

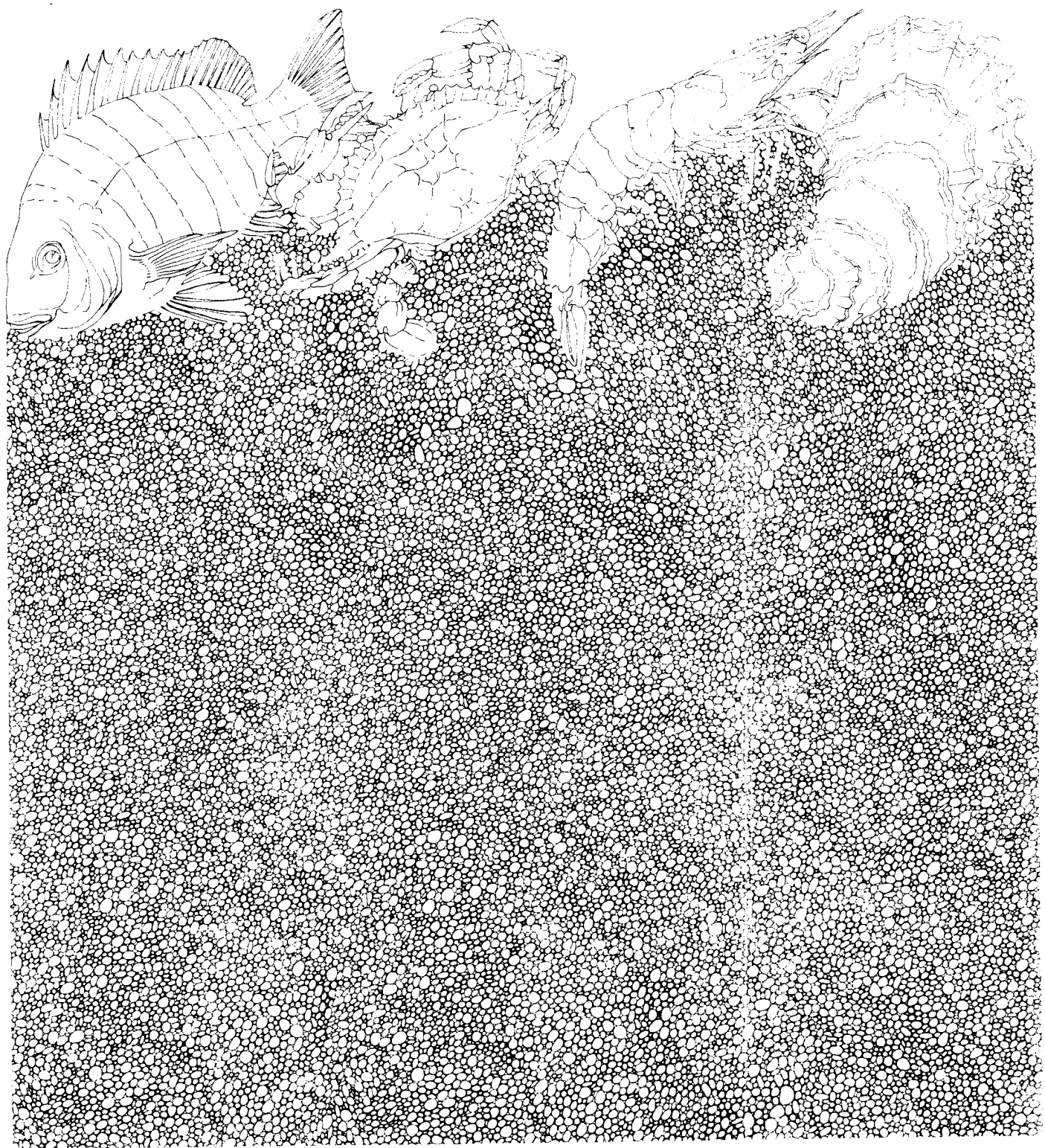
Shrimp

Mark-Recapture Studies of Penaeid Shrimp in Texas, 1978-1979

by Terry J. Cody and R. M. Avent

Management Data Series Number 14
1980

Texas Parks and Wildlife Department
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SHRIMP IN TEXAS, 1978-1979

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ABSTRACT

As part of the MEXUS-GULF Shrimp Tagging Program in the western Gulf of Mexico, the Texas Parks and Wildlife Department and National Marine Fisheries Service conducted 10 mark-recapture studies to determine movement and growth of penaeid shrimp stocks along the Texas coast. All shrimp were tagged with colored polyethylene streamer tags and released in either inshore or offshore areas near Port Aransas, Port Mansfield or Port Isabel.

From May 1978 through October 1979, 77,843 shrimp were released; 559 have been recaptured. The recapture rates for inshore studies were 0.0-2.2% while those for offshore studies were 6.7-10.0%. Most of the recovered shrimp had moved <37 km (20 nmi) and were recaptured within 28 days. Short-term recoveries came from all directions with dominant movement alongshore to the northeast and south. All long-term recaptures from the offshore studies came from the south.

Growth rates for individual shrimp were highly variable. During August-October 1978 recaptured shrimp had a mean growth rate of 5-6 mm (tail length) per 2-week period. After an initial period of slow growth following inshore releases in April-May 1979, the overall population growth rate was 6-9 mm (tail length) per 2-week period from late May through July 1979.

INTRODUCTION

After World War I commercial shrimping along the Atlantic and Gulf coasts of the United States became an important marine fishery (Anderson et al. 1949). The need for information on the abundance, life histories and population dynamics of the commercial penaeid species was immediately recognized and field and laboratory research programs were initiated. By 1935 experiments had shown that small celluloid-disk tags could be affixed to the first abdominal somite with nickel pins and could provide direct evidence from the field of growth and migrations of penaeid shrimp (Lindner and Anderson 1956).

Tagging studies were initiated from North Carolina to Texas to gain information on white shrimp (Penaeus setiferus) life history since this was by far the most important species at the time. Tagging programs remained much the same until the late 1950's when Dawson (1957) and Costello (1959) showed that penaeid shrimp could be marked with biological stains which did not seem to affect either short-term or long-term survival. This stain-injection method was widely used in the 1960's on white, brown (P. aztecus) and pink shrimps (P. duorarum) along the Gulf coast (Klima 1964, Kutkuhn 1966, Costello and Allen 1966, Clark et al. 1974).

Further refinements in the stain-injection technique led to the use of fluorescent pigments to identify classes (Klima 1965) and small PVC internal tags to identify individuals (Neal 1969). The need to identify individual shrimp in mark-recapture studies eventually led to the development of small flexible polyethylene streamer tags described by Marullo et al. (1976). These are the tags currently being used in the MEXUS-GULF Shrimp Tagging Program being conducted in the Gulf of Mexico by National Marine Fisheries Service, Texas Parks and Wildlife Department, Louisiana Wildlife and Fisheries Commission and the Instituto Nacional de Pesca of Mexico.

The need for studies like the MEXUS-GULF tagging program to provide information on the population dynamics of penaeid shrimp stocks was given the highest priority in the regional management plan for the shrimp fishery of the Gulf of Mexico developed by the Gulf States Marine Fisheries Commission's Technical Coordinating Committee (Christmas and Etzold 1977).

The plan recognizes that in order for resource managers to recommend effective measures to utilize the annual yield of penaeid shrimp, it is necessary to develop estimates of growth rates, mortality rates, migration patterns and maximum yield curves for the stocks involved. Mark-recapture studies can provide data necessary for these estimates. The Texas Parks and Wildlife Department (TPWD) and National Marine Fisheries Service (NMFS) initiated the MEXUS-GULF mark-recapture studies in 1978 to determine movements and growth of penaeid shrimp stocks along the Texas coast.

MATERIALS AND METHODS

The shrimp tagging program in Texas is a cooperative effort by the Texas Parks and Wildlife Department, National Marine Fisheries Service and Texas A&M University.

All shrimp in 1978-79 were tagged with colored polyethylene streamer tags provided by NMFS according to techniques described by Marullo et al. (1976). Holding tanks and release methods were similar to those described by Emiliani (1971) for the offshore releases. On the R/V Western Gulf two tanks with a flow-through water system using compressed air for additional aeration were used. The cooling units described by Emiliani were not used in this study and the water in the tagging pans was changed frequently instead of being recirculated. Inshore and shallow water releases in 1978 were made with sections of flexible dryer hose (102 mm dia.) instead of the telescoping aluminum pipes described by Emiliani. All tagged shrimp in the 1979 inshore studies were released by hand in water < 1.25 m deep.

The TPWD research vessel Western Gulf was used in many of the tagging studies as a tagging facility and to obtain, transport and/or release tagged shrimp. Holding facilities, aerators and other tagging gear were provided by TPWD and NMFS. Manpower for the capture, tagging and release was provided by TPWD and NMFS with assistance in 1978 from the Instituto Nacional de Pesca.

During the tagging process tail lengths were measured to the nearest mm and the sex was recorded. Individual shrimp weights could not be determined at the time of release since the highly sensitive instruments could not be operated under field conditions. Subsamples for length-weight ratios were taken at least once each tagging day so that length-weight equations could be developed for that particular group of shrimp. Returned shrimp were measured and weighed at the NMFS Galveston Laboratory. NMFS compiled the tag return data as part of their MEXUS-GULF Program.

Through a contract with NMFS the Texas A&M University Sea Grant Program was responsible for the awards system. The awards system was patterned after one found to be successful during previous studies in Louisiana. In this system everyone returning a tagged shrimp with the needed information receives a letter thanking him for participating in the mark-recapture program and explaining that his name has been entered into a contest pool for possible cash awards (Appendix A). At selected intervals throughout the year winners are randomly selected by computer and cash prizes awarded.

Figure 1 is an example of the poster distributed to promote the return of tagged shrimp in 1978. The award system was modified in 1979 to provide a \$500, a \$100 and six \$50 awards. Another new feature of the award system in 1979 was the presentation of Certificates of Recognition to fishermen who return 10 or more tagged shrimp and distribution of "The Gulf Streamer", a shrimp tagging newsletter, to interested parties (Appendix B).

Release areas in Texas during 1978 and 1979 are shown in Figure 2. Inshore studies were conducted at Port Mansfield (May 1978), Port Aransas (June and July 1978), Port Isabel (April and May 1979) and Aransas Pass (June 1979). Offshore studies utilizing the R/V Western Gulf were completed off the coast of Port Aransas (near Aransas Pass) in August and October 1978 and in September and October 1979.

RESULTS

All tagging studies proposed in the first two years of this 4-yr project were completed as scheduled. The number of shrimp marked during each year was largely dependent on the availability of shrimp and weather conditions; consequently, projected goals for individual studies were not met in some cases and were exceeded in others. Overall, 500,000 shrimp were to be marked during 1978 and 30,000 during 1979. The total number tagged in 1978 was 49,186 and the total marked in 1979 was 32,602 (Table 1).

Of the 81,788 shrimp tagged in 1978-79, 77,843 (95.2%) were released (Table 1). The percentage released each year was relatively constant—94.6% (46,510) in 1978 and 96.1% (31,333) in 1979. The shrimp not released (tagging mortality) ranged from 2.1 to 8.3% for individual tagging studies; daily tagging mortality ranged from 0.0 to 27.2% (Appendix C).

By 30 September 1979, 559 tagged shrimp had been recaptured and returned. Of this total 7 recoveries were from inshore releases in 1978 and 211 from inshore releases in 1979. Returns from offshore releases in August and October 1978 totaled 341 shrimp or 61% of the total returns. At the end of the second segment the offshore studies in 1979 had just been completed and no recoveries had been processed.

The preliminary tag returns, by study, during 1978 and 1979 are presented in Table 2. The recapture rates for inshore studies were 0.00-2.21% while those for offshore studies were 6.74-10.01%.

The recapture data for the 1978 inshore tagging operations are given in Table 3. The most interesting recoveries came from the May 1978 work at Port Mansfield. One tagged shrimp was reportedly captured 3 days after release approximately 153 km (83 nmi) north of the release location and another marked shrimp was recovered off the coast of Mexico 167 km (90 nmi) south of Port Mansfield (Figure 3).

The recapture areas and the density of recoveries in each six-minute block of latitude-longitude for the 1978 offshore tagging studies are shown in Figure 4. Over 80% of the recoveries occurred < 37 km (20 nmi) from the release area and the dominant movement was alongshore toward the northeast and south (Figure 5).

Direction of movement diagrams for the inshore and offshore releases show movement patterns in more detail (Figure 6). Shrimp released offshore traveled primarily northeast (22.5%), east (12.7%), south (23.2%) and southwest (17.8%) with more movement to the south (47.3%) than to the north (33.3%). Shrimp released inshore traveled primarily west (37.9%), south (21.2%) and southeast (18.2%).

Over 92% of the recaptured shrimp from inshore releases came from the April 1979 study at Port Isabel, Texas. Dominant movement was to the west (40.3%) with lesser movement south (20.4%) and southeast (17.7%) (Figure 7). Pink shrimp moved mainly to the west (45.8%) while brown shrimp moved mainly to the south (33.8%) and west (32.4%).

Movement by shrimp from offshore release sites in August and October 1978 generally paralleled the coastline with more movement to the northeast (24.7%), east (17.2%) and south (18.4%) in August and to the south (29.1%), southwest (24.1%) and northeast (19.9%) in October (Figure 8).

Tables 4 and 5 show the number of marked shrimp returned from each direction during successive two-week periods for releases in August and October 1978. Recaptures show short-term movement in all directions and long-term movement to the south and southwest in both studies.

Most of the recoveries from August and October releases in 1978 occurred during the first 28 days after release (Figure 9). In the August study 44% were recaptured in < 3 days and 77% within 14 days; 48% of the returns came within 14 days from October releases with peak recoveries in the 8-14 day period.

Over 71% of the recaptured shrimp from the April 1979 study near Port Isabel were returned during the first 14 days (Figure 10). However, in the May 1979 study the highest number of recoveries occurred between 29 and 56 days after release.

The minimum distance traveled by recaptured shrimp during the 1979 inshore studies is presented in Figure 11. Over 84% of the recovered shrimp from the April releases moved < 4 km (2 nmi) while 80% from the May study moved 9-139 km (6-75 nmi).

Tagged shrimp from the October 1978 study traveled farther than those released in August (Figure 12). Over 67% of the shrimp from August (118) were recovered within 9 km (5 nmi) while only 24% (34) of the October recoveries occurred within 9 km of the release site.

Growth data on individual shrimp that have been recaptured are presented in Table 3 and Appendices D, E and F. Summaries for offshore 1978 and inshore 1979 releases are given in Tables 6-8. In the August 1978 study mean size increased 5-6 mm per 14-day period through the first 56 days (Table 6). Because of low returns after 42 days mean sizes appeared to vary. Mean size increased from 74 to 83 mm during the first 42 days after release in October 1978 before low returns and an expected reduction in growth rate gave widely variable results (Table 7).

The inshore study at Port Isabel in April 1979 revealed more consistent growth rates than the offshore studies. After a period of little growth (+1 mm) in the overall population during the first 21 days after release, the mean tail length of recaptured shrimp increased 6-9 mm per 14-day period for the next two months (Table 8).

DISCUSSION

The tagging phase of mark-recapture experiments in Texas has generally been successful. Using techniques and study designs patterned after previous tagging experiments by the National Marine Fisheries Service, the estimated goals for the number of penaeid shrimp tagged in 1978 and 1979 were met. The recapture phase, however, has been somewhat disappointing--particularly in the number of shrimp returned from inshore releases.

For two consecutive years the return rate has been virtually nil for all inshore studies except the April-May 1979 release at Port Isabel. After the poor recovery rate for inshore releases in 1978 the method of releasing the tagged shrimp was changed from using a flexible tube in water 3-9 m deep to releasing them by hand in shallow, grassy areas adjacent to deeper channels leading to the Gulf. The initial study in April 1979 using this different technique was more successful but unfortunately the recovery rate for the following two inshore studies in 1979 was poor.

Cody and Rice (1979) reported that survey teams recovered 839 tags on the beaches of San Jose, Mustang and Padre Islands 1-10 days after their release near Port Aransas during 6-15 June 1978. An additional 355 tags were recovered from the Gulf beaches near Port Aransas 1-3 days after their release near Port Aransas during 18-23 July 1978. These tags represented 3.1-3.2% of the total shrimp released during those months and indicate short-term mortality in the tagged population. Whether this mortality was unusually high for studies of this type is unknown.

The reasons for the apparent shrimp mortality shortly after release and the concentration of tags recovered on the beach near the release site are not clear. Aquarium studies with streamer tags showed that they could pass through the digestive tract of fish relatively unchanged. However, the kinds and numbers of fish that might be feeding on the shrimp immediately after their release are unknown. It is possible that the bright orange streamers serve as attractants to fish and other predators.

Once the tags are free they float to the surface and may be carried and concentrated by winds and currents.

Tagging procedures were the same for all studies and were probably not a contributing factor to the immediate mortality of the June-July releases. Shrimp were carefully released by hand during the three inshore studies of the second year but this procedure did not appear to affect return rates. Number of predators, stress, fishing pressure and other unknown factors may have contributed to the poor results of the inshore studies.

In the next project year fishing pressure adjacent to the release area, size of shrimp at release, handling mortality and other factors that may have contributed to the poor recovery rate will be investigated. Current plans are to repeat the moderately successful inshore studies in the Port Isabel area and to move into the shallow Gulf waters for all studies along the central Texas coast.

The validity of conclusions based on mark-recapture experiments necessarily depends on the accuracy of the recovery information. All participants in the recovery phase make every effort to get detailed, accurate information on the recaptured shrimp. Nevertheless, caution should be exercised when making conclusions based on very few recoveries. For this reason the most valuable information so far has come from offshore releases in 1978 and inshore releases at Port Isabel.

The majority of the recoveries occurred within the first month after release and within 27 km (20 nmi) of the release area. If the recovery data on a few individual shrimp are accurate, penaeid shrimp evidently have the ability to travel large distances in a short period of time. Short-term movement from the offshore releases appeared to be in all directions with the majority of the movement alongshore to the northeast and south. Long-term movement during both offshore studies in 1978 was toward the south, probably indicating a net movement of shrimp in that direction. A very successful tagging operation along the south Texas coast in May 1979 by NMFS personnel aboard the Oregon II also showed similar movement patterns. Transboundary migrations of brown and pink shrimp between Texas and Mexico have been verified during the program.

Growth data on recovered shrimp have not been analyzed in detail by TPWD or NMFS scientists. Gross observations indicate that shrimp grow approximately 6 mm (tail length) per 14-day period. More detailed analysis of growth rates will be possible when data from recoveries are complete.

The cooperative mark-recapture studies of penaeid shrimp in Texas are an integral part of the MEXUS-GULF Shrimp Tagging Program being conducted by fisheries departments from the United States and Mexico. Data obtained from the releases of tagged shrimp in the western Gulf of Mexico will provide valuable information for resource managers of this extremely valuable fishery.

ACKNOWLEDGEMENTS

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Table 1. Penaeid shrimp mark-recapture studies along the Texas coast (1978-1979).

Release dates	Release area	Study type	Tag series	Color	No. tagged	No. released
May 1978 16-21	Port Mansfield	Inshore	118,001-122,000	Orange	3982	3873
June 1978 6-15	Port Aransas	Inshore	122,001-130,000 97,201-118,000	Orange Orange	28,659	27,324
July 1978 11-20	Port Aransas	Inshore	94,001- 97,200 130,001-136,000 00201-03000	Orange Orange Black	11,973	10,983
August 1978 8-18	Port Aransas	Offshore	03001-06000	Black	2986	2832
October 1978 10-20	Port Aransas	Offshore	06001-07600	Black	1586	1498
1978 Total						
April-May 1979 23-1	Port Isabel	Inshore	504,401-514,400	Green	9556	9084
May-June 1979 30-5	Port Isabel	Inshore	534,401-544,400	Green	9894	9494
June-July 1979 26-3	Aransas Pass	Inshore	554,401-564,400	Green	9917	9611
September 1979 25-28	Port Aransas	Offshore	260,001-261,600	Blue	1589	1555
October 1979 1-3	Port Aransas	Offshore	261,601-263,251	Blue	1646	1589
1979 Total						
					32,602	31,333
1978-1979 Total						
					81,788	77,843

Table 2. Preliminary totals of tags returned by 30 September 1979 for penaeid shrimp mark-recapture studies in Texas (1978-1979).

Month	Release area	Study type	No. released	No. returned	% returned
May 1978	Port Mansfield	Inshore	3873	3	0.08
June 1978	Port Aransas	Inshore	27,324	1	<0.01
July 1978	Port Aransas	Inshore	10,983	3	0.03
August 1978	Port Aransas	Offshore	2832	191	6.74
October 1978	Port Aransas	Offshore	1498	150	10.01
April-May 1979	Port Isabel	Inshore	9084	201	2.21
May-June 1979	Port Isabel	Inshore	9494	10	0.11
June-July 1979	Aransas Pass	Inshore	9611	0	-
September 1979	Port Aransas	Offshore	1555	-	-
October 1979	Port Aransas	Offshore	1589	-	-

Table 3. Recapture data for Texas inshore tagging studies of brown shrimp (Penaeus aztecus) in 1978.

No.	Sp.	Sex	Release Location	Recapture Location	Distance Traveled	Direction Traveled	Release Date	Recapture Date	Days Free	Release Length	Recapture Length	Change in Length
<u>May 1978 - Port Mansfield</u>												
1	B	M	26° 33' N 97° 14' W	26° 34' N 97° 21' W	11.76	279.09	78 518	78 519	1	49	50	1
2	B	F	26° 33' N 97° 14' W	27° 55' N 96° 58' W	154.14	9.78	78 519	78 522	3	42	42	0
3	U	U	26° 33' N 97° 14' W	25° 3' N 97° 16' W	166.72	181.14	78 521	78 1228	221	43	-	-
<u>June 1978 - Port Aransas</u>												
1	B	F	27° 50' N 97° 0' W	27° 18' N 96° 54' W	60.98	170.52	78 6 7	78 6 23	16	71	75	4
<u>July 1978 - Port Aransas</u>												
1	B	F	27° 50' N 97° 0' W	27° 50' N 97° 8' W	13.09	270.03	78 711	78 716	5	53	53	0
2	B	F	27° 50' N 97° 0' W	27° 41' N 97° 0' W	16.67	179.44	78 714	78 8 9	26	58	70	12
3	B	F	27° 50' N 97° 0' W	27° 50' N 96° 37' W	37.67	89.91	78 714	78 813	30	53	70	17

Legend : Species code: W=White (Penaeus setiferus); P=Pink (P. duorarum); B=Brown (P. aztecus)
Sex codes: M=Male; F=Female; U=Unknown
Distance traveled is in kilometers
Direction traveled is compass heading from release location to point of recapture in degrees
Dates are in the form: Year,Month,Day
All lengths are in millimeters (tail length)

Table 4. Direction of movement of recaptured shrimp for each two-week period following release off the coast of Texas in August 1978. (Directions represent 45-degree segments from point of release).

DAYS FREE	AUGUST 1978							
	N	NE	E	SE	S	SW	W	NW
0 - 14	22	37	27	9	22	16	1	5
15 - 28		3	2	1	4			2
29 - 42		3	1		2	1		
43 - 56					1			
57 - 70					1	1		
71 - 84					1	4		
85 - 98								
99 - 112								
113 - 126					1			
127 - 140								
141 - 154								
155 - 168								
> 169								

Table 5. Direction of movement of recaptured shrimp for each two-week period following release off the coast of Texas in October 1978. (Directions represent 45-degree segments from point of release).

DAYS FREE	OCTOBER 1978							
	N	NE	E	SE	S	SW	W	NW
0 - 14	3	18	7	7	8	18	8	
15 - 28	1	5	2	3	8	7	5	
29 - 42		3	1		4	5		
43 - 56		2			6	1		1
57 - 70					3	2		
71 - 84					1			
85 - 98					3			
99 - 112								
113 - 126					2			
127 - 140					1			
141 - 154					2			
155 - 168					1			
> 169					2	1		

Table 6 . Range and mean tail length of tagged shrimp (Penaeus spp.) recaptured during successive two-week periods after release in the Port Aransas offshore tagging study in August 1978 (sexes combined).

Number of days free	Number recaptured	Range tail length (mm)	Mean tail length (mm)	SD (mm)	SE (mm)	Equivalent No./lb (tails)
0-14	141	50-89	71	8.07	0.68	51
15-28	13	67-87	76	6.98	1.94	43
29-42	6	72-95	82	8.26	3.37	34
43-56	1	-	88	-	-	28
57-70	2	66-83	74	12.02	8.50	45
71-84	4	63-100	76	16.70	8.33	43
111-124	1	-	102	-	-	18

SD = Standard deviation
SE = Standard error

Table 7 . Range and mean tail length of tagged shrimp (Penaeus spp.) recaptured during successive two-week periods after release in the Port Aransas offshore tagging study in October 1978 (sexes combined).

Number of days free	Number recaptured	Range tail length (mm)	Mean tail length (mm)	SD (mm)	SE (mm)	Equivalent No./lb (tails)
0-14	69	58-96	74	8.97	1.08	45
15-28	31	59-101	77	9.97	1.79	40
29-42	11	64-101	83	9.78	2.95	33
43-56	8	68-96	82	9.10	3.22	34
57-70	4	61-88	79	12.52	6.26	38
71-84	1	-	95	-	-	23
85-96	2	76-87	82	7.78	5.50	34
97-110	1	-	102	-	-	19
111-124	2	83-87	85	2.83	2.00	31
125-138	2	92-93	92	0.71	0.50	25
139-152	0					
153-166	1	-	90	-	-	26
167+	2	95-96	96	0.71	0.50	22

SD = Standard deviation

SE = Standard error

Table 8 . Range and mean tail length of tagged shrimp (Penaeus spp.) recaptured weekly after release in the Port Isabel inshore tagging study in April 1979 (sexes combined).

Number of days free	Number recaptured	Range tail length (mm)	Mean tail length (mm)	SD (mm)	SE (mm)	Equivalent No./lb (tails)
0-7	100	38-64	49	5.23	0.52	140
8-14	40	38-65	49	6.53	1.03	140
15-21	15	44-75	50	7.63	1.97	130
22-28	2	47-64	56	12.02	8.50	95
29-42	7	48-76	62	8.32	3.14	71
43-56	6	55-75	68	7.49	3.06	55
57-70	7	71-85	77	5.38	2.03	39
71-84	2	80-86	83	4.24	3.00	32
85-96	7	68-90	82	8.02	3.03	33
97-110	0					
111-124	2	79-82	80	2.12	1.50	35

SD = Standard deviation

SE = Standard error

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SHRIMP HAVE BEEN TAGGED WITH PLASTIC RIBBONS LIKE THIS:

BLUE OR BLACK



BRIGHT ORANGE



Awards will be randomly selected from tagged shrimp that are returned. To qualify as an entry, the tag must be in the shrimp and the date and location the shrimp was caught must be given. Sets of awards will continue into 1979. Any tag number that hasn't been chosen remains eligible in the later drawings.

**AWARDS OF \$500 -- \$200 -- \$100 -- AND \$50
WILL BE AVAILABLE IN EACH SELECTION.**

Dates for making awards will be announced.

THIS STUDY IS BEING CARRIED OUT JOINTLY BY THE TEXAS PARKS AND WILDLIFE DEPARTMENT, TEXAS A&M UNIVERSITY, THE NATIONAL MARINE FISHERIES SERVICE AND THE INSTITUTO NACIONAL DE PESCA OF MEXICO.

If you have caught a tagged shrimp or know someone who has please contact:

AGENCY	ADDRESS	PHONE NUMBER
NMFS Galveston Lab.	FT. Crockett Galveston Tex. 77550	713-768-1211 ext. 105
Texas Parks & Wildlife Dept.	1018 Todville (P.O. Box 8) Seabrook Tex. 77586	713-474-2811
Texas A&M University	5115 Hwy 3 Dickinson Tex. 77539	713-534-3413 713-948-2581 ext. 496

Figure 1 . Poster distributed in 1978 to promote the shrimp tagging program in Texas.

SHRIMP TAGGING RELEASE AREAS

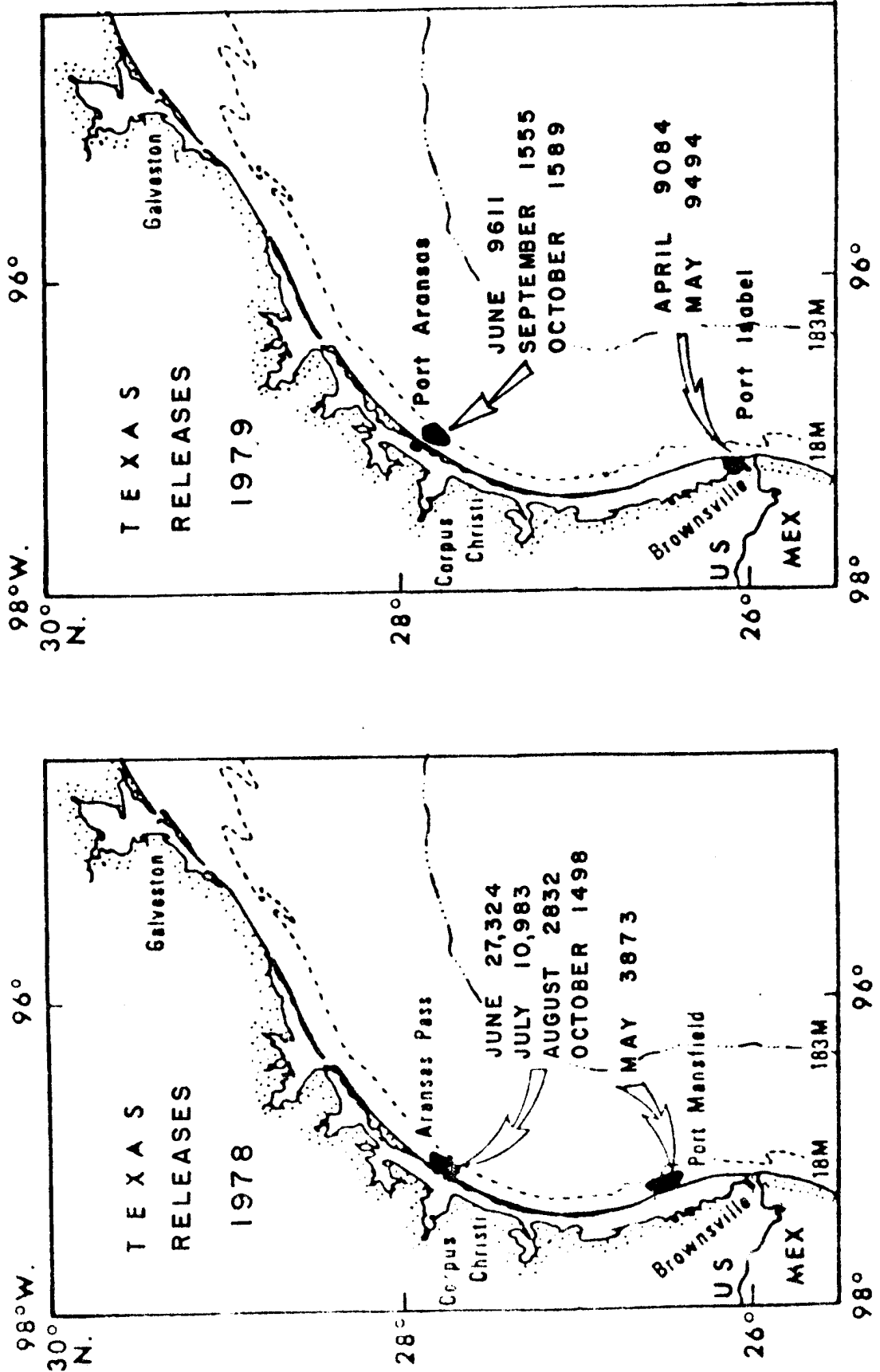


Figure 2. Release areas for Texas mark-recapture studies of penaeid shrimp in 1978 and 1979.

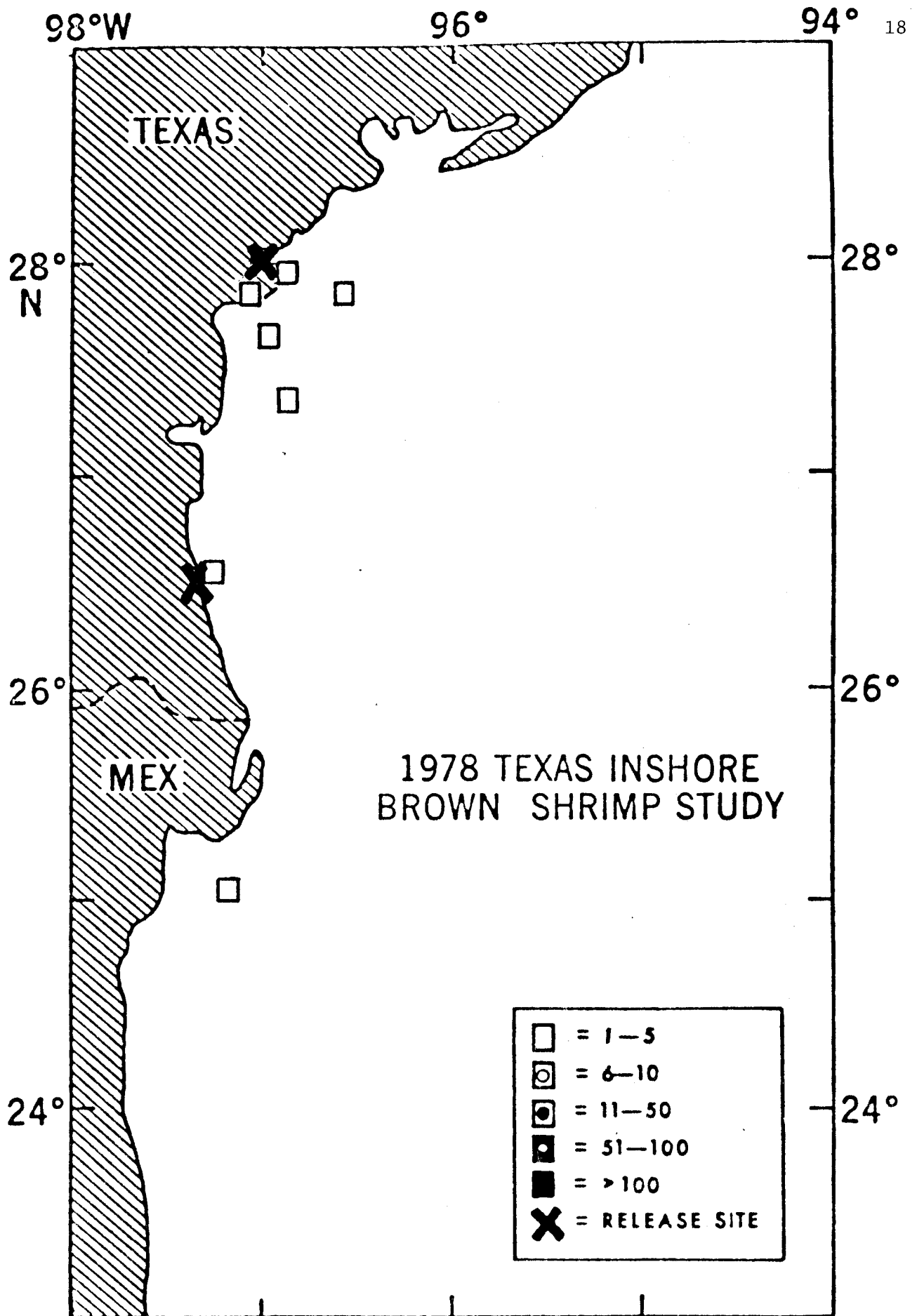


Figure 3. Distribution of recovered shrimp from inshore Texas studies in 1978.

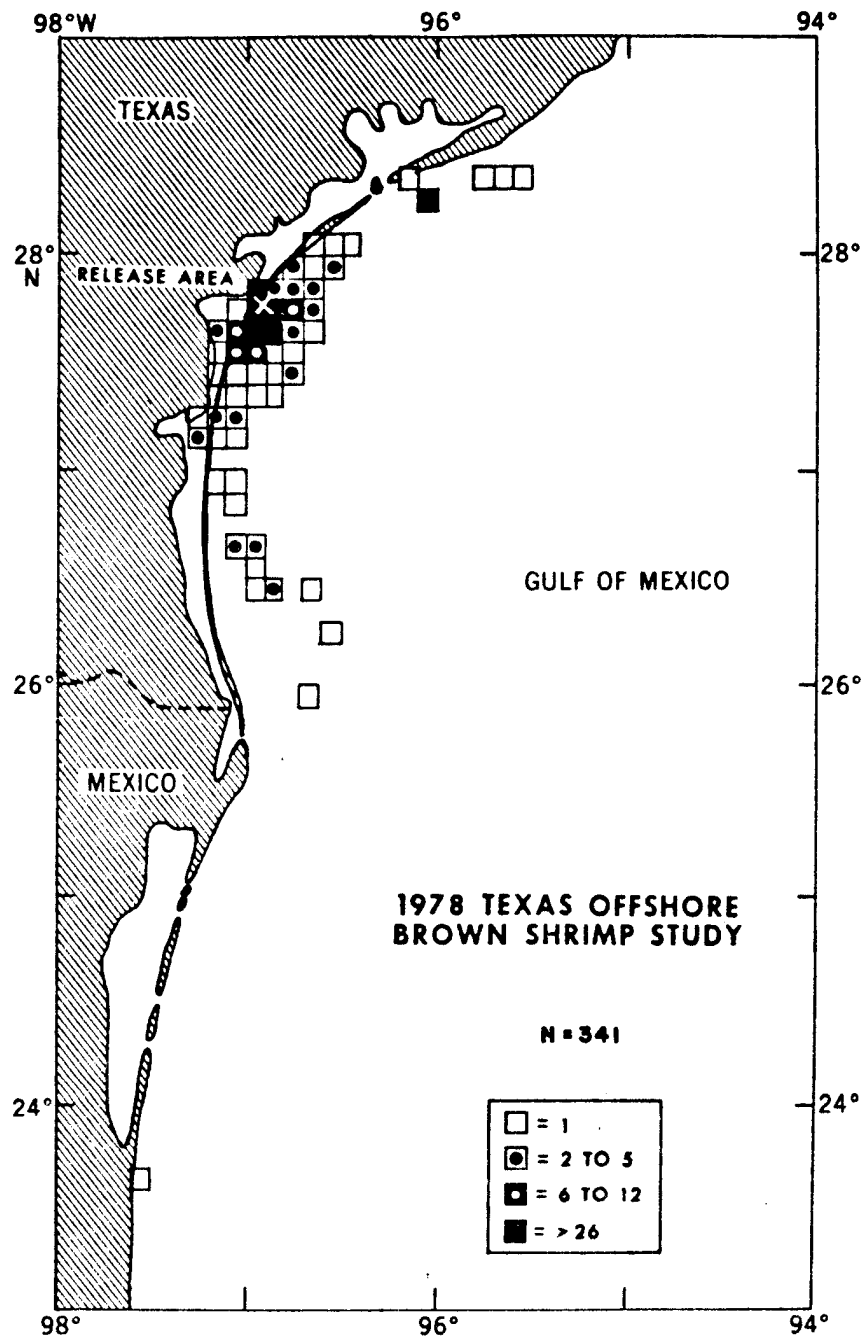


Figure 4. Distribution of recovered shrimp from offshore mark-recapture studies in Texas in 1978.

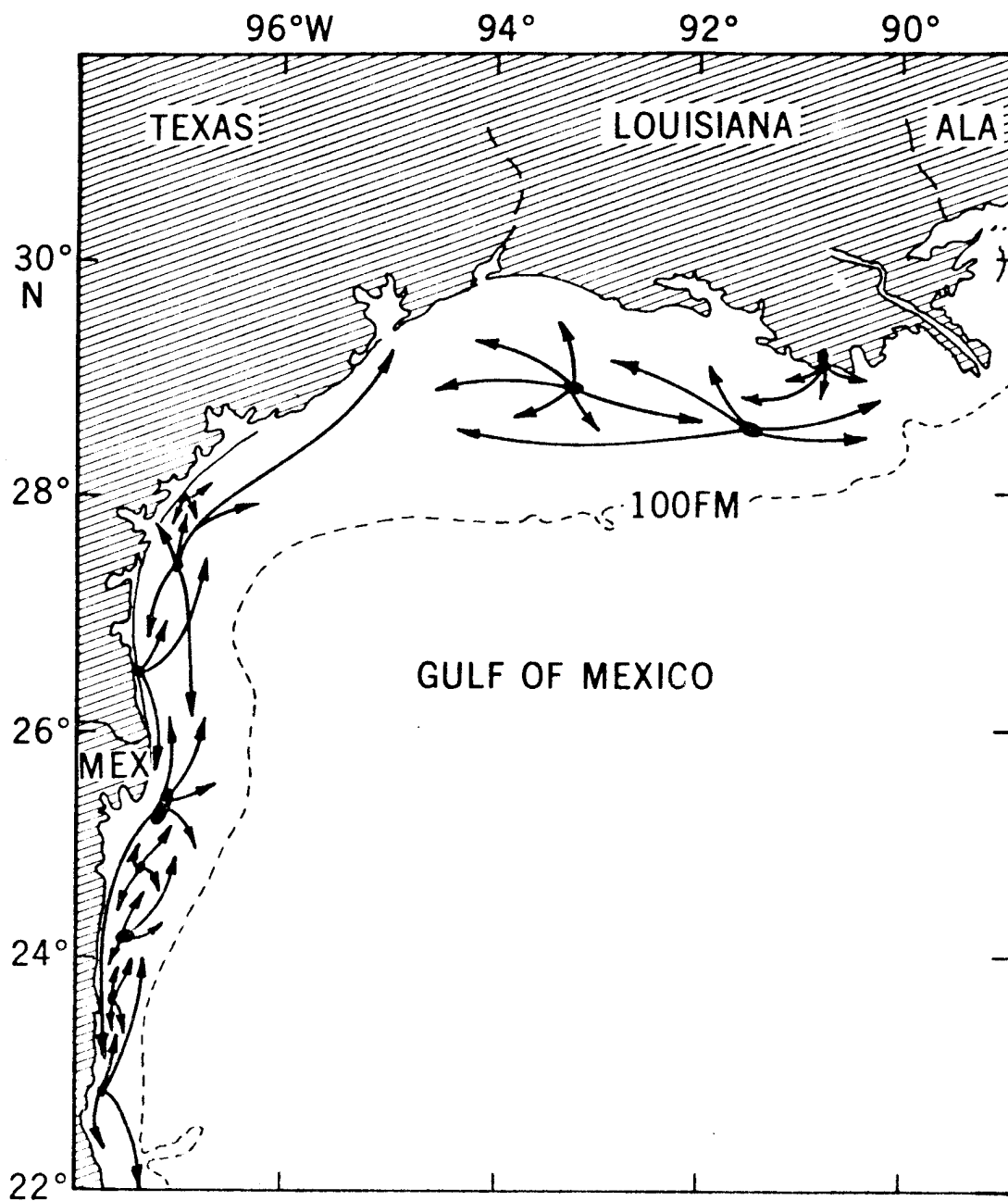


Figure 5. Preliminary movement patterns of penaeid shrimp released in MEXUS-GULF mark-recapture studies in 1978.

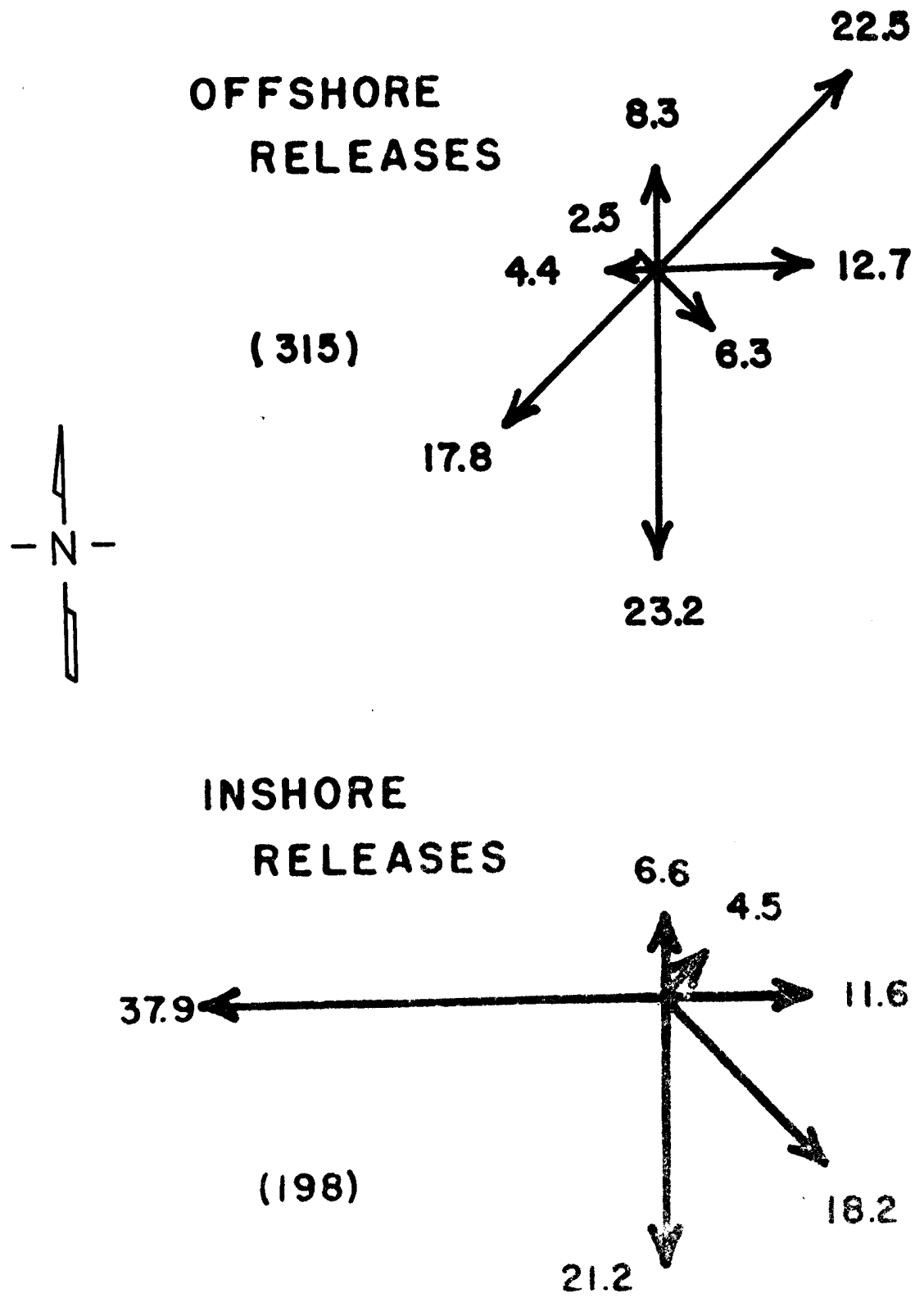


Figure 6. Percentage of recaptured shrimp moving in eight directions from offshore releases in 1978 and inshore releases in 1978 and 1979. (Directions represent 45-degree segments of the compass.)

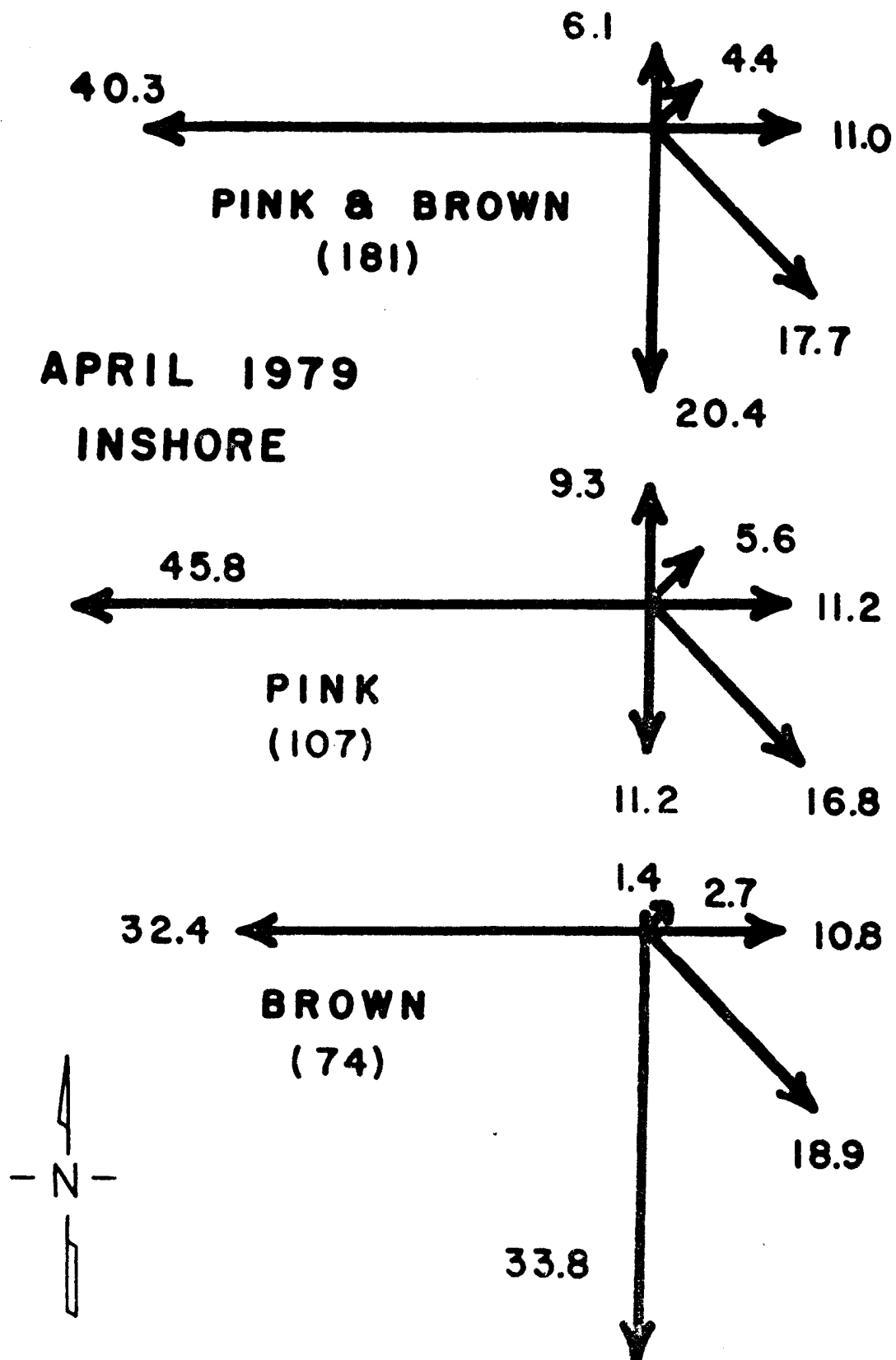
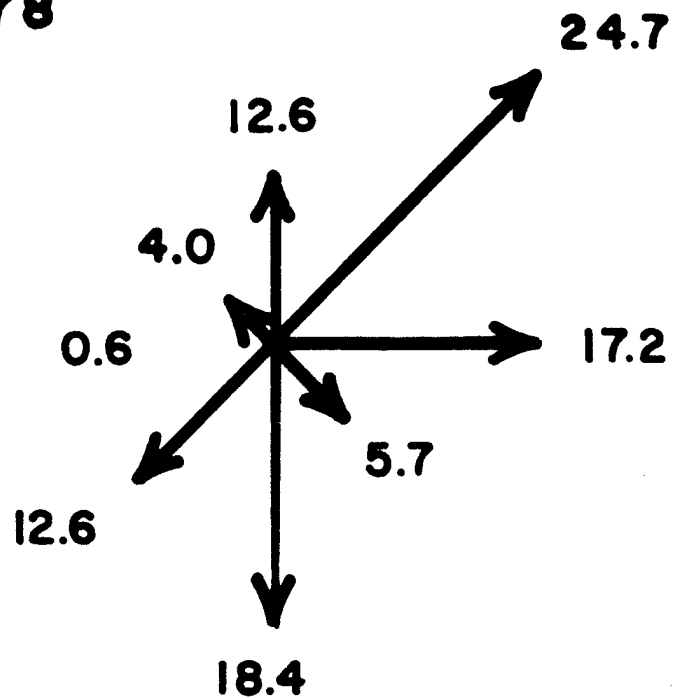


Figure 7. Percentage of recaptured shrimp moving in eight directions from an inshore release area near Port Isabel, Texas in April 1979. (Directions represent 45-degree segments of the compass.)

**AUGUST 1978
OFFSHORE**



**OCTOBER 1978
OFFSHORE**

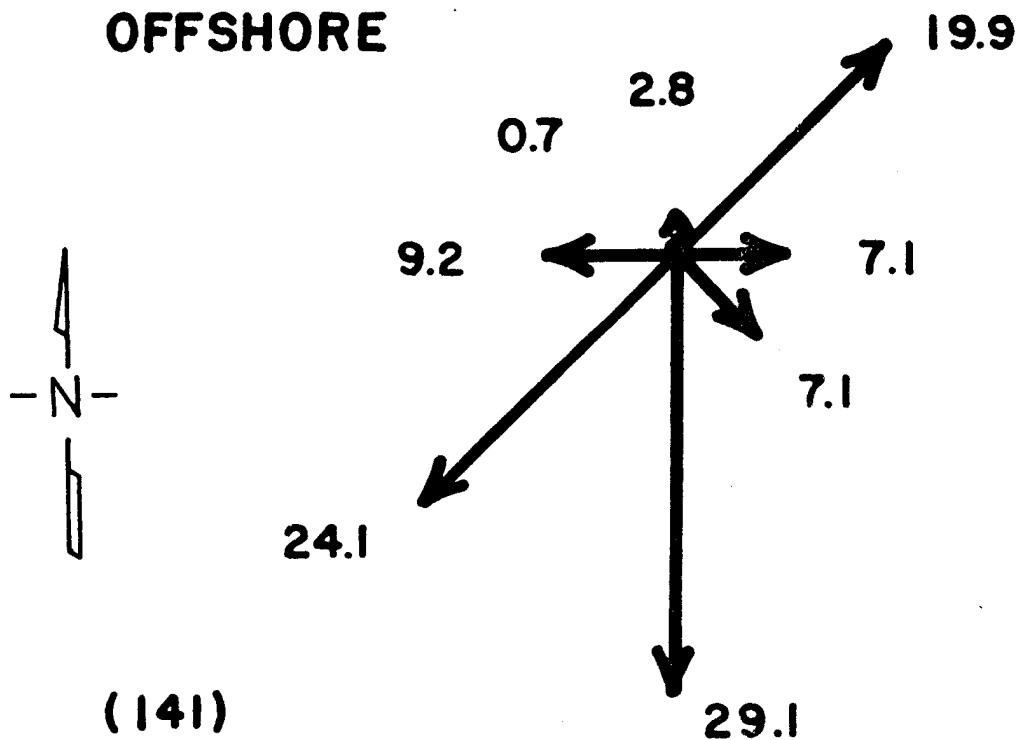


Figure 8. Percentage of recaptured shrimp moving in eight directions from release sites off the Texas coast in August and October 1978. (Directions represent 45-degree segments of the compass.)

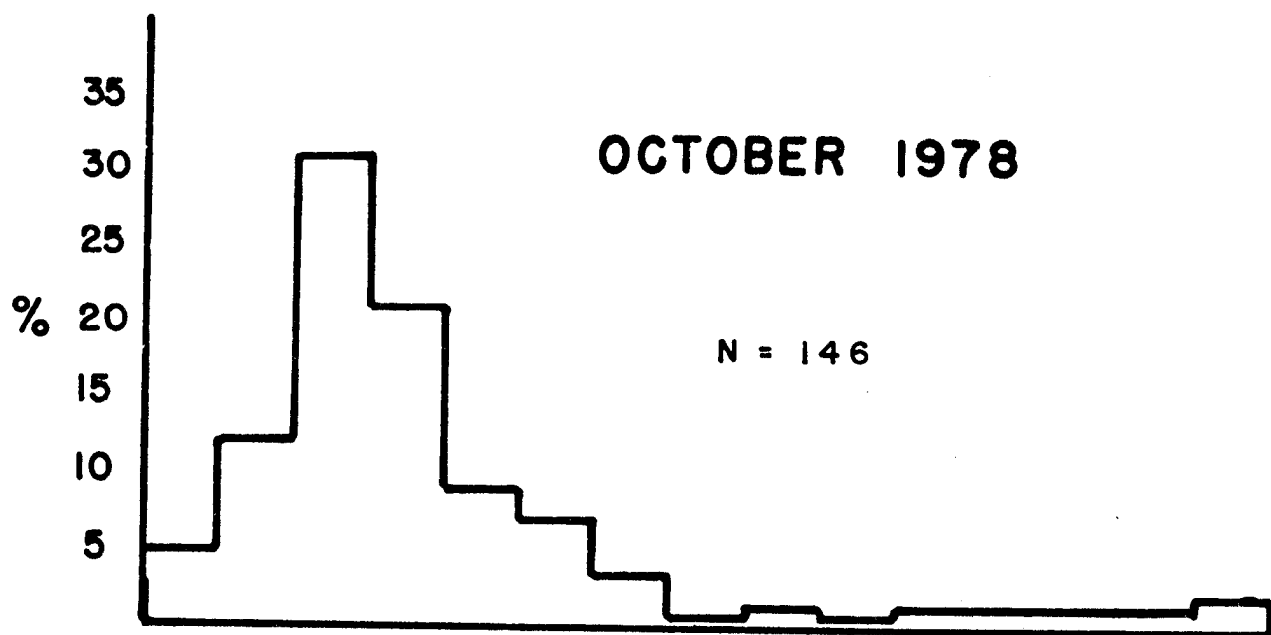
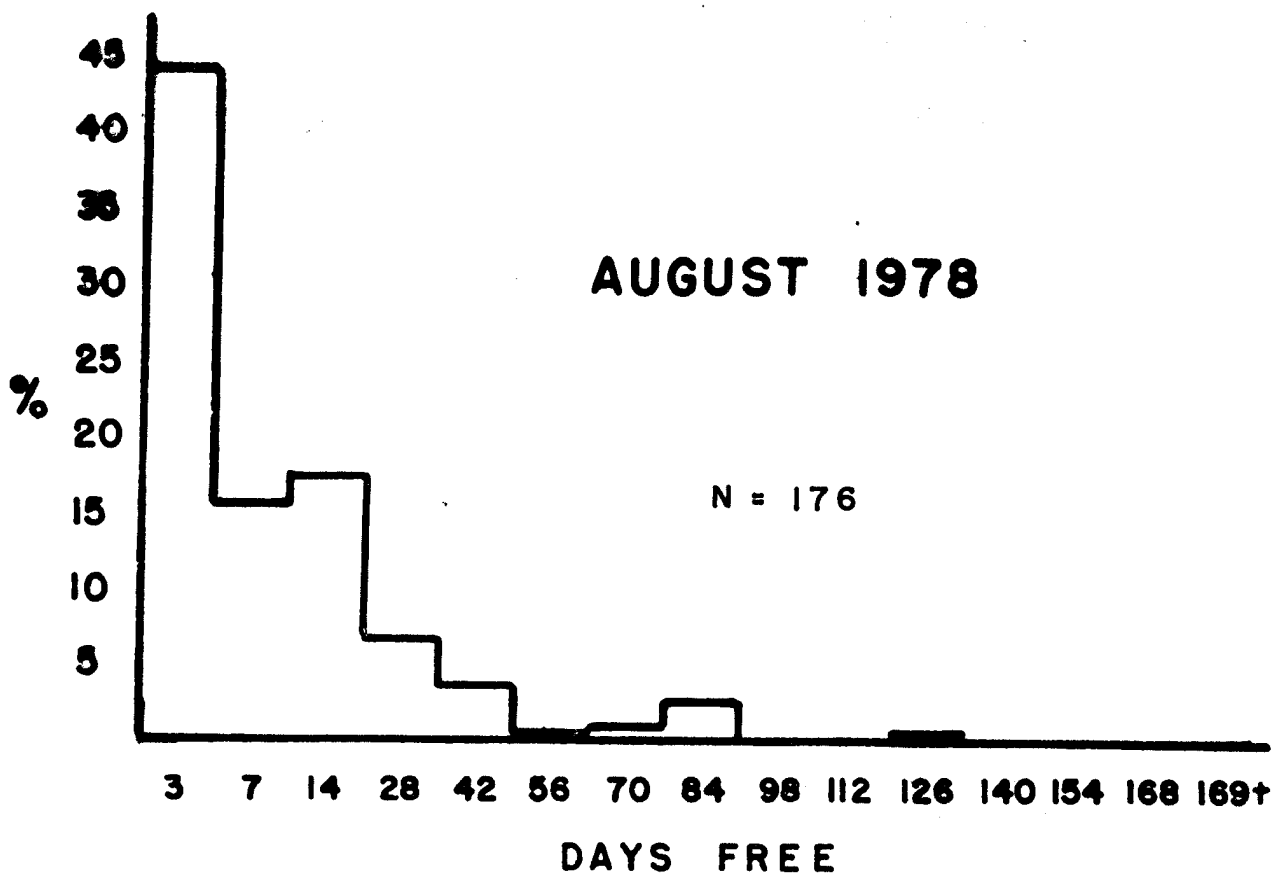


Figure 9. Number of days free for recaptured shrimp released off the Texas coast in August and October 1978.

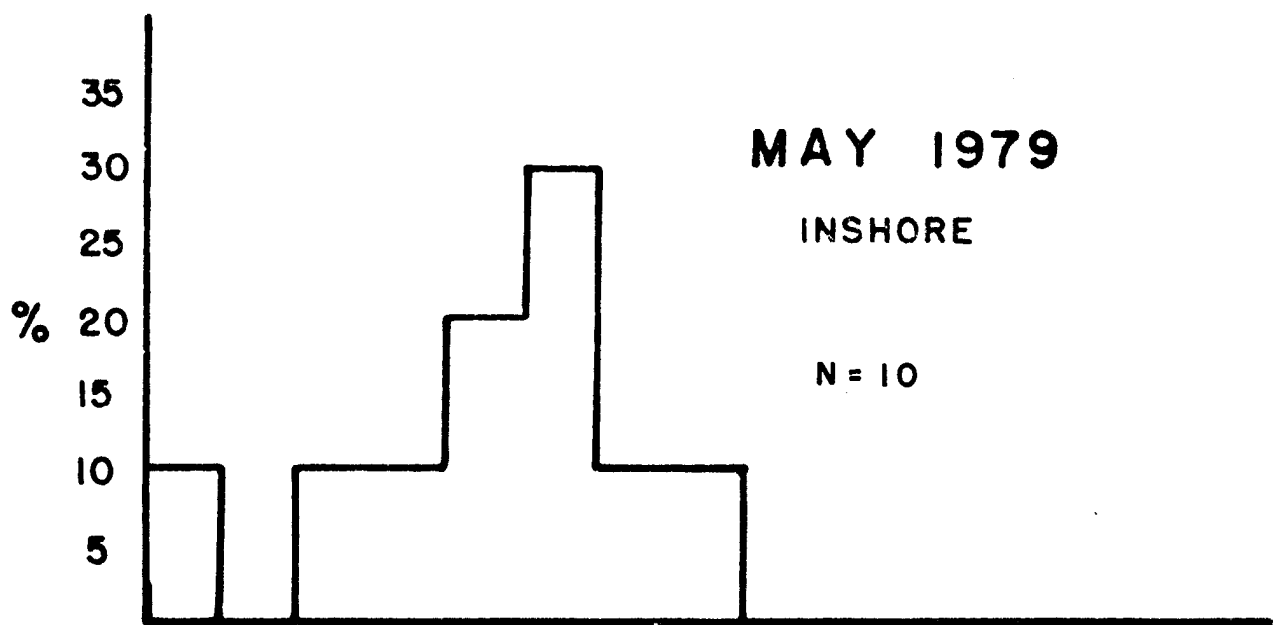
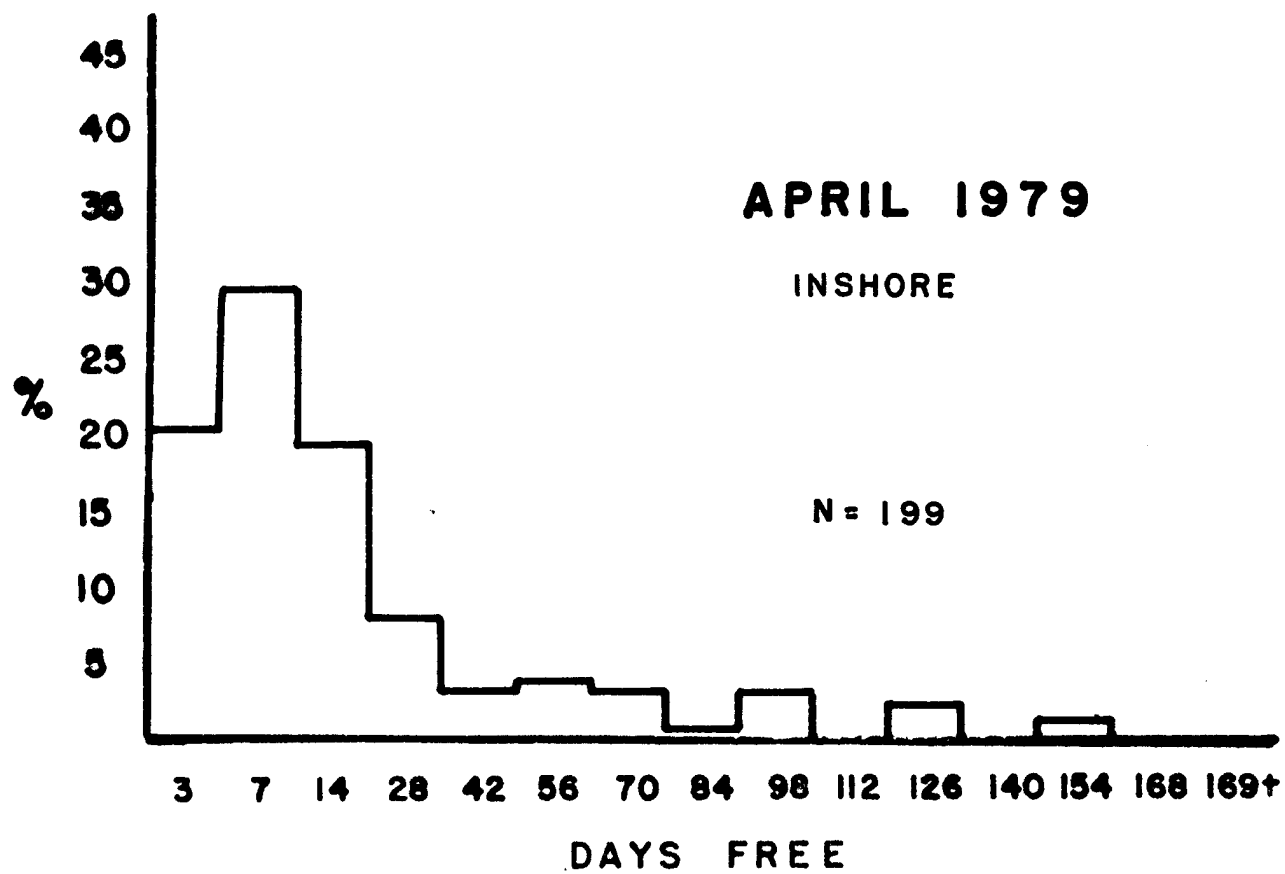


Figure 10. Number of days free for recaptured shrimp released near Port Isabel, Texas in April and May 1979.

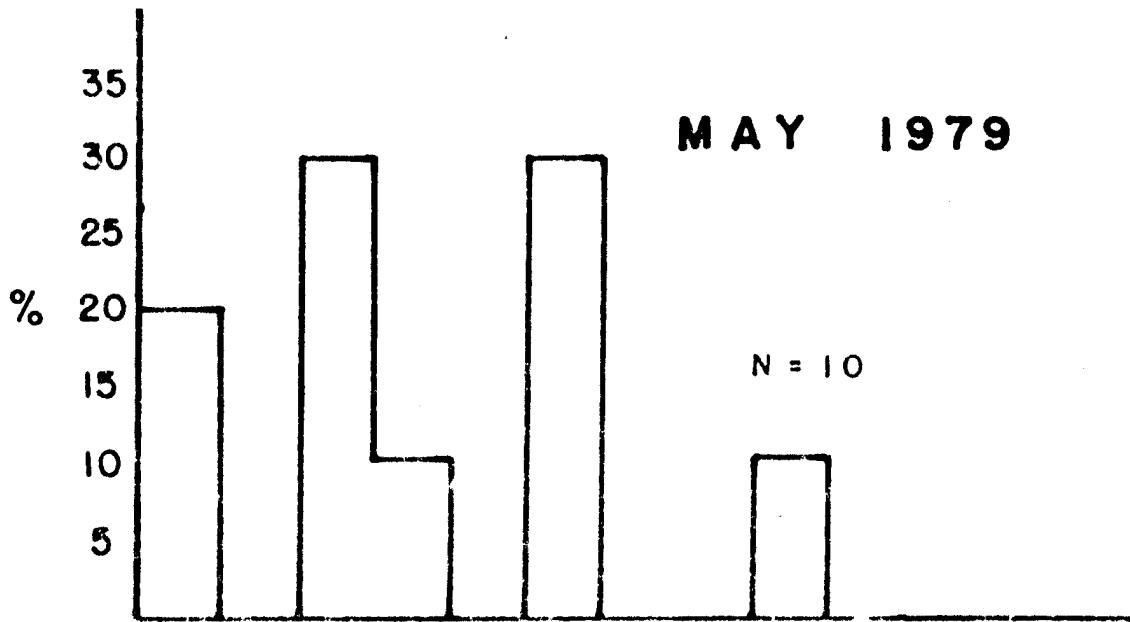
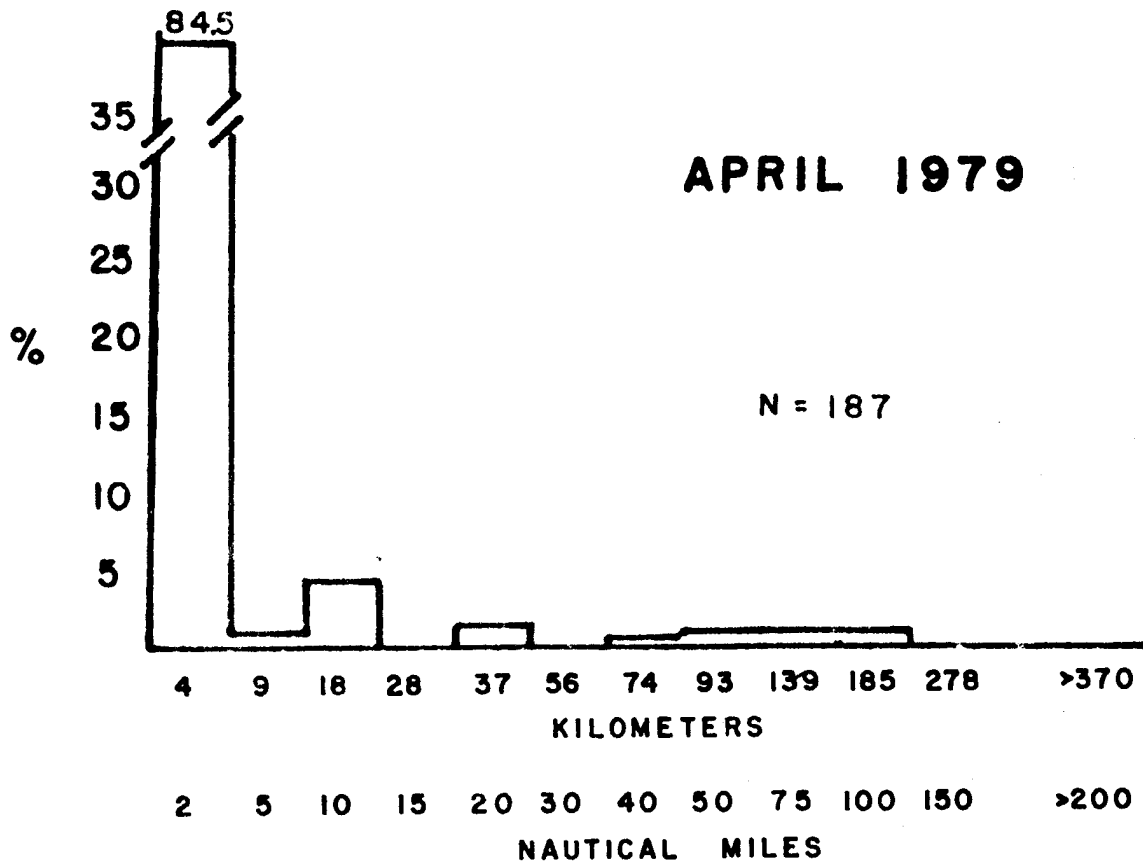


Figure 11. Minimum distance traveled by recaptured shrimp released near Port Isabel, Texas in April and May 1979.

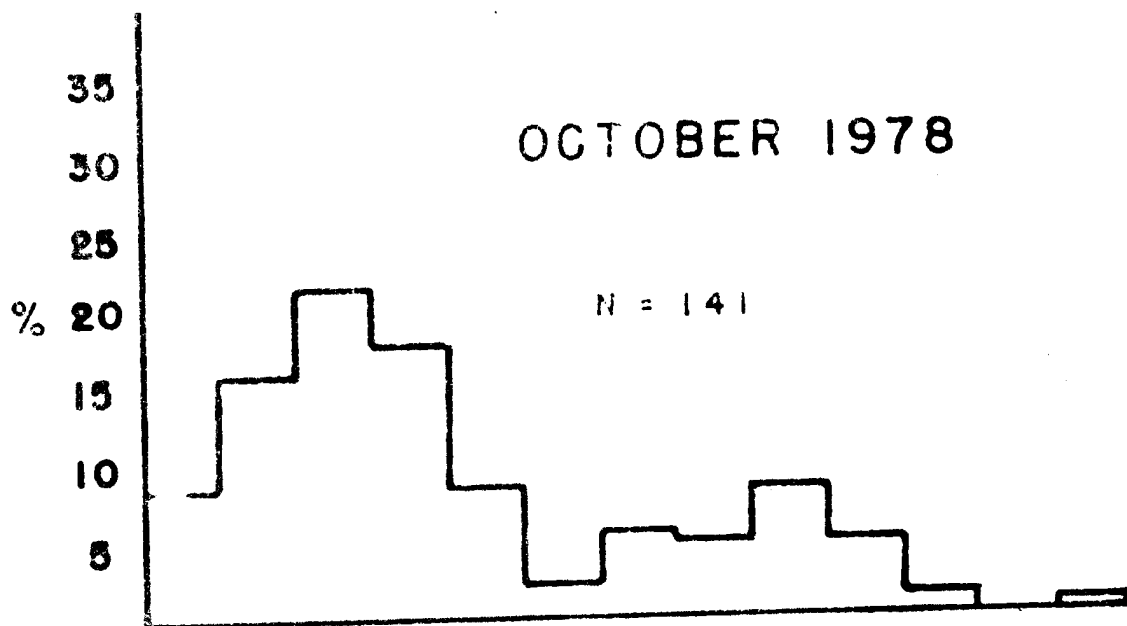
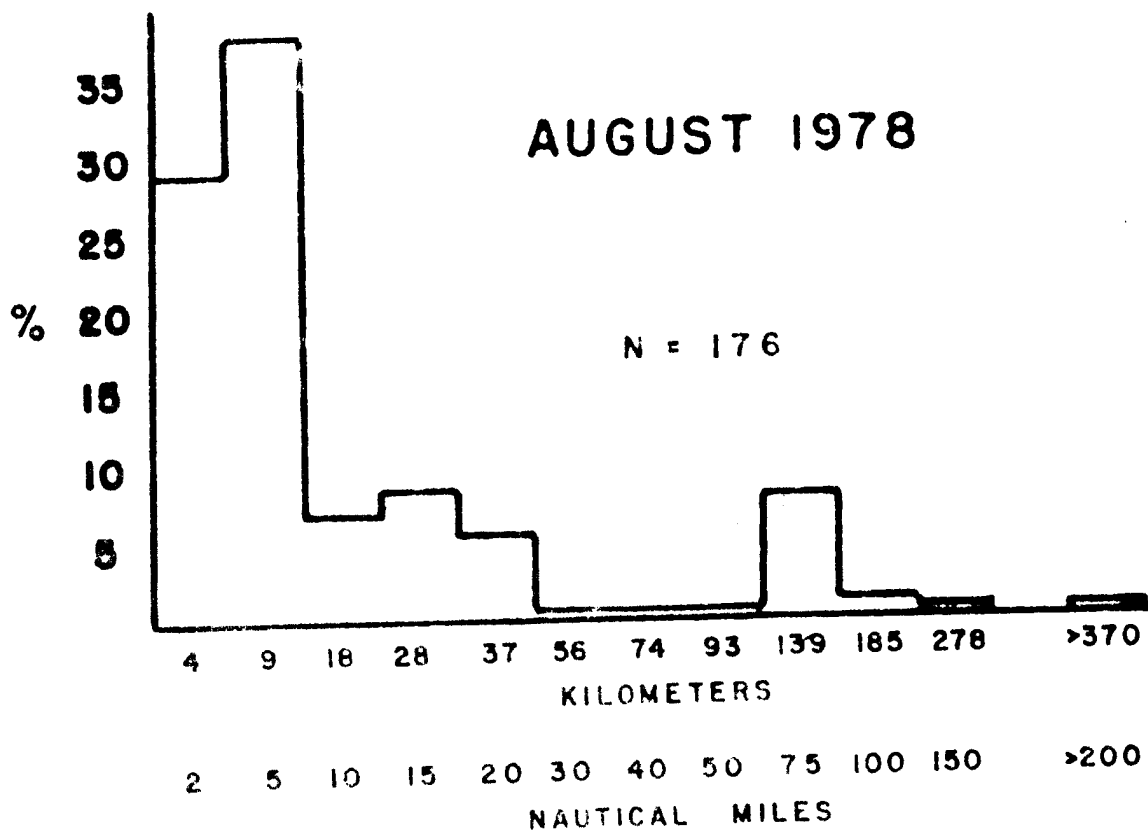
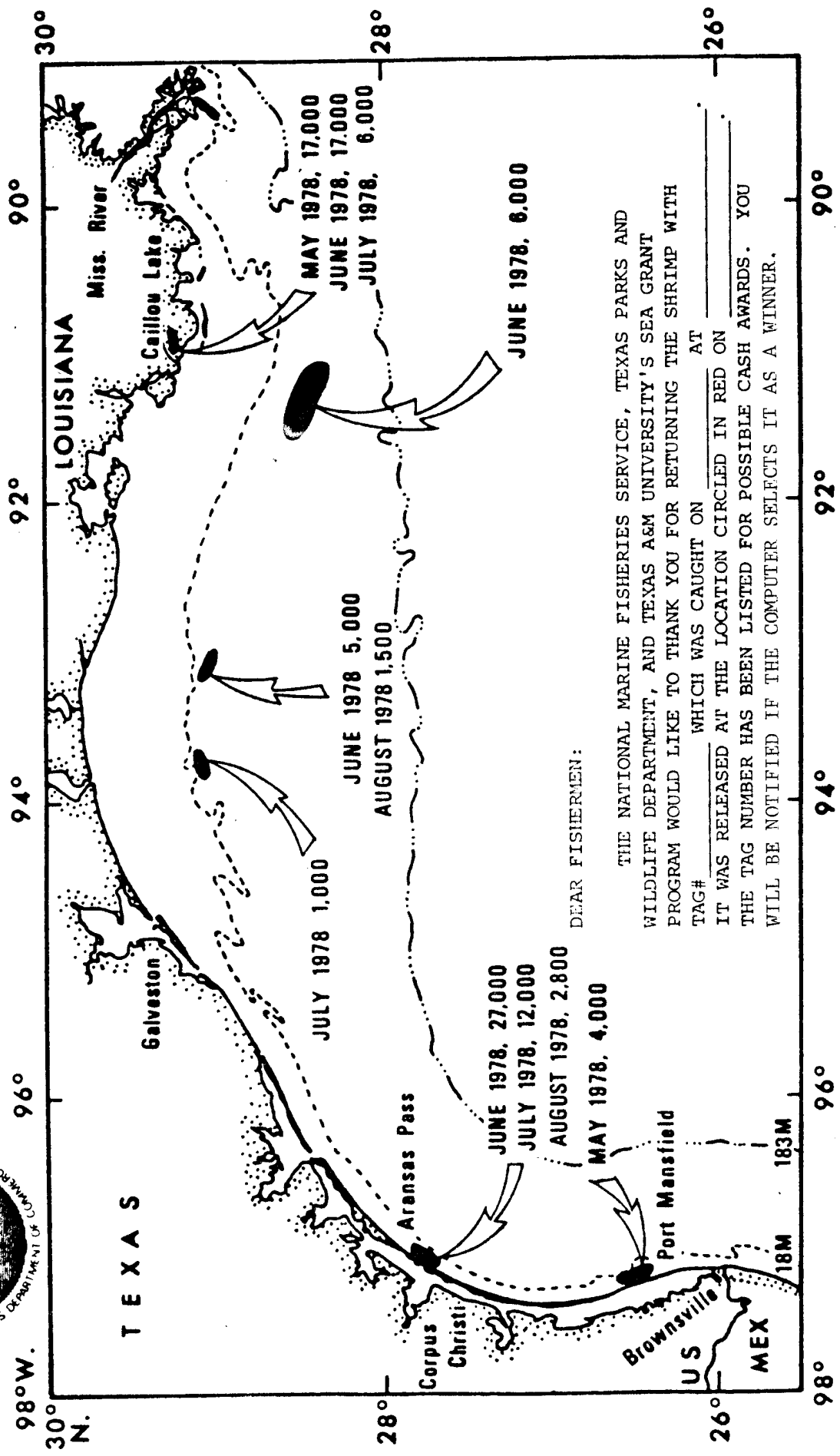


Figure 12. Minimum distance traveled by recaptured shrimp released off the coast of Texas in August and October 1978.

APPENDIX A. Letter to fishermen who have returned a tagged shrimp
from Texas releases in 1978.

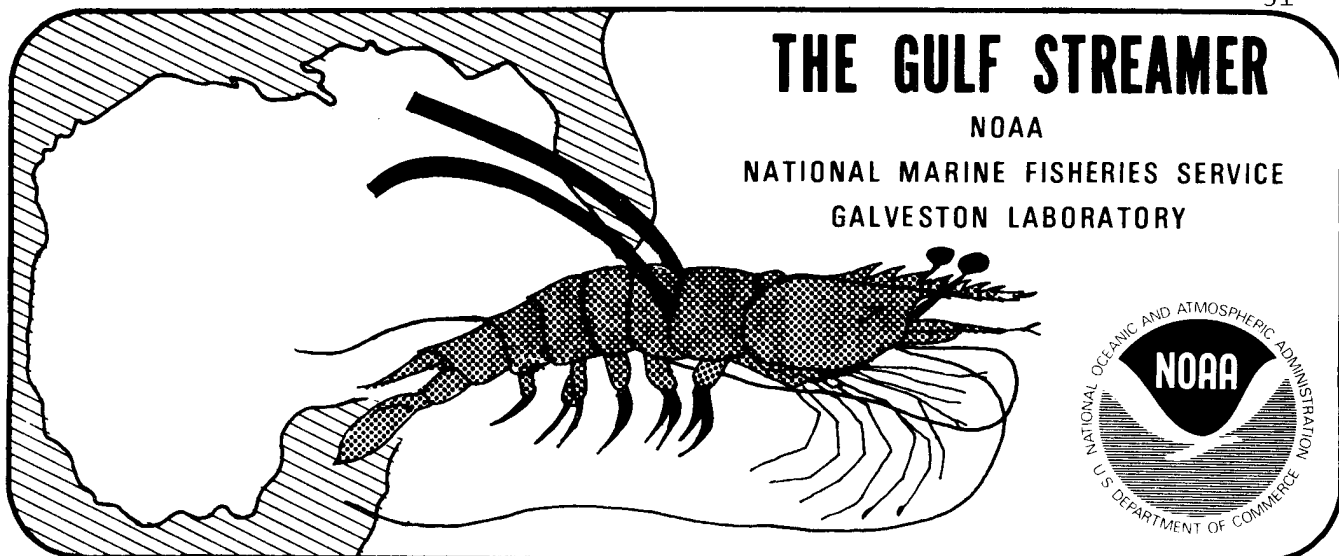


DEAR FISHERMEN:

THE NATIONAL MARINE FISHERIES SERVICE, TEXAS PARKS AND WILDLIFE DEPARTMENT, AND TEXAS A&M UNIVERSITY'S SEA GRANT PROGRAM WOULD LIKE TO THANK YOU FOR RETURNING THE SHRIMP WITH TAG# _____ WHICH WAS CAUGHT ON _____ AT _____ IT WAS RELEASED AT THE LOCATION CIRCLED IN RED ON _____ THE TAG NUMBER HAS BEEN LISTED FOR POSSIBLE CASH AWARDS. YOU WILL BE NOTIFIED IF THE COMPUTER SELECTS IT AS A WINNER.

Appendix A. Letter to fishermen who have returned a tagged shrimp from Texas releases in 1978.

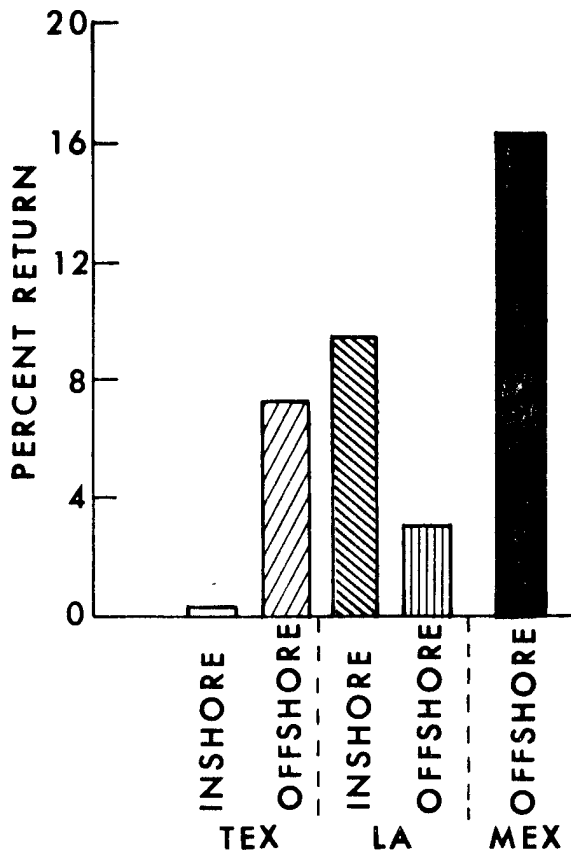
APPENDIX B. Shrimp tagging newsletter --"The Gulf Streamer"--
distributed to participants, fishermen and other
interested parties to keep them informed of progress
of the shrimp tagging program.



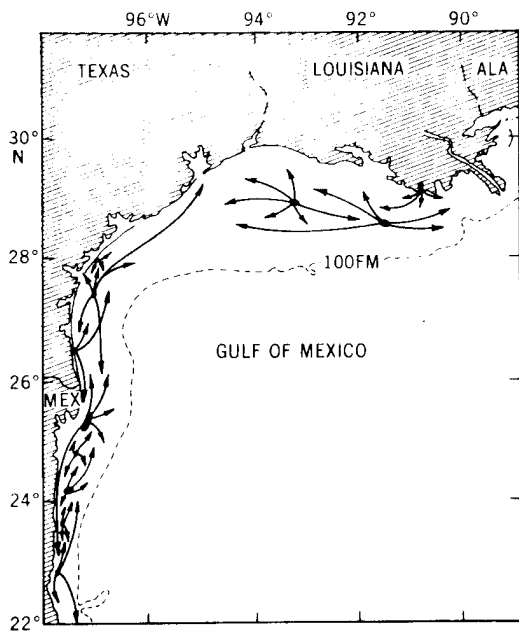
March 1979 Vol. 1 No. 1 Shrimp Tagging News

1978 TAGGING EFFORTS BEGINNING TO SHOW RESULTS

During 1978, tagged brown shrimp were released inshore and offshore Louisiana and Texas and offshore Mexico. A total of 6,039 of these shrimp have been recaptured as of February 28, 1979. Of the 107,457 tagged shrimp released, an overall return of 5.6% is shown. The largest percentage of return (16.6%) came from Mexican waters. Preliminary migration patterns based on returns are shown in the figure below.



1978
PERCENT RETURN FROM RELEASE SITES



1978
SHRIMP RELEASE SITES AND MIGRATION

A manuscript entitled "U.S.--Mexico Cooperative Shrimp Investigation in the Gulf of Mexico" written by Neal Baxter of NMFS and Guillermo Castro of Instituto Nacional de Pesca was presented at the project MEXUS-GULF meeting in November at Cancun, Mexico, as a summary of the project through October 1978.

The research project MEXUS-GULF is being coordinated by National Marine Fisheries Service (NMFS) from the Galveston Laboratory in cooperation with Texas Parks and Wildlife Department, Louisiana Department of Wildlife and Fisheries, the Sea Grant programs of Texas A&M University and Louisiana State University, and the Instituto Nacional de Pesca de Mexico.

CONTEST ENTRY RULES

To enhance the shrimp fishermen's interest in returning tagged shrimp, a contest offering rewards from \$50 to \$500 was held in 1978. There were contest drawings in Louisiana, Texas, and Mexico. The contest awards totaled \$6,800 last year. To be eligible for the drawings, a shrimp fisherman should follow these instructions: (1) put each tagged shrimp on ice or in a freezer as soon as possible after capture; (2) note the exact location of its capture, i.e., loran reading and depth; and (3) note the day of capture. When the vessel returns to port, notify the port agent or one of the people listed on the posters in the shrimp houses. It is imperative that the shrimp and support information be submitted without delay.

FEBRUARY CONTEST WINNERS DRAWN

The contest winners for the fourth contest drawing of Texas and Louisiana and the third drawing of Mexico have been announced. They are as follows:

TEXAS

1st Prize \$500.00	Art Hayes, #6778 Port Isabel, Texas vessel: DENGAY
2nd Prize \$200.00	James Hill, #7564 Corpus Christi, Texas
3rd Prize \$100.00	Jasinto Colunga, #6851 Brownsville, Texas vessel: LEON

4th Prize \$50.00	Antonio Barrios, #6387 Brownsville, Texas vessel: MISS CHARMAINE
----------------------	--

LOUISIANA

1st Prize \$500.00	Bobby Barbar, #201071 Grandbay, Alabama
2nd Prize \$200.00	Clifford Riggs, #213975 Ingleside, Texas
3rd Prize \$100.00	Oscar Thompson, #214187 Tampa, Florida
4th Prize \$50.00	Duke McCan, #200536 Gulf Shores, Alabama

MEXICO

1st Prize \$500.00	Teofilo Solis, #214797 Tampico, Tampico vessel: ODIN
2nd Prize \$200.00	Lorenzo Rexes (Reyes) M. #215731 Tampico, Tampico vessel: HALCON IV
3rd Prize \$100.00	Jose H. Blanco #216355 Tampico, Tampico vessel: MOBY DICK
4th Prize \$50.00	Guillermo, Rueda H. Jara #217231 Tampico, Tampico vessel: CAMORONES V

Winners were selected by a computerized random number generator to assure randomness, with consideration given to those shrimp at large for the longest period of time.

The next contest drawing will be held in May. For a complete listing of past or future winners, please contact the National Marine Fisheries Service, Galveston Laboratory, 4700 Avenue U, Galveston, Texas 77550.

CERTIFICATE OF RECOGNITION

Awarded to

on the _____ day of _____, _____

for cooperation and assistance in recovery of tagged
shrimp in Project Mexus-Gulf, a coordinated study of
the Gulf of Mexico shrimp fishery
by the:

NATIONAL MARINE FISHERIES SERVICE
LOUISIANA DEPARTMENT OF WILDLIFE AND FISHERIES
TEXAS PARKS AND WILDLIFE DEPARTMENT
LOUISIANA STATE UNIVERSITY, CWR, SEA GRANT
TEXAS A&M UNIVERSITY, SEA GRANT
INSTITUTO NACIONAL DE PESCA OF MEXICO

Dr Edward F. Klima
Dir., Galv. Lab., NMFS



CERTIFICATE OF RECOGNITION WILL BE GIVEN TO FISHERMEN WHO RETURN TEN OR MORE TAGGED SHRIMP

PROJECT MEXUS-GULF--1979

Project MEXUS-GULF will continue shrimp tagging and evaluation of growth and migration rates in 1979.

The tagging phase of the project will include approximately 20 releasing trips for Texas, Louisiana, and Mexico, with a projected total of 200,000 shrimp released over a nine-month period in 1979. White shrimp were tagged in the offshore waters of Louisiana this January by the biologists aboard NOAA/FRS OREGON II; however, brown and white shrimp will be the target species during the remainder of this year.

UPCOMING CONTEST CHANGES

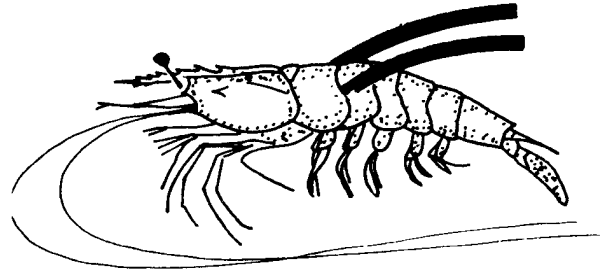
A revised award system will soon go into effect. This system will provide more money for more winners. The present system allows for awards of first prize \$500, second prize \$200, third prize \$100, and fourth prize \$50. The new system provides \$500 as first prize, \$100 as second prize, and six prizes of \$50 each.

A Certificate of Recognition will be added to the award system in 1979. It will be presented to each shrimp fisherman who returns ten or more shrimp to the National Marine Fisheries Service. This Certificate will be issued from the Galveston Laboratory.

To be eligible for monetary or certificate awards, fishermen are urged to follow the steps outlined in the "Contest Entry Rules" article in this publication.

TWO SHRIMP RETURNED FROM MEXICO

Two shrimp released in Texas during the 1978 shrimp tagging studies conducted by the National Marine Fisheries Service have been returned from Mexican waters. After a southerly movement, the first shrimp was caught by a Texas vessel 250 miles from Aransas Pass, where the shrimp was released 111 days earlier. The second shrimp, also moving south, was caught by a Mexican vessel 217 days after release off Port Mansfield, 90 miles away. ~~sk~~

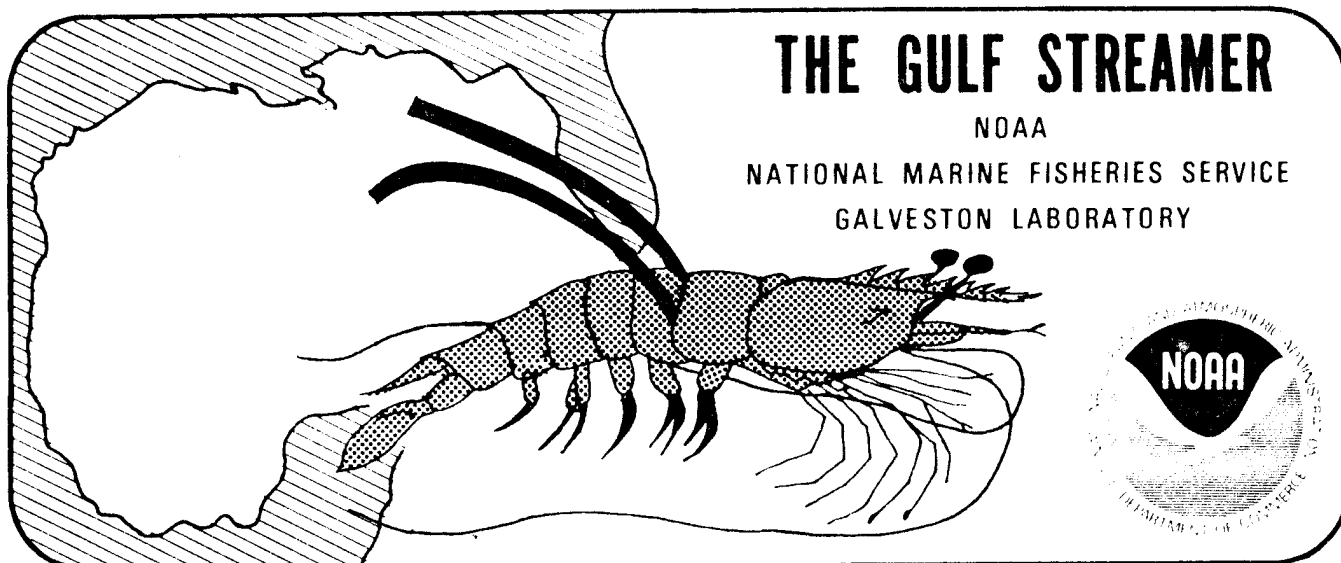


SHRIMP ARE TAGGED WITH ORANGE,
BLUE, GREEN, AND BLACK TAGS

LABORATORY PERSONNEL TRAVEL TO MEXICO

Dennis Emiliani and Gilbert Zamora of the Galveston Laboratory of National Marine Fisheries Service traveled to

San Fernando, Mexico, on February 20-25 to meet with biologists of Instituto Nacional de Pesca of Mexico. Plans for inshore tagging studies in the Laguna Madre of Mexico were furthered and field sites were selected for these studies to be held in April, May, and June of this year. ~~sk~~



JUNE 1979 Vol. 1 No. 2 Shrimp Tagging News

New Study Site Selected In Mexico

A study site approximately seventy-five miles due south of Brownsville, Texas in the Laguna Madre Tamulipas of Mexico was selected in February of this year to carry out research on wild shrimp resources. This is the first inshore shrimp study in Mexico for the MEXUS GULF Project.

Three of these inshore tagging studies in Mexico will be completed by the end of the summer. During April approximately three thousand shrimp were tagged and released at the new site. Eighty five percent of those released were brown shrimp, eleven percent pink shrimp, and four percent white shrimp. The second study was completed June 1. Of approximately 5,500 shrimp tagged and released, less than

one percent was composed of pink and white shrimp and more than ninety-nine percent were brown shrimp. The third study will begin in July.

Galveston Laboratory personnel and personnel from the Instituto Nacional de Pesca of Mexico are cooperating in the field phase of the inshore Mexico studies for the MEXUS GULF Project.

The MEXUS GULF Project, first initiated in 1977, is an international cooperative shrimp mark and recapture program designed to provide researchers with information pertaining to penaeid shrimp growth and migration from the estuary and along the Gulf of Mexico coast. National Marine Fisheries Service is coordinating the Project with Instituto Nacional de Pesca, Louisiana and Texas Sea Grant Agencies, Texas Parks and Wildlife, and Louisiana Wildlife and Fisheries. Project MEXUS GULF tagging studies began in 1977 inshore and offshore Louisiana and off Texas. Offshore Mexico and inshore Texas studies were added in 1978. Inshore studies in Mexico were initiated this year as the most recent phase of Project MEXUS GULF.



Instituto Nacional de Pesca personnel tagging shrimp at Laguna Madre Tamaulipas site.

Transborder Travelers

Eight tagged shrimp released in Texas and Mexico waters in 1978 and 1979 crossed the US-Mexico border as of June 22.

Four of the shrimp were released from the NOAA Research Vessel OREGON II in offshore Mexico waters in September, 1978. Three shrimp were released in offshore Texas waters between early August and mid October, 1978. The remaining shrimp was released in a Texas Estuary in May of

1978 and was recaptured 227 days later. Of the eight transborder travelers, the latter remained at large for the longest period of time.

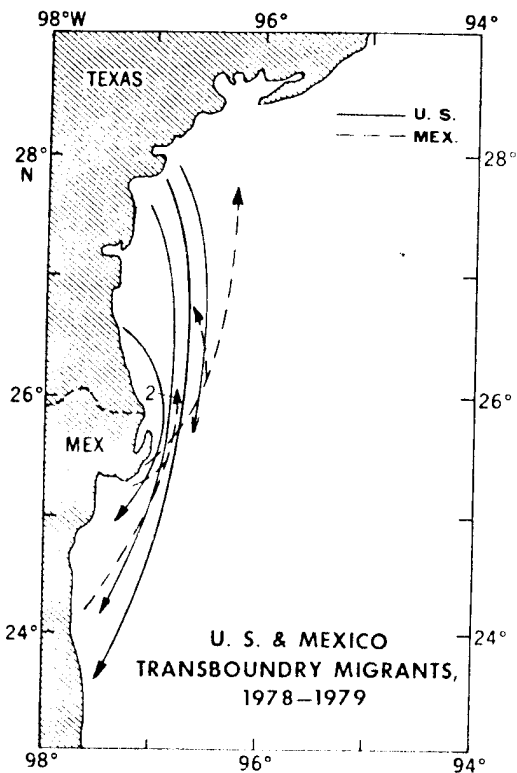
These recoveries have provided researchers with preliminary information regarding migration patterns of Texas and Mexico penaeid shrimp stocks.



May, six thousand penaeid shrimp were tagged and released inshore and three thousand were released in offshore Mexican waters.

SUMMARY

Through the third week in June, a total of seventy thousand tagged shrimp were released in 1979. By the end of the year another one hundred and thirty thousand are scheduled for release from Grand Isle, Louisiana to Tampico, Mexico.



Shrimp Release Update

LOUISIANA

The first offshore tagged shrimp release of 1979 was made in January off Louisiana. Six thousand white shrimp were tagged and released from the NOAA R/V OREGON II. Inshore studies began in April with the release of five thousand tagged brown and white shrimp in each of two locations, Caillou Lake and Barataria Bay. Another ten thousand tagged brown and white shrimp were released in May at these sites.

TEXAS

A total of ten thousand tagged brown, white, and pink shrimp were released during the Texas inshore studies which began in April at Port Isabel. In May an additional ten thousand shrimp were released at Port Isabel while twelve thousand were tagged and released off the south Texas coast.

MEXICO

Inshore tagging studies were initiated in April when three thousand brown, white, and pink shrimp were released in the Laguna Madre of Mexico. In

Return Update

In 1978, a total of 107,457 brown and pink shrimp were tagged and released at designated sites in Texas, Louisiana, and Mexico.

Roughly 6% of the tagged shrimp released in 1978 studies had been returned as of the third week in June, 1979. The largest number of returns came from the Mexico offshore study. Approximately 21% of the 9,024 shrimp released have been returned. The return percentages for Texas were: 0.02% of 42,188 released inshore and 7.6% of 4,330 released offshore. Louisiana studies return percentages were as follows: 9.8% of 38,378 released inshore and 3.6% of 13,545 released offshore.

Over eight hundred of the shrimp released in 1979 have been returned to National Marine Fisheries Service, Galveston Laboratory. Presently, the highest return rate (5.6%) is from the January offshore Louisiana study.

The awareness and response of the fishermen has netted them over \$30,000 in Fishing Contest award money. Their continuing cooperation is an important factor in the success of this program.



1978 SHRIMP TAGGING STUDIES
RECAPTURE OF ALL SPECIES AS OF 22 JUNE 1979

AREA	RELEASED	RECAPTURED	PERCENT
TEXAS INSHORE	42,188	7	< 0.1
TEXAS OFFSHORE	4,330	328	7.6
LOUISIANA INSHORE	38,378	3,750	9.8
LOUISIANA OFFSHORE	13,545	482	3.6
MEXICO INSHORE	0		0.0
MEXICO OFFSHORE	9,024	1,874	20.8
TOTAL	107,457	6,448	6.0

1979 SHRIMP TAGGING STUDIES
RECAPTURE OF ALL SPECIES AS OF 27 JUNE 1979

AREA	RELEASED	RECAPTURED	PERCENT
TEXAS INSHORE	10,561	152	0.0
TEXAS OFFSHORE	11,630	0	0
LOUISIANA INSHORE	17,261	302	1.8
LOUISIANA OFFSHORE	5,080	330	5.6
MEXICO INSHORE	2,082	0	0
MEXICO OFFSHORE	3,332	0	0
TOTAL	59,594	784	1.3

Tagged Shrimp Days-Out Record Set

A female white shrimp was recaptured 527 days after release in September, 1977, in Caillou Lake, Louisiana. This is a days-out record for the MEXUS GULF Project.

The shrimp was recaptured in four fathoms of water south of Marsh Island, Louisiana in February, 1979, by Timothy Schouest, Sr. of New Iberia, Louisiana. Since its release, the shrimp had grown from 50 mm tail length (an estimated 160 head-on count per pound) to 80 mm (40 head-on count). A less than average growth rate could possibly be accounted for by the time period of two winters and one summer that elapsed between release and recapture of the shrimp. It has been shown that shrimp grow more slowly in cooler temperatures.

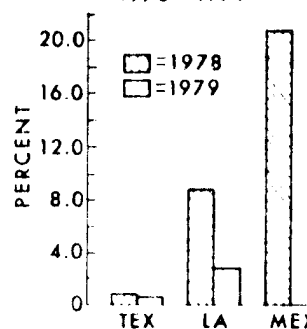
TIMS Contribution

The Technical Information Management Service, TIMS, is a vital connection between the shrimp fishing industry and government agencies. Economic and biological information gathered by TIMS is compiled and disseminated in such forms as Market News.

TIMS collects tagged shrimp and support information necessary for research on growth, mortality, and migration from fishermen and dealers. TIMS also conducts interviews which yield valuable information concerning catch volume, species and size composition, gear type, and effort expended by the shrimp fishery.

TIMS is centered in Miami, Florida at the Southeast Fisheries Center Laboratory and is directed by Eric Groess. The Statistical Division of TIMS coordinates all field work through four area supervisors located in North Carolina, Florida, Louisiana, and Texas. Each major port in those states has at least one port agent. According to Kem Newlin, Chief of the Statistical Division, there are special agents located in Houma, New Iberia, and Delcambre, Louisiana and Brownsville, Texas. These agents have the specific duty of collecting tagged shrimp and information directly related to shrimp research being conducted at the Galveston Laboratory.

PERCENT RECAPTURE
1978-1979



Final Contest Drawing for '78 Held

The final contest winners for 1978 were selected by computer for Texas, Louisiana, and Mexico on May 8.

A modified award system will be initiated in 1979. The new system includes monetary awards differing from previous drawings and the addition of Certificates of Recognition. The monetary award increase raises the total awarded per drawing from \$2550 to \$2700. Now, a \$500, \$100, and six \$50 prizes will be presented. Previously, the prizes were \$500, \$200, \$100, and \$50. Additionally, Certificates of Recognition will be presented to fishermen who return ten or more tagged shrimp.

Although the award system has changed, the procedures for entering the contest have not. Preserve the tagged shrimp as soon as possible, make notations as to date and exact location of the catch and record loran readings and depth. Notify a port agent or a participant listed on the Contest Posters so that your tagged shrimp can be entered in the contest.

The next contest drawings will be held in early July. To be eligible, all information must be received by the Galveston Laboratory by July 5th. Names of prize winners and Certificate recipients may be obtained by contacting the National Marine Fisheries Service, Galveston Laboratory, Attention: Gulf Streamer, 4700 Ave. U, Galveston, TX 77550.

Sea Turtle Tag Reward

During May through October, 1979, a number of shrimp trawlers fishing from Charleston, South Carolina, to Brownsville, Texas, will be assisting National Marine Fisheries Service personnel in evaluating a prototype sea turtle excluder trawl. During the excluder trawl evaluation, sea turtles will be captured, tagged with metal tags crimped into the base of one of the front flippers or attached by a steel wire through a hole in the turtle's shell, and released. If a tagged turtle is recaptured or found beached, please send the tag with date, location, and method of capture to the address below. A \$5.00 reward will be paid for each turtle tag returned.

National Marine Fisheries Service
P.O. Drawer 1207
Pascagoula, MS 39567

NOTICE

TO

READERS

To have a name and address added, removed, or corrected on the mailing list, write to:

National Marine Fisheries Service
Galveston Laboratory
Attention: Gulf Streamer
4700 Ave. U
Galveston, TX 77550

U.S. DEPARTMENT OF COMMERCE
NOAA
National Marine Fisheries Service
SEFC Galveston Laboratory
4700 Ave U
Galveston, TX 77550

Official Business
Penalty For Private Use \$300

Postage and Fees Paid
COM 210



APPENDIX C. Daily release summaries for penaeid shrimp tagging studies in Texas (1978-1979).

Table 1 . Daily release summary for penaeid shrimp tagging.

Texas Shrimp Tagging Operation No. 1
 Port Mansfield, Texas (INSHORE)
 May 16-21, 1978

Date	Tag Series	No. Tagged	No. Not Released	% Not Released	No. Released
	(orange tags)				
5-18-78	118,001 - 119,300	1293	63	4.9	1230
5-19-78	119,301 - 120,200	899	14	1.6	885
5-21-78	120,201 - 122,000	1790	32	1.8	1758
	Final Totals	3982	109	2.7	3873

Table 2. Daily release summary for penaeid shrimp tagging.

Texas Shrimp Tagging Operation No. 2
 Port Aransas, Texas (INSHORE)
 June 6-15, 1978

Date	Tag Series	No. Tagged	No. Not Released	% Not Released	No. Released
	(orange tags)				
6-6-78	122,001 - 124,200	2186	45	2.1	2141
6-7-78	124,201 - 127,000	2782	107	3.8	2675
6-8-78	127,001 - 130,000	2985	126	4.2	2859
6-9-78	112,001 - 115,000	2989	75	2.5	2914
6-10-78	115,001 - 118,000				
	111,401 - 112,000	3571	337	9.4	3234
6-11-78	107,401 - 111,400	3979	285	7.2	3694
6-12-78	104,001 - 107,400	3389	192	5.7	3197
6-13-78	101,201 - 104,000	2565	75	2.9	2490
6-14-78	98,401 - 101,600	3015	51	1.7	2964
6-15-78	97,201 - 98,400	1198	42	3.5	1156
	Final Totals	28,659	1335	4.7	27,324

Table 3. Daily release summary for penaeid shrimp tagging.

Texas Shrimp Tagging Operation No. 3
 Port Aransas, Texas (INSHORE)
 July 11-20, 1978

Date	Tag Series	No. Tagged	No. Not Released	% Not Released	No. Released
7-11-78	(orange tags) 94,001 - 95,400	1396	91	6.5	1305
7-12-78	95,401 - 96,800	1399	66	4.7	1333
7-13-78	96,801 - 97,200 130,001 - 131,000	1396	83	5.9	1313
7-14-78	131,001 - 132,200	1199	107	8.9	1092
7-15-78	132,201 - 133,200	992	59	5.9	933
7-16-78	133,201 - 134,200	997	92	9.2	905
7-17-78	134,201 - 135,200	999	83	8.3	916
7-18-78	135,201 - 136,000	799	68	8.5	731
	(black tags)				
	00201 - 00600	399	10	2.5	389
7-19-78	00601 - 02200	1598	224	14.0	1374
7-20-78	02201 - 03000	799	107	13.4	692
	Final Totals	11,973	990	8.3	10,983

Table 4. Daily release summary for penaeid shrimp tagging.

Texas Shrimp Tagging Operation No. 4
 Port Aransas, Texas (OFFSHORE)
 August 8-18, 1978

Date	Tag Series	No. Tagged	No. Not Released	% Not Released	No. Released
	(black tags)				
8-9-78	03001 04200	1193	31	2.6	1162
8-10-78	04201 - 05200	998	37	3.7	961
8-11-78	05201 - 05389	188	1	0.5	187
8-16-78	05390 - 05600	210	40	19.0	170
8-17-78	05601 - 05792	189	22	11.6	167
8-18-78	05793 - 06000	208	23	11.1	185
	Final Totals	2986	154	5.2	2832

Table 5. Daily release summary for penaeid shrimp tagging.

Texas Shrimp Tagging Operation No. 5
 Port Aransas, Texas (OFFSHORE)
 October 10-20, 1978

Date	Tag Series	No. Tagged	No. Not Released	% Not Released	No. Released
	(black tags)				
10-12-78	06001 - 06271	261	9	3.4	252
10-13-78	06272 - 06600	327	5	1.5	322
10-17-78	06601 06857	257	70	27.2	187
10-18-78	06858 - 07138	280	3	1.1	277
10-19-78	07139 - 07400	261	0	-	261
10-20-78	07401 - 07600	200	1	0.5	199
	Final Totals	1586	88	5.5	1498

Table 6 . Daily release summary for penaeid shrimp tagging.

Texas Shrimp Tagging Operation No. 6
 Port Isabel, Texas (INSHORE)
 April 23-May 1, 1979

Date	Tag Series	No. Tagged	No. Not Released	% Not Released	No. Released
	(Green Tags)				
4-23-79	504,401 - 504,800	398	14	3.5	384
4-24-79	504,801 - 505,800	997	92	9.2	905
4-25-79	505,801 - 507,000	1195	9	0.8	1186
4-26-79	507,001 - 508,200	1194	17	1.4	1177
4-27-79	508,201 - 509,400	1196	36	3.0	1160
4-28-79	509,401 - 510,400	993	20	2.0	973
4-29-79	510,401 - 510,600 511,001 - 511,200	397	6	1.5	391
4-30-79	511,201 - 512,800	1593	75	4.7	1518
5-1-79	512,801 - 514,400	1593	203	12.7	1390
	Final Totals	9556	472	4.9	9084

Table 7 . Daily release summary for penaeid shrimp tagging.

Texas Shrimp Tagging Operation No. 7
 Port Isabel, Texas (INSHORE)
 May 30-June 5, 1979

Date	Tag Series (Green Tags)	No. Tagged	No. Not Released	% Not Released	No. Released
5-30-79	534,401 - 535,400	992	36	3.6	956
5-31-79	535,401 - 536,800	1390	119	8.6	1271
6-1-79	536,801 - 538,400	1591	147	9.2	1444
6-2-79	538,401 - 539,600	1195	22	1.8	1173
6-3-79	539,601 - 541,600	1964	15	0.8	1949
6-4-79	541,601 - 543,400	1774	49	2.8	1725
6-5-79	543,401 - 544,400	988	12	1.2	976
Final Totals		9894	400	4.0	9494

Table 8 . Daily release summary for penaeid shrimp tagging.

Texas Shrimp Tagging Operation No. 8
 Aransas Pass, Texas (INSHORE)
 June 26-July 3, 1979

Date	Tag Series (Green Tags)	No. Tagged	No. Not Released	% Not Released	No. Released
6-26-79	554,401 - 555,800	1383	34	2.5	1349
6-27-79	555,801 - 557,400	1580	54	3.4	1526
6-28-79	557,401 - 559,200	1789	117	6.5	1672
6-29-79	559,201 - 560,800	1589	30	1.9	1559
6-30-79	560,801 - 561,200	400	6	1.5	394
7-1-79	561,201 - 562,300	1093	23	2.1	1070
7-2-79	562,301 - 563,500	1194	21	1.8	1173
7-3-79	563,501 - 564,400	889	21	2.4	868
	Final Totals	9917	306	3.1	9611

Table 9 . Daily release summary for penaeid shrimp tagging.

Texas Shrimp Tagging Operation No. 9
 Port Aransas, Texas (OFFSHORE)
 September 25-28, 1979

Date	Tag Series	No. Tagged	No. Not Released	% Not Released	No. Released
	(Blue Tags)				
9-25-79	260,001 - 260,600	595	17	2.9	578
9-26-79	260,601 - 261,100	499	9	1.8	490
9-27-79	261,101 - 261,350	247	8	3.2	239
9-28-79	261,351 - 261,600	248	0	-	248
	Final Totals	1589	34	2.1	1555

Table 10 . Daily release summary for penaeid shrimp tagging.

Texas Shrimp Tagging Operation No. 10
 Port Aransas, Texas No. 10
 October 1-3, 1979

Date	Tag Series (Blue Tags)	No. Tagged	No. Not Released	% Not Released	No. Released
10-1-79	261,601 - 262,150	548	44	8.0	504
10-2-79	262,151 - 262,750	599	11	1.8	588
10-3-79	262,751 - 263,251	499	2	0.4	497
Final Totals		1646	57	3.5	1589

Appendix D. Release and recapture data for the Texas offshore mark-recapture study near Port Aransas, Texas in August 1978.

LEGEND

Species code: W=White (Penaeus setiferus); P=Pink (P. duorarum);
B=Brown (P. aztecus); U= Unknown
Sex code: M=Male; F=Female; U= Unknown
Location data: 27.43.N = 27°43'N
Distance travelled is in nautical miles
Direction travelled is compass heading from release location to
point of recapture in degrees and tenths of degrees
Dates are in the form: Year, Month, Day
All lengths are in millimeters (tail length)
Release area key: I=Inshore; O=Offshore
Release state key: L=Louisiana; T=Texas;M=Mexico

NO.	CU.	SEA	RELEASE	LOCATION	RECAPTURE	EXCAPTURE	DISPATCH	DIRECTION	RELEASE	RECAP	DAYS	HELP	RELEASE	CHANGE	REPLE	REPLE
					TRAVELLED	TRAVELLED	TRAVELLED	TRAVELLED	DATE	DATE	OUT	LV	LV	IN	LV	STATE
51	F		27.43.N	96.56.W	0.	0.	0.	0.	78 8 9 78 8 10	78 8 9 78 8 10	6	61	62	4	0	T
52	F		27.43.N	96.56.W	07.26	07.26	04.00	04.00	78 8 9 78 8 10	78 8 9 78 8 10	9	73	69	7	0	T
53	F		27.43.N	96.56.W	3.08	3.08	74.23	74.23	78 8 9 78 8 22	78 8 9 78 8 22	13	76	75	1	0	T
54	F		27.43.N	96.56.W	1.97	1.97	180.00	180.00	78 8 9 78 8 11	78 8 9 78 8 11	2	69	67	0	0	T
55	F		27.43.N	96.56.W	57.26	57.26	04.00	04.00	78 8 9 78 8 18	78 8 9 78 8 18	9	65	70	5	0	T
56	F		27.43.N	96.56.W	57.26	57.26	04.00	04.00	78 8 9 78 8 18	78 8 9 78 8 18	9	75	74	-1	0	T
57	F		27.43.N	96.56.W	57.26	57.26	04.00	04.00	78 8 9 78 8 18	78 8 9 78 8 18	9	64	69	25	0	T
58	F		27.43.N	96.56.W	4.04	4.04	229.68	229.68	78 8 9 78 10 20	78 8 9 78 10 20	72	68	68	0	0	T
59	F		27.43.N	96.56.W	0.	0.	0.	0.	78 8 9 78 8 19	78 8 9 78 8 19	6	71	76	5	0	T
60	F		27.43.N	96.56.W	1.97	1.97	180.00	180.00	78 8 9 78 8 11	78 8 9 78 8 11	2	64	67	3	0	T
61	F		27.43.N	96.56.W	1.97	1.97	180.00	180.00	78 8 9 78 8 11	78 8 9 78 8 11	2	75	71	-4	0	T
62	F		27.43.N	96.56.W	0.	0.	0.	0.	78 8 9 78 8 9	78 8 9 78 8 9	0	68	77	9	0	T
63	F		27.43.N	96.56.W	4.04	4.04	77.25	77.25	78 8 9 78 8 22	78 8 9 78 8 22	13	74	75	1	0	T
64	F		27.43.N	96.56.W	4.04	4.04	77.25	77.25	78 8 9 78 8 22	78 8 9 78 8 22	13	67	67	0	0	T
65	F		27.43.N	96.56.W	5.05	5.05	8.32	8.32	78 8 9 78 8 11	78 8 9 78 8 11	2	72	72	0	0	T
66	F		27.43.N	96.56.W	5.05	5.05	8.32	8.32	78 8 9 78 8 11	78 8 9 78 8 11	2	60	60	0	0	T
67	F		27.43.N	96.56.W	4.04	4.04	77.25	77.25	78 8 9 78 8 22	78 8 9 78 8 22	13	68	72	4	0	T
68	F		27.43.N	96.56.W	6.03	6.03	221.11	221.11	78 8 9 78 8 9	78 8 9 78 8 9	0	62	64	2	0	T
69	F		27.43.N	96.56.W	5.05	5.05	8.32	8.32	78 8 9 78 8 11	78 8 9 78 8 11	2	70	82	2	0	T
70	F		27.43.N	96.56.W	4.04	4.04	33.66	33.66	78 8 9 78 8 9	78 8 9 78 8 9	0	70	75	-1	0	T
71	F		27.43.N	96.56.W	1.97	1.97	180.00	180.00	78 8 9 78 8 11	78 8 9 78 8 11	2	72	74	2	0	T
72	F		27.43.N	96.56.W	4.04	4.04	229.68	229.68	78 8 9 78 10 20	78 8 9 78 10 20	72	61	61	0	0	T
73	F		27.43.N	96.56.W	1.97	1.97	180.00	180.00	78 8 9 78 8 11	78 8 9 78 8 11	2	74	75	1	0	T
74	F		27.43.N	96.56.W	0.	0.	0.	0.	78 8 9 78 8 19	78 8 9 78 8 19	6	78	70	-8	0	T
75	F		27.43.N	96.56.W	1.97	1.97	180.00	180.00	78 8 9 78 8 11	78 8 9 78 8 11	2	76	61	-5	0	T
76	F		27.43.N	96.56.W	11.04	11.04	103.72	103.72	78 8 9 78 8 9	78 8 9 78 8 9	0	70	71	1	0	T
77	F		27.43.N	96.56.W	57.26	57.26	04.00	04.00	78 8 9 78 8 18	78 8 9 78 8 18	9	61	65	4	0	T
78	F		27.43.N	96.56.W	5.05	5.05	8.32	8.32	78 8 9 78 8 11	78 8 9 78 8 11	2	74	75	1	0	T
79	F		27.43.N	96.56.W	4.04	4.04	229.68	229.68	78 8 9 78 10 20	78 8 9 78 10 20	72	61	63	2	0	T
80	F		27.43.N	96.56.W	1.33	1.33	318.90	318.90	78 8 9 78 8 10	78 8 9 78 8 10	1	63	69	1	0	T
81	F		27.43.N	96.56.W	2.07	2.07	41.64	41.64	78 8 9 78 8 9	78 8 9 78 8 9	0	68	67	-1	0	T
82	F		27.43.N	96.56.W	15.06	15.06	163.53	163.53	78 8 9 78 8 20	78 8 9 78 8 20	17	71	77	6	0	T
83	F		27.43.N	96.56.W	2.07	2.07	110.60	110.60	78 8 9 78 8 11	78 8 9 78 8 11	2	67	70	3	0	T
84	F		27.43.N	96.56.W	1.97	1.97	180.00	180.00	78 8 9 78 8 11	78 8 9 78 8 11	2	68	70	2	0	T
85	F		27.43.N	96.56.W	2.07	2.07	110.60	110.60	78 8 9 78 8 11	78 8 9 78 8 11	2	66	68	2	0	T
86	F		27.43.N	96.56.W	57.26	57.26	221.11	221.11	78 8 9 78 8 9	78 8 9 78 8 9	0	71	62	-9	0	T
87	F		27.43.N	96.56.W	2.07	2.07	54.60	54.60	78 8 9 78 8 10	78 8 9 78 8 10	9	68	71	3	0	T
88	F		27.43.N	96.56.W	2.07	2.07	60.20	60.20	78 8 9 78 8 9	78 8 9 78 8 9	0	74	61	-2	0	T
89	F		27.43.N	96.56.W	1.97	1.97	180.00	180.00	78 8 9 78 8 11	78 8 9 78 8 11	2	69	69	-3	0	T
90	F		27.43.N	96.56.W	4.75	4.75	146.71	146.71	78 8 9 78 8 10	78 8 9 78 8 10	1	65	69	-16	0	T
91	F		27.43.N	96.56.W	17.04	17.04	146.71	146.71	78 8 9 78 8 10	78 8 9 78 8 10	1	73	74	1	0	T
92	F		27.43.N	96.56.W	1.97	1.97	61.93	61.93	78 8 9 78 8 7	78 8 9 78 8 7	29	65	65	10	0	T
93	F		27.43.N	96.56.W	1.97	1.97	180.00	180.00	78 8 9 78 8 11	78 8 9 78 8 11	2	70	72	2	0	T
94	F		27.43.N	96.56.W	2.07	2.07	66.20	66.20	78 8 9 78 8 9	78 8 9 78 8 9	0	70	71	1	0	T
95	F		27.43.N	96.56.W	1.33	1.33	318.90	318.90	78 8 9 78 8 10	78 8 9 78 8 10	1	71	73	3	0	T
96	F		27.43.N	96.56.W	2.07	2.07	167.26	167.26	78 8 9 78 11 30	78 8 9 78 11 30	113	66	74	3	0	T
97	F		27.43.N	96.56.W	14.03	14.03	21.50	21.50	78 8 9 78 8 14	78 8 9 78 8 14	6	69	102	44	0	T
98	F		27.43.N	96.56.W	57.26	57.26	04.00	04.00	78 8 9 78 8 10	78 8 9 78 8 10	9	72	69	-3	0	T
99	F		27.43.N	96.56.W	3.06	3.06	180.00	180.00	78 8 9 78 8 14	78 8 9 78 8 14	6	75	73	-2	0	T
100	F		27.43.N	96.56.W	27.43.N	27.43.N	96.56.W	96.56.W	78 8 9 78 8 14	78 8 9 78 8 14	6	75	73	-2	0	T

NO.	SP.	SEX	RELEASE	LOCATION	RECAPTURE	LOCATION	DISTANCE	DIRECTION	TRAVELLED	RELEASE DATE	RECAP DATE	RECAP	DAYS	RELE	RECAP	CHANGE	RELE	
							TRAVELLED	TRAVELLED				DATE	DATE	LV	LV	IN LV	AREA	STAGE
101	F		27.43.N	96.56.W	27.37.W	96.53.W	4.75	140.71	78 8 9	78 8 9	78 8 10	1	70	67	-3	0	1	
102	F		27.43.N	96.56.W	27.43.N	96.56.W	4.04	229.68	78 8 9	78 8 10	78 8 10	72	62	71	8	0	1	
103	F		27.43.N	96.56.W	27.37.W	96.53.W	11.01	193.40	78 8 9	78 8 14	78 8 14	5	79	61	2	0	1	
104	F		27.43.N	96.56.W	27.43.N	96.56.W	5.05	8.32	78 8 9	78 8 11	78 8 11	2	75	73	-2	0	1	
105	F		27.43.N	96.56.W	27.43.N	96.56.W	5.02	0.32	78 8 9	78 8 11	78 8 11	2	66	67	1	0	1	
106	F		27.43.N	96.56.W	27.43.N	96.56.W	57.26	54.60	78 8 9	78 8 16	78 8 16	9	75	75	0	0	1	
107	F		27.43.N	96.56.W	27.41.W	96.54.W	2.05	221.11	78 8 9	78 8 9	78 8 9	0	76	76	0	0	1	
108	F		27.43.N	96.56.W	27.43.N	96.56.W	2.02	119.80	78 8 9	78 8 11	78 8 11	2	75	79	4	0	1	
109	F		27.43.N	96.56.W	27.43.N	96.56.W	0.	0.	78 8 9	78 8 15	78 8 15	6	65	65	0	0	1	
110	F		27.43.N	96.56.W	27.43.N	96.56.W	3.02	74.23	78 8 9	78 8 18	78 8 18	9	72	73	1	0	1	
111	F		27.43.N	96.56.W	27.43.N	96.56.W	2.91	60.20	78 8 9	78 8 9	78 8 9	0	75	72	-3	0	1	
112	F		27.43.N	96.56.W	28.16.W	96.54.W	57.26	54.60	78 8 9	78 8 18	78 8 18	9	71	76	5	0	1	
113	F		27.42.N	96.53.W	27.44.N	96.52.W	2.18	23.48	78 8 10	78 8 13	78 8 13	3	60	58	-2	0	1	
114	F		27.42.N	96.53.W	27.44.N	96.57.W	4.97	299.46	78 8 10	78 8 19	78 8 19	9	60	56	-4	0	1	
115	F		27.42.N	96.53.W	27.41.W	96.54.W	1.33	221.11	78 8 10	78 8 11	78 8 11	1	60	70	4	0	1	
116	F		27.42.N	96.53.W	27.38.W	96.53.W	16.93	221.60	78 8 10	78 8 14	78 8 14	4	71	70	-1	0	1	
117	F		27.42.N	96.53.W	27.40.N	96.47.W	5.84	110.55	78 8 10	78 8 12	78 8 12	2	73	65	-8	0	1	
118	F		27.42.N	96.53.W	27.42.N	96.47.W	3.34	189.98	78 8 10	78 8 13	78 8 13	3	71	72	1	0	1	
119	F		27.42.N	96.53.W	27.37.W	96.53.W	5.27	146.70	78 8 10	78 8 9	78 8 9	27	73	60	-13	0	1	
120	F		27.42.N	96.53.W	27.43.N	96.51.W	2.05	60.89	78 8 10	78 8 19	78 8 19	9	59	57	-2	0	1	
121	F		27.42.N	96.53.W	27.41.N	96.54.W	1.33	221.11	78 8 10	78 8 11	78 8 11	1	69	70	1	0	1	
122	F		27.42.N	96.53.W	27.42.N	96.44.W	3.24	299.90	78 8 10	78 8 13	78 8 13	3	62	62	0	0	1	
123	F		27.42.N	96.53.W	27.42.N	96.45.W	7.03	189.47	78 8 10	78 8 19	78 8 19	9	70	68	-2	0	1	
124	F		27.42.N	96.53.W	27.38.W	96.53.W	4.00	135.53	78 8 10	78 8 9	78 8 9	27	68	79	11	0	1	
125	F		27.42.N	96.53.W	0.	0.	0.	0.	78 8 10	78 8 9	78 8 9	0	60	71	11	0	1	
126	F		27.42.N	96.53.W	27.42.N	96.44.W	2.05	56.89	78 8 10	78 8 19	78 8 19	9	61	62	1	0	1	
127	F		27.42.N	96.53.W	27.42.N	96.49.W	3.54	69.52	78 8 10	78 8 13	78 8 13	3	66	67	1	0	1	
128	F		27.42.N	96.53.W	27.42.N	96.49.W	3.54	299.98	78 8 10	78 8 13	78 8 13	3	61	53	-8	0	1	
129	F		27.42.N	96.53.W	27.44.N	96.50.W	3.53	53.05	78 8 10	78 8 11	78 8 11	1	74	65	-9	0	1	
130	F		27.42.N	96.53.W	27.40.W	96.50.W	3.32	126.25	78 8 10	78 8 14	78 8 14	4	63	63	0	0	1	
131	F		27.42.N	96.53.W	27.42.N	96.49.W	3.24	69.50	78 8 10	78 8 13	78 8 13	3	61	62	1	0	1	
132	F		27.42.N	96.53.W	27.38.W	96.50.W	4.32	146.30	78 8 10	78 8 22	78 8 22	12	68	60	-8	0	1	
133	F		27.42.N	96.53.W	27.41.W	96.54.W	1.32	221.11	78 8 10	78 8 11	78 8 11	1	60	76	16	0	1	
134	F		27.42.N	96.53.W	27.44.N	96.52.W	7.12	23.48	78 8 10	78 8 13	78 8 13	3	71	71	0	0	1	
135	F		27.42.N	96.53.W	27.43.N	96.55.W	2.05	299.11	78 8 10	78 8 9	78 8 9	27	78	67	-11	0	1	
136	F		27.42.N	96.53.W	27.37.W	96.49.W	9.12	144.71	78 8 10	78 8 13	78 8 13	3	62	62	0	0	1	
137	F		27.42.N	96.53.W	27.44.N	96.52.W	2.12	23.48	78 8 10	78 8 13	78 8 13	3	63	60	-3	0	1	
138	F		27.42.N	96.53.W	27.44.N	96.52.W	2.12	23.48	78 8 10	78 8 13	78 8 13	3	65	67	2	0	1	
139	F		27.42.N	96.53.W	0.	0.	0.	0.	78 8 10	78 8 11	78 8 11	-9	75	64	-11	0	1	
140	F		27.42.N	96.53.W	27.44.N	96.52.W	2.12	23.48	78 8 10	78 8 13	78 8 13	3	63	62	-1	0	1	
141	F		27.42.N	96.53.W	27.40.N	96.57.W	3.30	316.31	78 8 10	78 8 9	78 8 9	26	68	64	-4	0	1	
142	F		27.42.N	96.53.W	27.32.W	96.59.W	11.32	267.99	78 8 10	78 8 14	78 8 14	4	77	39	-38	0	1	
143	F		27.42.N	96.53.W	27.42.N	96.49.W	3.54	69.50	78 8 10	78 8 13	78 8 13	3	72	71	-1	0	1	
144	F		27.42.N	96.53.W	0.	0.	0.	0.	78 8 10	78 8 29	78 8 29	19	53	60	7	0	1	
145	F		27.42.N	96.53.W	27.39.W	96.54.W	3.11	199.44	78 8 10	78 8 14	78 8 14	4	73	77	4	0	1	
146	F		27.42.N	96.53.W	0.	0.	0.	0.	78 8 10	78 8 10	78 8 10	0	79	67	-12	0	1	
147	F		27.42.N	96.53.W	27.44.N	96.57.W	3.30	299.99	78 8 10	78 8 14	78 8 14	4	61	61	0	0	1	
148	F		27.42.N	96.53.W	27.44.N	96.52.W	2.12	23.48	78 8 10	78 8 13	78 8 13	3	70	70	0	0	1	
149	F		27.42.N	96.53.W	27.40.N	96.57.W	16.12	299.44	78 8 10	78 8 13	78 8 13	3	69	62	-7	0	1	
150	F		27.42.N	96.53.W	27.43.N	96.54.W	1.03	135.42	78 8 10	78 8 12	78 8 12	2	60	60	0	0	1	

NO.	SP.	SEA	RELEASE	LOCATION	RECAPTURE	LOCATION	STATUS	TRAVELLED	DIRECTION	TRAVELLED	DATE	RECAP	TIME	DAYS	FILE	RECAP	CHANGE	HELP
151	F	F	27.42.N	96.53.W	27.42.N	96.53.W	0.27	180.73	78	810	78	810	27	69	74	9	0	T
152	F	F	27.42.N	96.53.W	27.42.N	96.53.W	11.37	207.99	78	810	78	814	4	73	76	3	0	T
153	F	F	27.42.N	96.53.W	27.43.N	96.51.W	2.88	60.89	78	810	78	819	9	59	0	0	0	T
154	F	F	27.42.N	96.53.W	27.42.N	96.49.W	3.04	69.98	78	810	78	813	3	0	62	0	0	T
155	F	F	27.42.N	96.53.W	27.44.N	96.57.W	4.07	249.40	78	810	78	810	0	74	75	1	0	T
156	F	F	27.42.N	96.53.W	27.43.N	96.55.W	6.27	190.70	78	810	78	816	27	68	70	2	0	T
157	F	F	27.42.N	96.53.W	27.43.N	96.55.W	22.57	44.79	78	810	78	814	4	71	72	1	0	T
158	F	F	27.42.N	96.53.W	27.43.N	96.53.W	1.03	13.38	78	810	78	812	2	80	80	0	0	T
159	F	F	27.42.N	96.53.W	27.33.N	96.50.W	4.00	221.47	78	810	78	812	2	55	52	-3	0	T
160	F	F	27.42.N	96.53.W	0.00	0.00	0.	0.	78	810	78	810	0	61	78	-3	0	T
161	F	F	27.42.N	96.53.W	27.44.N	96.43.W	11.27	51.62	78	810	78	819	40	66	0	0	0	T
162	F	F	27.42.N	96.53.W	27.37.N	96.50.W	5.66	152.02	78	810	78	816	6	77	37	10	0	T
163	F	F	27.42.N	96.53.W	27.42.N	96.49.W	3.54	69.98	78	810	78	813	3	80	79	-1	0	T
164	F	F	27.42.N	96.53.W	27.39.N	96.54.W	3.11	195.44	78	810	78	814	4	52	63	1	0	T
165	F	F	27.47.N	96.59.W	28.30.N	96.51.W	17.49	23.83	78	811	78	820	15	79	82	3	0	T
166	F	F	27.47.N	96.59.W	27.41.N	96.50.W	6.05	172.40	78	811	78	811	0	75	74	-1	0	T
167	F	F	27.47.N	96.59.W	27.37.N	96.49.W	13.30	139.44	78	811	78	814	3	70	83	10	0	T
168	F	F	27.47.N	96.59.W	27.40.N	97.47.W	7.05	186.63	78	811	78	1020	70	80	83	3	0	T
169	F	F	27.47.N	96.59.W	27.40.N	97.47.W	10.60	95.34	78	811	78	810	0	73	0	0	0	T
170	F	F	27.47.N	96.59.W	27.59.N	96.54.W	5.36	55.81	78	811	78	824	13	55	64	3	0	T
171	F	F	27.45.N	96.52.W	27.55.N	96.35.W	10.00	56.30	78	810	78	820	4	65	72	7	0	T
172	F	F	27.45.N	96.52.W	27.43.N	96.51.W	2.22	154.24	78	810	78	819	3	56	57	1	0	T
173	F	F	27.45.N	96.52.W	27.57.N	96.45.W	10.95	56.30	78	810	78	820	4	60	63	3	0	T
174	F	F	27.45.N	96.52.W	0.00	0.00	0.	0.	78	810	78	810	0	70	0	0	0	T
175	F	F	27.45.N	96.52.W	27.23.N	96.50.W	17.23	169.50	78	810	78	820	35	73	69	12	0	T
176	F	F	27.45.N	96.52.W	29.59.N	97.20	46.00	190.90	78	810	78	1029	74	60	100	32	0	T
177	F	F	27.45.N	96.52.W	27.55.N	96.35.W	10.00	56.30	78	810	78	820	4	71	72	1	0	T
178	F	F	27.45.N	96.52.W	29.30.N	94.50.W	123.44	52.10	78	810	78	819	22	70	69	-1	0	T
179	F	F	27.45.N	96.52.W	27.40.N	97.00.W	0.07	234.82	78	810	78	1020	65	63	66	3	0	T
180	F	F	27.45.N	96.55.W	27.44.N	96.51.W	3.00	105.74	78	817	78	822	5	86	86	-2	0	T
181	F	F	27.45.N	96.55.W	0.00	0.00	0.	0.	78	817	78	818	1	71	0	0	0	T
182	F	F	27.45.N	96.55.W	0.00	0.00	0.	0.	78	817	0	0	0	0	75	0	0	T
183	F	F	27.45.N	96.55.W	27.47.N	96.47.W	7.40	74.19	78	817	78	816	20	77	85	8	0	T
184	F	F	27.46.N	96.57.W	28.41.N	97.13.W	66.54	192.41	78	818	78	919	32	60	74	8	0	T
185	F	F	27.46.N	96.57.W	28.25.N	96.50.W	01.24	175.58	78	818	78	830	43	75	84	13	0	T
186	F	F	27.46.N	96.57.W	27.47.N	96.50.W	7.17	23.48	78	810	78	824	6	74	65	-6	0	T
187	F	F	27.46.N	96.57.W	27.29.N	96.53.W	17.30	168.24	78	810	78	825	7	63	85	2	0	T
188	F	F	27.46.N	96.57.W	27.55.N	96.40.W	13.24	47.15	78	810	78	826	8	80	87	7	0	T
189	F	F	27.42.N	96.53.W	0.00	0.00	0.	0.	78	810	0	0	0	67	0	0	0	T
190	F	F	27.42.N	96.53.W	0.00	0.00	0.	0.	78	810	0	0	0	56	0	0	0	T
191	F	F	27.42.N	96.53.W	0.00	0.00	0.	0.	78	810	0	0	0	70	0	0	0	T

Appendix E. Release and recapture data for the Texas offshore mark-recapture study near Port Aransas, Texas in October 1978.

LEGEND

Species code: W=White (Penaeus setiferus); P=Pink (P. duorarum);
B=Brown (P. aztecus); U= Unknown
Sex code: M=Male; F=Female; U= Unknown
Location data: 27.43.N = 27°43'N
Distance travelled is in nautical miles
Direction travelled is compass heading from release location to
point of recapture in degrees and tenths of degrees
Dates are in the form: Year, Month, Day
All lengths are in millimeters (tail length)
Release area key: I=Inshore; O=Offshore
Release state key: L=Louisiana; T=Texas; M=Mexico

NO.	SP.	SEX	RELEASE	LOCATION	RECAPTURE	LOCALIZATION	DISTANCE	TRAVELLED	DIRECTION	WELL	DATE	RECAP	DAYS	WELL	RECAP	CHANGE	WELL	AREA	WELL
							TRAVELLED	TRAVELLED	TRAVELLED	DATE	DATE	DATE	OUT	DATE	DATE	DATE	DATE	DATE	DATE
51	B	F	27.45.N	96.59.W	27.47.N	96.57.W	0.01	72.99		781017	781030	781030	15	96	71	-1	0	0	1
52	B	F	27.45.N	96.58.W	27.47.N	96.54.W	4.65	130.12		781017	781031	781031	14	85	78	-7	0	0	1
53	B	F	27.45.N	96.58.W	27.48.N	97.0.W	5.01	194.63		781017	781020	781020	3	91	90	-1	0	0	1
54	B	F	27.45.N	96.58.W	27.53.N	96.54.W	71.09	177.10		781017	781025	781017	64	80	95	15	0	0	1
55	B	F	27.45.N	96.58.W	27.57.N	96.48.W	41.59	168.60		781017	781025	781017	8	65	72	7	0	0	1
56	U	F	27.45.N	96.58.W	27.55.N	97.0.W	12.63	224.60		781017	781030	781017	13	75	0	0	0	0	1
57	B	F	27.45.N	96.58.W	27.57.N	96.50.W	79.32	174.81		781017	781019	781017	2	82	61	-1	0	0	1
58	B	F	27.45.N	96.58.W	27.42.N	97.5.W	6.50	244.24		781017	781113	781017	27	60	59	-1	0	0	1
59	B	F	27.45.N	96.58.W	27.51.N	96.43.W	10.69	55.82		781017	781029	781017	12	70	72	2	0	0	1
60	F	F	27.45.N	96.58.W	27.42.N	96.53.W	5.36	124.03		781017	781113	781017	27	68	77	9	0	0	1
61	F	F	27.45.N	96.51.W	27.45.N	96.53.W	1.83	270.01		781018	781029	781018	11	68	70	2	0	0	1
62	B	F	27.45.N	96.51.W	27.37.N	96.55.W	6.75	203.45		781018	781029	781018	11	65	66	1	0	0	1
63	B	F	27.45.N	96.51.W	27.41.N	96.47.W	5.34	138.46		781018	781111	781018	14	73	75	2	0	0	1
64	B	F	27.45.N	96.51.W	27.44.N	96.44.W	2.06	119.10		781018	781030	781018	12	67	69	2	0	0	1
65	B	F	27.45.N	96.51.W	27.44.N	96.52.W	1.83	211.10		781018	781029	781018	11	77	74	-3	0	0	1
66	B	F	27.45.N	96.51.W	27.41.N	96.57.W	6.65	253.04		781018	781024	781018	6	71	72	1	0	0	1
67	B	F	27.45.N	96.51.W	27.24.N	97.13.W	28.06	222.97		781018	781215	781018	58	75	37	12	0	0	1
68	B	F	27.45.N	96.51.W	27.41.N	96.57.W	6.65	253.04		781018	781024	781018	6	59	70	11	0	0	1
69	B	F	27.45.N	96.51.W	27.44.N	96.57.W	1.83	276.01		781018	781029	781018	11	70	75	5	0	0	1
70	B	F	27.45.N	96.51.W	27.42.N	96.57.W	79.18	183.91		781018	79.111	781018	85	70	78	8	0	0	1
71	B	F	27.45.N	96.51.W	27.42.N	96.53.W	4.63	221.22		781018	781025	781018	7	61	60	-1	0	0	1
72	B	F	27.45.N	96.51.W	27.41.N	96.57.W	4.19	142.06		781018	781111	781018	22	70	75	6	0	0	1
73	B	F	27.45.N	96.51.W	27.33.N	97.2.W	15.46	219.15		781018	781029	781018	11	65	69	4	0	0	1
74	B	F	27.45.N	96.51.W	27.39.N	97.0.W	66.44	186.95		781018	781026	781018	8	58	64	6	0	0	1
75	B	F	27.45.N	96.51.W	27.21.N	97.55.W	41.61	247.32		781018	781111	781018	32	72	74	2	0	0	1
76	B	F	27.45.N	96.51.W	27.33.N	97.2.W	15.46	219.15		781018	781031	781018	13	93	95	2	0	0	1
77	B	F	27.45.N	96.51.W	27.37.N	97.0.W	17.05	242.09		781018	781031	781018	13	81	89	8	0	0	1
78	B	F	27.45.N	96.51.W	27.37.N	97.0.W	41.22	202.87		781018	781114	781018	27	71	71	0	0	0	1
79	U	F	27.45.N	96.51.W	27.55.N	97.13.W	49.84	199.82		781018	781219	781018	62	63	0	0	0	0	1
80	B	F	27.45.N	96.51.W	27.33.N	97.2.W	15.46	219.15		781018	781024	781018	11	66	73	5	0	0	1
81	B	F	27.45.N	96.51.W	27.35.N	97.0.W	63.48	186.95		781018	781025	781018	8	70	80	4	0	0	1
82	U	F	27.45.N	96.51.W	27.35.N	97.0.W	17.05	255.19		781018	781030	781018	12	80	0	0	0	0	1
83	U	F	27.45.N	96.51.W	27.14.N	97.13.W	36.63	212.26		781018	781215	781018	58	66	0	0	0	0	1
84	B	F	27.45.N	96.51.W	27.45.N	96.54.W	2.69	270.01		781018	781026	781018	8	64	65	1	0	0	1
85	B	F	27.45.N	96.51.W	27.33.N	97.2.W	15.46	219.15		781018	781031	781018	13	64	64	0	0	0	1
86	B	F	27.45.N	96.51.W	27.53.N	96.54.W	8.43	341.54		781018	781111	781018	18	88	91	3	0	0	1
87	B	F	27.45.N	96.51.W	27.33.N	97.2.W	15.46	219.15		781018	781029	781018	11	72	72	0	0	0	1
88	B	F	27.45.N	96.51.W	27.26.N	96.50.W	79.01	174.30		781018	781019	781018	1	75	75	3	0	0	1
89	B	F	27.45.N	96.51.W	27.33.N	97.2.W	15.46	219.15		781018	781031	781018	13	65	64	-1	0	0	1
90	B	F	27.45.N	96.51.W	27.45.N	96.54.W	2.69	270.01		781018	781026	781018	8	69	70	1	0	0	1
91	B	F	27.35.N	96.59.W	27.22.N	96.57.W	13.12	172.12		781019	79.311	781019	143	62	0	0	0	0	1
92	B	F	27.35.N	96.59.W	27.22.N	96.57.W	13.12	172.12		781019	79.311	781019	143	62	0	0	0	0	1
93	B	F	27.35.N	96.59.W	0.0.W	0.0.W	0.0	0.0		781019	781025	781019	6	80	81	1	0	0	1
94	B	F	27.35.N	96.59.W	27.33.N	97.2.W	2.65	233.11		781019	781029	781019	10	72	72	0	0	0	1
95	B	F	27.35.N	96.59.W	27.35.N	96.56.W	2.65	89.99		781019	781114	781019	31	58	61	3	0	0	1
96	B	F	27.35.N	96.59.W	27.45.N	96.51.W	12.20	35.29		781019	781020	781019	7	90	92	2	0	0	1
97	B	F	27.35.N	96.59.W	27.45.N	96.53.W	11.92	77.95		781019	781029	781019	10	60	59	-1	0	0	1
98	B	F	27.35.N	96.59.W	27.4.N	96.59.W	31.04	173.46		781019	79.123	781019	90	52	87	29	0	0	1
99	U	F	27.35.N	96.59.W	27.38.N	97.0.W	6.04	277.13		781019	781030	781019	11	60	0	0	0	0	1
100	B	F	27.35.N	96.59.W	27.45.N	96.53.W	11.82	27.55		781019	781024	781019	10	70	73	3	0	0	1

NO.	SP.	SEX	RELEASE	LOCALITY	CAPTURE	LOCALITY	INSTANCES	DIRECTION	RELE	RECAP	DAYS	RELE	RECAP	CHANGE	RELE	RELE
							TRAVELLED	TRAVELLED	DATE	DATE	VAL	LN	LN	IN LV	AREA	STATE
101	B	F	27.35.N	96.59.W	27.34.0	97.3.W	3.71	254.30	781019	781110	20	73	72	-1	0	T
102	B	M	27.35.N	96.59.W	41.00	96.59.W	41.00	179.55	781019	781110	114	66	67	19	0	T
103	B	F	27.35.N	96.59.W	18.84	96.59.W	18.84	64.50	781019	781020	1	66	66	0	0	T
104	B	M	27.35.N	96.59.W	19.54	97.8.W	19.54	203.96	781019	781115	27	71	74	3	0	T
105	B	F	27.35.N	96.59.W	6.66	96.53.W	6.66	126.68	781015	781114	21	85	88	3	0	T
106	B	F	27.35.N	96.59.W	3.33	97.2.W	3.33	233.11	781019	781031	12	58	54	0	0	T
107	B	M	27.35.N	96.59.W	8.24	96.54.W	8.24	32.35	781019	781025	6	60	59	-1	0	T
108	B	F	27.35.N	96.59.W	7.39	96.53.W	7.39	46.78	781019	781110	22	65	76	11	0	T
109	B	F	27.35.N	96.59.W	11.32	96.53.W	11.32	27.95	781019	781024	10	58	61	3	0	T
110	B	M	27.35.N	96.59.W	11.32	96.53.W	11.32	27.95	781019	781112	14	64	68	0	0	T
111	B	F	27.35.N	96.59.W	6.57	96.56.W	6.57	24.00	781019	781024	5	80	78	-2	0	T
112	B	F	27.35.N	96.59.W	16.84	96.54.W	16.84	64.50	781019	781020	1	68	66	-2	0	T
113	B	F	27.35.N	96.59.W	55.18	96.54.W	55.18	175.34	781019	781024	5	83	84	1	0	T
114	B	M	27.35.N	96.59.W	12.63	96.49.W	12.63	44.52	781019	781114	21	76	80	4	0	T
115	B	F	27.35.N	96.59.W	29.20	97.1.W	29.20	211.19	781019	781130	42	70	0	0	0	T
116	B	M	27.35.N	96.59.W	16.34	97.3.W	16.34	192.50	781019	781111	23	74	75	1	0	T
117	B	M	27.35.N	96.59.W	12.03	96.50.W	12.03	41.54	781019	781111	23	75	78	3	0	T
118	B	F	27.35.N	96.59.W	5.64	96.50.W	5.64	349.34	781019	781020	1	61	63	2	0	T
119	B	F	27.35.N	96.59.W	9.42	96.50.W	9.42	57.91	781019	781116	28	42	49	7	0	T
120	B	F	27.35.N	96.59.W	5.89	96.54.W	5.89	41.60	781019	781031	12	71	70	-1	0	T
121	B	M	27.35.N	96.59.W	34.30	96.42.W	34.30	170.15	781019	781024	118	61	83	22	0	T
122	B	F	27.35.N	96.59.W	4.09	96.55.W	4.09	60.71	781019	781024	10	62	66	6	0	T
123	B	F	27.35.N	96.59.W	15.54	96.52.W	15.54	163.46	781020	781124	35	85	91	6	0	T
124	B	F	27.35.N	96.59.W	287.91	96.53.W	287.91	184.11	781020	781029	160	70	90	20	0	T
125	B	F	27.35.N	96.59.W	0.64	96.53.W	0.64	80.00	781020	781029	6	76	81	5	0	T
126	B	F	27.35.N	96.59.W	32.31	96.53.W	32.31	172.07	781020	781215	56	94	0	0	0	T
127	B	F	27.35.N	96.59.W	32.31	96.53.W	32.31	172.07	781020	781215	56	94	0	0	0	T
128	B	F	27.35.N	96.59.W	7.39	96.54.W	7.39	46.78	781020	781031	11	68	70	2	0	T
129	B	F	27.35.N	96.59.W	14.61	96.52.W	14.61	28.57	781020	781027	7	92	96	4	0	T
130	B	F	27.35.N	96.59.W	3.63	96.52.W	3.63	7.53	781020	781024	4	74	76	2	0	T
131	B	F	27.35.N	96.59.W	3.63	96.52.W	3.63	7.53	781020	781024	4	74	76	2	0	T
132	B	F	27.35.N	96.59.W	24.67	96.57.W	24.67	177.14	781020	781024	43	69	85	16	0	T
133	B	F	27.35.N	96.59.W	11.46	96.52.W	11.46	38.23	781020	781026	6	75	72	-3	0	T
134	B	F	27.35.N	96.59.W	4.36	96.53.W	4.36	135.35	781020	781030	10	68	71	3	0	T
135	B	F	27.35.N	96.59.W	5.31	96.54.W	5.31	89.48	781020	781112	23	78	85	7	0	T
136	B	F	27.35.N	96.59.W	43.11	96.54.W	43.11	276.17	781020	781030	10	85	89	4	0	T
137	B	F	27.35.N	96.59.W	7.65	96.54.W	7.65	26.91	781020	781025	5	61	62	1	0	T
138	B	F	27.35.N	96.59.W	18.78	96.51.W	18.78	154.61	781020	781111	12	83	84	1	0	T
139	B	M	27.35.N	96.59.W	12.74	96.51.W	12.74	38.54	781020	781026	6	72	74	2	0	T
140	B	F	27.35.N	96.59.W	83.48	95.39.W	83.48	58.68	781020	781025	36	67	73	8	0	T
141	B	F	27.35.N	96.59.W	4.36	96.56.W	4.36	155.91	781020	781117	28	68	82	14	0	T
142	B	F	27.35.N	96.59.W	35.81	97.1.W	35.81	181.53	781020	781129	40	71	77	6	0	T
143	B	F	27.35.N	96.59.W	0.0	96.56.W	0.0	0.0	781020	781129	136	92	93	1	0	T
144	B	F	27.55.N	96.42.W	0.0	96.42.W	0.0	0.0	781012	0.0	0	88	0	0	0	T
145	B	M	27.55.N	96.42.W	0.0	96.42.W	0.0	0.0	781012	0.0	0	74	0	0	0	T
146	B	F	27.50.N	96.49.W	0.0	96.49.W	0.0	0.0	781015	0.0	0	70	0	0	0	T
147	B	F	27.45.N	96.51.W	0.0	96.51.W	0.0	0.0	781018	0.0	0	71	0	0	0	T
148	U	U	27.35.N	97.0.W	20.0	97.0.W	20.0	20.0	781020	781125	259	93	0	0	0	T
149	B	M	27.35.N	96.59.W	27.17.0	97.10.W	27.17.0	200.56	781019	781116	301	61	93	15	0	T
150	B	F	27.35.N	96.59.W	27.15.0	97.7.W	27.15.0	200.55	781019	781114	325	70	95	25	0	T

Appendix F. Release and recapture data for the Texas inshore mark-recapture study near Port Isabel, Texas in April-May 1979.

LEGEND

Species code: W=White (Penaeus setiferus); P=Pink (P. duorarum);
B=Brown (P. aztecus); U= Unknown
Sex code: M=Male; F=Female; U= Unknown
Location data: 27.43.N = 27°43'N
Distance travelled is in nautical miles
Direction travelled is compass heading from release location to
point of recapture in degrees and tenths of degrees
Dates are in the form: Year, Month, Day
All lengths are in millimeters (tail length)
Release area key: I=Inshore; O=Offshore
Release state key: L=Louisiana; T=Texas; M=Mexico

NO.	SP.	SEX	RELEASE	LOCATION	RECAPTURE	LOCALITY	DISTANCE TRAVELLED	DIRECTION TRAVELLED	WFL DATE	RECAP DATE	DAYS OUT	WFL LW	RECAP LW	CHANGE IN LW	FEEL AREA	WFLC STATE	
1	F	F	26.	4.N	97.12.W	26.	4.N	97.13.W	0.94	270.00	79	423	79	430	-4	I	I
2	F	F	26.	4.N	97.12.W	26.	3.0	97.12.W	1.03	166.62	79	423	79	53	-1	I	I
3	M	M	26.	4.N	97.12.W	26.	3.1	97.12.W	1.03	166.62	79	423	79	53	-1	I	I
4	F	F	26.	4.N	97.12.W	26.	4.0	97.13.W	0.94	270.00	79	423	79	51	4	I	I
5	F	F	26.	4.N	97.12.W	26.	5.0	97.11.W	1.33	136.90	79	423	79	430	2	I	I
6	F	F	26.	4.N	97.12.W	0.	0.0	0.0	0.	0.	79	423	79	51	0	I	I
7	F	F	26.	4.N	97.12.W	24.	25.0	97.37.W	68.63	193.34	79	423	79	65	15	I	I
8	F	F	26.	4.N	97.12.W	26.	3.0	97.10.W	1.03	69.99	79	423	79	51	3	I	I
9	F	F	26.	4.N	97.12.W	26.	22.0	97.10.W	18.20	8.50	79	423	79	722	26	I	I
10	F	F	26.	4.N	97.12.W	26.	4.0	97.10.W	3.51	89.99	79	424	79	55	10	I	I
11	F	F	26.	4.N	97.12.W	0.	0.0	0.0	0.	0.	79	424	79	51	0	I	I
12	F	F	26.	4.N	97.12.W	26.	3.0	97.11.W	1.33	138.90	79	424	79	58	-2	I	I
13	F	F	26.	4.N	97.12.W	26.	3.0	97.11.W	1.33	138.90	79	424	79	57	-4	I	I
14	F	F	26.	4.N	97.12.W	26.	3.0	97.12.W	1.03	166.62	79	424	79	515	2	I	I
15	F	F	26.	4.N	97.12.W	26.	3.0	97.12.W	1.03	166.62	79	424	79	519	0	I	I
16	F	F	26.	4.N	97.12.W	26.	7.0	97.10.W	4.67	50.05	79	424	79	624	13	I	I
17	F	F	26.	4.N	97.12.W	26.	4.0	97.13.W	0.94	270.00	79	424	79	50	-1	I	I
18	F	F	26.	4.N	97.12.W	26.	3.0	97.12.W	1.03	166.62	79	424	79	61	-2	I	I
19	F	F	26.	4.N	97.12.W	26.	3.0	97.11.W	1.33	138.90	79	424	79	513	3	I	I
20	F	F	26.	4.N	97.12.W	26.	3.0	97.12.W	1.03	166.62	79	424	79	53	0	I	I
21	F	F	26.	4.N	97.12.W	25.	52.0	97.10.W	16.14	137.99	79	424	79	628	30	I	I
22	F	F	26.	4.N	97.12.W	26.	3.0	97.12.W	1.03	166.62	79	424	79	53	-3	I	I
23	F	F	26.	4.N	97.12.W	26.	2.0	97.11.W	2.17	156.52	79	424	79	519	3	I	I
24	F	F	26.	4.N	97.12.W	25.	52.0	97.12.W	16.14	137.99	79	424	79	67	13	I	I
25	F	F	26.	4.N	97.12.W	26.	3.0	97.12.W	1.03	166.62	79	424	79	511	2	I	I
26	F	F	26.	4.N	97.12.W	26.	4.0	97.13.W	0.94	270.00	79	425	79	59	3	I	I
27	F	F	26.	4.N	97.12.W	26.	4.0	97.10.W	1.33	89.99	79	425	79	51	1	I	I
28	F	F	26.	4.N	97.12.W	26.	4.0	97.13.W	0.94	270.00	79	425	79	429	-1	I	I
29	F	F	26.	4.N	97.12.W	26.	4.0	97.13.W	0.94	270.00	79	425	79	52	0	I	I
30	F	F	26.	4.N	97.12.W	26.	4.0	97.10.W	1.33	89.99	79	425	79	55	0	I	I
31	F	F	26.	4.N	97.12.W	26.	4.0	97.10.W	1.33	89.99	79	425	79	51	2	I	I
32	F	F	26.	4.N	97.12.W	26.	4.0	97.13.W	0.94	270.00	79	425	79	429	2	I	I
33	F	F	26.	4.N	97.12.W	26.	4.0	97.13.W	0.94	270.00	79	425	79	52	1	I	I
34	F	F	26.	4.N	97.12.W	26.	4.0	97.13.W	0.94	270.00	79	425	79	51	2	I	I
35	F	F	26.	4.N	97.12.W	26.	4.0	97.13.W	0.94	270.00	79	425	79	51	2	I	I
36	F	F	26.	4.N	97.12.W	26.	4.0	97.10.W	1.33	136.90	79	425	79	57	-1	I	I
37	F	F	26.	4.N	97.12.W	26.	4.0	97.10.W	1.33	89.99	79	425	79	53	-3	I	I
38	F	F	26.	4.N	97.12.W	26.	4.0	97.13.W	0.94	270.00	79	425	79	53	-2	I	I
39	F	F	26.	4.N	97.12.W	26.	4.0	97.13.W	0.94	270.00	79	425	79	429	1	I	I
40	F	F	26.	4.N	97.12.W	26.	3.0	97.12.W	1.03	166.62	79	425	79	52	-1	I	I
41	F	F	26.	4.N	97.12.W	26.	4.0	97.13.W	0.94	270.00	79	425	79	51	-4	I	I
42	F	F	26.	4.N	97.12.W	0.	0.0	0.0	0.	0.	79	425	79	416	0	I	I
43	F	F	26.	4.N	97.12.W	26.	4.0	97.13.W	0.94	270.00	79	425	79	52	1	I	I
44	F	F	26.	4.N	97.12.W	26.	4.0	97.13.W	0.94	270.00	79	425	79	429	37	I	I
45	F	F	26.	4.N	97.12.W	26.	38.0	97.12.W	34.00	0.00	79	425	79	723	30	I	I
46	F	F	26.	4.N	97.12.W	26.	3.0	97.12.W	1.03	166.62	79	425	79	53	-3	I	I
47	F	F	26.	4.N	97.12.W	26.	4.0	97.13.W	0.94	270.00	79	425	79	53	0	I	I
48	F	F	26.	4.N	97.12.W	26.	4.0	97.13.W	0.94	270.00	79	425	79	52	-2	I	I
49	F	F	26.	4.N	97.12.W	26.	4.0	97.13.W	0.94	270.00	79	425	79	52	2	I	I
50	F	F	26.	4.N	97.12.W	26.	4.0	97.13.W	0.94	270.00	79	425	79	53	1	I	I

NO.	SP.	SEX	RELEASE	LOCATION	RECAPTURE	LOCALITY	DISTANCE	DIRECTION	RELE	RECAP	DAYS	HELP	RECAP	GRAND	RELE
							(MILES)	(MILES)	DATE	DATE	OUT	LV	LV	IN LV	AREA
51	F	F	25	4.N	97.12.W	26	4.0	97.13.W	79 425	79 429	4	41	43	2	I
52	P	F	26	4.N	97.12.W	26	4.0	97.13.W	79 425	79 5 5	0	60	61	1	I
53	P	F	26	4.N	97.12.W	26	4.0	97.10.W	79 425	79 5 1	6	51	52	1	I
54	P	F	26	4.N	97.12.W	0	0.0	0.0	79 425	79 430	5	50	54	-2	I
55	P	F	26	4.N	97.12.W	26	4.0	97.13.W	79 425	79 5 1	6	45	54	-3	I
56	P	U	26	4.N	97.12.W	26	3.0	97.11.W	79 425	79 5 7	12	41	38	-3	I
57	F	F	26	4.N	97.12.W	26	4.0	97.13.W	79 425	79 5 2	7	52	57	5	I
58	P	F	26	4.N	97.12.W	26	4.0	97.10.W	79 425	79 5 1	6	72	53	1	I
59	P	F	26	4.N	97.12.W	26	3.0	97.11.W	79 425	79 428	3	55	54	-1	I
60	F	F	26	4.N	97.12.W	26	3.0	97.12.W	79 425	79 611	47	50	55	5	I
61	P	F	26	4.N	97.12.W	25.10.N	97.15.W	79 425	79 723	89	42	80	38	I	
62	P	F	26	4.N	97.12.W	26	4.0	97.13.W	79 425	79 429	4	46	47	1	I
63	P	F	26	4.N	97.12.W	26	4.0	97.10.W	79 425	79 428	3	55	52	-3	I
64	P	F	26	4.N	97.12.W	26	4.0	97.13.W	79 425	79 429	4	56	54	2	I
65	P	F	26	4.N	97.12.W	26	4.0	97.13.W	79 425	79 5 1	6	47	45	-2	I
66	P	F	26	4.N	97.12.W	26	4.0	97.13.W	79 425	79 5 2	7	44	45	1	I
67	P	F	26	4.N	97.12.W	26	4.0	97.13.W	79 425	79 5 1	6	50	48	-2	I
68	P	F	26	4.N	97.12.W	26	4.0	97.13.W	79 425	79 427	2	54	55	2	I
69	P	F	26	4.N	97.12.W	26	4.0	97.13.W	79 425	79 5 9	14	40	44	-2	I
70	P	F	26	4.N	97.12.W	0	0.0	0.0	79 426	79 718	83	54	60	26	I
71	P	F	26	4.N	97.12.W	26.12.W	97.16.W	79 426	79 528	32	53	64	11	I	
72	U	U	26	4.N	97.12.W	24.25.W	97.17.W	79 426	79 5 9	44	50	0	0	I	
73	P	F	26	4.N	97.12.W	26	3.0	97.11.W	79 426	79 5 7	11	51	52	1	I
74	P	F	26	4.N	97.12.W	26	4.0	97.13.W	79 426	79 624	59	43	80	37	I
75	U	U	26	4.N	97.12.W	0	0.0	0.0	79 426	79 816	112	53	0	0	I
76	P	F	26	4.N	97.12.W	26.11.W	97.13.W	79 426	79 527	31	50	63	13	I	
77	P	F	26	4.N	97.12.W	26	3.0	97.12.W	79 426	79 513	17	43	44	1	I
78	P	F	26	4.N	97.12.W	0	0.0	0.0	79 426	79 816	112	50	79	29	I
79	P	F	26	4.N	97.12.W	26	4.0	97.13.W	79 426	79 5 6	10	40	41	1	I
80	P	F	26	4.N	97.12.W	26.57.W	97.12.W	79 426	79 722	87	44	75	31	I	
81	P	F	26	4.N	97.12.W	25.12.W	97.14.W	79 426	79 526	52	53	63	10	I	
82	P	F	26	4.N	97.12.W	26.35.W	97.12.W	79 426	79 719	64	55	66	31	I	
83	P	F	26	4.N	97.12.W	26	3.0	97.11.W	79 426	79 5 8	12	45	48	3	I
84	U	U	26	4.N	97.12.W	0	0.0	0.0	79 426	79 816	112	53	0	0	I
85	P	F	26	4.N	97.12.W	26	4.0	97.13.W	79 426	79 523	58	47	72	25	I
86	P	F	26	4.N	97.12.W	0	0.0	0.0	79 426	79 511	15	55	55	0	I
87	P	F	26	4.N	97.12.W	0	0.0	0.0	79 426	79 611	46	57	70	13	I
88	P	F	26	4.N	97.12.W	26	3.0	97.12.W	79 426	79 625	60	50	75	25	I
89	P	F	26	4.N	97.12.W	26	3.0	97.12.W	79 426	79 511	15	54	73	-1	I
90	P	F	26	4.N	97.12.W	26	2.0	97.11.W	79 426	79 511	15	74	75	1	I
91	P	F	26	4.N	97.12.W	26	3.0	97.12.W	79 426	79 513	17	47	46	-1	I
92	P	F	26	4.N	97.12.W	26	4.0	97.13.W	79 427	79 429	2	52	52	0	I
93	P	F	26	4.N	97.12.W	26	4.0	97.13.W	79 427	79 5 1	4	56	54	-2	I
94	P	F	26	4.N	97.12.W	26	4.0	97.13.W	79 427	79 430	3	48	49	1	I
95	P	F	26	4.N	97.12.W	26	4.0	97.13.W	79 427	79 427	0	51	52	1	I
96	P	F	26	4.N	97.12.W	26	4.0	97.13.W	79 427	79 5 2	5	45	46	1	I
97	P	F	26	4.N	97.12.W	26	5.0	97.13.W	79 427	79 5 4	7	43	44	0	I
98	P	F	26	4.N	97.12.W	26	4.0	97.13.W	79 427	79 5 6	5	47	46	-1	I
99	P	F	26	4.N	97.12.W	26.50.W	97.12.W	79 427	79 722	20	50	63	14	I	
100	P	F	26	4.N	97.12.W	26	4.0	97.13.W	79 427	79 5 1	4	50	43	-2	I

NO.	SP.	SEA	RELEASE	LOCATION	RECAP TIME	LOCATION	DISTANCE	TRAVELLED	DIRECTION	RELE DATE	RECAP DATE	PAYS OUT	REF LN	PROF LN	CHANGE IN LN	UNDE AREA	REF STRIP
101	P	F	26.	4.0N	97.12.0	26.	4.0N	97.12.0	1.83	79 427	79 428	1	51	47	-3		I
102	P	F	26.	4.0N	97.13.0	26.	4.0N	97.13.0	0.94	79 427	79 429	2	50	50	0		I
103	P	F	26.	4.0N	97.13.0	26.	4.0N	97.13.0	0.94	79 427	79 5 2	5	50	44	-1		I
104	P	F	26.	4.0N	97.13.0	26.	4.0N	97.13.0	0.94	79 427	79 430	3	47	47	0		I
105	P	F	26.	4.0N	97.12.0	26.	3.0N	97.12.0	1.03	79 427	79 5 3	6	45	45	0		I
106	P	F	26.	4.0N	97.13.0	26.	4.0N	97.13.0	0.94	79 427	79 429	2	45	42	-1		I
107	P	F	26.	4.0N	97.13.0	26.	4.0N	97.13.0	0.94	79 427	79 5 3	6	54	52	-2		I
108	P	F	26.	4.0N	97.13.0	26.	4.0N	97.13.0	1.83	79 427	79 5 3	6	45	45	0		I
110	P	F	26.	4.0N	97.12.0	26.	3.0N	97.12.0	1.03	79 427	79 510	13	47	49	2		I
111	P	F	26.	4.0N	97.13.0	26.	4.0N	97.13.0	0.94	79 427	79 429	2	52	51	-1		I
112	P	F	26.	4.0N	97.12.0	26.	3.0N	97.12.0	1.03	79 427	79 5 3	6	45	40	-3		I
113	P	F	26.	4.0N	97.13.0	26.	4.0N	97.13.0	0.94	79 427	79 429	2	58	57	-1		I
114	P	F	26.	4.0N	97.12.0	26.	10.0N	97. 5.0	8.62	79 427	79 528	31	50	63	13		I
115	P	F	26.	4.0N	97.12.0	26.	16.0N	97.21.0	48.04	79 427	79 624	58	58	83	25		I
116	P	F	26.	4.0N	97.12.0	26.	4.0N	97.13.0	0.94	79 427	79 429	2	42	38	-4		I
117	P	F	26.	4.0N	97.13.0	26.	4.0N	97.13.0	0.94	79 427	79 430	3	55	57	2		I
118	P	F	26.	4.0N	97.12.0	26.	5.0N	97. 1.0	17.14	79 427	79 619	50	58	73	15		I
119	P	F	26.	4.0N	97.12.0	26.	4.0N	97.13.0	0.94	79 427	79 5 2	5	50	50	0		I
120	P	F	26.	4.0N	97.12.0	26.	3.0N	97.12.0	1.03	79 427	79 5 2	5	43	45	2		I
121	P	F	26.	4.0N	97.13.0	26.	4.0N	97.13.0	0.94	79 427	79 5 2	5	51	0	0		I
122	P	F	26.	4.0N	97.12.0	26.	3.0N	97.12.0	1.03	79 427	79 5 2	5	55	53	-2		I
123	P	F	26.	4.0N	97.12.0	26.	4.0N	97.13.0	0.94	79 427	79 5 6	9	47	46	-1		I
124	P	F	26.	4.0N	97.12.0	26.	4.0N	97.13.0	0.94	79 427	79 429	2	54	51	-3		I
125	P	F	26.	4.0N	97.12.0	26.	4.0N	97.13.0	0.94	79 427	79 429	2	41	43	2		I
126	P	F	26.	4.0N	97.12.0	26.	5.0N	97.11.0	1.35	79 427	79 424	2	45	47	2		I
127	P	F	26.	4.0N	97.12.0	26.	4.0N	97.13.0	0.94	79 427	79 5 1	4	47	45	-2		I
128	P	F	26.	4.0N	97.12.0	26.	4.0N	97.13.0	0.94	79 427	79 429	2	45	47	2		I
129	P	F	26.	4.0N	97.13.0	26.	4.0N	97.13.0	0.94	79 427	79 5 1	4	49	47	-2		I
130	P	F	26.	4.0N	97.12.0	26.	4.0N	97.13.0	0.94	79 427	79 430	3	44	47	3		I
131	P	F	26.	4.0N	97.12.0	26.	4.0N	97.13.0	0.94	79 427	79 429	2	51	50	-1		I
132	P	F	26.	4.0N	97.12.0	26.	3.0N	97.12.0	1.04	79 427	79 5 7	10	48	48	0		I
133	P	F	26.	4.0N	97.12.0	26.	4.0N	97.13.0	0.94	79 427	79 5 2	5	53	52	-1		I
134	P	F	26.	4.0N	97.12.0	26.	4.0N	97.10.0	1.84	79 427	79 428	1	49	46	-3		I
135	P	F	26.	4.0N	97.12.0	26.	4.0N	97.10.0	1.53	79 427	79 5 1	4	48	48	0		I
136	P	F	26.	4.0N	97.13.0	26.	4.0N	97.13.0	0.94	79 427	79 429	2	45	47	2		I
137	P	F	26.	4.0N	97.13.0	26.	4.0N	97.13.0	0.94	79 427	79 5 3	6	54	51	-3		I
138	P	F	26.	4.0N	97.11.0	26.	3.0N	97.11.0	1.33	79 427	79 5 2	5	42	44	2		I
139	P	F	26.	4.0N	97.13.0	26.	4.0N	97.13.0	0.94	79 427	79 5 1	4	42	44	2		I
140	P	F	26.	4.0N	97.12.0	26.	3.0N	97.12.0	1.04	79 427	79 5 2	5	42	43	1		I
141	P	F	26.	4.0N	97.12.0	26.	0.0N	0. 0.0	0.	79 427	79 5 2	5	42	40	-2		I
142	P	F	26.	4.0N	97.12.0	26.	2.0N	97. 1.0	22.30	79 427	79 620	60	48	70	28		I
143	P	F	26.	4.0N	97.12.0	26.	0.0N	0. 0.0	0.	79 428	79 622	55	59	75	16		I
144	P	F	26.	4.0N	97.12.0	26.	4.0N	96.54.0	6.	79 428	79 621	54	44	0	0		I
145	P	F	26.	4.0N	97.12.0	26.	3.0N	97.12.0	1.04	79 428	79 527	29	75	76	1		I
146	P	F	26.	4.0N	97.12.0	26.	3.0N	97.11.0	1.04	79 428	79 517	19	45	45	0		I
147	P	F	26.	4.0N	97.12.0	26.	3.0N	97.12.0	1.04	79 428	79 5 6	10	44	44	0		I
148	P	F	26.	4.0N	97.12.0	26.	4.0N	97.12.0	0.94	79 428	79 517	19	45	45	0		I
149	P	F	26.	4.0N	97.12.0	26.	3.0N	97.12.0	1.04	79 428	79 5 6	6	53	52	-1		I
150	P	F	26.	4.0N	97.12.0	26.	2.0N	97.11.0	2.15	79 428	79 519	21	47	52	5		I

CO.	SP.	SPX	RELEASE	LOCATION	RECAPTYPE	LOCATION	DISTANCE	DIRECTION	TRAVELTIME	REFL DATE	RECAP DATE	DAYS OFF	FELT LW	RECAP LW	CHANGE IN LW	FELT AREA	REFL STAIR
121	P	26.	4.N	97.12.W	26.	4.N	97.11.W	2.14	156.52	79 429	79 511	13	45	44	-1	1	1
122	F	26.	4.N	97.12.W	26.	4.N	97.11.W	2.15	156.52	79 428	79 511	13	47	47	0	1	1
123	F	26.	4.N	97.12.W	26.	4.N	97.11.W	6.22	60.87	79 428	79 516	15	52	48	25	1	1
124	F	26.	4.N	97.12.W	26.	4.N	97.11.W	1.33	138.90	79 428	79 516	15	44	44	4	1	1
125	F	26.	4.N	97.12.W	26.	4.N	97.11.W	1.83	89.59	79 428	79 516	3	48	44	1	1	1
126	F	26.	4.N	97.12.W	26.	4.N	97.11.W	40.25	6.39	79 428	79 516	42	55	58	3	1	1
127	F	26.	4.N	97.12.W	26.	4.N	97.12.W	1.03	165.62	79 429	79 511	13	53	55	2	1	1
128	F	26.	4.N	97.12.W	26.	4.N	97.12.W	1.03	165.62	79 429	79 511	13	47	46	-1	1	1
129	F	26.	4.N	97.12.W	26.	4.N	97.13.W	0.94	270.00	79 429	79 511	10	47	46	-2	1	1
130	F	26.	4.N	97.12.W	26.	4.N	97.13.W	1.83	84.99	79 429	79 511	3	50	50	0	1	1
131	F	26.	4.N	97.12.W	26.	4.N	97.11.W	1.33	138.50	79 429	79 511	8	42	40	-2	1	1
132	F	26.	4.N	97.12.W	26.	4.N	97.11.W	1.33	138.50	79 429	79 511	2	54	57	3	1	1
133	F	26.	4.N	97.12.W	26.	4.N	97.13.W	0.94	270.00	79 429	79 511	4	43	45	2	1	1
134	F	26.	4.N	97.12.W	26.	4.N	97.13.W	0.94	270.00	79 429	79 511	4	50	54	4	1	1
135	F	26.	4.N	97.12.W	26.	4.N	97.13.W	10.05	354.56	79 429	79 527	28	53	64	11	1	1
136	F	26.	4.N	97.12.W	26.	4.N	97.11.W	1.33	138.50	79 429	79 511	8	56	54	-2	1	1
137	F	26.	4.N	97.12.W	26.	4.N	97.13.W	0.94	270.00	79 429	79 511	2	54	54	0	1	1
138	F	26.	4.N	97.12.W	26.	4.N	97.11.W	1.33	138.50	79 429	79 511	3	43	44	1	1	1
139	F	26.	4.N	97.12.W	26.	4.N	97.11.W	0.94	270.00	79 429	79 511	7	43	47	4	1	1
140	F	26.	4.N	97.12.W	26.	4.N	97.13.W	0.94	270.00	79 429	79 511	7	40	44	-2	1	1
141	F	26.	4.N	97.12.W	26.	4.N	97.13.W	0.94	270.00	79 429	79 511	4	45	44	-1	1	1
142	F	26.	4.N	97.12.W	26.	4.N	97.12.W	1.03	165.62	79 429	79 511	8	43	45	2	1	1
143	F	26.	4.N	97.12.W	26.	4.N	97.12.W	1.83	89.59	79 429	79 511	2	40	41	1	1	1
144	F	26.	4.N	97.12.W	26.	4.N	97.13.W	0.94	270.00	79 429	79 529	21	44	54	10	1	1
145	F	26.	4.N	97.12.W	26.	4.N	97.12.W	1.33	138.50	79 429	79 511	3	41	41	0	1	1
146	F	26.	4.N	97.12.W	26.	4.N	97.12.W	1.03	165.62	79 429	79 511	10	53	52	-1	1	1
147	F	26.	4.N	97.12.W	26.	4.N	97.13.W	0.94	270.00	79 429	79 430	1	50	51	1	1	1
148	F	26.	4.N	97.12.W	26.	4.N	97.13.W	1.83	89.59	79 429	79 511	6	47	46	-1	1	1
149	F	26.	4.N	97.12.W	26.	4.N	97.12.W	1.03	165.62	79 429	79 511	3	41	42	1	1	1
150	F	26.	4.N	97.12.W	26.	4.N	97.13.W	0.94	165.62	79 429	79 511	3	55	58	3	1	1
151	F	26.	4.N	97.12.W	26.	4.N	97.13.W	0.94	165.62	79 429	79 430	4	55	56	1	1	1
152	F	26.	4.N	97.12.W	26.	4.N	97.13.W	0.94	165.62	79 429	79 430	4	47	45	-2	1	1
153	F	26.	4.N	97.12.W	26.	4.N	97.13.W	1.83	89.59	79 429	79 430	6	45	45	0	1	1
154	F	26.	4.N	97.12.W	26.	4.N	97.13.W	1.83	89.59	79 429	79 428	-1	41	41	0	1	1
155	F	26.	4.N	97.12.W	26.	4.N	97.13.W	0.94	270.00	79 429	79 511	4	44	43	-1	1	1
156	F	26.	4.N	97.12.W	26.	4.N	97.13.W	1.83	89.59	79 429	79 511	4	44	43	-1	1	1
157	F	26.	4.N	97.12.W	26.	4.N	97.13.W	0.94	165.62	79 429	79 511	4	41	40	-1	1	1
158	F	26.	4.N	97.12.W	26.	4.N	97.12.W	1.83	89.59	79 429	79 511	4	41	40	-1	1	1
159	F	26.	4.N	97.12.W	26.	4.N	97.11.W	1.33	138.50	79 430	79 511	1	55	55	0	1	1
160	F	26.	4.N	97.12.W	26.	4.N	97.11.W	1.33	135.46	79 430	79 511	1	42	41	-1	1	1
161	F	26.	4.N	97.12.W	26.	4.N	97.11.W	1.33	138.50	79 430	79 511	8	43	42	-1	1	1
162	F	26.	4.N	97.12.W	26.	4.N	97.11.W	1.83	89.59	79 430	79 511	8	43	42	-1	1	1
163	F	26.	4.N	97.12.W	26.	4.N	97.11.W	1.83	89.59	79 430	79 511	1	47	45	-2	1	1
164	F	26.	4.N	97.12.W	26.	4.N	97.11.W	1.33	138.50	79 430	79 511	1	46	45	-1	1	1
165	F	26.	4.N	97.12.W	26.	4.N	97.11.W	1.33	138.50	79 430	79 511	2	44	43	-1	1	1
166	F	26.	4.N	97.12.W	26.	4.N	97.11.W	1.33	138.50	79 430	79 511	2	44	44	0	1	1
167	F	26.	4.N	97.12.W	26.	4.N	97.11.W	1.33	134.00	79 430	79 511	1	53	53	0	1	1
168	F	26.	4.N	97.12.W	26.	4.N	97.11.W	57.00	89.59	79 427	79 527	120	43	42	-1	1	1
169	F	26.	4.N	97.12.W	26.	4.N	97.11.W	0.94	270.00	79 428	79 527	95	54	54	0	1	1
170	F	26.	4.N	97.12.W	26.	4.N	97.11.W	0.94	270.00	79 427	79 527	147	43	40	-3	1	1
171	F	26.	4.N	97.12.W	26.	4.N	97.11.W	59.57	198.74	79 424	79 514	143	49	40	-9	1	1

SP.	SEX	RELEASE	LOCATION	RECAPTURE	LOCATION	DISTANCE	DIRECTION	WFILE	RECAP	DAYS	WFILE	RECAP	CHANGE	WFILE	WFILE
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201	U	U	26. 4. N 97. 12. W	26. 55. 00 97. 1. W	31. 04	P. S3	79 428	79 915	140	45	1	0	1	1	
DISTANCE TRAVELLED															
DATE															
WFILE															
RECAPTURE DATE															
DAYS															
WFILE															
RECAPTURE															
CHANGE															
WFILE															
WFILE															

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