

Job Report

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A Study of the Post-larval Penaeid Shrimp  
Entering Aransas Bay

Abstract: The first post-larval penaeids were taken in the Aransas Ship Channel bottom sample on February 19 at a length of 8 mm, but not until after March 17 in mid-water channel and sand flat samples. They were most abundant in March and April. Sizes ranged from 6 to 14 millimeters.

When shrimp Penaeus sp., were first taken in 1963, channel bottom temperatures were 11.7° C as compared to 15.8° C at the same place and time in 1962. In 1963, 2.33 shrimp per unit effort were caught at that time; in 1962, 25.9 shrimp per unit effort were taken. After the middle of March, when post-larvae became abundant, temperatures were about 19° C in both years.

Associated organisms taken in large numbers were mysids, sergestids, crab larvae, and arrow worms. Mysids showed a spring abundance peak similar to penaeid post-larvae.

Objectives: To determine the seasonal abundance and size of post-larval commercial shrimp species entering bay nursery grounds from the Gulf of Mexico spawning grounds through Port Aransas Ship Channel and Lydia Ann Channel. To record and evaluate associated organisms sampled and hydrographic factors at the time of sampling.

Procedure: Sampling stations were established at mid-jetty in the 40-foot deep Aransas Ship Channel at the bottom, at 5 feet above the bottom, at 20 feet from the surface, and at the surface. A sampling station was set up on a sand flat at the east side of Lydia Ann Channel in 6 inches to 3 feet of water. Samples were taken weekly.

A 9-foot plankton or hoop net of millimeter square mesh with an effective opening of .6640 square meters was used to sample the lower, mid, and surface water levels in Aransas Channel. The mid-water and surface samples were made by adjusting cable lengths. A flow meter mounted in the mouth of the net recorded a certain number of revolutions per sample. Water volume variation between samples was probably due to differences in current direction and velocity. All hauls were made at 700 rpm engine speed. Previous meter calibration gave the figure of 0.0900 cubic meters of water strained per revolution. An average 6-minute tow, 2 minutes at each depth, sampled 395.39 cubic meters of water.

A small beam trawl with a rectangular opening of 0.2038 square meters, and a 6-foot bag of millimeter square mesh, was used to sample the Aransas Ship Channel bottom using standardized 6-minute drags. Because the beam trawl moved at a speed closely comparable to that of the hoop net, under the same conditions, it was assumed that if a flow meter was attached to the beam trawl

then one revolution on its dial would indicate a flow of 0.0276 cubic meters of water. Since it was difficult to mount a flow meter safely on this bottom sampling device, the meter reading for the hoop net haul was used to figure the water volume sampled. An average beam trawl sampled 122.04 cubic meters of water.

A 5-foot pull seine (also called the sand flat sampler) with 50 holes per square centimeter and a bag of standard plankton netting was used to sample the sand flat at the east side of the Lydia Ann Channel. This net was hand pulled in a half circle radius 150 feet from the beach. One average haul sampled 70.14 cubic meters of water.

Compton and Bradley (1961-62) described sampling stations and gave more detailed information on net specifications. Post-larvae were measured on a millimeter rule.

Temperature and salinity data were obtained at time of sampling. Keys by Anderson and Lindner (1943), Holthuis (1959), Miner (1950), and Williams (1953) were used to identify species.

Findings and Discussion: First appearance of post-larval penaeids occurred on February 19 in a beam trawl sample. Post-larvae were taken in all but two samples through June 6. Samples in April and May produced the most; however, 21 was the greatest number taken in a single beam trawl sample. This converts to 8.82 shrimp per 70.14 cubic meters of water strained.

The number of post-larvae taken in 1962 in February and March was about 25 times greater than samples from the same period in 1963. After March, both years produced comparable numbers of shrimp (Figure 1).

Shrimp first appeared in a pull seine sample from the sand flat at a mean length of 13 mm on March 17. The last post-larvae were taken at this station on April 23, in contrast with 1962 when post-larval were taken in May. The March 27 sample produced the most shrimp (21 per 70.14 cubic meters of water) but the number was far below the 148 specimens taken on March 27, 1962. The seasonal occurrence of post-larval on the sand flat was similar for the past two years. (Figure 1).

Post-larval penaeids first appeared in the hoop net samples on March 26 at a length of 12 mm and were taken in most samples through June 20. This net caught the greatest numbers of post-larval shrimp, but the catch per unit effort was slightly less than the sand flat sampler. The largest catch, 245 specimens, occurred on April 8. This converts to 45.71 shrimp per 70.14 cubic meters of water (Figure 1). A hoop net catch curve was not available for 1962.

The size range of the post-larval shrimp was from 6 to 14 millimeters. Smallest shrimp occurred in February at 8 mm, May at 8 mm, and June at 6 mm.

Breakdown of sampled organisms and hydrographic data is presented in Table 1 for the sand flat sampler, Table 2 for the hoop net, and Table 3 for the beam trawl.

Three non-commercial crustacea occurring in large numbers in the samples were mysids and two sergestid genera, Lucifer and Acetes. Mysids were not identified. Other organisms occurring in abundance were arrow worms and crab larvae, the latter was common from late February through mid-March (Table 1-3).

In March and April, when the post-larval shrimp were abundant, mysids were found in larger quantities. Peak months for the sergestids were May, June, and November. Lucifer sp. was very abundant in June in both the hoop

net and beam trawl samples. Acetes sp. was abundant in November in both types of gear. Mysids were abundant in November in the beam trawl samples.

In Figure 2, mysids are graphed for the hoop net and beam trawl samples. Lucifer sp. is graphed in Figure 3; Acetes sp. in Figure 4. Few of these organisms were taken in the sand flat sampler.

Water temperatures and salinities for the Aransas Channel bottom and temperatures for the sand flat are graphed in Figure 5. When post-larvae first appeared in the third week of February, the temperature at 40 feet in Aransas Channel was 11.7°C. However, when penaeids began to appear in numbers at the end of March, temperatures were just above 19° in the channel and 20.5°C on the sand flat. Temperatures for 1962, not graphed, for the same date were 18.5°C in the channel and 19.6°C on the sand flat. In February 1962, samples produced 25.9 shrimp per unit effort when the channel water temperature was 15.8°C. In February 1963, samples produced 2.33 post-larval shrimp per unit effort when the water temperature was 11.7°C. Apparently, temperature in this case was a limiting factor.

The temperatures on the sand flat were remarkably close to those found at 40-foot depths in the channel throughout the sampling period. Except for a few periods, organisms coming out of the deeper water onto the flats would have had to undergo little change in either temperature or salinity.

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Table I

## Larval Samples

(Temperature in degrees centigrade; salinity in parts per thousand)

SAND FLAT SAMPLE - LYDIA ANN CHANNEL  
(Average sample strains 70.14 cubic meters of water)

<u>DATE</u>	<u>Organisms Collected</u>	<u>Temp.</u>	<u>Sal.</u>
2/11	2 Fam. Xanthidae (15 mm)	9.3	27.63
2/19	4 Mysids (9 mm)	10.1	28.34
2/25	1 Sagitta (8 mm)	12.2	30.92
3/7	None	15.5	29.96
3/11	70 Sagitta (4-10 mm) 7 Amphipods (2 mm)	16.5	32.08
3/17	1 Penaeid post-larva (13 mm) 75 Crab larvae - megalops (4 mm) 1 Amphipod (6 mm) 1 Isopod - parasitic (8 mm)	17.1	29.33
3/27	21 Penaeid post-larvae (13 mm) 2 Sagitta (11 mm)	20.5	32.06
4/3	6 Penaeid post-larvae (11 mm) 3 Mysids (4 mm)	26.9	32.29
4/8	2 Penaeid post-larvae (13 mm) 2 Mysids (6 mm) 6 Sagitta (8 mm) 4 Obelia	21.8	31.45
4/18	2 Mysids (6 mm) 3 Amphipods (4 mm)	23.9	36.27
4/23	3 Penaeid post-larvae (12-14 mm) 30 Sagitta (10 mm)	25.4	36.01
5/2	30 Mysids (6 mm) 1 <u>Trachypeneus</u> sp. (7 mm) 90 Amphipods (6 mm)	25.6	26.78
5/9	1 Mysid (7 mm)	25.3	34.90
5/16	None	23.4	35.43
5/27	1 Mysid (5 mm) 10 Sagitta (6 mm)	27.3	36.99

Table 1 (Continued)

<u>DATE</u>	<u>Organisms Collected</u>	<u>Temp.</u>	<u>Sal.</u>
6/6	1 <u>Penaeus aztecus</u> (40 mm) 1 Mysid (8 mm)	28.8	36.60
6/14	3 Obelia	29.4	36.60
6/20	None	29.2	36.32
7/12	1 Polychaeta (16 mm)	29.2	36.66
8/9	None	31.5	37.26
8/16	None	28.5	35.49
8/22	None	30.8	37.66

Table 2

## Larval Samples

## HOOP NET SAMPLE - Aransas Ship Channel

(Average sample strains 395.39 cubic meters of water)

<u>DATE</u>	<u>Organisms Collected</u>	<u>Temp.</u>	<u>Sal.</u>
1/4	None	14.5	31.45
2/25	30 Crab larvae - megalops (2 mm) 200 Obelia 1 Polychaeta (15 mm)	11.8	32.71
3/7	150 Crab larvae - megalops (1.5 mm) 1 Isopod (4 mm) 6 Obelia	15.9	33.10
3/11	2,000 Crab larvae - megalops (1.5 mm) 5 Copepods (1 mm)	16.3	32.75
3/26	9 Penaeid post-larvae (12 mm) 340 Mysids (10 mm) 3 <u>Acetes</u> sp. (14 mm) 10 <u>Lucifer</u> sp. (14 mm) 250 Sagitta (11 mm)	19.2	31.73
4/8	245 Penaeid post-larvae (-13 mm) 340 Mysids (4-10 mm) 25 <u>Lucifer</u> sp. (13 mm) 90 Sagitta (8 mm) 30 Ctenophora 100 Obelia	20.7	33.71

Table 2 (Continued)

<u>DATE</u>	<u>Organisms Collected</u>	<u>Temp.</u>	<u>Sal.</u>
4/18	158 Penaeid post-larvae (12 mm) 10 Mysids (8 mm) 4 <u>Acetes</u> sp. (25 mm) 40 <u>Lucifer</u> sp. (6-14mm) 10 <u>Sagitta</u> (8 mm) 50 obelia	23.9	36.39
4/23	11 Penaeid post-larvae (12 mm) 15 Mysids (6 mm) 3 <u>Acetes</u> sp. (25 mm) 250 <u>Lucifer</u> sp. (6-12 mm) 3 <u>Squilla</u> sp. larvae (12 mm) 1 Hippolytidae (15 mm) 30 <u>Sagitta</u> (10 mm)	25.3	35.85
5/22	11 Penaeid post-larvae (10 mm) 10 Mysids (6 mm) 1 <u>Acetes</u> sp. (11 mm) 150 <u>Lucifer</u> sp. (8 mm) 2 Crab larvae - megalops (2 mm) 20 <u>Sagitta</u> (7-11 mm)	25.6	36.28
5/27	8 Mysids (9 mm) 15 <u>Acetes</u> sp. (12-19 mm) 250 <u>Lucifer</u> sp. (11 mm)	26.9	36.10
6/5	5 Mysids (5 mm) 300 <u>Acetes</u> sp. (11-21 mm) 6,000 <u>Lucifer</u> sp. (10 mm) 5 <u>Squilla</u> larvae (17 mm) 200 Crab larvae - megalops (2 mm) 1 Isopod - parasitic (15 mm) 3 Copepods (1 mm) 3 Obelia	28.0 28.0	36.05 36.05
6/14	15 Penaeid post-larvae (12 mm) 15 Mysids (6 mm) 10 <u>Acetes</u> sp. (11-15 mm) 550 <u>Lucifer</u> sp. (10 mm) 1 <u>Squilla</u> larva (17 mm) 1 Crab larva - megalops (2 mm)	29.0	37.49
6/20	75 Penaeid post-larvae (6-12 mm) 20 Mysids (9 mm) 50 <u>Acetes</u> sp. (11-22 mm) 500 <u>Lucifer</u> sp. (8 mm) 4 <u>Squilla</u> larvae (16 mm)	29.1	36.95
10/10	65 Mysids (6-8 mm) 15 <u>Acetes</u> sp. (9-12 mm) 80 <u>Lucifer</u> sp. (9 mm) 1 <u>Palaemonetes</u> sp. (6 mm)	27.0	32.71

Table 2 (Continued)

<u>DATE</u>	<u>Organisms Collected</u>	<u>Temp.</u>	<u>Sal.</u>
10/18	60 Mysids (-10 mm) 30 <u>Acetes</u> sp. (4-15 mm) 80 <u>Lucifer</u> sp. (8 mm) 3 Hippolytidae (10 mm) 1 <u>Latreutes</u> sp. (11 mm)	25.6	36.68
10/23	6 Mysids (4-8 mm) 1 <u>Acetes</u> sp. (8 mm) 150 <u>Lucifer</u> sp. (4-8 mm)	25.5	36.72
10/29	3 Mysids (6 mm) 6 <u>Acetes</u> sp. (5-19 mm) 200 <u>Lucifer</u> sp. (8 mm)	25.1	35.41
10/31	2 Mysids (6 mm) 12 <u>Acetes</u> sp. (4-10 mm) 300 <u>Lucifer</u> sp. (8 mm)	23.8	36.81
11/5	50 Mysids (4-6 mm) 100 <u>Acetes</u> sp. (6-8 mm) 400 <u>Lucifer</u> sp. (8 mm)	23.4	36.39
11/12	300 Mysids (5-11 mm) 5,000 <u>Acetes</u> sp. (5-18 mm) 3 <u>Lucifer</u> sp. (9 mm) 4 Crab larvae - megalops (2 mm) 30 Sagitta (9 mm)	21.9	35.92
11/20	40 Mysids (4-8 mm) 23 <u>Acetes</u> sp. (10-20 mm) 31 <u>Lucifer</u> sp. (9 mm)	22.7	36.48



Table 3

## Larval Samples

## BEAM TRAWL SAMPLE - ARANSAS SHIP CHANNEL

(Average sample strains 122.04 cubic meters of water)

<u>DATE</u>	<u>Organisms Collected</u>	<u>Temp.</u>	<u>Sal.</u>
2/19	4 Penaeid post-larvae (8 mm) 3 Mysids (3-7 mm) 2 <u>Acetes</u> sp. (7 mm) 5 <u>Palaemonetes</u> sp. (25 mm) 10 Crab larvae - megalops (2.5 mm) 1 Amphipod (11 mm)	11.7	29.03
2/27	2 Penaeid post-larvae (9 mm) 8 Mysids (4-8 mm) 30 Crab larvae - Megalops (1.5 mm) 6 Amphipods (3-9 mm) 2 Medusae - unknown	12.8	32.89
3/7	3 <u>Trachypeneus similis</u> (30 mm) 1 <u>Squilla empusa</u> (35 mm) 30 Crab larvae - megalops (1.5 mm) 10 Sagitta (9 mm)	14.2	33.10
3/26	2 Penaeid psot-larvae (13 mm) 50 Mysids (11 mm) 1 <u>Acetes</u> sp. (13 mm) 5 Crab larvae - megalops (3 mm) 2 Crab post-larvae (9 mm)	19.2	31.73
4/8	11 Penaeid psot-larvae (14 mm) 57 Mysids (10 mm) 2 <u>Acetes</u> sp. (20 mm) 7 <u>Lucifer</u> sp. (16 mm)	20.7	33.71
4/18	17 Penaeid psot-larvae (12 mm) 140 Mysids (6-10 mm) 1 <u>Lucifer</u> sp. (9 mm) 2 <u>Tozeuma</u> sp. (12, 35 mm) 4 Hippolytidae (20 mm) 30 Obelia	23.9	36.39
4/23	5 Penaeid post-larvae (10 mm) 35 Mysids (8 mm) 1 <u>Acetes</u> sp. (30 mm) 120 <u>Lucifer</u> sp. (7 mm) 8 <u>Squilla</u> larvae (15 mm) 50 Sagitta (10 mm)	25.3	35.85
5/22	9 Penaeid post-larvae (8-11 mm) 12 Mysids (8-12 mm) 7 <u>Acetes</u> sp. (13 mm) 25 <u>Lucifer</u> sp. (10 mm) 5 Sagitta (10 mm)	25.6	36.28

Table 3 (Continued)

5/27	21 Penaeid post-larvae (10 mm)	26.9	36.10
	30 Mysids (6-8 mm)		
	250 <u>Acetes</u> sp. (20-25 mm)		
	4,000 <u>Lucifer</u> sp. (9 mm)		
	15 <u>Squilla</u> larvae (15 mm)		
	2 Amphipods (4 mm)		
6/5	35 Mysids (9 mm)	28.0	36.81
	45 <u>Acetes</u> sp. (12-21 mm)		
	225 <u>Lucifer</u> sp. (8 mm)		
	3 <u>Squilla</u> larvae (12 mm)		
	3 Crab larvae - megalops (2 mm)		
	1 <u>Lolliguncula brevis</u> (20 mm mantle length)		
6/14	2 Penaeids (10 mm)	29.0	37.49
	2 Mysids (9,14 mm)		
	1 <u>Acetes</u> sp. (10 mm)		
	1 <u>Palaemonetes</u> sp. (10 mm)		
	6 Amphipods (4-6 mm)		
6/20	22 Mysids (8 mm)	29.1	34.98
	20 <u>Lucifer</u> sp.		
	1 Crab larva - megalops (2 mm)		
	2 <u>Callianassa</u> sp. (4 mm)		
10/1	4 Mysids (3-7 mm)	25.6	32.68
	14 <u>Acetes</u> sp. (4-16 mm)		
	1 Hippolytidae (3 mm)		
	1 Crab larva - megalops (2 mm)		
10/18	45 Mysids (4-11 mm)	25.6	36.68
	19 <u>Acetes</u> sp. (20 mm)		
	1 <u>Sicyonia dorsalis</u> (30 mm)		
10/23	300 Mysids (5-12 mm)	25.5	36.72
	50 <u>Acetes</u> sp. (9-16 mm)		
	1 Hippolytidae (10 mm)		
	2 <u>Lolliguncula brevis</u> (20 mm)		
10/29	30 Mysids (6-8 mm)	25.1	35.41
	350 <u>Acetes</u> sp. (8-20 mm)		
	3 Hippolytidae (10 mm)		
	40 Ctenophora		
11/21	1,000 Mysids (5-10 mm)	22.9	35.62
	600 <u>Acetes</u> sp. (6-20 mm)		
	80 <u>Lucifer</u> sp. (9 mm)		
	2 Hippolytidae (8 mm)		
	200 Crab larvae - megalops (2 mm)		

Figure 1 - Beam Trawl Samples

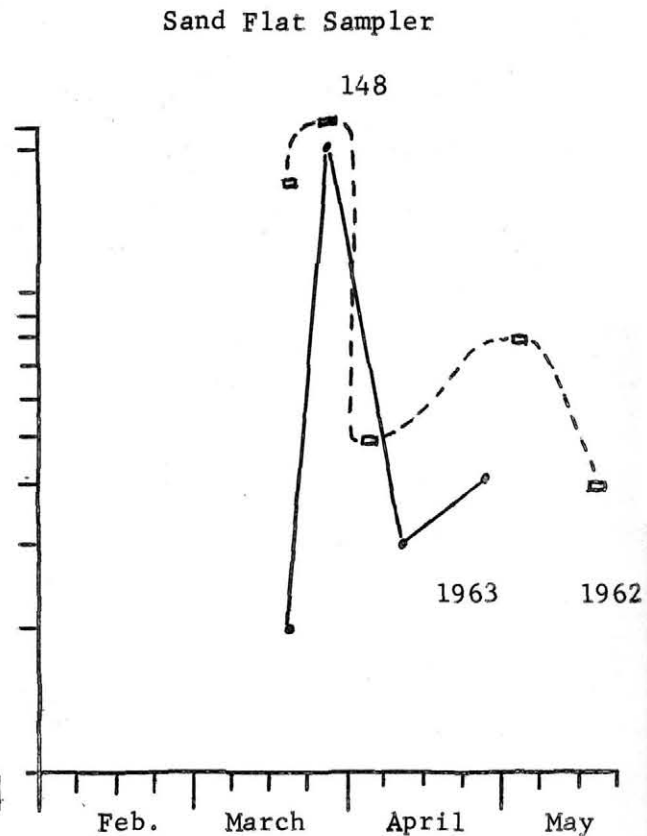
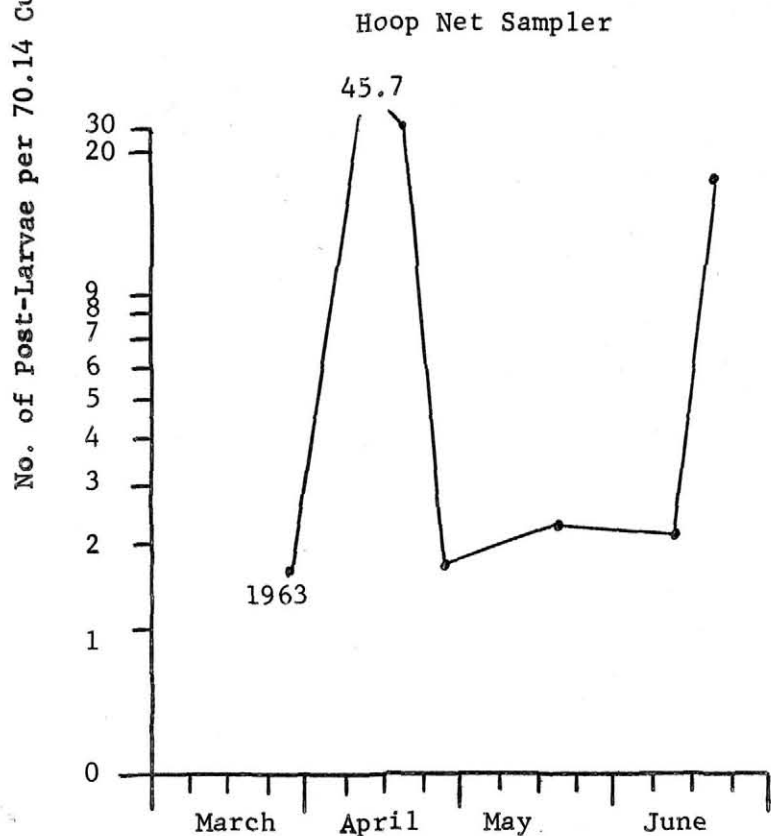
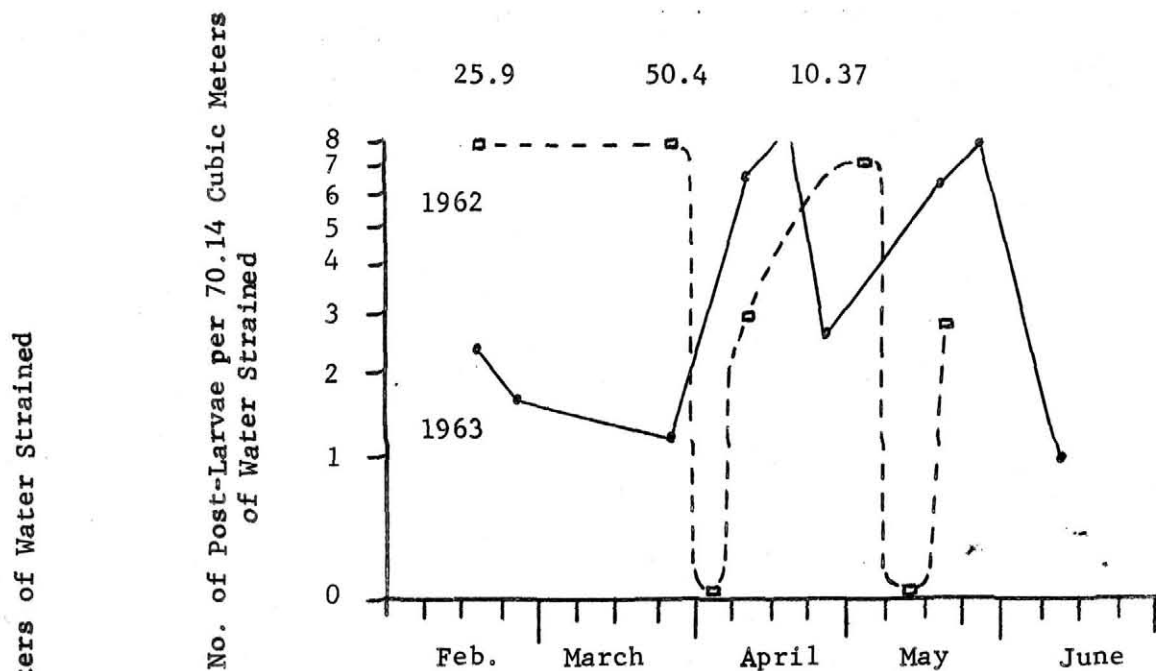




Figure 3

Average Number of Lucifer sp. by Month

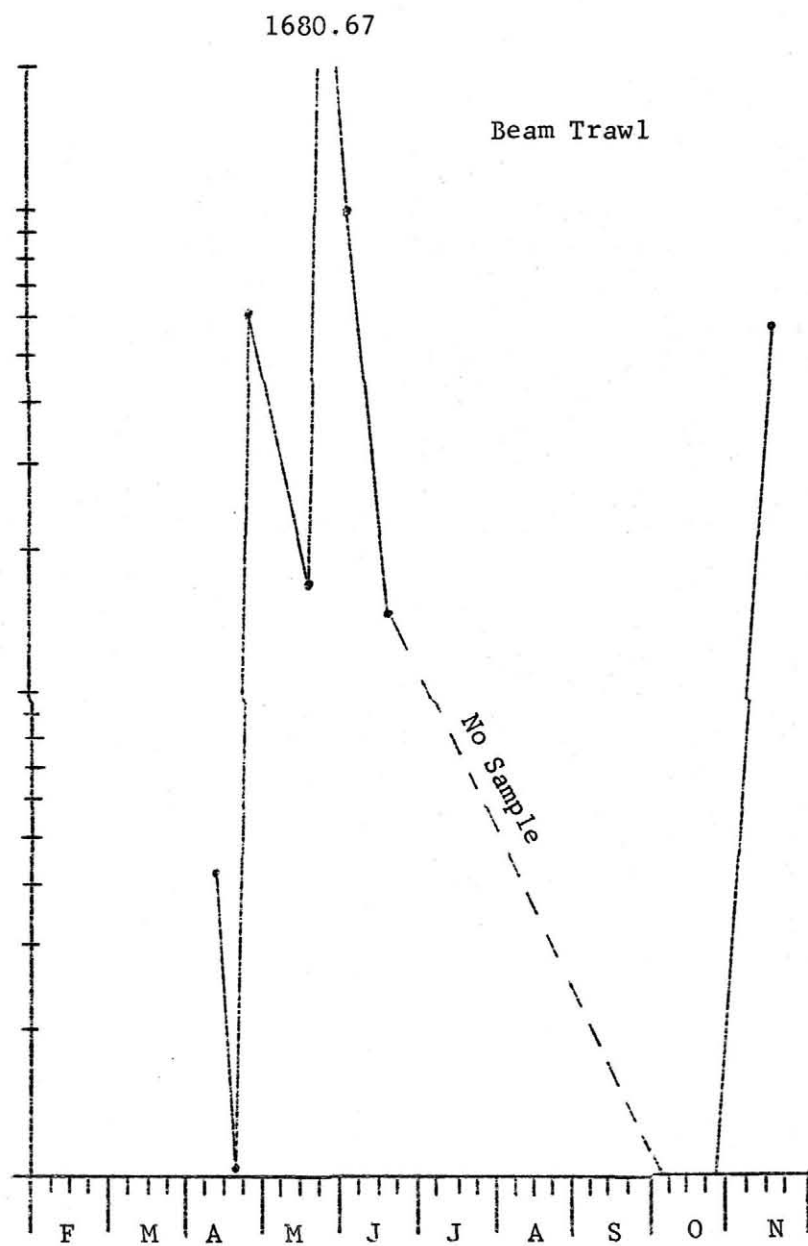
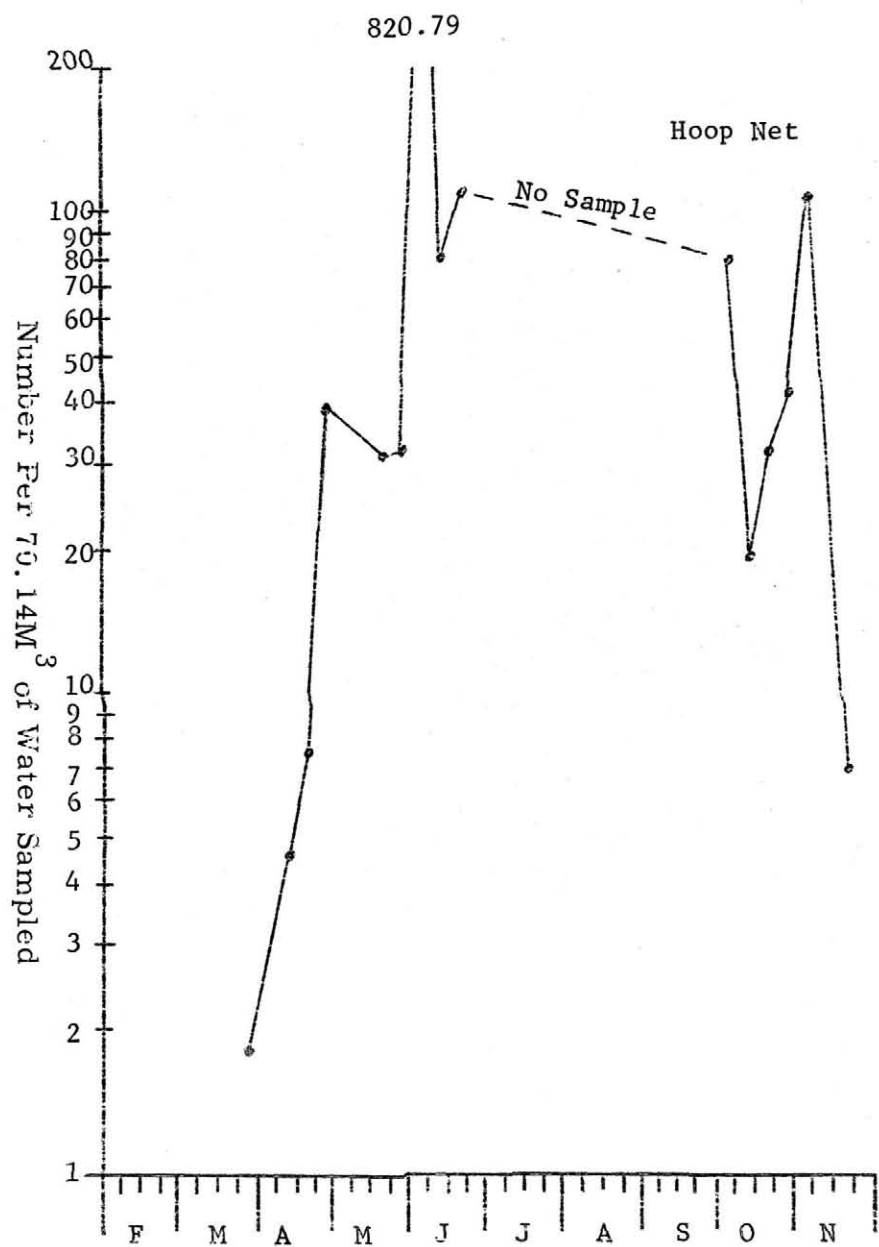


Figure 4

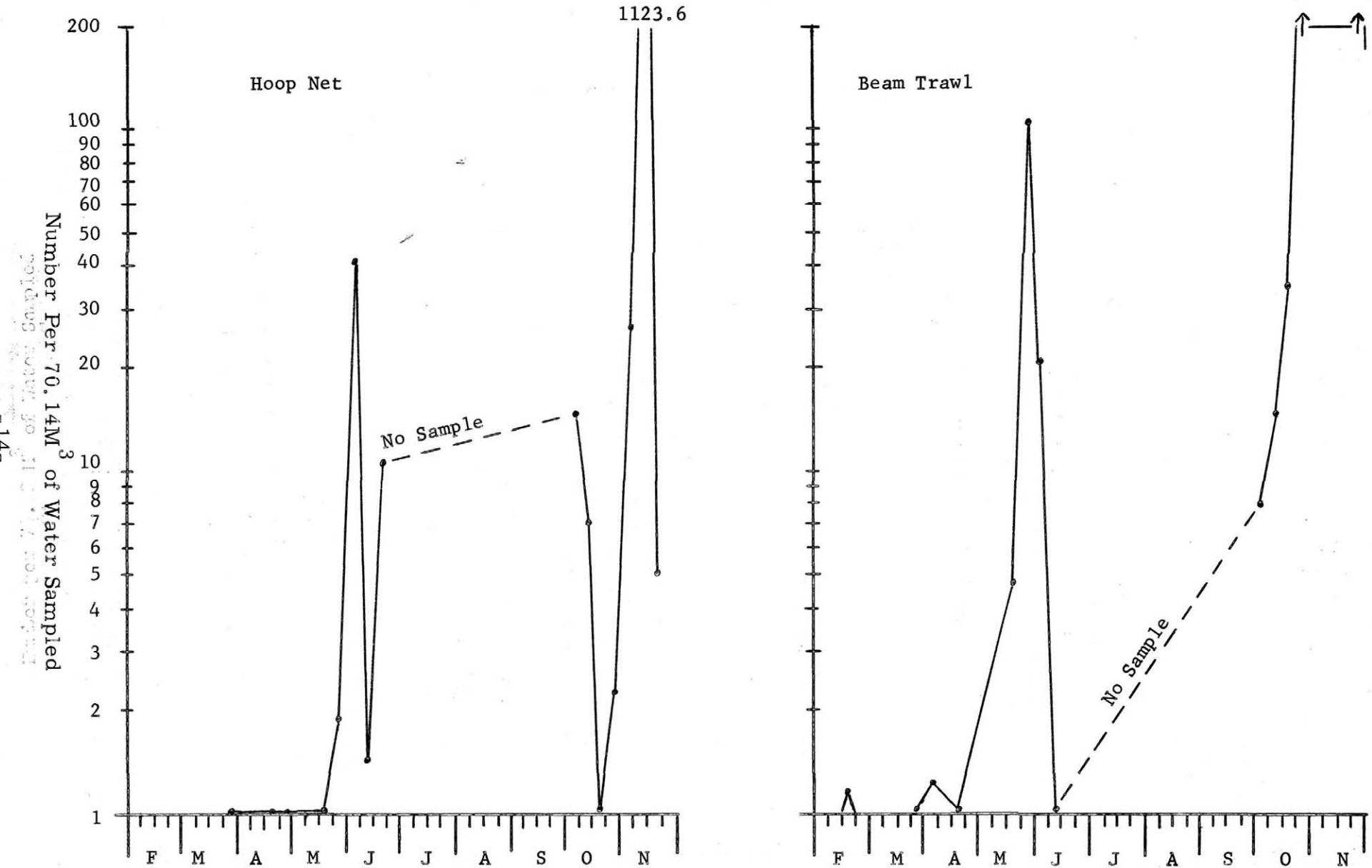
Average Number of Acetes sp. by Month

Figure 5  
Hydrographic Data

