

PENAEID SHRIMP MONITORING OFF THE
CENTRAL TEXAS COAST, 1977-1981

by

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ABSTRACT

From October 1977 through March 1981 the Texas Parks and Wildlife Department's (TPWD) research vessel Western Gulf took 256 trawl samples in the Gulf of Mexico as part of a continuing program to monitor commercial penaeid shrimp stocks for movement, size and abundance. Night samples were collected off the central Texas coast during May-August at depths of 11-18, 20-27, 29-37 and 38-46 m. An additional transect out to a depth of 55 m was added in 1980 off the south Texas coast. Day samples were collected in 5-9, 11-18 and 20-27 m depth zones off Port Aransas and Pass Cavallo from October 1977 through March 1978 with supplementary samples from April 1978 to March 1981.

There was no indication of a major movement of brown shrimp (Penaeus aztecus) into the Gulf before the closed season in 1978, 1979 or 1980. During 1978 and 1980 emigrating brown shrimp were most abundant in the 11-18 m depth zone in June corresponding with the start of the 1 June-15 July Gulf closed season in Texas waters. Limited sampling during 1979 indicated that brown shrimp abundance was below average in all zones until August. Texas shrimp landings and TPWD shrimp samples were highest during 1978 and lowest during 1979. The mean size of brown shrimp generally increased with depth and all shrimp caught beyond 18 m met legal count (39/1b, heads-on) by August.

During 1980 brown shrimp were more abundant during May off south Texas (346/h) than off central Texas (16/h). Catch rates were generally high (1654-2868/h) in the 11-18 m zone in both areas from June through August.

White shrimp (P. setiferus) were most abundant during November and December. The mean sizes were smallest during December and January corresponding with the winter (15 December-1 February) closed season.

INTRODUCTION

In recent years the need for current information on the commercial penaeid shrimp (Penaeus aztecus, P. setiferus and P. duorarum) stocks of Texas has been re-emphasized by legislation at both the state and federal levels.

In Texas the Texas Parks and Wildlife Department (TPWD) Commission has the authority to set the summer closed shrimp season in the Gulf of Mexico. The closed season is ordinarily from 1 June to 15 July and allows a portion of the emigrating shrimp an opportunity to reach a larger size before harvest. In 1975 the Texas Shrimp Conservation Act was amended by the 64th Texas Legislature to provide greater flexibility in the management of penaeid shrimp resources. Chapter 77 of the Parks and Wildlife Code provides that the Parks and Wildlife Commission (or its Executive Director) may, based on sound biological data, change the opening and closing dates of the 1 June-15 July closed season to provide for an earlier, later or longer season not to exceed 60 days.

The Fishery Conservation and Management Act of 1976 (Public Law 94-265) established a 200-mi Fishery Conservation Zone (FCZ) around the United States and created eight regional management councils responsible for the preparation of plans to manage the fishery resources within this zone. Using the best available biological, sociological and economic data the Gulf of Mexico Fishery Management Council developed a plan to manage shrimp in the FCZ in 1981. Measure 2 of the plan provided for a closure of the FCZ off Texas during the same period that Texas closes its territorial sea. By providing additional time and area for growth before harvest and by minimizing waste caused by discarding of undersized shrimp, this measure should increase the total yield of the shrimp harvest in both weight and value. As with all fishery plans developed by the regional councils, the Shrimp Management Plan will continue to be evaluated for effectiveness and updated or modified as needed.

The purpose of this study was to monitor penaeid shrimp in the Gulf of Mexico along the south-central coast of Texas for movement, growth and relative abundance to formulate management recommendations that result in the capture of larger, more valuable shrimp without excessive discarding of smaller shrimp. Specific objectives were:

- o to determine when the major movement of shrimp into the Gulf occurred,
- o to estimate the size of shrimp before, during and after the closed season and
- o to monitor the relative abundance of penaeid shrimp by month, depth zone and for the total sampling period.

MATERIALS AND METHODS

In October 1977 TPWD established a penaeid shrimp monitoring program in the Gulf of Mexico similar to that conducted during 1975-1977 (Cody et al. 1978). Samples were collected along transects off the central and south Texas coast between Pass Cavallo and Port Mansfield (Figure 1).

Although sampling design changed during the study the basic program remained the same (Cody and Rice 1979, Cody and Avent 1980). Night samples were collected from May through August to monitor brown shrimp (Penaeus aztecus) emigration from the bays and size and relative abundance during the summer closed season in the Gulf. Samples were collected off Port Aransas during 1978, 1979 and 1980 and off Port Mansfield during 1980. The depth zones sampled were 11-18, 20-27, 29-37 and 38-46 m off Port Aransas and Port Mansfield, with an additional zone (48-55 m) off Port Mansfield.

Day samples were collected mainly from November through February to monitor white shrimp (P. setiferus) emigration from the bays and size and relative abundance during the winter (16 December-1 February) closed season in the Gulf. Samples were collected off Pass Cavallo during 1977-78 and off Port Aransas during 1977-78, 1978-79, 1979-80 and 1980-81. The depth zones sampled were 5-9, 11-18 and 20-27 m during 1977-78 and 5-9 and 11-18 m during 1978-79, 1979-80 and 1980-81. Supplemental day samples were also collected during other months.

Sampling was conducted aboard the research vessel Western Gulf, a 21.9-m steel-hull shrimp trawler operated out of TPWD's Marine Laboratory at Rockport. Shrimp samples were collected with a 13.7-m wide otter trawl with 5.1-cm stretched mesh. Nets were equipped with tickler chains and were spread by wooden doors 0.9 m high and 2.1 m long.

Bottom trawling time ranged from 10 to 60 min. Samples were processed on the afterdeck of the Western Gulf after each trawl by culling shrimp from the catch and dividing the shrimp into groups according to species. For each species, all shrimp were divided by sex and weighed en masse if ≤ 50 shrimp were captured; individual shrimp were then measured. If > 50 shrimp of one species were caught a subsample of at least 50 shrimp was divided by sex, weighed en masse and individually measured. The remainder of this species was weighed and a ratio used to estimate the total number of shrimp caught.

Weights were measured to the nearest 10 g using platform scales. Total lengths of individual shrimp were measured to the nearest mm. Bottom and surface hydrological data were taken at each sample station and were accurate to $\pm 1^\circ\text{C}$ and ± 1 o/oo. Bottom water samples were taken with a Nansen bottle. An A.O. refractometer was used to determine salinities. Standard lab-grade thermometers were used to determine temperatures. Station locations were estimated using LORAN-A station 3H3 and depth.

In Texas the minimum commercial legal size for penaeid shrimp is 86 whole shrimp per kg (39/lb) or 143 tails per kg (65/lb). Throughout this report the term "count" refers to the number of whole shrimp per lb and "legal-count" refers to shrimp counts $\geq 86/\text{kg}$ (39/lb heads-on). Shrimp with a mean size ≥ 110 mm approximate legal count (Fontaine 1971).

RESULTS

From October 1977 through March 1981, 256 shrimp trawl samples were collected in the Gulf of Mexico (Appendix A).

Brown Shrimp--Night Samples

1978--May to August Season, Port Aransas

Mean catch rates were highest during June (3523/h) in the 11-18 m depth zone and during June (2330/h) and July (3984/h) in the 20-27 m depth zone (Table 1). The mean catch rate for all samples combined was 14.33 ± 2.38 kg/h (Figure 2).

Mean sizes were ≤ 110 mm in the 11-18, 20-27 and 29-37 m depth zones from May through July (Figure 3). By August mean sizes were ≥ 115 mm in all zones except 11-18 m.

1979--May to August Season, Port Aransas

The highest mean catch rates of the season occurred during July (1560/h) in the 20-27 m depth zone and August (4675/h) in the 11-18 m zone (Table 1). The mean catch rate for all samples combined was 6.48 ± 2.04 kg/h (Figure 2).

The mean sizes were < 110 mm in the 11-18 m depth zone during May, July and August and in the 20-27 m zone during July (Figure 3). The mean sizes in the 29-37 and 38-46 m zones exceeded 120 mm throughout the season.

1980--May to August Season, Port Aransas

Mean catch rates were highest during June (2607/h) and July (2342/h) in the 11-18 m depth zone (Table 1). No other monthly mean catch rates exceeded 2000/h. The mean catch rate for all samples combined was 9.28 ± 2.12 kg/h (Figure 2).

Mean sizes were < 110 mm in the 11-18 m depth zone throughout the season and in the 20-27 m zone and 29-37 m zone during June (Figure 3). By August mean sizes were > 120 mm in all zones except 11-18 m.

1980--May to August Season, Port Mansfield

Highest catch rates for the season occurred in 11-18 m depth zone during July (2868/h) and August (2710/h) and in the 29-37 m zone during July (2308/h) (Table 2). Mean catch rates for all samples combined were $716 \pm 201/\text{h}$ and $8.20 \pm 2.16 \text{ kg/h}$.

During May, June and July mean sizes ranged from 72 to 78 mm in the 11-18 m depth zone and 90 to 98 mm in the 20-27 m zone (Table 2). By August mean sizes were $>110 \text{ mm}$ in all depth zones.

Brown shrimp did not meet legal count in the 11-18 m depth zone and the 20-27 m zone from May through July. The highest counts within the season occurred in the 11-18 m zone during May (207/1b) and July (113/1b). By August all samples exceeded legal count.

White Shrimp and Pink Shrimp--1980 Night Trawls

During 1980 white shrimp were collected in eight samples off Port Aransas and in three samples off Port Mansfield (Appendix B, Table 3). The highest catch rates occurred at 15 m off Port Aransas during June (222/h, 8.74 kg/h). At no other time did the catch exceed 28/h or 0.86 kg/h . Mean sizes ranged from 129 to 194 mm and counts ranged from 6 to 23/1b.

During 1980 pink shrimp (*P. duorarum*) were collected in 13 samples off Port Aransas and in seven samples off Port Mansfield (Appendix B, Table 3). The only catches over 100/h or 1 kg/h occurred off Port Mansfield. Highest catch rates occurred during late May at 11 m (174/h) and 20 m (238/h). Mean sizes ranged from 80 to 172 mm and count sizes ranged from 10 to 101/1b.

White Shrimp--Day Trawls

1977-1978--November to February Season

Mean catch rates were highest during November (479/h) and December (532/h) in the 5-9 m depth zone and during December (464/h) in the 11-18 m zone (Table 3). All other catch rates were $<400/\text{h}$. The mean catch rate for all samples combined was $4.20 \pm 0.78 \text{ kg/h}$ (Figure 4).

Mean sizes were $<110 \text{ mm}$ during January and February in the 5-9 m depth zone and during February in the 11-18 m zone. Shrimp approached or exceeded legal count at all other times (Table 3).

1978-1979--November to February Season

The highest mean catch rates occurred during November (2605/h) and December (2556/h) in the 5-9 m depth zone (Table 3). Catch rates did not exceed 400/h during any other sampling period. The mean catch rate for all samples combined was 8.89 ± 3.86 kg/h (Figure 4).

Mean sizes were <110 mm during November and December in the 5-9 m depth zone and during January in the 11-18 m zone. These were the only months during which white shrimp did not meet legal count (Table 3).

1979-1980--November to February Season

Mean catch rates were highest during December in the 5-9 m depth zone (1128/h) and the 11-18 m zone (716/h) (Table 3). The mean catch rate for all samples combined was 3.47 ± 0.66 kg/h (Figure 4).

Mean sizes were <110 mm in the 5-9 m depth zone during December, January and February and in the 11-18 m zone during December. Shrimp did not meet legal count in the 5-9 m zone during the November-February season (Table 3).

Brown shrimp outnumbered white shrimp in day samples only twice during December 1979-July 1980 (Appendix C, Table 3). On 5 June 1980 brown shrimp and white shrimp were collected at rates of 252 and 44/h, respectively. On 25 June the brown shrimp catch was 1788/h, the white shrimp catch was 444/h, and the pink shrimp catch was 76/h.

1980-1981--November to March Season

Mean catch rates were highest during December (238/h) in the 5-9 m depth zone and during November (204/h) in 11-18 m zone (Table 3). Mean catch rates for all samples combined were 195 ± 39 /h and 2.48 ± 0.50 kg/h (Figure 4).

Mean sizes were <110 mm only during February in the 11-18 m depth zone. White shrimp did not meet legal count during November in 5-9 m and during February in the 11-18 m zone (Table 3).

During the November 1980-March 1981 season brown shrimp outnumbered white shrimp in day samples only once--on 30 March 1981 at 7 m the brown shrimp catch was 12/h and the white shrimp catch was 6/h (Appendix C, Table 4).

DISCUSSION

During 1978 and 1980, sampling indicated that the Texas closed season from 1 June through 15 July protected the largest number of undersize brown shrimp within the State's territorial sea. During 1979 the major movement of small brown shrimp did not appear in the samples until August; however, this may not have been representative of actual conditions on the shrimp grounds since two of the three cruises scheduled during the closed season were cancelled because of bad weather and mechanical breakdowns. Because of these sampling problems, an earlier emigration of brown shrimp during 1979 may have been missed. Catch rates in Aransas Bay indicated the major movement of brown shrimp into the Gulf occurred during the 1979 closed season (Benefield and Baker 1980). There was no indication of a major movement into the Gulf before the 1 June closing date during 1978, 1979 or 1980.

In general the mean size of brown shrimp increased with depth during the May-August season. With the exception of June 1979 when the catch rate was extremely low (4/h) monthly mean sizes of brown shrimp in the 11-18 m depth zone were <110 mm and did not meet legal count. However, even after the season opens (generally on 16 July) these small shrimp are still protected by a law that closes Gulf waters within the 12.8 m (7 fm) depth zone at night year-round. Also, after June, shrimp are available in deeper waters and fishing pressure on small shrimp in the shallower waters is diminished. Beyond 27 m brown shrimp nearly always approached or exceeded legal count.

During 1980 count size was generally higher (indicating a smaller mean size of shrimp) off Port Mansfield than off Port Aransas.

Catches of white shrimp and pink shrimp had little effect on overall catch rates or mean size of mixed penaeids during 1980. Only three times was count changed from non-legal (for brown shrimp only) to legal status (for all species combined) by the addition of white shrimp and pink shrimp to the brown shrimp catch.

Monthly catch rates by depth zones for brown shrimp indicated a great deal of variation between years. Much of the variation was probably due to natural changes in the amount of shrimp available and the movement patterns induced by environmental conditions. Other factors that may also have contributed to this apparent variation between years are changes in the sampling program that have led to uneven sample sizes and non-randomly selected stations.

Total Texas shrimp landings showed the same general pattern of relative abundance as the mean catch (kg/h) in TPWD samples for 1978-1980. Total landings and TPWD catch rates were highest during 1978, lowest during 1979 and intermediate during 1980. A similar pattern was also evident in the 29-37 and 38-46 m zones.

White shrimp samples indicated that the major movement of white shrimp into the Gulf of Mexico occurred during November and December 1977-81. With the exception of the 1980-81 season (which may have been affected by Hurricane Allen during August 1980), most white shrimp caught during November approached or exceeded legal count while those caught during December and January failed to meet legal count. These data indicated that closing the Gulf season from 16 December through 1 February protected part of the white shrimp population that emigrated to the Gulf during the winter from the bays along the central Texas coast.

LITERATURE CITED

- Benefield, R. L. and W. B. Baker, Jr. 1980. Studies of shrimp populations in selected coastal bays of Texas. Tex. Pks. Wildl. Dept., Coast. Fish. Branch, Mngmnt. Data Ser. No. 13. 102 p.
- Cody, T. J., K. W. Rice, and C. E. Bryan. 1978. Commercial fish and penaeid shrimp studies, northwestern Gulf of Mexico. Tex. Pks. Wildl. Dept., P. L. 88-309 Proj. 2-276-R Com. Rep. 29 p.
- Cody, T. J. and K. W. Rice. 1979. Shrimp and finfish investigations in the northwestern Gulf. Tex. Pks. Wildl. Dept. P. L. 88-309 Proj. 2-312-R-1 Seg. Rep. 81 p.
- Cody, T. J. and R. M. Avent. 1980. Shrimp and finfish investigations in the northwestern Gulf. Tex. Pks. Wildl. Dept. P. L. 88-309 Proj. 2-312-R-2 Seg. Rep. 117 p.
- Fontaine, C. T. 1971. Conversion tables for commercially important penaeid shrimp of Gulf of Mexico. U.S. Dep. Commer., NOAA, NMFS Data Rep. 70, Seattle, Wash. 9 p.

Table 1. Trends in relative abundance and size, by month and depth, of brown shrimp (*Penaeus aztecus*) collected in night samples with a 13.7-m otter trawl in the Gulf of Mexico off the central Texas coast (1976-80).^a

Month	Year	Depth zones									
		11-18 m (6-10 fm)		20-27 m (11-15 fm)		29-37 m (16-20 fm)		38-46 m (21-25 fm)			
		Kg/h	No./h	Mean (mm)	Kg/h	No./h	Mean (mm)	Kg/h	No./h	Mean (mm)	Kg/h
May	1976	9.58	1890	88	5.75	663	100	1.10	42	145	1.44
	1977 ^b	3.42	681	88	3.50	457	99	3.61	359	118	2.73
	1978 ^b	8.48	1262	92	12.04	1472	99	0.56	44	110	1.02
	1979	3.18	505	91	0.81	45	121	0.68	19	154	0.87
	1980 ^b	0.16	16	95	0.34	14	136	0.52	18	151	1.70
June	1976	3.77	432	99	27.53	3714	96	6.55	537	111	2.84
	1977	9.09	1155	95	14.33	1298	106	9.58	1046	102	3.91
	1978	20.68	3523	88	20.92	2330	100	7.82	699	108	7.07
	1979 ^b	0.08	4	135	4.80	358	120	1.42	94	122	1.74
	1980	24.80	2607	104	14.16	1558	95	8.50	754	109	1.60
July	1976	22.76	2524	103	26.91	2333	110	23.87	2513	104	16.18
	1977	31.67	2784	108	15.67	1418	114	26.14	2321	107	35.92
	1978	8.96	1112	97	35.48	3984	98	12.60	1126	109	18.16
	1979 ^b	9.30	850	109	16.34	1560	109	5.31	342	121	1.88
	1980	19.26	2342	95	5.42	393	116	9.28	595	123	7.19
August	1976	3.77	459	100	ND	-	-	ND	-	-	ND
	1977	4.50	598	96	14.92	968	122	24.31	1539	120	22.14
	1978	1.85	215	99	7.65	498	120	3.24	236	115	10.01
	1979	34.16	4675	92	10.08	749	115	5.04	269	130	4.82
	1980	15.35	1654	98	8.37	463	122	4.08	167	135	8.98

^a 1976 & 1977 samples were taken off Port Aransas, Corpus Christi Pass, Cedar Bayou, and Pass Cavallo; 1978 samples were taken off Port Aransas and Cedar Bayou, and 1979 and 1980 samples were taken off Port Aransas only.

^b Samples taken last two days of the month only.

ND = No Data

Table 2. Abundance and size of brown shrimp (Penaeus aztecus) in night shrimp trawls off Port Mansfield, Texas (May-August 1980).

Sampling period			Depth zones									
			11-18 m			(6-10 fm)			20-27 m			(11-15 fm)
			No. ^a	range	mean	ct. ^b	No./h	kg/h	No.	range	mean	ct.
Month	Day	Year		(mm)	(mm)					(mm)	(mm)	No./h
May	20-21	1980	1	57-142	72	207	346	0.76	1	72-133	90	71
												616
June	17-18	1980	1	62-114	76	82	80	0.44	1	65-135	90	57
												1186
July	23-24	1980	1	62-128	78	113	2868	11.48	1	73-128	98	47
												984
August	25-26	1980	1	78-144	113	32	2710	39.01	1	100-173	131	23
												990
												19.20

Sampling period			Depth zones (cont'd.)									
			29-37 m			(16-20 fm)			38-46 m			(26-30 fm)
			No.	range	mean	ct.	No./h	kg/h	No.	range	mean	ct.
Month	Day	Year		(mm)	(mm)					(mm)	(mm)	No./h
1	79-180	137	18	200	5.02	1	152-177	167	10	44	1.96	1
												134-188
												169
												11
1	82-198	114	48	414	3.98	1	110-194	158	13	40	1.40	1
												142-158
												150
												9
1	83-142	108	41	2308	25.40	1	96-176	120	30	480	7.20	1
												123-192
												150
												15
1	105-184	135	23	482	9.66	1	101-176	137	20	280	6.46	1
												109-183
												146
												16
												118
												3.32

^a Number of samples

^b Count is the number of shrimp per pound (heads-on)

Table 3. Trends in relative abundance and count size by month and depth of white shrimp (*Penaeus setiferus*) collected in day samples with a 13.7-m otter trawl in the Gulf of Mexico off the central Texas coast (1975-1981).

Month	Year	Depth zones											
		5-9 m (3-5 fm)				11-18 m (6-10 fm)				20-27 m (11-15 fm)			
		Kg/h	No./h	Mean (mm)	Count ^a	Kg/h	No./h	Mean (mm)	Count	Kg/h	No./h	Mean (mm)	Count
November	1975	4.35	479	108	50	6.86	438	122	29	0.45	22	145	22
	1976	9.37	790	116	38	6.98	363	132	24	0.04	2	145	22
	1977	7.57	479	124	29	6.74	394	132	27	2.34	83	151	16
	1978	26.31	2605	107	45	4.28	388	110	41	4.28	196	138	21
	1979	ND				ND				ND			
December	1980	2.28	276	112	55	3.18	204	126	29	ND			
	1975	5.09	974	91	89	5.32	577	113	49	2.33	116	147	23
	1976	4.22	504	105	54	1.15	92	118	36	0.39	28	122	33
	1977	5.61	532	114	43	6.13	464	119	34	2.96	137	142	21
	1978	20.87	2556	103	56	1.74	132	120	34	2.59	130	135	23
January	1979	7.38	1128	90	69	6.16	716	101	53	0.86	24	155	13
	1980	2.76	238	113	39	1.32	114	114	39	ND			
	1976	4.12	578	102	64	0.67	60	117	41	0.29	12	145	19
	1977	0.43	67	102	71	0.65	53	118	37	0.18	6	152	15
	1978	0.15	26	85	79	ND				ND			
February	1979	ND				2.18	251	107	52	ND			
	1980	1.58	238	97	68	1.92	148	118	35	ND			
	1981	1.38	108	110	36	0.42	27	117	29	ND			
	1976	2.61	183	120	32	1.45	81	127	25	1.02	28	159	12
	1977	1.39	174	102	57	0.92	85	115	42	0.34	14	140	19
	1978	0.42	78	91	84	3.10	323	105	47	4.10	297	120	33
	1979	ND				ND				ND			
	1980	3.76	389	105	47	4.46	422	113	40	ND			
	1981	0.09	6	118	30	3.12	291	108	42	ND			

^aCount = Number per pound (heads-on).

ND = No Data

Figure 1. Penaeid shrimp sampling areas off the coast of Texas (1977-1981).

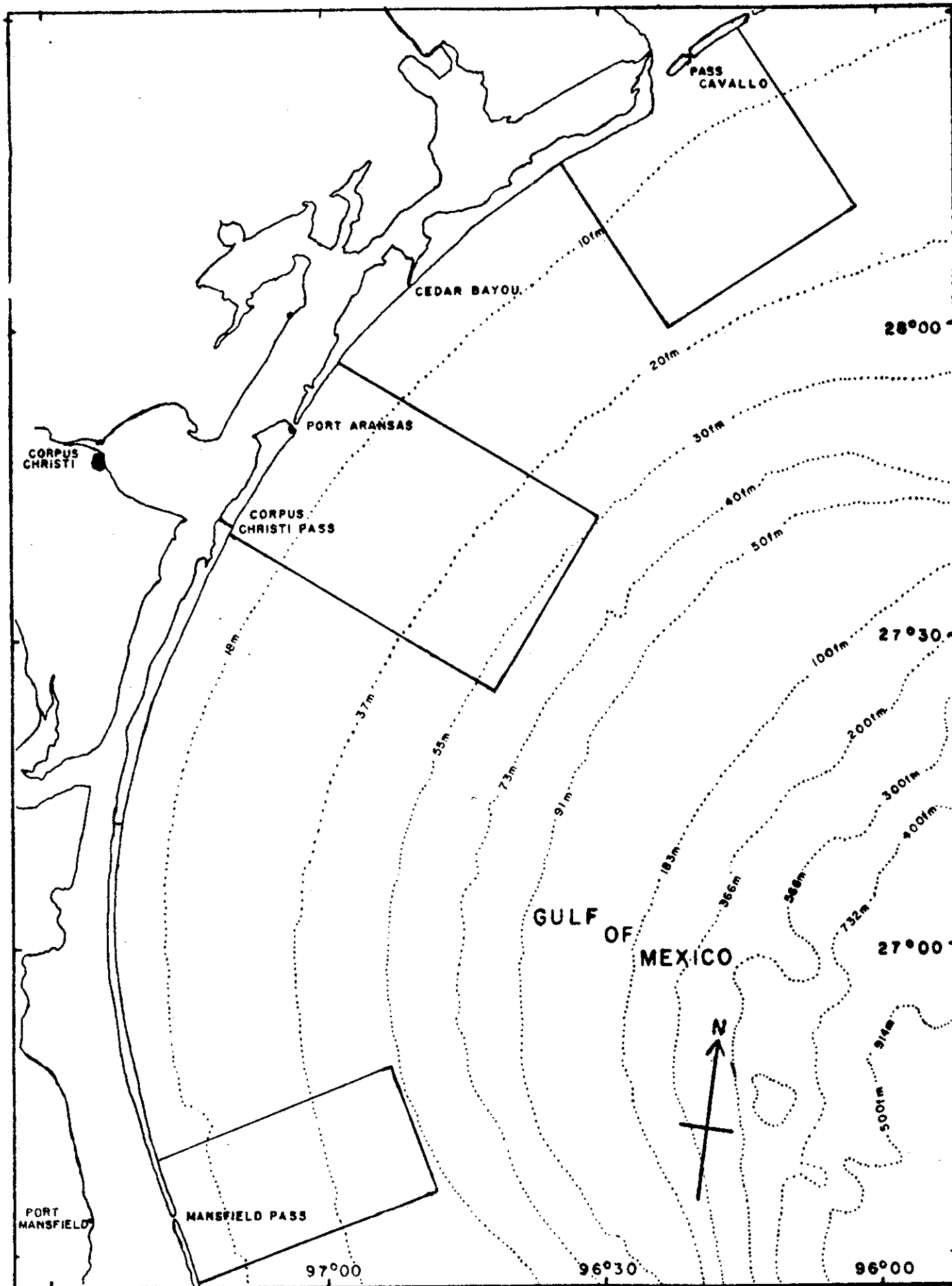


Figure 2. Total Texas landings and seasonal catch rates for brown shrimp (Penaeus aztecus) collected during May-August off the central Texas coast.

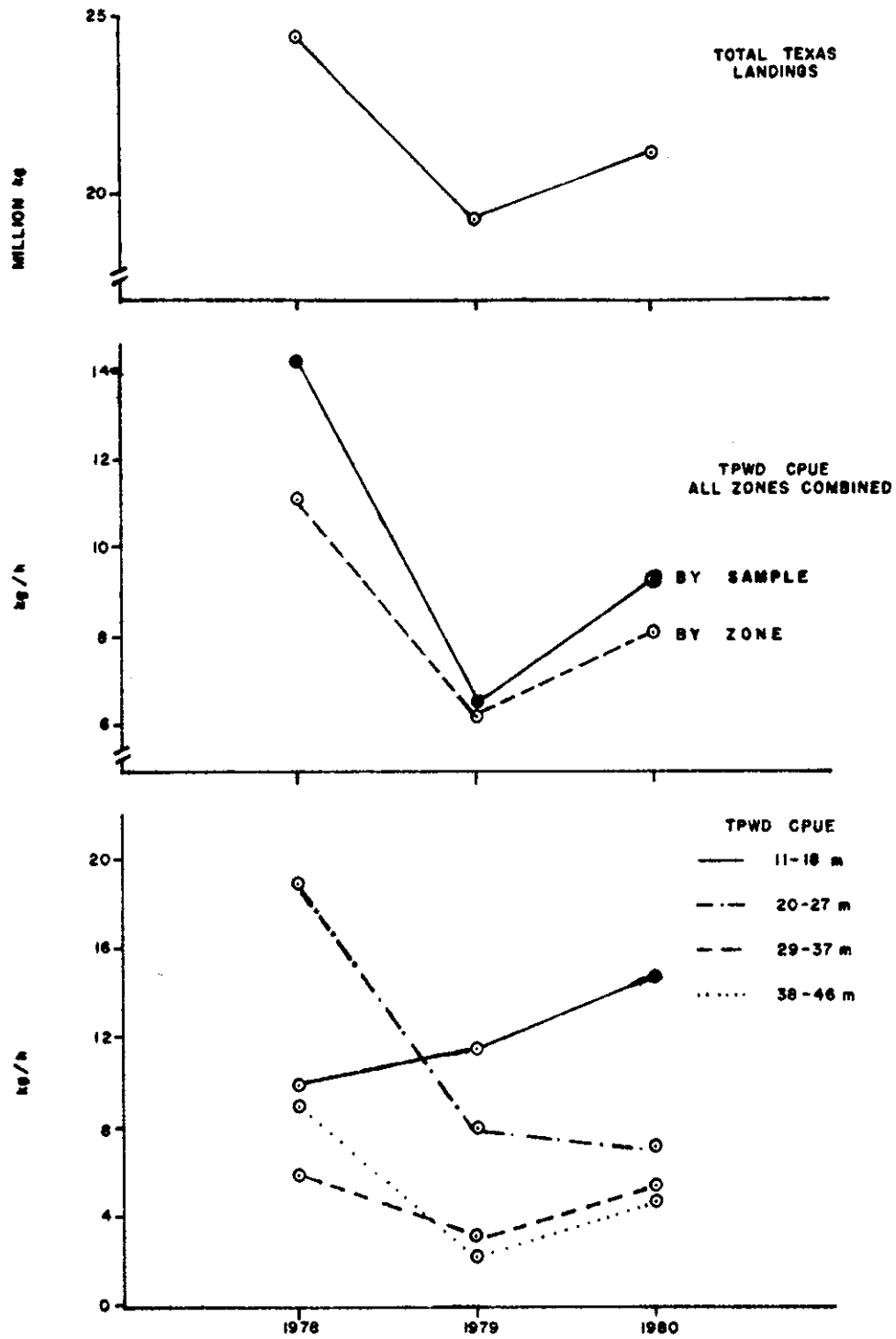


Figure 3. Mean size of brown shrimp (Penaeus aztecus) by month and depth in night shrimp trawl samples taken off the central Texas coast.

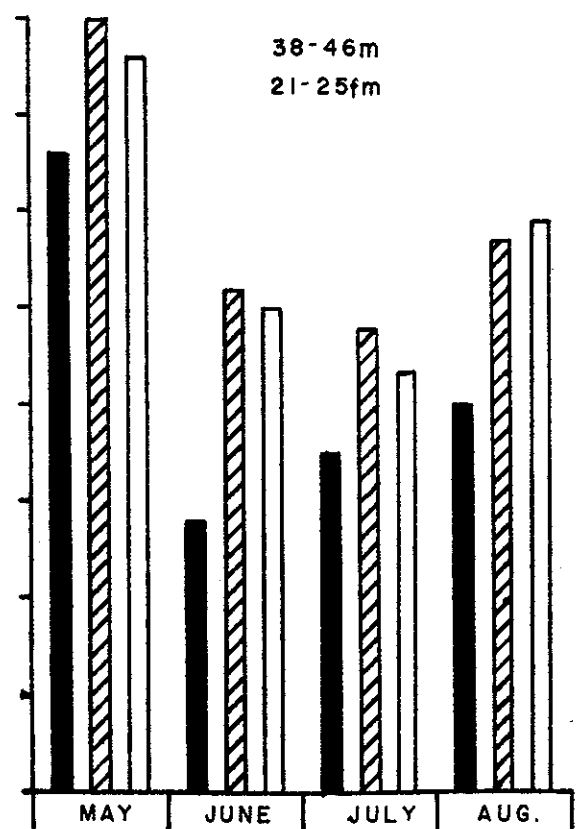
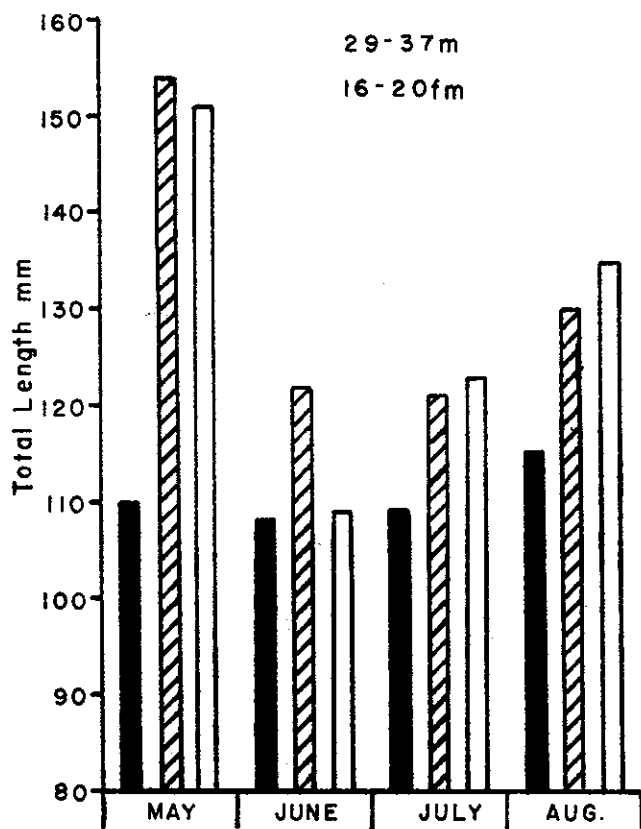
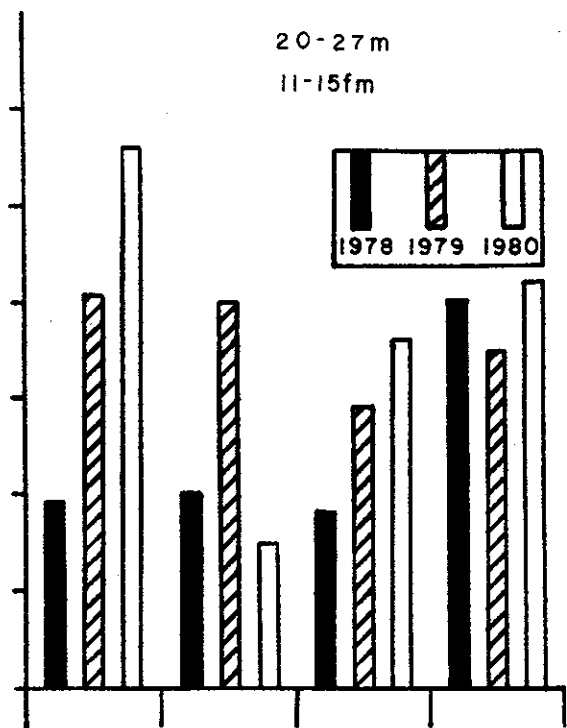
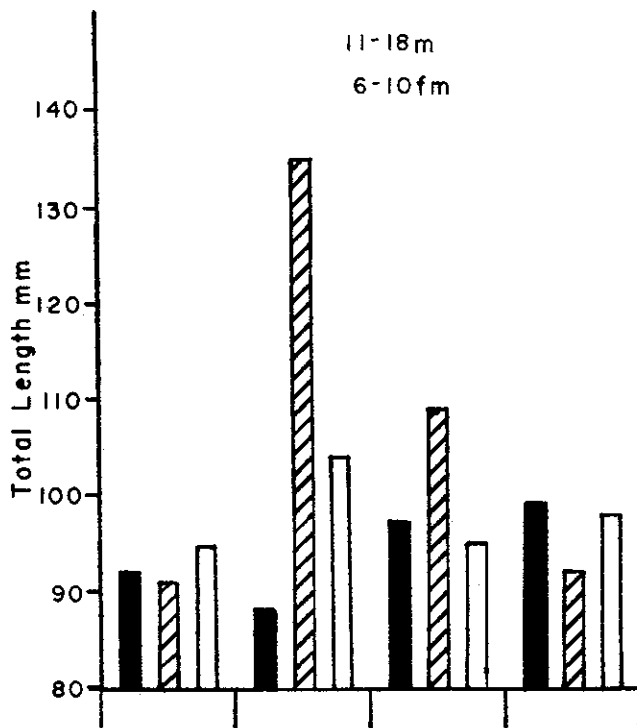
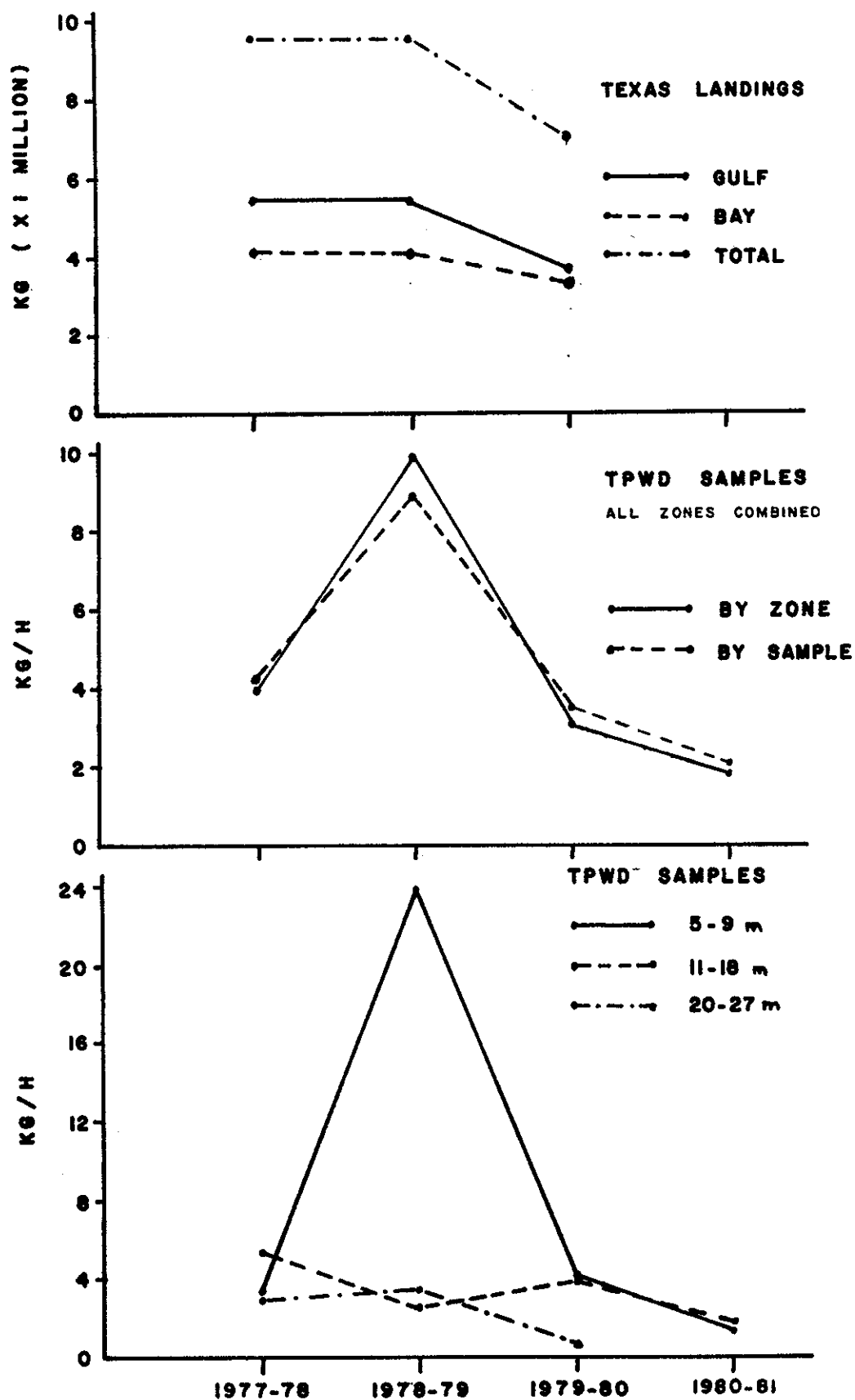


Figure 4. Total Texas landings and seasonal catch rates for white shrimp (Penaeus setiferus) collected during November-February off the central Texas coast.



Appendix A. Station list with hydrological data for all samples collected during October 1977-March 1981.

Table A.1. Station list with hydrological data for samples taken during segments 1, 2, & 3 (October 1977-March 1981).

Station	Date	Time (D/N ^a)	Latitude (N)	Location		Depth m	Gear ^b	Effort (min)	Tow direction degrees	Hydrology		Species ^c
				Longitude (W)	LRAN-A (3H3)					Bottom Temp. (C)	Surface Sal. (o/oo)	
	mo-da-yr											
77-01-01	10-05-77	1533 (D)	27°42.6'	97°04.4'	2134	7	FL	30	210	28.5	37.2	W,B
77-01-02	10-05-77	1635 (D)	27°44.2'	97°03.8'	2105	15	FL	30	210	27.7	38.8	W,B
77-01-03	10-05-77	1806 (D)	27°39.4'	96°59.6'	2070	22	FL	30	210	28.5	37.2	W,B
77-01-04	10-05-77	2020 (N)	27°34.2'	96°47.6'	2072	38	FL	30	025	26.5	38.3	B,P
77-01-05	10-05-77	2122 (N)	27°37.6'	96°51.4'	2094	29	FL	30	200	27.5	38.8	B,W
77-01-06	10-05-77	2318 (N)	27°39.8'	96°59.8'	2075	22	FL	30	025	27.5	37.2	B,W,P
77-01-07	10-06-77	0049 (N)	27°45.8'	97°03.6'	2119	11	FL	30	025	27.5	38.3	B,W,P
77-02-01	10-25-77	1617 (D)	28°05.0'	96°20.6'	2540	27	FL	30	040	25.0	35.5	B
77-02-02	10-25-77	1805 (D)	28°09.8'	96°30.2'	2580	18	FL	30	040	23.5	32.8	W,B
77-02-03	10-25-77	1925 (D)	28°16.6'	96°25.6'	2620	11	FL	30	040	23.5	32.2	W,P
77-02-04	10-26-77	1008 (D)	28°20.0'	96°23.2'	2670	7	FL	30	210	23.7	33.3	-
77-03-01	11-10-77	1740 (D)	27°48.4'	97°03.2'	2148	7	FL	30	210	20.7	34.4	W,B,P
77-03-02	11-10-77	1825 (N)	27°46.6'	97°03.4'	2132	11	FL	30	020	19.6	32.2	W,B,P
77-03-03	11-11-77	1050 (D)	27°44.2'	96°53.6'	2140	24	FL	30	220	23.3	35.0	W,B
77-03-04	11-11-77	1215 (D)	27°43.2'	96°57.8'	2118	20	FL	30	210	23.0	35.0	W,B,P
77-03-05	11-11-77	1315 (D)	27°42.2'	97°01.4'	2090	18	FL	30	020	22.5	35.0	W,B,P
77-03-06	11-11-77	1430 (D)	27°45.0'	97°04.4'	2110	13	FL	30	030	20.5	35.0	W,B,P
77-05-01	11-30-77	1342 (D)	28°12.4'	96°13.2'	2655	24	FL	30	210	20.7	32.7	W,B,P
77-05-02	11-30-77	1522 (D)	28°15.8'	96°21.0'	2643	20	FL	30	030	20.0	32.2	W
77-05-03	11-30-77	1623 (D)	28°17.6'	96°20.0'	2665	18	FL	30	030	19.9	32.8	W,B,P
77-05-04	11-30-77	1723 (D)	28°19.8'	96°20.8'	2681	13	FL	30	195	19.1	30.0	W,P
77-05-05	11-30-77	1931 (N)	28°21.2'	96°21.2'	2693	11	FL	30	035	18.9	29.4	W,P
77-05-06	12-01-77	0746 (D)	28°23.4'	96°20.4'	2720	7	FL	30	210	19.0	30.0	W,P
77-05-07	12-01-77	1245 (D)	27°48.4'	96°49.2'	2211	24	FL	30	210	21.1	33.9	W,B,P
77-05-08	12-01-77	1400 (D)	27°47.0'	96°56.2'	2161	20	FL	30	030	21.1	33.9	W,B,P
77-05-09	12-01-77	1501 (D)	27°47.2'	96°57.6'	2159	18	FL	30	220	21.1	33.9	W,B,P
77-05-10	12-01-77	1610 (D)	27°46.4'	97°02.2'	2137	13	FL	30	210	20.0	33.3	W,B
77-05-11	12-01-77	1715 (D)	27°46.6'	97°03.8'	2127	7	FL	30	030	19.9	33.3	W,P
77-05-12	12-01-77	1858 (N)	27°46.6'	97°03.8'	2127	11	FL	30	030	20.0	33.3	W,P
77-06-01	12-12-77	2050 (N)	28°15.0'	96°21.8'	2630	11	FL	30	030	18.6	31.1	W,P
77-06-02	12-14-77	0803 (D)	28°24.0'	96°20.4'	2725	7	FL	30	220	17.7	28.9	W,P
77-06-03	12-14-77	0854 (D)	28°20.4'	96°20.2'	2690	13	FL	30	210	18.0	31.6	W,P
77-07-01	01-27-78	1135 (D)	27°46.8'	97°04.6'	2128	7	FL	30	210	10.0	28.9	W,P
77-08-01	02-14-78	1115 (D)	27°48.0'	97°04.2'	2143	7	FL	30	210	8.8	27.2	W
77-08-03	02-14-78	1225 (D)	27°44.6'	97°02.8'	2076	15	FL	30	220	9.9	28.9	W,P
77-08-06	02-14-78	1505 (D)	27°39.6'	97°00.2'	2118	22	FL	30	025	11.0	32.2	W,P
77-08-08	02-14-78	1905 (N)	27°46.0'	97°04.4'	2118	11	FL	30	025	9.2	26.6	W
77-09-01	02-16-78	1405 (D)	28°24.6'	96°20.0'	2730	7	FL	30	210	9.9	26.6	W
77-09-02	02-16-78	1500 (D)	28°20.0'	96°19.8'	2688	15	FL	30	025	10.2	27.8	W,P

Table A.1. (Cont'd.).

Station	Date	Time (D/N ^a)	Location		Depth m	Gear ^b	Effort (min)	Tow direction degrees	Hydrology		Species ^c
			Latitude (N)	Longitude (W)					Bottom Temp. (C)	Surface Sal. (‰)	
	mo-da-yr					fm					
77-09-03	02-16-78	1625 (D)	28°15.0'	96°15.2'	22	12	FL	30	11.1	33.3	W
77-09-04	02-16-78	1845 (N)	28°16.6'	96°26.2'	11	6	FL	30	9.8	27.2	W
77-11-01	03-08-78	1400 (D)	27°43.2'	96°56.2'	22	12	FL	30	14.4	35.5	W
77-11-03	03-08-78	1520 (D)	27°45.0'	96°59.5'	18	10	FL	30	13.4	35.5	W,P
77-11-05	03-08-78	1635 (D)	27°44.4'	97°02.2'	15	8	FL	30	13.1	34.4	W,P
77-11-07	03-08-78	1745 (D)	27°44.2'	97°06.8'	7	4	FL	30	12.6	31.6	W,P
77-11-09	03-08-78	2100 (N)	27°46.0'	97°04.2'	11	6	FL	30	12.9	31.6	W,P
77-12-06	03-17-78	0455 (N)	28°17.8'	96°13.8'	11	6	FL	30	13.7	30.0	W
77-12-07	03-17-78	0707 (D)	28°17.4'	96°26.2'	7	4	FL	30	13.4	30.0	W
77-12-08	03-17-78	0805 (D)	28°14.8'	96°26.5'	15	8	FL	30	13.9	33.3	W
77-12-09	03-17-78	0927 (D)	28°08.0'	96°24.6'	22	12	FL	30	14.2	36.6	W
77-16-01	05-30-78	1440 (D)	27°48.8'	97°03.2'	7	4	FL	30	28.4	32.2	W
77-16-02	05-30-78	1530 (D)	27°47.4'	97°02.6'	11	6	FL	15	27.4	33.3	-
77-16-03	05-30-78	1620 (D)	27°47.4'	97°00.8'	15	8	FL	30	27.0	33.3	W,B
77-16-04	05-30-78	1725 (D)	27°46.6'	96°57.6'	18	10	FL	30	25.6	34.4	W,B
77-16-05	05-30-78	1840 (D)	27°43.4'	96°55.4'	22	12	FL	30	22.7	36.1	W,B
77-16-06	05-30-78	2100 (N)	27°35.2'	96°46.4'	31	17	FL	15	21.7	38.9	B
77-16-07	05-30-78	2220 (N)	27°38.0'	96°49.4'	26	14	FL	15	21.2	35.5	B
77-16-08	05-30-78	2330 (N)	27°40.8'	96°53.2'	22	12	FL	15	21.3	34.4	B
77-16-09	05-31-78	0020 (N)	27°43.4'	96°55.6'	15	8	FL	15	22.0	35.5	B
77-16-10	05-31-78	0140 (N)	27°47.2'	97°01.2'	11	6	FL	15	26.0	32.2	W,B,P
77-16-11	05-31-78	0220 (N)	27°47.6'	97°02.2'	11	6	FL	15	26.7	33.3	W,B,P
77-19-01	06-08-78	2215 (N)	27°40.6'	96°41.2'	38	21	FL	30	20.4	33.3	B
77-19-02	06-08-78	2325 (N)	27°41.2'	96°47.2'	31	17	FL	30	28.6	36.6	B
77-19-03	06-09-78	0040 (N)	27°42.0'	96°52.4'	26	14	FL	30	21.5	36.1	W,B,P
77-24-01	06-13-78	2130 (N)	27°45.2'	96°53.4'	15	8	FL	30	22.5	36.6	W,B,P
77-24-02	06-13-78	0015 (N)	27°48.0'	97°02.6'	11	6	FL	30	26.2	33.3	B
77-24-03	06-14-78	0940 (D)	27°48.6'	97°03.4'	7	4	FL	15	28.2	34.4	B
77-24-04	06-14-78	1025 (D)	27°48.6'	97°01.4'	15	8	FL	15	27.6	34.4	B
77-24-05	06-14-78	1135 (D)	27°44.2'	96°54.8'	22	12	FL	15	22.8	36.6	B
77-24-06	06-14-78	1235 (D)	27°48.2'	97°03.5'	7	4	FL	15	27.8	35.5	W,B
77-27-01	06-28-78	1330 (D)	27°46.4'	97°01.4'	15	8	FL	15	26.0	38.9	W,B,P
77-27-02	06-28-78	1500 (D)	27°46.4'	96°55.8'	20	11	FL	15	25.6	37.2	W,B
77-27-03	06-28-78	1010 (N)	27°45.4'	96°56.8'	20	11	FL	15	25.2	35.5	W,B
77-27-06	06-28-78	1125 (N)	27°46.8'	97°01.0'	15	8	FL	15	26.5	35.5	B,P
77-27-07	06-29-78	0020 (N)	27°48.2'	97°02.4'	11	6	FL	15	28.0	33.9	B,W
77-27-12	06-29-78	2130 (N)	27°38.5'	96°34.8'	53	29	FL	15	20.8	37.7	B,W,P

Table A.1. (Cont'd.).

Station	Date	Time (D/N ^a)	Location		Depth m	Gear ^b	Effort (min)	Tow direction degrees	Hydrology		Species ^c		
			Latitude (N)	Longitude (W)					Bottom Temp. (C)	Surface Sal. (o/oo)			
mo-da-yr													
77-27-13	06-29-78	2315 (N)	27°42.8'	96°38.0'	40	22	FL	15	22.3	35.5	28.2	33.3	B
77-27-14	06-29-78	2345 (N)	27°44.4'	96°41.6'	33	18	FL	15	22.8	36.6	29.0	33.3	B
77-27-15	06-30-78	0115 (N)	27°49.6'	96°49.6'	22	12	FL	15	25.7	35.5	29.0	33.3	B,P
77-29-01	07-12-78	2240 (N)	27°38.2'	96°33.8'	55	30	FL	15	20.2	37.7	28.5	36.6	B
77-29-02	07-13-78	0010 (N)	27°41.0'	96°39.4'	40	22	FL	15	22.0	36.1	27.9	36.1	B
77-29-03	07-13-78	0125 (N)	27°41.4'	96°44.6'	33	18	FL	15	23.0	37.7	27.2	36.6	B
77-29-04	07-13-78	0300 (N)	27°45.4'	96°53.4'	22	12	FL	15	23.0	37.7	27.2	36.1	B
77-29-05	07-13-78	0400 (N)	27°46.8'	96°55.4'	20	11	FL	15	23.4	36.6	29.7	36.1	-
77-30-01	07-14-78	1850 (D)	27°48.0'	97°04.0'	7	4	FL	15	28.0	36.6	29.5	37.2	W,B
77-30-02	07-14-78	1940 (D)	27°46.6'	97°01.4'	15	8	FL	15	25.4	37.2	28.5	37.2	B
77-30-03	07-14-78	2040 (D)	27°46.0'	96°57.0'	20	11	FL	15	23.3	37.8	28.2	36.6	B,W,P
77-30-04	07-14-78	2330 (N)	27°46.6'	97°01.2'	15	8	FL	15	27.0	36.6	28.1	36.1	B,W,P
77-30-05	07-15-78	0030 (N)	27°47.2'	97°03.0'	11	6	FL	15	27.0	36.6	28.3	36.1	B
77-33-01	07-17-78	1835 (D)	27°46.0'	96°53.2'	22	12	FL	15	27.0	37.1	29.4	37.7	B
77-33-02	07-17-78	2055 (N)	27°44.2'	96°38.0'	38	21	FL	15	24.2	37.7	28.2	36.6	B
77-33-03	07-17-78	2200 (N)	27°45.2'	96°41.6'	33	18	FL	15	23.0	37.1	27.5	35.5	B
77-33-04	07-17-78	2345 (N)	27°46.2'	96°52.4'	22	12	FL	15	24.4	37.7	28.5	37.1	B
77-33-05	07-18-78	0038 (N)	27°46.6'	96°55.4'	20	11	FL	15	28.5	37.7	29.2	36.0	B
77-35-01	07-19-78	1830 (D)	27°47.6'	97°04.2'	7	4	FL	15	26.0	38.8	28.5	37.7	-
77-35-02	07-19-78	1915 (D)	27°46.4'	97°01.6'	15	8	FL	15	30.0	37.8	28.2	38.3	B
77-37-01	08-08-78	1610 (D)	27°48.6'	97°03.0'	7	4	FL	30	28.8	37.8	30.2	37.8	W,P,B
77-37-02	08-08-78	1725 (D)	27°44.4'	97°02.8'	15	8	FL	30	27.8	37.8	29.0	37.1	B,P
77-37-13	08-09-78	2100 (N)	27°40.2'	96°55.8'	24	13	FL	15	29.2	37.2	28.0	37.2	B
77-37-21	08-10-78	1315 (N)	27°44.8'	97°04.8'	11	6	FL	10	27.8	37.7	29.5	37.7	B,W,P
77-37-24	08-10-78	2030 (N)	27°39.4'	96°43.2'	38	21	FL	15	29.2	37.7	29.2	37.7	B
77-37-25	08-10-78	2130 (N)	27°39.6'	96°48.2'	31	17	FL	15	25.5	36.6	29.2	37.7	W,B
77-38-09	08-16-78	1525 (D)	27°48.0'	97°03.6'	7	4	FL	15	27.0	37.6	30.5	37.6	B
77-38-10	08-16-78	1620 (D)	27°47.6'	97°01.2'	15	8	FL	15	31.0	36.1	30.0	36.6	B
77-38-11	08-16-78	1730 (D)	27°45.2'	96°53.8'	22	12	FL	15	28.5	36.1	30.5	37.8	B
77-38-12	08-16-78	2030 (N)	27°40.4'	96°52.4'	27	15	FL	15	28.0	37.2	29.0	37.8	B
77-38-18	08-17-78	0125 (N)	27°48.0'	97°02.2'	11	6	FL	15	26.0	36.1	29.2	36.6	B
77-40-01	09-21-78	1330 (D)	27°50.4'	97°02.2'	7	4	FL	10	28.8	36.6	29.4	34.4	W
77-40-02	09-21-78	1425 (D)	27°50.4'	97°00.8'	11	6	FL	30	29.8	35.0	29.9	36.1	W,B,P
77-40-03	09-21-78	1630 (D)	27°45.4'	96°53.0'	22	12	FL	30	29.2	36.1	29.9	36.1	B
77-41-01	09-29-78	1615 (D)	27°50.0'	97°01.4'	9	5	FL	30	26.8	27.8	29.8	35.0	W,B,P
77-41-02	09-29-78	1725 (D)	27°50.4'	96°56.6'	15	8	FL	15	29.2	35.5	29.8	37.8	B
77-41-03	09-29-78	1840 (D)	27°48.4'	96°54.6'	20	11	FL	15	27.2	28.9	27.4	27.8	-
77-41-04	09-29-78	2050 (N)	27°42.0'	96°40.8'	38	21	FL	15	27.8	34.4	27.3	27.2	B

Table A.1. (Cont'd.).

Station	Date	Time (D/Na)	Location		Depth m	Gear ^b	Effort (min)	Tow direction degrees	Hydrology		Species ^c		
			Latitude (N)	Longitude (W)					Bottom Temp. (C)	Surface Sal. (o/oo)			
77-41-05	09-29-78	2135 (N)	27°43.4'	96°42.6'	33	FL	15	230	27.8	33.3	27.4	31.1	B
77-41-06	09-29-78	2300 (N)	27°37.8'	96°57.8'	24	FL	15	220	27.7	33.3	27.0	28.3	B,P
77-41-07	09-30-78	0030 (N)	27°47.0'	97°03.0'	11	FL	15	030	27.0	27.2	26.5	26.6	P,B,W
77-41-08	09-30-78	0120 (N)	27°47.8'	97°04.2'	7	FL	15	020	27.4	27.2	27.4	26.6	W,P,B
78-04-02	11-08-78	1425 (D)	27°48.5'	97°01.8'	7	F1	30	210	21.4	31.6	21.5	32.2	W
78-04-03	11-08-78	1520 (D)	27°46.1'	97°02.0'	13	F1	30	020	22.3	32.2	22.4	33.3	W
78-04-05	11-08-78	1645 (D)	27°44.4'	96°57.1'	20	F1	30	210	22.3	31.6	22.4	32.2	W
78-06-01	12-12-78	0855 (D)	27°47.7'	97°02.0'	9	F1	30	210	14.9	30.0	15.0	30.0	W
78-06-02	12-12-78	1005 (D)	27°44.7'	96°58.1'	15	F1	30	210	15.9	30.0	15.9	30.0	W,P
78-06-04	12-12-78	1405 (D)	27°38.9'	97°00.0'	22	F1	30	030	17.8	32.8	16.6	32.2	W,P
78-07-03	01-17-79	1730 (D)	27°50.1'	96°58.0'	15	F1	50	280	12.4	32.2	11.2	28.9	W,P
78-11-01	03-05-79	1730 (D)	27°50.7'	97°01.0'	9	F1	45	020	13.9	28.9	13.9	28.9	W,P
78-11-02	03-05-79	1830 (D)	27°51.0'	96°59.6'	11	F1	40	050	13.9	28.9	13.9	28.9	W,P
78-12-01	05-15-79	1620 (D)	27°47.8'	97°02.1'	7	SB	30	210	24.2	22.8	24.6	22.8	B
78-12-02	05-15-79	2035 (N)	27°31.9'	96°43.0'	49	SB	30	025	20.5	36.6	23.4	33.3	B
78-12-03	05-15-79	2155 (N)	27°37.3'	96°42.7'	40	SB	30	022	23.0	33.5	23.0	33.3	B
78-12-04	05-15-79	2320 (N)	27°36.5'	96°49.5'	33	SB	30	025	22.5	35.0	23.1	32.2	B
78-12-05	05-16-79	1240 (D)	27°49.2'	97°00.2'	9	SB	30	020	23.8	26.6	24.9	21.2	B,P
78-12-06	05-16-79	1335 (D)	27°50.3'	96°59.0'	13	SB	30	025	23.5	28.9	24.4	23.3	B,P
78-12-07	05-16-79	1516 (D)	27°46.9'	96°53.6'	20	SB	30	020	23.5	29.4	24.4	26.6	W
78-12-08	05-16-79	1640 (D)	27°46.0'	96°50.5'	24	SB	30	035	23.3	28.9	24.2	22.2	P
78-12-09	05-16-79	2050 (N)	27°47.1'	96°49.4'	24	SB	30	030	23.6	25.5	24.0	21.1	W,P
78-12-10	05-16-79	2215 (N)	27°51.5'	96°56.2'	15	SB	30	030	23.6	25.5	24.0	20.0	B,W,P
78-12-11	05-16-79	2326 (N)	27°53.3'	96°58.5'	11	F1	30	030	24.0	20.0	24.0	22.8	B,P
78-12-12	05-17-79	0026 (N)	27°53.7'	96°59.4'	7	F1	30	210	24.2	20.5	24.2	20.5	B,P
78-13-01	05-23-79	1346 (D)	27°47.2'	96°58.5'	16	SB	30	210	23.4	33.3	25.5	28.3	B,W,P
78-13-02	05-23-79	1505 (D)	27°43.6'	96°55.4'	22	SB	30	020	28.3	36.1	25.4	22.6	B
78-13-03	05-23-79	2050 (N)	27°36.7'	96°43.5'	40	SB	30	210	21.7	35.5	25.3	23.3	B
78-13-04	05-23-79	2155 (N)	27°37.8'	96°48.1'	33	SB	30	210	23.7	33.3	25.2	24.4	B
78-13-05	05-23-79	2320 (N)	27°39.3'	96°56.0'	24	SB	30	030	23.3	33.3	25.0	26.6	B,P
78-13-06	05-24-79	0043 (N)	27°44.4'	97°01.4'	16	SB	30	020	23.8	31.1	25.4	27.2	B,W,P
78-13-07	05-24-79	0207 (N)	27°45.8'	97°03.0'	11	SB	30	020	25.0	27.2	25.3	25.5	B,W,P
78-13-08	05-24-79	1233 (D)	27°48.6'	97°02.9'	7	SB	30	210	25.6	27.2	26.0	26.1	B,W,P
78-13-09	05-24-79	1325 (D)	27°45.2'	97°03.5'	11	SB	30	180	24.5	31.1	26.3	27.2	B
78-14-01	06-21-79	2107 (N)	27°37.9'	96°43.4'	38	SB	30	030	23.8	34.4	28.3	26.1	B
78-14-02	06-21-79	2238 (N)	27°40.0'	96°47.8'	31	SB	30	210	25.0	34.4	27.8	27.8	B
78-14-03	06-22-79	0016 (N)	27°41.2'	96°54.3'	24	SB	30	030	24.4	33.0	27.8	28.9	B
78-14-04	06-22-79	0210 (N)	27°45.4'	97°01.5'	15	SB	30	030	24.9	32.2	27.9	27.8	B

Table A.1. (Cont'd.).

Station	Date	Time (D/N ^a)	Location		Depth m	Gear ^b	Effort (min)	Tow direction degrees	Hydrology		Species ^c
			Latitude (N)	Longitude (W)					Bottom Temp. (C)	Surface Temp. (C)	
									Sal. (o/oo)	Sal. (o/oo)	
78-15-01	07-30-79	1600 (D)	27°51.3'	97°01.6'	7	SB	30	030	29.3	35.5	33.3
78-15-02	07-30-79	1725 (D)	27°51.3'	96°58.7'	13	SB	30	030	28.5	36.1	34.4
78-16-01	08-02-79	1610 (D)	27°48.4'	97°01.3'	9	SB	30	200	28.8	36.6	35.5
78-16-02	08-02-79	2035 (N)	27°39.2'	96°41.2'	40	SB	30	210	25.5	36.6	36.6
78-16-03	08-02-79	2205 (N)	27°41.2'	96°46.9'	31	SB	30	210	28.8	35.5	36.6
78-16-04	08-02-79	2325 (N)	27°42.8'	96°53.5'	24	SB	30	210	28.9	35.5	36.6
78-16-05	08-03-79	0110 (N)	27°46.7'	97°01.2'	15	SB	30	030	28.4	36.1	36.1
78-17-01	08-09-79	1704 (D)	27°48.2'	97°00.7'	11	SB	30	210	29.9	33.3	28.9
78-17-03	08-09-79	2100 (N)	27°43.7'	96°57.2'	20	SB	30	220	29.2	35.5	34.4
78-17-05	08-09-79	2300 (N)	27°46.8'	97°01.5'	13	SB	30	230	29.7	33.9	33.9
78-17-10	08-10-79	2236 (N)	27°37.9'	96°43.4'	38	SB	30	210	24.2	38.9	36.6
78-17-11	08-10-79	2356 (N)	27°37.8'	96°48.1'	33	SB	30	210	28.3	36.6	36.1
78-18-09	08-23-79	0053 (N)	27°49.2'	97°00.3'	13	SB	60	030	-	-	33.9
78-18-10	08-23-79	0315 (N)	27°49.7'	96°51.8'	20	SB	30	210	29.5	34.4	33.3
78-18-11	08-23-79	2003 (N)	27°38.8'	96°42.5'	38	SB	30	220	26.7	37.2	29.6
78-18-12	08-23-79	2116 (N)	27°39.6'	96°48.3'	31	SB	30	210	29.3	34.4	35.5
79-03-01	12-19-79	0925 (D)	27°48.4'	97°02.0'	7	SB	20	220	13.6	25.5	25.5
79-03-02	12-19-79	1010 (D)	27°47.0'	97°01.8'	13	SB	15	030	14.9	26.6	13.8
79-03-06	12-20-79	0840 (D)	27°45.3'	96°56.2'	20	SB	30	200	17.3	30.5	16.5
79-03-09	12-20-79	1230 (D)	27°38.2'	96°47.8'	33	SB	30	210	17.9	31.6	19.0
80-01-01	01-15-80	1225 (D)	27°48.3'	97°03.1'	7	SB	30	200	15.1	31.2	15.9
80-01-04	01-15-80	1755 (D)	27°43.0'	97°03.5'	15	SB	60	020	14.7	29.1	15.1
80-03-01	02-21-80	1340 (D)	27°48.2'	97°03.7'	7	F1	30	205	13.6	32.2	17.6
80-03-02	02-21-80	1340 (D)	27°48.2'	97°03.7'	7	SB	30	205	13.6	32.2	29.4
80-03-03	02-21-80	1430 (D)	27°45.7'	97°03.0'	13	F1	30	020	-	-	-
80-03-04	02-21-80	1430 (D)	27°45.7'	97°03.0'	13	SB	30	020	-	-	-
80-03-05	02-21-80	1520 (D)	27°46.6'	97°03.0'	11	F1	60	245	14.0	34.4	16.8
80-03-06	02-21-80	1520 (D)	27°46.6'	97°03.0'	11	SB	60	245	14.0	34.4	16.8
80-06-01	05-19-80	2045 (N)	27°35.5'	96°45.0'	40	SB	30	210	23.2	33.3	33.3
80-06-02	05-19-80	2205 (N)	27°36.8'	96°50.6'	31	SB	30	210	23.2	33.3	33.3
80-06-03	05-19-80	2350 (N)	27°42.5'	96°56.5'	22	SB	30	025	23.5	32.8	23.9
80-06-04	05-20-80	0140 (N)	27°45.6'	97°02.8'	13	SB	30	025	24.6	31.6	25.0
80-06-05	05-20-80	2105 (N)	26°40.0'	96°51.8'	48	SB	30	155	20.8	36.1	24.0
80-06-06	05-20-80	2220 (N)	26°37.2'	96°56.0'	40	SB	30	155	23.3	34.4	23.7
80-06-07	05-20-80	0020 (N)	26°31.6'	97°03.4'	29	SB	30	340	23.5	33.3	23.9
80-06-08	05-21-80	0130 (N)	26°32.5'	97°09.4'	20	SB	30	340	24.2	33.3	24.2
80-06-09	05-21-80	0130 (N)	26°31.5'	97°14.5'	11	SB	30	340	24.8	33.9	25.0

Table A.1. (Cont'd.).

Table A.1. (Cont'd.).															
Station	Date	Time (D/N ^a)	Location		Depth		Gear ^b	Effort (min)	Tow direction degrees	Hydrography		Species ^c			
			Latitude (N)	Longitude (W)	Loran 3H3	m				fm	Bottom Temp. (C)		Surface Sal. (o/oo)	Temp. (C)	Sal. (o/oo)
mo-da-yr															
80-08-01	06-05-80	1550 (D)	27°51.0'	97°02.0'	2175	7	4	SB	15	040	28.1	30.0	28.3	29.4	B,W
80-08-02	06-05-80	1640 (D)	27°48.6'	97°03.8'	2148	7	4	SB	15	215	28.1	30.0	28.5	31.1	-
80-08-03	06-05-80	2110 (N)	27°37.2'	96°43.6'	2127	40	22	SB	30	210	23.0	35.0	27.5	30.0	B
80-08-04	06-05-80	2220 (N)	27°83.2'	96°48.1'	2114	33	18	SB	30	210	23.5	35.0	28.1	27.8	B
80-08-05	06-05-80	2400 (N)	26°40.3'	96°55.6'	2100	24	13	SB	30	030	25.1	33.3	27.8	27.2	B
80-08-06	06-06-80	0155 (N)	27°46.3'	97°01.8'	2131	15	8	SB	30	030	27.5	30.0	27.7	29.4	B,W,P
80-09-01	06-17-80	2220 (N)	26°37.2'	96°49.5'	1460	48	26	SB	30	320	23.5	36.6	28.5	32.8	B
80-09-02	06-17-80	2350 (N)	26°37.6'	96°56.2'	1436	40	22	SB	30	160	24.0	36.6	28.5	32.2	B
80-09-03	06-18-80	0145 (N)	26°37.2'	97°05.6'	1383	31	17	SB	30	330	27.0	36.6	28.0	31.6	B,P
80-09-04	06-18-80	0250 (N)	26°36.6'	97°08.6'	1372	22	12	SB	30	160	27.5	37.2	27.8	34.4	B,P
80-09-05	06-18-80	0455 (N)	26°37.0'	97°15.4'	1352	13	7	SB	30	165	-	-	28.0	32.2	B
80-09-06	06-18-80	2214 (N)	27°34.5'	96°44.0'	2098	42	23	SB	30	025	23.5	36.6	28.5	32.2	B
80-09-07	06-18-80	2340 (N)	27°38.3'	96°48.7'	2117	31	17	SB	30	025	24.5	36.1	28.5	28.8	B,P
80-10-01	06-22-80	0935 (D)	North of Port Arkansas Jetties				7	4	SB	15	030	-	-	-	W,B
80-13-01	06-25-80	1204 (D)	27°50.6'	97°02.3'	2173	7	4	SB	15	030	25.0	38.8	26.4	38.8	B,W,P
80-14-02	06-26-80	2105 (N)	27°44.5'	96°54.8'	2148	22	12	SB	30	210	24.0	37.2	26.5	36.6	B,P
80-14-03	06-26-80	2237 (N)	27°46.5'	97°02.2'	2143	13	7	SB	30	025	24.5	36.6	26.5	34.4	B,W,P
80-15-01	07-07-80	2121 (N)	27°35.7'	96°42.1'	2120	44	24	SB	30	210	23.0	37.2	28.0	37.2	B
80-15-02	07-07-80	2240 (N)	27°38.1'	96°46.5'	2122	35	19	SB	30	030	22.0	37.8	27.0	37.2	B
80-15-03	07-08-80	0038 (N)	27°41.8'	96°52.2'	2135	26	14	SB	30	210	23.5	37.8	27.0	37.2	B
80-15-04	07-08-80	0225 (N)	27°45.1'	97°00.7'	2127	16	9	SB	15	030	26.0	37.8	28.0	37.2	B,P
80-15-05	07-09-80	1347 (D)	27°48.5'	97°02.5'	2153	7	4	SB	15	210	29.0	38.3	30.0	38.3	B,W,P
80-19-01	07-19-80	1750 (D)	27°50.8'	97°01.7'	2174	7	4	SB	15	000	26.3	36.6	28.3	36.6	P
80-22-01	07-22-80	2045 (N)	27°46.4'	96°55.6'	2165	20	11	SB	15	025	24.5	36.6	27.8	35.5	B
80-23-02	07-23-80	2144 (N)	26°45.5'	96°55.2'	1523	48	26	SB	15	170	23.0	37.2	28.5	36.6	B
80-23-03	07-23-80	2245 (N)	26°42.6'	97°00.7'	1461	38	21	SB	15	170	23.0	37.2	28.0	36.6	B
80-23-04	07-24-80	0030 (N)	26°37.6'	97°05.7'	1378	29	16	SB	15	170	23.5	37.2	28.0	36.6	B
80-23-05	07-24-80	0125 (N)	26°34.5'	97°09.7'	1337	20	11	SB	15	335	24.5	37.2	27.5	36.6	B,P
80-23-06	07-24-80	0240 (N)	26°33.3'	97°14.2'	1312	11	6	SB	15	030	26.5	37.2	28.0	36.6	B
80-23-07	07-24-80	2111 (N)	27°37.3'	96°45.6'	2127	38	21	SB	15	030	24.0	37.7	28.5	36.0	B
80-23-08	07-24-80	2215 (N)	27°40.7'	96°49.3'	2137	29	16	SB	15	030	26.5	36.6	28.5	36.0	B
80-23-09	07-25-80	0018 (N)	27°47.3'	97°02.5'	2139	11	6	SB	15	015	29.0	37.2	30.0	36.6	B,W
80-24-01	08-14-80	1955 (N)	27°35.8'	96°44.7'	2110	40	22	SB	30	210	27.8	36.6	28.7	36.6	B,P
80-24-02	08-14-80	2140 (N)	27°37.7'	96°50.0'	2100	31	17	SB	30	030	28.0	36.1	29.0	35.5	B,W
80-24-03	08-14-80	2128 (N)	27°43.5'	96°55.8'	2128	22	12	SB	30	210	28.0	35.0	28.0	35.0	B,W
80-24-04	08-15-80	0120 (N)	27°44.4'	97°03.0'	2105	15	8	SB	30	030	28.2	34.4	28.4	33.3	B,W
80-25-01	08-25-80	2040 (N)	26°47.1'	96°53.0'	1550	53	29	SB	30	170	23.9	37.2	29.0	36.1	B
80-25-02	08-25-80	2215 (N)	26°44.8'	96°56.5'	1510	44	24	SB	30	065	23.8	36.6	29.0	36.6	B

Table A.1. (Cont'd.).

Station	Date	Time (D/N ^a)	Location		Depth	Gear ^b	Effort (min)	Tow direction degrees	Hydrology		Species ^c
			Latitude (N)	Longitude (W)	m fathoms				Bottom Temp. (C)	Surface Sal. (o/oo)	
80-25-03	08-25-80	2345 (N)	26°39.0'	97°00.9'	35	SB	30	355	25.2	36.1	B
80-25-04	08-26-80	0135 (N)	26°39.2'	97°07.6'	14	SB	30	165	26.5	36.6	B
80-25-05	08-26-80	0300 (N)	26°36.3'	97°12.7'	16	SB	30	165	27.8	35.5	B,W,P
80-25-06	08-26-80	2055 (N)	27°34.5'	96°43.4'	46	SB	30	210	23.9	36.6	B
80-25-07	08-26-80	2220 (N)	27°36.2'	96°46.8'	37	SB	30	025	25.7	36.6	B
80-25-08	08-26-80	2355 (N)	27°39.4'	96°53.0'	27	SB	30	025	27.5	36.1	B,P
80-25-09	08-27-80	0145 (N)	27°43.5'	97°00.6'	57	SB	30	025	28.2	35.5	B,P,W
80-26-01	11-03-80	1127 (D)	27°48.2'	97°03.1'	7	SB	10	210	20.1	31.6	W
80-26-02	11-03-80	1159 (D)	27°46.7'	97°02.8'	13	SB	10	210	21.0	32.8	W,P
80-26-03	11-03-80	1315 (D)	27°49.1'	96°59.2'	15	SB	10	025	20.2	32.8	W,B
80-26-04	11-03-80	1347 (D)	27°49.8'	97°01.0'	11	SB	10	210	20.2	32.2	W
80-27-01	12-18-80	1045 (D)	27°51.8'	97°01.6'	7	SB	10	005	16.8	33.3	W
80-27-02	12-18-80	1117 (D)	27°51.3'	96°59.5'	11	SB	10	010	16.8	33.3	W
80-27-03	12-18-80	1205 (D)	27°51.6'	96°58.0'	13	SB	10	010	16.8	33.9	W
80-27-04	12-18-80	1243 (D)	27°51.8'	97°00.7'	9	SB	10	010	16.8	33.3	W,B
80-27-05	12-18-80	1318 (D)	27°52.3'	97°01.4'	7	SB	30	205	16.8	33.3	W
81-01-01	01-14-81	1159 (D)	27°47.3'	96°59.1'	15	SB	10	205	14.2	31.6	W
81-01-02	01-14-81	1251 (D)	27°47.6'	97°02.0'	9	SB	10	005	13.6	31.1	W
81-01-03	01-14-81	1342 (D)	27°50.9'	97°01.8'	7	SB	10	010	13.6	31.1	W
81-01-04	01-14-81	1411 (D)	27°50.7'	97°00.2'	11	SB	10	200	13.7	31.6	W
81-02-01	02-17-81	1145 (D)	27°50.5'	97°02.0'	7	SB	10	010	11.8	31.6	-
81-02-02	02-17-81	1233 (D)	27°50.9'	96°58.8'	13	SB	10	210	11.5	32.8	W,P
81-02-03	02-17-81	1315 (D)	27°48.1'	97°00.0'	13	SB	10	210	11.3	32.8	W,B,P
81-02-04	02-17-81	1355 (D)	27°47.9'	97°02.6'	9	SB	10	030	11.8	32.2	W
81-03-01	03-30-81	1158 (D)	27°50.3'	97°01.7'	9	SB	10	010	20.0	34.4	W,B,P
81-03-02	03-30-81	1230 (D)	27°50.2'	96°59.4'	15	SB	10	210	18.5	36.6	W,B,P
81-03-03	03-30-81	1315 (D)	27°47.7'	97°00.3'	13	SB	10	210	19.0	35.5	W,B,P
81-03-04	03-30-81	1358 (D)	27°47.5'	97°02.9'	7	SB	10	010	20.0	35.5	W,B

^aD = day, N = night^bF1 = 51 mm mesh flat net, 13.7 m; SB = 51 mm mesh semiballoon net^cB = brown shrimp (*P. aztecus*), W = white shrimp (*P. setiferus*), P = pink shrimp (*P. duorarum*)

Appendix B. Abundance and size of penaeid shrimp in night shrimp trawls by station (October 1977-August 1980).

Table B.1. Abundance and size of penaeid shrimp collected in individual night shrimp trawl samples off the central coast of Texas during October 1977-September 1978. (Blanks = no shrimp caught.)

Station	Date	Area	Effort			Penaeus aztecus			Penaeus setiferus			Penaeus duorarum			Mixed Penaeus spp.		
			min.	m	fm	No./h	kg/h	TL (mm)	No./h	kg/h	TL (mm)	No./h	kg/h	TL (mm)	No./h	kg/h	TL (mm)
77-01-04	10-05-77	PA	30	38	21	222	7.70	100-178 158 13				6	0.06	90-108 101 45	228	7.76	90-178 156 13
77-01-05	10-05-77	PA	30	29	16	126	3.82	85-177 145 15							128	3.86	85-177 145 15
77-01-06	10-05-77	PA	30	22	12	120	1.52	77-164 113 36				6	0.10	110-140 125 27	168	2.84	77-170 123 27
77-01-07	10-06-77	PA	30	11	6	26	0.24	59-119 87 49							124	1.10	59-155 100 51
77-02-03	10-25-77	PC	30	11	6							8	0.08	64-132 87 45	102	1.02	64-155 114 45
77-03-02	11-10-77	PA	30	11	6	146	0.60	65-101 81 110				684	2.60	66-110 76 119	1338	10.88	65-181 95 56
77-03-05	11-30-77	PC	30	11	6							12	0.12	70-115 98 45	1444	19.88	70-115 122 33
77-05-12	12-01-77	PA	30	11	6							12	0.12	70-115 98 45	236	2.42	75-140 107 44
77-06-01	12-12-77	PC	30	11	6							110	0.86	75-130 95 58	582	5.38	80-129 106 49
77-08-08	02-14-77	PA	30	11	6							24	0.26	85-124 98 42	48	0.28	73-109 91 78
77-09-04	02-16-78	PC	30	11	6										68	0.54	74-113 95 57
77-11-09	03-08-78	PA	30	11	6							12	0.09	97-104 93 60	366	3.35	90-128 108 50
77-12-06	03-17-78	PC	30	11	6										62	1.02	85-143 127 28
77-16-06	05-30-78	PA	30	38	21	34	1.02	110-175 146 15							34	1.02	110-175 146 15
77-16-07	05-30-78	PA	15	31	17	44	0.56	93-149 110 36							44	0.56	93-149 110 36
77-16-08	05-30-78	PA	15	26	14	204	2.20	81-156 106 42							204	2.20	81-156 106 42
77-16-09	05-31-78	PA	15	22	12	2740	21.88	85-112 99 57							2740	21.88	85-112 99 57
77-16-10	05-31-78	PA	15	15	8	2028	14.20	81-112 94 65							2100	16.80	81-194 96 57
77-16-11	05-31-78	PA	15	11	6	496	2.76	66-120 84 82							564	5.16	66-181 92 50
77-19-01	06-08-78	PA	30	38	21	70	1.06	87-176 115 30							70	1.06	87-176 115 30
77-19-02	06-08-78	PA	30	31	17	146	1.28	82-163 102 52							146	1.28	82-163 102 52
77-19-03	06-09-78	PA	30	26	14	192	1.52	57-165 98 57							192	1.52	57-165 98 57
77-24-01	06-13-78	PA	30	22	12	4208	38.72	78-138 100 49							4208	38.72	78-138 100 49
77-24-02	06-13-78	PA	30	15	8	2854	18.19	75-132 91 71							2878	18.77	75-189 91 70
77-24-03	06-14-78	PA	30	11	6	4798	26.44	66-103 86 82							4886	29.88	66-192 87 74
77-27-06	06-28-78	PA	15	20	11	4216	35.40	71-140 97 54							4220	35.52	71-140 97 54
77-27-07	06-28-78	PA	15	15	8	2704	16.00	74-125 90 77							2776	19.44	74-202 92 65
77-27-08	06-29-78	PA	15	11	6	3132	18.80	71-136 88 76							3296	25.84	71-191 92 58
77-27-12	06-29-78	PA	15	53	29	332	6.32	102-192 130 24							332	6.32	102-192 130 24
77-27-13	06-29-78	PA	15	40	22	1672	19.08	70-140 108 40							1672	19.08	70-140 108 40
77-27-14	06-29-78	PA	15	33	18	1804	20.92	75-132 109 39							1804	20.92	75-132 109 39
77-27-15	06-30-78	PA	15	22	12	964	9.64	80-143 102 45							968	9.72	80-143 102 45

Table B.1. (Cont'd.).

Station	Date	Area	Effort	Depth	Panaeus aztecus				Panaeus setiferus				Panaeus duorarum				Mixed Panaeus spp.					
					min.	m	fm	No./h	kg/h	range	mean	ct.	No./h	kg/h	range	mean	ct.	No./h	kg/h	range	mean	ct.
mo-da-yr																						
77-29-01	07-12-78	PA	15	55	30		252	6.16	110-200	141	19							252	6.16	110-200	141	19
77-29-02	07-13-78	PA	15	40	22		1728	22.80	98-153	116	34							1728	22.80	98-153	116	34
77-29-03	07-13-78	PA	15	33	18		1028	11.76	82-147	107	40							1028	11.76	82-147	107	40
77-29-04	07-13-78	PA	15	22	12		1392	14.02	78-158	103	45							1392	14.02	78-158	103	45
77-29-05	07-13-78	PA	15	20	11		7688	70.84	82-142	99	49							7688	70.84	82-142	99	49
77-30-04	07-14-78	PA	15	15	8		1404	10.04	71-125	94	63							1420	10.70	71-193	95	60
77-30-05	07-15-78	PA	15	11	6		820	7.88	78-160	103	47							884	10.84	78-197	108	37
77-33-02	07-17-78	PA	15	38	21		1072	13.52	76-153	113	36							1072	13.52	76-153	113	36
77-33-03	07-17-78	PA	15	33	18		1224	13.44	84-161	110	41							1224	13.44	84-161	110	41
77-33-04	07-17-78	PA	15	22	12		2096	18.04	78-161	99	53							2096	18.04	78-161	99	53
77-33-05	07-18-78	PA	15	20	11		4760	39.04	74-115	95	55							4760	39.04	74-115	95	55
77-37-13	08-09-78	PA	15	24	13		408	6.08	84-157	116	30							408	6.08	84-157	116	30
77-37-21	08-10-78	PA	10	11	6		204	1.92	75-135	103	48							220	2.46	75-172	106	41
77-37-24	08-10-78	PA	15	38	21		636	10.00	105-170	120	29							636	10.00	105-170	120	29
77-37-25	08-10-78	PA	15	31	17		236	3.24	88-158	115	33							236	3.24	88-158	115	33
77-38-12	08-16-78	PA	15	27	15		588	9.22	96-158	122	29							588	9.22	96-158	122	29
77-38-18	08-17-78	PA	15	11	6		224	1.82	64-141	96	56							224	1.82	64-141	96	56
77-41-04	09-29-78	PA	15	38	21		52	1.40	115-160	140	17							52	1.40	115-160	140	17
77-41-05	09-29-78	PA	15	33	18		24	0.88	112-163	142	12							24	0.88	112-163	142	12
77-41-06	09-29-78	PA	15	24	13		224	3.20	78-150	112	32							232	3.32	78-150	112	32
77-41-07	09-30-78	PA	15	11	6		36	0.36	86-105	97	45							232	1.80	59-158	87	58
77-41-08	09-30-78	PA	15	7	4		8	0.10	89-110	100	36							72	0.86	57-165	96	38

Table B.2. Abundance and size of penaeid shrimp collected in individual night shrimp trawl samples off the central coast of Texas during May-August 1979. (Blanks = no shrimp caught.)

Station	Date	Area	Effort		Depth	Penaeus aztecus				Penaeus setiferus				Penaeus duorarum				Mixed Penaeus spp.				
			min.	m		ft	No./h	kg/h	range	mean	ct.	No./h	kg/h	range	mean	ct.	No./h	kg/h	range	mean	ct.	
						TL (mm)				TL (mm)				TL (mm)					TL (mm)			
78-12-02	05-15-79	PA	30	49	27		18	0.58	138-181	153	14							18	0.58	138-181	153	14
78-12-03	05-15-79	PA	30	40	22		10	0.30	135-182	153	15							10	0.30	135-182	153	15
78-12-04	05-15-79	PA	30	33	18		8	0.22	137-161	150	17							8	0.22	137-161	150	17
78-12-09	05-16-79	PA	30	24	13													16	0.40	100-180	134	18
78-12-10	05-16-79	PA	30	15	8		12	0.15	86-144	107	36							70	1.23	86-170	119	26
78-12-11	05-16-79	PA	30	11	6		44	0.38	78-112	93	52							294	3.72	78-131	111	36
78-12-12	05-17-79	PA	30	7	4		192	1.32	73-114	89	66							842	8.86	73-132	104	43
78-13-03	05-23-79	PA	30	40	22		32	1.44	137-185	162	10							32	1.44	137-185	162	10
78-13-04	05-23-79	PA	30	33	18		30	1.14	135-180	155	12							30	1.14	135-180	155	12
78-13-05	05-23-79	PA	30	24	13		90	1.62	82-169	121	25							92	1.68	82-169	121	25
78-13-06	05-24-79	PA	30	16	9		1306	8.20	81-107	91	72							1374	10.68	81-196	94	58
78-13-07	05-24-79	PA	30	11	6		658	4.00	74-116	90	75							722	5.64	74-175	95	58
78-14-01	06-21-79	PA	30	38	21		80	1.74	98-176	132	21							80	1.74	98-176	132	21
78-14-02	06-21-79	PA	30	31	17		94	1.42	98-167	122	30							94	1.42	98-167	122	30
78-14-03	06-22-79	PA	30	24	13		358	4.80	96-144	120	34							358	4.80	96-144	120	34
78-14-04	06-22-79	PA	30	15	8		4	0.08	129-141	135	23							4	0.08	129-141	135	23
78-16-02	07-02-79	PA	30	40	22		108	1.88	110-164	128	26							120	2.32	110-164	130	23
78-16-03	07-02-79	PA	30	31	17		342	5.31	82-166	121	29							342	5.31	82-166	121	29
78-16-04	07-16-04	PA	30	24	13		1560	16.34	74-157	109	43							1564	16.48	74-157	109	43
78-16-05	07-03-79	PA	30	15	8		850	9.30	78-148	109	41							876	10.60	78-201	111	38
78-17-03	08-09-79	PA	30	20	11		1232	15.68	86-149	114	36							1232	15.68	86-149	114	36
78-17-05	08-09-79	PA	30	13	7		7436	50.00	66-127	91	68							7436	50.00	66-127	91	68
78-17-10	08-10-79	PA	30	38	21		262	5.98	108-168	138	20							262	5.98	108-168	138	20
78-17-11	08-10-79	PA	30	33	18		364	6.34	88-166	128	26							364	6.34	88-166	128	26
78-18-09	08-23-79	PA	60	13	7		3295	26.24	56-139	95	57							3356	27.67	-	-	55
78-18-10	08-23-79	PA	30	20	11		226	4.48	80-158	118	27							226	4.48	80-158	118	27
78-18-11	08-23-79	PA	30	38	21		166	3.66	106-171	136	21							166	3.66	106-171	136	21
78-18-12	08-23-79	PA	30	31	17		174	3.74	98-174	135	21							174	3.74	98-174	135	21

Table B.3. Abundance and size of penaeid shrimp collected in individual night shrimp trawl samples off the central coast of Texas during May-August 1980. (Blanks = no shrimp caught.)

August 1980. (Blanks = no shrimp caught.)

Station	Date	Area Effort			Penaeus aztecus				Penaeus setiferus				Penaeus duorarum				Mixed Penaeus spp.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
		min.	m	Depth	No./h	kg/h	TL (mm)			No./h	kg/h	TL (mm)			No./h	kg/h	TL (mm)			No./h	kg/h	TL (mm)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
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Table B.3. (Cont'd.).

Station	Date	Area	Effort	Depth	Peneus astecus						Peneus setiferus						Peneus duorarum						Mixed Peneus spp.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																		
					min.		m		ft		No./h	kg/h	range	mean	ct.	TL (mm)	No./h	kg/h	range	mean	ct.	TL (mm)	No./h	kg/h	range	mean	ct.	TL (mm)	No./h	kg/h	range	mean	ct.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								

Appendix C. Abundance and size of penaeid shrimp in day shrimp trawls by station (October 1977-March 1981).

Table C.1. (Cont'd.).

Station	Date	Area			Effort			Depth			Panaeus aztecus			Panaeus setiferus			Panaeus duorarum			Mixed Penaeus spp.						
		min.	m	fm	No/h	kg/h	range	TL (mm)	mean	ct.	No/h	kg/h	range	TL (mm)	mean	ct.	No./h	kg/h	range	TL (mm)	mean	ct.				
mo-da-yr																										
77-11-05	03-08-78	PA	30	15	8						20	0.20	97-122	110	45		2	0.03	-	132	30	22	0.23	97-132	112	43
77-11-07	03-08-78	PA	30	7	4						774	4.80	78-113	95	73		6	0.04	70-100	82	68	780	4.84	70-113	95	73
77-12-07	03-17-78	PC	30	7	4						64	1.08	115-147	127	27							64	1.08	115-147	127	27
77-12-08	03-17-78	PC	30	15	8						30	0.40	98-146	127	34							30	0.40	98-146	127	34
77-12-09	03-17-78	PC	30	22	12						4	0.08	121-162	142	23							4	0.08	121-162	142	23
77-16-01	05-30-78	PA	30	7	4																	No Shrimp	Caught			
77-16-02	05-30-78	PA	15	11	6						8	0.28	160-180	170	13							68	0.58	68-180	91	53
77-16-03	05-30-78	PA	30	15	8						10	0.38	152-174	167	12							1042	6.58	73-174	88	72
77-16-04	05-30-78	PA	30	18	10						2	0.06	-	146	15							216	1.24	69-146	87	79
77-16-05	05-30-78	PA	30	22	12																	788	4.26	78-101	89	84
77-16-06	06-14-78	PA	15	7	4																	16	0.16	89-128	109	45
77-24-05	06-14-78	PA	15	15	8																	384	2.84	74-141	97	61
77-24-06	06-14-78	PA	15	22	12																	44	0.32	83-125	99	62
77-27-01	06-28-78	PA	15	7	4						16	0.60	179-189	184	12							156	1.28	65-189	93	55
77-27-02	06-28-78	PA	15	15	8						44	1.88	152-172	166	11		4	0.12	-	144	15	2036	16.80	73-172	95	55
77-27-03	06-28-78	PA	15	20	11						4	0.28	-	173	6							224	1.76	76-173	93	58
77-30-01	07-14-78	PA	15	7	4						4	0.16	-	181	11							No Shrimp	Caught			
77-30-02	07-14-78	PA	15	15	8																	152	1.56	78-181	106	44
77-30-03	07-14-78	PA	15	20	11																	4840	41.08	82-137	101	53
77-33-01	07-17-78	PA	15	22	12																	48	0.48	87-114	100	45
77-35-01	07-19-78	PA	15	7	4																	No Shrimp	Caught			
77-35-02	07-19-78	PA	15	15	8																	48	0.53	98-170	120	41
77-37-01	08-08-78	PA	30	7	4						16	0.59	80-196	139	12		12	0.50	137-177	155	11	62	1.51	80-196	126	19
77-37-02	08-08-78	PA	30	15	8												2	0.10	-	192	9	136	1.58	80-192	109	39
77-37-11	08-09-78	PA	15	22	12																	4	0.04	-	120	45
77-38-09	08-16-78	PA	15	7	4						20	0.78	127-196	161	12							72	1.34	78-196	118	24
77-38-10	08-16-78	PA	15	15	8																	84	0.96	80-145	107	40
77-38-11	08-16-78	PA	15	22	12																	4	0.04	-	116	45
77-40-01	09-21-78	PA	30	7	4						4	0.12	153-158	156	15							4	0.12	153-158	156	15
77-40-02	09-21-78	PA	30	11	6						208	6.40	123-195	155	15		78	0.76	65-161	95	47	322	7.48	65-195	134	20
77-40-03	09-21-78	PA	30	22	12																	86	1.10	72-158	113	35
77-41-01	09-29-78	PA	30	9	5						138	4.04	82-184	151	15		8	0.06	83-100	91	60	154	4.16	82-184	145	17
77-41-02	09-29-78	PA	15	15	8																	No Shrimp	Caught			
77-41-03	09-29-78	PA	15	20	11																	20	0.30	99-120	110	30