MOVEMENT OF BLUE CRABS IN TRINITY BAY

by

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ABSTRACT

Blue crab (Callinectes sapidus) were tagged during December 1977 in Trinity Bay, Texas to determine movement during winter and spring. Peterson disc tags were attached by wire to 300 blue crabs (>127 mm) which were released at eight sites. Commercial fishermen returned 54 tags (18% return rate). Of these tags, 94% were returned during March and April.

A general southward movement of blue crabs was detected during spring. Male crabs generally remained within an average distance of 7.9 km of release sites whereas female crabs traveled an average distance of 19.1 km. from release sites. Most male crabs remained within Trinity Bay whereas female crabs traveled to middle and lower bay areas.

INTRODUCTION

The Texas blue crab fishery ranks second to shrimp (Penaeus sp.) in total landings. Annual blue crab landings ranged from 13 to 440,446 kg prior to 1959 (Moss 1986). Landings increased to 2 million kg/year in 1962 (More 1969) and since 1977 have averaged 3.8 million kg/year (Osburn et al. 1987). The first facility for exclusively processing crabs was established in Palacios, Texas in 1959 (Moss 1982). Crab processing plants increased to three by 1961, 10 by 1965 and since then have varied from eight to 12 plants/year (More 1969; Richard Thompson, Texas Department of Health, personal communication).

In response to increased fishing pressure on blue crab populations, studies were initiated to obtain information for managing the resource (Childress 1962, 1963; Hawley 1963; Moffett and More 1963; More and Moffett 1964; More 1969). Information about spawning and movement of blue crabs through Cedar Bayou into the Gulf of Mexico was reported by Daugherty (1952) and King (1971). Studies in the Chesapeake Bay (Tan and Van Engel 1966) and North Carolina (Tagatz 1965) report that blue crabs exhibit tolerance to salinity that corresponds with the mating-spawning cycle. Maturation of the female generally occurs within a lower salinity environment. Mating occurs after the last molt when the female is in the soft shell state. Ovigerous females do not osmoregulate well in lower salinities (Tagatz 1965). This may stimulate spring movement of females toward the Gulf of Mexico where higher salinities can be found. More (1965) reported a pattern of self distribution in mature crabs that varied with season and areas fishes. The commercial catch was influenced by movements of female crabs into East and lower Galveston Bays during late fall and early spring. Mature male crabs predominated in catches from May-October in upper Galveston and Trinity Bays. In Louisiana, Jaworski (1972) reported similar movements of female crabs into the lower Barataria Estuary. He also reported that some crabs, primarily adult male and large adolescent crabs overwinter in the upper estuary. Data concerning winter movements of blue crabs in the upper areas of the Galveston Bay system was lacking.

In response to inquires from commercial crab fishermen concerning blue crab movements during winter, this tagging study was implemented to provide information on winter and spring movements of adult crabs in the upper reaches of a major Texas bay.

MATERIALS AND METHODS

Adult blue crabs (>127 mm) were provided for tagging by a commercial crabber on 15 December 1977. The commercial crabber was accompanied by a Texas Parks and Wildlife Department biologist. Blue crabs taken from his traps in Trinity Bay were tagged and released at eight locations (Fig. 1). Peterson disc tags were placed across the top of the blue crab carapace with monel wire; each end was attached to lateral spine tips (Cargo 1958). Release areas were selected to insure that blue crabs would be released near the capture site. Length (lateral spine tip to lateral spine tip) in mm, sex, and area of release were recorded for each blue crab tagged and released. Posters detailing the blue crab tagging study were distributed to commercial seafood dealers buying directly from crabbers in the Galveston Bay area. No other advertising of the program was done, and no rewards were offered for returned

tags. Calculation of days free included tagging date but not the date of recapture. Minimum distances traveled were determined by plotting tag returns on a NOAA Nautical Chart for Galveston Bay and measuring the shortest aquatic distance to the nearest km. Direction was determined by placing a parallel ruler along the distance traveled line and transposing to the nearest compass rose on the chart.

RESULTS

Of 300 tagged crabs, 249 were males and 51 were females (Table 1). Fifty-four tagged crabs were recaptured (18% recovery rate); 48 were males and six were females. The first tag return was reported 2 March 1978; 27 were returned during March, 24 during April and three during May. Tags were recovered from 11 general areas in the Galveston Bay system (Figure 2). All tag returns were reported by commercial fishermen. Of the 54 returns, 49 were taken in traps, 2 in gill nets and 3 in shrimp trawls (Table 2).

Blue crab movement generally was southward; 85% of males and 83% of females were captured south of release sites. Average distance traveled was 7.9 km for recaptured males and 19.1 km for females. The greatest distance traveled by a tagged blue crab was a female that moved southward 25.7 km after 103 days free. Days free averaged 112 days and ranged from 76-144 days.

DISCUSSION

More (1969) found that 85% of male blue crabs and 45% of female blue crabs were recaptured within 9.3 km of release sites. This study found similar movements of male blue crabs as 70% were captured within 9.3 km from release area, however, 100% of the female blue crabs were recaptured farther than 9.3 km from release sites. The general movement of female crabs away from release sites to lower bay areas could be attributed to approaching maturation prior to spawning.

More (1969) reported that the majority of tagged blue crabs were returned by recreational fishermen. All tags in this study were returned by commercial fishermen. This was due in part to blue crabs being tagged only in Trinity Bay which has limited access for recreational crabbers and the winter/spring period being a time of low recreational activity (Benefield 1968). Another aspect of the origin of tag returns is increased commercial fishing pressure. More (1969) reported the number of commercial crabbers fishing Texas waters to be 31 in 1965, 65 in 1966 and 62 in 1967. Coastwide, commercial landings during this period averaged 1.4 million kg. Moss (1982) estimated that 173 commercial crabbers fished Texas waters during 1976. This is a 266% increase in the number of commercial crabbers over a 10-year period with landings increasing to 3 million kg of blue crabs during the same period.

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Table 1. Number of blue crabs tagged at eight locations in Trinity Bay and tag returns from release areas.

Release Area[a]	Males		Females		Total	
	Tagged	Returned	Tagged	Returned	Tagged	Returned
1	28	4	18	3	46	7
2	19	3	2	1	21	4
3	31	6	2	0	33	6
4	34	7	15	0	49	7
5	14	4	2	1	16	5
6	46	12	9	0	55	12
7	52	7	3	1	55	8
8	25	5	0	0	25	5
Total	249	48	51	6	300	54

[a]See Figure 1 for locations of sites.

Table 2. Recapture data of blue crabs tagged in Trinity Bay during 15 December 1977. All tag returns were during March-May 1978.

Sex	Release area	Capture date	Direction of movement	Days free	Distance moved(km)	Capture method
♂	3	Mar 2	SW	76	8.0	Gill net
♂	6	18	S	92	14.6	Trap
♂	4	18	S	92	18.3	Trap
♀	2	18	S	92	21.9	Trap
♀	1	23	S	97	15.8	Trap
♂	8	24	S	98	1.6	Trap
♂	8	24	SW	98	3.7	Trap
♂	3	24	S	98	8.4	Trap
♀	1	24	W	98	10.1	Trap
♀	7	24	S	98	11.9	Trap
♂	7	27	SW	101	1.6	Trap
♂	7	27	SW	101	1.6	Trap
♂	8	27	SW	101	3.7	Trap
♂	5	27	S	101	5.4	Trap
♂	6	27	S	101	5.4	Trap
♂	4	27	S	101	9.2	Trap
♂	4	27	S	101	9.2	Trap
♂	3	27	S	101	10.9	Trap
♂	4	27	S	101	10.9	Trap
♀	7	28	S	102	25.7	Trap
♂	1	29	S	103	0.8	Trap
♂	2	29	S	103	4.2	Trap
♂	6	29	S	103	5.4	Trap
♂	1	29	SE	103	6.0	Trap
♂	3	29	S	103	10.1	Trap
♀	1	29	SW	103	24.1	Trap
♀	5	31	SW	105	17.7	Trap
♂	4	Apr 03	SW	108	2.3	Gill net
♂	2	05	S	110	8.2	Trap
♂	1	05	W	110	8.5	Trap
♂	7	07	W	112	1.6	Trap
♂	8	13	SW	118	1.6	Trap
♂	6	13	N	118	4.0	Trap
♂	4	13	S	118	8.5	Trap
♂	1	13	W	118	19.3	Trap
♂	7	18	SW	123	3.7	Trawl
♂	5	18	SE	123	8.0	Trap
♂	7	18	S	123	8.0	Trap
♂	6	18	SE	123	8.5	Trap
♂	6	18	SE	123	10.3	Trap
♂	6	18	SE	123	10.3	Trap

Table 2 (continued)

Sex	Release area	Capture date	Direction of movement	Days free	Distance moved(km)	Capture method
♂	5	21	SE	126	8.0	Trap
♂	8	21	S	126	10.1	Trap
♂	6	21	SE	126	10.3	Trap
♂	7	24	SW	129	1.6	Trap
♂	4	24	SE	129	8.0	Trap
♂	5	26	SE	131	8.0	Trap
♂	6	26	SE	131	8.5	Trap
♂	3	26	S	131	16.1	Trap
♂	6	26	S	131	16.1	Trap
♂	2	27	SW	132	3.2	Trap
♂	6	May 01[a]	N	135	8.4	Gill net
♂	3	05	S	140	24.1	Trawl
♂	6	09	N	144	1.6	Trap

[a]Reported as caught during May, no date provided. Assumed 1 May in order to calculate days free.

Figure 1. Release sites of tagged blue crabs (Callinectes sapidus) in Trinity Bay on 15 December 1977.

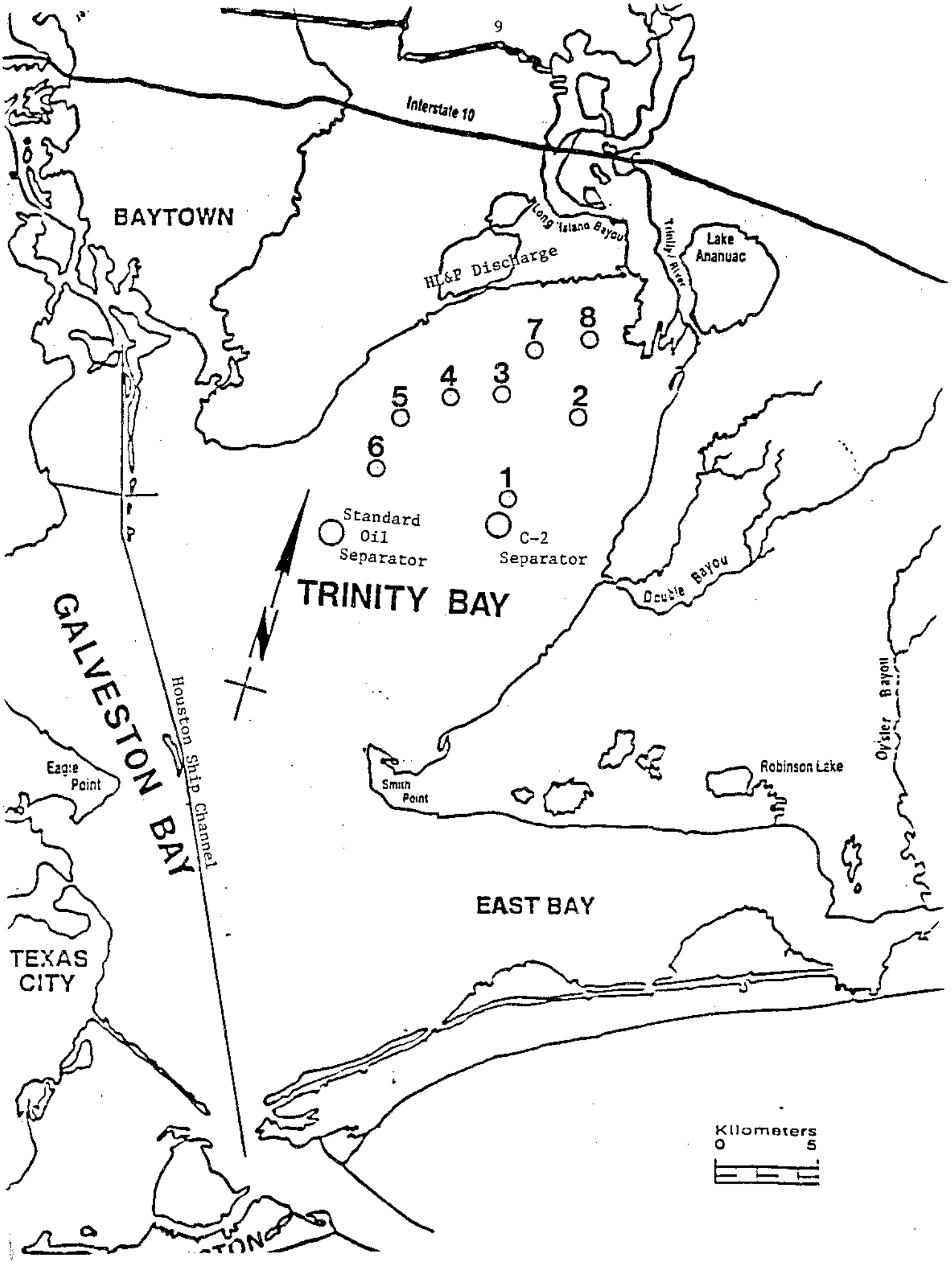
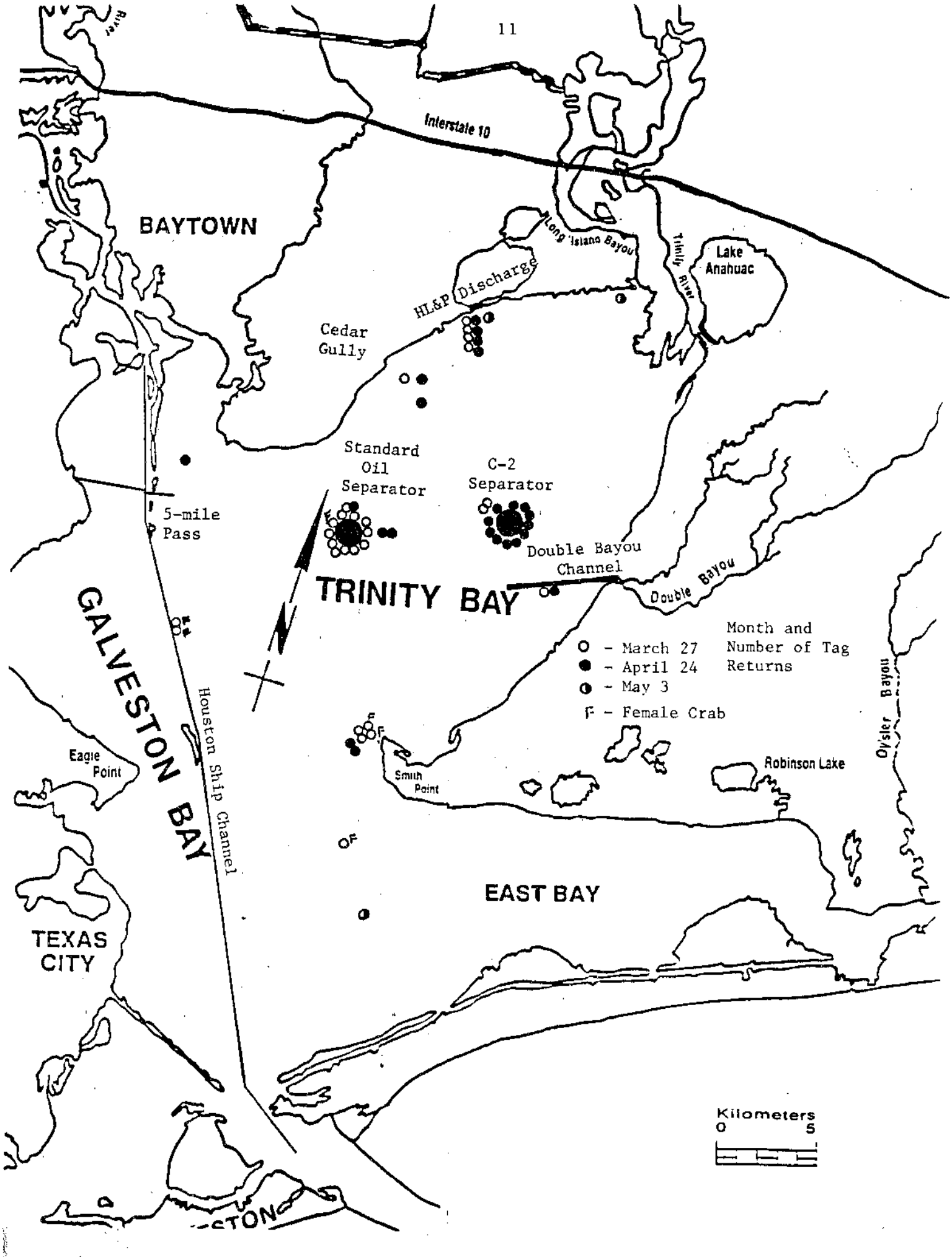

9
Interstate 10
BAYTOWN
Long Island Bayou
Trinity River
Lake Ananuac
HL&P Discharge
7
8
4
3
5
2
6
1
Standard Oil Separator
C-2 Separator
TRINITY BAY
Double Bayou
Oyster Bayou
GALVESTON BAY
Houston Ship Channel
Eagle Point
Smith Point
Robinson Lake
EAST BAY
TEXAS CITY
Kilometers
0
5

Figure 2. Returns by month of blue crabs (Callinectes sapidus) tagged in Trinity Bay.


Interstate 10
BAYTOWN
Long Island Bayou
Trinity River
Lake Anahuac
HL&P Discharge
Cedar Gully
Standard Oil Separator
C-2 Separator
5-mile Pass
Double Bayou Channel
Double Bayou
TRINITY BAY
GALVESTON BAY
Houston Ship Channel
Month and Number of Tag Returns
O - March 27
● - April 24
◑ - May 3
F - Female Crab
Eagle Point
Smith Point
Robinson Lake
Oyster Bayou
EAST BAY
TEXAS CITY
Kilometers
0 5

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