

**Use of Greater Than 12 Hour
Fishing Trip Interview Data
to Improve Texas Marine
Sport Boat Harvest Estimates**

by
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Rebecca A. Hensley
and
Richard A. Spaw**

**Management Data Series
No. 165
2000**



COASTAL FISHERIES DIVISION

4200 Smith School Road
Austin, Texas 78744

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ABSTRACT

Harvest surveys of marine sport-boat anglers have been conducted in Texas since 1974 by Texas Parks and Wildlife's Coastal Fisheries Division staff. The current program routinely collects information from all angling trips but does not use trips >12 h for estimation of pressure and landings. The purpose of this study was to characterize these trips and develop a method to improve landings and pressure estimates by using all angling information collected during routine harvest surveys.

Most of the >12 h trips occur in the lower Texas coast with upper and lower Laguna Madre making up 79.9%. The percentage of angling trips >12 h range from 0.37 to 18.76 in Texas bays. Time spent for only fishing and boating time was determined for all >12 h trip lengths (TLn) and used as an adjusted trip length (ATLn). Significant differences were observed in mean TLn by day type and mean ATLn by season. The number of trips were clustered into 3 time periods of angling activity (Period 1=12.5-36.5 h, Period 2=37.0-61.0 h, and Period 3= \geq 61.5 h).

Our recommendation is to use all information collected and modify the programming to incorporate >12 h trips into supplemental estimates and pressure files. Because this study indicates that fishing activities are different for TLn >12 h, we recommend these trips be corrected for differently. The equations for the ATLn are:

- 1) For $12.5 \leq TLn \leq 36.5$ h, the correction factor =0.56.

$$ATLn = TLn \times 0.56$$

- 2) For trip lengths ≥ 37.0 h:

$$ATLn = TLn \times 0.33$$

Because all anglers are interviewed during the harvest survey, no extra effort or expense is needed to incorporate all data into calculating pressure or harvest estimates. By using the best available information, improved estimates and comparisons of fish populations can be achieved. This will provide fisheries managers with better information to use when managing Texas fish populations.

INTRODUCTION

Management of Texas saltwater fisheries and the assessment of the impacts of fishing regulations depend upon estimates of angling pressure and landings (Spiller et al. 1988). The Texas Parks and Wildlife department began conducting surveys of marine sport-boat anglers in 1974 (Weixelman and Green 1984). These surveys were initiated to document long-term trends in species composition, fish size, number landed and catch per unit effort (CPUE) in Texas coastal bays and the Gulf of Mexico (Warren et al. 1994). Osburn and Osborn (1991) documented the history of harvest surveys in Texas. Changes in the program made estimates of landings and pressure more efficient. Efficiency was improved while maintaining accuracy and precision of the estimates by specifying an eight-hour survey period (McEachron 1979), using two rather than four seasons (Osburn 1986), decreasing the number of surveys during the low-use season (McEachron 1979), terminating surveys early when no angling interviews occurred (Weixelman and Green 1984, Osburn and Weixelman 1989) and canceling surveys on days with inclement weather (Spiller et al. 1988). A reduction of precision and comparability of estimates can occur when all information is not used (Best and Boles 1956, Thomson 1991).

The Texas Sport-Harvest Monitoring Program uses trip lengths to represent fishing effort to calculate estimates of total angling pressure and CPUE. These estimates are calculated using trip lengths ≤ 12 h. Trips of this length often involve only fishing activity and fishing related boat travel. Trips >12 h are more likely to include non-fishing activity. If these >12 h trips with non-fishing activity were included, they could bias the estimates by falsely increasing pressure and decreasing CPUE. However, not including the fishing component of these trips underestimates the fishing pressure, both coastwide and in the bay systems where the >12 h trips are common. During 1992-94 high-use seasons (15 May-20 November), 4.5% of the 24,681 bay/pass fishing interviews were not used in the coastwide harvest estimates because the trip lengths were >12 h (Table 1). Distribution of >12 h fishing trips ranged from 10 in Sabine Lake to 597 in upper Laguna Madre (L. Green personal communication).

Cabins located on spoil islands and in open water (either floating or on pilings) are more numerous on lower coast bays, especially in upper Laguna Madre and portions of the lower Laguna Madre. Anglers using these cabins often extend their fishing trips and may engage in non-fishing activities. These activities include cabin or property maintenance, socializing and sleeping. Anglers with trip lengths ≤ 12 h are assumed to be engaged in only fishing or fishing-related boat travel.

The purpose of this study was to determine the portion of >12 h trips spent fishing and/or boating to fish. Specific objectives were to:

- 1) Determine the percentage of fishing interviews that have trip lengths >12 h by bay system and coastwide.
- 2) For fishing interviews with trip lengths >12 h, calculate an adjusted trip length that includes only fishing related activities.

- 3) For fishing interviews with trip lengths >12 h, calculate what percent the adjusted trip length is of the total trip length and determine a correction factor, based on this calculation.
- 4) Recommend a method or procedure for using the calculated correction factor on fishing interviews with trip lengths >12 h to calculate total estimates of fishing pressure and CPUE for these trips.

MATERIALS AND METHODS

During August 1995 through August 1996, interviewers were asked to determine adjusted trip lengths (actual boating and fishing time) to the nearest 0.5 h from angling parties with trip lengths >12 h in eight Texas bay systems (Figure 1). Using routine harvest survey methodology (Warren et al. 1994), an additional question was asked of anglers with >12 h trip lengths to determine the adjusted trip length. The adjusted trip length question was: "Including boat travel time, how much time did you spend fishing?" Definitions used in this study were:

Fishing time (FT) = all time spent fishing regardless of method.

Boat travel time (BTT) = all boat travel time from and to boat access site plus boat travel time to and from fishing sites.

Trip length (TLn) = total time away from boat access site.

Adjusted trip length (ATLn) = total fishing time (FT) plus boat travel time (BTT).

The following parameters for fishing trips with trip lengths >12 h were recorded: bay system, minor bay fished, interview date, number of anglers, trip length, adjusted trip length (Table A.1.). Data from Gulf of Mexico interviews were not included in this study. Adjusted trip length was divided by total trip length to calculate a fishing time correction factor for each interview. Trip length frequencies for each bay system were analyzed separately and then pooled for coastwide values. Coastwide trip length frequency data were divided into three non overlapping 24 h periods.

RESULTS

During August 1995 through August 1996, 359 angling parties with >12 h TLn were interviewed (Table 2, Table A.1.). Most interviews came from upper Laguna Madre (49.6%) and lower Laguna Madre (20.3%) (Table 2). The percentage of >12 h trip interviews from all other individual bay systems ranged from 0.6-11.1.

Mean TLn ranged from 14.6 h in Corpus Christi Bay to 38.0 h in upper Laguna Madre (Table 2). The coastwide mean ATLn was 13.3 h and

ranged from 3.6 to 100 h (Table A.1.) which was 41.8% of the coastwide mean TLn. Mean ATLn of individual bays ranged from 9.4 h (64.1% of TLn) to 15.5 h (100% of TLn) in Corpus Christi Bay and Sabine Lake, respectively (Table 2).

All interview data were pooled because of small sample sizes in all but two systems. No statistical differences were observed with the number of anglers between seasons (high and low-use) and day types (weekend and weekday). Significant differences were found in mean ATLn and mean TLn for seasons and day types, respectively (Table 3). Mean ATLn for high-use season anglers was 13.7 (± 9.3) h and 9.2 (± 4.9) h for low-use season anglers. Anglers fishing during weekdays had longer mean TLn (36.3 ± 22.3 h) compared to anglers fishing during weekend (29.8 ± 14.6 h).

Coastwide frequencies of >12 h trip lengths were divided into three non overlapping 24 h periods (Period 1=12.5-36.5 h, Period 2=37.0-61.0 h, and Period 3= ≥ 61.5 h) (Figure 2). Mean ATLn of all three 24 h periods were significantly different ($P < 0.01$) (Table 3). Mean percentages of actual fishing related activity (% ATLn) were 56.0% (± 28.9), 32.8% (± 18.9) and 33.1% (± 24.2) for Periods 1, 2 and 3, respectively.

DISCUSSION

Anglers making >12 h trips are concentrated on the lower Texas coast, especially in upper and lower Laguna Madre. The activity pattern of these anglers is different from the activity pattern of the ≤ 12 h trip anglers. In general, the longer anglers spend away from the boat access site, the less time they spend fishing and more time they spend on other non-angling activities (i.e., property maintenance, sleeping). Anglers making ≤ 12 h trips, spend all or most of their time engaged in angling activities.

This study was designed to incorporate the seasonal and day type components of a survey year. Significant differences were observed between week and weekend days and between high and low-use seasons. However, because of small sample size during low-use season ($N=34$ interviews) the data were pooled. Most of the >12 h trips occurred during the high-use season and on weekends. This was due to the angling parties leaving for long trips, generally on Friday and returning on Sunday. The length of the trips change during periods with holidays (three day weekends) and vacations (i.e., summer, Christmas).

Depending upon future legislation and/or regulations with respect to cabin development on spoil islands and floating cabins, the potential exists for changes in the >12 h fishing activity. A special study should be done to monitor possible changes in actual fishing time (ATLn). Even though the sample size for the low-use season is small, the data collected suggests a difference between the high and low-use seasons. The sample size needs to be increased to verify the differences observed in our study. The study should be conducted for at least a year to incorporate both high-use and low-use seasons. Even though adjustment factors may be shaped by bay systems where >12 h trips are more common, any future study should be conducted in all bay systems

to better characterize these trips where they are less frequent. To better characterize >12 h trips, additional information that could be collected in any future study includes the number of fish eaten and type of fishing (i.e., night, pier, wadefishing).

Because all anglers, regardless of trip length, are interviewed during harvest surveys, no extra effort or expense is needed to incorporate the use of all data into calculating pressure or harvest estimates. By using all available information, improved estimates and comparisons of fish populations can be achieved (Matlock 1991). This will provide fisheries managers with better information to use when managing Texas fish populations.

OPTIONS AND RECOMMENDATIONS

There are several options that exist to deal with the issue of trips >12 h. Our discussion of these options as well as our recommendations follow.

Option 1: Make no changes to the program. Continue the current procedure of interviewing anglers with >12 h trips and not including this information in calculation of the estimates. It is an inefficient use of time and energy to collect and not use all of the information. Considerable effort is expended to interview and collect data from anglers with >12 h trips. The best estimates of harvest and pressure are not provided by this option.

Option 2: Make some changes to the program. Do not interview anglers with trip lengths >12 h. These anglers would need to be identified during the survey by an activity code (similar to the non-angling activity codes currently used) so that rove counts could be adjusted downward. A higher number of missed interviews could occur when anglers reluctant to be interviewed, learn they could avoid the interview by saying their trip was >12 h. This option, like option 1, ignores the fact that anglers with trip lengths >12 h continue to contribute to pressure and landings.

Option 3: Make changes to use all information collected. No changes would need to be made to the survey procedure. However, changes would need to be made to the computer programming to fully use all information collected. Besides improving estimates, this option has a number of benefits, including improving interviewer moral and more efficient interviewer output (Jucius 1967). This improvement comes from the knowledge that all data collected is being used to ensure the continued high quality of the program. Another major benefit is that we obtain harvest and pressure estimates from the >12 h angling trips with little to no extra effort or cost. This option is our recommendation.

Since our data indicates differences in three periods of fishing activity, we recommend trips be corrected for differently in the computer programs for calculation of the final harvest and pressure estimates. We recommend retaining current pressure files and estimates and generate supplemental estimates based on the >12 h trips with separate pressure files. The correction factors are:

Period 1 (12.5 ≤ X < 36.5 h) = 0.5599

Period 2 ($37.0 \leq Y \leq 61.0$ h) = 0.3276

Period 3 ($Z \geq 61.5$ h) = 0.3313

where X, Y, and Z are period-specific TLn.

If the correction factor is rounded to the nearest 0.01, then the same correction factor (0.33) can be used for both Periods 2 and 3. The programming statement then becomes:

IF $12.5 \leq \text{TRIP} \leq 36.5$, THEN $\text{TRIP} = \text{TRIP} * 0.56$

IF $37.0 \leq \text{TRIP}$, THEN $\text{TRIP} = \text{TRIP} * 0.33$

These corrections of TLn to an ATLn, incorporates all angling activity without recalculation of the current bay/pass pressure files and harvest estimates. Using the appropriate correction factors, eliminates the potential of falsely increasing effort estimates and falsely decreasing CPUE estimates by including non-fishing activity on trips >12 h.

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Table 1. Number of Texas marine sport-boat fishing interviews summarized by trip length (L. Green personal communication) from 1992-94 high use season (15 May-20 November) (Trip=number of fishing interviews conducted).

Bay System	Number of Trips			Percent
	Total	≤12 h	>12 h	>12 h
Sabine Lake	2,702	2,692	10	0.37
Galveston Bay	3,209	3,176	33	1.03
Matagorda Bay	2,290	2,192	98	4.28
San Antonio Bay	3,303	3,119	184	5.57
Aransas Bay	3,433	3,407	26	0.76
Corpus Christi Bay	3,205	3,188	17	0.53
Upper Laguna Madre	3,182	2,585	597	18.76
Lower Laguna Madre	3,357	3,202	155	4.62
Coastwide	24,681	23,561	1,120	4.54

Table 2. Trip times for >12 h sport-boat fishing trips in Texas bays and passes (trip length = time away from boat access site in hours, adjusted trip length = boat travel time plus actual fishing time in hours, +1S.E.).

Bay System	Number of Interviews	Percent of Coastwide	Trip Length Mean	Adjusted Trip Length Mean	Percent of Total Trip
Sabine	2	0.6	15.5 ± 2.1	15.5 ± 2.1	100.0
Galveston	18	5.0	18.3 ± 3.9	10.7 ± 6.8	58.5
Matagorda	40	11.1	26.5 ± 17.2	15.1 ± 8.9	57.0
San Antonio	27	7.5	34.4 ± 25.8	14.1 ± 8.8	41.2
Aransas	17	4.7	31.0 ± 16.1	13.7 ± 6.5	44.2
Corpus Christi	4	1.1	14.6 ± 1.5	9.4 ± 6.5	64.1
Upper Laguna Madre	178	49.6	38.0 ± 16.3	13.1 ± 9.8	34.5
Lower Laguna Madre	73	20.3	23.6 ± 13.5	13.0 ± 8.4	54.9
Coastwide	359		31.8 ± 17.6	13.3 ± 9.0	41.8

∞

Table 3. Mean values ($\pm 1SE$) and significance levels of trip lengths (TLn) and adjusted trip lengths (ATLn) for >12 h sport-boat fishing trips in Texas bays and passes (TLn=time away from boat access site, ATLn=boat travel time plus actual fishing time, N=number of interviews, SE=standard error, P values are from t-Tests).

Survey components	N	TLn (h)	ATLn (h)
Season			
Low-use	34	28.7 \pm 2.3	9.2 ^a \pm 0.8
High-use	325	32.2 \pm 1.0	13.7 \pm 0.5
Day Type			
weekend	247	29.8 ^b \pm 0.9	12.9 \pm 0.5
weekday	112	36.3 \pm 2.1	14.1 \pm 1.1

^a (P < 0.001)

^b (P < 0.01)

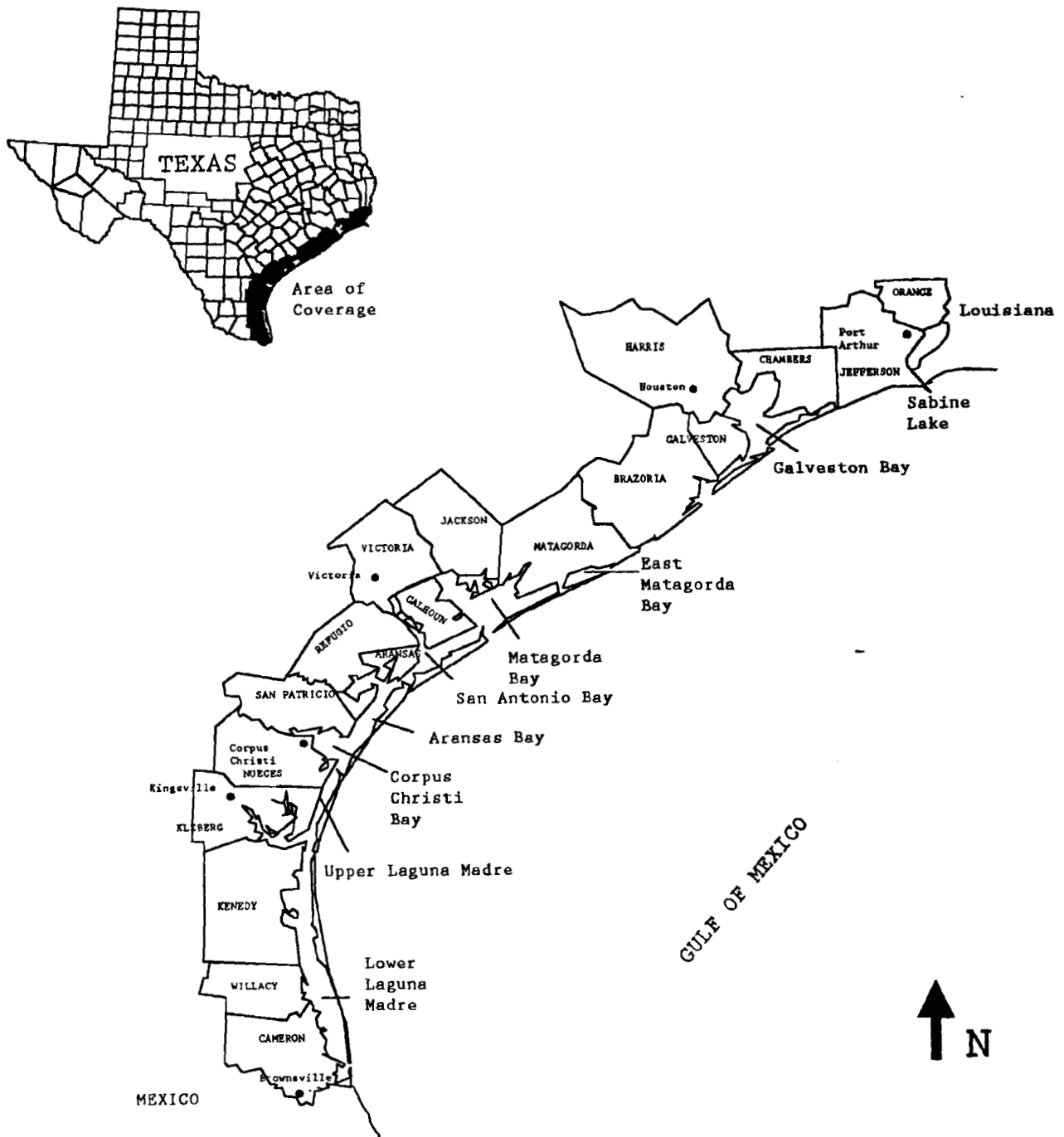


Figure 1. Texas bay systems and coastal counties.

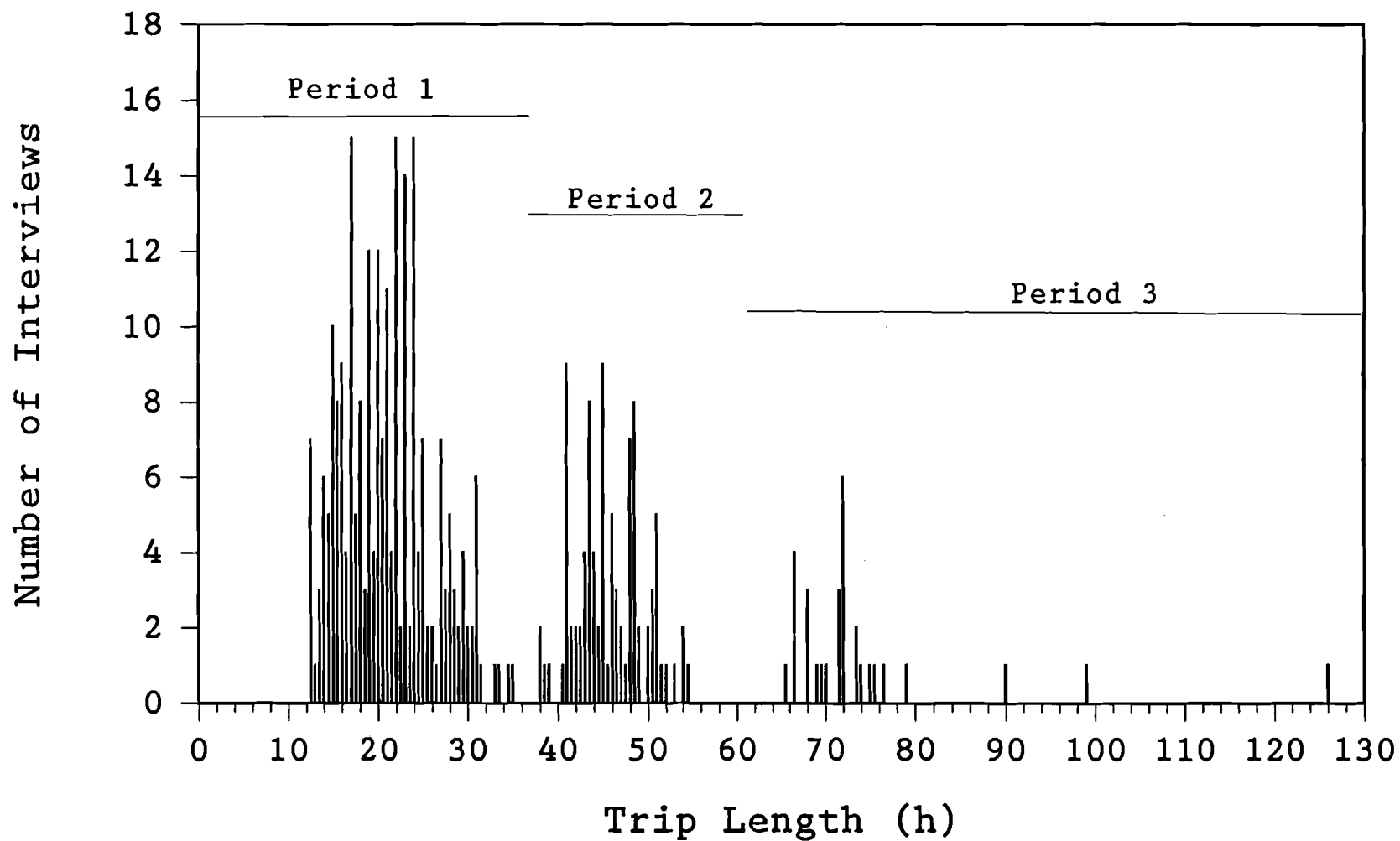


Figure 2. Number of >12 h trip interviews collected along the Texas coast (August 1995-August 1996). Trip length is the total time away from boat-access site. (Period 1=12.5-36.5 h; Period 2=37.0-61.0 h; and Period 3= \geq 61.5 h.)

Appendix A. Interview trip data from >12 h trips from Texas bays and passes.

Table A.1.

Interview data from >12 h trips from Texas bays (anglers=number of people fishing on boat, trip length (TLn)=time away from boat access sites, adjusted trip length (ATLn)=boat travel time plus actual fishing time, % ATLn=percentage of TLn spent in fishing related activities. WE=weekends, WD=weekdays, High=high-use season 15 May to 20 Nov., Low=low-use season 21 Nov. to 14 May).

Bay System	Interview Date	Season	Day Type	Minor Bay	Number of Anglers	TLn(h)	ATLn(h)	Percent ATLn
Sabine Lake								
	10/20/95	High	WD	710	4	14.0	14.0	100.0
	8/3/96	High	WE	714	2	17.0	17.0	100.0
Galveston Bay								
	8/20/95	High	WE	330	2	19.0	19.0	100.0
	8/26/95	High	WE	110	2	21.0	8.0	38.1
	8/26/95	High	WE	110	3	23.0	6.0	26.1
	1/21/96	High	WE	50	1	18.0	3.0	16.7
	6/29/96	High	WE	350	2	22.0	22.0	100.0
	6/29/96	High	WE	350	1	12.5	12.5	100.0
	6/29/96	High	WE	350	2	13.5	13.5	100.0
	6/29/96	High	WE	350	1	17.0	17.0	100.0
	6/29/96	High	WE	180	5	24.0	20.0	83.3
	7/5/96	High	WD	180	2	14.0	14.0	100.0
	7/7/96	High	WE	180	3	17.5	13.0	74.3
	8/3/96	High	WE	91	5	13.5	2.0	14.8
	8/3/96	High	WE	91	2	14.0	10.0	71.4
	8/4/96	High	WE	560	2	22.0	2.0	9.1
	8/4/96	High	WE	560	2	22.0	1.0	4.5
	8/17/96	High	WE	110	2	17.0	17.0	100.0
	8/24/96	High	WE	110	2	16.0	3.0	18.8
	8/24/96	High	WE	100	1	24.0	10.0	41.7
Matagorda Bay								
	9/7/95	High	WD	360	1	20.5	20.5	100.0
	9/26/95	High	WD	360	3	14.0	14.0	100.0
	10/1/95	High	WE	360	1	20.0	16.0	80.0
	10/1/95	High	WE	360	2	23.0	21.0	91.3
	10/1/95	High	WE	360	2	16.0	16.0	100.0
	10/1/95	High	WE	160	4	23.0	19.0	82.6
	10/7/95	High	WE	220	2	16.5	6.5	39.4
	10/28/95	High	WE	590	2	12.5	12.5	100.0
	3/12/96	High	WD	590	2	21.0	9.0	42.9
	5/5/96	Low	WE	560	2	30.5	15.0	49.2
	5/5/96	Low	WE	360	4	20.5	7.0	34.1
	5/19/96	High	WE	360	4	14.5	12.0	82.8
	5/19/96	High	WE	360	3	19.0	13.0	68.4
	5/19/96	High	WE	360	1	21.0	18.0	85.7
	5/25/96	High	WE	590	2	16.5	16.5	100.0
	6/23/96	High	WE	360	2	20.0	8.0	40.0

Table A.1.

Bay System	Interview Date	Season	Day Type	Minor Bay	Number of Anglers	TLn(h)	ATLn(h)	Percent ATLn
Matagorda Bay (cont.)								
	6/23/96	High	WE	360	5	27.0	15.0	55.6
	6/23/96	High	WE	360	2	71.5	54.0	75.5
	6/23/96	High	WE	360	1	71.5	27.0	37.8
	6/23/96	High	WE	360	1	71.5	27.0	37.8
	6/23/96	High	WE	98	5	35.0	15.0	42.9
	6/29/96	High	WE	360	4	18.0	16.0	88.9
	7/5/96	High	WD	620	3	18.0	4.0	22.2
	7/5/96	High	WD	98	3	22.0	16.0	72.7
	7/11/96	High	WD	220	2	25.0	25.0	100.0
	7/13/96	High	WE	360	1	28.0	22.0	78.6
	7/13/96	High	WE	360	2	17.5	15.0	85.7
	7/13/96	High	WE	360	2	20.5	20.0	97.6
	7/13/96	High	WE	160	4	17.0	17.0	100.0
	7/13/96	High	WE	160	2	18.0	18.0	100.0
	7/21/96	High	WE	160	2	20.5	8.0	39.0
	7/28/96	High	WE	360	2	17.0	13.0	76.5
	7/28/96	High	WE	271	3	20.0	16.0	80.0
	8/10/96	High	WE	360	2	17.0	5.0	29.4
	8/10/96	High	WE	360	2	18.5	6.0	32.4
	8/10/96	High	WE	360	1	18.5	8.0	43.2
	8/10/96	High	WE	360	3	20.0	9.0	45.0
	8/12/96	High	WD	360	4	24.0	16.0	66.7
	8/22/96	High	WD	360	3	68.0	3.0	4.4
	8/22/96	High	WD	360	1	68.0	3.0	4.4
San Antonio Bay								
	8/9/95	High	WD	170	1	126.0	36.0	28.6
	8/12/95	High	WE	170	3	14.0	14.0	100.0
	8/18/95	High	WD	98	3	16.5	16.5	100.0
	9/9/95	High	WE	300	2	15.0	15.0	100.0
	9/9/95	High	WE	300	2	15.0	15.0	100.0
	9/12/95	High	WD	170	3	26.0	12.0	46.2
	10/1/95	High	WE	170	4	38.0	24.0	63.2
	10/9/95	High	WD	170	2	13.0	13.0	100.0
	10/9/95	High	WD	170	3	72.0	30.0	41.7
	10/9/95	High	WD	98	1	24.0	12.0	50.0
	3/17/96	Low	WE	98	2	21.0	6.0	28.6
	4/20/96	Low	WE	170	2	20.0	6.0	30.0
	4/23/96	Low	WD	170	5	24.0	12.0	50.0
	6/2/96	High	WE	620	5	22.0	6.0	27.3
	6/2/96	High	WE	170	3	45.0	12.0	26.7
	6/11/96	High	WD	302	2	48.5	11.0	22.7
	6/23/96	High	WE	170	2	42.0	10.0	23.8
	6/23/96	High	WE	170	4	22.0	7.0	31.8
	6/26/96	High	WD	300	2	72.0	36.0	50.0

Table A.1.

Bay System	Interview Date	Season	Day Type	Minor Bay	Number of Anglers	TLn(h)	ATLn(h)	Percent ATLn
San Antonio Bay (cont.)								
	6/29/96	High	WE	170	2	13.5	13.5	100.0
	7/5/96	High	WD	170	4	23.0	5.0	21.7
	7/5/96	High	WD	170	2	31.0	6.0	19.4
	7/21/96	High	WE	170	3	46.0	4.0	8.7
	8/10/96	High	WE	302	1	24.0	24.0	100.0
	8/17/96	High	WE	300	3	17.0	8.0	47.1
	8/17/96	High	WE	170	2	23.0	12.0	52.2
	8/22/96	High	WD	170	3	74.0	16.0	21.6
Aransas Bay								
	8/20/95	High	WE	20	2	18.0	18.0	100.0
	9/2/95	High	WE	250	2	51.0	24.0	47.1
	9/15/95	High	WD	90	2	19.0	11.0	57.9
	10/12/95	High	WD	90	2	72.0	14.0	19.4
	5/19/96	High	WE	250	2	15.5	15.5	100.0
	5/19/96	High	WE	90	3	44.0	25.0	56.8
	5/19/96	High	WE	90	2	19.0	3.0	15.8
	6/5/96	High	WD	90	3	17.0	5.5	32.4
	7/28/96	High	WE	300	2	24.0	8.0	33.3
	7/28/96	High	WE	90	2	46.0	16.0	34.8
	7/28/96	High	WE	90	2	46.0	16.0	34.8
	7/28/96	High	WE	90	4	41.0	24.0	58.5
	7/28/96	High	WE	90	3	31.0	11.0	35.5
	7/28/96	High	WE	90	2	19.0	6.0	31.6
	7/28/96	High	WE	90	4	20.0	12.0	60.0
	7/28/96	High	WE	90	3	22.0	12.0	54.5
	8/10/96	High	WE	90	4	23.0	12.0	52.2
Corpus Christi Bay								
	9/3/95	High	WE	284	4	15.0	8.0	53.3
	12/3/95	Low	WE	260	4	16.0	16.0	100.0
	12/31/95	Low	WE	130	3	12.5	12.5	100.0
	3/22/96	Low	WD	13	2	15.0	1.0	6.7
Upper Laguna Madre								
	8/9/95	High	WD	370	2	72.0	6.0	8.3
	8/9/95	High	WD	370	2	28.0	1.0	3.6
	8/9/95	High	WD	370	5	19.0	5.0	26.3
	8/9/95	High	WD	370	2	48.0	5.0	10.4
	8/9/95	High	WD	40	3	45.0	10.0	22.2
	8/9/95	High	WD	40	2	23.5	12.0	51.1
	8/13/95	High	WE	370	2	24.0	12.0	50.0
	8/13/95	High	WE	370	2	28.5	3.5	12.3
	8/13/95	High	WE	370	1	22.5	10.0	44.4
	8/13/95	High	WE	370	2	31.5	5.0	15.9

Table A.1.

Bay System	Interview Date	Season	Day Type	Minor Bay	Number of Anglers	TLn(h)	ATLn(h)	Percent ATLn
Upper Laguna Madre (cont.)								
	8/13/95	High	WE	370	6	54.0	36.0	66.7
	8/13/95	High	WE	370	2	24.0	12.0	50.0
	8/13/95	High	WE	282	2	16.0	16.0	100.0
	8/13/95	High	WE	40	4	28.0	12.0	42.9
	8/22/95	High	WD	370	5	23.0	18.0	78.3
	8/23/95	High	WD	370	3	54.5	16.0	29.4
	8/23/95	High	WD	40	2	43.0	17.0	39.5
	9/16/95	High	WE	10	3	22.0	22.0	100.0
	9/19/95	High	WD	370	2	20.0	17.0	85.0
	9/24/95	High	WE	370	2	25.5	4.0	15.7
	9/24/95	High	WE	370	3	48.0	15.0	31.3
	9/27/95	High	WD	370	3	19.0	4.0	21.1
	9/27/95	High	WD	370	2	20.5	3.0	14.6
	10/5/95	High	WD	40	2	24.0	7.0	29.2
	10/8/95	High	WE	370	2	43.5	10.0	23.0
	10/8/95	High	WE	370	2	40.5	18.0	44.4
	10/8/95	High	WE	370	2	24.5	5.0	20.4
	10/8/95	High	WE	370	2	23.0	3.0	13.0
	10/8/95	High	WE	370	3	25.0	7.0	28.0
	10/8/95	High	WE	370	3	33.0	22.0	66.7
	10/8/95	High	WE	370	4	42.0	30.0	71.4
	10/8/95	High	WE	40	2	44.5	12.0	27.0
	10/8/95	High	WE	40	2	46.5	14.0	30.1
	10/8/95	High	WE	40	2	42.5	5.0	11.8
	10/8/95	High	WE	40	1	25.0	3.0	12.0
	10/8/95	High	WE	40	3	27.0	10.0	37.0
	10/8/95	High	WE	40	2	43.5	15.0	34.5
	10/8/95	High	WE	40	3	26.0	10.0	38.5
	10/8/95	High	WE	40	2	15.5	2.5	16.1
	10/12/95	High	WD	370	3	25.0	12.0	48.0
	10/12/95	High	WD	370	2	34.5	8.0	23.2
	10/12/95	High	WD	370	2	25.0	12.0	48.0
	10/12/95	High	WD	370	1	25.0	12.0	48.0
	10/15/95	High	WE	370	3	46.0	5.0	10.9
	10/15/95	High	WE	370	3	68.0	6.0	8.8
	10/23/95	High	WD	40	3	52.0	18.0	34.6
	10/29/95	High	WE	370	1	41.0	20.0	48.8
	10/29/95	High	WE	370	3	29.5	9.0	30.5
	10/29/95	High	WE	370	3	38.5	24.0	62.3
	10/29/95	High	WE	370	2	42.5	7.0	16.5
	10/29/95	High	WE	40	2	66.5	8.0	12.0
	10/29/95	High	WE	40	4	22.5	4.0	17.8
	10/29/95	High	WE	40	3	66.5	18.0	27.1
	10/29/95	High	WE	40	3	45.0	42.0	93.3
	11/2/95	Low	WD	40	1	31.0	3.0	9.7

Table A.1.

Bay System	Interview Date	Season	Day Type	Minor Bay	Number of Anglers	TLn(h)	ATLn(h)	Percent ATLn
Upper Laguna Madre (cont.)								
	12/2/95	Low	WE	370	3	20.0	15.0	75.0
	3/2/96	Low	WE	370	2	29.5	14.0	47.5
	3/13/96	Low	WD	370	4	69.5	14.0	20.1
	3/13/96	Low	WD	370	2	24.5	3.0	12.2
	3/23/96	Low	WE	370	3	17.0	6.0	35.3
	3/23/96	Low	WE	370	4	17.0	10.0	58.8
	4/7/96	Low	WE	370	2	24.0	20.0	83.3
	4/7/96	Low	WE	370	2	54.0	12.0	22.2
	4/7/96	Low	WE	370	2	50.5	4.5	8.9
	4/17/96	Low	WD	370	3	27.0	15.0	55.6
	4/25/96	Low	WD	370	2	27.0	14.0	51.9
	4/25/96	Low	WD	370	2	20.0	5.0	25.0
	4/25/96	Low	WD	370	3	28.0	18.0	64.3
	4/25/96	Low	WD	370	2	31.0	12.0	38.7
	4/28/96	Low	WE	370	3	26.5	5.5	20.8
	4/28/96	Low	WE	370	2	27.5	8.0	29.1
	4/28/96	Low	WE	370	4	51.0	10.0	19.6
	4/28/96	Low	WE	370	2	51.0	10.0	19.6
	4/28/96	Low	WE	370	2	48.5	5.0	10.3
	4/28/96	Low	WE	370	3	43.5	6.0	13.8
	6/2/96	High	WE	370	2	25.5	4.0	15.7
	6/2/96	High	WE	370	2	50.0	18.0	36.0
	6/2/96	High	WE	370	2	50.0	18.0	36.0
	6/2/96	High	WE	370	2	41.0	10.0	24.4
	6/2/96	High	WE	370	3	21.0	8.0	38.1
	6/2/96	High	WE	370	1	45.0	20.0	44.4
	6/2/96	High	WE	370	3	27.5	21.0	76.4
	6/2/96	High	WE	370	2	53.0	3.0	5.7
	6/2/96	High	WE	370	4	44.0	18.0	40.9
	6/2/96	High	WE	370	2	45.0	12.0	26.7
	6/2/96	High	WE	370	2	72.0	9.0	12.5
	6/2/96	High	WE	370	5	41.0	14.5	35.4
	6/2/96	High	WE	370	3	30.0	14.0	46.7
	6/2/96	High	WE	370	3	27.5	21.5	78.2
	6/2/96	High	WE	370	1	75.5	15.0	19.9
	6/2/96	High	WE	370	4	12.5	12.5	100.0
	6/2/96	High	WE	370	3	50.5	24.0	47.5
	6/2/96	High	WE	370	3	50.5	24.0	47.5
	6/2/96	High	WE	370	2	43.0	16.0	37.2
	6/2/96	High	WE	370	1	21.5	6.0	27.9
	6/2/96	High	WE	40	1	48.0	8.0	16.7
	6/2/96	High	WE	40	2	47.0	12.0	25.5
	6/2/96	High	WE	40	5	49.0	6.0	12.2
	6/2/96	High	WE	40	4	48.5	20.0	41.2
	6/2/96	High	WE	40	3	43.5	15.0	34.5

Table A.1.

Bay System	Interview Date	Season	Day Type	Minor Bay	Number of Anglers	TLn(h)	ATLn(h)	Percent ATLn
Upper Laguna Madre (cont.)								
	6/2/96	High	WE	40	4	43.5	13.0	29.9
	6/2/96	High	WE	40	2	44.0	9.0	20.5
	6/2/96	High	WE	40	4	23.0	12.0	52.2
	6/6/96	High	WD	40	2	46.5	12.0	25.8
	6/6/96	High	WD	40	3	48.5	12.0	24.7
	6/6/96	High	WD	40	3	79.0	32.0	40.5
	6/7/96	High	WD	370	1	39.0	2.0	5.1
	6/7/96	High	WD	370	2	45.0	10.0	22.2
	6/7/96	High	WD	370	2	75.0	26.0	34.7
	6/12/96	High	WD	370	2	66.5	21.0	31.6
	6/12/96	High	WD	282	3	66.5	21.0	31.6
	6/12/96	High	WD	40	2	21.0	5.0	23.8
	6/15/96	High	WE	370	2	41.0	12.0	29.3
	6/15/96	High	WE	370	1	41.0	12.0	29.3
	6/15/96	High	WE	370	2	15.5	10.0	64.5
	6/15/96	High	WE	370	3	45.0	12.5	27.8
	6/15/96	High	WE	370	2	21.5	6.0	27.9
	6/15/96	High	WE	40	2	23.0	5.0	21.7
	6/15/96	High	WE	40	2	21.0	11.0	52.4
	6/15/96	High	WE	40	2	21.0	11.0	52.4
	6/20/96	High	WD	370	3	76.5	28.0	36.6
	6/20/96	High	WD	370	2	20.5	5.0	24.4
	6/20/96	High	WD	370	2	31.0	14.0	45.2
	6/20/96	High	WD	370	1	31.0	14.0	45.2
	6/23/96	High	WE	40	5	14.5	13.5	93.1
	7/3/96	High	WD	370	3	49.0	2.0	4.1
	7/3/96	High	WD	370	2	51.0	24.0	47.1
	7/3/96	High	WD	370	2	51.5	24.0	46.6
	7/3/96	High	WD	370	4	47.0	8.0	17.0
	7/3/96	High	WD	370	4	28.5	10.0	35.1
	7/3/96	High	WD	370	3	24.5	7.0	28.6
	7/6/96	High	WE	370	2	51.0	16.0	31.4
	7/6/96	High	WE	370	3	18.0	8.0	44.4
	7/6/96	High	WE	370	2	43.0	16.0	37.2
	7/6/96	High	WE	370	2	48.0	8.0	16.7
	7/9/96	High	WD	370	3	46.0	10.0	21.7
	7/29/96	High	WD	370	2	21.0	7.0	33.3
	8/1/96	High	WD	370	3	48.5	33.0	68.0
	8/1/96	High	WD	370	2	33.5	18.0	53.7
	8/4/96	High	WE	370	3	22.0	3.0	13.6
	8/4/96	High	WE	370	4	29.5	4.0	13.6
	8/4/96	High	WE	370	5	29.5	4.0	13.6
	8/4/96	High	WE	370	4	15.5	14.0	90.3
	8/4/96	High	WE	370	2	43.0	4.0	9.3
	8/4/96	High	WE	370	2	65.5	39.5	60.3

Table A.1.

Bay System	Interview Date	Season	Day Type	Minor Bay	Number of Anglers	TLn(h)	ATLn(h)	Percent ATLn
Upper Laguna Madre (cont.)								
	8/4/96	High	WE	370	2	30.5	8.0	26.2
	8/4/96	High	WE	370	2	44.0	4.0	9.1
	8/4/96	High	WE	370	2	28.0	4.0	14.3
	8/4/96	High	WE	370	4	21.0	21.0	100.0
	8/4/96	High	WE	370	8	45.0	18.0	40.0
	8/4/96	High	WE	370	2	41.0	12.0	29.3
	8/4/96	High	WE	370	2	29.0	4.0	13.8
	8/4/96	High	WE	370	2	46.5	30.0	64.5
	8/4/96	High	WE	370	2	72.0	20.0	27.8
	8/4/96	High	WE	370	2	48.5	6.0	12.4
	8/4/96	High	WE	370	5	29.0	19.0	65.5
	8/4/96	High	WE	370	1	41.0	15.0	36.6
	8/4/96	High	WE	370	3	41.0	13.5	32.9
	8/4/96	High	WE	370	6	45.0	39.0	86.7
	8/4/96	High	WE	370	4	19.5	7.0	35.9
	8/4/96	High	WE	370	3	19.5	7.0	35.9
	8/4/96	High	WE	40	4	38.0	8.0	21.1
	8/4/96	High	WE	40	2	48.0	4.0	8.3
	8/4/96	High	WE	40	3	48.5	21.0	43.3
	8/4/96	High	WE	40	3	48.5	21.0	43.3
	8/4/96	High	WE	40	2	48.0	42.0	87.5
	8/4/96	High	WE	40	3	43.5	16.0	36.8
	8/6/96	High	WD	370	2	99.0	9.0	9.1
	8/9/96	High	WD	370	4	47.5	13.0	27.4
	8/9/96	High	WD	370	2	41.5	6.5	15.7
	8/13/96	High	WD	370	3	73.5	66.0	89.8
	8/13/96	High	WD	370	3	73.5	66.0	89.8
	8/17/96	High	WE	370	3	17.0	8.0	47.1
	8/17/96	High	WE	370	3	12.5	9.0	72.0
	8/17/96	High	WE	370	2	41.5	7.0	16.9
	8/17/96	High	WE	370	1	15.0	4.0	26.7
	8/17/96	High	WE	370	2	12.5	10.0	80.0
	8/17/96	High	WE	40	2	23.5	13.0	55.3
Lower Laguna Madre								
	8/14/95	High	WD	230	3	24.0	18.0	75.0
	8/17/95	High	WD	230	2	19.0	11.0	57.9
	8/30/95	High	WD	230	3	44.5	16.0	36.0
	8/30/95	High	WD	230	2	24.5	12.5	51.0
	9/2/95	High	WE	230	6	16.0	12.0	75.0
	9/2/95	High	WE	230	5	16.0	12.0	75.0
	9/2/95	High	WE	230	4	15.0	13.0	86.7
	9/2/95	High	WE	230	3	23.0	15.0	65.2
	9/2/95	High	WE	230	4	24.0	13.0	54.2
	9/10/95	High	WE	282	2	14.5	11.5	79.3

Table A.1.

Bay System	Interview Date	Season	Day Type	Minor Bay	Number of Anglers	TLn(h)	ATLn(h)	Percent ATLn
Lower Laguna Madre (cont.)								
	9/10/95	High	WE	282	4	15.5	13.0	83.9
	9/10/95	High	WE	97	3	30.0	18.0	60.0
	10/8/95	High	WE	230	3	17.0	9.0	52.9
	10/8/95	High	WE	230	4	16.0	12.0	75.0
	10/8/95	High	WE	230	3	19.0	8.0	42.1
	10/8/95	High	WE	230	2	23.0	11.5	50.0
	10/19/95	High	WD	282	5	19.0	12.0	63.2
	10/22/95	High	WE	282	4	12.5	11.0	88.0
	10/22/95	High	WE	230	4	18.0	16.0	88.9
	12/17/95	Low	WE	230	1	24.0	4.0	16.7
	2/18/96	Low	WE	230	3	20.5	8.0	39.0
	2/18/96	Low	WE	230	3	19.5	8.0	41.0
	3/17/96	Low	WE	230	3	17.0	6.0	35.3
	5/7/96	Low	WD	282	3	17.0	2.0	11.8
	5/15/96	High	WD	230	4	43.5	15.0	34.5
	5/25/96	High	WE	282	5	14.5	14.5	100.0
	5/25/96	High	WE	282	5	25.0	20.0	80.0
	5/25/96	High	WE	282	3	22.0	19.0	86.4
	5/25/96	High	WE	230	2	15.5	15.5	100.0
	5/27/96	High	WD	230	5	70.0	10.0	14.3
	5/27/96	High	WD	230	3	15.5	8.0	51.6
	5/27/96	High	WD	230	4	23.0	10.0	43.5
	5/27/96	High	WD	230	4	19.0	7.0	36.8
	5/27/96	High	WD	230	4	18.5	13.0	70.3
	5/27/96	High	WD	230	4	21.5	3.0	14.0
	5/27/96	High	WD	230	4	19.5	18.0	92.3
	5/27/96	High	WD	230	4	22.0	8.0	36.4
	5/27/96	High	WD	230	4	21.5	17.0	79.1
	6/2/96	High	WE	282	7	48.0	20.0	41.7
	6/2/96	High	WE	282	4	27.0	14.0	51.9
	6/2/96	High	WE	282	4	28.5	8.0	28.1
	6/2/96	High	WE	282	2	22.0	7.0	31.8
	6/2/96	High	WE	282	2	21.0	12.0	57.1
	6/2/96	High	WE	230	3	15.0	10.5	70.0
	6/6/96	High	WD	230	5	17.0	12.0	70.6
	6/13/96	High	WD	97	3	15.0	2.0	13.3
	6/15/96	High	WE	313	3	19.0	14.0	73.7
	6/16/96	High	WE	230	3	22.0	2.0	9.1
	6/16/96	High	WE	230	2	22.0	21.0	95.5
	6/16/96	High	WE	230	2	22.0	21.0	95.5
	7/1/96	High	WD	282	3	43.5	9.0	20.7
	7/1/96	High	WD	282	6	69.0	14.0	20.3
	7/5/96	High	WD	230	2	14.5	14.5	100.0
	7/5/96	High	WD	230	2	17.5	12.5	71.4
	7/5/96	High	WD	230	3	15.5	11.0	71.0

Table A.1.

Bay System	Interview Date	Season	Day Type	Minor Bay	Number of Anglers	TLn(h)	ATLn(h)	Percent ATLn
Lower Laguna Madre (cont.)								
	7/5/96	High	WD	230	3	27.0	17.0	63.0
	7/5/96	High	WD	230	2	20.0	15.0	75.0
	7/6/96	High	WE	282	3	16.5	10.0	60.6
	7/6/96	High	WE	282	4	16.0	12.0	75.0
	7/6/96	High	WE	230	5	15.0	6.0	40.0
	7/16/96	High	WD	230	2	17.5	17.0	97.1
	7/20/96	High	WE	230	3	18.0	6.0	33.3
	7/20/96	High	WE	230	2	17.5	10.0	57.1
	7/20/96	High	WE	230	4	20.0	9.0	45.0
	7/20/96	High	WE	230	2	23.0	14.0	60.9
	7/20/96	High	WE	230	4	20.0	11.0	55.0
	8/7/96	High	WD	230	2	24.0	18.0	75.0
	8/16/96	High	WD	282	2	27.0	15.0	55.6
	8/16/96	High	WD	97	3	90.0	70.0	77.8
	8/18/96	High	WE	282	4	16.0	12.0	75.0
	8/18/96	High	WE	282	4	45.5	29.5	64.8
	8/27/96	High	WD	230	4	15.0	10.0	66.7
	8/27/96	High	WD	230	2	14.0	10.0	71.4

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