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SHELL MANAGEMENT ANNUAL REPORT, SEPTEMBER 1980 - AUGUST 1981

By: Arthur L. Crowe

Management Data Series Number 44
1982

Texas Parks and Wildlife Department
Coastal Fisheries Branch

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Texas Parks and Wildlife Department
Coastal Fisheries Branch
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ABSTRACT

The Texas Parks and Wildlife Department (TPWD) shell management program was designed to insure that shell mining companies comply with TPWD rules. During fiscal 1980-81, the shell dredge Trinity I (owned by Parker Brothers Company, Incorporated) was monitored 66 times while it operated in the central part of San Antonio Bay. No citations for siltation were issued. There were no requests for special permits. During 1980-81, 916,129 m³ (1,198,182 yd.³) of shell were removed from San Antonio Bay. The state received \$426,871 for the shell. In July, oyster mortality occurred throughout the bay due to flooding from heavy rains during May and June.

INTRODUCTION

The shell management program monitors dredging activity in San Antonio Bay to insure protection of exposed oyster reefs and manages shell replacement to promote development of productive oyster habitat.

Parks and Wildlife rules (Section 57.41-.50) require shell dredges to operate outside of 91 m (300 ft.) of any exposed oyster reef. No more than a trace of silt is allowed on any reef regardless of the distance the dredge is from the reef. A dredge is not allowed to operate within 0.8 km (0.5 mi.) of a shoreline. Exposed reefs may be removed only with the approval of the State and such reefs must be replaced on a one-for-one basis at a location determined by the shell management biologist.

Prior to July 1981, shell dredges were not allowed north of latitude $28^{\circ}22'$. However, after that date the Texas Parks and Wildlife Commission approved dredging in four state land tracts (ST 74, 101, 102 and 106) above the $28^{\circ}22'$ line.

New rules were written expressly for these four state tracts. They required all reefs within 455 m (1,500 ft.) of proposed dredging activity to be marked. They allowed a dredge to operate to within 30 m (100 ft.) of an exposed reef. If live oysters were present on reefs in the area, siltation rules remained in effect. However, if oysters were not present, a dredge could in effect silt the reef if it was restored to its original condition after the dredge left the area. A live reef was defined as having an average of one or more market oysters, or 10 or more seed oysters and spat combined per bushel sample. In addition, three percent of all shell removed from those four state tracts was to be used as replacement shell for building exposed reefs in San Antonio Bay and the rest of the Texas coast. The royalty dredging companies paid the state for mudshell increased from \$0.25 to \$1.25 per cubic yard and the price was tied to a consumer price index (Bureau of Labor Statistics CPI-U) to be adjusted semi-annually.

MATERIALS AND METHODS

Dredging activities were monitored one to two times a week, more frequently when the dredge operated near an exposed reef. A 11 m (35 ft.) twin screw diesel boat (Lookdown) was used to monitor the dredge and collect oyster samples. The position of the dredge was determined by triangulation using a Navy Mark II sextant and plotting on a 1"=2,000' scale Mylar map. Date, shot points used, angles, state tract numbers, and incidences of siltation were recorded.

When dredging occurred in the vicinity of an exposed oyster reef, the reef edge was marked with red flagged poles and yellow markers were placed at the minimum distance the dredge was allowed to operate from the reef. This established a visual reference for both the dredge operators and the shell management personnel. Silt indicator stations were maintained on the edge of numbered reefs when the dredge operated within 155 m (1,500 ft.) of the reefs. Silt trays were used as indicators that silt was moving

toward a reef. Trays were made of galvanized sheet metal 30x30x4 cm, fitted with a wire cradle and tied with a rope to a pole. Siltation of a reef was confirmed by sampling with oyster tongs.

In order to compare oyster populations in the area where the dredge was operating to the rest of the bay, San Antonio Bay was divided into three regions: upper, middle and lower bay. The upper bay included those reefs above the 28°22' line. The middle bay was from the 28°22' line to the Gulf Intracoastal Water Way (GIWW), and lower bay stations were below the GIWW. Two sample sites were chosen within each region (Figure 1). Stations were sampled once each month except during the April-May intensive shrimp sampling period.

One standard bushel (0.035 m³) of unculled oysters was dredged or tonged from each station according to methods described by Hofstetter (1977). Oyster measurements were grouped as follows: Spat 1-25 mm, small 26-75 mm, and market above 75 mm. When large numbers of oysters were present, sub-samples (one-quarter to one-half bushel) were taken and at least 100 individuals measured.

Description of Oyster Sample Stations

The size of oyster reefs presented here are from a 1968-1970 survey, unless updated. Increases or decreases in current acreage are probable.

Upper Bay

Reef 169 was plotted in 1981 at approximately 5 acres located in ST 74 above the 28°22' line. The initial survey showed it as 6.5 acres. The crest is exposed on a winter low tide. Average water depth in summer on the flanks is 1.5 m. It is orientated in an almost N-S line. The surrounding bottom is soft mud.

Reef 80 was plotted in 1981 at approximately 3 acres located in ST 101 above the 28°22' line. The initial survey showed it as 4.2 acres. Average depth in summer on the flanks is 1.3 m. It is orientated NW-SE. A metal push rod with a flat end will penetrate approximately 1.0 m into the surrounding soft mud.

Middle Bay

Halfmoon Reef is approximately 56 acres located in ST 62 and ST 77 along the western shore of the bay. The shape of the reef is more like a boomerang with one handle running NE-SW and the other handle running NW-SE. Small sections of Halfmoon's crest are exposed on an extremely low winter tide. Water depth in summer over the flanks is as deep as 1.8 m. The surrounding bottom is muddy sand.

Reef 51 is approximately 20 acres located in ST 136 within 1/4-mile of the eastern shore of San Antonio Bay. During the summer, portions of the reef are in 1.5 m of water while the largest section is approximately 1.0 m deep. The original Reef 51 was only 2.5 acres in size but was enlarged

with replacement shell in the 1960's. The surrounding bottom is muddy sand with scattered oyster shell.

Lower Bay

Panther Reef at over 500 acres is the largest reef in the bay. The size has probably increased since the initial survey due to heavy commercial oystering. It extends in a wide band from Panther Point on Matagorda Island NW to the GIWW where it is breached. It continues above the GIWW for approximately two miles. Spoil areas along the channel also support some oysters.

The sample site is approximately half way between the GIWW and the large Sun Oil gas production platform. Water depth at mean summer tide ranges from 2.0 m at the flanks to 1.5 m at the crest. During the summer, an attached brown algae is a common part of the reef community. The surrounding bottom ranges from sand near the island shore to sandy mud near the sample station.

Middleground is approximately 20 acres of mostly replacement shell 1-1/2 miles due south of the Turnstake on the GIWW in 2.0 m of water. The surrounding bottom has a 2.5 to 5.0 cm coating of soft mud over a hard sand substrate. The reef has been oystered consistently since replacement shell was added in the late sixties and again in the late seventies.

RESULTS

The dredge, Trinity I, owned by Parker Brothers, Incorporated operated in five state tracts in the central part of San Antonio Bay (Figure 2). Dredging activities were monitored 66 times (Table 1). No violations for siltation were issued nor were any special permits for removing exposed reefs requested during 1980-81.

Silt indicators showed normal levels of natural brown silt (2-10 mm) as long as the dredge operated outside of 455 m (1,500 ft.) from any numbered reef. During most of the year, the dredge operated beyond that distance from any numbered reef.

However, in May, dredging occurred within 121 m (400 ft.) of the west side of Reef 167 in ST 75. The silt indicator on the edge of the reef became full of gray silt, but tonging the area near the indicator did not show any silt accumulated on the oyster reef itself. The dredge did not operate close to Reef 167 for more than two or three days and then dropped back over 182 m (600 ft.) and continued to move away from the reef. This fact along with prevailing currents moving silt away from the reef probably helped to keep silt from accumulating on it.

Dredging occurred in three of the four state tracts above the 28°22' line during 1970. One of the dredge cuts in ST 74 was rechecked during December 1981. The water depth over the cut was 2.0 m and a sounding rod could be pushed 1-1/2 m into the sediment. This compares to an undredged area immediately adjacent where the water depth was 1-1/2 m and where a sounding rod was able to probe 1.0 m into the sediment.

Several reefs in ST 76 and ST 99 (Figure 2) were not as they appeared on the original survey (1968-70) map. During a 1976 survey, they were marked as fine shell reefs. These reefs were formed during the time when dredges did not keep shell less than 3/8-inch in size. Fine shell reefs are not able to withstand storms and siltation as well as natural reefs.

During 1980-81, 916,129 m³ (1,198,182 yd.³) of mudshell were removed from San Antonio Bay (Table 2). This is about the same amount dredged in the previous year (Crowe 1982). The Parks and Wildlife Department received \$426,871 in revenues, a 40 percent increase over the previous year.

Oyster samples indicated a good spat set occurred in September and October in the upper and lower bay (Table 3). Good growth occurred throughout the fall and winter as was evidenced by oysters with long, thin lips.

Commercial oystering was centered around Panther and Middleground reefs. Some boats began moving to the area of Steamboat Pass and the west shore of San Antonio Bay near the Aransas National Wildlife Refuge later in the season.

Heavy rainfall fell over the Guadalupe watershed during the second half of May through July. Rainfall totals for the period May through July recorded by the National Weather Service in Victoria were 12 inches above the 20-year average. The monthly mean discharge for the Guadalupe River during June was over 8,000 cubic feet per second above the long-term average (United States Geological Survey (USGS), In press). Daily salinities recorded at Swan Point during May averaged 10 o/oo and declined to 1 o/oo by the end of June. Throughout July, they remained zero. Low salinities (Table 4) were also recorded at the monthly oyster sample stations and temperatures (Table 5) were 26 to 31 C during the period.

Oyster mortalities were first observed in the upper bay during late June (Figure 4). By late July 100 percent mortality was observed at all the regular sample stations. The mortality time frame is similar to that recorded by Hofstetter (1977) where severe mortality was observed when oysters were exposed to low salinities for more than four weeks at temperatures of 25 to 28 C.

LITERATURE CITED

- Crowe, A. L. 1982. Shell management annual report, September 1979-August 1980. Tx. Pks. Wildlf. Dept., Coastal Fish. Br., Mgmt. Data Ser. 39. 9 p.
- Hofstetter, R. P. 1977. Trends in population levels of the American oyster Crassostrea virginica Gmelin on public reefs in Galveston Bay, Texas. Tx. Pks. Wildlf. Dept., Tech. Ser. 24. 90 p.
- United States Geological Survey, In press. Water resources data for Texas. Water year 1981.

Table 1. Summary of dredge observations (dredge Trinity I) in San Antonio Bay, 1980-81.

Month	Number of Observations	State Tract Number
September '80	5	76
October	6	76
October	2	99
November	4	99
December	5	99
January '81	4	75
February	2	75
February	2	76
March	4	75
April	5	75
May	5	75
June	6	75
July	2	75
July	5	100
July	1	101
August	8	101
Total	66	

Table 2. Shell removed and revenues paid by Parker Brothers, Inc. during September 1980-August 1981.

Month	³ m	Shell Removed yd. ³	Approximate Revenues Paid to State
September '80	58,861	76,983	\$ 19,246
October	87,503	114,443	28,611
November	72,626	94,986	23,746
December	82,168	107,465	26,866
January '81	76,299	99,789	24,947
February	75,419	98,638	24,660
March	67,747	88,604	22,151
April	83,961	109,810	27,452
May	80,788	105,660	26,415
June	60,741	79,442	19,860
July	72,664	95,036	23,759
August	97,353	127,326	159,158
Total	916,129	1,198,182	\$ 426,871

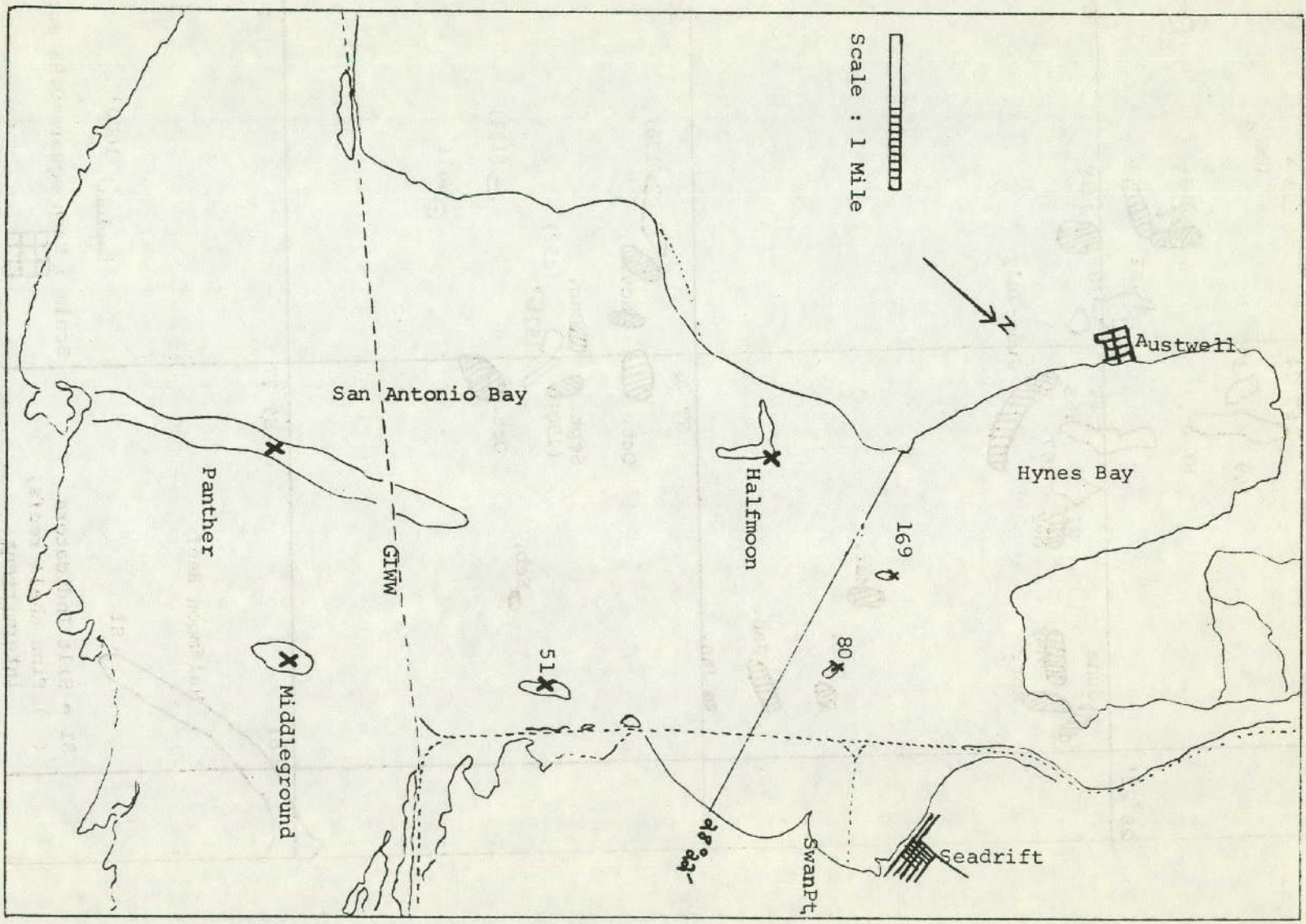


Figure 1. Oyster reef sample stations in San Antonio Bay.

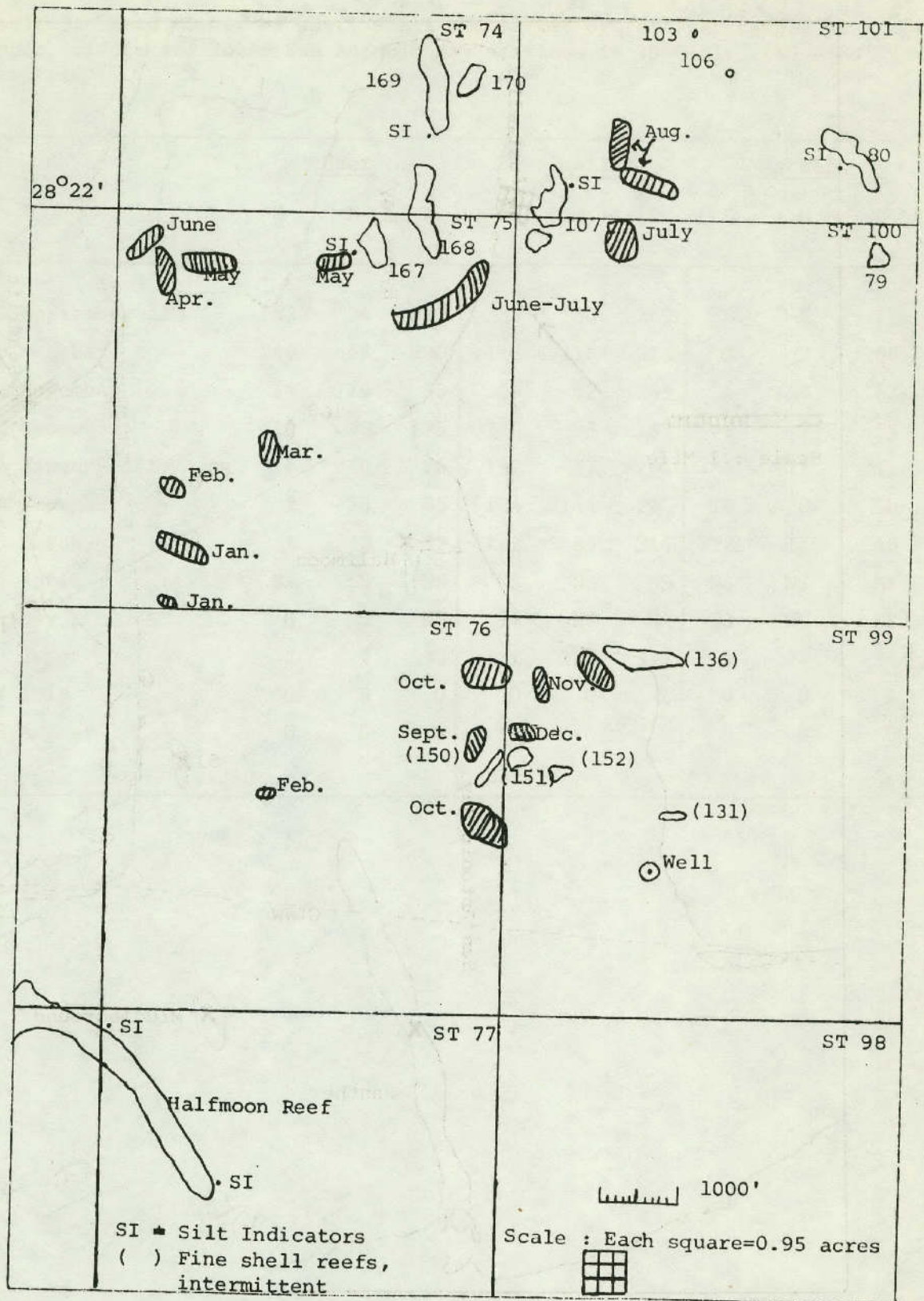


Figure 2. Approximate monthly location of dredge cuts (shaded areas) and numbered reefs in state tracts (ST) in San Antonio Bay during 1980-1981.

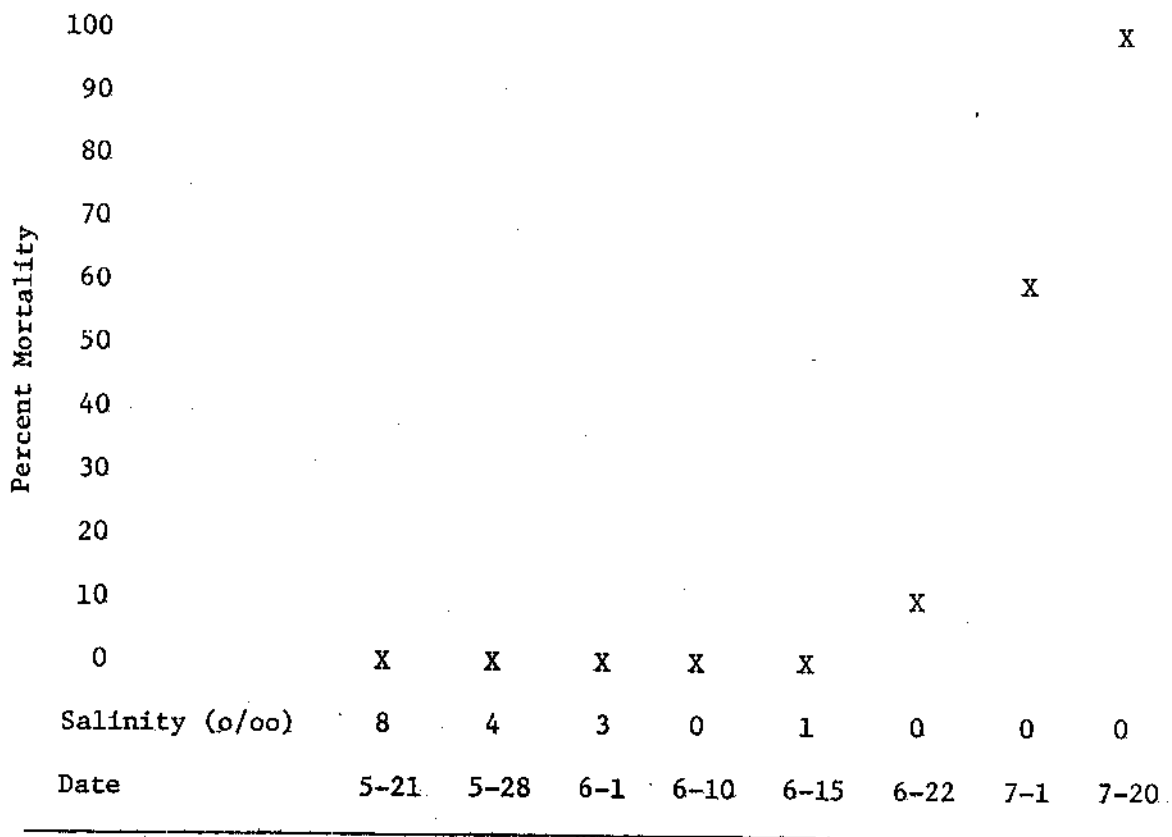
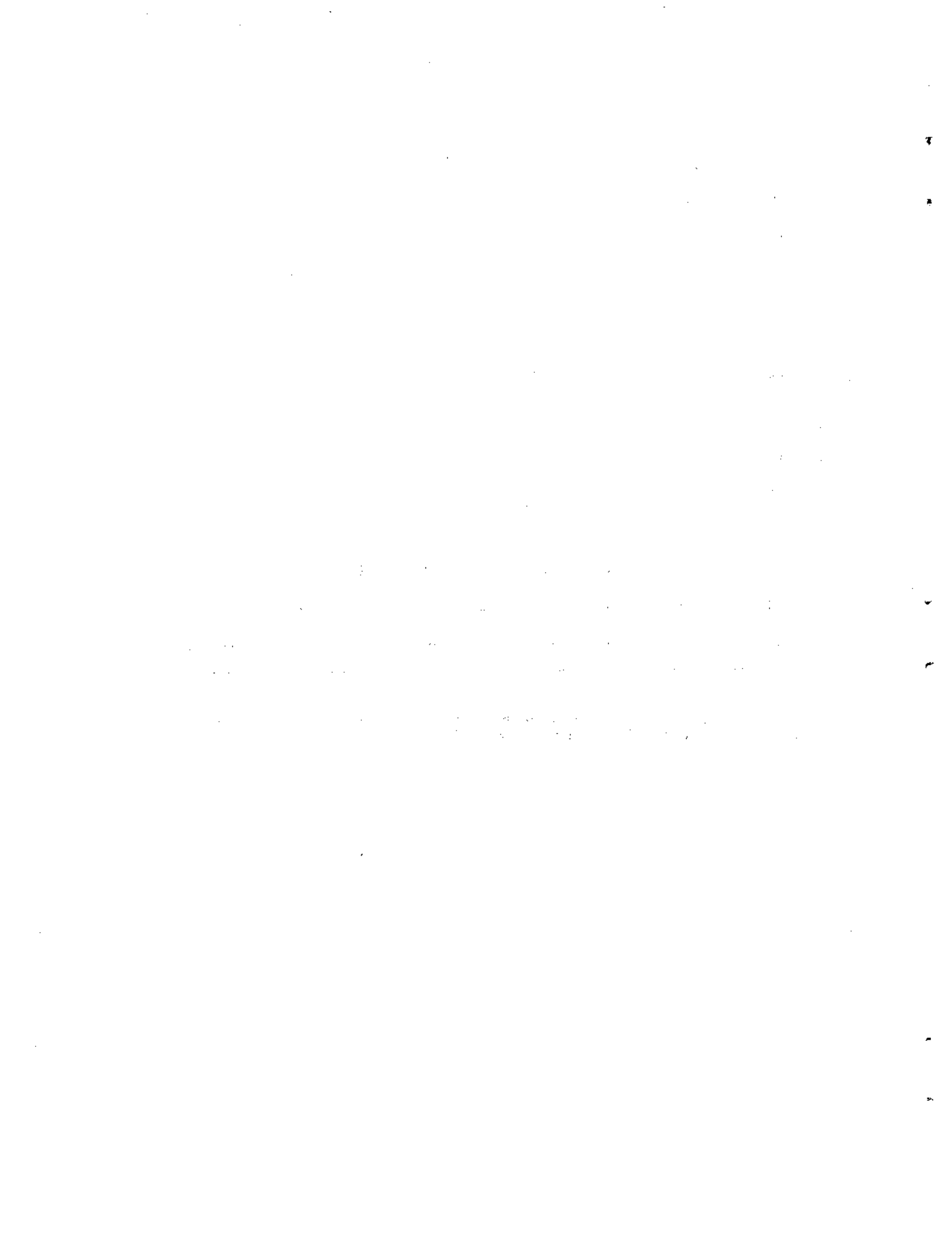


Figure 3. Oyster mortality in upper San Antonio Bay in relation to low salinity conditions during May-July 1981.





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