An Estimate of Unsurveyed Coastal Recreational Boat Fishing Activity in Texas

MAURY O. FERGUSON and ALBERT W. GREEN

Introduction

Management and allocation of fishery resources requires information on changes in fish populations, the composition of the harvest, and numbers and behavior of fishermen. Since September 1974, the Texas Parks and Wildlife Department (TPWD) has conducted coastwide surveys of saltwater sportfishing in Texas' marine waters to determine minimum estimates of boat, wade-bank, and lighted-pier fishing pressure and landings (McEachron, 1980, 1983; McEachron et al., 1981; McEachron and Green, 1983).

Surveys were conducted during 1979-80 to estimate pressure and landings from specialized fishing activities for fall wade-bank southern flounder, *Paralichthys lethostigma* (Spiller, 1982), fall wade-bank red drum, *Sciaenops ocellatus* (Weixelman, 1982), and spring black drum, *Pogonias cromis* (Campbell-Hostettler, 1982). The coastwide surveys provide information on the majority of saltwater sportfishing activity. However, fishermen launching boats from private residences and some types of marinas are not included in these estimates.

In 1982 a mail survey of boat owners registered in Texas was conducted to estimate the percent of saltwater sportfishing boat trips missed by the on-site survey. Secondary objectives included estimating: 1) The number and percent of registered Texas boat owners participating and boats used in saltwater sportfishing and 2) the total number of saltwater sportfishing boat trips made during 1982. The estimate of the percent of boat trips not sampled could be used to adjust coastwide on-site survey estimates of saltwater sportboat fishing pressure and landings.

Materials and Methods

The TPWD boat registration file was used to sample randomly owners of boats <12 m long with a postcard mail survey six times during 1982. All motorized boats must be registered with TPWD unless hold capacity exceeds 4.5 metric tons. Except for headboats, vessels ≥12 m and vessels with hold capacity >4.5 metric tons that are documented by the U.S. Coast Guard are not normally used for sportfishing (Ditton et al., 1980a).

In December 1981, 100 each of three different preliminary survey questionnaire forms were tested. The questionnaires requested information on boating activity during November 1981 and were evaluated for clarity and response rates. Beginning in March 1982, postcards were mailed first class every other month (bimonthly waves) to selected boat owners. Each wave requested information on the previous month's boating activity. Boat owners were stratified according to residence in coastal and noncoastal counties. Coastal counties were defined as those having any portion of their borders within 80 km of the surf line (Fig. 1). For both coastal and noncoastal counties the first registration record to be sampled was selected from a random numbers table. A unique starting record was chosen for each wave of the survey. The total number of boats <12 m on the registration file was divided by the sample size to determine the interval between sampled records. If a boat owner was selected more than once in a single wave, only the first selection was used.

Sample sizes for each wave were determined using the variance and return rates from the pretest for the first wave and from previous waves for the last five waves ($\alpha = 0.05$, $P = 0.80$) (Sokal and Rohlf, 1981). In January 1983, an additional questionnaire requesting information for the entire year was mailed to determine the percent of boat owners and boats participating in saltwater sportfishing. This final mailing was required because the monthly surveys would have

ABSTRACT—*The Texas Parks and Wildlife Department has conducted on-site creel surveys to estimate saltwater sportfishing landings and pressure since 1974. Boat trips originating from launch sites such as marina wet slips and boathouses at private residences have not been surveyed and were not included in landings and pressure estimates. In 1982 a mail survey of boat owners registered in Texas was conducted to estimate the percent of saltwater sportfishing boat trips that were missed by the on-site survey and the percent and number of registered Texas boat owners who use their boats for saltwater fishing. From 25 to 30 percent of all saltwater sportfishing boat trips originated from unsurveyed launch sites. Therefore, the TPWD on-site boat survey underestimates saltwater sportfishing boat pressure by 355,000-426,000 trips annually. Of the estimated 79,200 saltwater fishing boat owners, 18 percent never launched from surveyed sites in 1982.*
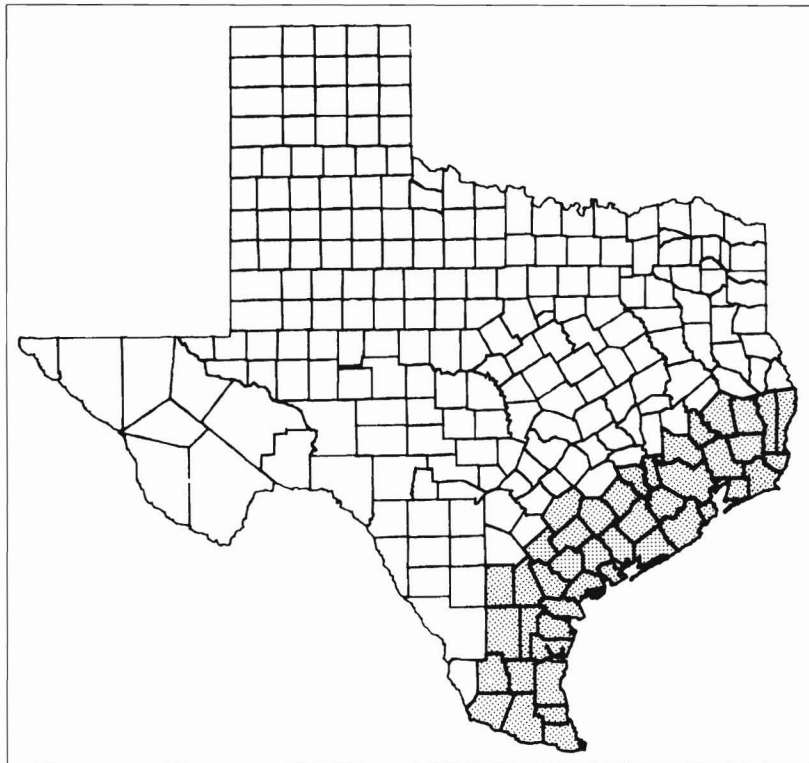
Figure 1.—Texas coastal counties within 80 kilometers of the surf line.

How many boats did you own in **August** 1982?

How many of these boats were registered with Texas Parks and Wildlife (TX No.)? Note. Any boat not powered by a motor (canoe, sailboat) is not required to be registered

How many **days** was your boat(s) used in Texas during the month of **August**? **If it was not used enter a "0" and return**

How many **days** was your boat used in Texas during **August** in Fresh water (reservoir, lake, river, pond)_____ Salt water (bay or gulf)? _____

How many **days** was your boat used in the following activities during **August**? Fishing _____ Skiing_____ Scuba_____ Other? _____

How many **days** was your boat launched during **August**
  From a free public boat ramp?
  From a commercial boat ramp (fee required)?
  From a boat ramp or boat-house at a private residence?
  From a commercial boat-house?
  From a ramp at a marina?
  From a marina wet slip?
  Other than the above?
      Explain_____
PWD 399 (Rev 8/82)   3400

Figure 2.—Final form used to conduct the monthly and annual surveys.

overestimated total boats and boat owners in a year due to possible sampling of the same boat owners in successive waves.

All questionnaires requested boat owners to provide the number of boats owned, the total number of days their boats were used, types of boating activities (i.e., fishing, sailing, pleasure riding), and the total number of launches made from each type of launch site. The types of launch sites were free public boat ramps, commercial boat ramps, boat ramps or boathouses at private residences, commercial boathouses, marinas, and others. Information was requested on all types of salt- and freshwater boating activities to increase interest and, hopefully, to increase the response rates. A question on the number of boats registered with TPWD was asked on a subsample of the first two waves. After determining that response rates were not decreased, this question was included on all questionnaires. During the fourth wave a change in design (Fig. 2) was tested on a subsample of selected boat owners. This revision allowed better matching of activities with area fished and permitted launches from marina boat ramps (which are included in the on-site surveys) to be separated from launches at marina wet slips and dry docks (which are not included in the on-site surveys). The revised questionnaire was used during the rest of the study.

The sample size for each wave varied from 1,400 to 1,700 (Table 1). Sample sizes were highest during fall, winter, and spring when saltwater boat sportfishing activity was low (McEachron, 1979; McEachron et al., 1983) and the probability of encountering fishing for the survey month was low. Sample sizes for inland county boat owners were reduced after the third wave because the low percent of saltwater sport-boat fishing participants and low variances associated with the estimates allowed a true difference among means to be detected with a smaller sample size (Sokal and Rohlf, 1981).

A telephone follow-up was used to determine nonrespondent activity and to clarify ambiguous returns from the first wave. Telephone surveys to obtain nonresponse data were discontinued in subsequent waves because of low success in

Table 1.—Sample sizes (initial mailings) and fate of each survey questionnaire for the six bimonthly waves and final annual wave.

Wave	Area	Sample size	Nondeliverable	Ineligible responses	Adjusted sample size	Useable responses	
						Total	Percent
February	Coastal	850	19	6	825	394	47.8
	Inland	850	17	6	827	435	52.6
	Total	1,700	36	12	1,652	829	50.2
April	Coastal	850	28	18	804	499	62.1
	Inland	850	20	19	811	507	62.5
	Total	1,700	48	37	1,615	1,006	62.3
June	Coastal	700	25	13	662	408	61.6
	Inland	700	15	11	674	407	60.4
	Total	1,400	40	24	1,336	815	61.0
August	Coastal	900	20	15	865	489	56.5
	Inland	700	22	4	674	422	62.6
	Total	1,600	42	19	1,539	911	59.2
October	Coastal	1,100	39	16	1,045	685	65.5
	Inland	600	18	9	573	388	67.7
	Total	1,700	57	25	1,618	1,073	66.3
December	Coastal	1,100	35	20	1,045	716	68.5
	Inland	600	18	9	573	410	71.6
	Total	1,700	53	29	1,618	1,126	69.6
Annual	Coastal	500	20	2	478	283	59.2
	Inland	500	12	3	485	314	64.7
	Total	1,000	32	5	963	597	62.0

contacting nonrespondents. Only 19 of 72 selected nonrespondents were successfully contacted; the remainder could not be found by telephone operators, had unpublished numbers, disconnected phones, or were busy or did not answer on repeated tries.

Beginning with the second wave, identical postcards were mailed to nonrespondents 15 days after the initial mailing. Beginning with the fifth wave, a third set of postcards was mailed to nonrespondents a month after the initial mailing as a further attempt to increase the response rate. Telephone contact was used during all waves to clarify ambiguous returns and to match fishing areas, days, and launches when more than one type of activity occurred. The total useable response rate ranged from 50.2 percent for the February wave to 69.6 percent for the December wave. Secondary mailings increased response rates by 6.3-28.3 percent and third mailings increased response rates by 2.3-6.2 percent. Since the objectives were concerned with sportboat fishing only, returns were defined as ineligible if the respondent no longer owned a boat or was a commercial fisherman.

The percent of saltwater sportfishing boat trips originating from each launch site type was estimated from monthly wave data. Launch sites were categorized into three types: 1) Surveyed (public and commercial boat ramps, and marina boat ramps), 2) unsurveyed (private residences, commercial boathouses, and marina wet slips), and 3) unknown, where it could not be determined whether the site was surveyed or not (beach launchings and others which were not defined). A stepwise discriminant analysis (BMDP7M, Biomed Statistical Program[1]) was used to determine if responses could be assigned to different populations by area of residence (coastal or inland), wave (months), or response type (initial, subsequent mailings, or telephone) based on the frequency with which members of each group launched their boats from different types of sites. Data from the third mailings were excluded since third mailings were used for only two waves. The percent launchings were transformed using arcsine $\sqrt{}$-percent to approximate a normal distribution and prevent variances that are a function

[1] Mention of trade names or commercial firms does not imply endorsement by the National Marine Fisheries Service, NOAA.

of the mean (Sokal and Rohlf, 1981). The data were pooled whenever the analysis indicated no variables could be used to identify groups. The percent launchings by launch site category was calculated as:

$$\hat{L}_c = 100 \frac{\displaystyle\sum_{i=1}^{n} l_{ic}}{n} \cdot \frac{1}{3} \displaystyle\sum_{i=1}^{n} \sum_{c=1}^{} l_{ic}$$

where:

$\hat{L}_c$ = percent of saltwater sportfishing boat trip launches originating from category c (surveyed, unsurveyed, unknown),

l_{ic} = number of saltwater sportfishing boat launches made from category c by the ith respondent, and

n = the number of respondents.

Variances were computed using ratio estimation (launches at category c/all launches) (Mendenhall et al., 1971). Launches from unknown site types were classified further as surveyed, unsurveyed, or unknown when comments made by the respondent on the questionnaire made it clear as to which category the launch belonged.

Annual wave data was used to calculate the percent and number of registered boat owners who used their boats to fish in salt water. The percent of boat owners in each area of residence was calculated as:

$$\hat{S}_a = \frac{\displaystyle\sum_{i=1}^{n} S_{ia}}{n_a}$$

where:

$\hat{S}_a$ = the percent of registered boat owners living in area a who used their boats to fish in saltwater,

S_{ia} = 1 if the ith respondent living in area used his boat(s) to fish in salt water or 0 of he did not, and

n_a = the number of respondents from area of residence a.

Variance was computed using the variance of a percent (Mendenhall et al., 1971). The statewide percent was computed by weighting percents for each area of residence by the percent registrations for each area.

The number of registered boat owners participating in saltwater sportboat fishing during calendar year 1982 was calculated with annual data using:

$$\hat{B} = \sum_{a=1}^{2} P_a \frac{\sum_{i=1}^{n} S_{ia}}{n} \Bigg/ \sum_{i=1}^{n} y_{ia}$$

where:

$\hat{B}$ = the estimated number of boat owners participating in saltwater fishing during 1982,

P_a = the number of boats <12 m on the TPWD registration file in area a (coastal, noncoastal),

S_{ia} = 1 if the ith respondent living in area a fished in salt water or 0 if he did not,

y_{ia} = the number of registered boats owned by the ith respondent living in area a, and

n = the number of respondents.

Variances were calculated using ratio estimation (number of participants/registered boats) (Mendenhall et al., 1971), the variance of a product (Mendenhall et al., 1971), and the variance of a sum (Snedecor and Cochran, 1967).

Estimates of the number of boats used in saltwater fishing, and the total number of saltwater boat-fishing trips made during 1982 were calculated by multiplying the total boats <12 m on the registration file with ratio estimators that had owned boats as the denominator. Therefore, an adjustment factor of owned boats to registered boats was calculated using:

$$\hat{T}_{x_{aw}} = \frac{\sum_{i=1}^{n} b_{iaw}}{\sum_{i=1}^{n} b_{iaw}}$$

where:

$\hat{T}x_{aw}$ = the ratio of owned boats to registered boats in area a (coastal, noncoastal) and wave w,

b_{iaw} = the number of all boats owned by the ith respondent living in area a from wave w,

y_{iaw} = the number of registered boats owned by the ith respondent living in area a from wave w, and

n = the number of respondents in wave w.

Variances were computed using ratio estimation (owned boats/registered boats) (Mendenhall et al., 1971). Two-way analysis of variance was used to determine if data for all areas of residence, and wave-response type could be pooled.

The number of registered boats used for saltwater sportfishing during calendar year 1982 was calculated with annual data using:

$$\hat{F} = \hat{T}x \sum_{a=1}^{2} P_a \frac{\sum_{i=1}^{n} f_{ia}}{\sum_{i=1}^{n} b_{ia}}$$

where:

$\hat{F}$ = the estimated number of registered boats used for saltwater sportfishing during 1982;

$\hat{T}x$ = the pooled adjustment factor of owned boats to registered boats,

P_a = the number of boats <12 m on the TPWD registration file in area a (coastal, noncoastal),

f_{ia} = the total number of boats owned if the ith respondent living in area a fished in salt water,

b_{ia} = the number of boats owned by the ith respondent living in area a, and

n = the number of respondents.

Variances for boats used/owned boats were calculated using ratio estimation (Mendenhall et al., 1971). The variance for the estimate of number of boats used was computed as the variance of a product (Goodman, 1960) and the variance of a sum (Snedecor and Cochran. 1967).

The mean number of saltwater sportfishing trips per boat was calculated for each wave by area of residence using:

$$\hat{M}_{aw} = \frac{\sum_{i=1}^{n} t_{iaw}}{\sum_{i=1}^{n} b_{iaw}}$$

where:

$\hat{M}_{aw}$ = the mean saltwater sportfishing boat trips per all boats owned in area a and wave w,

t_{iaw} = the number of saltwater sportfishing boat trips made by the ith respondent living in area a for wave w,

b_{iaw} = the number of boats owned by the ith respondent living in area a for wave w, and

n = the total number of respondents from area a in wave w.

All responses were used, regardless of participation in saltwater boat sportfishing, in order to simplify calculations of total trips. Variances were calculated using ratio estimation (saltwater sportfishing boat trips/owned boats) (Mendenhall et al., 1971). These means were tested by area and wave reponse type in a two-way analysis of variance (BMDP7M, Biomed Statistical Program). Log transformation was used to assure variances were independent of the means. Two additional one-way analyses of variance testing means by wave response type within each area were conducted to determine if data should be pooled within an area of residence. The method of Games and Howell (1976) for unplanned comparison among pairs of means when variances are heterogeneous was used to determine which waves could be pooled for the coastal area of residence.

The total number of saltwater sportfishing trips made during 1982 was estimated from monthly wave data as:

$$\hat{TT} = 2 \sum_{a=1}^{2} \sum_{w=1}^{6} P_{aw} \cdot \hat{Tx} \cdot \hat{M}_{aw}$$

where:

$\hat{TT}$ = the estimated total number of saltwater sportfishing boat trips made during 1982,

P_{aw} = the number of boats <12 m on the registration file in area of residence a for wave w,

$\hat{T}_x$ = the pooled adjustment factor of owned boats to registered boats, and

$\hat{M}_{aw}$ = the mean saltwater sportfishing boat trips per boat for area of residence a and wave w.

Mean saltwater sportfishing boat trips per boat (M_{aw}) were pooled means for waves that were similar. It was assumed that the six unsurveyed months had the same mean activity as the six surveyed months. The variance for the total pressure (TT) was calculated as the variance of a product (Goodman, 1960) and the variance of the sums (Snedecor and Cochran, 1967).

Results

Launchings at sites which are not sampled by the coastwide on-site survey accounted for 25.3 percent of all activity, including private residences and marina wet slips. Seventy percent of all saltwater sportfishing boat trips in Texas were initiated from areas which are sampled in the on-site survey by TPWD. It was not possible to determine where 4.4 (± 2.8) percent of the launches occurred. Launchings at public and commercial boat ramps accounted for 63.6 percent of the total activity (Fig. 3). Based on comments entered on the questionnaires, telephone clarification, and the separation of marina boat ramps from wet slips, 6.7 (± 2.7) percent of all launches occurred at marina boat ramps, which are also sampled. The incidence of trips initiated from the three different launch categories was consistent among areas, waves, and response types ($P > 0.05$). Eighty-two percent of the saltwater fishing boat owners launched their boats at least once dur-

ing 1982 from sites that were included in the TPWD on-site sampling frame.

Information from the annual questionnaire revealed that 37.7 percent of coastal boat owners and 7.3 percent of inland boat owners used their boats for sportfishing in saltwater (Table 2). We estimated that 79,200 boat owners used their boats to fish in saltwater. There were no significant differences in the ratios of owned to registered boats between areas of residence ($F_s = 1.92$; df = 1, 2812; $P < 0.05$) or among wave-response type ($F_s = 0.42$; df = 5, 2812; $P > 0.05$). Therefore a pooled ratio ($Tx = 1.078 \pm 0.013$) was used to calculate the number of saltwater sportfishing boats and the
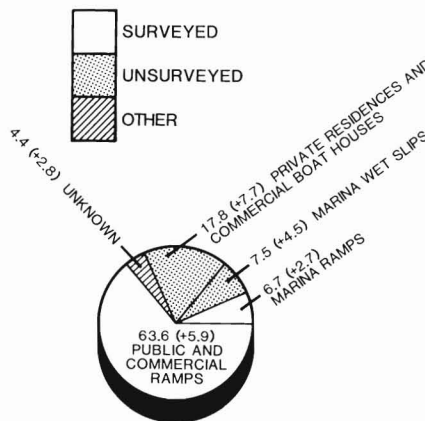

Figure 3.—Percent (± 2 SE) of saltwater sport-boat fishing trips originating from surveyed and unsurveyed launch sites and from launch sites where survey coverage was unknown ($n = 571$) during 1982. Surveyed = public, commercial, and marina boat ramps. Unsurveyed = private residences, commercial boat houses, and marine wet slips.

total number of saltwater sportfishing trips during 1982.

The total number of saltwater sportfishing boat trips made by registered boat owners in 1982 was 1,420,000 with a 95 percent confidence interval of 1,360,000 to 1,480,000 (Table 3). For coastal boat owners, mean saltwater fishing trips per boat were calculated using pooled data for the February, April, and December waves (0.221 $\pm$ 0.047) and for the June, August, and October waves (0.709 $\pm$ 0.089; Table 4). For inland boat owners, a pooled mean using data from all months was used (0.043 $\pm$ 0.018). This was done because significant differences in the mean number of saltwater sportfishing trips per boat were found between areas of residence ($F_s = 4.81$; df = 1, 4690; $P < 0.05$) and among monthly means for coastal boat owners ($F_s = 8.77$; df = 4, 2599; $P < 0.05$). However, no significant differences among monthly means were found for inland boat owners ($F_s = 1.63$, df = 4, 2093, $P > 0.05$).

Discussion

The TPWD on-site fishing survey estimates sportfishing boat pressure (in man-hours) and landings only for surveyed sites where 70 percent of all trips are initiated. If trip lengths and catch rates are assumed to be similar for surveyed and unsurveyed sites, estimates of pressure and landings should be increased by 30 percent. These assumptions should be tested by conducting intercepts of fishermen on the water when returning to waterfront housing developments, marina wet slips, and commercial boat-houses to determine trip lengths and catch rates by species.

Table 2.—Percent (± 2 SE) and number (± 2 SE) of boats and boat owners participating in saltwater sport-boat fishing during 1982 by area of residence based on results of the annual wave.

Item	Area of Residence		
	Coastal	Inland	Statewide
Boats used			
Percent	43.0 ($\pm$ 6.2)	10.3 ($\pm$ 4.1)	21.8 ($\pm$ 3.4)
Number	87,300 ($\pm$ 12,600) $\pm$ 19,600)	38,900 ($\pm$ 15,200)	126,000 (
Boat owners			
Percent	37.7 ($\pm$ 5.8)	7.3 ($\pm$ 2.9)	18.2 ($\pm$ 3.5)
Number	59,000 ($\pm$ 12,700) $\pm$ 15,500)	20,200 ($\pm$ 8,900)	79,200 (

Table 3.—Total number of registered boats < 12 m, adjustment factor of mean owned boats per registered boats (± 2 SE), mean saltwater sportfishing boat trips per owned boat (± 2 SE), and total estimated saltwater sportfishing boat trips (± 2 SE) by area and wave for 1982.

Area	Wave	No. regis-tered boats	Mean saltwater fishing trips per all boats (± 2 SE)	Estimated trips for all boats (± 2 SE)[1]
Coastal	February	198,952	0.221 (± 0.047)	47,400 (± 10,200)
	April	200,372	0.221 (± 0.047)	47,700 (± 10,200)
	June	201,135	0.709 (± 0.089)	154,000 (± 19,400)
	August	203,093	0.709 (± 0.089)	155,000 (± 19,600)
	October	204,226	0.709 (± 0.089)	156,000 (± 19,700)
	December	202,895	0.221 (± 0.047)	44,800 (± 10,400)
	Total for 6 months			605,000 (± 38,200)
	Total for 12 months			1,210,000 (± 54,100)
Inland	February	363,493	0.043 (± 0.018)	16,800 (± 7,060)
	April	365,471	0.043 (± 0.018)	16,900 (± 7,090)
	June	360,009	0.043 (± 0.018)	16,700 (± 6,990)
	August	374,795	0.043 (± 0.018)	17,400 (± 7,270)
	October	375,815	0.043 (± 0.018)	17,400 (± 7,290)
	December	375,819	0.043 (± 0.018)	17,400 (± 7,290)
	Total for 6 months			103,000 (± 17,600)
	Total for 12 months			206,000 (± 24,800)
Statewide Total				1,420,000 (± 59,500)

[1]The ratio of total boats owned/registered boats (1.078 ± 0.013) has been incorporated as a product in these estimates (i.e., 198,952 × 0.221 × 1.078 = 47,400).

Table 4.—Results of the approximate test of equality of monthly mean saltwater sportfishing trips per boat for coastal respondents where variances are heterogeneous. Unplanned comparison among pairs of means using the Games and Howell Method.

Samples (a = 6)	n	$\overline{Y}_i$	S_i^2	$S_{\overline{Y}_i}^2 = \dfrac{S_i^2}{n_i}$	$\dfrac{\left(S_{\overline{Y}_i}^2\right)^2}{(n_i - 1)}$
February	394	0.175	0.0028	0.0000071	0.000,000,018,1
April	499	0.219	0.0019	0.0000038	0.000,000,007,6
December	716	0.248	0.0010	0.0000013	0.000,000,001,8
June	408	0.634	0.0053	0.0000129	0.000,000,031,7
October	685	0.639	0.0038	0.0000055	0.000,000,008,2
August	489	0.857	0.0089	0.0000182	0.000,000,037,3

Differences among pairs of means ($\overline{Y}_i - \overline{Y}_j$) are below the diagonal and corresponding MSD_{ij} values are above the diagonal.

	February	April	December	June	October	August
February	0	0.150	0.132	0.203	0.162	0.228
April	0.044	0	0.103	0.685	0.139	0.213
December	0.073	0.029	0	0.171	0.119	0.200
June	0.459*	0.415*	0.386*	0	0.195	0.253
October	0.464*	0.420*	0.391*	0.005	0	0.221
August	0.682*	0.638*	0.609*	0.223	0.218	0

* = Significant at α = 0.05.

Complete representation of the total population in a survey is difficult. Good statistical design can reduce the level of uncertainty about survey estimates by keeping the nonresponse rate low. This survey had a relatively low nonresponse rate; however, follow-up telephoning to determine nonresponse bias was unsuccessful. Boat registration renewal in Texas is done every 3 years; therefore, a portion of the registration file was probably not accurate due to people moving, dieing, or selling their boats. In a mail survey of Galveston Bay area boat owners, Ditton et al. (1980b) found no significant difference in the frequency of fishing participation (trips made) between respondents and nonrespondents, although nonrespondents were more likely to have sold or stopped using their boats or they may have fished more in fresh water. If nonresponse in this survey was due to inaccuracies in the sampling frame, then the total trips made, boat owners fishing, and boats used in saltwater were overestimated. Estimates from this mail survey were equal to or lower than estimates of other survey (Ditton and Graefe, 1978; Ditton et al., 1980b; Anonymous, 1982; Ditton and Fedler, 1983; NMFS, 1985).

Because of differences in sampling periods and exclusions in sampling frames, estimates of total saltwater sportboat fishing pressure from the mail survey and the on-site TPWD survey cannot be compared directly. The on-site survey estimate of saltwater private sportfishing boat trips for 15 May 1982 to 15 May 1983 was 748,000 (man-hours divided by mean hours per trip for bay/pass, Territorial Sea, and Fishery Conservation Zone fishing) (Osburn and Ferguson, 1986). When the on-site estimate was adjusted by 30 percent to account for trips from unsurveyed sites (approximate 95 percent confidence interval = 935,000 to 1,247,000) it was still less than the lower confidence limit of 1,360,000 trips estimated by the mail survey. This was not surprising, considering the differences between the two surveys. The mail survey did not estimate saltwater sportfishing boat trips made by nonresidents; however, <10 percent of all fishermen interviewed in the on-site survey were nonresidents (Osburn and Ferguson, 1986). The on-site survey did not estimate trips made from access points in Sabine Lake or trips made at night.

There are other surveys that estimate saltwater fishing activity in Texas, but they are not comparable to this mail survey. The National Marine Fisheries Service (NMFS, 1985) estimated that 4,356,000 saltwater fishing trips were made by Texas residents during 1982; however, trips by fishing mode within states were not published. A mail survey conducted by the Texas State Department of Highways and Public Transportation (Anonymous, 1982) estimated that 1,922,400 saltwater sportfishing boat trips were made in Texas during 1982; no variances were available. Recall period was for 1 year of activity, and fishermen >322 km from the coast were not surveyed, which may have resulted in overestimation.

This survey estimated that 38 percent of coastal boat owners, 7 percent of inland boat owners and 18 percent of all boat owners statewide used their boats to fish in saltwater. Ditton and Graefe (1978) and Ditton et al. (1980b) found that 34 percent and 31 percent, respectively, of the boat owners residing around Galveston Bay used their boats for saltwater fishing. Ditton and Fedler (1983) found that 31 percent of coastal boat owners in Texas (within 161 km of the coast) and 4 percent of inland boat owners fished in saltwater. The Texas State Department of Highways and Public Transportation (Anonymous, 1982) survey estimated that 39 percent of all boat owners residing within 322 km of the coast used their boats to fish in saltwater.

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