

## Studies of the Blue Crab in Texas

Project No.: MCR6 - 1966

William R. More

### ABSTRACT

Blue crab, Callinectes sapidus, populations were studied in eight coastal bays and in the Gulf near Bolivar Peninsula.

In 1966, young crabs were more abundant in Aransas Bay and the upper Laguna Madre than at any time since 1962. Observable abundance changes were not apparent in other bays sampled.

Galveston Bay fishermen produced 50% of the commercial blue crab catch. Total landings decreased 24% from 1965.

Spawning and seasonal occurrence is discussed.

### INTRODUCTION

Fluctuations in the abundance of blue crabs, Callinectes sapidus, usually occurring abruptly and without advance indications, have been a serious problem to the crab industry (Rees 1966). One purpose of this study was to measure changes in crab abundance and factors that limit abundance.

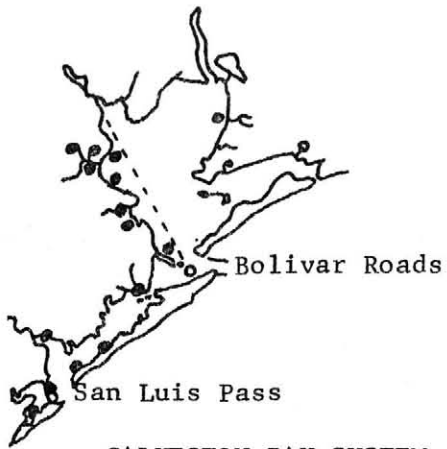
Studies on the abundance of blue crabs in different bay systems on the Texas coast were continued for the sixth year. Previous findings accentuated the need for intensifying studies of the fishery and the availability and spawning condition of female crabs in lower bay areas and the Gulf of Mexico. New phases of study, aimed at providing this information, were begun.

This report presents findings in 1966.

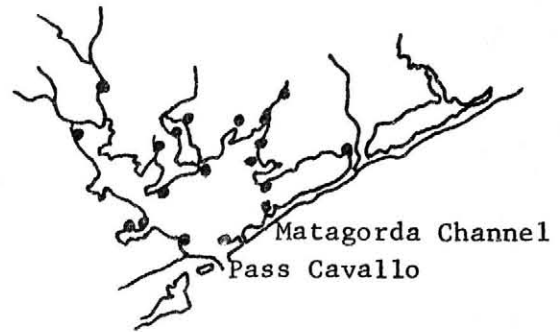
### MATERIALS AND METHODS

Analyses of blue crab populations are based on data from eight bay systems (Figure 1). Standard collecting gear and the operating procedures were:

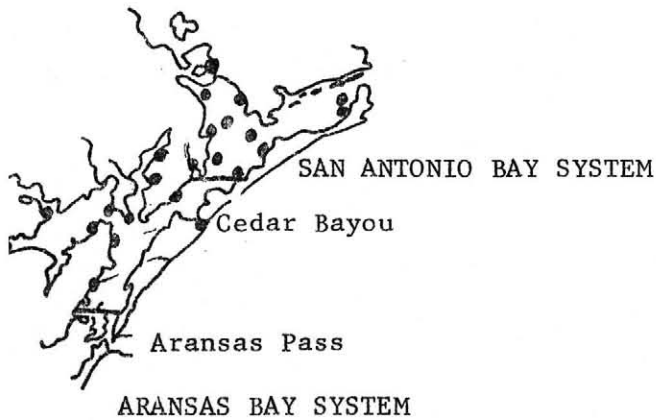
- (1) Six foot bar seines (6 foot tapered bag of 1/2 inch stretched mesh webbing) towed 500 feet by hand or boat in shallow nursery areas semi-monthly.
- (2) Ten foot trawls (of 1 1/4 inch stretched mesh lined with a 1/2 inch stretched mesh webbing) towed 15 minutes behind a boat in secondary and primary bays semi-monthly.
- (3) Sixty foot seines (6 foot deep of 3/4 inch stretched mesh) pulled, monthly, a standard distance at shoreline nursery areas and equated to 5000 square feet.



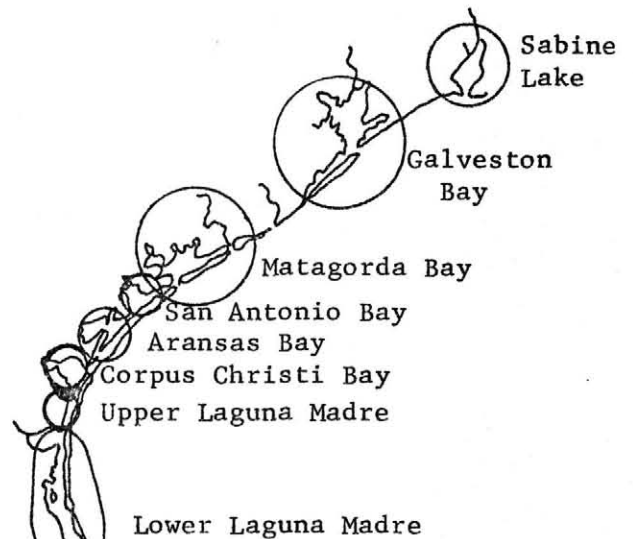
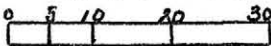
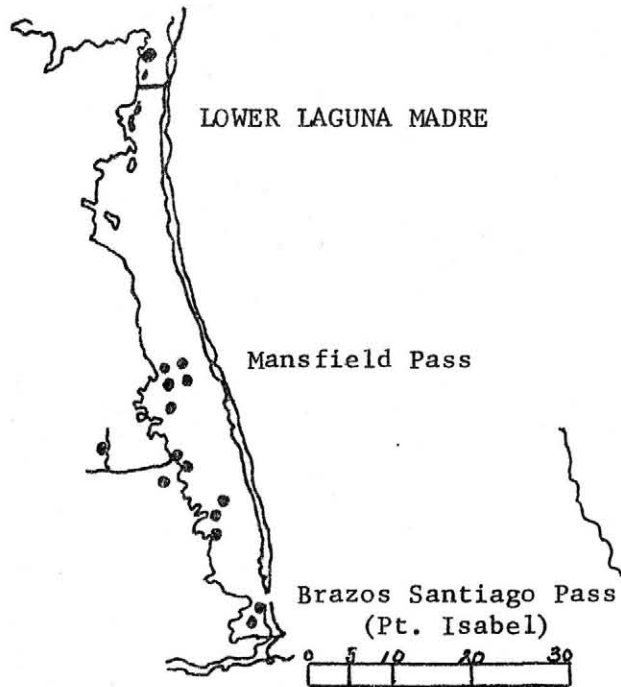
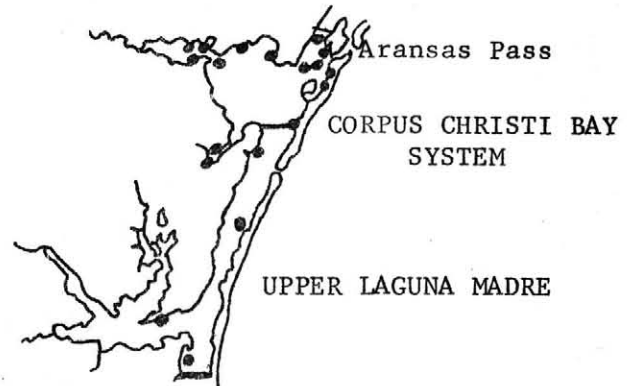
GALVESTON BAY SYSTEM



MATAGORDA BAY SYSTEM



ARANSAS BAY SYSTEM



Additional crab sampling with trawls and seines was conducted March-September in lower Galveston Bay and the adjacent Gulf to get information on the seasonality and spawning condition of female crabs. The descriptions of female crab maturity stages were modified from the method of Hard (1942). All blue crabs and Gulf crabs, *C. danae*, caught in the samples were measured in "carapace width",; i.e., the distance between the tips of the lateral spines and sexed. Hydrological and meteorological data were collected while sampling. Salinity values were determined by the Mohr titration method, hydrometers or refractometers.

Mature female crabs were tagged and released in the Bolivar surf (Galveston). More & Moffett (1964) described tagging procedures. A random sample of 100 crabs was measured monthly at commercial crab houses on Bolivar Peninsula (Galveston Bay) and in Palacios (Matagorda Bay). The sex, maturity stage, area fished, meat yield and prices paid were recorded.

Catch per effort\* information was obtained from three crab fishermen.

## RESULTS

### Commercial Fishery Survey

Blue crab landings (1966) declined 23.8% from 1965 (Table 1). Production declines in Galveston and San Antonio Bays were attributed to a reduction in total effort caused by: (1) a drop in frozen crab meat demand in the spring which resulted in a price cut in May, (2) closure of one crab company in February and (3) the state law prohibiting capture of sponge crabs (which previously composed about 80% of the catch during spring).

Fishermen in the Galveston district produced approximately 50% (1.4 million pounds) of the total crab production. Production from Aransas- Copano Bay was 15,500 pounds, the lowest since 1960. In Sabine Lake the fishery continued to grow and over 535 thousand pounds were landed.

In 1966, 63 crab pot fishermen fished a total of 9870 days (see below), using from 100 to 500 pots per set.

	Sabine Lake	Galveston Bay	Matagorda Bay	San Antonio Bay	Aransas Bay
Number Fishermen	6	25	21	0	2
Total Days Fished	1530	4020	3090	1110	120

Crabs caught in the commercial catch from Matagorda Bay were slightly smaller than those taken in Galveston Bay (Figure 2). Approximately 6% of the crabs examined from Matagorda Bay catches were below 5 inches in width as compared to 2% in Galveston Bay catches.

\* Same as catch per unit effort

Figure 2: Width distributions of blue crabs examined in commercial crab house samples (1966)

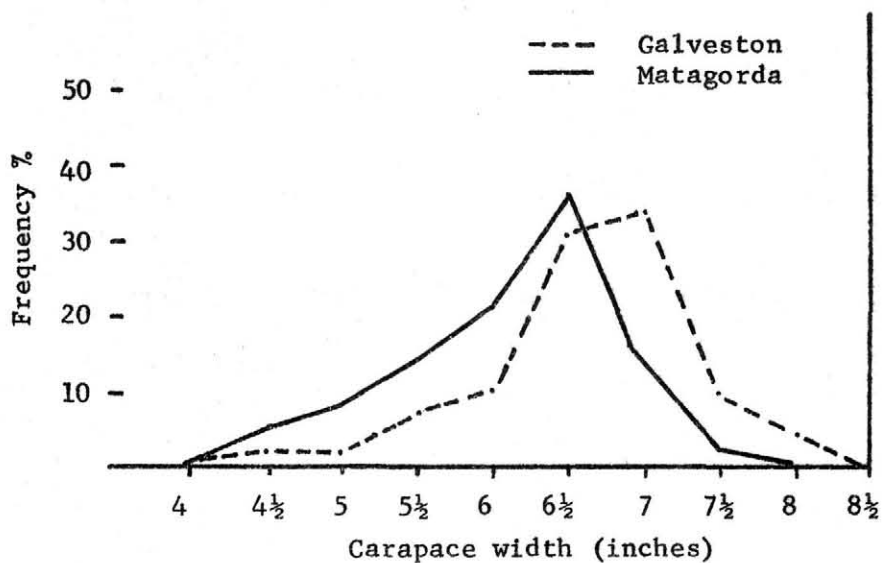


Figure 3: Catch-per-effort of Galveston Bay crab-pot fishermen, 1965-66.

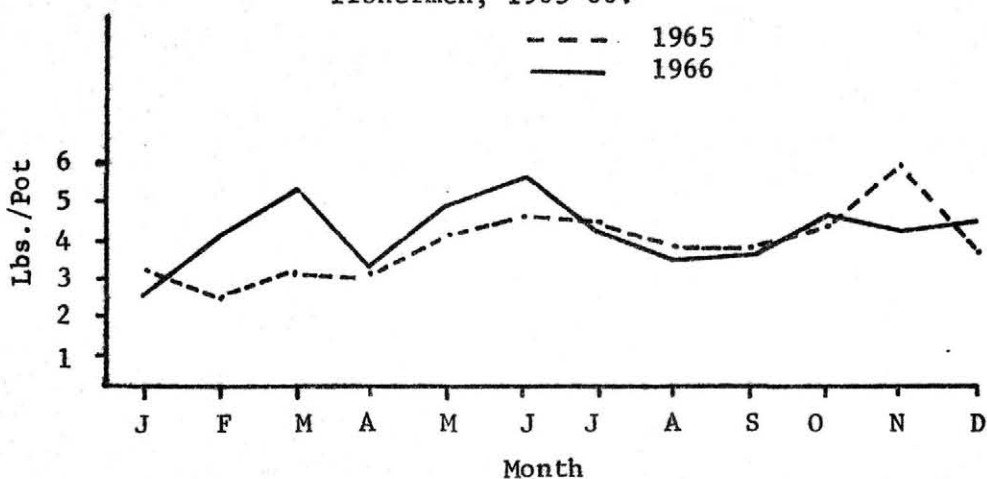
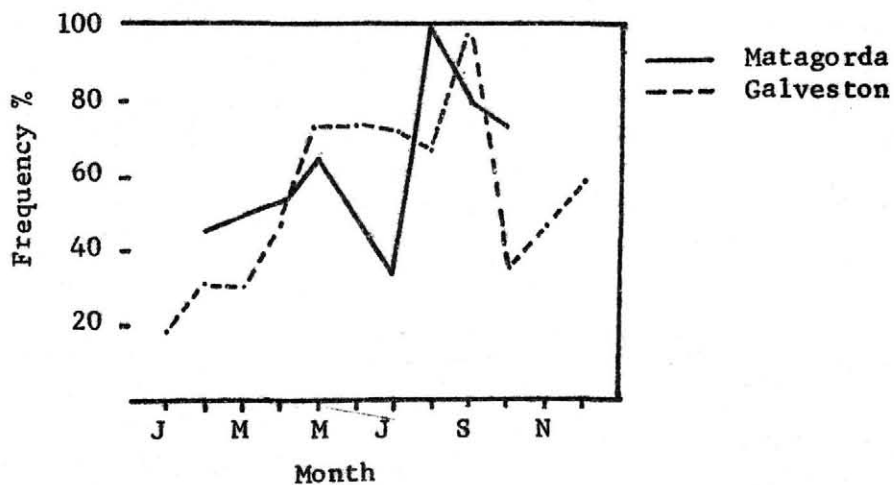


Figure 4: Per cent male crabs in commercial catches examined from Galveston and Matagorda Bays (1966)



Galveston Bay received the most fishing pressure. Catch per effort records indicated an overall average of 4.2 pounds per pot as compared to 3.8 pounds per pot in 1965 (Figure 3). Total fishing effort and catch per effort were highest in June. Catch per effort values dropped in August and September due mainly to the scarcity of female crabs in the catch (Figure 4).

## Bay Studies

### Seasonal Occurrence of Juvenile Crabs

As usual, blue crabs less than 20 mm wide were predominant in samples between December and April. These young crabs encountered low water temperatures and grew slowly. Crabs spawned in the spring were detected in late June and there was a gradual buildup of small crabs throughout summer as subsequent waves of crabs from later spawning entered nursery areas. Small crabs began appearing in large numbers in October when water temperatures dropped below 25°C. Recruitment continued throughout December.

The per cent size distribution of blue crabs by seasons is shown below

Size (mm)	Jan.-Mar.	April-June	July-Sept.	Oct.
0-20	71.3	46.7	47.9	67
20-40	20.8	27.4	22.9	22
40-80	6.1	18.0	16.7	5
80-130	1.8	7.9	12.5	4
<hr/>				
Number Measured	6887	3052	2081	33
Total	15,365			

Increases in the number of crabs in larger size groups occurred after bays warmed in the spring. The availability of precommercial size crabs (80-130 mm) was highest in May and September.

### Relative Abundance of Juvenile Crabs

Compared to 1965, data indicated an overall increase in crab abundance on the lower Texas coast (Aransas-Corpus Christi Bays and the Laguna Madre) whereas little change in abundance was noted in Matagorda and San Antonio Bays (Table 2). Samples from Sabine Lake indicated a fourfold increase in crab abundance whereas the catch per effort in Galveston Bay was down one-third.

Data collected in 1966 by area, gear type and month are presented in Table 3. The relative abundance of blue crabs varied by season and bay system.

### Sabine Lake

The monthly average of blue crabs caught in trawl samples was 9.4 as compared to 1.8 in 1965 and 4.2 in 1964. Crabs were taken in fair numbers during all months except August and September. Of 115 crabs caught in December, 99 were mature females which were probably overwintering in the

channel near Cameron Causway. Small crabs dominated other samples.

#### Galveston Bay

Average monthly sample catches indicated a decrease in juvenile crab abundance as compared to 1964 and 1965. Continuous recruitment of crabs spawned in the fall of 1965 occurred throughout the winter. The wave of crabs from spring spawning (April-May) was smaller than the two previous years. Unusually large numbers of crabs were taken with the 10 foot trawl in June when salinities were at the lowest level since sampling began in 1961 (2-5.7 ppt). Sixty foot seine catches were down 40 per cent from 1965.

#### Matagorda Bay

Sub adult crab catches in bar seine samples were slightly larger than those recorded in 1964 and 1965, but sampling by other methods showed a decrease. The fall wave of juvenile crabs was larger than previous years, the largest samples being collected in areas characterized by low salinity levels and soft mud bottoms.

#### San Antonio Bay

Fewer sub-adult crabs were caught during 1966 than in 1965, but the monthly average of trawl catches was higher than values recorded in 1962, 1963 and 1964. As in past years, few crabs were caught with seines.

#### Aransas Bay

A sharp increase in juvenile crab availability was noted at bar seine stations and small crabs were more abundant than at any other time since sampling began in 1962. By December, precommercial size crabs (80-120 mm) were distributed throughout the bay system.

#### Corpus Christi Bay

More crabs were taken in the 10 foot trawl during 1966 than in previous years, but seine catches were down from 1965. Like other areas, the smaller crabs were most abundant in the less saline waters.

#### Laguna Madre

Blue crabs were taken at seine and trawl stations during all months, whereas they were present in the upper Laguna Madre only in February and March in 1965. The reappearance of crabs in the upper Laguna Madre coincided with the abeyance of drought conditions. Data from the lower Laguna Madre indicated little change in the availability of blue crabs.

#### Aransas Wildlife Refuge Area

Crabs were sampled with a bar seine from March-December. Juveniles were taken in fair numbers during all months but May. The monthly catch average compared favorably to that of Aransas Bay.

## Special Studies

### Abundance and Spawning of Crabs in Lower Galveston Bay and Adjacent Gulf.

Sponge crabs were detected in lower Galveston Bay on March 14 and by April 1 approximately 80 per cent of the crabs caught were bearing eggs. Salinity in the lower bay was favorable for larval development (<20 ppt) until mid-April when Trinity River flood water reduced values 50 per cent. A large movement of female crabs from the bay to the Gulf was noted in May. From June 7 to August 19, 293 female crabs captured in the Gulf surf at Bolivar were examined for stages of sexual development. This information is summarized below:

<u>Stage</u>	<u>Condition of Female Crabs</u>	<u>June</u>	<u>July</u>	<u>August</u>
2-4	% not spawned (excludes sponge crabs)	50	20	0
5	% with 1st sponge	33	58	50
6-7	% that had spawned at least once	17	22	33
8	% recently spent	0	0	17

A peak in crab availability in the surf occurred in July; few were caught after August 1. Stage 2-4 female crabs decreased June-August and sponge crabs (stage 5) were most abundant in early July. Spent crabs were not detected until August.

Sponge crabs were still present in the lower bay during August and September, but none were caught in the Gulf after August 18.

One hundred female crabs (73 sponge and 27 sooks) were tagged and released in the Gulf surf at Bolivar. Of these, ten were recaptured near the area of release within 18 days. None were recovered more than one mile from the release area.

### Parasites

Data on the occurrence and incidence of some of the common parasites of blue crabs were compiled for future analyses. A summary of this information is offered in Table 4.

### Fishery Outlook

Crab fishing should be profitable on the lower coast in 1967. High salinity patterns which existed in lower coastal bays from 1963-1965 apparently had an adverse affect on crab population levels. For example, crabbers in the Aransas-Copano Bay system produced 1.6 million pounds of crabs in 1962. From 1963-1966 the fishery declined to 125, 112, 40 and 16 thousand pounds, respectively. In 1966, heavy rainfall lowered salinity and small crabs appeared in nursery areas in abundance, hence the outlook for the crab fishery is good.

LITERATURE CITED

- ard, W. L. 1942 Ovarian growth and ovulation in the mature blue crab,  
Callinectes sapidus Rathbun Ches. Biol. Lab., Solomons Is., Md. Publ. 46
- ore, William R. and Alan W. Moffett 1964 Population studies of the blue crabs  
of the Galveston Bay system. Proj. Rpts., Tex. Parks and Wildl. Dept. Mar.  
Div. (Mimeo.).
- ees, George H. 1966 Blue Crab Program, Annual Rpt. Bur. Comm. Fish. Biol.  
Lab. Beaufort, N.C.. 1965 Cir. 240.



Table 1: Hard crab landings, by statistical districts (1966 - in pounds)

	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	%	Total
Sabine	3300	2200	24951	45889	66927	66893	74193	48051	52009	46791	51571	54076	19.5	5368
Galveston	20685	18875	82747	106431	141708	208958	199431	202175	198949	110212	44991	22106	49.2	13578
Matagorda	19303	9520	28200	55986	75145	82697	72832	36417	31334	33250	25832	18816	17.7	4893
Aransas	25300	5000	5000	51000	65000	60000	46000	26000	39060	25000	14600	12600	13.6	3745
Total	68585	35595	140898	259306	348780	418548	392456	313183	321352	215253	136994	107598		27585

Total Landings: 1965 - 3.6 million pounds

Table 2: Blue crab data, by year and gear type (1962-66).

Six foot bar-seine - Average number per sample (3000 ft.<sup>2</sup>).

	Galveston Bay	Matagorda Bay	San Antonio Bay	Aransas Bay	Corpus Christi Bay	Lower Laguna Madre	Sabine Lk
1962	17.0	16.4	-	5.7	-	-	-
1963	13.4	14.7	-	1.8	-	-	-
1964	33.3	28.7	-	2.4	-	-	-
1965	38.1	27.7	2.3	2.8	3.9	4.2	-
1966	25.9	34.1	2.9	27.1	-	-	-

10 foot trawl - Average number per sample (15 minute).

1962	4.3	4.0	4.4	2.0	7.3	4.9	-
1963	2.8	3.4	4.1	1.3	3.2	2.0	-
1964	14.2*	1.3	4.3	.5	4.6	1.8	4.2
1965	4.0	2.0	9.6	1.5	5.4	4.1	1.8
1966	3.2	2.3	7.3	1.0	7.6	-	9.4

\* Average preponderated by two large samples

60 foot seine - Average number per sample (5000 ft.<sup>2</sup>).

1964	12.2	4.5	1.3	3.8	1.7	6.5	-
1965	13.5	6.2	.8	3.2	4.5	8.0	-
1966	8.3	2.1	-	4.3	2.1	7.6	-

Table 5: Catch data (1966), expressed as number of blue crabs per sample for each gear type, by months.

6' Bar Seine

10' Trawl

Area	2 & 3	4	5	6	Refuge Area	Catch Index
Jan.	55.5	45	.5	14	-	28.8
Feb.	77	43	.1	7.5	-	32.1
March	48.5	96.5	8.5	20.5	-	43.5
April	38.5	53.5	3.5	44	24	28.4
May	11.5	7	11.5	3	4.5	7.5
June	7	8	1	6	31.5	10.7
July	6.5	14.5	1.5	-	-	7.5
Aug.	5	13	3.5	4	34.5	12.0
Sept.	7.5	8	1.5	10.5	21	9.7
Oct.	11.5	23.5	1.5	75.5	32	28.8
Nov.	25.5	60	.5	-	-	28.6
Dec.	17	37.5	.2	85.5	16	31.2

1	2 & 3	4	5	6	7	Catch Index
-	.5	-	31.5	-	-	16.0
-	-	-	21.5	0	-	10.8
19.5	2	1.5	13	-	23	11.2
7	2.5	7.5	11.5	.5	7	6.0
5.5	1	3	2.5	3	3	3.0
11	14.5	2.5	1.5	-	17.5	9.4
10	4.5	3	1	-	12.0	6.1
3.5	1	2.5	2	0	4.5	2.3
3	1	.2	.1	.5	4	1.5
8	5.5	.2	1	1.5	3.5	3.3
5.5	1.5	.5	1	1.5	.5	1.8
20.5	1.5	-	1.5	0	1	4.9

Monthly Average

25.9 34.1 2.9 27.1 23.3

9.4 3.2 2.3 7.3 1.0 7.6

60' Seine

Area	2 & 3	4	5	6	7	8	9	Catch Index
Jan.	6	.2	1.5	4	.5	-	7.5	3.3
Feb.	4.5	4	.5	-	3	-	6	3.6
March	12	.5	11.5	4.5	1.5	14	0	6.3
April	4	2.5	-	8	1	10	20	7.6
May	21.5	2	-	-	3.5	3	7.5	7.5
June	7.5	1.5	-	-	-	17	-	8.7
July	11.5	1	-	-	-	-	-	6.3
Aug.	14.5	4	-	5.5	-	4	-	7.0
Sept.	5.5	3	-	3	3.0	7.5	5	4.5
Oct.	4	1.5	-	-	-	3	8	4.1
Nov.	7	3.5	-	.5	-	.5	5.5	3.4
Dec.	2	.5	-	-	-	-	1	1.2

Combined Average/Sample

Galveston Bay = 12.5  
 Matagorda Bay = 13.2  
 San Antonio Bay = 5.1  
 Aransas Bay = 10.8  
 Catch Index = avg. of avg. catch by area

Index of Areas:

- 1 Sabine Lake
- 2 & 3 Galveston Bay
- 4 Matagorda Bay
- 5 San Antonio Bay
- 6 Aransas Bay
- 7 Corpus Christi Bay
- 8 Upper Laguna Madre
- 9 Lower Laguna Madre

Monthly

Table 4: Common Blue Crab Parasites

<u>Parasite</u>	<u>Location</u>	<u>Effect on Host</u>	<u>Incidence</u>
<u>Loxotylacus texanus</u> (Class-Crustacea Order-Rhizocephala)	External sac attached to underside of abdomen	Castration	Found in all bays but Sabine Lake; highest incidence in Laguna Madre and San Antonio Bays.
<u>Carcinonemertes carcinophilia</u> (Phylum Nemertea)	Lives in gills-becomes sexually mature in egg mass	Unknown	78% of mature female crabs examined from the Gulf surf at Galveston were infected; also found in mature female crabs from lower Galveston Bay.
<u>Octolasmis lowei*</u> (Class-Crustacea Order-Thoracica)	Lives on gills and gill chambers	Commensal relationship	21% of mature female crabs examined from the Gulf surf at Galveston were infected with at least one barnacle.
<u>Myzobdella lugubris</u> (Phylum-Annelida Class-Hirudinea)	Attached to carapace and within gill chambers	Unknown	Approximately 20% of blue crabs examined from the fresher areas of Galveston Bay had one or more of these leeches attached to carapace; it was not found in the saltier areas of the bay system.
Unknown metacercariae-resembles <u>Spelotrema sp.</u> (Class-Trematoda)	Black cysts in muscle tissue	Unknown	Not determined

---

\* Probably cannot be considered a true parasite