

# Characteristics of the Texas Shrimp Fleet, 1979-82

JUDITH T. KRAUTHAMER, WILLIAM E. GRANT, and WADE L. GRIFFIN

## Introduction

The shrimp fishery is the most valuable commercial fishery in Texas. The fishery is characterized as an open-access common property resource utilized by two user groups, recreational and commercial fishermen. Both groups participate in each of two distinctly different sectors of the fishery, the inshore sector, physically described by bays and inlets, and the offshore, or Gulf sector.

In the inshore sector fishermen harvest small, juvenile brown shrimp, *Penaeus aztecus*, and white shrimp, *P. setiferus*, on a daily basis with vessels ranging in size up to 55 feet. In contrast, the offshore sector supports primarily larger vessels from 55 feet to > 70 feet which fish on a trip basis, staying away

from port for 2-4 weeks (Maril<sup>1</sup>), and which harvest large, mature brown and white shrimp, although some immature brown, white, and pink shrimp, *P. duorarum*, make up part of their catch (Christmas and Etzold, 1977).

The economic contribution of the total commercial landings in Texas varies greatly from year to year. The variations are, in part, a function of the economic conditions within the fishery, such as fishing costs and price of the catch. The years 1976-78 generally were profitable years for the Texas shrimp fishery (Tetty et al., 1984). However, during 1979 fuel prices nearly doubled from \$1.30/10 l to \$2.20/10 l (Tetty et al., 1984). Total landings decreased but the actual value of the commercial harvest increased<sup>2</sup>. During 1980, fuel prices continued to rise (\$2.50/10 l) and the total value of Texas landings decreased by 8 million dollars. The greatest variation in value of the landings occurred from 1981 to 1982. Within these two years landings and their associated value decreased from a record high (59.5 million pounds, 165 million dollars, 1981) to a record low (26 million pounds, 97 million dollars, 1982) (footnote 1).

Sound management of the Texas shrimp fishery requires an understanding of the complex interplay between user groups and fishing sectors. However, analyses of catch/effort relationships (Christmas and Etzold, 1977),

economic costs/returns relationships (Griffin and Nichols, 1976), and bioeconomic interrelationships (Grant and Griffin, 1979) within the fishery have been based on a variety of assumptions about the composition of the commercial shrimp fleet. Few studies have presented empirical descriptions of the shrimp fleet (Warren, 1979; Warren and Bryan, 1981). Our study quantitatively characterizes the Texas shrimp fleet during 1979-82 and evaluates changes in the composition of the fleet in light of recent regulatory measures.

## Data Source

The Texas Parks and Wildlife Department (TPWD) commercial license records (1979-82) were the data source for the present study. By law a vessel is required to be licensed for each fishery (bay, bait, Gulf) in which it participates. Since additional information such as vessel length, home port, county, and vessel identification number (U.S. Coast Guard number or TPWD number) must be reported with each license purchased, the Texas Parks and Wildlife license records provide a rich data set from which a description of the fleet can be generated.

The TPWD licensing system describes restrictions regarding where and when commercial and recreational fishermen may fish and the amount they may harvest. Commercial licenses include a commercial bay shrimp license,

*ABSTRACT—Sound management of the Texas shrimp fishery requires an understanding of the composition of the shrimp fleet and its response to changing economic conditions and regulations. This study utilized Texas Parks and Wildlife Department licensing data to quantitatively describe and evaluate the commercial fleet from 1979 to 1982. Tables representing the number of vessels in the fleet, the license (bay, bait, Gulf) or license combinations that they maintain, the home ports of vessels, and the counties of residence of vessel owners, are presented. Despite yearly fluctuations, the shrimp fleet has been increasing, as have been the purchases of single and multiple licenses. Decreases in the number of vessels in the fleet for any given year resulted primarily from vessels less than 25 feet in length and vessels 55-70 feet in length leaving the fishery. The expansion of the fleet in 1981 and its relationship to 1981 fisheries legislation is discussed.*

<sup>1</sup>Maril, R. 1979. Shrimping in Texas: Social and economic marginality fishing for a luxury commodity. Paper presented to the Association for Humanist Sociology, Johnston, Penn., 42 p.

<sup>2</sup>Unpublished data on file at National Marine Fisheries Service, Galveston, Tex.

Judith T. Krauthamer and William E. Grant are with the Department of Wildlife and Fisheries Sciences, Texas A&M University, College Station, TX 77843, and Wade L. Griffin is with the Department of Agricultural Economics, Texas A&M University, College Station, TX 77843.

a commercial bait shrimp license, and a commercial Gulf license. Recreational licenses include a sport fishermen license and an individual bait shrimp trawl license. By definition a commercial bay shrimp boat is a registered boat used for taking shrimp for pay or sale from the major bays. A commercial bay boat may catch no more than 300 pounds of any size shrimp per day during the open spring season (15 May through 15 July) and may catch any amount during the open fall season (15 August through 15 December).

A commercial bait boat is a registered boat used in inside or bay waters for taking bait shrimp for sale or pay. Prior to 1981 bait boats were required to have adequate live holding facilities for shrimp and could catch no more than 150 pounds of any size shrimp per day during the bait shrimp season (open throughout the year except at night during the open fall season). At least 50 percent of the onboard catch had to be kept alive. As of August 1981 the harvest limit for bait shrimp increased to 200 pounds per day with no requirement to maintain 50 percent of the shrimp alive (from 15 August through October).

A commercial Gulf shrimp boat is a registered boat used for catching shrimp for sale or pay from the Gulf or "outside waters." Outside waters are defined in part as that portion of the Gulf of Mexico extending from the shoreline seaward and within the jurisdiction of the State of Texas (Christmas and Etzold, 1977).

Two recreational licenses, an individual bait-shrimp trawl license and a sport fishing license, are available to persons shrimping for personal use only. However, since the legal catch limits for personal use (no more than 4 quarts per boat during any closed season in inside waters, no more than 100 pounds legal size whole shrimp per day from major bays during open fall season and from outside waters during open Gulf season, no more than 15 pounds from major bays during open spring season) are smaller than those for commercial licenses, many recreational and part-time fishermen purchase commercial licenses (Christmas and Etzold, 1977).

Licensing data were provided by TPWD on a computerized tape contain-

**Table 1.—Number of licensed vessels in the Texas shrimp fleet each year from 1975 to 1982 from TPWD license records. Data from 1975 to 1978 taken from those presented by Warren (1979). Data for 1979 differs from Warren and Bryan (1980). At the time of their study, 1979 data files did not include all entries.**

Size class (length in feet)	Number of licensed vessels							
	1975	1976	1977	1978	1979	1980	1981	1982
<25	2,367	2,136	2,413	2,659	3,543	3,214	3,707	3,327
25-40	1,158	1,138	1,127	1,147	1,360	1,453	1,637	1,619
40-55	379	380	359	371	413	437	536	491
55-70	1,013	996	1,012	1,078	1,197	1,099	1,268	1,106
70+	295	256	289	298	386	395	442	372
Total	5,212	4,906	5,200	5,553	6,899	6,598	7,590	6,915

ing files by license year. For example, license year 1980 was from 1 September 1979 through 31 August 1980. Since any given vessel can hold one or more licenses (such as a bay/bait license combination) a number of individual vessels had more than one record entered, leading to duplication of vessels. To eliminate this duplication, data within license years were sorted by vessel number, providing a listing of current licenses held by each vessel. From this data base further data sets were generated with compilations by vessel size, home port, and county.

Vessels were aggregated into the five size classes used by Warren and Bryan (1981): 25 feet and under; over 25 through 40 feet; over 40 through 55 feet; over 55 through 70 feet; and over 70 feet. The boundaries of these five classes were based on the observations that most part-time, occasional, and recreational fishermen use small boats less than 25 feet (Warren and Bryan, 1981) although some boats used are less than 40 feet (Gulf of Mexico Fishery Management Council, 1981), that most commercial bay and bait shrimpers use vessels between 25 and 55 feet although these size classes include a number of Gulf vessels, and that most Gulf vessels are longer than 55 feet.

### Fleet Characteristics

#### Number of Vessels

A comparison of the number of commercially licensed vessels, by size class, that participated in the fishery each year from 1975 to 1982 indicates that while the fleet expanded and contracted on a yearly basis the total number of vessels

in the fishery increased in a generally linear fashion (Table 1). The yearly variation of the total number of vessels can be attributed primarily to the relatively large variation of smaller vessels that entered or left the fishery. For example, during 1981 a net of 992 vessels entered the fishery, marking 1981 as a record year in terms of vessel participation in the commercial fleet. Smaller vessels (<25 feet in length) accounted for 50 percent of the increase. From 1981 to 1982 there was a decrease in vessel numbers in all size classes; smaller vessels accounted for 56 percent of the overall decrease.

The proportional size class composition of the shrimp fleet remained fairly constant from 1975 through 1982. Vessels less than 25 feet were by far the most numerous licensed vessel. In contrast, the largest (>70 feet) vessels represented the smallest proportion of the fleet.

#### Number of Licenses

In terms of total number of licenses purchased, 1981 was a record year, corresponding to an overall increase in vessels entering the fishery during that year (Table 2). Of the additional 1,566 bay, bait, and Gulf licenses purchased, 60 percent were bay licenses, representing the single largest annual increase (24 percent) in bay licenses. In general, however, the number of bay and Gulf license purchases fluctuated on a yearly basis. Note, for example, that despite the 1981 increases the 1982 total number of Gulf and bay licenses did not differ significantly from 1979 levels. In contrast, the number of bait licenses steadily increased despite overall decreases in (total) license purchases in 1980 and 1982.

**Table 2.—Total number of bay, bait, and Gulf licenses purchased each year from 1979 to 1982 from TPWD license records. Parenthetical entries represent the net change in the number of licenses purchased between the indicated year and the previous year.**

Type of license	Total licenses purchased			
	1979	1980	1981	1982
Bay	4,260	3,960 (-300)	4,893 (+933)	4,277 (-616)
Bait	1,766	1,979 (+213)	2,185 (+206)	2,207 (+22)
Gulf	3,300	3,245 (-55)	3,672 (+427)	3,379 (-293)
Total	9,326	9,184 (-142)	10,750 (+1,566)	9,863 (-887)

**Table 3.—Total number of licenses, by size class, for years 1979-82 from TPWD license records. Parenthetical entries represent the percentage of total licenses held by a given size class for a given year.**

Size class (length in feet)	Total licenses			
	1979	1980	1981	1982
≤25	4,345 (47)	3,978 (43)	4,702 (44)	4,190 (42)
25-40	2,511 (27)	2,736 (30)	3,151 (29)	3,070 (31)
40-55	832 (9)	929 (10)	1,095 (10)	1,049 (11)
55-70	1,246 (13)	1,142 (12)	1,355 (13)	1,178 (12)
70 <	392 (4)	399 (4)	447 (4)	376 (4)

**Table 4.—Number of vessels in each size class that held a given license or license combination during 1979 from TPWD license records. Parenthetical entries represent the percentage of total licenses sold in each license or license combination category. Bracketed entries represent the percentage of vessels that held each license or license combination.**

Size class (feet)	License or license combination						
	Bay	Bait	Gulf	Bay/Bait	Bay/Gulf	Bait/Gulf	All
≤25	2,060	341	426	177	429	24	86
25-40	339	87	66	453	109	23	283
40-55	66	7	74	53	4	56	153
55-70	7	0	1,152	3	21	3	11
70 <	1	1	378	4	1	1	0
Total	2,473	436	2,096	690	564	107	533
% of total licenses	(26.5)	(4.7)	(22.5)	(14.8)	(12.1)	(2.3)	(17.1)
% of vessels	[35.8]	[6.3]	[30.4]	[10.0]	[8.2]	[1.6]	[7.7]

**Table 5.—Number of vessels in each size class that held a given license or license combination during 1980 from TPWD license records. Parenthetical entries represent the percentage of total licenses sold in each license or license combination category. Bracketed entries represent the percentage of vessels that held each license or license combination.**

Size class (feet)	License or license combination						
	Bay	Bait	Gulf	Bay/Bait	Bay/Gulf	Bait/Gulf	All
≤25	1,709	395	422	214	364	34	76
25-40	294	116	77	496	110	43	317
40-55	39	13	73	65	51	16	180
55-70	9	0	1,056	3	20	2	9
70 <	0	0	391	0	4	0	0
Total	2,051	524	2,019	778	549	95	582
% of total licenses	(22.3)	(5.7)	(22.0)	(16.9)	(12.0)	(2.1)	(19.0)
% of vessels	[31.1]	[7.9]	[30.6]	[11.8]	[8.3]	[1.4]	[8.8]

**Table 6.—Number of vessels in each size class that held a given license or license combination during 1981 from TPWD license records. Parenthetical entries represent the percentage of total licenses sold in each license or license combination category. Bracketed entries represent the percentage of vessels that held each license or license combination.**

Size class (feet)	License or license combination						
	Bay	Bait	Gulf	Bay/Bait	Bay/Gulf	Bait/Gulf	All
≤25	2,145	318	371	296	418	37	122
25-40	345	94	75	579	127	26	391
40-55	53	8	131	66	47	16	215
55-70	9	1	1,183	2	60	1	12
70 <	1	1	435	0	5	0	0
Total	2,553	422	2,195	943	657	80	740
% of total licenses	(23.7)	(3.9)	(20.4)	(17.5)	(12.2)	(1.5)	(20.7)
% of vessels	[33.6]	[5.5]	[28.9]	[12.4]	[8.6]	[1.0]	[9.7]

**Table 7.—Number of vessels in each size class that held a given license or license combination during 1982 from TPWD license records. Parenthetical entries represent the percentage of total licenses sold in each license or license combination category. Bracketed entries represent the percentage of vessels that held each license or license combination.**

Size class (feet)	License or license combination						
	Bay	Bait	Gulf	Bay/Bait	Bay/Gulf	Bait/Gulf	All
≤25	1,743	369	455	274	343	40	103
25-40	323	118	86	563	114	56	359
40-55	46	17	78	67	57	18	208
55-70	10	0	1,032	3	52	1	8
70 <	1	1	366	1	2	1	0
Total	2,123	505	2,017	908	568	116	678
% of total licenses	(21.5)	(5.1)	(20.4)	(18.4)	(11.5)	(2.4)	(20.6)
% of vessels	[30.7]	[7.3]	[29.2]	[13.1]	[8.2]	[1.7]	[9.8]

The proportion of licenses held by a given size class was consistent with the proportion of vessels of that size class participating in the fishery. Small vessels (<25 feet) held the majority (44 percent) of licenses. In contrast large

Gulf vessels (>70 feet) held only 4 percent of all licenses (Table 3). It should be noted that the proportion of licenses held by a given size class remained constant over the 4-year span. A comparison of

each of the three commercial fisheries shows that the most popular license was the single bay license, accounting for about one-fourth of the total of all license combinations (Tables 4, 5, 6, 7). Roughly one-third of all vessels operated

under this license alone. The second most popular license was the single Gulf license, accounting for about one-fifth of all license combinations. Slightly less than one-third of the fleet operated under this license alone. Although the single bait licenses accounted for only about 5 percent of all licenses held, bait licenses alone and in combination with other licenses accounted for roughly one-fifth of all licenses held (Table 2).

The percentage of vessels in the fleet maintaining more than one license increased from 28 percent (1979) to 33 percent (1982). However, over half of the vessels holding more than one license were 25-40 feet or 40-55 feet in length. About 8-10 percent of the fleet maintained a combination of all three licenses; however, vessels in the 25-40 foot and 40-55 foot classes accounted for the majority (84 percent) of multiple (bay/bait/Gulf) licenses held during 1982 (Table 7). Among the license combinations, the bait/Gulf combination was the least popular. This is not surprising since the vessel and gear requirements for the two fisheries are not highly compatible.

Comparison of the bay, bait, and Gulf fisheries with regard to the number of commercial licenses held by a given vessel size class indicates that three-fourths of the licenses held by vessels 25-40 feet and 40-55 feet in length were bay and bait licenses. One-fourth of the licenses maintained were Gulf licenses (alone and in combination with other licenses), although single Gulf licenses accounted for only 4 percent of all licenses held. Vessels greater than 55 feet held almost exclusively Gulf licenses; bay and/or bait licenses represented roughly 5 percent of all licenses held by these vessels.

### Home Ports

The number of home ports claimed by commercially licensed vessels remained relatively constant from 1980 to 1982 (Table 8). Vessels <25 feet in length claimed the largest number of home ports. This is most likely due to the fact that small boats are transported easily and do not necessarily require close affiliation with a specific ice house, fuel dock, or market (Warren, 1979). Roughly half of the home ports claimed

**Table 8.—Number of home ports claimed by vessels in each size class during 1980-82 from TPWD license records.**

Size class (length in feet)	No. of home ports		
	1980	1981	1982
≤25	212	221	216
25-40	80	94	93
40-55	42	48	44
55-70	54	67	62
70<	43	42	43
Total	431	472	458

**Table 9.—Number of out-of-state home ports claimed by vessels in the three largest size classes during 1980-82 from TPWD license records.**

Size class (length in feet)	Out-of-state home ports		
	1980	1981	1982
40-55	11	9	7
55-70	35	39	38
70<	19	20	19

**Table 10.—Number of vessels in each size class that used each of 15 major Texas ports during 1980. Parenthetical entries represent the percentage of vessels of the indicated size that used one of the 15 major ports.**

Home port	No. of vessels (by size class <sup>1</sup> )					Total vessels
	≤25	25-40	40-55	55-70	70<	
Rockport/Fulton/ Aransas/Corpus Christi	207	335	85	263	54	944
Galveston	180	239	121	139	69	748
Houston	353	93	47	17	0	510
Brownsville/Pt. Isabel	36	16	11	314	94	471
Baytown	166	32	5	0	0	203
Beaumont	164	11	0	2	0	177
Pt. Arthur	125	25	22	20	3	195
Kemah/Seabrook	74	106	6	3	1	190
Texas City	120	33	2	0	0	155
Freeport/Brazoria	71	31	1	7	2	112
Pt. Lavaca	34	51	24	16	7	132
Palacios	29	87	16	20	13	165
San Leon/Dickinson	70	46	2	0	0	118
Seadrift	22	65	22	1	0	110
Orange	40	1	0	1	0	42
Total	1,691	1,171	364	803	243	4,272
% using a major port	(52.6)	(80.6)	(83.3)	(73.1)	(61.5)	(64.7)

<sup>1</sup>Length in feet.

by vessels >55 feet in length were out-of-state (Tables 8 and 9). The number of out-of-state home ports for Gulf vessels remained constant from 1980 through 1982.

Fifteen ports served approximately half the fleet (Tables 10-12). The Rockport/Fulton/Aransas/Corpus Christi, Galveston, Brownsville, and Houston ports were among the most important ports in Texas during 1980-82. These ports supported a significant number of bay, bait, and Gulf vessels. In terms of licenses, Brownsville was primarily a Gulf fishing port, whereas Baytown, Kemah/Seabrook, Pt. Lavaca, Seadrift, and San Leon were primarily bay and bait fishing ports (Table 13). Houston was a primary home port for 455

vessels. Although the majority of vessels were small (<40 feet), 112 licenses held at these ports were Gulf licenses. Similarly, Beaumont supported mostly small vessels (<25 feet); however, 62 percent of the licenses held at these ports were Gulf licenses (Tables 12 and 13). This suggests that these ports were popular ports for a large number of part-time or recreational fishermen.

Roughly 50 percent of vessels less than 25 feet in length utilized the 15 major ports and the majority of licenses were bay licenses (Table 14). Between 80 and 85 percent of vessels 25-40 feet and 40-55 feet in length used the 15 major ports as their home ports during 1982, with bay and bait licenses being

**Table 11.—Number of vessels in each size class that used each of 15 major Texas ports during 1981. Parenthetical entries represent the percentage of vessels of the indicated size that used one of the 15 major ports.**

Home port	No. of vessels (by size class <sup>1</sup> )					Total vessels
	≤25	25-40	40-55	55-70	70 <	
Rockport/Fulton/ Aransas/Corpus Christi	214	354	91	258	53	970
Galveston	191	276	126	151	36	780
Houston	350	105	54	13	0	522
Brownsville/Pt. Isabel	42	15	13	306	86	462
Baytown	207	39	4	1	0	251
Beaumont	197	10	0	1	0	208
Pt. Arthur	111	33	31	25	3	203
Kemah/Seabrook	79	121	7	3	0	210
Texas City	106	45	4	0	0	155
Freeport/Brazoria	90	38	0	15	2	145
Pt. Lavaca	40	58	33	20	3	154
Palacios	39	98	19	24	13	193
San Leon/Dickinson	84	47	5	0	0	136
Seadrift	46	71	25	1	0	143
Orange	72	4	0	1	0	77
<b>Total</b>	<b>1,868</b>	<b>1,314</b>	<b>412</b>	<b>819</b>	<b>196</b>	<b>4,609</b>
% using a major port	(50.4)	(80.3)	(76.9)	(64.6)	(44.3)	(60.7)

<sup>1</sup>Length in feet.

**Table 12.—Number of vessels in each size class that used each of 15 major Texas ports during 1982. Parenthetical entries represent the percentage of vessels of the indicated size that used one of the 15 major ports.**

Home port	No. of vessels (by size class <sup>1</sup> )					Total vessels
	≤25	25-40	40-55	55-70	70 <	
Rockport/Fulton/ Aransas/Corpus Christi	208	365	95	234	41	943
Galveston	167	267	125	121	35	715
Houston	284	105	47	18	1	455
Brownsville/Pt. Isabel	50	13	10	306	80	459
Baytown	177	36	4	0	1	218
Beaumont	185	7	0	1	0	193
Pt. Arthur	122	38	33	28	1	222
Kemah/Seabrook	67	109	10	1	0	187
Texas City	88	53	9	0	0	150
Freeport/Brazoria	77	42	3	6	1	129
Pt. Lavaca	38	55	32	18	1	144
Palacios	34	88	19	22	13	176
San Leon/Dickinson	70	52	4	0	0	126
Seadrift	29	72	24	1	0	126
Orange	77	6	0	0	0	83
<b>Total</b>	<b>1,673</b>	<b>1,308</b>	<b>415</b>	<b>756</b>	<b>174</b>	<b>4,326</b>
% using a major port	(50.3)	(80.1)	(84.5)	(68.4)	(46.8)	(62.6)

<sup>1</sup>Length in feet.

**Table 13.—Number of licenses by fishery (bay, bait, or Gulf) for each of 15 major Texas ports, during 1982 only, from TPWD license records.**

Home port	No. of licenses represented		
	Bay	Bait	Gulf
Rockport/Fulton/ Aransas/Corpus Christi	506	568	447
Galveston	479	371	423
Houston	415	126	112
Brownsville/Pt. Isabel	12	56	415
Baytown	208	59	14
Beaumont	142	12	106
Pt. Arthur	75	16	204
Kemah/Seabrook	153	100	57
Texas City	132	60	26
Freeport/Brazoria	66	53	76
Pt. Lavaca	116	53	43
Palacios	130	67	108
San Leon/Dickinson	113	59	21
Seadrift	114	67	46
Orange	23	1	73

**Table 14.—Number of licenses held by vessel size class and type of fishery at 15 major Texas ports during 1982 only. Parenthetical entries represent the percentage of the total number of licenses held at all ports purchased by vessels claiming one of the 15 major ports as a home port.**

Size class (length in feet)	No. of licenses		
	Bay	Bait	Gulf
≤25	1,177 (47.8)	468 (59.5)	460 (48.9)
25-40	1,116 (82.1)	913 (83.3)	494 (80.3)
40-55	330 (87.3)	288 (92.9)	299 (82.8)
55-70	57 (78.0)	11 (91.7)	748 (68.4)
70 <	4 (100)	3 (100)	171 (46.3)

the primary licenses held. Between 47 and 69 percent of the vessels > 55 feet in length claimed major ports as their home ports during 1982 (Table 12).

### Counties

The majority of owners of licensed vessels claimed Texas coastal counties as their county of residence (Table 15). The pattern of distribution for coastal residency by vessel size class was consistent from 1980 to 1982. As vessel size increased, the percentage of vessels

claiming Texas coastal and Texas non-coastal residency decreased and out-of-state residency increased. This observation is consistent with the fact that as vessel size increased the percentage of vessels using one of the 15 major Texas ports as a home port decreased. In terms of ownership, proximity to the Texas Gulf coast was not a requisite for larger vessels. A number of the Gulf vessels 55-70 feet in length (16-22 percent) and greater than 70 feet in length (28-50 percent) were owned, but not necessarily

**Table 15.—Residency of owners of commercially licensed vessels in each size class during 1980-82 from TPWD license records. Parenthetical entries represent the percentage of vessels in each residency category.**

Year	Residency	No. of vessels (by size class <sup>1</sup> )					Total vessels
		≤25	25-40	40-55	55-70	70 <	
1980	Texas coastal	2,855 (89)	1,370 (94)	392 (90)	918 (84)	285 (72)	5,820
	Texas noncoastal	352 (11)	76 (5)	13 (3)	18 (2)	6 (2)	465
	Out-of-state	7 (<1)	7 (<1)	32 (7)	163 (15)	104 (26)	313
	<b>Total</b>	<b>3,214</b>	<b>1,453</b>	<b>437</b>	<b>1,099</b>	<b>395</b>	<b>6,598</b>
1981	Texas coastal	3,248 (88)	1,500 (92)	442 (83)	989 (78)	222 (50)	6,401
	Texas noncoastal	375 (10)	70 (4)	11 (2)	11 (<1)	19 (4)	486
	Out-of-state	84 (2)	67 (4)	83 (16)	268 (21)	201 (46)	703
	<b>Total</b>	<b>3,707</b>	<b>1,637</b>	<b>536</b>	<b>1,268</b>	<b>442</b>	<b>7,590</b>
1982	Texas coastal	2,932 (88)	1,502 (92)	443 (90)	893 (81)	210 (57)	5,980
	Texas noncoastal	352 (11)	97 (7)	19 (4)	13 (1)	4 (1)	485
	Out-of-state	43 (1)	20 (1)	29 (6)	200 (18)	158 (42)	450
	<b>Total</b>	<b>3,327</b>	<b>1,619</b>	<b>491</b>	<b>1,106</b>	<b>372</b>	<b>6,915</b>

<sup>1</sup>Length in feet.

operated, by residents of out-of-state (coastal and noncoastal) or Texas non-coastal areas. In contrast, bay vessels were owned primarily by residents of coastal regions. Only 6-8 percent of the smaller bay vessels (25-40 feet) and 10-18 percent of the larger bay vessels (40-55 feet) were owned by noncoastal or out-of-state residents. This is not surprising since bay and bait shrimp boat owners were the primary operators of their vessels (Warren, 1979). Similarly, the majority of the small (<25 feet) boat owners claimed coastal residency.

From 1980 to 1981 the number of out-of-state owned vessels of all sizes dramatically increased (<25 feet = +1,100 percent; 25-40 feet = +857 percent; 40-55 feet = +159 percent; 55-70 feet = +65 percent; >70 feet = +93 percent), as did the number of Texas coastal county vessels in most size classes. From 1981 to 1982, out-of-state vessels decreased in number, although not as sharply as they had increased from 1980 to 1981 (<25 feet = -49 percent; 25-40 feet = -70 percent; 40-55 feet = -65 percent; 55-70 feet = -25 percent; >70 feet = -21 percent). The number of Texas coastal county vessels in some size classes also decreased slightly (less than 25 feet = -10 percent; 55-70 feet = -10 percent; greater than 70 feet = -5 percent). However, Texas coastal residency of owners of vessels in size classes 25-40 feet and 40-55 feet remained virtually constant.

### Discussion

Because the Texas shrimp fishery is an open access resource it is subject to increasing amounts of fishing pressure and competition between harvesters as vessels enter the fishery on a continuous basis. Examination of the TPWD's licensing data indicates that despite yearly variation in vessel and license numbers the number of vessels participating in the shrimp fishery and the number of licenses that they hold have been increasing. The general dynamics of vessels entering and leaving the fishery, including the substantial expansion of the fleet in 1981, can be interpreted partially in light of management regulations and yearly economic fishery

conditions.

In 1981 the Texas State Legislature passed Senate Bill 749, which states that during calendar years 1982 and 1983 a commercial bay and bait shrimp boat license may be issued only to persons who possessed a bay or bait shrimp boat license on 28 February 1981, or to any person who owned a boat that was at least 50 percent completed by 1 March 1981. This bill was intended to enhance fishing success and stabilize or reduce fishing effort in the inshore fishery. However, in response to these restrictions, members of the established shrimp fleet who had not traditionally fished in the bay and/or bait fisheries, as well as new entrants to the fleet, sought out these licenses. Owners of bay-licensed vessels also purchased bait licenses, and vice versa. By the end of 1981 bait and bay licenses had increased 19 percent over 1980 levels, although by 1982 bay and bait license numbers approximated those of 1979.

Traditionally, once limited entry schemes are initiated they are not easily repealed (Rettig and Ginter, 1978). Despite the initial 2-year legal limit on the moratorium, the response of fishermen to renew/apply for bay/bait licenses is understandable in light of the historical treatment of limited entry. Vessel owners and operators entered these fisheries to ensure future participation in them.

House Bill 1367, which allowed for a 200-pound daily bait catch and simultaneously eliminated the requirement to maintain live shrimp on board, may have contributed to the increase in purchases of bait licenses. This provision appears to be beneficial to bay boats (55 feet or less in length). Since the spring commercial catch is limited to a 300-pound limit, bay boats could effectively harvest an additional 200 pounds without incurring additional expenses to meet live holding tank gear requirements.

Finally, the 1981 Texas Legislature enacted Senate Bill 865 which called for a simultaneous closure of the territorial sea and the Fisheries Conservation Zone from 1 June to 15 July. This bill was intended to make the offshore fishery more profitable by allowing shrimp to grow larger before harvest. Given gener-

ally favorable fishery conditions (shrimp availability), it is speculated that offshore operators anticipated more profitable catches. Gulf license purchases for vessels 55 feet and over increased considerably in 1981, the first year of the closure. However, this decreased in 1982 to about the 1980 level.

In spite of changing economic conditions the year-to-year breakdown of vessel numbers participating in the shrimp fleet indicates that the number of vessels 25-40 feet and 40-55 feet in length did not vary greatly during the 4-year period examined. Decreases in fleet size (1980, 1982) resulted primarily from vessels less than 25 feet in length and vessels 55-70 feet in length leaving the fishery. A possible explanation for this trend may be that for recreational and occasional fishermen fishing for shrimp is a luxury activity and is not worth the investment during times of personal economic stress. Likewise, some large Gulf vessels which are costly to operate would incur fewer losses by not fishing at all. In contrast, vessels 25-40 and 40-55 feet in length would be more likely to remain in the fishery, despite an economically unprofitable year, because of less overhead and other outside sources of income (Warren, 1979). Given the resiliency of the shrimp stock and fluctuating market prices it is not unreasonable for a vessel owner to have expectations of future profitability or, at worst, break-even conditions.

An important descriptor of the Texas shrimp fishery is the substantial number of combination shrimp licenses held by individual vessels. Shrimp vessels are outfitted such that their versatility for utilization in other fisheries is limited. Thus, shrimp vessel operators may increase their fishing options by harvesting in different sectors of the shrimp fishery. Vessels 25-40 feet and 40-55 feet in length were the primary holders of combination or multiple licenses. Since these vessel classes participated primarily in inshore bay or bait fisheries, their total landings were assumed to be inshore landings. However, the relatively high proportion of multiple licenses held by the inshore vessels suggests potential mobility into the Gulf sector when the weather permits and the shrimp are in

season. It is likely that typically inshore fishermen supplement their harvest in Gulf waters. Thus a portion of the landings attributed to the inshore fishery may be harvested in offshore Gulf waters.

Aggregation of vessels into five distinct size classes was based on prior observations which associated vessel size with type of license held. The current quantitative analysis verified these observations. Vessels 25-40 feet, 40-55 feet, 55-70 feet, and > 70 feet in length represented primarily full-time commercial operators, and it is these groups that have been represented in studies of the shrimp fishery. Vessels < 25 feet in length have been presented as representing part-time, occasional commercial, and recreational fishermen. This group held about 43 percent of all commercial shrimp licenses during the early 1980's. However, to date, very little is known about this fishing population. Considering the high proportion of vessels and licenses in this class a finer definition of its members and further understanding of their fishing effort and harvest is recommended.

### Conclusions

While the Texas shrimp fleet expanded and contracted on a yearly basis from 1975 to 1982, the total number of vessels in the fishery increased in a generally linear fashion during this period. The number of bay and Gulf licenses fluctuated on a yearly basis from 1979 to 1982. In contrast, the number of bait licenses steadily increased during this period.

The percentage of vessels in the fleet maintaining more than one license increased from 1979 to 1982. Over half of the vessels holding more than one commercial shrimp license were 25-40 or 40-55 feet in length.

Fifteen Texas ports served about half the fleet. Between 80 and 85 percent of all vessels 25-55 feet in length claimed Texas ports as their home ports. And, the majority of owners of licensed vessels claimed Texas coastal counties as their county of residence.

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