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**U.S. Department of Commerce**

**National Oceanic and Atmospheric Administration**

**National Marine Fisheries Service**

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NOAA Technical Memorandum NMFS-SEFC-257

**A DESCRIPTION OF TRIP DATA  
COLLECTED FROM THE 1987  
INSHORE SHRIMP FISHERY OF  
GALVESTON BAY, TEXAS**

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**May 1990**

NATIONAL MARINE FISHERIES

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U.S. Department of Commerce  
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National Marine Fisheries Service  
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**May 1990**

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We wish to thank John Ward, Walter Keithly, Edward Klima and Neal Baxter for their constructive comments and suggestions about earlier drafts of this report. Nevertheless, the authors accept responsibility for any remaining errors.

# ABSTRACT

Personnel at the National Marine Fisheries Service Laboratory at Galveston, Texas, interviewed fishermen at dockside to collect economic information about inshore shrimping trips in Galveston Bay, Texas. Interviews were conducted between May 20 and October 30, 1987. This study presents information about fishing effort, operating costs, landings and revenues per trip for trips with bay and bait licenses in Galveston Bay.

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# A DESCRIPTION OF TRIP DATA COLLECTED FROM THE 1987 INSHORE SHRIMP FISHERY OF GALVESTON BAY, TEXAS

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## 1. INTRODUCTION

Shrimp fishing in the estuaries of Texas is important to coastal economies. Substantial numbers of full- and part-time commercial fishermen and recreational fishermen traditionally have fished for brown (*Penaeus aztecus*) and white shrimp (*P. setiferus*) in inshore waters. During the 1980s world-wide oil surpluses reduced employment opportunities in coastal communities, thereby increasing the importance of inshore shrimping both as a primary and supplemental source of family income. Also, implementation of the Texas Closure rule (GMFMC 1980) in 1981 has induced some offshore shrimpers to fish in inshore waters during the closed season offshore. In addition, inshore waters function as valuable nursery areas for the brown and white shrimp populations which support both the inshore and offshore shrimp fisheries.

Despite the importance of the inshore shrimp fisheries, little current information exists about them. Warren (1980) described the Texas bay shrimp fishery; and Baxter, Furr and Scott (1988) described the bait shrimp fishery in Galveston Bay, Texas. Also, Swartz and Adams (1979) calculated average monthly budgets for bay shrimpers in Rockport, Texas. Blomo et al. (1978), Grant and Griffin (1979) and Warren (1980) presented simulation analyses of hypothetical management strategies

designed to change the distribution of shrimp caught in inshore and adjacent offshore fishing grounds.

The purpose of this study was to collect and describe economic information about shrimping activities in Galveston Bay, Texas. The data included (1) variable costs and revenues per trip, and (2) effort expended per trip. Information was collected at the trip level because a trip is the basic unit for the production of fishing effort in the short run. Once the decision has been made to fish during the season, vessel owners maximize their profits by embarking on an additional trip as long as expected revenues exceed expected variable costs per trip. By focusing on fishing trips, this study complements rather than updates the annual data described in previous studies of the inshore fisheries.

This report describes data collected by the survey. Data will be presented by season and license type corresponding to the ways in which fishery regulations differ. The approach here is to describe each variable separately although it is recognized that relationships exist between variables. These descriptions are provided in anticipation of future analyses of important behavioral relationships among variables.

## 2. DESCRIPTIONS OF STUDY AREA AND FISHERY REGULATIONS

Fishermen were interviewed from the inshore fishery of Galveston Bay, Texas. Galveston Bay is located along the northeastern coast of Texas near the large urban centers of Houston and Galveston. It is heavily used for shipping, recreational fishing and boating, as well as for the commercial harvest of shrimp, oysters and crabs. Petrochemicals, manufacturing and tourism are the primary industries in the region. In 1987, commercial fishermen with bay (inshore) licenses made over 30 thousand trips and landed nearly 4.6 million pounds of shrimp (heads-off weight). In addition, bait fishermen landed nearly 0.26 million pounds (heads-on weight) between April and June, the only period in 1987 for which data were available (Baxter et al. 1988). Bait fishermen landed an average of 0.82 million pounds (heads-on) between 1980 and 1984, with 1984 the last year for which complete data were available (Baxter et al. 1988). Nance et al. (1989) provide a detailed description of the Galveston Bay area.

Commercial shrimpers in Texas may hold one or more of three licenses: bay, bait, or, gulf. The bay and bait licenses represent the inshore fishery. The gulf license is required to land shrimp caught in the Gulf of Mexico. Many shrimpers hold several licenses (Krauthamer et al. 1984) to ensure flexibility in the choice of fishing times, locations and the most advantageous applicable regulations. Recreational shrimpers are required to purchase a sport trawl license, although some purchase commercial licenses to take advantage of larger daily catch limits.

Fishery regulations in the State of Texas are designed to allow small brown and white

shrimp to grow to larger, more valuable sizes (TP&WD 1985). Seasonal closures, gear restrictions, time-of-day restrictions, daily catch limits and minimum size limits are used to manage commercial bay fishermen (TP&WD 1986). During the spring brown shrimp season, from May 15 to July 15, shrimpers harvesting with a bay license may trawl with one main net no wider than 34 feet between doors. Mesh size may not be less than 6 1/2 inches in length between the two most widely separated knots in any consecutive series of five stretched meshes. In addition, fishermen are limited to a daily catch of 300 pounds and permitted to shrimp only between sunrise and sunset. These restrictions are to ensure that a sufficient amount of brown shrimp migrate offshore. During the fall white shrimp season, between August 15 and December 15, shrimpers are permitted to use one main net with a maximum total width of 95 feet for the trawl plus doors, and a mesh size not less than 8 3/4 inches between the two most widely separated knots in any consecutive series of five stretched meshes. There is no daily catch limit. However, there is a minimum size limit of 50 heads-on shrimp to the pound between August 15 to October 15. These regulations enable the inshore shrimpers to target the larger and more valuable white shrimp which remain predominantly in the bays and near shore in the Gulf. Shrimping with a bay license is prohibited during the one month closure between the spring and fall seasons.

The bait shrimp fishery is a year round fishery which supplies live and dead bait to recreational fishermen. Fishermen shrimping with a bait license may harvest a maximum daily catch of 200 pounds, one half of which must be kept alive ex-

cept during the period from August 16 to November 15 (TP&WD 1986). Fishing craft must be equipped with a single trawl no wider than 34 feet and with a mesh size of not less than 6 1/2 inches in length between the two most widely separated knots in any consecutive series of five stretched meshes. Bait fishermen may shrimp all year and at any time of day except from sunset to sunrise between August 16 and December 15.

### 3. METHODS OF DATA COLLECTION AND ANALYSIS

Fishermen were interviewed at dockside between May 20 and October 30, 1987, about fishing effort, trip costs, landings and prices (and hence revenues). Interviews were conducted at 24 commercial fish houses and 46 bait camps,<sup>1</sup> which facilitated the collection of data from trips with commercial fishing licenses while excluding recreational trips and trips by fishermen who sold their catches at roadside or by newspaper advertisement. Therefore, the sampling unit was a fishing trip with a commercial bay or bait license. The sample included 168 bay and 173 bait trips.<sup>2</sup>

Time and budgetary constraints caused the sampling fraction (the ratio of the number of trips sampled to the total number of trips taken) for bay trips to vary over the sampling period (Table 3.1). Sampling effort was greatest during the spring brown shrimp season. The number of trip interviews declined after mid September because relatively more time was devoted then to conducting sociological background interviews (see Nance et al. 1989). Exact sampling fractions could not be calculated for bait trips because information about the total number of trips with bait licenses is not known. Approximate sampling fractions are based on the ratio of total hours fished

on sampled trips to the 1980-1984 average of total hours fished on all bait trips (Table 3.2). Estimates of total hours fished have not been available since 1984 (see Baxter et al. 1988). The number of bait trips sampled and the approximate sampling fractions were greatest between mid July and mid August (Table 3.2) because, with the bay fishery closed then, all sampling effort was devoted to the bait fishery.

Also, trips out of ports in Chambers County were rarely sampled. We assume that the samples were not biased because trips out of some ports were under-represented. Unpublished data obtained from the NMFS laboratory at Galveston indicate that shrimp landings and exvessel value for bay fishermen in Chambers County were approximately proportional to the number of trips taken.<sup>3</sup> Information about total landings, revenues and trips was not available by port for bait fishermen.

Data are presented for each variable separately in the form of frequency histograms. Kolmogorov-Smirnov two-sample tests are used to examine the null hypothesis of no seasonal differences in the distributions of each variable (see Appendix A). Kolmogorov-Smirnov tests are sensitive to differences in entire distributions of variables rather than to differences in means only and do not require the assumption of normality for the error terms as in analysis of variance.<sup>4</sup> Variable means are calculated for each season and for all seasons combined. The overall mean was calculated as a weighted average of the seasonal means to minimize the potential for bias due to seasonal variation in sampling fractions. See Appendix B for a discussion of appropriate weighting factors.

TABLE 3.1

NUMBER OF BAY TRIPS SAMPLED  
 COMPARED WITH THE TOTAL NUMBER OF FISHING TRIPS<sup>a</sup>  
 IN THE INSHORE WATERS OF GALVESTON BAY, 1987

Month	Total Pounds	Total Trips	Trips Sampled	Sampling Fraction
Jan	9,177	80	0	0.0
Feb	1,628	11	0	0.0
Mar	2,942	62	0	0.0
Apr	24,665	392	0	0.0
May	654,857	3,987	16	0.00401
Jun	1,117,536	6,192	54	0.00872
Jul	435,605	3,496	30	0.00858
Aug	910,045	4,353	18	0.00414
Sep	699,942	5,450	38	0.00697
Oct	461,631	4,096	12	0.00299
Nov	196,697	1,733	0	0.0
Dec	43,152	296	0	0.0
Total	4,557,877	30,148	168	
May-Jul	2,207,998	13,675	100	0.00731
Aug-Oct	2,071,618	13,899	68	0.00489

<sup>a</sup> Source: Estimates of the total number of bay trips fished and total landings (heads-off weights) were obtained from the National Marine Fisheries Service, Galveston Laboratory, 4700 Avenue U, Galveston, Texas 77551.

TABLE 3.2

HOURS FISHED ON SAMPLED BAIT TRIPS  
 COMPARED WITH INDEPENDENT ESTIMATES OF TOTAL HOURS FISHED<sup>a</sup>  
 BY BAIT FISHERMEN IN GALVESTON BAY

Month	Total Pounds (Heads-On)	Hours Fished (Total)	Trips Sampled	Hours Fished (Sample)	Sampling Fraction (Hours)
Jan	8,162	494	0	0	0.0
Feb	4,681	362	0	0	0.0
Mar	462	201	0	0	0.0
Apr	5,889	530	0	0	0.0
May	75,548	2,700	6	19	0.00704
Jun	148,490	4,425	25	85	0.01921
Jul	149,845	4,990	66	236	0.04730
Aug	113,340	4,714	32	119	0.02525
Sep	94,391	3,929	15	67	0.01705
Oct	112,756	4,022	29	92	0.02287
Nov	74,024	2,952	0	0	0.0
Dec	28,610	1,402	0	0	0.0
Total	816,198	30,721	173	618	
May - mid July	298,961	9,620	54	187	0.01944
Mid July-mid Aug	131,592	4,852	64	237	0.04885
Mid Aug - Sept	263,817	10,307	55	194	0.01882

<sup>a</sup> Source: Estimates of total landings and total hours fished on bait trips were obtained from the National Marine Fisheries Service, Galveston Laboratory, 4700 Avenue U, Galveston, Texas 77551. Total landings and hours fished are average values for 1980-1984. The sampling fraction is based on hours fished. Data for mid July and mid August were calculated as one-half of the totals for July and August.

#### 4. DESCRIPTION OF FISHING TRIPS WITH BAY LICENSES

Economic information was obtained from 168 trips with bay licenses in the inshore waters of Galveston Bay. The sample included 100 trips between May 20 and July 14, 1987, during the spring brown shrimp season, and 68 trips between August 17 and October 30, 1987, during the fall white shrimp season. No data were collected during the one month closure between July 16 and August 14. Most fishermen in the sample (146 of 168 trips) unloaded their entire catches at commercial fish houses. Of the remaining trips, ten fishermen sold their entire catches directly to consumers, ten fishermen apparently kept their shrimp for home use or consumption, and 2 fishermen sold portions of their catches to fish houses and either sold the remainder directly from the boat or kept it for home consumption. Although fishermen on ten trips did not sell their shrimp, information from their trips were retained in the sample because they were operating with a commercial bay license and presumably would have sold shrimp if their catches had been greater.<sup>5</sup> The sample data for trips with bay licenses are presented in Appendix C. Selected summary statistics for the sample are presented in Table 4.1.

The fishing crafts from which the sample was obtained varied in length from 15 to 57 feet (Fig. 4.1). Both the overall mean and median vessel lengths were 36 feet and there were no significant differences in vessel lengths between the brown and white shrimp seasons. However, gear size differed significantly between seasons in accordance with state law which required a maximum trawl width of 34 feet in the spring and 95 feet during the fall. The sample indicated that most trips used 30 or 32 foot trawls during the spring, but that

trawl size averaged nearly 47 feet and ranged up to 72 feet during the fall (Fig. 4.1). Approximately 97% of all trips in the sample carried a crew of 1 or 2, including the captain (Fig. 4.1).

Because state law allowed fishing only between sunrise and sunset, most trips in the sample lasted 10 hours or less absent from port and 7 hours or less actually fishing (Fig. 4.2). The sample also included 5 extended trips of 3 to 5 days on which fishermen anchored overnight on the fishing grounds. Usually, fishermen made between 1 and 4 tows per trip (Fig. 4.3). The average length of tow per trip ranged from 30 to 240 minutes, with the most frequently mentioned tow times being 60, 90 and 120 minutes (Fig. 4.3). Fifty-five percent of the trips in the sample reported tow times of 90 minutes or less (Fig. 4.3). Hours fished and the duration of tows were marginally greater during the fall than spring.

Catch per trip exhibited a great deal of variation due to differences in hours fished, gear size, vessel length, and the size of the shrimp population. Landings per trip ranged from 0 to 1562 pounds of heads-on shrimp, with an average of 158 pounds in the spring and 136 pounds in the fall. The fall distribution of landings per trip had a disproportionately high number of trips with small catches, primarily because 8 of 10 sampled trips for which fishermen did not sell their catches occurred during the fall. It is not known whether or not the higher incidence of trips during the fall on which fishermen kept shrimp for personal use was due to sampling error. Over 90% of the sampled trips in each season landed 300 pounds or less even though the 300 pound limit was removed after August 15.

Ninety-one percent of the shrimp in the spring sample were smaller than 50 count, heads-on, but only 25% of the shrimp in the fall sample (which included some trips after October 15 when the 50 count minimum size limit was relaxed) were smaller than 50 count (Fig. 4.4). Nevertheless, exvessel revenues per trip (Fig. 4.5) were only marginally higher during the fall, and only when the trips which kept shrimp for personal use were omitted.<sup>6</sup> During the spring, total revenues ranged from \$6 to \$625 with an average of \$134 per trip. During the fall, revenues ranged from \$0 to \$2127 with an average of \$196 per trip.

Costs per trip exhibited great variability due to differences in hours fished, distance traveled to the fishing grounds, vessel length, engine horsepower and type, and gear size. Costs per trip for fuel, ice, food, lost gear and gear and vessel repair ranged from \$5 to \$513 (Fig. 4.5). Normal operating expenses (fuel, ice and food) ranged from \$5 to \$338 with an overall average of \$36 per trip. Fuel accounted for 74% of normal operating expenses. Fishermen on 17 trips (10.1%) incurred costs for lost gear or repairs that ranged from \$1 to \$350 and averaged \$101 per incident. The expected gear loss and repair cost per trip was \$10 (approximately  $0.101 \times \$101$ ).

Net revenues for all trips ranged from -\$263 to \$1907, with an overall mean of \$120. Fishermen were reluctant to reveal their crew share arrangements for each trip; hence, net revenues are defined as a net return before payments to labor (captain plus crew) and capital. The data suggest that 1987 was only marginally profitable for inshore shrimpers in Galveston Bay due to low catch rates, the large proportion of relatively small shrimp that were landed and low exvessel prices for small shrimp. Exvessel prices ranged from \$0.30 to \$3.50 per

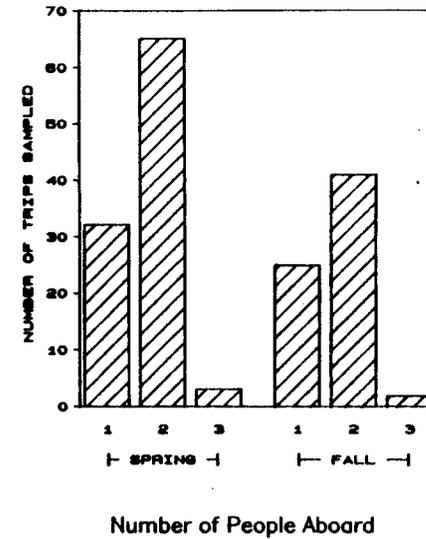
pound, heads on, in the spring and from \$0.70 to \$3.00 per pound in the fall. The sample indicated that shrimpers received an average of only \$0.85 per pound in the spring and \$1.44 per pound in the fall (Table 4.2). Caillouet et al. (1980) described the recent trend toward smaller shrimp in catches from Texas and Louisiana. Sixty percent of the trips in the sample realized a net return of less than \$100; 81% of the trips had a net return of less than \$200, and 93% had a net return of less than \$300. Fishermen on 25 trips failed to cover variable costs before payments to labor and capital. Fishermen on the 6 worst trips incurred substantial repair costs. Eight of ten trips for which fishermen kept their catches for personal use did not cover variable costs, excluding labor and capital.

FIGURE 4.1

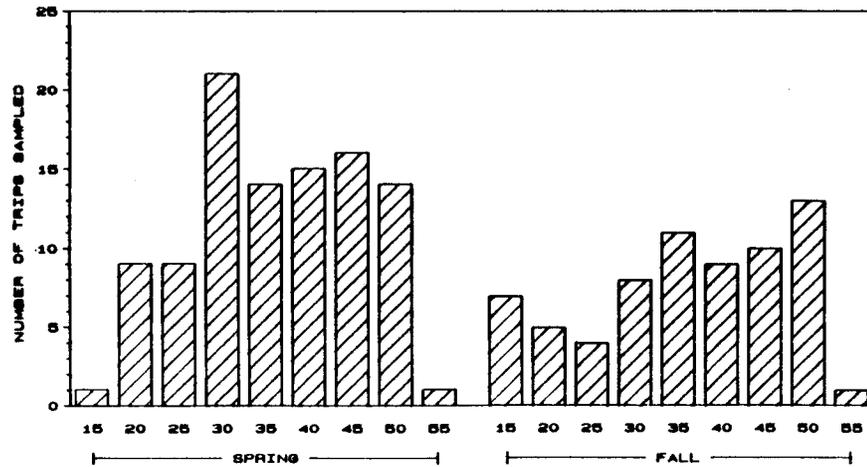
CRAFT LENGTHS, GEAR AND CREW SIZES  
FOR TRIPS WITH BAY LICENSES  
GALVESTON BAY SAMPLE, 1987

SAMPLE SIZE:  
100 Trips between May 20 and July 14 (Spring)  
68 Trips between August 17 and October 30 (Fall)

CREW SIZE

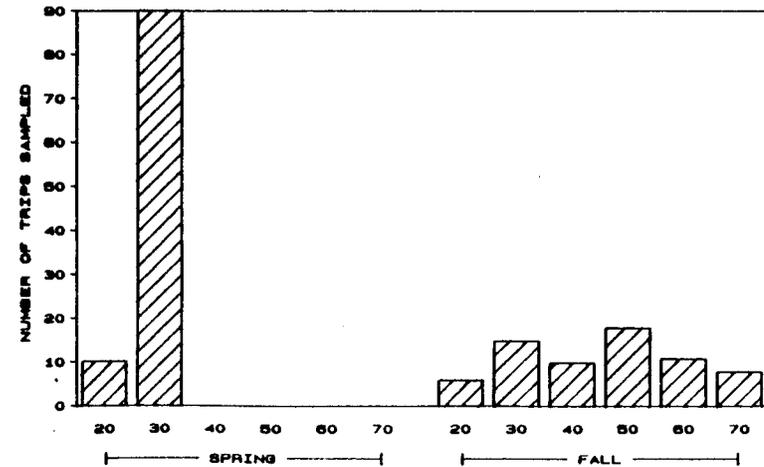


LENGTHS OF CRAFTS INTERVIEWED



Midpoint of Length Group, in Feet

TOTAL WIDTH OF ALL TRAWLS

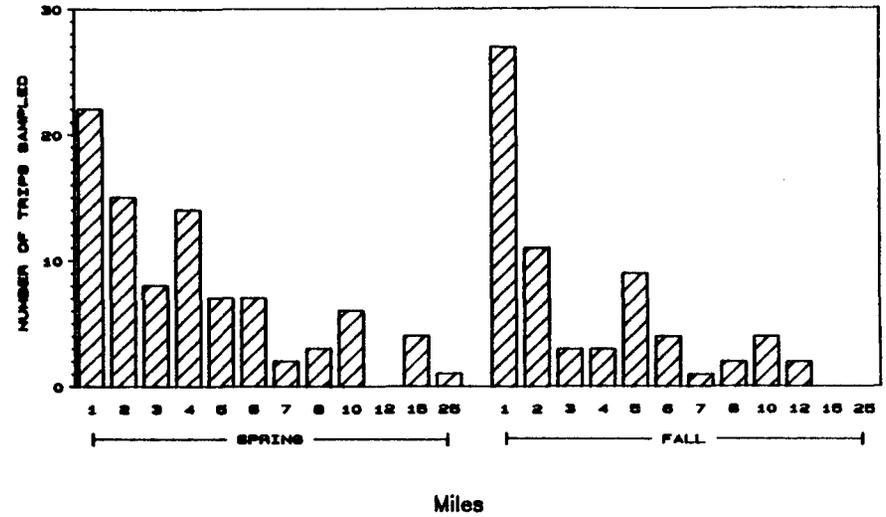


Midpoint of Width Group, in Feet

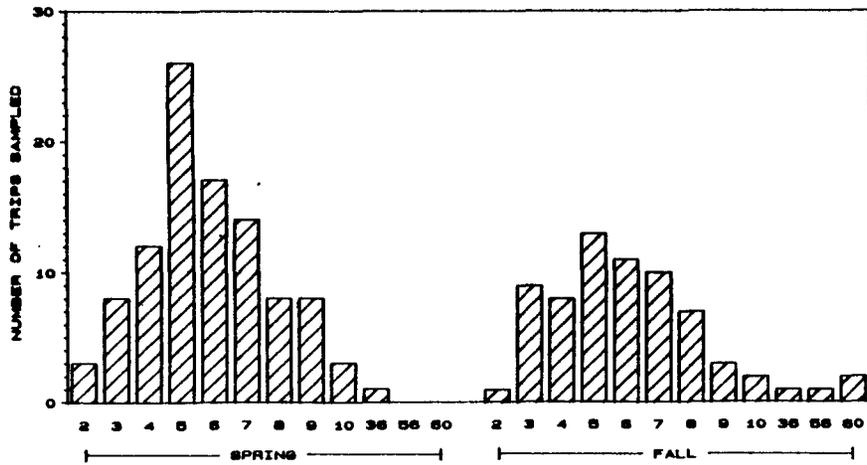
FIGURE 4.2  
 LENGTHS OF TRIPS  
 AND DISTANCE TO FISHING GROUNDS  
 FOR TRIPS WITH BAY LICENSES  
 GALVESTON BAY SAMPLE, 1987

SAMPLE SIZE:  
 100 Trips between May 20 and July 14 (Spring)  
 68 Trips between August 17 and October 30 (Fall)

DISTANCE TO FISHING GROUNDS  
 (N=89 TRIPS IN SPRING, 66 TRIPS IN FALL)

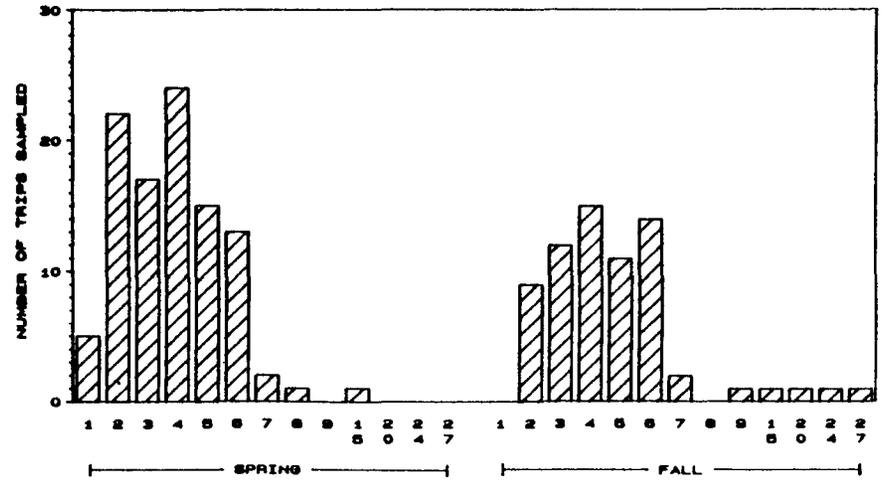


HOURS ABSENT FROM PORT



Hours Absent per Trip

HOURS FISHED

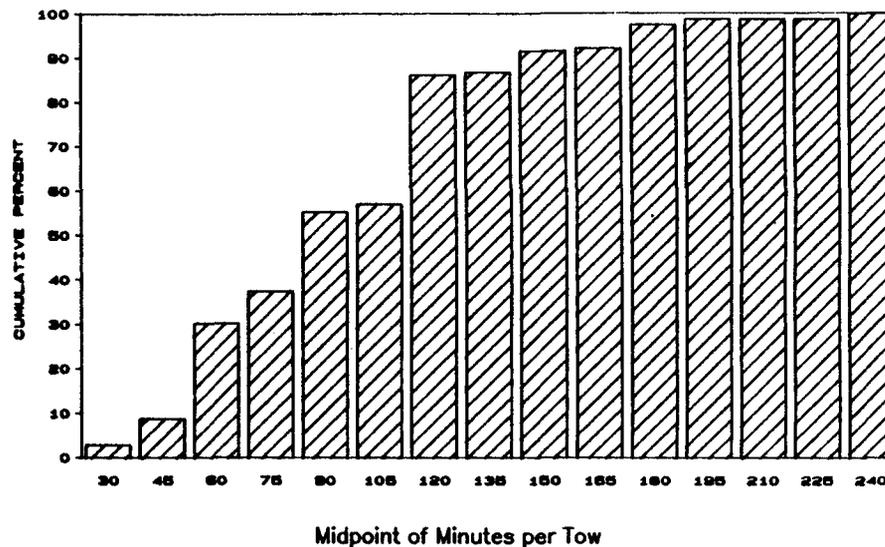


Hours Fished Per Trip

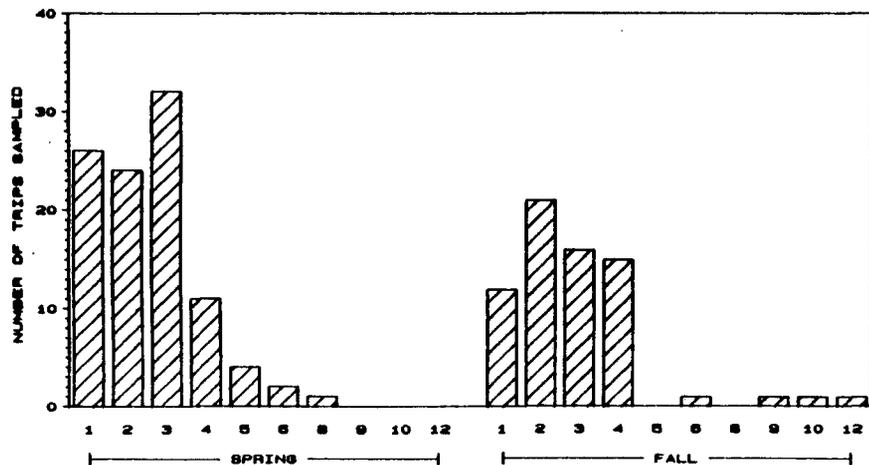
FIGURE 4.3  
 NUMBER OF TOWS  
 AND DURATION OF TOWS  
 FOR TRIPS WITH BAY LICENSES  
 GALVESTON BAY SAMPLE, 1987

SAMPLE SIZE:  
 100 Trips between May 20 and July 14 (Spring)  
 68 Trips between August 17 and October 30 (Fall)

PERCENTAGE OF SAMPLE  $\leq$  EACH TOW TIME  
 (SPRING AND FALL SEASONS COMBINED)

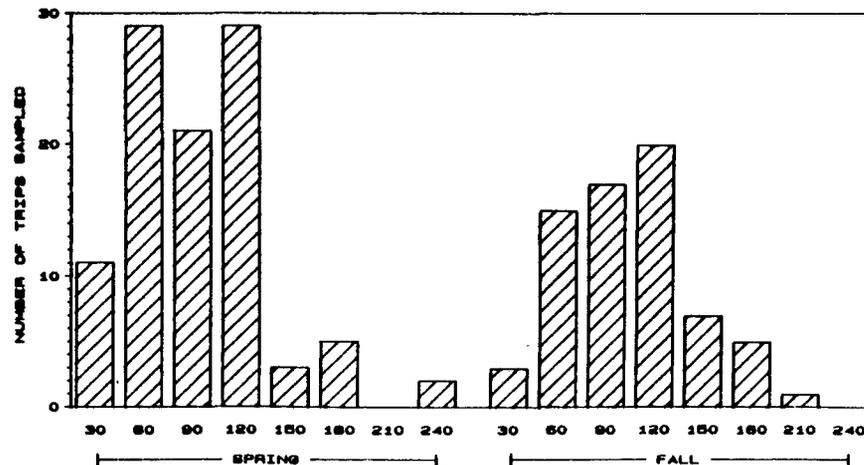


NUMBER OF TOWS PER TRIP



Number of Tows per Trip

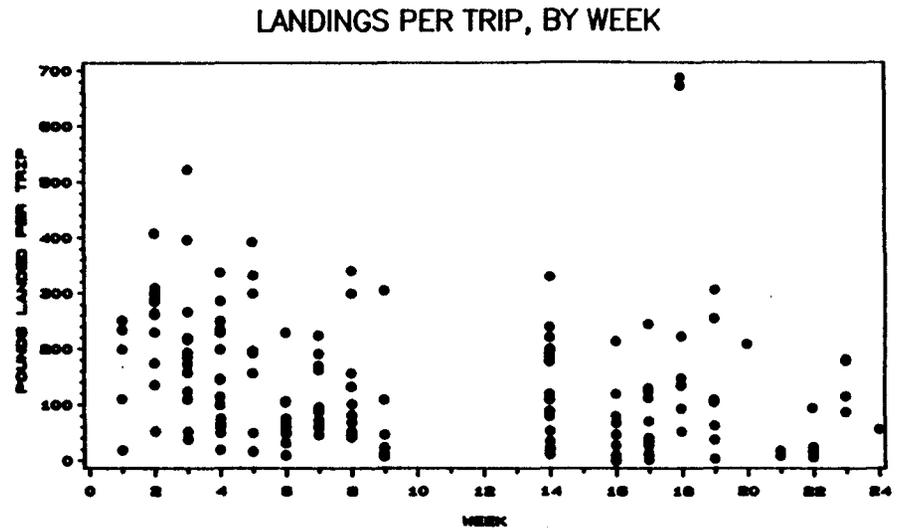
MINUTES PER TOW



Midpoint of Minutes per Tow

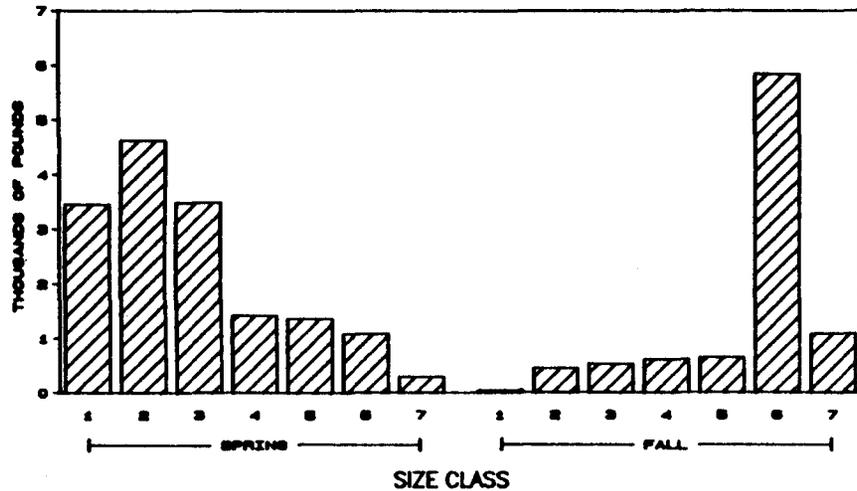
**FIGURE 4.4**  
**LANDINGS PER TRIP**  
**WITH BAY LICENSES**  
**GALVESTON BAY SAMPLE, 1987**

**SAMPLE SIZE:**  
 100 Trips between May 20 and July 14 (Spring)  
 68 Trips between August 17 and October 30 (Fall)



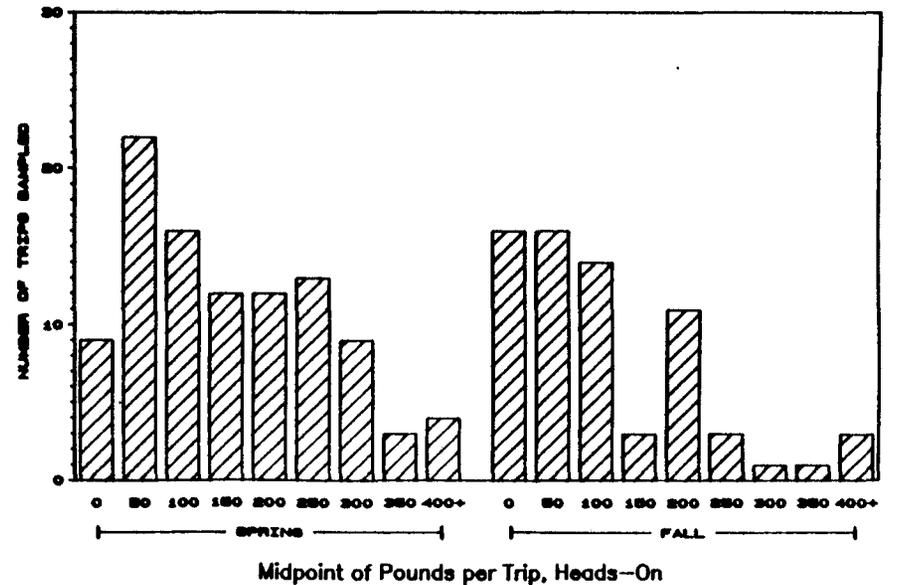
Week 1 Ended on May 23; Week 9 Ended on July 18, 1987  
 Week 14 Ended on August 22, 1987; Week 24 Ended on October 31, 1987  
 (One catch of 1562 pounds in week 14 is omitted)

**LANDINGS BY SIZE CLASS**  
 (25,049 POUNDS IN SAMPLE)



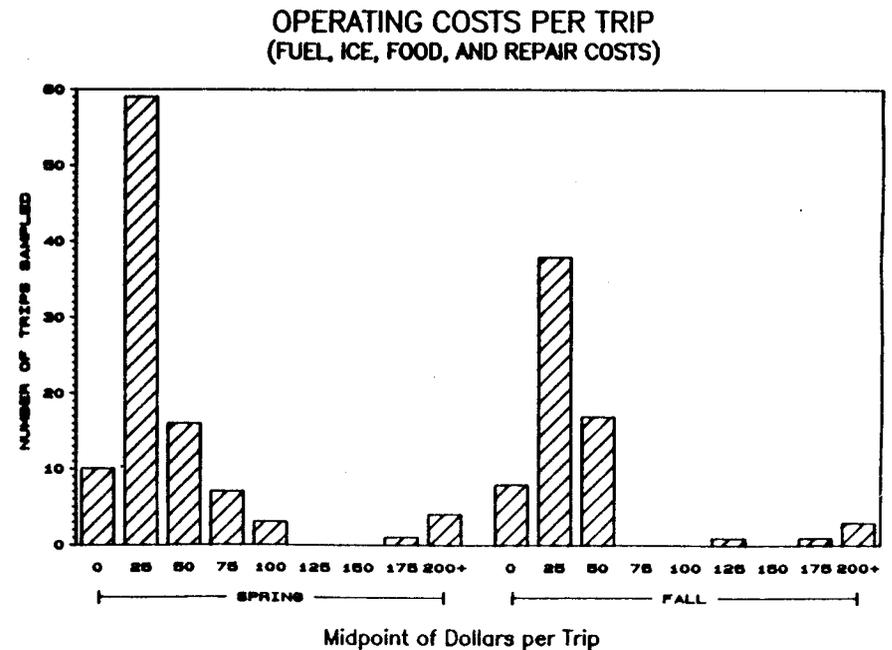
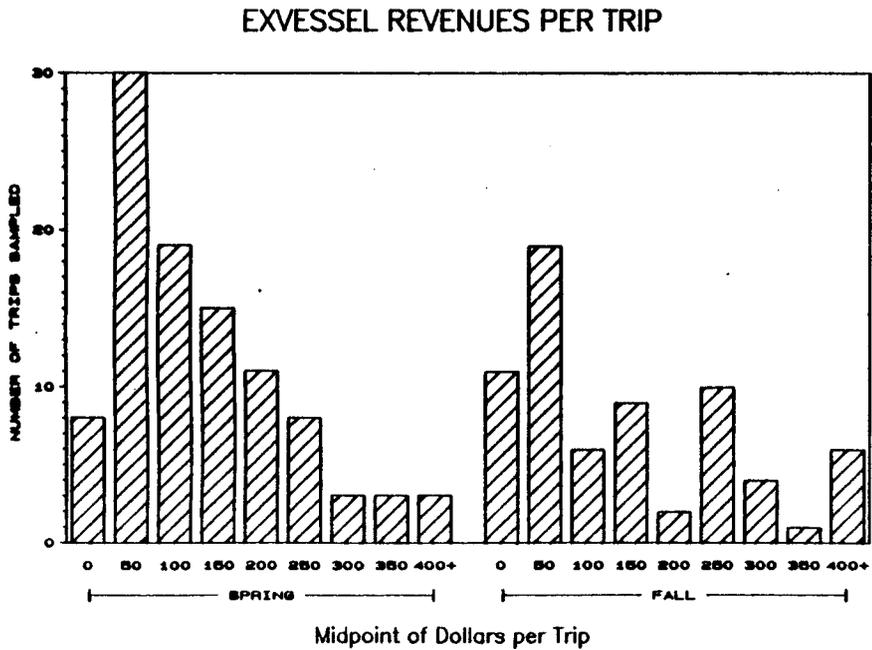
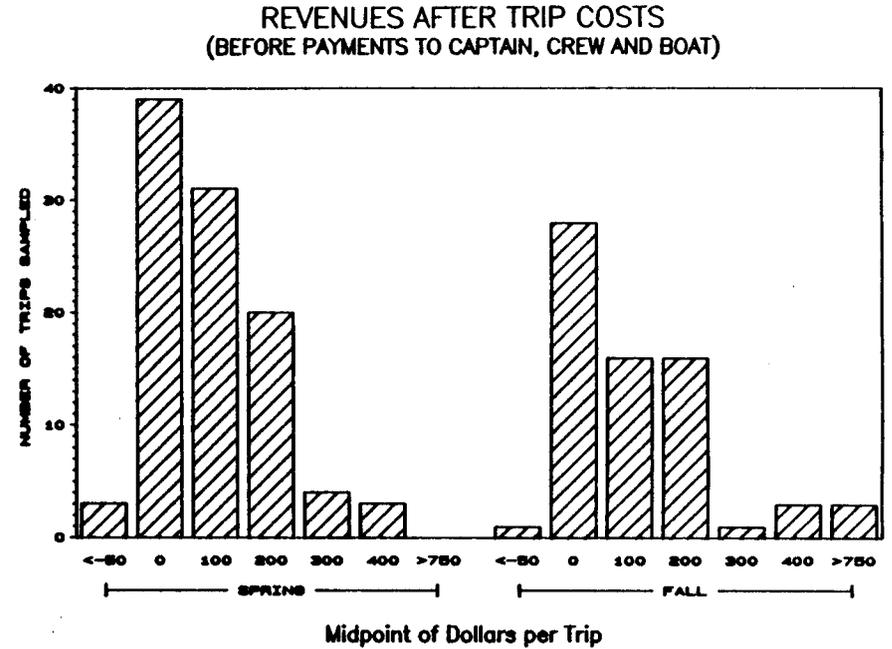
Legend for Size Classes (Number of Shrimp per Pound, Heads-On)  
 1=>100; 2=81-100; 3=71-80; 4=61-70; 5=51-60; 6=31-50; 7=<30

**POUNDS LANDED**



**FIGURE 4.5**  
**FINANCIAL PERFORMANCE**  
**FOR TRIPS WITH BAY LICENSES**  
**GALVESTON BAY SAMPLE, 1987**

**SAMPLE SIZE:**  
 100 Trips between May 20 and July 14 (Spring)  
 68 Trips between August 17 and October 30 (Fall)



**TABLE 4.1**

**SUMMARY STATISTICS FOR THE SAMPLE OF TRIPS WITH BAY LICENSES  
IN GALVESTON BAY, TEXAS, MAY 20-OCTOBER 30, 1987**

VARIABLE	SEASON	N	MINIMUM	25TH PERCENTILE	MEDIAN	75TH PERCENTILE	MAXIMUM	MEAN	STANDARD DEVIATION	COEFF OF VARIATION
CRAFT LENGTH	SPRING	100	17	30.0	35.5	45.0	53	36.3	9.8	27.0
	FALL	68	15	29.0	37.0	45.0	57	36.0	11.4	31.7
	COMBINED	168	15	30.0	36.0	45.0	57	36.1	10.6	29.3
TRAWL WIDTH	SPRING	100	25	30.0	30.0	32.0	34	30.3	2.1	7.0
	FALL	68	20	32.0	49.5	60.0	72	46.9	14.9	31.7
	COMBINED	168	20	30.0	32.0	44.5	72	38.7	13.5	34.9
CREW SIZE	SPRING	100	1	1.0	2.0	2.0	3	1.7	0.5	30.4
	FALL	68	1	1.0	2.0	2.0	3	1.7	0.5	32.4
	COMBINED	168	1	1.0	2.0	2.0	3	1.7	0.5	31.2
HOURS ABSENT	SPRING	100	2	5.0	6.0	7.0	36	6.1	3.6	58.6
	FALL	68	2	4.0	6.0	7.0	60	8.5	11.7	137.5
	COMBINED	168	2	5.0	6.0	7.0	60	7.3	8.7	118.9
HOURS FISHED	SPRING	100	1	2.0	4.0	5.0	15	3.9	1.9	50.2
	FALL	68	2	3.0	4.0	6.0	27	5.3	4.5	84.5
	COMBINED	168	1	3.0	4.0	5.0	27	4.6	3.5	76.7
MILES TO GROUNDS	SPRING	89	1	2.0	3.0	6.0	25	4.4	4.1	93.8
	FALL	66	1	1.0	2.0	5.0	12	3.4	3.1	89.5
	COMBINED	155	1	1.0	3.0	5.0	25	3.9	3.6	93.3
NUMBER OF TOWS	SPRING	100	1	1.0	2.5	3.0	8	2.5	1.3	52.8
	FALL	68	1	2.0	3.0	4.0	12	2.9	2.0	67.4
	COMBINED	168	1	2.0	3.0	3.0	12	2.7	1.7	61.8
MINUTES PER TOW	SPRING	100	30	60.0	90.0	120.0	240	93.7	42.1	44.9
	FALL	68	30	72.5	100.0	120.0	200	105.4	39.3	37.3
	COMBINED	168	30	60.0	90.0	120.0	240	99.6	41.0	41.1
POUNDS LANDED	SPRING	100	8	60.0	140.5	234.0	523	158.0	110.2	69.7
	FALL	68	0	28.0	84.0	180.5	1562	136.0	218.5	160.6
	COMBINED	168	0	49.5	110.5	216.0	1562	146.9	172.8	117.6
EXVESSEL REVENUES	SPRING	100	6	53.9	95.2	189.0	625	134.1	108.9	81.2
	FALL	68	0	35.6	118.6	240.0	2127	195.9	317.0	161.8
	COMBINED	168	0	49.7	99.8	216.3	2127	165.3	238.3	144.2

(CONTINUED)

**SUMMARY STATISTICS FOR THE SAMPLE OF TRIPS WITH BAY LICENSES  
IN GALVESTON BAY, TEXAS, MAY 20-OCTOBER 30, 1987**

VARIABLE	SEASON	N	MINIMUM	25TH PERCENTILE	MEDIAN	75TH PERCENTILE	MAXIMUM	MEAN	STANDARD DEVIATION	COEFF OF VARIATION
FUEL	SPRING	100	5	13.0	20.0	30.0	146	25.6	19.9	77.5
COST	FALL	68	3	12.5	21.0	30.0	175	27.0	27.7	102.6
	COMBINED	168	3	13.0	20.0	30.0	175	26.3	24.0	91.2
FUEL, ICE	SPRING	100	5	16.0	25.0	38.5	226	32.0	26.5	83.0
AND FOOD	FALL	68	6	18.5	30.0	40.0	338	40.5	53.0	130.9
COST	COMBINED	168	5	16.5	27.5	40.0	338	36.2	42.0	115.8
REPAIR	SPRING	100	0	0.0	0.0	0.0	350	13.0	56.4	433.9
COST	FALL	68	0	0.0	0.0	0.0	300	6.1	38.3	627.5
	COMBINED	168	0	0.0	0.0	0.0	350	9.5	48.1	504.7
TOTAL	SPRING	100	5	16.0	26.0	45.0	401	45.0	62.9	139.9
OPERATING	FALL	68	6	18.5	30.0	41.0	513	46.6	76.3	163.7
COST	COMBINED	168	5	16.5	29.0	44.0	513	45.8	69.6	152.1
NET	SPRING	100	-263	19.1	61.3	161.3	401	89.2	115.7	129.7
OPERATING	FALL	68	-150	19.8	72.3	197.4	1907	149.3	280.3	187.7
REVENUES	COMBINED	168	-263	19.1	63.5	169.3	1907	119.5	215.8	180.6

TABLE 4.2

LANDINGS AND REVENUES BY SIZE CATEGORY FOR SAMPLED BAY TRIPS  
(All sampled trips combined for each season)

Size Heads-On	Pounds Sampled	Spring		Fall		
		Exvessel Revenues	Average Price	Pounds Sampled	Exvessel Revenues	Average Price
16- 18	20	\$ 58.30	\$ 2.92	73	\$ 200.75	\$ 2.75
19- 21	183	573.60	3.13	65	161.50	2.48
22- 25	5	13.50	2.70	256	533.45	2.08
26- 30	92	216.28	2.36	698	1326.40	1.90
31- 35	322	655.95	2.04	107	213.15	1.99
36- 40	17	32.60	1.92	748	1121.05	1.50
41- 50	756	1030.25	1.36	4995	7176.60	1.44
51- 60	1377	1586.55	1.15	654	875.25	1.34
61- 70	1435	1450.60	1.01	618	705.10	1.14
71- 80	3501	3076.65	0.88	532	560.55	1.05
81-100	4632	3200.05	0.69	453	407.70	0.90
101-120	3119	1382.95	0.44	50	37.85	0.76
121-	341	136.40	0.40			
Total	15800	13413.68	0.85	9249	13319.35	1.44

## 5. DESCRIPTION OF FISHING TRIPS WITH BAIT LICENSES

Economic information was obtained from 173 trips with bait licenses during 1987. The sample included 54 trips between May 20 and July 15 during the spring season for brown shrimp, 64 trips between July 16 and August 15 when shrimping for bait is permitted but regular commercial trawling is not, and 55 trips between August 17 and October 30 during the fall season for white shrimp. Sampling intensity was greatest during the month-long mid-summer period because, with the fishery closed to bay licenses, all sampling effort was devoted to the bait fishery. Most fishermen in the sample (162 of 173 trips) unloaded their shrimp at commercial bait camps or fish houses. Fishermen on the remaining trips either sold their catches directly from the boat or kept them for home use. The sample data for trips with bait licenses are presented in Appendix C. Selected summary statistics are presented in Table 5.1.

Bait trips were taken with vessels of lengths ranging from 15 to 56 feet, with 81% of the trips taken with vessels less than or equal to 40 feet in length (Fig. 5.1). The overall mean vessel length was 34 feet, and there were no significant differences in the distributions of vessel lengths among the three seasons. Vessels on bait trips included a higher concentration of vessels smaller than 40 feet than did vessels on commercial bay trips (cf. Figures 5.1 and 4.1), primarily because large vessels are not needed to pull trawls with a maximum legal width of 34 feet. Nevertheless, the sample included a few trips on which 50-65 foot trawls were used (Fig. 5.1), probably by bay fishermen who also had purchased bait licenses. Most

vessels carried a one or two man crew, including the captain (Fig. 5.1).

Trips were relatively short, usually lasting less than 8 hours absent from port and with fishermen actually fishing less than 6 hours per trip (Fig. 5.2). Although both bait and bay trips lasted less than one day, there were significantly more bait than bay trips that lasted less than 8 hours and with fishing times of less than 6 hours. Bait trips were relatively short to maximize chances for keeping shrimp alive. The median distance was 3 miles to the fishing grounds.

The unique aspect of bait trips is that fishermen produce more than one product: live shrimp for bait, and dead shrimp for bait or human consumption (Table 5.2). By law, fishermen can land no more than 200 pounds per trip, and at least one-half of the catch must be kept alive except between August 16 and November 15. Although it was difficult to keep shrimp alive, the reward for doing so was great given that over 90% of the shrimp landed as live bait were 50 count or smaller. Prices for live bait ranged from \$2.00 to \$6.50 per quart<sup>7</sup> with \$4.00 being the most frequently occurring price. In contrast, prices for dead bait ranged from \$0.30 to \$2.00 per pound, and prices for shrimp sold for human use ranged from \$0.70 to \$3.00 per pound, heads-on.

The percentage of shrimp sold as live bait varied from 0% to 100% of the catch. The ability to land at least some live bait depended on tow times; hence, bait trips were characterized by a large number of tows and relatively short tow times. Fishermen made from 1 to 13 tows per trip with tows between 10 and 150 minutes each (Fig. 5.3). The median

length of tow was 30 minutes. The sample included 119 trips with tows of less than 60 minutes each and among these there were only 17 trips (14%) which failed to sell any shrimp as live bait (Table 5.3). However, 13 of 30 trips (43%) with tow times between 60 and 65 minutes and 19 of 24 trips (79%) with tow times greater than 80 minutes failed to land any live shrimp. (There were no trips sampled with tow times between 65 and 80 minutes.) Two-thirds of the trips with longer tow times (>80 minutes) occurred during the summer period when regular commercial trawling was not permitted. Apparently, these fishermen used bay licenses primarily, but were using bait licenses and familiar, regular commercial fishing techniques during the closed period.

Landings of live bait ranged from 0 to 100 quarts per trip worth up to \$320 (Fig. 5.4). Fishermen on 49 trips (28% of the sample) reported having landed no live shrimp with a disproportionately high number of these trips occurring during the summer season. The overall mean catch was 18.6 quarts worth \$71.5, but among those who reported landing live shrimp the mean was 23.9 quarts worth \$92.41. Live shrimp tended to increase in size throughout the year: only 7% (by weight) were larger than 60 count in the spring, 17% were larger than 60 count in the summer, and 37% were larger than 60 count in the fall (Fig. 5.4).

Landings of dead shrimp for bait ranged from 0 to 185 pounds worth up to \$185 (Fig. 5.5). The overall average catch was 21.6 pounds, but this included 72 fishermen who did not sell any dead shrimp for bait. Among those who sold dead bait shrimp, mean landings were 35.2 pounds and mean revenues were \$33.10. There were no significant seasonal differences in either landings or revenues per trip. Dead shrimp sold for bait were small but increased in size

throughout the year: no shrimp were larger than 60 count (heads-on) in the spring, 20% (by weight) were larger than 60 count in the summer, and 25% were larger than 60 count during the fall.

Fishermen using bait licenses on 78 trips (45% of the sample) sold part or all of their catches in the market for human consumption (Table 5.2). Fishermen apparently sold their dead shrimp in the market that offered the highest price. Larger (dead) shrimp generally were sold in regular commercial markets rather than the bait market. Smaller shrimp were sold in both markets. Among those trips that sold shrimp for human use, catches ranged from 2 to 318 pounds, heads-on, with a mean of 68.7 pounds, and revenues ranged from \$3 to \$298 with a mean of \$79.25. There was a disproportionately large number of trips in the summer season that sold more than 125 pounds of shrimp for human consumption.

Fishermen on bait trips earned between \$0 and \$378 per trip with an overall average of \$127 (Fig. 5.7). Revenues from the sale of live bait accounted for over 60% of total revenues for all trips (in the sample) combined in the spring and fall and 36% in the summer when large quantities of shrimp were sold in the market for human consumption (Table 5.4). Sales to the market for human use accounted for 51% of total revenues in the summer period. Revenues from the sale of dead bait accounted for 14% of revenues in the spring and summer and 20% in the fall.

Operating costs per trip for fuel, ice, food, lost gear and gear and vessel repair ranged from \$4 to \$402 (Fig. 5.7), with 86% of the trips having incurred costs of

\$50 or less. Normal operating costs (i.e., fuel, ice and food) ranged from \$4 to \$102 with an overall average of \$24. Fuel accounted for 74% of normal operating expenses. Fishermen on 15 trips (8.7% of the sample) incurred repair or lost gear expenses that ranged from \$4 to \$300 and averaged \$104 per incident. The expected gear loss and repair cost per trip was \$9 (i.e.,  $0.087 \times \$104$ ).

Net operating revenues (before payments to captain, crew or boat) on all trips ranged from -\$328 to \$358 with a median of \$88 and a mean of \$92 (Fig. 5.7). Fifty-eight percent of the trips realized a net return to labor (captain plus crew) and capital (boat and equipment) of less than \$100; 85% of the trips had a net return of less than \$200, and 98% had a net return of less than \$300. Fishermen on 17 trips (9.8% of the sample) could not cover variable costs before payments to labor and capital. Fishermen on the six worst trips incurred substantial repair expenses. Eight of nine trips for which fishermen kept their catches for personal use failed to catch enough to cover variable costs.

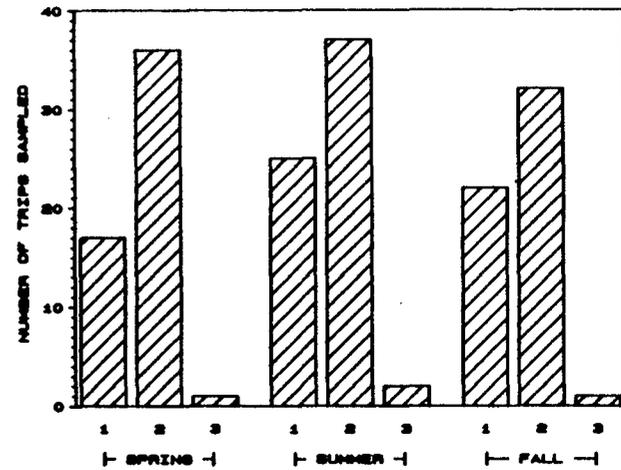
FIGURE 5.1

CRAFT LENGTHS, GEAR AND CREW SIZES  
FOR TRIPS WITH BAIT LICENSES  
GALVESTON BAY SAMPLE, 1987

SAMPLE SIZE:

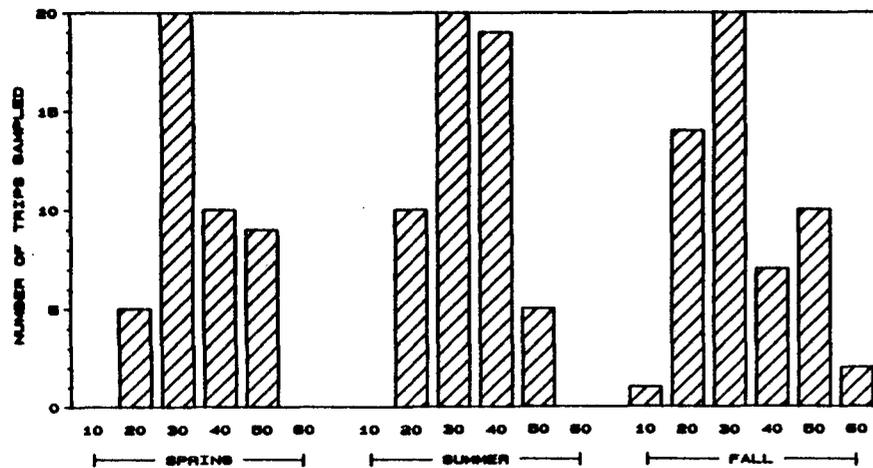
54 Trips between May 20 and July 15 (Spring)  
64 Trips between July 16 and August 13 (Summer)  
55 Trips between August 17 and October 30 (Fall)

CREW SIZE



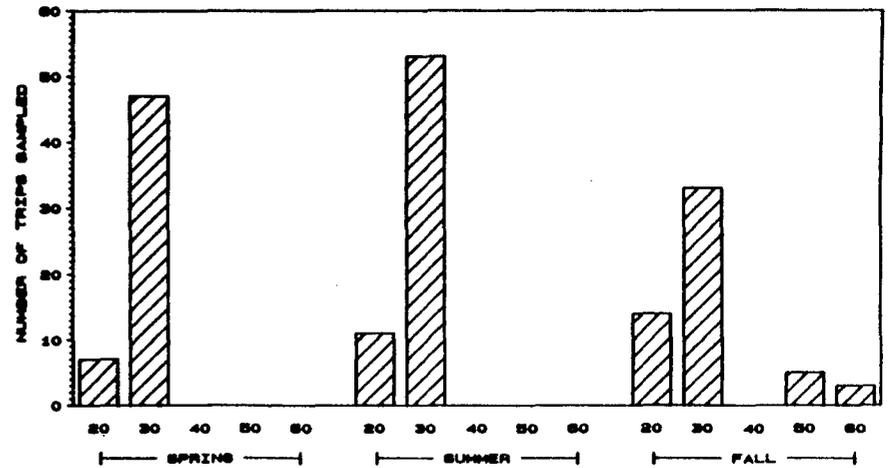
Number of People Aboard

LENGTHS OF CRAFTS INTERVIEWED



Midpoint of Length Group, in Feet

TOTAL WIDTH OF ALL TRAWLS

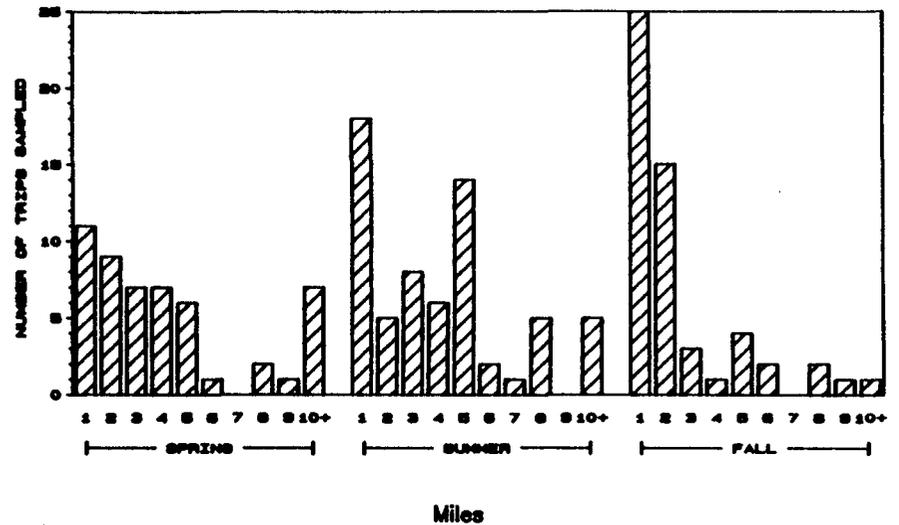


Midpoint of Width Group, in Feet

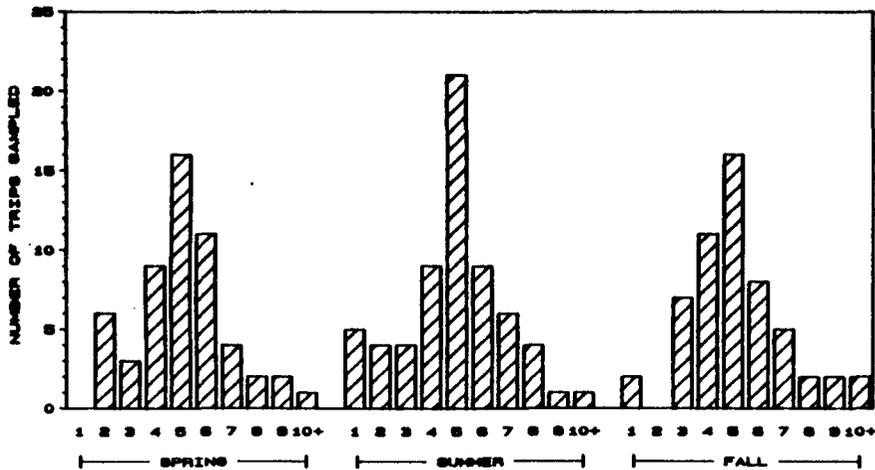
**FIGURE 5.2**  
**LENGTHS OF TRIPS**  
**AND DISTANCE TO FISHING GROUNDS**  
**FOR TRIPS WITH BAIT LICENSES**  
**GALVESTON BAY SAMPLE, 1987**

**SAMPLE SIZE:**  
 54 Trips between May 20 and July 15 (Spring)  
 64 Trips between July 16 and August 13 (Summer)  
 55 Trips between August 17 and October 30 (Fall)

**DISTANCE TO FISHING GROUNDS**  
 (N=51 TRIPS IN SPRING, 64 TRIPS IN SUMMER, 54 TRIPS IN FALL)

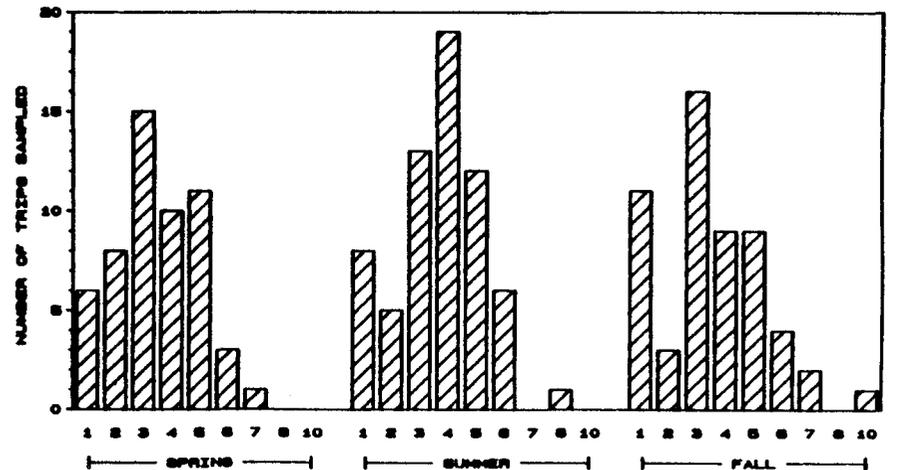


**HOURS ABSENT FROM PORT**



Hours Absent per Trip

**HOURS FISHED**

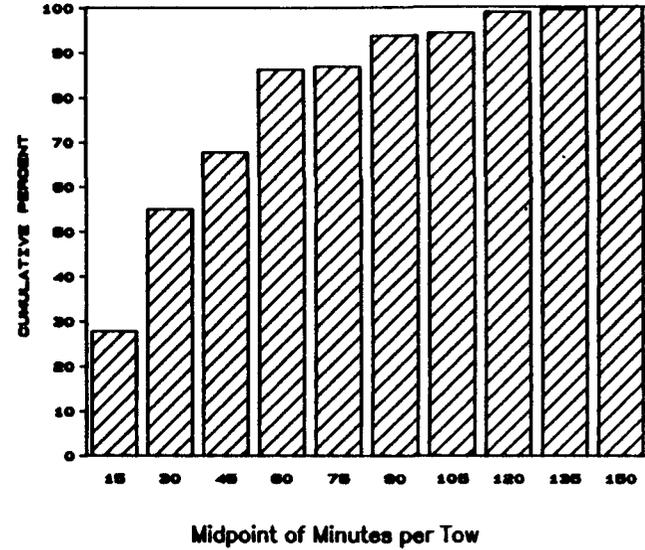


Hours Fished Per Trip

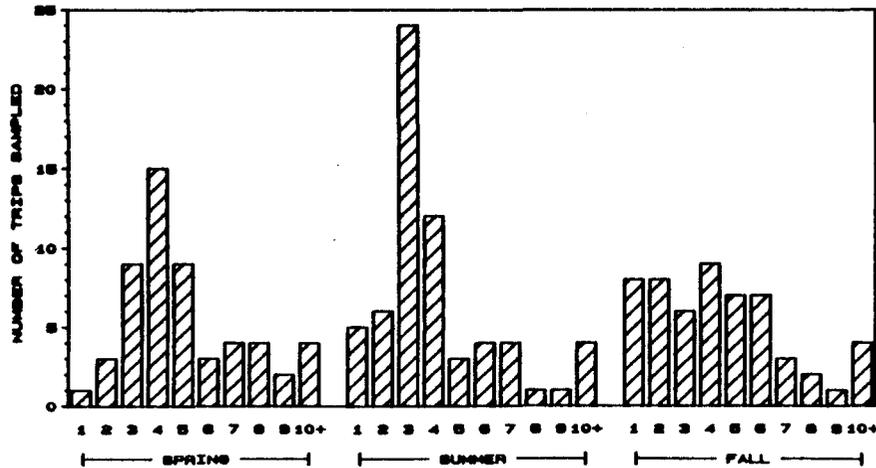
FIGURE 5.3  
 NUMBER OF TOWS  
 AND DURATION OF TOWS  
 FOR TRIPS WITH BAIT LICENSES  
 GALVESTON BAY SAMPLE, 1987

SAMPLE SIZE:  
 54 Trips between May 20 and July 15 (Spring)  
 64 Trips between July 16 and August 13 (Summer)  
 55 Trips between August 17 and October 30 (Fall)

PERCENTAGE OF SAMPLE <= EACH TOW TIME  
 (ALL SEASONS COMBINED)

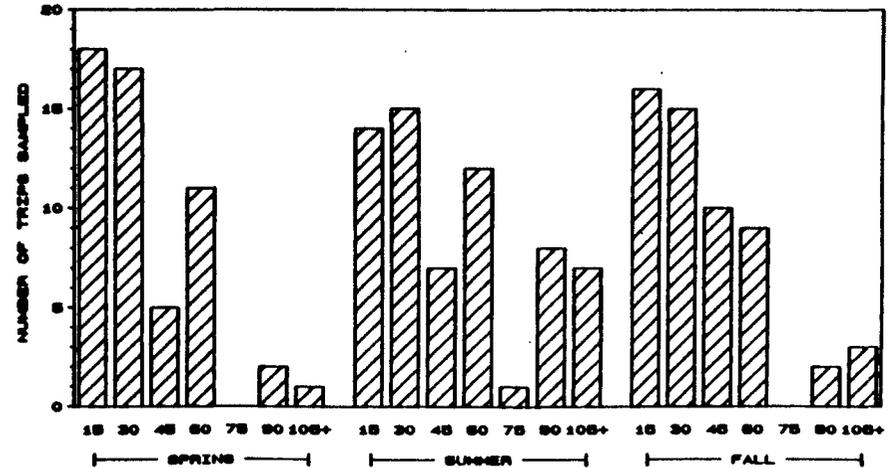


NUMBER OF TOWS PER TRIP



Number of Tows per Trip

MINUTES PER TOW

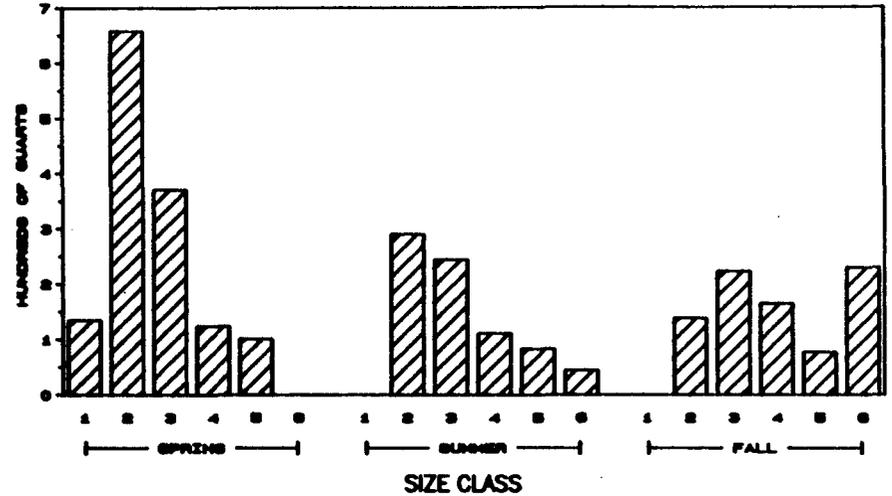


Midpoint of Minutes per Tow

**FIGURE 5.4**  
**LANDINGS AND REVENUES**  
**OF LIVE BAIT**  
**FROM TRIPS WITH BAIT LICENSES**  
**GALVESTON BAY SAMPLE, 1987**

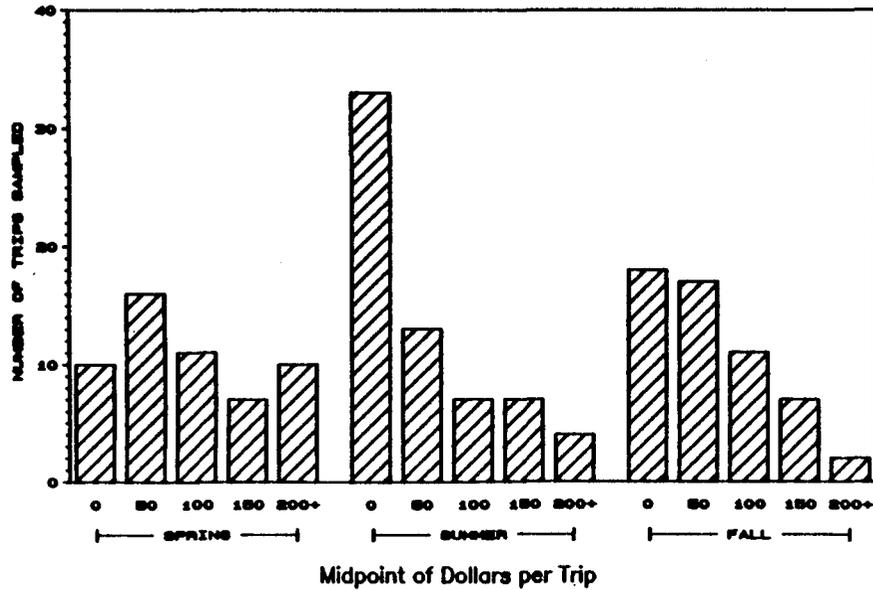
**SAMPLE SIZE:**  
 54 Trips between May 20 and July 15 (Spring)  
 64 Trips between July 16 and August 13 (Summer)  
 55 Trips between August 17 and October 30 (Fall)

**LANDINGS BY SIZE CLASS**  
 (2991 QUARTS IN SAMPLE)

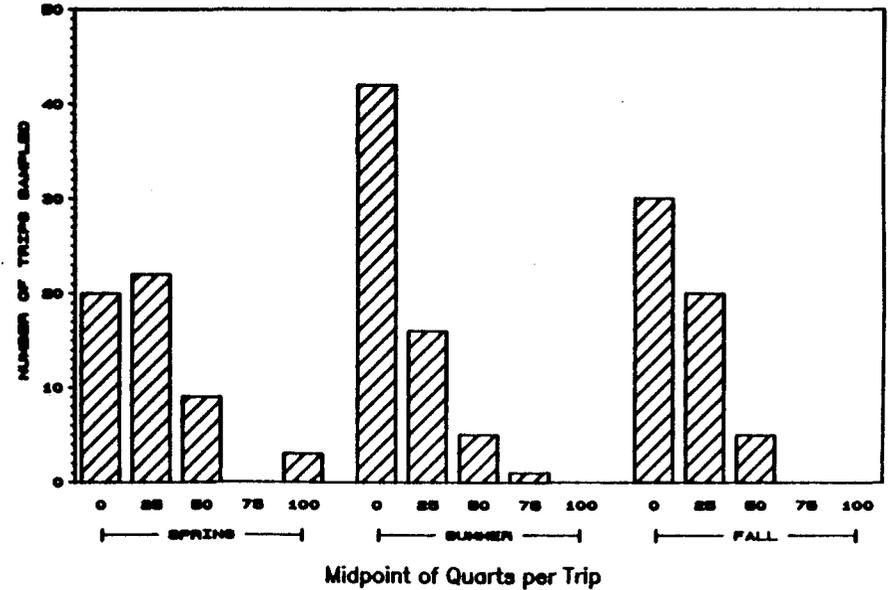


Legend for Size Classes (Number of Shrimp per Pound, Heads-On)  
 1=>100; 2=81-100; 3=71-80; 4=61-70; 5=51-60; 6=31-50

**EXVESSEL REVENUES FROM LIVE BAIT**



**QUARTS OF LIVE BAIT LANDED**



**FIGURE 5.5**  
**LANDINGS AND REVENUES**  
**OF DEAD SHRIMP FOR BAIT**  
**FROM TRIPS WITH BAIT LICENSES**  
**GALVESTON BAY SAMPLE, 1987**

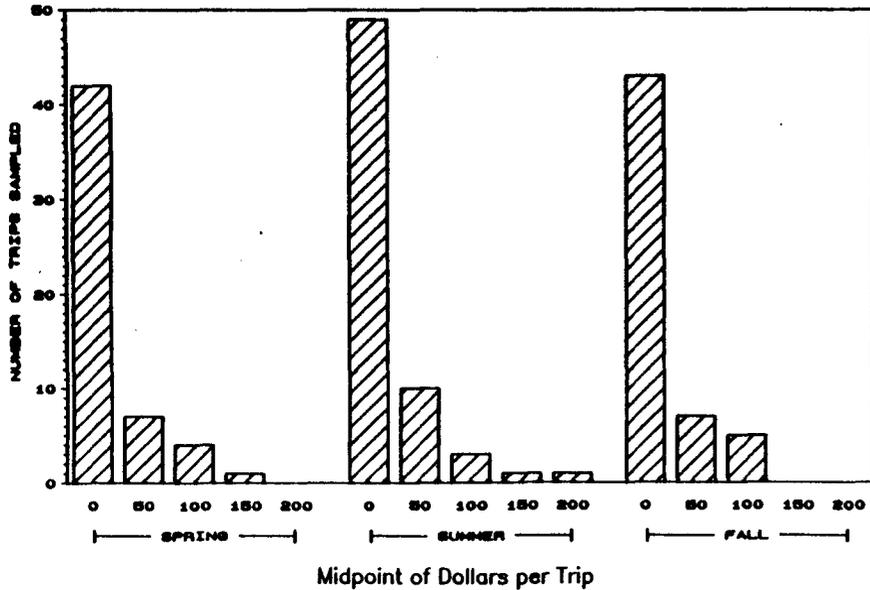
**SAMPLE SIZE:**  
 54 Trips between May 20 and July 15 (Spring)  
 64 Trips between July 16 and August 13 (Summer)  
 55 Trips between August 17 and October 30 (Fall)

**LANDINGS BY SIZE CLASS**  
 (3600 POUNDS IN SAMPLE)

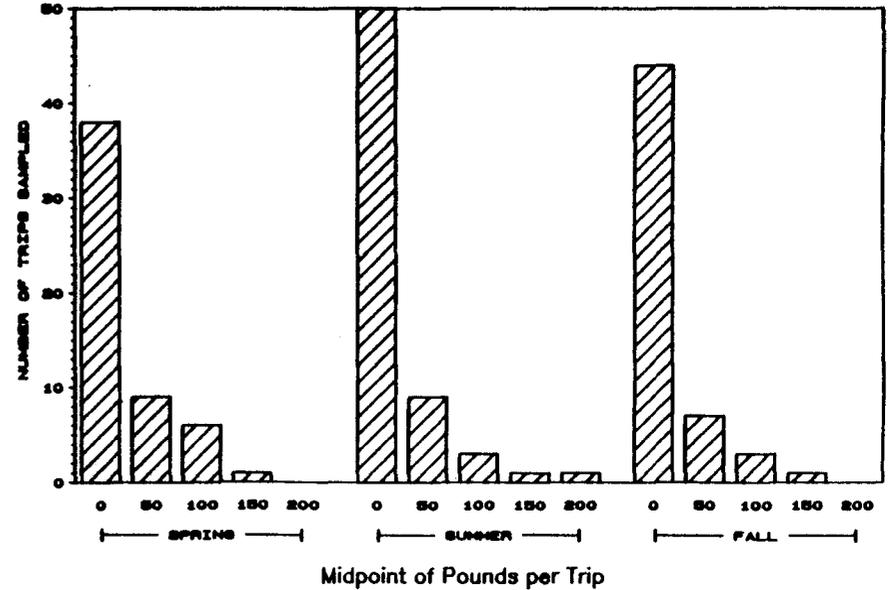


**Legend for Size Classes (Number of Shrimp per Pound, Heads-On)**  
 1=>100; 2=81-100; 3=71-80; 4=61-70; 5=51-60; 6=31-50

**EXVESSEL REVENUES FROM DEAD BAIT**



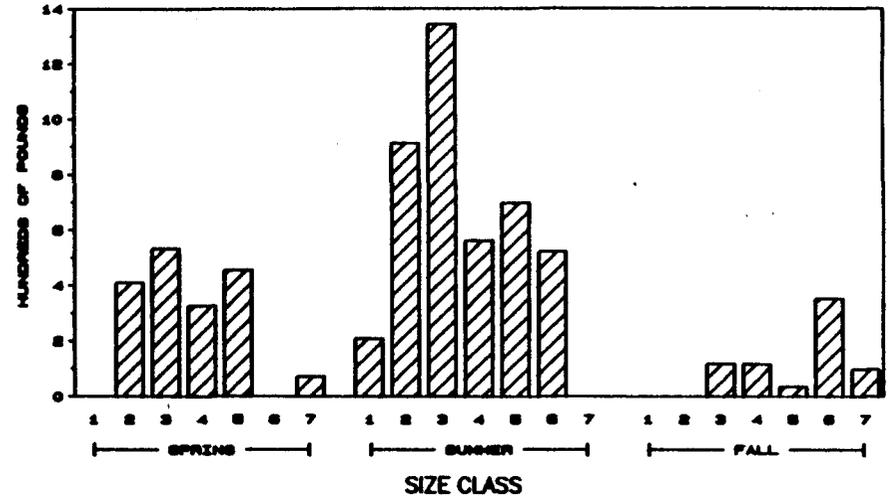
**POUNDS OF DEAD BAIT LANDED**



**FIGURE 5.6**  
**LANDINGS AND REVENUES**  
**OF SHRIMP FOR HUMAN USE**  
**FROM TRIPS WITH BAIT LICENSES**  
**GALVESTON BAY SAMPLE, 1987**

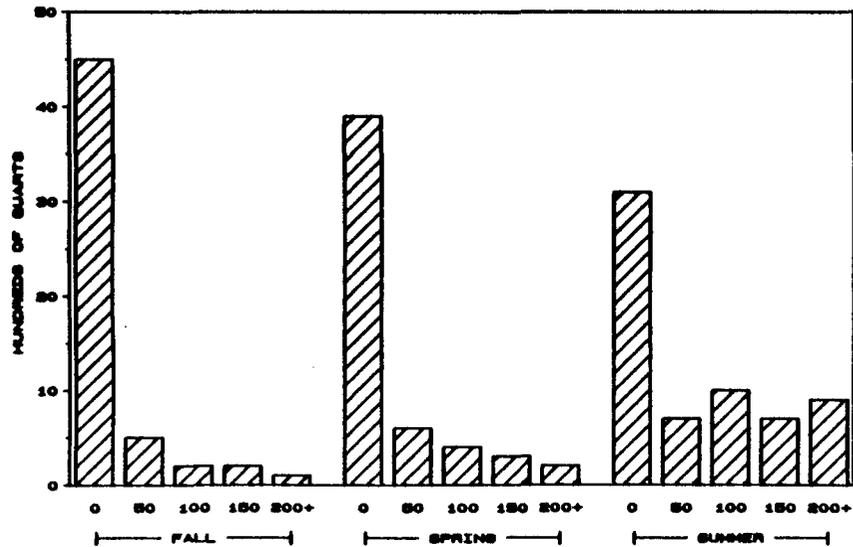
**SAMPLE SIZE:**  
 54 Trips between May 20 and July 15 (Spring)  
 64 Trips between July 16 and August 13 (Summer)  
 55 Trips between August 17 and October 30 (Fall)

**LANDINGS BY SIZE CLASS**  
 (6757 POUNDS IN SAMPLE)



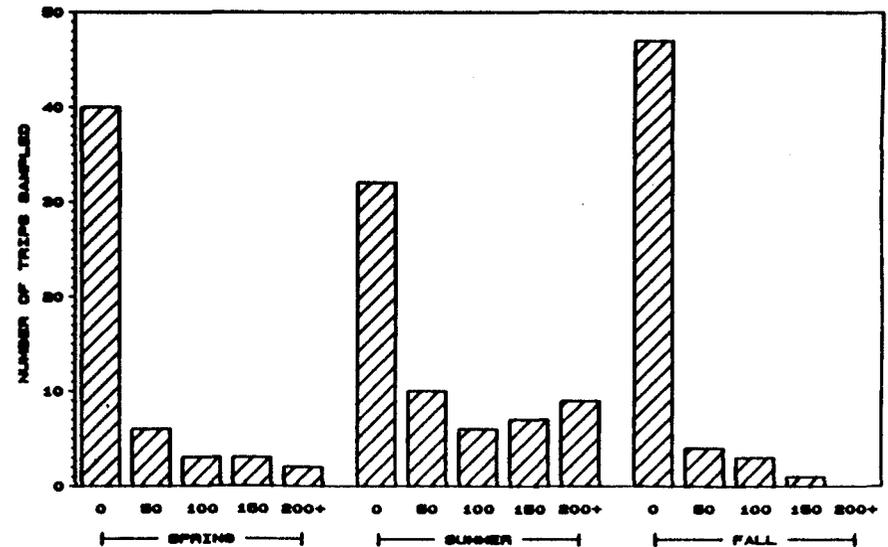
Legend for Size Classes (Number of Shrimp per Pound, Heads-On)  
 1=>100; 2=81-100; 3=71-80; 4=61-70; 5=51-60; 6=31-50; 7=<30

**EXVESSEL REVENUES**



Midpoint of Dollars per Trip

**POUNDS OF SHRIMP LANDED**



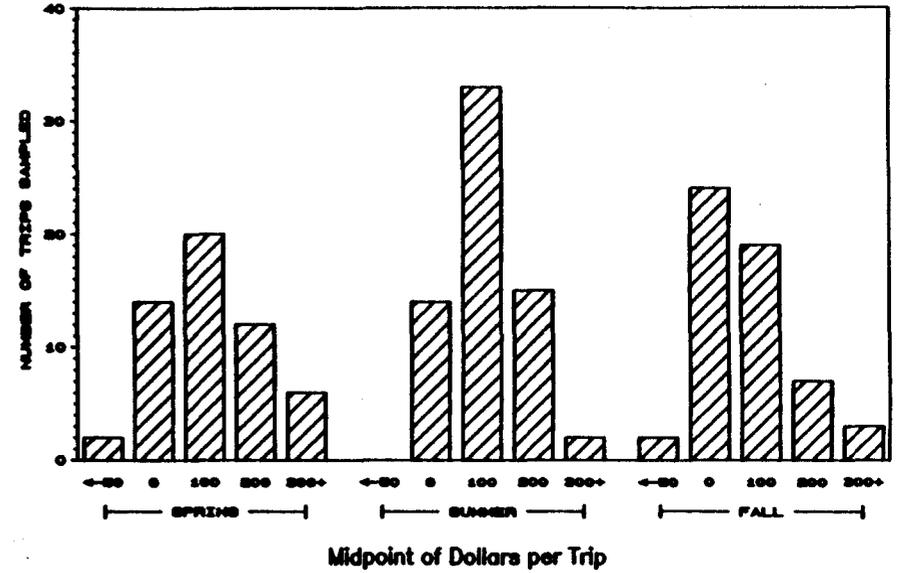
Midpoint of Pounds per Trip

FIGURE 5.7

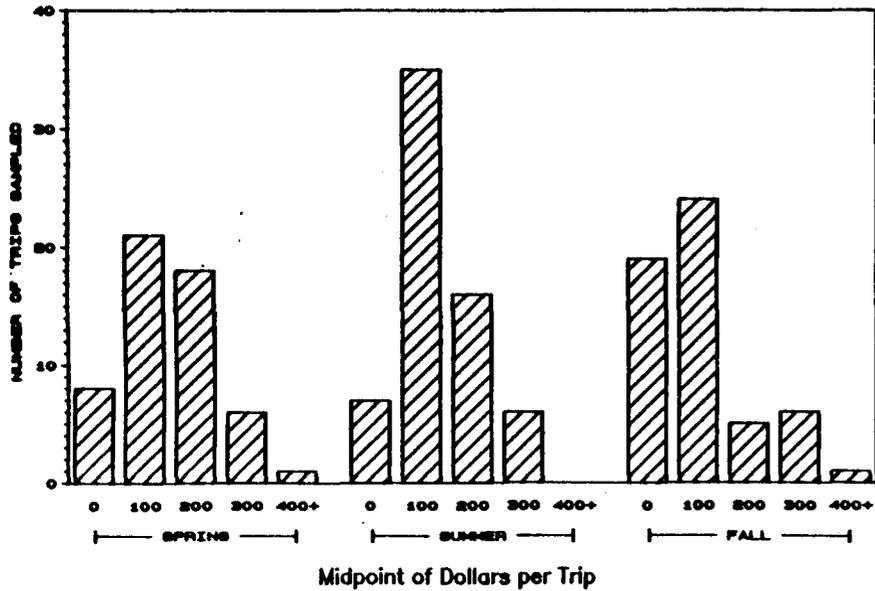
FINANCIAL PERFORMANCE  
FOR TRIPS WITH BAIT LICENSES  
GALVESTON BAY SAMPLE, 1987

SAMPLE SIZE:  
54 Trips between May 20 and July 15 (Spring)  
64 Trips between July 16 and August 13 (Summer)  
55 Trips between August 17 and October 30 (Fall)

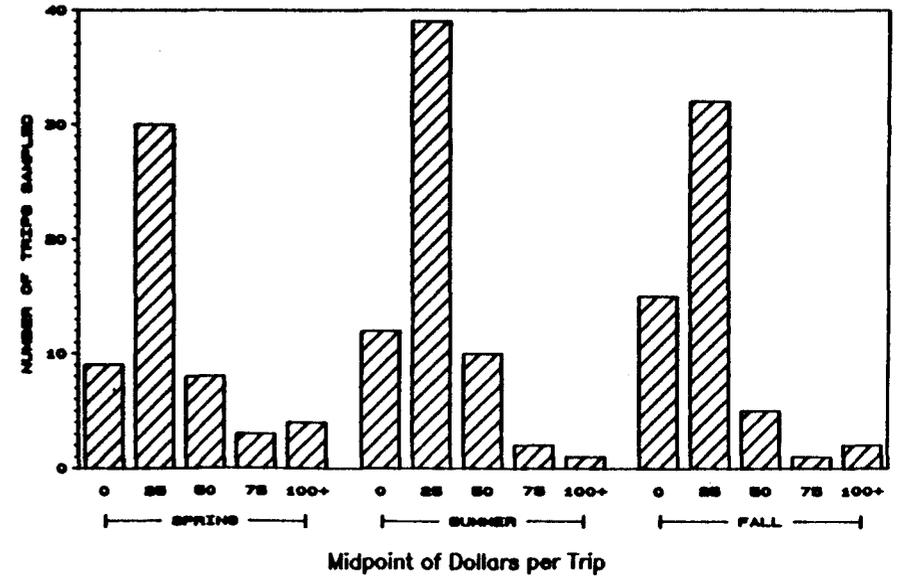
REVENUES AFTER TRIP COSTS  
(BEFORE PAYMENTS TO CAPTAIN, CREW AND BOAT)



TOTAL REVENUES PER TRIP



OPERATING COSTS PER TRIP  
(FUEL, ICE, FOOD, AND REPAIR COSTS)



**TABLE 5.1**

**SUMMARY STATISTICS FOR THE SAMPLE OF TRIPS WITH BAIT LICENSES  
IN GALVESTON BAY, TEXAS, MAY 20-OCTOBER 30, 1987**

VARIABLE	SEASON	N	MINIMUM	25TH PERCENTILE	MEDIAN	75TH PERCENTILE	MAXIMUM	MEAN	STANDARD DEVIATION	COEFF OF VARIATION
CRAFT LENGTH	SPRING	54	20	28.0	34.0	40.0	55	35.1	9.5	27.2
	SUMMER	64	17	30.0	33.5	40.0	55	33.7	8.7	25.7
	FALL	55	15	21.0	32.0	40.0	56	33.1	11.9	36.0
	COMBINED	173	15	28.0	33.0	40.0	56	34.0	10.4	30.6
TRAWL WIDTH	SPRING	54	22	30.0	30.0	32.0	34	29.9	2.9	9.5
	SUMMER	64	22	30.0	30.5	32.0	35	30.0	2.9	9.6
	FALL	55	20	25.0	30.0	32.0	65	32.6	10.5	32.4
	COMBINED	173	20	28.0	30.0	32.0	65	31.0	7.2	23.1
CREW SIZE	SPRING	54	1	1.0	2.0	2.0	3	1.7	0.5	29.5
	SUMMER	64	1	1.0	2.0	2.0	3	1.6	0.5	33.4
	FALL	55	1	1.0	2.0	2.0	3	1.6	0.5	32.7
	COMBINED	173	1	1.0	2.0	2.0	3	1.7	0.5	31.4
HOURS ABSENT	SPRING	54	2	4.0	5.0	6.0	10	5.1	1.8	36.0
	SUMMER	64	1	4.0	5.0	6.0	12	4.9	2.1	42.6
	FALL	55	1	4.0	5.0	6.0	11	5.2	2.0	38.1
	COMBINED	173	1	4.0	5.0	6.0	12	5.1	1.9	37.9
HOURS FISHED	SPRING	54	1	2.0	3.0	5.0	7	3.5	1.5	43.2
	SUMMER	64	1	3.0	4.0	5.0	8	3.7	1.6	42.0
	FALL	55	1	2.0	3.0	5.0	10	3.5	1.9	53.9
	COMBINED	173	1	3.0	4.0	5.0	10	3.5	1.7	47.3
MILES TO GROUNDS	SPRING	51	1	2.0	3.0	5.0	25	4.7	4.6	99.6
	SUMMER	64	1	1.0	4.0	5.0	20	4.2	3.6	84.7
	FALL	54	1	1.0	2.0	3.0	22	2.7	3.4	123.4
	COMBINED	169	1	1.0	3.0	5.0	25	3.8	4.0	106.4
NUMBER OF TOWS	SPRING	54	1	4.0	4.0	7.0	12	5.2	2.5	48.3
	SUMMER	64	1	3.0	3.0	5.0	12	4.1	2.5	60.2
	FALL	55	1	2.0	4.0	6.0	13	4.5	2.9	65.0
	COMBINED	173	1	3.0	4.0	6.0	13	4.7	2.7	57.4
MINUTES PER TOW	SPRING	54	10	20.0	30.0	56.0	100	36.4	21.4	58.6
	SUMMER	64	10	25.0	45.0	72.5	135	52.3	34.7	66.3
	FALL	55	15	20.0	30.0	60.0	150	41.6	28.4	68.1
	COMBINED	173	10	20.0	30.0	60.0	150	41.7	27.7	66.4
LIVE BAIT LANDED (QUARTS)	SPRING	54	0	8.0	20.0	35.0	100	25.7	24.5	95.1
	SUMMER	64	0	0.0	5.0	20.0	64	12.1	15.7	130.5
	FALL	55	0	1.0	12.0	24.0	60	15.1	14.2	94.0
	COMBINED	173	0	0.0	12.0	25.0	100	18.6	19.8	106.2
DEAD BAIT LANDED (POUNDS)	SPRING	54	0	0.0	14.5	31.0	150	27.5	38.7	140.6
	SUMMER	64	0	0.0	0.0	20.5	185	17.4	34.5	198.1
	FALL	55	0	0.0	4.0	20.0	132	18.2	30.3	166.9
	COMBINED	173	0	0.0	6.0	25.0	185	21.6	34.6	159.8

(CONTINUED)

**SUMMARY STATISTICS FOR THE SAMPLE OF TRIPS WITH BAIT LICENSES  
IN GALVESTON BAY, TEXAS, MAY 20-OCTOBER 30, 1987**

VARIABLE	SEASON	N	MINIMUM	25TH PERCENTILE	MEDIAN	75TH PERCENTILE	MAXIMUM	MEAN	STANDARD DEVIATION	COEFF OF VARIATION
REGULAR SHRIMP LANDED (POUNDS)	SPRING	54	0	0.0	0.0	28.0	298	33.2	65.3	196.5
	SUMMER	64	0	0.0	27.0	130.0	318	66.3	82.2	123.9
	FALL	55	0	0.0	0.0	7.0	137	13.0	31.2	239.4
	COMBINED	173	0	0.0	0.0	60.0	318	31.3	60.9	194.5
REVENUES FROM LIVE BAIT	SPRING	54	0	32.0	80.0	128.0	320	93.7	80.2	85.6
	SUMMER	64	0	0.0	20.0	80.0	256	48.5	63.0	129.9
	FALL	55	0	4.0	48.0	96.0	240	61.7	59.8	96.9
	COMBINED	173	0	0.0	48.0	104.0	320	71.5	70.8	99.0
REVENUES FROM DEAD BAIT	SPRING	54	0	0.0	12.0	24.0	126	21.6	30.6	141.4
	SUMMER	64	0	0.0	0.0	20.5	185	18.5	36.1	195.7
	FALL	55	0	0.0	4.0	23.0	119	19.7	32.0	162.7
	COMBINED	173	0	0.0	6.0	22.1	185	20.2	32.1	158.7
REVENUES FROM REGULAR SHRIMP	SPRING	54	0	0.0	0.0	50.0	298	34.6	62.4	180.4
	SUMMER	64	0	0.0	39.0	126.5	282	69.1	83.0	120.1
	FALL	55	0	0.0	0.0	10.9	219	19.6	46.4	236.3
	COMBINED	173	0	0.0	0.0	66.0	298	35.1	63.4	180.5
TOTAL REVENUES	SPRING	54	12	78.0	139.3	200.5	359	150.0	91.5	61.0
	SUMMER	64	4	72.2	123.0	190.3	344	136.1	79.4	58.4
	FALL	55	0	35.0	80.0	128.8	378	101.0	89.1	88.2
	COMBINED	173	0	58.0	115.0	186.0	378	126.9	90.3	71.2
FUEL COST	SPRING	54	5	10.0	18.0	22.0	70	20.3	13.3	65.2
	SUMMER	64	4	9.0	19.5	25.0	50	18.8	11.1	59.2
	FALL	55	5	8.0	15.0	20.0	62	15.8	10.3	65.3
	COMBINED	173	4	9.0	15.0	22.0	70	18.2	11.8	64.9
FUEL, ICE AND FOOD COST	SPRING	54	6	15.0	23.5	30.0	102	27.1	17.8	66.0
	SUMMER	64	4	14.5	25.0	32.5	80	25.9	15.8	60.8
	FALL	55	5	12.0	18.0	27.0	70	20.9	12.8	61.3
	COMBINED	173	4	13.0	23.0	30.0	102	24.3	15.6	64.4
REPAIR COST	SPRING	54	0	0.0	0.0	0.0	300	19.6	64.2	327.3
	SUMMER	64	0	0.0	0.0	0.0	100	2.0	12.9	634.6
	FALL	55	0	0.0	0.0	0.0	300	6.7	41.1	611.1
	COMBINED	173	0	0.0	0.0	0.0	300	10.8	48.4	447.8
TOTAL OPERATING COST	SPRING	54	6	15.0	25.0	49.0	402	46.7	71.7	153.7
	SUMMER	64	4	15.0	25.0	33.0	117	28.0	20.0	71.5
	FALL	55	5	12.0	18.0	27.0	328	27.7	44.6	161.0
	COMBINED	173	4	14.0	23.0	33.0	402	35.1	54.2	154.3
NET OPERATING REVENUES	SPRING	54	-288	42.0	101.7	162.0	306	103.3	109.8	106.3
	SUMMER	64	-2	53.0	100.5	159.6	267	108.1	68.3	63.2
	FALL	55	-328	15.7	55.0	113.0	358	73.3	104.7	142.7
	COMBINED	173	-328	36.0	88.0	155.0	358	91.8	101.0	110.1

**TABLE 5.2**

**NUMBER OF BAIT TRIPS SAMPLED BY SEASON,  
CLASSIFIED BY DISPOSITION OF SHRIMP CAUGHT  
IN GALVESTON BAY, 1987**

Shrimp Sold For:	Spring	Summer	Fall	Total
Live bait only	3	2	9	14
Live and dead bait	25	23	22	70
Live bait and human use	12	8	6	26
Live & dead bait & human use	8	1	5	14
Dead bait only	2	3	5	10
Dead bait and human use	0	2	5	7
Human use only	4	25	2	31
Nothing caught	0	0	1	1
Total	54	64	55	173

TABLE 5.3

NUMBER OF BAIT TRIPS SAMPLED,  
 CLASSIFIED BY MINUTES PER TOW AND MARKET TYPE OF SHRIMP  
 IN GALVESTON BAY, 1987

Shrimp Sold For:	Minutes Per Tow			Total
	10-59	60-65	80-150	
Live bait only	12	2	0	14
Live and dead bait	62	5	3	70
Live bait and human use	17	7	2	26
Live & dead bait & human use	11	3	0	14
Dead bait only	8	1	1	10
Dead bait and human use	2	1	4	7
Human use only	6	11	14	31
Nothing caught	1	0	0	1
Total	119	30	24	173

TABLE 5.4

PERCENTAGES OF TOTAL REVENUES BY SEASON,  
CLASSIFIED BY MARKET TYPE OF SHRIMP CAUGHT  
ON BAIT TRIPS IN GALVESTON BAY, 1987

Shrimp Used For:	Spring	Summer	Fall	Total
Live bait	62.5%	35.6%	61.1%	51.7%
Dead bait	14.4	13.6	19.5	15.3
Human consumption	23.1	50.8	19.4	33.0
Total	100.0	100.0	100.0	100.0

## 6. DISCUSSION AND SUMMARY

This study has attempted to describe the inshore bay and bait fisheries in Galveston Bay with respect to fishing effort and financial performance per trip. The samples indicated that bay and bait fishermen employed different fishing strategies but earned approximately the same net return to labor and capital. Fishermen with bait licenses tended to use smaller boats than bay fishermen, primarily because regulations mandated a maximum trawl width of only 34 feet. Bay fishermen faced the same regulation during the spring, but were permitted to use larger trawls during the fall. Also, bait trips were shorter than bay trips and were characterized by relatively short tow times as a means of keeping shrimp alive for the lucrative market for live bait. Bait fishermen landed smaller quantities of shrimp per trip than did bay fishermen and incurred lower operating costs because trips were shorter. Nevertheless, the distributions of net returns to labor and capital were not significantly different between bait and bay trips. This result is characteristic of competitive industries in which unusually high net returns in one sector of the industry would attract new participants until equilibrium is restored between sectors. Appendix A tests the hypothesis for each variable that bay and bait trips did not differ.

The sample of bay trips was relatively homogeneous across seasons. Among the measures of fishing effort, trawl width was significantly different between the brown and white shrimp seasons due to seasonal differences in fishery regulations. Also, fishermen tended to catch greater quantities during the spring than the fall, apparently because the smaller (spring) brown shrimp were more numerous than larger (fall) white shrimp. However, white

shrimp were more valuable; hence the distributions of revenues per trip did not exhibit significant seasonal differences. Similarly, the distributions of variable costs and net operating revenues per trip were homogeneous across seasons. Appendix A tests the hypothesis that there were no differences across seasons for each variable.

The sample of bait trips included several variables that differed significantly among seasons. Observed differences in landings and revenues of live bait and shrimp destined for the market for human consumption were due to a substantial number of trips during the summer that more closely resembled bay than bait trips. Regulations prohibited shrimping with bay licenses between mid July and mid August, but allowed shrimping with bait licenses. Consequently, some bay fishermen purchased both bay and bait licenses and then continued to fish with the bait license during the mid summer closure. The sample of bait trips was consistent with the hypothesis that bay fishermen used bait licenses during the summer season (mid July to mid August). There was a disproportionately large number of trips during the summer with 3 or fewer tows per trip. Usually, bait trips were characterized by a large number of relatively short tows whereas bay trips were characterized by a small number of long tows. Also, there was a disproportionately large number of trips that landed very few live shrimp during the summer and a corresponding disproportionately large number of trips that landed large quantities of shrimp destined for the market for human consumption. Surprisingly, however, the distributions of minutes per tow did not differ by season. Some significant differences among seasons for

total revenues and number of tows per trip were evident even after ad hoc corrections for pseudo-bait trips during the summer.<sup>8</sup> These differences are attributable to the relatively higher incidence (7 of 9 trips) of trips during the fall for which fishermen made few tows, caught small quantities of shrimp and then did not sell their catches.<sup>9</sup> It is not known whether or not the higher incidence of these "noncommercial" trips during the fall was due to sampling error or represented a common phenomenon in the fishery. Tests of the hypothesis that there were no differences across seasons for each variable are presented in Appendix A.

Although the results of the bay and bait samples were sensible, a comparison of the sample average catches with the overall averages as calculated from Tables 3.1 and 3.2 were not completely satisfactory. Among sampled bay trips for which shrimp were sold through commercial fish houses,<sup>10</sup> the average catches per trip were 161.0 pounds in the spring and 152.8 pounds in the fall.<sup>11</sup> The overall averages for Galveston Bay were 258.4 pounds per trip from May-July and 229.5 pounds per trip from August-October.<sup>12</sup> The sample of bay trips may have excluded an important segment of the fishery, probably because interviewers normally stopped collecting data at approximately 5 p.m. whereas many fishermen fished until sunset. Therefore, the sample probably reflects bay trips that are shorter than average and with lower than average catches.

A comparison of sampled catches per hour fished for bait trips with the overall average catch rates indicated that the sample and overall data are consistent, at least during the spring and summer seasons. Among sampled bait trips for which shrimp were sold through commercial fish houses and bait camps, catch rates were 30.4 pounds

per hour fished in the spring, 29.0 pounds per hour in the summer, and 16.6 pounds per hour in the fall.<sup>13</sup> Overall catch rates for 1987 are not known because data from the overall fishery have not been collected since 1984. The overall averages from the 1980-1984 period, as calculated from annual data used to construct Table 3.2, were approximately 32 pounds per hour fished for May-mid July, 28 pounds per hour for mid July through mid August, and 26 pounds per hour for mid August through October.<sup>14</sup> Although there is a difference between the sample and overall averages of 9 pounds per hour during the fall, the 95% confidence intervals (barely) overlap. It is not known if the two averages differ due to sampling error, an error in sampling procedures or a real difference between 1987 and the 1980-1984 period during the fall.

Despite the problems just mentioned, this survey gained useful information about the inshore shrimp fishery in Galveston Bay. In addition to its descriptive value, data are available to support future analyses such as: (1) estimation of a production function (i.e., catch per trip as a function of various components of fishing effort such as hours fished, the number and duration of tows, trawl width, vessel length, etc.); (2) the effect on catch rates if inshore fishermen chose to limit their tows to 90 minutes or less rather than to use turtle excluder devices; and (3) the interrelationship of prices in the markets for bait and table shrimp.

The experience gained in gathering and analyzing these data enables us to offer useful suggestions that would improve similar surveys in the future. First, as much pre-survey work as possible is required to identify total fishing activity by

month, port, area, time-of-day, etc. to avoid suboptimal allocation of sampling effort. Second, despite the desire to keep data confidential, craft identification numbers should be recorded because special statistical techniques are required for vessels that are sampled more than once. In this survey, vessel identification was recorded for some trips but not for others. Third, more detail is required about fishing costs to facilitate estimation of cost functions. In particular, interviewers should request the quantity and unit price for fuel, ice and other inputs rather than the total cost for each component. Information about engine horsepower and type of engine would help in the estimation of fuel consumption and costs.

## FOOTNOTES

<sup>1</sup> Galveston Bay was divided into 5 subareas, with unloading docks in each subarea used as interview points once each week. The interviewer was instructed to randomly determine the order in which each subarea was visited each week. The number of interviews at each dock was determined largely by the number of trips that arrived at the dock while the interviewer was there. Personnel at the National Marine Fisheries Service Laboratory (NMFS) at Galveston, Texas, conducted the survey.

<sup>2</sup> The sample also included 19 offshore trips with gulf licenses which were excluded from the following discussions and analyses.

<sup>3</sup> Ports in Chambers County accounted for 17% of the trips, 19% of the catch and 17% of the exvessel revenues by fishermen with bay licenses in Galveston Bay.

<sup>4</sup> As already mentioned, it is recognized that causal relationships exist between variables. For example, catch per trip is expected to be a function of hours fished, gear size, craft length, etc. Error terms are expected to be normally distributed after accounting for these relationships. Therefore the normality assumption is likely to be violated in an analysis of variance for each variable separately as a function of season.

<sup>5</sup> These trips were taken with small craft, probably by part-time commercial or recreational fishermen who did not catch enough to sell. Other trips with similarly sized craft did sell their shrimp when greater quantities were caught.

<sup>6</sup> Prices were recorded for all trips. Hence, net revenues could be calculated even if catch was not sold commercially.

<sup>7</sup> There are approximately 1.5 pounds of shrimp per quart (Baxter et al. 1988). Therefore, a price of \$4.00 per quart would be equivalent to \$2.67 per pound.

<sup>8</sup> Tests for significant differences among seasons were repeated after deleting trips during the summer (mid July-mid August) for which no live or dead bait were landed and for which tow times were 80 minutes or longer. These criteria were ad hoc. Discriminant analysis would formally identify pseudo-bait trips during the summer.

<sup>9</sup> Although shrimp were not sold, revenues could be calculated based on appropriate prices that were recorded by the interviewer.

<sup>10</sup> Ten trips for which fishermen did not sell their catches were excluded from the comparison of sample and overall average catch per trip because the overall data (Table 3.1) reflect shrimp sold through commercial fish houses only.

## FOOTNOTES (Cont'd)

<sup>11</sup> The sample average pounds per trip were calculated with untransformed data without accounting for differences per trip in hours fished, trawl width, vessel length, etc. The sample means and standard errors are expressed in heads-on weights.

Season	Mean	Std. Error
May-Jul	161.0	11.0
Aug-Oct	152.8	29.3

<sup>12</sup> The overall average catches per trip were calculated from Table 3.1 by dividing total pounds by the total number of trips. The averages were converted from heads-off to heads-on weights by multiplying by 1.6 for spring brown shrimp and by 1.54 for fall white shrimp.

<sup>13</sup> Sample means and standard errors for pounds per hour fished on bait trips were calculated from untransformed data. Quarts of live bait were converted to pounds by multiplying 1.5 pounds per quart.

Season	Mean	Std. Error
May-mid Jul	30.4	2.63
Mid Jul-mid Aug	29.0	2.20
Mid Aug-October	16.6	2.05

<sup>14</sup> Unpublished data obtained from the NMFS laboratory at Galveston provided monthly estimates of total pounds landed (heads-on weights) and total hours fished on bait trips in Galveston Bay for 1980-1984. Average catch per trip by season for each year was calculated as the ratio of total pounds caught to total hours fished. Data for mid July and mid August were calculated as one-half of the totals for July and August. The overall means and standard errors for catch per trip were calculated from the annual ratios.

Season	Mean	Std. Error
May-mid Jul	31.8	2.88
Mid Jul-mid Aug	27.6	2.87
Mid Aug-October	25.6	2.47

## REFERENCES

- Baxter, Kenneth N., Carlton H Furr, Jr., and Elizabeth Scott. 1988. The commercial bait shrimp fishery in Galveston Bay, Texas, 1959-87. U.S. National Marine Fisheries Service, *Marine Fisheries Review* 50(2):20-28.
- Blomo, V., K. Stokes, W. Griffin, W. Grant, and J. Nichols. 1978. Bioeconomic modeling of the Gulf shrimp fishery: an application to Galveston Bay and adjacent offshore areas. *Southern Journal of Agricultural Economics* 10 (July):119-125.
- Caillouet, C.W., F.J. Patella, and W.B. Jackson. 1980. Trends toward decreasing size of brown shrimp, *Penaeus aztecus*, and white shrimp, *Penaeus setiferus*, in reported annual catches from Texas and Louisiana. *Fishery Bulletin U.S.* 77:985-989.
- Conover, W.J. 1971. *Practical Nonparametric Statistics*. John Wiley and Sons Inc., New York, 462p.
- GMFMC (Gulf of Mexico Fishery Management Council). 1980. Fishery management plan for the shrimp fishery of the Gulf of Mexico, United States waters. *Federal Register* 45:74190-74308.
- Grant, W.E., and W.L. Griffin. 1979. A bioeconomic model of the Gulf of Mexico shrimp fishery. *Transactions of the American Fisheries Society* 108:1-13.
- Krauthamer, J.T., W.E. Grant, and W.L. Griffin. 1984. Characteristics of the Texas shrimp fleet, 1979-82. U.S. National Marine Fisheries Service, *Marine Fisheries Review* 46(2):53-59.
- Nance, J.M., N. Garfield, and J.A. Paredes. 1989. A demographic profile of participants in two Gulf of Mexico inshore shrimp fisheries and their response to the Texas Closure. Unpublished manuscript, National Marine Fisheries Service, Galveston Laboratory, Galveston, Texas, 77551.
- SAS Institute Inc. 1987. *SAS/STAT Guide for Personal Computers, Version 6 Edition*. SAS Institute Inc., Cary, N.C. 27512, 1028p.
- Sokal, Robert R., and F. James Rohlf. *Biometry: The Principles and Practice of Statistics in Biological Research, Second Edition*. W.H. Freeman and Company, New York, 859p.

## REFERENCES (Cont'd)

- Swartz, A. Nelson, and Charles M. Adams. 1979. The economics of Rockport, Texas, bay shrimping vessels. Staff Paper Series DIR 79-1 SP-6, Department of Agricultural Economics, Texas A&M University, College Station, Texas 77843, 10p.
- TP&WD (Texas Parks and Wildlife Department). 1985. The Texas Shrimp Fishery: A Report to the Governor and the 69th Legislature. PWD Report 3000-153, Texas Parks and Wildlife Department, 4200 Smith School Road, Austin, TX, 78744, 11p.
- TP&WD (Texas Parks and Wildlife Department). 1986. Commercial Fishing Regulations (June 1, 1986-August 31, 1987). Texas Parks and Wildlife Department, 4200 Smith School Road, Austin, TX, 78744, 17p.
- Warren, John P. 1980. The Texas Bay Shrimp Industry: A Descriptive and Management Model. Unpublished Ph.D. dissertation, Department of Agricultural Economics, Texas A&M University, College Station, Texas, 77843.

## APPENDIX A. STATISTICAL COMPARISONS BY SEASON

This appendix describes the statistical methods that were used to test for differences in fishing activities by season. Seasonal differences were expected because the spring and fall seasons are supported by different shrimp populations and because fishery regulations differ. During the spring, fishermen target small, migratory brown shrimp. Regulations are designed to reduce the productivity of inshore shrimpers as a means of balancing the tradeoffs between the inshore fishery for small shrimp and the offshore fishery for large shrimp that have migrated out of the inshore areas. During the fall, fishermen target the less migratory white shrimp. Regulations are designed to allow white shrimp to grow to larger sizes in inshore waters but productivity is not restricted.

The Kolmogorov-Smirnov two-sample test was used to examine the null hypothesis of no seasonal differences in the distributions of each variable. In addition, the null hypothesis of no differences by license type was examined.

The Kolmogorov-Smirnov two-sample test is a nonparametric test for differences in entire distributions of variables. It "is applicable to continuous frequency distributions, where it has greater power than the G- or chi-square tests for goodness of fit" (Sokal and Rohlf 1981, p. 716). The test statistic is based on the maximum observed difference between the two cumulative frequency distributions and is sensitive to differences in both shape and location (Sokal and Rohlf 1981, pp. 440-445, 716-721). Probability levels of significance for the asymptotic Kolmogorov-Smirnov test statistic for the two-sample case were cal-

culated with SAS procedure NPAR1WAY (SAS 1987, pp. 713-726).

Kolmogorov-Smirnov two-sample tests were calculated for each pair of seasons for bait trips because there were three seasons for the bait fishery and tabled critical values for the Kolmogorov-Smirnov three-sample case with different sample sizes were not available (Conover 1971, pp. 317, 325). Tests for significant differences were repeated after deleting pseudo-bait trips in the summer (mid July-mid August) season. Pseudo-bait trips were defined as trips for which no live or dead bait were landed and for which tow times were 80 minutes or longer.

Test results are presented in Table A.1. Column (1) shows the probability levels of significance for tests of the null hypothesis that bay trips did not differ by season (spring vs. fall). Columns (2)-(4) show significance levels for tests of the hypothesis that bait trips did not differ by season (spring vs. fall, spring vs. summer, and summer vs. fall). Columns (5) and (6) present tests of the same hypothesis for bait trips after deleting observations in the summer season which more closely resemble bay than bait trips. Columns (7) and (8) test the null hypothesis that bay and bait trips did not differ regardless of season. Column (7) uses all data. Column (8) reclassifies 14 bait trips during the summer season as bay trips.

**APPENDIX TABLE A.1**

**PROBABILITY LEVELS OF SIGNIFICANCE FOR KOLMOGOROV-SMIRNOV  
TWO-SAMPLE TESTS OF THE NULL HYPOTHESIS OF NO DIFFERENCE  
BETWEEN CUMULATIVE FREQUENCY DISTRIBUTIONS**

	Bay Trips -----			Bait Trips -----			Combined	
	Spring vs Fall (1)	Spring vs Summer (2)	Summer vs Fall (3)	Spring vs Fall (4)	Spring vs Summer <sup>a</sup> (5)	Summer <sup>a</sup> vs Fall (6)	Bay vs Bait (7)	Bay vs Bait <sup>b</sup> (8)
Craft Length	0.7053	0.9084	0.4111	0.3396	0.9255	0.6993	0.0102	0.0016
Trawl Width	0.0001	0.9999	0.4311	0.6116	0.9838	0.6366	0.0002	0.0004
Crew Size	0.9999	0.9960	0.9999	0.9890	0.6444	0.9999	0.9999	0.8565
Hours Absent	0.9999	0.9940	0.9047	0.9981	0.4383	0.6366	0.0096	0.0002
Hours Fished	0.3177	0.6982	0.6152	0.9825	0.9975	0.9820	0.1572	0.0615
Miles to Grounds	0.2736	0.9792	0.0004	0.0034	0.8808	0.0048	0.9687	0.4828
Number of Tows	0.8186	0.0083	0.3545	0.1542	0.3745	0.2955	0.0001	0.0001
Minutes per Tow	0.2257	0.1324	0.1939	0.8208	0.9877	0.9961	0.0001	0.0001
Live Bait (Qts)		0.0006	0.0819	0.1902	0.1317	0.9909		
Dead Bait (Lbs)		0.1159	0.1153	0.1817	0.8691	0.6680		
Table Shrimp (Lbs)	0.0093	0.0390	0.0005	0.4151	0.8540	0.1072	0.0001	0.0001
Total Pounds	0.0093	0.8748	0.0005	0.0039	0.1620	0.0061	0.0001	0.0001
Live Bait (\$)		0.0006	0.0819	0.2795	0.1317	0.9779		
Dead Bait (\$)		0.2152	0.1153	0.3714	0.9972	0.6523		
Table Shrimp (\$)	0.4163	0.0272	0.0002	0.4002	0.7453	0.0739	0.0001	0.0001
Total Revenues	0.4163	0.5721	0.0248	0.0072	0.4723	0.0552	0.2335	0.2746
Fuel Cost	0.8895	0.8366	0.1250	0.3440	0.5749	0.5743	0.0039	0.0004
Fuel, Ice, Food Cost	0.3361	0.7751	0.0300	0.0717	0.4839	0.2748	0.0035	0.0001
Repair Cost	0.9877	0.7946	0.9999	0.8832	0.7874	0.9999	0.9999	0.9999
Total Cost	0.5306	0.7191	0.0180	0.0245	0.2618	0.1793	0.0141	0.0002
Net Operating Revenues	0.6613	0.7701	0.0177	0.0440	0.9292	0.0251	0.0817	0.2869

<sup>a</sup> Fourteen trips during the summer season that more closely resembled bay than bait trips were deleted. These trips did not land any live or dead bait and reported tow times of 80 minutes or more.

<sup>b</sup> Fourteen bait trips during the summer season were reclassified as bay trips. See previous note.

## APPENDIX B. DERIVATION OF WEIGHTING FACTORS FOR CALCULATION OF OVERALL MEANS AND VARIANCES

As noted in Chapter 3, time and budgetary constraints caused the sampling fraction to vary over the sampling period. Variation in sampling intensity poses a potential problem if catch rates, fishing effort, revenues or costs per trip vary significantly between seasons. Therefore, a sample with a disproportionately high number of observations during the spring brown shrimp season, for example, would yield estimates of the overall average characteristics of fishing trips that would be unduly influenced by trips taken during the spring.

The solution is to weight each observation in the sample such that the number of weighted observations in each season occurs in the same proportion as the total number of trips taken in the fishery. Appendix Table B.1 illustrates the weighting procedure. For example, approximately 49.6% (13,675 of 27,574) of the bay trips were taken during the May-June season but 59.5% (100 of 168) of the samples were obtained then. The weighting factor for May-June is calculated as  $0.8 = (49.6\% / 59.5\%)$ . This procedure treats each observation during the spring as if it had occurred only 0.8 times. It does not change catch per trip, effort per trip, or any other characteristic of the sampled trips. The weighting factor for the August-October bay white shrimp season was calculated as  $1.2 = (50.4\% / 40.5\%)$ .

Weighting factors were approximated for bait trips because data about the total fishing effort in 1987 were unknown. Independent estimates of total hours fished on bait trips for the 1980-1984 period were averaged for each of three seasons: May

through mid July, mid July through mid August, and mid August through October. Data for mid July and mid August were calculated as one-half of the July and August totals. Then weighting factors were calculated as the ratio of the percentage of total hours fished to the percentage of bait trips sampled in each season (Appendix Table B.1). For example, the weighting factor for the spring season was calculated as  $1.2 = (38.8\% / 31.2\%)$ . Weighting factors were based on the number of sampled trips rather than hours fished on sampled trips because (1) hours fished per trip were approximately equal for all seasons, and (2) by using trips sampled, the weights summed over all observations in the data set would equal the number of trips sampled.

Once weighting factors had been determined the overall mean and variance for each variable were calculated as:

$$Y\text{-bar}_{\text{overall}} = \sum_i (w_i Y_i) / \sum_i (w_i)$$

$$\text{Var}_{\text{overall}} = \frac{\sum_i w_i (Y_i - Y\text{-bar}_{\text{overall}})^2}{\sum_i (w_i) - 1}$$

where the  $w_i$  are weighting factors for the  $i$ th trip and the  $Y_i$  are the individual observations. The formula for the overall mean is the same as a weighted average of the individual means for each season,  $Y\text{-bar}_j$ , where in this case the weights are the proportions of total trips ( $N_j/N$ ) taken in season  $j$ .

$$Y\text{-bar}_{\text{overall}} = \sum_j (N_j/N) Y\text{-bar}_j$$

The overall variance was calculated as a pooled (common) variance for all seasons combined.

This report accounted for seasonal variation in sampling fractions but other criteria for weighting could have been used. Variation in sampling fractions by month and/or port could bias the seasonal means if catch rates, fishing effort, revenues or costs per trip varied significantly by month and/or by port within each fishing season. Seasonal weighting factors were used because in general the overall means and variances did not differ much when monthly rather than seasonal weighting factors were used. There was not enough information available with which to calculate weighting factors by port.

**APPENDIX TABLE B.1**

**WEIGHTING FACTORS FOR TRIPS WITH BAY AND BAIT LICENSES**

Bay Trips					
Season	Total Trips	Percent of Total	Trips Sampled	Percent of Sample	Weighting Factor
May-Jul	13,675	49.594	100	59.524	0.833
Aug-Oct	13,899	50.406	68	40.476	1.245
Total	27,574	100.000	168	100.000	

Bait Trips					
Season	Total Hours Fished	Percent of Total	Trips Sampled	Percent of Sample	Weighting Factor
May-mid Jul	9,620	38.822	54	31.214	1.244
Mid Jul-mid Aug	4,852	19.580	64	36.994	0.529
Mid Aug-Oct	10,307	41.598	55	31.792	1.308
Total	24,779	100.000	173	100.000	

**APPENDIX C. DATA FOR TRIPS SAMPLED IN THE INSHORE SHRIMP FISHERY OF GALVESTON BAY, TEXAS, 1987**

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APPENDIX TABLE C.1

MEASURES OF EFFORT FOR TRIPS WITH BAY LICENSES  
IN GALVESTON BAY, TEXAS, MAY 20-OCTOBER 30, 1987

OBS	DATE UNLOADED	CRAFT LENGTH (FEET)	TRAWL WIDTH (FEET)	CREW SIZE	HOURS ABSENT	HOURS FISHED	MILES TO GROUNDS	NUMBER OF TOWS	MINUTES PER TOW
1	20MAY1987	28	30	1	4	2	4	2	53
2	21MAY1987	36	30	2	3	1	5	1	60
3	21MAY1987	50	32	2	7	2	15	1	120
4	22MAY1987	33	25	1	7	6	4	6	45
5	22MAY1987	53	32	1	8	4	5	2	120
6	26MAY1987	32	30	1	6	4	1	4	60
7	26MAY1987	38	32	2	5	5	8	3	90
8	26MAY1987	50	32	2	9	6	10	4	60
9	27MAY1987	35	32	1	6	1	4	1	35
10	27MAY1987	27	30	1	6	4	1	2	120
11	27MAY1987	30	32	1	3	3	1	1	150
12	27MAY1987	30	30	2	6	4	1	3	80
13	27MAY1987	30	30	3	7	7	2	5	75
14	28MAY1987	28	32	2	6	4	4	2	120
15	28MAY1987	38	32	2	8	6	4	3	120
16	28MAY1987	35	32	1	7	5	2	5	60
17	01JUN1987	40	32	2	4	2	2	2	30
18	01JUN1987	51	32	2	10	5	3	4	90
19	01JUN1987	40	30	2	5	2	10	1	90
20	01JUN1987	29	32	2	9	3	6	2	65
21	01JUN1987	43	30	2	9	4	15	2	114
22	01JUN1987	46	32	2	9	6	10	2	180
23	02JUN1987	45	32	2	7	6	3	3	120
24	02JUN1987	37	32	2	8	5	2	4	70
25	02JUN1987	47	30	2	2	2		1	90
26	02JUN1987	48	30	2	6	2	3	2	60
27	03JUN1987	47	30	2	5	5		3	90
28	03JUN1987	45	32	2	5	4		3	90
29	03JUN1987	42	32	2	5	3		2	90
30	04JUN1987	31	32	2	9	7	6	5	120
31	05JUN1987	34	30	2	8	4	10	3	85
32	08JUN1987	25	30	1	5	4	2	3	60
33	08JUN1987	30	30	1	4	2	4	1	120
34	09JUN1987	21	30	1	5	4	1	3	45
35	09JUN1987	20	32	1	9	4	5	3	90
36	09JUN1987	40	30	2	5	4	2	2	120
37	09JUN1987	32	32	2	6	5		4	45
38	09JUN1987	52	32	2	7	4	2	2	120
39	09JUN1987	29	30	2	5	2	3	2	60
40	10JUN1987	20	25	1	4	2	2	3	40
41	10JUN1987	36	32	1	4	4	2	4	60
42	10JUN1987	51	32	2	10	4	4	3	60
43	10JUN1987	48	32	2	8	4	5	2	120
44	10JUN1987	18	25	2	5	4	4	3	60
45	10JUN1987	35	32	2	5	3	2	3	60
46	11JUN1987	31	30	2	6	5		4	60
47	11JUN1987	38	30	2	7	6		3	90
48	12JUN1987	45	32	2	6	4	2	8	30
49	12JUN1987	32	32	2	7	3	5	1	180
50	15JUN1987	31	28	1	5	2	4	1	60

(CONTINUED)

**C.1. MEASURES OF EFFORT FOR TRIPS WITH BAY LICENSES  
IN GALVESTON BAY, TEXAS, MAY 20-OCTOBER 30, 1987**

OBS	DATE UNLOADED	CRAFT LENGTH (FEET)	TRAWL WIDTH (FEET)	CREW SIZE	HOURS ABSENT	HOURS FISHED	MILES TO GROUNDS	NUMBER OF TOWS	MINUTES PER TOW
51	15JUN1987	50	32	1	7	5	4	3	80
52	17JUN1987	45	30	1	2	2		1	90
53	18JUN1987	36	30	2	6	6	8	3	90
54	18JUN1987	35	32	2	6	4	2	2	120
55	18JUN1987	33	30	2	5	3		2	90
56	19JUN1987	40	30	1	8	5	10	2	120
57	19JUN1987	38	30	2	7	6	4	4	90
58	22JUN1987	43	31	2	5	2	4	1	120
59	22JUN1987	20	28	1	6	5	4	5	60
60	22JUN1987	30	30	1	5	2	4	1	120
61	22JUN1987	24	25	1	5	3	10	2	90
62	22JUN1987	25	30	1	3	1	7	1	75
63	23JUN1987	25	30	2	5	3	2	3	60
64	23JUN1987	50	32	2	10	5	5	3	100
65	23JUN1987	26	30	2	4	3	1	1	180
66	23JUN1987	32	30	2	5	4	1	3	80
67	25JUN1987	18	30	2	3	2	2	3	30
68	26JUN1987	42	34	2	7	2	7	1	120
69	29JUN1987	45	32	2	6	6		3	120
70	30JUN1987	28	25	2	6	5	3	4	60
71	01JUL1987	21	30	1	7	6	25	3	60
72	01JUL1987	25	30	1	6	5	5	4	60
73	02JUL1987	40	30	2	4	3	1	1	180
74	02JUL1987	46	29	2	5	2	15	1	120
75	02JUL1987	52	25	2	5	4	1	1	240
76	02JUL1987	27	30	1	5	4	1	1	240
77	02JUL1987	44	30	2	8	6	6	3	120
78	02JUL1987	40	32	1	8	8	6	3	120
79	02JUL1987	47	30	2	3	3	1	1	150
80	02JUL1987	32	30	2	4	3	3	3	60
81	07JUL1987	33	30	2	4	2	1	2	60
82	07JUL1987	42	34	2	5	3	3	2	90
83	07JUL1987	40	30	2	4	2	1	3	50
84	07JUL1987	50	32	2	7	5	8	3	120
85	09JUL1987	46	29	2	3	2	1	1	120
86	09JUL1987	52	25	2	4	3	1	1	180
87	09JUL1987	47	30	2	3	2	1	1	120
88	09JUL1987	27	30	1	2	1	1	1	60
89	09JUL1987	30	32	2	5	3	1	2	90
90	09JUL1987	32	30	2	7	6	2	3	120
91	09JUL1987	50	30	3	6	5	3	2	120
92	10JUL1987	35	30	2	9	2	6	2	60
93	13JUL1987	44	30	2	6	4	6	2	120
94	13JUL1987	31	32	2	4	1	2	1	45
95	13JUL1987	33	32	1	9	6	6	3	120
96	14JUL1987	42	32	1	3	2	1	1	120
97	14JUL1987	18	25	1	5	4	1	4	60
98	14JUL1987	17	25	1	5	3	1	3	45
99	14JUL1987	18	25	1	5	3	1	3	45
100	14JUL1987	49	32	3	36	15	15	6	150

(CONTINUED)

**C.1. MEASURES OF EFFORT FOR TRIPS WITH BAY LICENSES  
IN GALVESTON BAY, TEXAS, MAY 20-OCTOBER 30, 1987**

OBS	DATE UNLOADED	CRAFT LENGTH (FEET)	TRAWL WIDTH (FEET)	CREW SIZE	HOURS ABSENT	HOURS FISHED	MILES TO GROUNDS	NUMBER OF TOWS	MINUTES PER TOW
101	17AUG1987	52	72	2	8	3	5	2	70
102	17AUG1987	40	72	2	7	3	5	2	90
103	17AUG1987	34	40	1	8	7	6	3	120
104	17AUG1987	36	54	2	7	6	6	4	90
105	18AUG1987	50	68	2	60	27	5	10	150
106	18AUG1987	17	32	1	5	4		4	60
107	18AUG1987	17	22	1	6	5	2	4	60
108	18AUG1987	48	48	2	7	6	1	2	180
109	18AUG1987	30	30	3	6	4	1	4	60
110	18AUG1987	21	52	1	6	5		4	60
111	18AUG1987	19	22	1	5	4	2	4	60
112	18AUG1987	40	36	2	8	7	1	3	140
113	19AUG1987	48	30	2	3	3	1	2	90
114	19AUG1987	45	40	3	7	6	1	3	120
115	20AUG1987	43	68	2	7	6	3	2	150
116	20AUG1987	33	32	2	6	5	3	2	150
117	21AUG1987	16	25	1	3	3	1	4	45
118	21AUG1987	19	32	1	5	4	4	4	60
119	02SEP1987	57	60	2	7	6	1	2	180
120	03SEP1987	38	45	1	8	6	2	3	90
121	03SEP1987	17	45	1	4	3	1	2	90
122	03SEP1987	44	65	2	3	2	2	1	120
123	04SEP1987	35	55	1	3	2	1	1	120
124	04SEP1987	26	25	1	5	4	1	4	60
125	05SEP1987	24	32	1	7	6	2	3	120
126	05SEP1987	37	55	2	6	5	1	4	70
127	05SEP1987	15	20	2	4	3	2	4	30
128	08SEP1987	40	48	2	36	15	8	12	120
129	08SEP1987	48	50	1	10	5	6	2	120
130	08SEP1987	28	32	1	7	5	5	3	90
131	10SEP1987	45	50	2	3	2	1	1	120
132	11SEP1987	17	32	1	2	2	1	1	90
133	11SEP1987	48	30	2	4	3	1	2	75
134	11SEP1987	46	50	2	4	3	1	2	90
135	11SEP1987	34	30	1	4	4	2	1	200
136	12SEP1987	24	32	1	7	6	2	3	120
137	12SEP1987	30	45	2	7	4	5	4	60
138	12SEP1987	33	65	2	5	4	2	3	80
139	12SEP1987	30	44	1	5	2	4	1	120
140	12SEP1987	40	50	2	6	5	12	2	150
141	12SEP1987	21	32	1	5	4	1	3	45
142	17SEP1987	37	30	2	3	2	1	1	90
143	17SEP1987	41	66	2	6	3	6	1	180
144	17SEP1987	44	65	2	5	4	5	3	60
145	17SEP1987	50	63	2	56	24	7	9	150
146	17SEP1987	42	65	2	60	20	3	6	180
147	17SEP1987	40	66	2	5	4	5	2	120
148	18SEP1987	35	55	2	5	4	5	2	120
149	22SEP1987	30	45	2	10	9	1	4	120
150	22SEP1987	52	65	2	6	5	1	2	120

(CONTINUED)

**C.1. MEASURES OF EFFORT FOR TRIPS WITH BAY LICENSES  
IN GALVESTON BAY, TEXAS, MAY 20-OCTOBER 30, 1987**

OBS	DATE UNLOADED	CRAFT LENGTH (FEET)	TRAWL WIDTH (FEET)	CREW SIZE	HOURS ABSENT	HOURS FISHED	MILES TO GROUNDS	NUMBER OF TOWS	MINUTES PER TOW
151	22SEP1987	52	65	2	6	5	1	2	120
152	22SEP1987	50	70	2	6	5	1	4	60
153	24SEP1987	32	50	2	5	4	1	2	100
154	24SEP1987	40	50	1	5	4	8	3	70
155	25SEP1987	16	20	2	4	3	1	3	60
156	25SEP1987	32	32	1	4	3	1	2	90
157	01OCT1987	50	50	1	8	6	2	3	120
158	08OCT1987	30	44	1	5	4	10	1	195
159	09OCT1987	21	45	2	4	3	2	2	90
160	13OCT1987	45	60	2	3	2	1	1	120
161	15OCT1987	23	58	1	3	2	1	1	90
162	16OCT1987	35	55	1	8	6	4	3	100
163	17OCT1987	47	50	2	3	2	1	1	120
164	23OCT1987	50	67	2	9	6	12	3	120
165	23OCT1987	43	30	2	9	6	10	4	90
166	23OCT1987	51	60	2	6	5	10	2	120
167	23OCT1987	34	49	2	9	6	10	3	80
168	30OCT1987	43	50	2	8	6	5	2	165

**APPENDIX TABLE C.2**

**MEASURES OF FINANCIAL PERFORMANCE FOR TRIPS WITH BAY LICENSES  
IN GALVESTON BAY, TEXAS, MAY 20-OCTOBER 30, 1987**

OBS	DATE UNLOADED	POUNDS LANDED (HEADS-ON)	# DEALERS WHERE CATCH UNLOADED	PERCENT SOLD OFF BOAT	EXVESSEL REVENUES (DOLLARS)	FUEL COST (DOLLARS)	FUEL+ICE+ FOOD COST (DOLLARS)	REPAIR COST (DOLLARS)	TOTAL COST (DOLLARS)	NET OPERATING REVENUES
1	20MAY1987	111	1	0	44	45	50	0	50	-6
2	21MAY1987	19	1	0	22	13	16	0	16	6
3	21MAY1987	252	1	0	190	30	40	0	40	150
4	22MAY1987	235	1	0	165	20	25	0	25	140
5	22MAY1987	200	1	0	160	32	38	30	68	92
6	26MAY1987	231	1	0	162	20	20	0	20	142
7	26MAY1987	286	1	0	242	60	60	0	60	182
8	26MAY1987	300	1	0	135	45	57	0	57	78
9	27MAY1987	136	1	0	48	25	27	20	47	1
10	27MAY1987	175	1	0	79	11	17	0	17	62
11	27MAY1987	290	1	15	245	6	8	0	8	237
12	27MAY1987	265	1	0	172	10	12	0	12	160
13	27MAY1987	408	1	0	287	35	42	0	42	245
14	28MAY1987	53	1	0	58	10	10	0	10	48
15	28MAY1987	310	1	0	230	60	60	0	60	170
16	28MAY1987	263	1	0	79	40	45	0	45	34
17	01JUN1987	53	1	0	42	15	16	0	16	26
18	01JUN1987	523	1	0	277	69	85	0	85	192
19	01JUN1987	39	1	0	33	30	30	0	30	3
20	01JUN1987	397	1	0	254	13	15	0	15	239
21	01JUN1987	186	1	0	134	35	39	135	174	-40
22	01JUN1987	173	1	0	61	35	44	0	44	17
23	02JUN1987	125	1	0	81	65	71	0	71	10
24	02JUN1987	111	1	0	89	17	17	0	17	72
25	02JUN1987	218	1	0	174	7	7	0	7	167
26	02JUN1987	194	1	0	87	22	37	0	37	50
27	03JUN1987	268	1	0	107	70	90	0	90	17
28	03JUN1987	268	1	0	188	30	45	0	45	143
29	03JUN1987	194	1	0	140	60	60	40	100	40
30	04JUN1987	221	2	0	270	25	30	0	30	240
31	05JUN1987	158	1	0	105	20	20	0	20	85
32	08JUN1987	338	1	0	224	15	15	0	15	209
33	08JUN1987	115	1	0	75	15	15	0	15	60
34	09JUN1987	50	1	0	33	12	22	0	22	11
35	09JUN1987	200	1	0	190	40	51	350	401	-211
36	09JUN1987	230	1	0	213	15	20	0	20	193
37	09JUN1987	250	1	0	223	32	32	0	32	191
38	09JUN1987	233	1	0	214	30	30	0	30	184
39	09JUN1987	65	1	0	42	9	14	0	14	28
40	10JUN1987	20	1	0	8	12	21	0	21	-13
41	10JUN1987	100	1	0	40	20	26	0	26	14
42	10JUN1987	147	1	0	140	60	76	0	76	64
43	10JUN1987	251	1	0	259	20	24	0	24	235
44	10JUN1987	145	1	0	58	18	32	0	32	26
45	10JUN1987	76	1	0	30	20	20	0	20	10
46	11JUN1987	287	1	0	244	25	25	0	25	219
47	11JUN1987	235	1	0	235	25	35	0	35	200
48	12JUN1987	200	1	0	90	25	40	40	80	10
49	12JUN1987	60	1	0	51	20	30	0	30	21
50	15JUN1987	17	1	0	6	19	24	15	39	-33

(CONTINUED)

**C.2. MEASURES OF FINANCIAL PERFORMANCE FOR TRIPS WITH BAY LICENSES  
IN GALVESTON BAY, TEXAS, MAY 20-OCTOBER 30, 1987**

OBS	DATE UNLOADED	POUNDS LANDED (HEADS-ON)	# DEALERS WHERE CATCH UNLOADED	PERCENT SOLD OFF BOAT	EXVESSEL REVENUES (DOLLARS)	FUEL COST (DOLLARS)	FUEL+ICE+FOOD COST (DOLLARS)	REPAIR COST (DOLLARS)	TOTAL COST (DOLLARS)	NET OPERATING REVENUES
51	15JUN1987	193	1	0	120	20	22	0	22	98
52	17JUN1987	50	1	0	33	5	10	0	10	23
53	18JUN1987	393	1	0	343	50	55	0	55	288
54	18JUN1987	157	1	0	168	15	25	0	25	143
55	18JUN1987	197	1	0	197	10	15	0	15	182
56	19JUN1987	333	1	0	356	25	35	0	35	321
57	19JUN1987	300	1	0	315	18	37	0	37	278
58	22JUN1987	107	1	0	91	20	30	0	30	61
59	22JUN1987	105	1	0	79	17	22	0	22	57
60	22JUN1987	76	1	0	65	13	13	0	13	52
61	22JUN1987	32	1	0	24	20	25	0	25	-1
62	22JUN1987	65	1	0	55	15	18	300	318	-263
63	23JUN1987	10	1	0	7	21	26	0	26	-20
64	23JUN1987	230	1	0	173	50	63	0	63	110
65	23JUN1987	50	1	0	50	5	13	0	13	37
66	23JUN1987	53	1	0	53	10	15	0	15	38
67	25JUN1987	49	1	0	37	12	12	0	12	25
68	26JUN1987	62	1	0	66	30	34	0	34	32
69	29JUN1987	170	1	0	179	34	44	0	44	135
70	30JUN1987	93	1	0	94	20	25	0	25	69
71	01JUL1987	60	1	0	48	40	58	0	58	-10
72	01JUL1987	163	1	0	147	23	23	0	23	124
73	02JUL1987	88	1	0	79	20	23	0	23	56
74	02JUL1987	93	1	0	79	26	36	0	36	43
75	02JUL1987	60	1	0	54	26	26	0	26	28
76	02JUL1987	47	1	0	42	13	13	0	13	29
77	02JUL1987	96	1	0	96	23	33	0	33	63
78	02JUL1987	225	1	0	225	60	70	0	70	155
79	02JUL1987	72	1	0	61	8	13	0	13	48
80	02JUL1987	192	1	0	173	10	10	0	10	163
81	07JUL1987	133	1	0	143	10	15	0	15	128
82	07JUL1987	133	1	0	166	19	24	0	24	142
83	07JUL1987	47	1	0	61	15	30	70	100	-39
84	07JUL1987	300	1	0	375	50	50	0	50	325
85	09JUL1987	157	1	0	188	16	26	0	26	162
86	09JUL1987	82	1	0	98	21	21	0	21	77
87	09JUL1987	102	1	0	122	10	15	0	15	107
88	09JUL1987	69	1	0	83	11	11	0	11	72
89	09JUL1987	43	1	0	54	18	18	0	18	36
90	09JUL1987	53	1	0	66	16	16	0	16	50
91	09JUL1987	341	1	0	426	25	25	0	25	401
92	10JUL1987	300	1	0	420	50	50	0	50	370
93	13JUL1987	47	1	0	52	25	35	0	35	17
94	13JUL1987	24	0	100	72	15	28	300	328	-256
95	13JUL1987	110	1	0	121	20	30	0	30	91
96	14JUL1987	12	1	0	13	5	5	0	5	8
97	14JUL1987	23	0	100	69	5	10	0	10	59
98	14JUL1987	8	0	0	8	10	15	0	15	-7
99	14JUL1987	9	0	0	9	11	16	0	16	-7
100	14JUL1987	305	1	0	625	146	226	0	226	399

(CONTINUED)

**C.2. MEASURES OF FINANCIAL PERFORMANCE FOR TRIPS WITH BAY LICENSES  
IN GALVESTON BAY, TEXAS, MAY 20-OCTOBER 30, 1987**

OBS	DATE UNLOADED	POUNDS LANDED (HEADS-ON)	# DEALERS WHERE CATCH UNLOADED	PERCENT SOLD OFF BOAT	EXVESSEL REVENUES (DOLLARS)	FUEL COST (DOLLARS)	FUEL+ICE+FOOD COST (DOLLARS)	REPAIR COST (DOLLARS)	TOTAL COST (DOLLARS)	NET OPERATING REVENUES
101	17AUG1987	221	1	0	281	42	62	0	62	219
102	17AUG1987	190	1	0	219	40	50	0	50	169
103	17AUG1987	240	1	0	324	15	15	0	15	309
104	17AUG1987	330	1	0	479	30	30	0	30	449
105	18AUG1987	1562	1	0	2127	150	220	0	220	1907
106	18AUG1987	54	1	0	73	8	12	0	12	61
107	18AUG1987	21	0	100	47	15	19	0	19	28
108	18AUG1987	197	1	0	276	30	30	0	30	246
109	18AUG1987	183	1	0	247	28	33	0	33	214
110	18AUG1987	110	0	100	248	25	28	0	28	220
111	18AUG1987	22	0	100	50	12	15	0	15	35
112	18AUG1987	200	1	0	240	28	36	0	36	204
113	19AUG1987	80	0	100	160	35	48	0	48	112
114	19AUG1987	120	0	100	240	39	49	0	49	191
115	20AUG1987	178	1	0	251	35	48	0	48	203
116	20AUG1987	89	1	0	120	40	46	0	46	74
117	21AUG1987	12	0	0	17	4	9	0	9	8
118	21AUG1987	35	0	0	47	18	22	0	22	25
119	02SEP1987	214	1	0	289	40	49	0	49	240
120	03SEP1987	68	1	0	68	40	45	0	45	23
121	03SEP1987	28	1	0	38	12	14	0	14	24
122	03SEP1987	80	0	100	160	20	34	0	34	126
123	04SEP1987	10	1	0	14	25	30	0	30	-17
124	04SEP1987	0	1	0	0	7	10	0	10	-10
125	05SEP1987	47	1	0	63	25	28	0	28	35
126	05SEP1987	120	1	0	162	25	37	100	137	25
127	05SEP1987	2	0	0	2	6	9	0	9	-7
128	08SEP1987	245	1	0	363	85	213	300	513	-150
129	08SEP1987	125	1	0	163	24	41	1	42	121
130	08SEP1987	130	1	0	117	12	18	0	18	99
131	10SEP1987	13	1	0	17	15	28	0	28	-11
132	11SEP1987	2	0	0	2	3	6	0	6	-4
133	11SEP1987	11	0	100	29	15	30	0	30	-1
134	11SEP1987	35	0	100	88	10	20	0	20	68
135	11SEP1987	28	1	0	33	7	7	0	7	26
136	12SEP1987	40	1	0	32	20	23	0	23	9
137	12SEP1987	113	1	0	101	20	25	0	25	76
138	12SEP1987	71	1	0	72	14	19	0	19	53
139	12SEP1987	35	1	0	28	11	11	0	11	17
140	12SEP1987	41	1	0	33	21	31	0	31	2
141	12SEP1987	10	0	0	15	18	25	0	25	-10
142	17SEP1987	53	1	0	72	8	11	2	13	59
143	17SEP1987	135	1	0	196	25	42	2	44	152
144	17SEP1987	148	1	0	148	20	30	0	30	118
145	17SEP1987	673	1	0	1132	175	338	0	338	794
146	17SEP1987	688	1	0	1169	67	167	0	167	1002
147	17SEP1987	223	1	0	234	30	40	0	40	194
148	18SEP1987	94	1	0	147	25	38	0	38	109
149	22SEP1987	110	1	0	226	30	38	0	38	188
150	22SEP1987	38	1	0	74	22	32	5	37	37

(CONTINUED)

**C.2. MEASURES OF FINANCIAL PERFORMANCE FOR TRIPS WITH BAY LICENSES  
IN GALVESTON BAY, TEXAS, MAY 20-OCTOBER 30, 1987**

OBS	DATE UNLOADED	POUNDS LANDED (HEADS-ON)	# DEALERS WHERE CATCH UNLOADED	PERCENT SOLD OFF BOAT	EXVESSEL REVENUES (DOLLARS)	FUEL COST (DOLLARS)	FUEL+ICE+FOOD COST (DOLLARS)	REPAIR COST (DOLLARS)	TOTAL COST (DOLLARS)	NET OPERATING REVENUES
151	22SEP1987	38	1	0	74	22	32	5	37	37
152	22SEP1987	306	1	0	428	33	45	0	45	383
153	24SEP1987	63	1	0	91	11	21	0	21	70
154	24SEP1987	255	1	0	441	21	26	0	26	415
155	25SEP1987	4	0	0	6	6	14	0	14	-8
156	25SEP1987	105	1	0	173	11	14	0	14	159
157	01OCT1987	209	1	0	261	20	23	0	23	238
158	08OCT1987	19	1	0	16	20	30	0	30	-14
159	09OCT1987	9	0	0	12	14	20	0	20	-8
160	13OCT1987	18	1	0	31	12	17	0	17	14
161	15OCT1987	7	0	0	10	6	12	0	12	-2
162	16OCT1987	95	1	0	152	30	34	0	34	118
163	17OCT1987	25	1	0	43	13	13	0	13	30
164	23OCT1987	116	1	0	165	30	45	0	45	120
165	23OCT1987	182	1	0	255	30	40	0	40	215
166	23OCT1987	179	1	0	236	30	35	0	35	201
167	23OCT1987	88	1	0	122	35	40	0	40	82
168	30OCT1987	57	1	0	74	20	30	0	30	44

**APPENDIX TABLE C.3**

**MEASURES OF EFFORT FOR TRIPS WITH BAIT LICENSES  
IN GALVESTON BAY, TEXAS, MAY 20-OCTOBER 30, 1987**

OBS	DATE UNLOADED	CRAFT LENGTH (FEET)	TRAWL WIDTH (FEET)	CREW SIZE	HOURS ABSENT	HOURS FISHED	MILES TO GROUNDS	NUMBER OF TOWS	MINUTES PER TOW
1	20MAY1987	45	30	2	7	3	4	7	30
2	21MAY1987	40	32	2	2	2		3	30
3	21MAY1987	40	30	2	9	3		7	20
4	21MAY1987	34	30	2	4	3	1	4	30
5	21MAY1987	28	32	1	8	6	4	7	45
6	21MAY1987	28	30	1	3	2	3	2	45
7	02JUN1987	55	32	2	6	4	1	5	30
8	02JUN1987	48	28	2	6	5	2	10	30
9	04JUN1987	34	32	2	6	5	1	5	30
10	04JUN1987	32	30	2	4	3	2	3	30
11	05JUN1987	30	28	1	4	3	3	4	30
12	05JUN1987	40	30	2	5	4	2	4	45
13	05JUN1987	32	32	2	5	3	5	6	30
14	12JUN1987	26	22	2	6	4	5	7	20
15	15JUN1987	39	32	1	4	1	4	3	15
16	15JUN1987	35	30	2	10	2	15	4	18
17	15JUN1987	28	30	2	4	2	2	4	20
18	17JUN1987	20	25	1	2	2	8	5	10
19	17JUN1987	20	25	1	2	1	12	2	30
20	18JUN1987	48	32	2	6	5	10	3	90
21	18JUN1987	55	32	2	4	3		3	45
22	19JUN1987	32	32	2	7	5	6	3	100
23	24JUN1987	35	30	2	5	2	15	5	10
24	25JUN1987	34	30	2	9	7	8	12	30
25	26JUN1987	52	32	2	5	4	4	4	60
26	26JUN1987	37	32	2	5	4	1	4	60
27	26JUN1987	32	30	2	5	3	5	8	20
28	29JUN1987	34	32	2	6	5	2	6	20
29	29JUN1987	34	32	2	4	3	9	4	33
30	30JUN1987	35	32	2	6	4	3	6	30
31	30JUN1987	55	32	2	2	1	1	1	45
32	01JUL1987	20	30	2	4	3	3	3	60
33	01JUL1987	28	30	1	6	5	25	3	60
34	01JUL1987	32	28	1	7	6	1	12	20
35	02JUL1987	30	28	1	6	5	1	5	30
36	02JUL1987	40	30	2	3	3	1	4	30
37	02JUL1987	26	22	2	6	5	5	10	20
38	06JUL1987	27	32	1	5	2	2	2	60
39	06JUL1987	26	22	1	5	3	4	9	20
40	07JUL1987	55	32	2	5	4	1	4	60
41	07JUL1987	52	32	3	5	4	1	4	60
42	07JUL1987	48	28	2	5	4	1	8	30
43	07JUL1987	32	32	2	5	3	5	5	56
44	08JUL1987	36	30	2	5	3	10	8	15
45	08JUL1987	35	30	2	3	1	12	3	10
46	10JUL1987	20	25	1	2	1	3	4	15
47	10JUL1987	20	25	1	2	1	5	4	15
48	14JUL1987	39	32	1	5	2	4	8	15
49	15JUL1987	32	32	1	7	6	3	4	90
50	15JUL1987	30	28	1	6	5	2	5	30

(CONTINUED)

**C.3. MEASURES OF EFFORT FOR TRIPS WITH BAIT LICENSES  
IN GALVESTON BAY, TEXAS, MAY 20-OCTOBER 30, 1987**

OBS	DATE UNLOADED	CRAFT LENGTH (FEET)	TRAWL WIDTH (FEET)	CREW SIZE	HOURS ABSENT	HOURS FISHED	MILES TO GROUNDS	NUMBER OF TOWS	MINUTES PER TOW
51	15 JUL 1987	34	34	2	4	3	2	9	15
52	15 JUL 1987	36	32	1	5	4	3	4	60
53	15 JUL 1987	32	32	2	5	5	4	5	60
54	15 JUL 1987	27	32	2	8	5	2	5	56
55	16 JUL 1987	32	25	1	5	4	1	6	30
56	16 JUL 1987	29	30	1	5	4	2	9	25
57	16 JUL 1987	34	30	2	6	5	6	10	15
58	16 JUL 1987	34	32	2	4	3	6	7	30
59	17 JUL 1987	34	32	2	4	3	1	6	20
60	21 JUL 1987	40	30	2	5	4	1	3	60
61	21 JUL 1987	34	30	1	5	4	1	4	45
62	21 JUL 1987	26	30	2	5	4	1	4	60
63	21 JUL 1987	35	30	1	3	1	12	4	10
64	22 JUL 1987	42	34	2	4	2	4	1	90
65	22 JUL 1987	30	32	2	5	4	1	2	120
66	22 JUL 1987	36	32	2	12	5	5	3	90
67	22 JUL 1987	40	32	2	7	6	5	3	90
68	23 JUL 1987	33	32	2	6	4	3	2	120
69	23 JUL 1987	43	32	2	7	6	20	3	90
70	23 JUL 1987	40	35	1	8	5	5	2	135
71	23 JUL 1987	32	30	2	8	6	10	3	120
72	23 JUL 1987	31	32	2	8	6	7	3	120
73	24 JUL 1987	37	30	1	3	3	1	4	20
74	27 JUL 1987	32	32	2	5	4	3	4	45
75	27 JUL 1987	30	32	2	5	5	4	5	45
76	27 JUL 1987	38	30	2	4	3	5	3	50
77	27 JUL 1987	32	25	2	6	5	3	7	20
78	27 JUL 1987	34	32	2	9	8	5	7	30
79	28 JUL 1987	35	32	2	7	4	15	2	120
80	28 JUL 1987	45	32	3	2	2	1	1	90
81	28 JUL 1987	32	30	1	6	5	8	4	30
82	28 JUL 1987	31	30	2	5	4	8	7	30
83	28 JUL 1987	36	32	1	5	4	8	4	60
84	28 JUL 1987	30	30	2	7	6	3	4	35
85	28 JUL 1987	45	30	1	2	2	1	1	120
86	29 JUL 1987	55	32	2	3	2	3	3	30
87	29 JUL 1987	48	32	2	4	3	3	3	40
88	29 JUL 1987	32	32	3	5	4	4	5	45
89	30 JUL 1987	21	25	1	1	1	5	3	10
90	30 JUL 1987	18	22	1	2	1	2	2	15
91	30 JUL 1987	18	22	1	1	1	10	1	15
92	30 JUL 1987	36	32	2	2	1	1	3	25
93	30 JUL 1987	21	25	1	1	1	5	3	10
94	30 JUL 1987	21	25	1	1	1	2	1	20
95	30 JUL 1987	39	32	2	5	3	4	10	15
96	30 JUL 1987	21	25	1	1	1	4	3	10
97	31 JUL 1987	18	30	1	4	3	1	3	60
98	03 AUG 1987	20	30	1	3	2	3	4	30
99	03 AUG 1987	40	30	2	7	5	1	3	90
100	04 AUG 1987	32	32	2	7	5	5	3	90

(CONTINUED)

**C.3. MEASURES OF EFFORT FOR TRIPS WITH BAIT LICENSES  
IN GALVESTON BAY, TEXAS, MAY 20-OCTOBER 30, 1987**

OBS	DATE UNLOADED	CRAFT LENGTH (FEET)	TRAWL WIDTH (FEET)	CREW SIZE	HOURS ABSENT	HOURS FISHED	MILES TO GROUNDS	NUMBER OF TOWS	MINUTES PER TOW
101	05AUG1987	55	32	2	4	3	1	3	40
102	05AUG1987	40	32	2	8	6	5	12	30
103	05AUG1987	40	32	2	5	4	1	3	60
104	05AUG1987	48	28	2	6	5	1	4	30
105	06AUG1987	34	32	2	5	4	5	8	25
106	06AUG1987	32	25	2	6	5	3	6	25
107	07AUG1987	33	31	2	6	5	4	12	20
108	07AUG1987	28	30	1	4	3	5	5	30
109	07AUG1987	30	30	1	6	3	5	3	60
110	07AUG1987	31	28	1	5	4	5	4	60
111	07AUG1987	43	32	2	6	5	5	3	90
112	07AUG1987	19	32	2	5	4	2	3	65
113	10AUG1987	40	32	1	5	3	8	3	60
114	10AUG1987	27	32	1	5	4	2	2	80
115	11AUG1987	17	25	1	4	3	1	6	20
116	11AUG1987	32	25	1	5	4	1	3	60
117	11AUG1987	46	30	2	5	4	1	4	60
118	13AUG1987	40	32	1	5	3	8	3	60
119	17AUG1987	32	32	1	3	3	1	1	150
120	17AUG1987	32	32	1	5	4	2	4	60
121	19AUG1987	34	30	2	4	3	2	5	30
122	20AUG1987	32	32	2	5	5	1	12	20
123	20AUG1987	34	32	2	5	4	1	5	35
124	21AUG1987	20	25	1	4	3	1	4	30
125	21AUG1987	18	27	1	3	3	2	4	15
126	24AUG1987	35	50	2	4	3	3	3	45
127	24AUG1987	26	20	2	1	1	1	2	15
128	25AUG1987	40	30	2	4	3	5	4	30
129	25AUG1987	30	28	1	6	3	1	5	30
130	03SEP1987	21	32	1	5	4	1	4	45
131	04SEP1987	52	32	2	11	10	1	5	120
132	05SEP1987	15	20	2	4	1	2	1	40
133	05SEP1987	39	32	2	5	4	2	6	20
134	05SEP1987	47	55	2	7	6	6	7	45
135	05SEP1987	56	54	2	4	3	1	3	40
136	10SEP1987	17	30	1	6	5		4	40
137	11SEP1987	48	28	2	7	6	1	6	60
138	11SEP1987	36	28	2	6	5	1	8	20
139	12SEP1987	21	25	1	4	3	1	7	15
140	12SEP1987	21	25	1	4	3	1	7	15
141	12SEP1987	20	25	1	5	4	9	9	15
142	20SEP1987	28	25	1	3	2	2	5	20
143	24SEP1987	48	65	2	6	5	1	4	60
144	29SEP1987	48	32	2	8	6	1	12	20
145	01OCT1987	29	30	1	4	3	1	6	30
146	01OCT1987	32	31	1	5	4	1	2	95
147	01OCT1987	17	25	2	5	1	2	1	30
148	01OCT1987	18	25	2	5	1	2	3	20
149	02OCT1987	32	32	2	6	5	1	6	45
150	02OCT1987	36	25	1	6	5	2	13	20

(CONTINUED)

**C.3. MEASURES OF EFFORT FOR TRIPS WITH BAIT LICENSES  
IN GALVESTON BAY, TEXAS, MAY 20-OCTOBER 30, 1987**

OBS	DATE UNLOADED	CRAFT LENGTH (FEET)	TRAWL WIDTH (FEET)	CREW SIZE	HOURS ABSENT	HOURS FISHED	MILES TO GROUNDS	NUMBER OF TOWS	MINUTES PER TOW
151	02OCT1987	16	20	3	7	1	3	1	20
152	03OCT1987	42	32	1	1	1	1	1	30
153	03OCT1987	48	32	2	6	5	8	4	60
154	03OCT1987	55	32	2	6	1	8	1	35
155	08OCT1987	21	30	1	5	1	2	1	20
156	08OCT1987	28	25	1	5	3	2	5	25
157	08OCT1987	16	20	2	7	1	5	2	20
158	09OCT1987	28	32	2	3	1	2	1	45
159	09OCT1987	20	30	1	3	2	1	3	30
160	09OCT1987	21	32	1	5	3	1	3	40
161	10OCT1987	34	32	2	5	4	2	6	30
162	15OCT1987	52	62	2	9	7	5	6	60
163	16OCT1987	32	32	2	3	2	1	2	60
164	16OCT1987	34	30	2	9	5	4	8	30
165	17OCT1987	34	30	1	3	1	6	2	20
166	17OCT1987	40	50	2	7	5	5	4	60
167	22OCT1987	36	50	2	5	4	2	3	60
168	22OCT1987	56	60	2	4	3	1	2	60
169	22OCT1987	32	29	1	10	6	22	6	40
170	24OCT1987	30	32	2	4	3	2	2	90
171	28OCT1987	55	32	2	5	4	1	2	120
172	28OCT1987	48	28	2	8	7	3	10	30
173	30OCT1987	28	25	1	5	3	1	5	30

APPENDIX TABLE C.4

LANDINGS AND REVENUES FOR TRIPS WITH BAIT LICENSES  
IN GALVESTON BAY, TEXAS, MAY 20-OCTOBER 30, 1987

OBS	DATE UNLOADED	LIVE BAIT		DEAD BAIT		REGULAR SHRIMP		# DEALERS WHERE CATCH UNLOADED	PERCENT SOLD OFF BOAT
		LANDED (QUARTS)	REVENUES (DOLLARS)	LANDED (POUNDS, HEADS-ON)	REVENUES (DOLLARS)	(POUNDS, HEADS-ON)	REVENUES (DOLLARS)		
1	20MAY1987	10	32	31	9	0	0	1	0
2	21MAY1987	7	28	150	98	0	0	2	0
3	21MAY1987	100	320	60	39	0	0	1	0
4	21MAY1987	35	224	0	0	0	0	1	0
5	21MAY1987	15	48	30	20	20	60	1	0
6	21MAY1987	25	163	120	36	3	9	1	0
7	02JUN1987	20	80	125	88	7	20	1	0
8	02JUN1987	15	48	100	70	0	0	2	0
9	04JUN1987	100	200	0	0	160	112	2	0
10	04JUN1987	50	170	20	16	0	0	1	0
11	05JUN1987	60	192	40	24	0	0	1	0
12	05JUN1987	60	192	20	14	0	0	1	0
13	05JUN1987	30	96	26	18	8	23	1	0
14	12JUN1987	10	40	33	33	0	0	1	0
15	15JUN1987	15	48	10	10	0	0	1	0
16	15JUN1987	52	234	100	100	0	0	1	0
17	15JUN1987	6	24	10	10	0	0	1	0
18	17JUN1987	10	32	20	20	0	0	1	0
19	17JUN1987	0	0	0	0	25	25	1	0
20	18JUN1987	8	32	0	0	298	298	1	0
21	18JUN1987	20	80	100	100	0	0	1	0
22	19JUN1987	12	48	120	126	0	0	1	0
23	24JUN1987	40	180	12	12	0	0	1	0
24	25JUN1987	20	128	0	0	250	188	2	0
25	26JUN1987	45	144	16	16	71	86	1	0
26	26JUN1987	35	112	0	0	167	167	2	0
27	26JUN1987	52	221	20	16	0	0	1	0
28	29JUN1987	100	320	0	0	0	0	3	0
29	29JUN1987	4	10	21	22	0	0	1	0
30	30JUN1987	12	48	0	0	95	114	1	0
31	30JUN1987	0	0	25	25	0	0	1	0
32	01JUL1987	0	0	15	12	0	0	1	0
33	01JUL1987	4	16	10	8	0	0	1	0
34	01JUL1987	35	112	5	4	0	0	1	0
35	02JUL1987	32	128	50	43	6	14	1	0
36	02JUL1987	44	176	20	17	0	0	1	0
37	02JUL1987	25	100	10	9	0	0	1	0
38	06JUL1987	16	64	0	0	28	28	1	0
39	06JUL1987	25	100	60	51	0	0	1	0
40	07JUL1987	0	0	0	0	64	66	1	0
41	07JUL1987	0	0	0	0	170	170	1	0
42	07JUL1987	40	128	0	0	50	50	2	0
43	07JUL1987	30	96	0	0	15	15	1	0
44	08JUL1987	0	0	0	0	97	146	1	0
45	08JUL1987	24	108	0	0	0	0	1	0
46	10JUL1987	12	48	6	6	0	0	1	0
47	10JUL1987	8	32	14	14	0	0	1	0
48	14JUL1987	20	64	21	21	0	0	1	0
49	15JUL1987	8	32	0	0	67	60	2	0

(CONTINUED)

**C.4. LANDINGS AND REVENUES FOR TRIPS WITH BAIT LICENSES  
IN GALVESTON BAY, TEXAS, MAY 20-OCTOBER 30, 1987**

OBS	DATE UNLOADED	LIVE BAIT		DEAD BAIT		REGULAR SHRIMP		# DEALERS WHERE CATCH UNLOADED	PERCENT SOLD OFF BOAT
		LANDED (QUARTS)	REVENUES (DOLLARS)	LANDED (POUNDS, HEADS-ON)	REVENUES (DOLLARS)	(POUNDS, HEADS-ON)	(DOLLARS)		
50	15 JUL 1987	20	80	15	12	2	3	1	0
51	15 JUL 1987	32	128	50	50	15	23	1	0
52	15 JUL 1987	16	60	0	0	20	18	1	0
53	15 JUL 1987	5	16	0	0	88	114	2	0
54	15 JUL 1987	25	80	0	0	68	61	2	0
55	16 JUL 1987	40	128	21	21	0	0	1	0
56	16 JUL 1987	26	104	10	10	0	0	1	0
57	16 JUL 1987	20	128	6	12	0	0	1	0
58	16 JUL 1987	40	128	20	20	0	0	1	0
59	17 JUL 1987	20	80	31	34	0	0	1	0
60	21 JUL 1987	0	0	0	0	242	190	1	0
61	21 JUL 1987	0	0	85	106	17	34	1	0
62	21 JUL 1987	0	0	0	0	73	91	1	0
63	21 JUL 1987	28	126	32	64	2	4	1	46
64	22 JUL 1987	0	0	0	0	36	47	1	0
65	22 JUL 1987	0	0	89	89	0	0	1	0
66	22 JUL 1987	0	0	0	0	153	199	1	0
67	22 JUL 1987	0	0	0	0	208	270	1	0
68	23 JUL 1987	0	0	0	0	135	101	1	0
69	23 JUL 1987	0	0	0	0	182	137	1	0
70	23 JUL 1987	0	0	0	0	140	105	1	0
71	23 JUL 1987	0	0	0	0	318	282	1	0
72	23 JUL 1987	0	0	0	0	191	153	1	0
73	24 JUL 1987	20	80	40	40	0	0	1	0
74	27 JUL 1987	30	150	15	15	0	0	1	0
75	27 JUL 1987	12	48	8	8	0	0	1	0
76	27 JUL 1987	0	0	0	0	83	100	1	0
77	27 JUL 1987	24	96	30	30	0	0	1	0
78	27 JUL 1987	48	192	15	15	0	0	1	0
79	28 JUL 1987	0	0	0	0	114	137	1	0
80	28 JUL 1987	0	0	0	0	56	67	1	0
81	28 JUL 1987	8	30	25	28	0	0	1	0
82	28 JUL 1987	20	75	0	0	40	44	2	0
83	28 JUL 1987	8	30	29	32	0	0	1	0
84	28 JUL 1987	12	45	0	0	19	21	2	0
85	28 JUL 1987	0	0	0	0	92	92	1	0
86	29 JUL 1987	12	48	0	0	75	90	1	0
87	29 JUL 1987	15	60	0	0	70	84	1	0
88	29 JUL 1987	20	80	0	0	80	98	2	0
89	30 JUL 1987	12	48	10	10	0	0	1	0
90	30 JUL 1987	4	16	0	0	0	0	1	0
91	30 JUL 1987	1	4	0	0	0	0	1	0
92	30 JUL 1987	6	24	10	10	0	0	1	0
93	30 JUL 1987	12	48	9	9	0	0	1	0
94	30 JUL 1987	0	0	30	30	0	0	1	0
95	30 JUL 1987	18	72	28	28	0	0	1	0
96	30 JUL 1987	12	48	10	10	0	0	1	0
97	31 JUL 1987	0	0	0	0	15	11	0	0
98	03 AUG 1987	24	96	8	6	0	0	1	0

(CONTINUED)

**C.4. LANDINGS AND REVENUES FOR TRIPS WITH BAIT LICENSES  
IN GALVESTON BAY, TEXAS, MAY 20-OCTOBER 30, 1987**

OBS	DATE UNLOADED	LIVE BAIT LANDED (QUARTS)	LIVE BAIT REVENUES (DOLLARS)	DEAD BAIT LANDED (POUNDS, HEADS-ON)	DEAD BAIT REVENUES (DOLLARS)	REGULAR SHRIMP (POUNDS, HEADS-ON)	REGULAR SHRIMP REVENUES (DOLLARS)	# DEALERS WHERE CATCH UNLOADED	PERCENT SOLD OFF BOAT
99	03AUG1987	0	0	0	0	125	250	0	100
100	04AUG1987	0	0	0	0	118	118	1	0
101	05AUG1987	16	64	0	0	150	180	1	0
102	05AUG1987	64	256	19	17	0	0	1	0
103	05AUG1987	36	144	0	0	147	147	1	0
104	05AUG1987	48	192	152	152	0	0	2	0
105	06AUG1987	36	144	185	185	0	0	2	0
106	06AUG1987	48	192	20	15	0	0	1	0
107	07AUG1987	0	0	0	0	60	90	1	0
108	07AUG1987	8	32	0	0	50	45	2	0
109	07AUG1987	0	0	0	0	229	206	1	0
110	07AUG1987	0	0	0	0	185	167	1	0
111	07AUG1987	0	0	0	0	236	225	1	0
112	07AUG1987	0	0	0	0	75	68	0	0
113	10AUG1987	0	0	0	0	162	162	1	0
114	10AUG1987	24	96	79	95	0	0	2	0
115	11AUG1987	0	0	50	45	0	0	1	0
116	11AUG1987	0	0	50	45	35	49	1	0
117	11AUG1987	0	0	0	0	135	135	1	0
118	13AUG1987	0	0	0	0	198	228	1	0
119	17AUG1987	0	0	64	80	16	25	1	0
120	17AUG1987	15	48	2	3	0	0	1	0
121	19AUG1987	34	218	0	0	80	160	1	0
122	20AUG1987	20	80	35	35	120	162	2	0
123	20AUG1987	16	64	0	0	35	44	2	0
124	21AUG1987	4	16	7	8	0	0	1	0
125	21AUG1987	8	32	2	3	0	0	1	0
126	24AUG1987	24	96	132	119	0	0	1	0
127	24AUG1987	20	80	0	0	0	0	1	0
128	25AUG1987	18	72	36	52	0	0	1	0
129	25AUG1987	40	160	25	25	0	0	1	0
130	03SEP1987	8	32	0	0	137	219	2	0
131	04SEP1987	16	64	20	29	0	0	1	0
132	05SEP1987	0	0	1	1	0	0	0	0
133	05SEP1987	31	124	19	19	4	6	1	0
134	05SEP1987	28	112	10	14	0	0	1	0
135	05SEP1987	24	96	2	3	0	0	1	0
136	10SEP1987	0	0	77	62	0	0	1	0
137	11SEP1987	36	144	60	60	7	11	1	0
138	11SEP1987	28	112	10	10	0	0	1	0
139	12SEP1987	10	40	4	4	0	0	1	0
140	12SEP1987	10	40	6	6	0	0	1	0
141	12SEP1987	10	40	13	13	0	0	1	0
142	20SEP1987	10	40	2	2	0	0	1	0
143	24SEP1987	12	51	11	16	19	41	1	0
144	29SEP1987	0	0	75	109	8	20	1	0
145	01OCT1987	20	80	0	0	0	0	1	0
146	01OCT1987	0	0	11	10	13	20	1	0
147	01OCT1987	0	0	1	1	0	0	0	0

(CONTINUED)

**C.4. LANDINGS AND REVENUES FOR TRIPS WITH BAIT LICENSES  
IN GALVESTON BAY, TEXAS, MAY 20-OCTOBER 30, 1987**

OBS	DATE UNLOADED	LIVE BAIT		DEAD BAIT		REGULAR SHRIMP		# DEALERS WHERE CATCH UNLOADED	PERCENT SOLD OFF BOAT
		LANDED (QUARTS)	REVENUES (DOLLARS)	LANDED (POUNDS, HEADS-ON)	REVENUES (DOLLARS)	(POUNDS, HEADS-ON)	REVENUES (DOLLARS)		
148	01OCT1987	0	0	4	6	0	0	0	0
149	02OCT1987	40	160	0	0	110	110	1	0
150	02OCT1987	40	160	0	0	0	0	1	0
151	02OCT1987	1	4	0	0	0	0	0	0
152	03OCT1987	0	0	0	0	3	4	1	0
153	03OCT1987	12	48	0	0	40	67	1	0
154	03OCT1987	0	0	0	0	0	0	1	0
155	08OCT1987	0	0	5	4	0	0	0	0
156	08OCT1987	11	44	1	1	0	0	1	0
157	08OCT1987	2	8	0	0	0	0	0	0
158	09OCT1987	6	24	2	2	0	0	1	0
159	09OCT1987	10	40	0	0	0	0	1	0
160	09OCT1987	12	48	20	16	0	0	1	0
161	10OCT1987	32	128	90	104	16	27	1	0
162	15OCT1987	20	80	20	23	0	0	1	0
163	16OCT1987	40	160	0	0	70	112	1	0
164	16OCT1987	20	80	0	0	0	0	1	0
165	17OCT1987	0	0	0	0	7	8	0	0
166	17OCT1987	2	8	0	0	0	0	1	0
167	22OCT1987	60	240	15	15	0	0	1	0
168	22OCT1987	32	128	0	0	0	0	1	0
169	22OCT1987	12	48	110	110	0	0	1	0
170	24OCT1987	0	0	55	63	4	7	1	0
171	28OCT1987	0	0	40	40	28	36	1	0
172	28OCT1987	20	80	10	15	0	0	1	0
173	30OCT1987	16	64	2	2	0	0	1	0

**APPENDIX TABLE C.5**

**MEASURES OF FINANCIAL PERFORMANCE FOR TRIPS WITH BAIT LICENSES  
IN GALVESTON BAY, TEXAS, MAY 20-OCTOBER 30, 1987**

OBS	DATE UNLOADED	TOTAL LANDINGS (POUNDS)	TOTAL REVENUES (DOLLARS)	FUEL COST (DOLLARS)	FUEL+ICE+FOOD COST (DOLLARS)	REPAIR COST (DOLLARS)	TOTAL COST (DOLLARS)	NET OPERATING REVENUES
1	20MAY1987	46	41	22	29	300	329	-288
2	21MAY1987	161	126	30	32	0	32	94
3	21MAY1987	210	359	70	102	300	402	-43
4	21MAY1987	53	224	12	12	0	12	212
5	21MAY1987	73	128	21	29	0	29	99
6	21MAY1987	161	208	5	6	0	6	202
7	02JUN1987	162	188	34	34	0	34	154
8	02JUN1987	123	118	12	19	0	19	99
9	04JUN1987	310	312	9	9	0	9	303
10	04JUN1987	95	186	10	25	0	25	161
11	05JUN1987	130	216	15	15	0	15	201
12	05JUN1987	110	206	40	60	0	60	146
13	05JUN1987	79	137	30	33	0	33	104
14	12JUN1987	48	73	25	30	25	55	18
15	15JUN1987	33	58	15	17	0	17	41
16	15JUN1987	178	334	50	68	0	68	266
17	15JUN1987	19	34	50	55	0	55	-21
18	17JUN1987	35	52	8	10	0	10	42
19	17JUN1987	25	25	9	11	0	11	14
20	18JUN1987	310	330	19	24	0	24	306
21	18JUN1987	130	180	20	25	0	25	155
22	19JUN1987	138	174	18	29	20	49	125
23	24JUN1987	72	192	35	53	0	53	139
24	25JUN1987	280	316	21	29	0	29	287
25	26JUN1987	155	246	20	50	0	50	196
26	26JUN1987	220	279	11	21	0	21	258
27	26JUN1987	98	237	15	33	0	33	204
28	29JUN1987	150	320	50	62	0	62	258
29	29JUN1987	27	32	6	11	4	15	17
30	30JUN1987	113	162	20	23	50	73	89
31	30JUN1987	25	25	10	10	200	210	-185
32	01JUL1987	15	12	7	11	0	11	1
33	01JUL1987	16	24	22	22	0	22	2
34	01JUL1987	58	116	40	47	0	47	69
35	02JUL1987	104	184	12	15	0	15	169
36	02JUL1987	86	193	15	23	60	83	110
37	02JUL1987	48	109	30	30	0	30	79
38	06JUL1987	52	92	20	20	100	120	-28
39	06JUL1987	98	151	20	25	0	25	126
40	07JUL1987	64	66	28	28	0	28	38
41	07JUL1987	170	170	15	15	0	15	155
42	07JUL1987	110	178	10	16	0	16	162
43	07JUL1987	60	111	20	23	0	23	88
44	08JUL1987	97	146	15	20	0	20	126
45	08JUL1987	36	108	20	33	0	33	75
46	10JUL1987	24	54	6	8	0	8	46
47	10JUL1987	26	46	8	10	0	10	36
48	14JUL1987	51	85	18	23	0	23	62
49	15JUL1987	79	92	15	25	0	25	67
50	15JUL1987	47	95	8	13	0	13	82

(CONTINUED)

**C.5. MEASURES OF FINANCIAL PERFORMANCE FOR TRIPS WITH BAIT  
LICENSES IN GALVESTON BAY, TEXAS, MAY 20-OCTOBER 30, 1987**

OBS	DATE UNLOADED	TOTAL LANDINGS (POUNDS)	TOTAL REVENUES (DOLLARS)	FUEL COST (DOLLARS)	FUEL+ICE+ FOOD COST (DOLLARS)	REPAIR COST (DOLLARS)	TOTAL COST (DOLLARS)	NET OPERATING REVENUES
51	15 JUL 1987	113	201	10	10	0	10	191
52	15 JUL 1987	44	78	20	30	0	30	48
53	15 JUL 1987	96	130	10	20	0	20	110
54	15 JUL 1987	106	141	17	28	0	28	113
55	16 JUL 1987	81	149	25	25	0	25	124
56	16 JUL 1987	49	114	9	9	0	9	105
57	16 JUL 1987	36	140	13	18	0	18	122
58	16 JUL 1987	80	148	14	22	0	22	126
59	17 JUL 1987	61	114	6	6	0	6	108
60	21 JUL 1987	242	190	21	29	0	29	161
61	21 JUL 1987	102	140	7	7	0	7	133
62	21 JUL 1987	73	91	9	14	0	14	77
63	21 JUL 1987	76	194	20	28	0	28	166
64	22 JUL 1987	36	47	20	25	0	25	22
65	22 JUL 1987	89	89	40	50	0	50	39
66	22 JUL 1987	153	199	40	50	0	50	149
67	22 JUL 1987	208	270	40	50	0	50	220
68	23 JUL 1987	135	101	19	39	0	39	62
69	23 JUL 1987	182	137	25	45	25	70	67
70	23 JUL 1987	140	105	31	51	0	51	54
71	23 JUL 1987	318	282	32	80	0	80	202
72	23 JUL 1987	191	153	23	34	0	34	119
73	24 JUL 1987	70	120	7	7	0	7	113
74	27 JUL 1987	60	165	15	23	0	23	142
75	27 JUL 1987	26	56	23	23	0	23	33
76	27 JUL 1987	83	100	30	32	0	32	68
77	27 JUL 1987	66	126	25	28	0	28	98
78	27 JUL 1987	87	207	25	35	0	35	172
79	28 JUL 1987	114	137	50	55	0	55	82
80	28 JUL 1987	56	67	9	19	0	19	48
81	28 JUL 1987	37	58	15	25	0	25	33
82	28 JUL 1987	70	119	10	15	5	20	99
83	28 JUL 1987	41	62	20	25	0	25	37
84	28 JUL 1987	37	66	11	13	0	13	53
85	28 JUL 1987	92	92	8	13	0	13	79
86	29 JUL 1987	93	138	17	27	0	27	111
87	29 JUL 1987	93	144	20	25	0	25	119
88	29 JUL 1987	110	178	10	20	0	20	158
89	30 JUL 1987	28	58	5	5	0	5	53
90	30 JUL 1987	6	16	4	4	0	4	12
91	30 JUL 1987	2	4	6	6	0	6	-2
92	30 JUL 1987	19	34	8	16	0	16	18
93	30 JUL 1987	27	57	5	5	0	5	52
94	30 JUL 1987	30	30	4	4	0	4	26
95	30 JUL 1987	55	100	15	20	0	20	80
96	30 JUL 1987	28	58	5	5	0	5	53
97	31 JUL 1987	15	11	8	12	0	12	-2
98	03 AUG 1987	44	102	8	8	0	8	94
99	03 AUG 1987	125	250	25	32	0	32	218
100	04 AUG 1987	118	118	15	31	0	31	87

(CONTINUED)

**C.5. MEASURES OF FINANCIAL PERFORMANCE FOR TRIPS WITH BAIT  
LICENSES IN GALVESTON BAY, TEXAS, MAY 20-OCTOBER 30, 1987**

OBS	DATE UNLOADED	TOTAL LANDINGS (POUNDS)	TOTAL REVENUES (DOLLARS)	FUEL COST (DOLLARS)	FUEL+ICE+ FOOD COST (DOLLARS)	REPAIR COST (DOLLARS)	TOTAL COST (DOLLARS)	NET OPERATING REVENUES
101	05AUG1987	174	244	20	25	0	25	219
102	05AUG1987	115	273	40	55	0	55	218
103	05AUG1987	201	291	20	30	0	30	261
104	05AUG1987	224	344	15	17	100	117	227
105	06AUG1987	239	329	50	62	0	62	267
106	06AUG1987	92	207	25	30	0	30	177
107	07AUG1987	60	90	6	17	0	17	73
108	07AUG1987	62	77	25	30	0	30	47
109	07AUG1987	229	206	18	23	0	23	183
110	07AUG1987	185	167	28	33	0	33	134
111	07AUG1987	236	225	20	40	0	40	185
112	07AUG1987	75	68	24	41	0	41	27
113	10AUG1987	162	162	21	26	0	26	136
114	10AUG1987	115	191	25	25	0	25	166
115	11AUG1987	50	45	8	13	0	13	32
116	11AUG1987	85	94	15	19	0	19	75
117	11AUG1987	135	135	23	33	0	33	102
118	13AUG1987	198	228	21	26	0	26	202
119	17AUG1987	80	105	15	15	0	15	90
120	17AUG1987	25	51	30	35	0	35	16
121	19AUG1987	131	378	15	20	0	20	358
122	20AUG1987	185	277	15	20	0	20	257
123	20AUG1987	59	108	14	18	0	18	90
124	21AUG1987	13	24	7	11	0	11	13
125	21AUG1987	14	35	8	8	0	8	27
126	24AUG1987	168	215	18	18	0	18	197
127	24AUG1987	30	80	6	6	0	6	74
128	25AUG1987	63	124	15	25	0	25	99
129	25AUG1987	85	185	11	14	0	14	171
130	03SEP1987	149	251	20	27	0	27	224
131	04SEP1987	44	93	62	70	0	70	23
132	05SEP1987	1	1	5	17	0	17	-16
133	05SEP1987	70	149	15	20	0	20	129
134	05SEP1987	52	126	29	40	0	40	86
135	05SEP1987	38	99	18	18	0	18	81
136	10SEP1987	77	62	20	30	20	50	12
137	11SEP1987	121	215	25	38	0	38	177
138	11SEP1987	52	122	22	34	0	34	88
139	12SEP1987	19	44	8	8	0	8	36
140	12SEP1987	21	46	8	8	0	8	38
141	12SEP1987	28	53	17	19	0	19	34
142	20SEP1987	17	42	7	12	0	12	30
143	24SEP1987	48	108	21	21	0	21	87
144	29SEP1987	83	129	22	33	0	33	96
145	01OCT1987	30	80	8	8	0	8	72
146	01OCT1987	24	30	11	14	0	14	16
147	01OCT1987	1	1	5	12	0	12	-11
148	01OCT1987	4	6	8	15	0	15	-9
149	02OCT1987	170	270	12	22	0	22	248
150	02OCT1987	60	160	18	21	0	21	139

(CONTINUED)

**C.5. MEASURES OF FINANCIAL PERFORMANCE FOR TRIPS WITH BAIT  
LICENSES IN GALVESTON BAY, TEXAS, MAY 20-OCTOBER 30, 1987**

OBS	DATE UNLOADED	TOTAL LANDINGS (POUNDS)	TOTAL REVENUES (DOLLARS)	FUEL COST (DOLLARS)	FUEL+ICE+FOOD COST (DOLLARS)	REPAIR COST (DOLLARS)	TOTAL COST (DOLLARS)	NET OPERATING REVENUES
151	02OCT1987	2	4	6	11	0	11	-7
152	03OCT1987	3	4	5	5	0	5	-1
153	03OCT1987	58	115	21	26	0	26	89
154	03OCT1987	0	0	20	28	300	328	-328
155	08OCT1987	5	4	6	13	0	13	-9
156	08OCT1987	18	45	11	16	0	16	29
157	08OCT1987	3	8	5	12	0	12	-4
158	09OCT1987	11	26	6	13	0	13	13
159	09OCT1987	15	40	8	8	0	8	32
160	09OCT1987	38	64	20	27	0	27	37
161	10OCT1987	154	259	10	14	0	14	245
162	15OCT1987	50	103	44	54	0	54	49
163	16OCT1987	130	272	15	15	0	15	257
164	16OCT1987	30	80	20	25	0	25	55
165	17OCT1987	7	8	10	10	0	10	-2
166	17OCT1987	3	8	25	45	50	95	-87
167	22OCT1987	105	255	11	11	0	11	244
168	22OCT1987	48	128	15	15	0	15	113
169	22OCT1987	128	158	20	30	0	30	128
170	24OCT1987	59	71	15	19	0	19	52
171	28OCT1987	68	76	35	45	0	45	31
172	28OCT1987	40	95	20	25	0	25	70
173	30OCT1987	26	66	8	8	0	8	58