.7	11.4	29,686	4.1
Corpus Christi	4,465	8.1	13.6	60,724	8.4
Upper Laguna	2,179	3.9	11.2	24,405	3.4
Lower Laguna	3,189	5.8	14.3	45,603	6.3
TOTAL	59,529*		12.2	725,001	100.0

*This total is larger than the actual number of coastal stratum bay boat fishermen (n=56, 448) because a fisherman may have fished more than one bay system.

less than half the number of Galveston Bay fishermen, were represented by slightly more counties. Fishermen from only seven different counties reported fishing in Sabine Lake, perhaps because of the proximity of Galveston Bay. In addition, Sabine Lake lies on the easternmost edge of the Texas coast and adjoins Louisiana. The extent and nature of boat fishing undertaken by Louisiana residents is not known.

Appendix C also shows that most boat fishermen reside in urban counties (e.g., Harris, Galveston, Bexar and Dallas). Because most Texas boat fishermen reside in the coastal stratum, continued population growth in this area probably will result in even greater percentages of bay fishing effort coming from the local area.

Table 7: Estimates of the Number of Fishermen and Number of Trips Made to Texas Bay System by Inland Strata Boat Fishermen (n=75)

Bay System	Number of Boat Fishermen	Percent of Boat Fishermen	Mean Number of Trips	Total Number of Trips	Percent of Trips
Sabine	0	0	0	0	0
Galveston	2,052	17.1	4.4	9,029	10.2
Matagorda	1,710	14.3	6.3	10,773	12.1
San Antonio	342	2.9	2.5	855	1.0
Aransas	6,157	51.4	7.8	48,025	53.9
Corpus Christi	2,565	21.4	4.0	10,260	11.5
Upper Laguna	1,368	11.4	4.9	6,703	7.5
Lower Laguna	855	7.1	4.0	3,420	3.8
TOTAL	15,049*		5.4	89,065	100.0

*This total is larger than the actual number of inland stratum bay boat fishermen (n=12,826) because a fisherman may have fished more than one bay system.

TABLE 8

Number of Bay Boat Fishermen Residing in Coastal Counties as Defined

Bay System	Number of Fishermen	Number of Local Fishermen	Percent of Local Fishermen
Sabine Lake	5,262	4,252	80.8
Galveston Bay	31,817	29,086	91.4
Matagorda Bay	11,915	6,574	55.2
San Antonio Bay	2,202	1,193	54.2
Aransas Bay	8,761	1,543	17.6
Corpus Christi Bay	7,030	4,084	58.1
Upper Laguna Madre	3,547	1,843	52.0
Lower Laguna Madre	4,044	2,571	63.6
TOTAL	74,578	51,146	68.6

Offshore FishingNumber and Distribution of Fishermen

Offshore fishing along the Texas coast attracted considerably fewer boat fishermen than bay fishing. A total of 15,828 boatowners statewide used their boats to fish offshore (Table 9). These fishermen used nine ports along the Texas coast to make nearly 120,000 trips offshore.

Offshore fishing activity was not evenly distributed along the Texas coast: three port areas accounted for nearly three-fourths of the boat fishermen. Almost all offshore boat fishermen used the same port

Table 9: Estimates of the Number of Fishermen and Number of Trips Made From Texas Ports to Offshore Waters by Texas Boat Fishermen

Port of Departure	Number of Boat Fishermen	Percent of Boat Fishermen	Mean Number of Trips	Total Number of Trips	Percent of Trips
Beaumont	1,435	9.1	9.1	13,076	10.9
Galveston	5,498	34.7	8.6	47,192	39.4
Freeport	2,510	15.9	5.7	14,321	12.0
Port O'Connor	1,417	9.0	7.1	10,009	8.4
Port Lavaca	437	2.8	12.5	5,468	4.6
Port Aransas	3,723	23.5	6.2	23,070	19.3
Corpus Christi	159	1.0	2.7	425	.4
Port Mansfield	425	2.7	10.1	4,305	3.5
Port Isabel	608	3.8	3.0	1,842	1.5
TOTAL	16,212*		7.4	119,708	100.0

*This total is larger than the actual number of offshore boat fishermen (N=15,828) because a fisherman may have fished out of more than one port.

for all of their fishing trips. Less than three percent departed from two different ports and none departed from more than two ports. Nearly 35 percent of the boat fishermen departed from Galveston. Port Aransas and Freeport were the next most frequently chosen ports. The other six ports accounted for the remaining 28 percent of the boat fishermen.

It is understandable why few fishermen departed from Port Lavaca or Corpus Christi, because additional travel time is required to reach the Gulf from those ports. Also, they are relatively close to Port O'Connor and Port Aransas, respectively, which offer better access to the Gulf. Relatively few boat fishermen depart from Port Mansfield and Port Isabel, probably because of the lack of a major population center and large boat fleet in the adjacent area.

Generally, the distribution of offshore fishing trips concentrated on three port areas: Galveston, Freeport and Port Aransas (Table 9). More than 70 percent of all offshore fishing trips departed from these three ports. A relatively small percentage of trips was generated from the lower coast ports of Port Mansfield and Port Isabel.

The average number of offshore trips varied with port of debarkation. Some of the ports least used for offshore fishing (e.g., Beaumont, Port Lavaca and Port Mansfield) had the highest average number of offshore trips made by boat fishermen (Table 9).

Offshore boat fishermen were categorized into coastal and inland strata. Table 10 shows the total number of fishermen and total number of trips made, by port, for each stratum. Overall, 75 percent of all

offshore boat fishermen resided in the coastal stratum. The middle coast ports of Port O'Connor, Port Lavaca and Port Aransas, and Port Isabel on the lower coast, each had substantial percentages of boat fishermen from inland counties. Moreover, a majority of the boat fishermen making offshore trips from Port Aransas and Port Isabel were inland residents. A small percentage of boat fishermen fishing out of Galveston and Freeport came from the inland stratum.

In terms of the number of offshore fishing trips made by coastal and inland boat fishermen, Port Aransas was the only port where a majority of the trips were made by inland strata fishermen (Table 10). For the other ports, coastal stratum fishermen accounted for 70 to 100 percent of the offshore trips. Taking all port areas into account, boat fishermen from the coastal stratum accounted for 85 percent of all offshore trips.

Tables 11 and 12 show the distribution of coastal and inland strata boat fishermen and the number of offshore trips by port area, respectively. The three upper coast ports of Beaumont, Galveston and Freeport accounted for more than 70 percent of the boat fishermen and trips made offshore by coastal stratum fishermen, probably because the surrounding area is so heavily populated. Most inland stratum fishermen departed from Port Aransas on offshore trips. Relatively few inland boat fishermen used the other eight port areas. Coastal stratum fishermen averaged almost twice as many offshore trips as inland fishermen. Coastal boat fishermen traveled offshore to fish four to five times more often than inland fishermen (Tables 11 and 12). Port

Table 10: Distribution of the Total Number of Offshore Fishermen and Trips by Port of Departure for the Coastal and Inland Strata

Port of Departure	Fishermen		Trips	
	Number	% Coastal	Number	% Coastal
Beaumont	1,435	100.0	13,076	100.0
Galveston	5,498	93.8	47,192	98.6
Freeport	2,510	93.2	14,321	97.6
Port O'Connor	1,417	63.8	10,009	89.7
Port Lavaca	437	60.9	5,468	87.5
Port Aransas	3,723	35.7	23,070	38.5
Corpus Christi	159	100.0	425	100.0
Port Mansfield	425	100.0	4,305	100.0
Port Isabel	608	43.8	1,842	72.1
TOTAL	16,212	75.7	119,708	85.4

Table 11: Estimates of the Number of Fishermen and Number of Trips Made From Texas Ports to Offshore Waters by Coastal Stratum Boat Fishermen (n=227)

Port of Departure	Number of Boat Fishermen	Percent of Boat Fishermen	Mean Number of Trips	Total Number of Trips	Percent of Trips
Beaumont	1,435	11.9	9.1	13,076	12.8
Galveston	5,156	42.7	9.0	46,508	45.5
Freeport	2,339	19.3	6.0	13,979	13.6
Port O'Connor	904	7.5	10.0	8,983	8.8
Port Lavaca	266	2.2	18.0	4,784	4.7
Port Aransas	1,329	11.0	6.7	8,876	8.7
Corpus Christi	159	1.3	2.7	425	.4
Port Mansfield	425	3.5	10.1	4,305	4.2
Port Isabel	266	2.2	5.0	1,329	1.3
TOTAL	12,279*		8.3	102,265	100.0

*This total is larger than the actual number of coastal stratum offshore boat fishermen (N=12,066) because a fisherman may have fished out of more than one port.

Table 12: Estimates of the Number of Fishermen and Numbers of Trips Made From Texas Ports to Offshore Waters by Inland Stratum Boat Fishermen (n=22)

Port of Departure	Number of Boat Fishermen	Percent of Boat Fishermen	Mean Number of Trips	Total Number of Trips	Percent of Trips
Beaumont	0	0.0	0.0	0	0.0
Galveston	342	9.1	2.0	684	3.9
Freeport	171	4.5	2.0	342	2.0
Port O'Connor	513	13.6	2.0	1,026	5.9
Port Lavaca	171	4.5	4.0	684	3.9
Port Aransas	2,394	63.6	5.9	14,194	81.4
Corpus Christi	0	0.0	0.0	0	0.0
Port Mansfield	0	0.0	0.0	0	0.0
Port Isabel	342	9.1	1.5	513	2.9
TOTAL	3,933*		4.4	17,443	100.0

*This total is larger than the actual number of inland stratum offshore boat fishermen (N=3,762) because fishermen may have fished out of more than one port.

Aransas was an exception, in that inland and coastal strata fishermen averaged about the same number of trips. The data reflect Port Aransas' attractiveness as a travel destination for inland boat fishermen desiring to fish offshore.

To further understand the distribution of boat fishermen using different ports, the number of boat fishermen residing in the local area of each port was calculated using the data shown in Appendix D. More than 90 percent of the boat fishermen using the ports of Beaumont, Galveston and Freeport resided in the surrounding counties (Table 13). Less than one-half of the boat fishermen using each remaining port area were local residents. Overall, 68 percent of the offshore fishermen were from the local areas of the ports. Coastal and inland counties with large urban populations (e.g., Bexar, Dallas, Brazoria and Harris) were the primary sources of non-local offshore fishermen in the central and lower Texas coastal ports, where local residents generally comprised less than one-half of the boat fishermen population.

The number of boat fishermen in the sample is shown in Appendix D by county of residence and port of departure. As was the case with bay boat fishermen, ports used by larger numbers of boat fishermen (e.g., Galveston and Freeport) were represented by fishermen from relatively fewer counties than those with smaller numbers of boat fishermen (e.g., Port O'Connor and Port Aransas). Ports on the central coast appeared to appeal to a wider segment of the marine boat fishing population than either upper or lower coast ports. This is supported by the finding

TABLE 13

Number of Offshore Boat Fishermen Residing in Coastal Counties as Defined

Port of Departure	Number of Fishermen	Number of Local Fishermen	Percent of Local Fishermen
Beaumont	1,435	1,320	92.0
Galveston	5,498	5,094	92.7
Freeport	2,510	2,331	92.9
Port O'Connor	1,417	638	45.0
Port Lavaca	437	106	24.3
Port Aransas	3,723	1,116	30.0
Corpus Christi	159	53	33.3
Port Mansfield	425	159	37.4
Port Isabel	608	159	26.2
Total	16,212	10,976	67.7

that many central coast boat fishermen fishing offshore came from inland and upper and lower coastal counties.

Distance Traveled Offshore

To determine offshore fishing patterns, boat fishermen were asked to estimate the average distance they traveled offshore to fish, as well as the longest offshore trip they made during the study year. Most offshore trips were made within 10 miles of shore, and few travelled more than 30 miles (Table 14). Therefore, most of offshore fishermen,

under normal or average circumstances, stayed within the U.S. Territorial Sea. Less than one-half of the offshore boat fishing population used the U.S. Fishery Conservation Zone (FCZ).

This picture of offshore fishing changes somewhat when the farthest distance traveled offshore is considered (Table 15). The average Texas boat fisherman extended his offshore fishing range by about seven miles when farthest distance traveled offshore was examined. Use of the FCZ increased to include 10,162 fishermen or 63 percent of the offshore boat fishing population. More than one-fifth of the offshore fishermen traveled more than 30 miles, and some traveled as far as 115 miles offshore to fish.

Assuming that fishermen traveling different distances offshore all fish with the same frequency, the number of trips in the U.S. Territorial Sea and the FCZ can be calculated by multiplying the mean number of trips taken offshore by all boat fishermen (7.4) by the number of fishermen in each group (based on average distance fished offshore). This computation yields about 56,700 trips to the FCZ and 63,300 trips to the U.S. Territorial Sea. The number of trips to the FCZ is probably a conservative estimate, because many of the Territorial Sea fishermen extended their fishing locations into the FCZ during their farthest trip offshore.

Mean average and farthest distances traveled offshore are similar to those found in a study of offshore boat fishermen in the Houston/Galveston area (Ditton and Graefe, 1978). Houston/Galveston offshore fishermen traveled 18.3 and 25.4 miles offshore on their

Table 14: Average Distance Traveled From Shore by Texas Boat Fishermen

Distance From Shore (miles)	Number of Fishermen	Percent of Fishermen
1 - 5	5,059	31.2
6 - 10	3,494	21.6
11 - 15	2,935	18.1
16 - 20	1,777	11.0
21 - 30	1,872	11.5
31 - 40	703	4.3
41 - 96	372	2.3
TOTAL	16,212	100.0

Mean Average Distance = 13.96 miles

Table 15: Farthest Distance Traveled From Shore by Texas Boat Fishermen

Distance From Shore (miles)	Number of Fishermen	Percent of Fishermen
1 - 5	3,695	22.8
6 - 10	2,355	14.5
11 - 15	2,438	15.0
16 - 20	1,777	11.0
21 - 30	2,574	15.8
31 - 40	1,777	11.0
41 - 60	1,064	6.6
61 -115	532	3.3
TOTAL	16,212	100.0

Mean Farthest Distance = 21.27 miles

average and farthest trips, respectively (Ditton and Graefe 1978). Statewide, offshore boat fishermen traveled 14 and 21.3 miles offshore on their average and farthest trips, respectively. Thus, in general, a greater percentage of offshore fishermen from the Houston/Galveston area probably fish in the FCZ on both average and farthest trips than Texas offshore boat fishermen. This may be a result of the greater distances upper coast boat fishermen must travel seaward to reach desirable offshore water depths and fishing locations.

CONCLUSIONS AND IMPLICATIONS

Fishing is popular among Texas boatowners. More than 60 percent of registered boatowners in the state used their boats for fishing during the study year. However, only 72,244 (14 percent) of all Texas boatowners fished in salt water (bays or offshore).

Because there have been no previous studies of boat fishermen in Texas, it is impossible to directly compare all findings with previous work. Only if we assume that each saltwater boat fisherman takes at least seven different people fishing during the course of a year can we find comparability with TPWD household survey findings that 480,000 saltwater fishermen fished at least once during the year from a boat (Matlock, 1982). Although no data are available on how many people each saltwater boat owner takes fishing annually, this appears to be a reasonable assumption. Further, saltwater fishing activity was not evenly distributed statewide; a greater percentage of coastal area boatowners than inland boatowners fished in saltwater.

The Galveston Bay area, with almost one-half of all bay boat fishing activity and more than one-third of all offshore fishing activity, is clearly the state's center of marine recreational boat fishing. Undoubtedly, this is a result of the large population and boat fleet in the Houston/Galveston area. This area's influence carried over to the Matagorda Bay system, which accounted for the second largest number of bay fishing trips. Port Aransas was the second leading

offshore recreational fishing port, with almost 25 percent of all offshore trips made by Texas boatowners. These areas are undeniably important in terms of their fisheries value, a fact that should not be overlooked in resource allocation decisions.

Bay boat fishermen outnumbered offshore fishermen by a factor of about 4.5. Boat fishermen made almost seven times more bay fishing trips than offshore trips. Nevertheless, offshore fishing along the Texas coast is not an insignificant activity. More than 120,000 offshore fishing trips were made by 16,000 boatowners (approximately three percent of all registered boatowners). In a study of recreational fishing by the population of boat owners in the Houston/Galveston area, Ditton and Graefe (1978) found that about five percent traveled offshore to fish. Also, the Eighth Coast Guard District (Swinburn, 1979) estimated that 10 percent of the boats registered in the Gulf states (those longer than sixteen feet with the assumed capability of going offshore) may venture offshore. As they correctly noted, "It is not valid to assume that all recreational boats capable of venturing onto the OCS [outer continental shelf] actually do so."

In this study we did not directly ask respondents to divide their offshore fishing days between U.S. Territorial Sea and Fishery Conservation Zone waters. In addition to increasing problems of recall, it was unlikely that fishermen could classify their trips into one category or another. Instead, uses of these zones were inferred from responses regarding average and farthest distances traveled offshore (Tables 14 and 15). Based on their distances traveled offshore under

average or normal conditions, the majority of offshore fishermen stayed within the U.S. Territorial Sea. When farthest distance traveled was considered, use of the FCZ increased to include about 63 percent of offshore fishermen. We feel that the average distance traveled is more indicative of their usual offshore fishing patterns. Hence, in general, use of the U.S. Fishery Conservation Zone is limited to less than one-half of the offshore boat fishing population, or slightly more than one percent of the population of Texas boatowners. These are important considerations for locating artificial reefs, evaluating the recreational potential of offshore petroleum platforms as well as other outer continental shelf development impacts and establishing the equity involved in fishery resource allocations.

Locals (those residing within two counties of the coast) comprise a large majority of those boatowners who fish offshore and in the bays along the Texas coast. However, different regions of the coast have different mixes of local and non-local fishermen. For example, the boat fishermen using upper Texas coastal bays and offshore waters are mostly locals. On the central and lower coast, locals comprise roughly one-half of the bay boat fishermen and one-third of the offshore fishermen.

The Port Aransas area is unique in that less than 20 percent of all bay boat fishermen and less than 30 percent of offshore fishermen reside in the immediate area. Port Aransas and the Aransas Bay area are well established as a major tourism and fishing center for inland and other non-local boat fishermen. Why this area appeals more than other areas

to non-locals was not addressed in this study. The appeal can be explained somewhat by the fact that there are no major cities in this area. The fishery in the Port Aransas/Aransas Bay area is driven primarily by fishermen from inland metropolitan counties (Appendices C and D). Additionally, the Port Aransas area has a well-developed tourism infrastructure, good transportation links with most of the state's urban areas, a tropical climate and fishermen can reach deep water faster than they can in Galveston, where the outer continental shelf is more gently sloping. For many of these same reasons, a substantial percentage of the boat fishing activity along the central and lower coast are accounted for by non-local tourists and are thus more vulnerable to energy related impacts than for example, the Galveston area.

Residence locations of bay and offshore fishermen (Appendices C and D) can provide businessmen and entrepreneurs with information about existing marine recreational fishing markets. Bay fishermen is an attractive market for businessmen. First, most saltwater boat fishermen own boats shorter than 20 feet. Also, they concentrate their fishing activity in the bays (Ditton et al., 1980). Thus, the potential for recruiting boat fishermen who have previously fished only in fresh water is great because less than 22 percent of all Texas boatowners who fish do so in saltwater. Also, bay fishing involves less experience, knowledge and risk than offshore fishing. More fishermen fish in bays before they would attempt to travel offshore, especially if they have never fished in salt water before.

Between 1979 and 1981, it was thought that more data would be available on recreational boat fishing in the U.S. Territorial Sea and the Fishery Conservation Zone because of an initiative of the Gulf of Mexico Fisheries Management Council. The Gulf states were encouraged to amend their boat registration procedures to routinely gather a limited amount of use information (whether or not boaters fished in the U.S. Territorial Sea and beyond). The system was established to provide a sampling frame for future follow-up studies of saltwater boat fishermen and would have eliminated the need for the screening procedures like those used in this study. Unfortunately, these data collection efforts were only implemented in Texas, Louisiana and Florida and were terminated in Texas in March 1982.

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APPENDIX A: Telephone Interview Survey

CODE# _____ NAME _____
 COUNTY# _____ ADDRESS _____
 ZONE# _____ PHONE# () _____

INTRODUCTION: Hello, _____
 This is _____
 and I am a graduate student at Texas A&M University. I am calling you this evening because your boat was randomly selected from the state boat registration file to be part of our boating and fishing study.

1. Do you still own the _____ boat? Yes ___ No ___
 2. Did you use this boat in the past 12 months?
 Yes ___
 No ___ Why _____

3. Where did you use this boat in the last 12 months?
 ___ fresh only ___ salt water ___ both
 4. Which of the following activities did you use your boat for during the past year?

Freshwater	(Check all that apply)	Saltwater
_____	Fishing	_____
_____	Water skiing	_____
_____	Pleasure boating	_____
_____	SCUBA diving	_____
_____	Hunting	_____
_____	Racing	_____
_____	Sailing	_____

5. Did you fish Bays in the last 12 months? Yes ___ No ___
 Which Bays: How Many Times Game Species Caught
- | | | |
|----------|----------|----------|
| a. _____ | a. _____ | a. _____ |
| b. _____ | b. _____ | b. _____ |
| c. _____ | c. _____ | c. _____ |
| d. _____ | d. _____ | d. _____ |

6. Did you fish in the open Gulf in the last 12 months? Yes ___ No ___

Where Did You Launch Your Boat?	How Many Times	Species Caught	Average Distance One-Way From Shore	Farthest Distance One-Way From Shore
a. _____	a. _____	a. _____	a. _____	a. _____
b. _____	b. _____	b. _____	b. _____	b. _____
c. _____	c. _____	c. _____	c. _____	c. _____
d. _____	d. _____	d. _____	d. _____	d. _____

Thank you very much for your help. Since you are a saltwater fisherman, you will receive a questionnaire in the mail shortly and we would appreciate it very much if you would fill it out and return it to us at your earliest convenience.

Verify address.

ADDRESS: _____

Thanks Again!

APPENDIX B: Mail Questionnaire Survey Instrument

TEXAS A&M UNIVERSITY

COLLEGE STATION, TEXAS 77843

A/C 713-845-5411

Department of
RECREATION AND PARKS

September 15, 1980



Dear Boat Owner:

Texas A&M University is conducting a study of boating and fishing in Texas. Your name has been selected in our random sample of boat owners to participate in the study. The information you provide is important because it will help business and government to better respond to your boating and fishing needs.

The accuracy of this study depends on the number of questionnaires returned. Would you please take a few minutes to answer the questions on the enclosed questionnaire?

Please place your completed questionnaire in the enclosed postage-paid envelope and return it to us as promptly as possible. All responses will be handled in strict confidentiality. Survey data will be summarized and mailing lists destroyed so there will be no way to associate your name or address with any particular set of responses.

Thank you for your interest and cooperation.

Sincerely,

Robert B. Ditton
Associate Professor
Recreation and Parks

Anthony J. Fedler
Research Assistant

1980 FISHING STUDY
QUESTIONNAIRE

THE FOLLOWING QUESTIONS ARE ABOUT YOU PERSONALLY AND WILL HELP US TO KNOW MORE ABOUT FISHERMEN. REMEMBER, YOU WILL NOT BE IDENTIFIED WITH YOUR ANSWERS, SO PLEASE BE FRANK.

How often do you watch fishing or outdoor programs on television?
 not at all occasionally regularly

Do you subscribe to any fishing or outdoor magazines? yes no
If yes, please list them _____

How often do you read outdoor columns in the newspaper?
 not at all occasionally regularly

Are you a member of a fishing club? yes no

During which seasons do you fish? (Check as many as apply)
 winter spring summer fall

When do you do your fishing? (Check as many as apply)
 on workdays on weekends or other days off during vacation

How long does a typical day of fishing last? _____ hours (actual fishing time).

How often do you participate in fishing tournaments?
 not at all occasionally frequently

How often do you take weekend fishing trips?
 not at all occasionally frequently

How often do you take longer vacation fishing trips?
 not at all occasionally frequently

Do you make any of your own fishing tackle? yes no

Please check each type of group listed below that you fish with:

- family friends by myself family and friends business associates

Which type of group do you fish with most often? _____

Do you usually fish with the same group of people? yes no

Including yourself, how many people are usually in your fishing group? _____

Which member of the fishing group usually initiates the idea to go fishing?

- yourself another member of the group both yourself and another member of the group

At about what age did you first go fishing? _____ years of age.

Who introduced you to the sport of fishing?

- parents spouse friends other relatives no one

To the best of your memory, how often did you fish as a youth?

- not at all occasionally frequently

About how many of your close friends fish?

- none some most don't know

About how many of your co-workers fish?

- none some most don't know

BELOW IS A LIST OF VARIOUS REASONS WHY PEOPLE GO FISHING. PLEASE CIRCLE THE NUMBER THAT INDICATES HOW IMPORTANT EACH ITEM IS TO YOU AS A REASON FOR FISHING.

REASON:	not at all important	slightly important	moderately important	very important	extremely important
To be outdoors	1	2	3	4	5
For relaxation	1	2	3	4	5
To get away from the regular routine	1	2	3	4	5
For the challenge or sport	1	2	3	4	5
For family recreation	1	2	3	4	5
To obtain fish for eating	1	2	3	4	5
For physical exercise	1	2	3	4	5
To be with my friends	1	2	3	4	5
For the experience of the catch	1	2	3	4	5
To obtain a trophy	1	2	3	4	5
To experience natural surroundings	1	2	3	4	5
To develop my skills	1	2	3	4	5
To test my equipment	1	2	3	4	5

Considering all the fishing, water skiing, and cruising or pleasure boating you did during the past 12 months, about how many days did you spend doing each of the following activities?

- Number of days saltwater boat fishing _____
- Number of days saltwater fishing without boat _____
- Number of days freshwater boat fishing _____
- Number of days freshwater fishing without boat _____
- Number of days water skiing _____
- Number of days cruising or pleasure boating _____

Do you specialize in fishing for one particular kind of fish? yes no

Please list the fish species you fish for most often, in decreasing order of importance.

How do you compare your fishing ability to other fishermen in general?
 less skilled equally skilled more skilled

How many fish do you usually catch compared to the average fisherman?
 fewer fish about the same number more fish

Which of the following best describes the area in which you live?
 Rural Urban area 100,000 to 250,000 people
 Village or town under 20,000 Metropolitan area over 250,000 people
 City of 20,000 to 99,999 people

PLEASE ANSWER THE FOLLOWING QUESTIONS WITH REGARD TO YOUR MOST RECENT FISHING TRIP ONLY. HOW WELL DO EACH OF THE FOLLOWING STATEMENTS DESCRIBE YOUR FEELINGS ABOUT YOUR MOST RECENT FISHING TRIP.

		strongly disagree	disagree	neutral	agree	strongly agree
I thoroughly enjoyed the fishing trip	1	2	3	4	5	
The fishing trip was not as enjoyable as I expected it to be	1	2	3	4	5	
I cannot imagine a better fishing trip	1	2	3	4	5	
I was disappointed with some aspects of the fishing trip	1	2	3	4	5	
The trip was well worth the money I spent to take it	1	2	3	4	5	

BELOW IS A SERIES OF WORD PAIRS WHICH CAN BE USED TO DESCRIBE FEELINGS ABOUT BOAT FISHING. PLEASE CIRCLE THE NUMBER BETWEEN EACH PAIR THAT YOU FEEL COMES CLOSEST TO DESCRIBING HOW YOU FEEL ABOUT BOAT FISHING. CIRCLE ONE NUMBER PER LINE FOR EACH WORD PAIR.

BOAT FISHING IS

		Extremely	Very	Slightly	Neutral	Slightly	Very	Extremely	
Unpleasant . . .	1	2	3	4	5	6	7 . . .	Pleasant	
Acceptable . . .	1	2	3	4	5	6	7 . . .	Unacceptable	
Bad	1	2	3	4	5	6	7 . . .	Good	
Frustrating . . .	1	2	3	4	5	6	7 . . .	Satisfying	
Nice	1	2	3	4	5	6	7 . . .	Awful	

In general, my family thinks

I should not . . . 1 2 3 4 5 6 7 . . . I should
go boat fishing.

I feel

I should not . . . 1 2 3 4 5 6 7 . . . I should
go along with my family's wishes about going boat fishing .

In general, my friend's think

I should not . . . 1 2 3 4 5 6 7 . . . I should
go boat fishing.

I feel

I should not . . . 1 2 3 4 5 6 7 . . . I should
go along with my friend's wishes about boat fishing

The chance that I will go boat fishing next year is?

Low . . . 1 2 3 4 5 6 7 . . . High

To what degree would unplanned events influence your going boat fishing next year?

Low . . . 1 2 3 4 5 6 7 . . . High

BELOW IS A SERIES OF WORD PAIRS WHICH CAN BE USED TO DESCRIBE FEELINGS ABOUT WATER SKIING. PLEASE ANSWER ALL QUESTIONS ABOUT WATER SKIING EVEN IF YOU DON'T WATER SKI.

WATER SKIING IS

	Extremely	Very	Slightly	Neutral	Slightly	Very	Extremely	
Unpleasant . . .	1	2	3	4	5	6	7 . . .	Pleasant
Acceptable . . .	1	2	3	4	5	6	7 . . .	Unacceptable
Bad	1	2	3	4	5	6	7 . . .	Good
Frustrating . . .	1	2	3	4	5	6	7 . . .	Satisfying
Nice	1	2	3	4	5	6	7 . . .	Awful

In general, my family thinks

I should not . . . 1 2 3 4 5 6 7 . . . I should
go water skiing.

I feel

I should not . . . 1 2 3 4 5 6 7 . . . I should
go along with my family's wishes about going water skiing.

In general, my friend's think

I should not . . . 1 2 3 4 5 6 7 . . . I should
go water skiing.

I feel

I should not . . . 1 2 3 4 5 6 7 . . . I should
go along with my friend's wishes about going water skiing.

The chance that I will go cruising or water skiing next year is?

Low . . . 1 2 3 4 5 6 7 . . . High

To what degree would unplanned events influence your going water skiing next year?

Low . . . 1 2 3 4 5 6 7 . . . High

BELOW IS A SERIES OF WORD PAIRS WHICH CAN BE USED TO DESCRIBE FEELINGS ABOUT CRUISING OR PLEASURE BOATING. PLEASE ANSWER ALL QUESTIONS ABOUT CRUISING OR PLEASURE BOATING EVEN IF YOU DON'T GO CRUISING.

	Extremely	Very	Slightly	Neutral	Slightly	Very	Extremely	
Unpleasant	1	2	3	4	5	6	7 . . .	Pleasant
Acceptable	1	2	3	4	5	6	7 . . .	Unacceptable
Bad	1	2	3	4	5	6	7 . . .	Good
Frustrating	1	2	3	4	5	6	7 . . .	Satisfying
Nice	1	2	3	4	5	6	7 . . .	Awful

In general, my family thinks

I should not . . . 1 2 3 4 5 6 7 . . . I should
go cruising or pleasure boating.

I feel

I should not . . . 1 2 3 4 5 6 7 . . . I should
go along with my family's wishes about going cruising or pleasure boating.

In general, my friend's think

I should not . . . 1 2 3 4 5 6 7 . . . I should
go cruising or pleasure boating.

I feel

I should not . . . 1 2 3 4 5 6 7 . . . I should
go along with my friend's wishes about going cruising or pleasure boating.

The chance that I will go cruising or pleasure boating next year is?

Low . . . 1 2 3 4 5 6 7 . . . High

To what degree would unplanned events influence your going cruising next year?

Low . . . 1 2 3 4 5 6 7 . . . High

PLEASE INDICATE THE EXTENT TO WHICH YOU AGREE OR DISAGREE WITH EACH OF THE FOLLOWING STATEMENTS ABOUT FISHING. THERE ARE NO RIGHT OR WRONG ANSWERS, SO PLEASE JUST GIVE US YOUR OWN OPINION.

	1	2	3	4	5	
		strongly disagree	disagree	neutral	agree	strongly agree
If the bait or lure I'm using isn't working, I usually try something else	1	2	3	4	5	
If I thought I wouldn't catch any fish, I wouldn't go fishing	1	2	3	4	5	
The bigger the fish I catch, the better the fishing trip	1	2	3	4	5	
I'm just as happy if I don't keep the fish I catch	1	2	3	4	5	
A full stringer is the best indicator of a good fishing trip	1	2	3	4	5	
When I go fishing, I'm not satisfied unless I catch at least something	1	2	3	4	5	
Catching a "trophy" fish is the biggest reward to me	1	2	3	4	5	
Keeping the fish I catch is more enjoyable than releasing them	1	2	3	4	5	
A fishing trip can be successful to me even if no fish are caught	1	2	3	4	5	
Cleaning fish is worth it to be able to eat the fish I catch	1	2	3	4	5	
The more fish I catch, the happier I am	1	2	3	4	5	
When I go fishing, I'm just as happy if I don't catch a fish	1	2	3	4	5	
Bringing fish home to the table is an important outcome of fishing	1	2	3	4	5	
I'm happiest with a fishing trip if I catch challenging game fish	1	2	3	4	5	
A successful fishing trip is one in which many fish are caught	1	2	3	4	5	
It doesn't matter to me what type of fish I catch	1	2	3	4	5	
If I was sure I would catch a fish, I wouldn't go fishing	1	2	3	4	5	

What is your age? _____

Are you male? Female?

How much formal education have you had?

- grade school
- some high school
- graduated high school
- technical or vocational school
- some college
- graduated college
- graduate study

What is your approximate annual household income before taxes?

- under \$10,000
- \$10,000 to \$19,999
- \$20,000 to \$29,999
- \$30,000 to \$39,999
- \$40,000 to \$49,999
- \$50,000 to \$59,999
- \$60,000 to \$69,999
- \$70,000 and above

PLEASE PLACE YOUR COMPLETED QUESTIONNAIRE IN THE PREPAID, SELF-ADDRESSED ENVELOPE PROVIDED AND DROP IN ANY CONVENIENT MAIL BOX.

THANK YOU FOR YOUR HELP

**Department of Recreation and Parks
Texas A&M University
College Station, Texas 77843**

APPENDIX C: Number of Bay Boat Fishermen in the Sample by County of Residence and Bay System Fished

County	Sabine Lake	Galveston Bay	Matagorda Bay	San Antonio Bay	Aransas Bay	Corpus Christi		Upper Laguna Madre		Lower Laguna Madre		Total
						Bay	Bay	Bay	Bay	Bay	Bay	
Coastal Stratum												
Aransas					10	1	1	1	1	1	1	13
Austin			2									2
Bee				1	1	1	1	2	1	1	1	6
Brazoria		44	33	1								78
Brooks				1				1				1
Calhoun			5	3	1			1				9
Cameron												31
Chambers		11						1	30			11
Colorado			1	1	1							3
DeWitt			3	1	1							5
Duval								1				1
Fayette				1								2
Fort Bend		7	18									28
Galveston	2	81	5	1	1	1	1		1			89
Goliad			1									1
Gonzales		1			1							2
Hardin	3	1										4
Harris	3	341			6	6	6	3	6	6	6	428
Hidalgo			57					4				22
Jackson			10		1				17			11
Jasper	2	1	1									4
Jefferson	38	23										61
Jim Wells							2	8				10
Karnes					1			1				2
Kleberg							2					7
Lavaca			4	1				5				5

(continued)

APPENDIX C: Number of Bay Boat Fishermen in the Sample by County of Residence and Bay System Fished (continued)

County	Sabine Lake		Galveston Bay		Matagorda Bay		San Antonio Bay		Aransas Bay		Corpus Christi Bay		Upper Laguna Madre		Lower Laguna Madre		Total
Coastal Stratum																	
Liberty			3														3
Matagorda					20							1					21
Montgomery	1		9		1							1					11
Nueces	37		10								42		12	1			55
Orange			1		1												47
Polk																	2
Refugio							1			5							6
San Jacinto																	1
San Patricio									4		18			2			23
Tyler																	1
Victoria					11		13			1			1				26
Waller					1												2
Wharton										1			1				24
Willacy					22										2		2
					(198)					(35)		(75)		(41)		(61)	(1062)
					(536)					(30)							
					(86)												
(Subtotal Coastal)																	
Inland Stratum																	
Angelina																	1
Antascosa														1			1
Bastrop																	1
Bell												1					1
Bexar			2		3		1			13		8	2	2			31
Blanco					1												1
Brazos					1					1		1					3
Burleson					1												1
Caldwell					1												1
Dallas												2					8
Falls										1			3	2			1
Gillespie																	1

(Continued)

APPENDIX C: Number of Bay boat Fishermen in the Sample by County of Residence and Bay System Fished (Continued)

County	Sabine Lake		Galveston Bay		Matagorda Bay		San Antonio Bay		Aransas Bay		Corpus Christi Bay		Upper Laguna Madre		Lower Laguna Madre		Total
Coastal Stratum																	
Guadalupe																	1
Harrison																	1
Johnson		1															2
Kaufman																	1
Limestone					1												1
Live Oak																	1
McLennan			1														1
Milam						1									1		3
Runnels																	1
Tarrant			2														1
Travis						1											4
Uvalde												1					5
Williamson																	1
Wilson																	1
(Subtotal Inland	(0)	(11)	(10)	(1)	(28)	(13)	(7)	(5)	(75)								
TOTAL	86	547	208	31	63	88	48	66	1137								
Number of Counties Represented	7	25	28	12	27	15	17	12	66								

APPENDIX D: Number of Offshore Boat Fishermen in the Sample by County of Residence and Port of Departure

County	Port of Departure										Total	
	Beaumont	Galveston	Freeport	O'Connor	Lavaca	Port Aransas	Corpus Christi	Mansfield	Port Isabel	Port		
Coastal Stratum												
Aransas							1					1
Bee							2					2
Brazoria	1	6	16									23
Calhoun				1								1
Cameron								2		3		5
Chambers		1										1
Colorado				1								1
DeWitt				1								1
Fort Bend		1	1		1		2			1		6
Galveston		14		1								15
Hardin				1								1
Harris	1	64	22	4	2		2	1		2		98
Hidalgo								1				1
Jefferson	15	5						1				21
Jim Wells				1			1					2
Kleberg							1					1
Lavaca												1
Matagorda		1			1							2
Montgomery		2	1									3
Nueces							8		1			9
Orange	7	1					6		2			8
San Patricio								1				1
Tyler	1											1
Victoria				4	1		2					7
Wharton			2	3								5
Willacy									1			1
(Subtotal Coastal)	(25)	(95)	(42)	(18)	(5)	(25)	(3)	(8)	(6)	(227)		

(Continued)

APPENDIX D: Number of Offshore Boat Fishermen in the Sample by County of Residence and Port of Departure (con'd)

County	Port of Departure										Total	
	Beaumont	Galveston	Freeport	Port O'Connor	Lavaca	Port Aransas	Corpus Christi	Port Mansfield	Port Isabel	Port Total		
Inland Stratum												
Angelina	1											1
Bell				1								1
Bexar			1			5						6
Brazos			1									1
Burleson				1								1
Dallas						4			1			5
Falls						1						1
Johnson						1						1
Kaufman						1						1
Live Oak						1						1
McLennan						1						1
Palo Pinto												1
Randall						1						1
(Subtotal inland)	(0)	(2)	(1)	(2)	(1)	(14)	(0)	(0)	(2)	(0)	(22)	(22)
TOTAL	25	97	43	20	6	39	3	8	8	8	249	249
Number of Counties Represented	5	11	6	12	5	16	3	6	5	5	39	39

