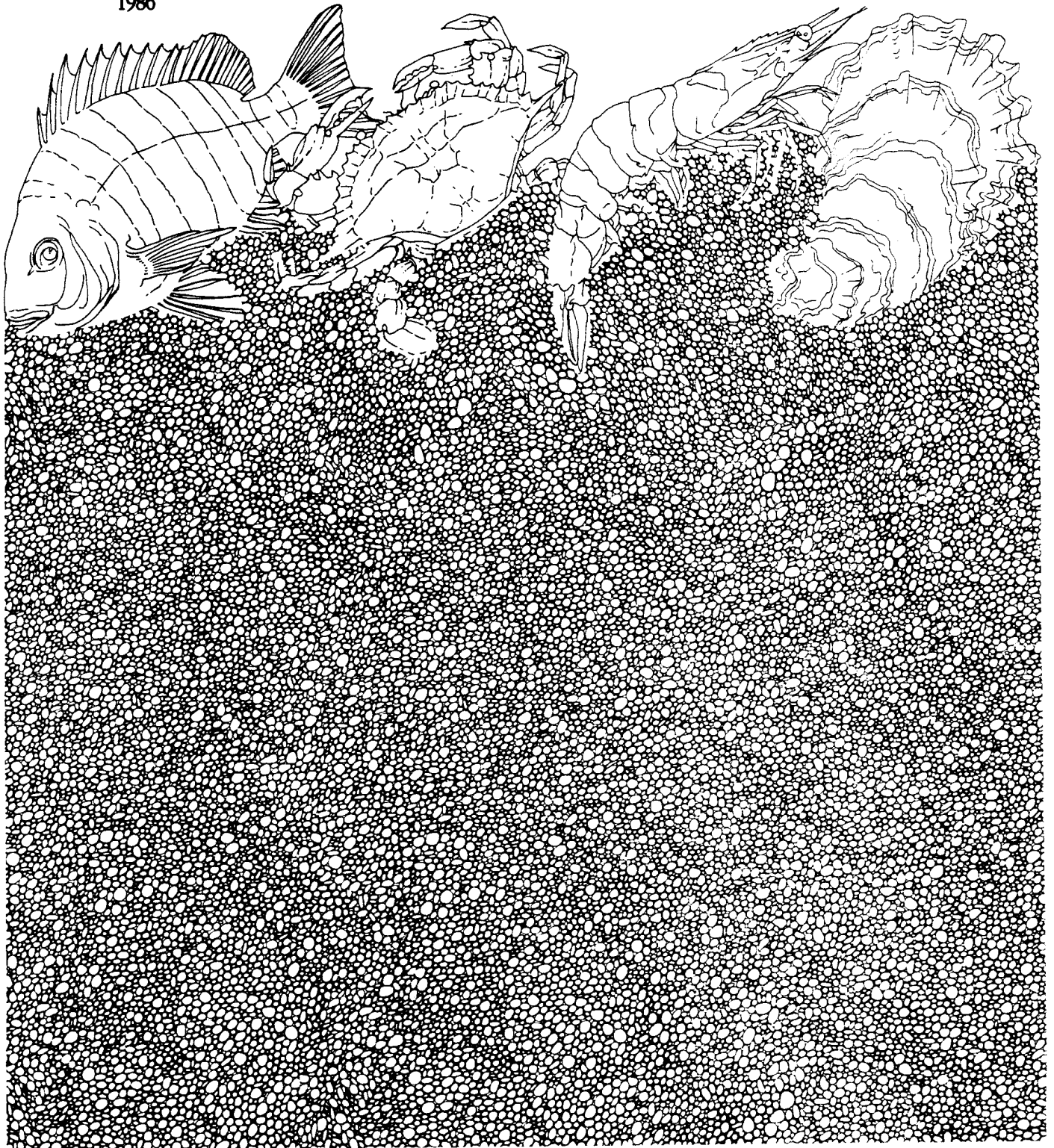


Monitoring of Coastal Shellfish Resources January-December 1984

by Richard L. Benefield, Paul C. Hammerschmidt, Robert P. Hofstetter,
and Brenda Bowling

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ABSTRACT

Trends in relative abundance and size of brown shrimp (*Penaeus aztecus*), white shrimp (*P. setiferus*), pink shrimp (*P. duorarum*), blue crab (*Callinectes sapidus*) and American oyster (*Crassostrea virginica*) in Texas bay systems and the Gulf of Mexico (shrimp and crabs only) were monitored during January-December 1984. Bag seines (18.3-m, 60-feet, long) were used to sample along shorelines of bays, 6.1-m (20-feet) wide otter trawls were used to sample the deeper (>1.0-m, 3-feet) portion of bays, passes leading from the bays to the Gulf of Mexico and Gulf waters. Gill nets (183-m, 600-feet, long) were used to sample shorelines of bays, and oyster dredges (46-cm, 18-inches, wide) were used to sample oyster reefs within the bay.

Shorelines and deeper portions of Galveston, Matagorda, San Antonio, Aransas and Corpus Christi Bays and the upper and lower Laguna Madre were sampled. Passes were sampled in Galveston, Matagorda, Aransas and Corpus Christi Bays and the lower Laguna Madre and Gulf samples were collected along the central coast off Port Aransas. Oyster samples were collected primarily in Galveston Bay with seasonal samples taken in Matagorda, San Antonio and Aransas Bays.

Coastwide bag seine catch rates of brown shrimp increased from 1983 to 1984, whereas trawl catch rates were similar during both years. Coastwide bag seine catch rates of white shrimp increased from 1983 to 1984, while trawl catch rates decreased. Coastwide bag seine catch rates of pink shrimp declined from 1983 to 1984, whereas trawl catch rates were similar during both years. Coastwide mean lengths of brown shrimp and white shrimp caught in trawls increased from 1983 to 1984. Coastwide bag seine catch rates of blue crabs declined and trawl catch rates decreased slightly from 1982 to 1984.

INTRODUCTION

The shrimp fishery is the most valuable commercial fishery in Texas. The 1983 harvest was 32.7 million kg having a dockside value of \$171.4 million (Hamilton and Saul 1984). Reported landings of shrimp species by weight consisted of 70.3% brown shrimp (Penaeus aztecus) and pink shrimp (P. duorarum), 28.3% white shrimp (P. setiferus) and 1.3% other species.

The shrimp fishery is primarily regulated by the Texas Legislature through the Shrimp Conservation Act of 1959. This Act requires that Texas Parks and Wildlife Department (TPWD) continually monitor the supply, economic value and other aspects of the fishery to provide information on which to base sound management decisions. The TPWD Commission has the responsibility for adjusting the statutory 1 June-15 July Gulf shrimping closed season dates should biological sampling indicate an earlier, later or more prolonged emigration of brown shrimp from the bays to the Gulf.

The oyster (Crassostrea virginica) fishery is the second most valuable commercial fishery in Texas. From 1977-1983, reported landings of oyster meat averaged 1.3 million kg valued at \$4.0 million dockside (Hamilton and Saul 1984). The 1983 harvest was a record of 3.6 million kg valued at \$11.3 million. The Galveston Bay system became the leading oyster producing area on the Texas coast during the mid-1950's (Hofstetter 1977). Scientific investigations were initiated in Galveston Bay in 1951 and have continued through 1985.

The blue crab (Callinectes sapidus) fishery is the third most valuable commercial fishery in Texas following shrimp and oysters. From 1977-1983, reported landings of hardshell blue crabs averaged 3.7 million kg and were valued at \$2.3 million dockside (Hamilton and Saul 1984). From 1968-1977, reported blue crab landings increased from 1.9 to 3.7 million kg indicating possible increased fishing pressure. This led to the development of the blue crab monitoring program by TPWD (Hammerschmidt 1982).

Penaeid shrimp populations have been monitored in at least some bay systems since 1958 (Benefield and Baker 1980) while blue crab populations have been continually monitored since 1977 (Hammerschmidt 1982). The present bay and Gulf shellfish monitoring program was implemented in 1982 (Benefield et al., 1983) and designed to establish long term trend information on relative abundance and size of penaeid shrimp and blue crabs in Texas coastal waters. The monitoring of oyster populations in the Galveston Bay system was added to the shellfish program in October 1984. This report summarizes data collected during calendar year 1984 with that collected during previous years when similar standardized procedures were used.

MATERIALS AND METHODS

Bay Sampling

Bag Seines

During January-December 1984, samples were collected with bag seines in Galveston, East Matagorda, Matagorda, San Antonio, Aransas and Corpus Christi Bays and the upper and the lower Laguna Madre (Figures 1-10). Ten different shoreline stations were sampled each month in each bay system. During January-August, stations were randomly selected from 100 sample stations established in each bay system. Each station on the list was at least 1.6 km of continuous shoreline from any other bag seine station (Hegen 1982). During September-December, bag seine stations were randomly selected from a list of grids established from each bay system on National Oceanic and Atmospheric Administration (NOAA) nautical charts. Grids were based on 1-minute longitude-latitude lines and were designated as bag seine stations if any part of the bay shoreline (mainland, peninsula, island or exposed reef) fell within the grid. The actual location of the bag seine sample in each station grid was randomly selected from the 144 5-second longitude-latitude blocks (gridlets) within the grid, provided the selected gridlet fulfilled the criteria for grid station designation. Figures illustrating the new grid sample system are being drafted but were unavailable for this report.

Five different stations were sampled with bag seines during the first two and five during the last two fullest weeks of each month from January-August. During September-December, the bag seine sample periods were standardized with trawl sample periods so that five stations were sampled during the first half (1st-15th) and five during the last half (16th-end of month) of each month. Each sampling week extended from sunrise Monday through sunset the following Sunday. Samples were collected during daylight hours. The randomly selected stations for bag seines could not always be sampled as scheduled. If a preselected station could not be sampled, an alternate randomly selected station was substituted.

During January-August, a bag seine sample was collected by pulling an extended seine parallel to shore for a distance of no less than 15.2 m and no more than 30.5 m. The rectangular surface area sampled was estimated using the distance pulled and the length of extension of the bag seine. During September-December, bag seine samples were standardized to a parallel pull of 15.2 m covering a rectangular surface area of 0.03 ha.

Bag seines were 18.3 m long and 1.8 m deep with 19-mm stretched nylon multifilament mesh in the wings and 13-mm stretched nylon multifilament mesh in the 1.8 m square bag in the middle.

Brown shrimp, white shrimp, pink shrimp and blue crabs were identified to species and counted in each sample. No more than 19 randomly selected shrimp of each species and 19 randomly selected blue crabs were measured from each sample. Shrimp were measured to the nearest 1 mm from tip of rostrum to tip of telson. Blue crabs were measured to the nearest 1 mm from lateral spine tip to lateral spine tip.

Monthly abundance (No./ha) was calculated using the ratio estimator (Cochran 1977):

$$A = \frac{N}{H}$$

A = abundance
 N = total number of individuals of each species caught
 H = total number of hectares covered

Values were reported to the nearest 0.01 individuals/ha. Mean monthly length was calculated using the ratio estimator:

$$\bar{L} = \frac{\sum_{k=1}^j c_k \frac{\sum_{i=1}^{m_k} L_i}{m_k}}{\sum_{k=1}^j c_k}$$

\bar{L} = mean length
 L_i = total length of shrimp i
 j = total number of samples
 m = total shrimp measured in sample
 c = total shrimp caught in sample

Coastwide mean monthly abundance and size values were calculated by weighting individual bay system values by the total amount of shoreline present in the respective bay system (Matlock and Ferguson 1982).

Trawls

During January-December 1984, samples were collected with trawls in Galveston, Matagorda, San Antonio, Aransas, Corpus Christi Bays and the upper and lower Laguna Madre. Trawl stations were established using grids on NOAA nautical charts (Figures 11-20). Grids were based on 1-minute longitude-latitude lines. A sample station was established in a grid if at least 1/3 of the grid's surface area was covered by water >1 m and had no known obstructions, snags or reefs which would hinder sampling, damage equipment or compromise safety.

Bay systems were divided into three sampling zones: Zone I (upper bay), Zone II (lower bay) and Zone III (passes) (Figures 11-20). Galveston, Matagorda, Aransas and Corpus Christi Bays were divided into Zones I, II and III; San Antonio into Zones I and II; upper Laguna Madre into Zone II; and lower Laguna Madre into Zones II and III. Zone I contained upper bay stations nearest the mouths of rivers and bayous while Zone II contained lower bay stations farthest from river and bayou influence. Zone III contained pass stations including Bolivar Roads (Galveston Bay), Pass Cavallo and Matagorda Ship Channel (Matagorda Bay), Lydia Ann Channel (Aransas Bay), Corpus Christi Ship Channel (Corpus Christi Bay) and Brazos Santiago Pass (lower Laguna Madre).

Five stations in Zone I and five in Zone II were sampled during each of the first and latter half of the month. Data collected in Zones I and II were combined and reported on a monthly basis. Two stations were sampled in Zone III each week and the sample week extended from sunrise Monday through sunset Sunday. All sampling stations were selected at random for each zone and each sample period. Samples were collected during daylight hours.

Trawls used in bays were 6.1 m wide at the mouth measured along the cork line between the rear margins of the trawl doors. The net was constructed of #9 nylon multifilament thread with a stretched mesh of 38 mm. Trawl doors were 1.2 m long and 0.6 m high.

Trawls were towed using available TPWD boats. Trawls were towed in Zones I and II in a circular fashion near the center of each sample grid. They were towed linearly in Zone III (Gulfward or bayward); one sample with the current and one sample against the current. Direction of tow was randomly selected at each station on each sample date. Tow duration was 15 minutes in all bay systems except in the upper Laguna Madre where heavy vegetation necessitated reducing tow duration to 7.5 minutes. Catches in upper Laguna Madre were doubled to be comparable with all other catches. If a particular scheduled station could not be sampled, an alternate station was selected at random from stations immediately adjacent to that which could not be sampled.

Brown shrimp, white shrimp, pink shrimp and blue crabs were identified to species and counted in each sample. No more than 50 randomly selected shrimp of each species and 35 randomly selected blue crabs were measured from each sample. Shrimp and blue crabs were measured in the same manner as those caught in bag seines.

Catch rates were calculated in the same manner used for bag seines except total number of tows made was used instead of total area fished. Values were reported to the nearest 0.1 individuals/tow; the notation <0.1 individuals/tow indicated that at least one shrimp or crab was caught but due to the rounding, the value of the derived catch rate was less than the established degree of precision (Cochran 1977). Mean size of each species was calculated in the same manner as for bag seines. Coastwide data were weighted according to the percentage each bay system's surface area in water ≥ 1.2 m deep contributed to the coastwide area (Matlock and Ferguson 1982).

Gulf Sampling

In August and September 1984, TPWD monitored penaeid shrimp in the Gulf of Mexico along the Texas coast from latitude $26^{\circ} 40'$ N to latitude $28^{\circ} 40'$ N. Twenty monthly samples were scheduled to be taken in randomly selected 1-minute sample grids within the Territorial Sea in National Marine Fisheries Service (NMFS) statistical areas 19 and 20 (Figure 21).

From February-March 1985, TPWD monitored penaeid shrimp in the Gulf of Mexico along the Texas coast in an area extending 24.1 km either side of the Aransas Pass jetties and from the Gulf beach shore to the 16.7 km limit of the Texas Territorial Sea. Sixteen samples were taken in randomly selected 1-minute sample grids within the sample area (Figure 22).

Trawls used in the bay were also used for Gulf sampling. Direction of tow (north or south) was randomly chosen on the initial sample and alternated on subsequent samples. Samples were processed as previously described for bay trawling.

Additional sampling in the Gulf of Mexico was carried out as part of the Southeastern Monitoring Assessment Program (SEAMAP). Samples were collected along the Texas coast (NMFS statistical areas 18-21) (Figure 21) during 26 June-6 July by the NMFS vessel Oregon II using a 12.2-m wide trawl. Stratified random samples were taken perpendicular to shore for the length of each depth stratum sampled. Catch rates were adjusted to No./h. Additional sampling details may be found in Stuntz, et al. (1984).

Gill Nets

During spring (15 April-17 June) and fall (9 September-18 November) 1984 samples were collected with gill nets in Galveston, East Matagorda, Matagorda, San Antonio, Aransas and Corpus Christi Bays and the upper and lower Laguna Madre (Figures 23-31). Forty-five gill net sets were made in each of the two sampling seasons in each bay system. Not more than seven nor less than three overnight gill net sets were made each week to insure sampling was conducted over a wide range of environmental conditions. No more than nine stations (20% of total) were duplicated during each season. Gill net samples were collected monthly during January-August 1984 and seasonally (fall) during 9 September-18 November 1984 in East Matagorda Bay (Figure 25). A summary of blue crab catch data from East Matagorda Bay, is presented in Appendix C, Table C.1.

Stations were randomly selected during the spring season from a list of 100 sample stations established in each bay system. Each station on the list was at least 1.6 km of continuous shoreline from any other gill net station (Hegen 1982). During the fall season, gill net stations were randomly selected from the list of grids established for bag seine stations. Actual gill net set locations were selected in a similar manner as bag seine sample locations.

Gill nets were 183 m long and 1.2 m deep with separate 46-m sections of 7.6-, 10.2-, 12.7- and 15.2-cm stretched monofilament meshes. Thread sizes were #12 (Nylon Net Company) for the 7.6- and 10.2-cm meshes, #6 for the 12.7-cm mesh and #7 for the 15.2-cm mesh. Webbing in each section was hung to both the float and lead lines on a one-half basis. One-half basis indicates that the finished gill net is one-half the length of the original stretched webbing before hanging. All four sections were tied together; 7.6-cm tied to 10.2-cm, 10.2-cm tied to 12.7-cm and 12.7-cm tied to 15.2-cm.

Each gill net was set perpendicular to shore with the smallest mesh shoreward. Gill nets were set within 1 h before sunset and were retrieved no later than 2 h after the following sunrise. Total fishing time was recorded to the nearest 0.1 h.

Blue crabs were counted and recorded according to the appropriate mesh size. The first 19 blue crabs from each mesh size during each week of seasonal sampling were measured in the same manner as those caught in bag seines.

Catch rates (No./h) for blue crabs were calculated by dividing the total number of crabs caught by the total hours the gill net fished. Values were reported to the nearest 0.1 crabs/h; the notation <0.1 crab/h

indicates that at least one crab was caught but due to rounding, the value of the derived catch rate was less than the established degree of precision (Cochran 1977). Mean monthly size was calculated in a similar manner as blue crabs caught in bag seines. Coastwide data were weighted according to the percentage each bay system's shoreline contributed to the coastwide shoreline (Matlock and Ferguson 1982).

Oyster Sampling

During September-October 1984 samples were collected on reefs in Galveston, East Matagorda, Matagorda, San Antonio and Aransas Bays (Figure 1). Samples consisted of five 1-minute drags with an 8-tooth Louisiana style oyster dredge approximately 46 cm wide, 25 cm high with a bag 36 cm deep. The bag had 6 bottom rows of linked metal rings 50 mm in diameter and 4 rows of 76-mm mesh nylon webbing.

Beginning October 1984, oyster sample stations within the Galveston Bay system were established using grids (1-minute latitude-longitude) plotted on NOAA nautical charts 11326 and 11322 and TPWD charts of oyster reefs in Galveston Bay. Figures are being drafted and are unavailable for this report.

The bay system was stratified into reef and non-reef grids. Reef grids, numbering 114 initially, were those containing known or mapped oyster reefs as shown on TPWD charts. Non-reef grids included all other grids (730) within the bay system. Eighty reef grids and 20 non-reef grids were selected randomly for sampling each month. Fifty grids were sampled each half of the month.

The sample site was randomly selected from the gridlets (5-second latitude-longitude) within each grid. If the site could not be sampled due to shallow water, obstructions or navigation hazards, an adjacent grid or gridlet was randomly chosen as an alternate sample site.

The dredge was towed behind an inboard boat at each sample site for 30 seconds. Timing began as the dredge began to drag and ended 30 seconds later. The dredge was then brought aboard and emptied.

Nineteen live oysters (>25 mm) were randomly selected and measured to the nearest 1 mm along the dorso-ventral axis of the right valve. Oyster measurements were categorized into three size classes: spat (<25 mm), small (25-75 mm) and market (>75 mm). Ten dead oyster shells were randomly selected and measured to the nearest 1 mm.

Five measured oysters and five measured shells were randomly selected to record oyster spat and encrusting organisms. The number of spat on one side of each oyster or shell was recorded. The percent coverage of 9 common encrusting organisms was estimated based upon an index of 1 (0-9%), 2 (10-25%), 3 (26-50%), 4 (51-75%), 5 (76-90%) and 6 (91-100%). The encrusting organisms included boring sponges, hydroids, tube worms, slipper shells, mussels, boring clams, barnacles, bryozoans and an "others" category. Catch rates (No./drag) were calculated in the same manner used for trawls and were reported to the nearest 0.1 oyster/sample for both reef and non-reef strata samples.

Salinity (o/oo) and water temperature (C) were measured at the time and location of each biological sample. Monthly means are summarized in Appendix A, Tables A.1-10.

This report summarizes data collected during calendar year 1984. Data collected during January-March 1985 for bag seines, bay and gulf trawls, and oyster dredges are summarized in Appendix B, Tables 1-18. These data are not included in the calculation presented in order to maintain consistency between the years. Any difference in this report compared to previous reports is due to updating of the data base and the most recent report should be considered the most accurate.

RESULTS

Bay Sampling

Bag Seines

Annual Trends. Coastwide annual mean catch rates of brown shrimp increased from 308.26/ha during 1983 to 396.11/ha during 1984 (Table 1). Catch rates ranged from 40.60/ha in the upper Laguna Madre during 1983 to 1007.77/ha in the lower Laguna Madre during 1981. Brown shrimp catch rates increased during 1984 in Galveston, East Matagorda, Matagorda and Aransas Bays and the upper Laguna Madre and decreased in the remaining bays compared to 1983. The 1984 Matagorda Bay catch rate of 261.44/ha was the highest since bag seine sampling was initiated in 1978. Coastwide mean lengths of brown shrimp increased from 53 mm during 1982 to 64 mm during 1984. Mean lengths ranged from 49 mm in San Antonio Bay during 1982 and Corpus Christi Bay during 1981 to 76 mm in East Matagorda Bay during 1983.

Coastwide annual mean catch rates of white shrimp ranged from 288.20/ha during 1980 to 1275.71/ha during 1982 (Table 1). Catch rates in 1984 increased in each bay except Galveston Bay compared to 1983. Galveston Bay catch rates decreased from 1524.17/ha during 1983 to 1487.22/ha during 1984. Catch rates ranged from 2.75/ha in the upper Laguna Madre during 1983 to 3559.63/ha in Galveston Bay during 1982. Coastwide mean lengths of white shrimp increased from 53 mm during 1983 to 60 mm during 1984. Mean lengths ranged from 42 mm in Corpus Christi Bay during 1983 to 74 mm in Matagorda Bay during 1980.

Coastwide annual mean catch rates of pink shrimp decreased from 12.62/ha during 1983 to 6.32/ha during 1984 (Table 1). Mean catch rates ranged from 0.00/ha in all bays except the upper Laguna Madre to 124.40/ha in Aransas Bay during 1982. Coastwide mean lengths of pink shrimp decreased from 53 mm during 1983 to 52 mm during 1984. Mean lengths ranged from 25 mm in Matagorda Bay during 1984 to 106 mm in lower Laguna Madre during 1979.

Coastwide annual mean catch rates of blue crabs in bag seines increased from 48.94/ha in 1978 to 101.67/ha in 1982 and declined to 65.66/ha in 1984 (Table 1). Mean catch rates ranged from 10.68/ha during 1978 in Matagorda Bay to 192.61/ha during 1982 in Aransas Bay. Coastwide mean widths of blue crabs ranged from 46 mm in 1983 to 52 mm in 1978. Mean widths ranged from 33 mm in the lower Laguna Madre during 1983 to 77 mm in East Matagorda Bay during 1983.

Monthly Trends. Coastwide monthly mean catch rates of brown shrimp were generally highest (441.46-1194.62/ha) during April-July (Table 2). Mean catch rates ranged from 0.00/ha in each bay to 2674.00/ha in Aransas Bay during June. Coastwide mean lengths of brown shrimp ranged from 31 mm during March to 71 during July. Mean lengths ranged from 22 mm in East Matagorda Bay during March to 102 mm in the upper Laguna Madre during August.

Coastwide monthly mean catch rates of white shrimp were highest (1215.57-2950.74/ha) during July-October (Table 3). Mean catch rates ranged from 0.00/ha in each bay to 9216.67/ha in Galveston Bay during July. Coastwide mean lengths of white shrimp ranged from 43 mm during June to 122 mm during May. Mean lengths ranged from 40 mm in Matagorda Bay during June to 133 mm in the upper Laguna Madre during October.

Coastwide monthly mean catch rates of pink shrimp were highest (26.17/ha) during September (Table 4). No pink shrimp were collected in Galveston and East Matagorda Bays during 1984. Mean catch rates ranged from 0.00/ha in each bay to 153.33/ha in Corpus Christi Bay during September. Coastwide mean lengths of pink shrimp ranged from 25 mm during March to 81 mm during May. Mean lengths ranged from 25 mm in Matagorda Bay during March to 89 mm in the upper Laguna Madre during July.

Coastwide mean monthly catch rates of blue crabs were generally higher (108.61-129.75/ha) during March-April than the remainder of the year when catch rates ranged from 5.25/ha to 87.18/ha (Table 5). Monthly catch rates ranged from 0.00/ha in five bays to 341.67/ha in East Matagorda Bay. Coastwide mean widths of blue crabs during 1984 ranged from 23 mm in February to 68 mm in June. Mean widths increased from February-June and decreased June-December. Monthly mean widths ranged from 13 mm in Aransas Bay to 108 mm in Matagorda Bay.

Trawls

Annual Trends. Coastwide annual mean catch rates of brown shrimp increased from 6.8/tow during 1982 to 7.5/tow during 1984 (Table 6). Mean catch rates ranged from 0.9/tow in the upper Laguna Madre during 1983 to 26.7/tow in Aransas Bay during 1984. Mean catch rates increased during 1984 in Galveston, San Antonio, Aransas and Corpus Christi Bays and the upper Laguna Madre while catch rates decreased in the two other bay systems when compared to 1983. Coastwide mean lengths of brown shrimp decreased from 94 mm during 1983 to 92 mm during 1984. Brown shrimp caught in the lower Laguna Madre were considerably smaller (61, 65 and 74 mm during 1982-84) respectively than were shrimp from other bay systems.

Coastwide annual mean catch rates of white shrimp decreased from 11.7/tow during 1982 to 7.9/tow during 1984 (Table 6). Mean catch rates increased in each bay system during 1984 with exception of Galveston, Matagorda and San Antonio Bays where decreases occurred. Mean catch rates of white shrimp ranged from 0.4/tow in the lower Laguna Madre during 1983 to 20.1/tow in Galveston Bay during 1982. Coastwide mean lengths of white shrimp increased from 97 mm during 1983 to 104 mm during 1984. Mean lengths ranged from 63 mm in the lower Laguna Madre during 1982 to 126 mm in the upper Laguna Madre during 1984.

Coastwide annual mean catch rates of pink shrimp were similar (<0.5/tow) during 1982-84 (Table 6). Catch rates ranged from 0.0/tow in the lower Laguna Madre during 1982 and Galveston Bay during 1984 to 2.3/tow in Aransas Bay during 1983. Coastwide mean lengths increased from 93 mm during 1982 to 97 mm during 1983 and 1984. Mean sizes ranged from 71 mm in the lower Laguna Madre during 1984 to 116 mm in Matagorda Bay during 1982.

Coastwide annual mean catch rates of blue crabs decreased from 5.1/tow during 1982 to 3.7/tow during 1984 (Table 6). Mean catch rates ranged from 0.7/tow in the upper Laguna Madre to 12.1/tow in lower Laguna Madre. Mean catch rates during 1984 decreased in Galveston, Matagorda, San Antonio and Aransas Bays and increased in all other bay systems when compared to 1983. Coastwide mean widths of blue crabs were slightly smaller (86 mm) in 1983 than in 1984 (87 mm). Annual mean widths ranged from 80 mm in San Antonio and Aransas Bays during 1983 to 148 mm in the upper Laguna Madre during 1982.

Monthly Trends. Coastwide monthly mean catch rates of brown shrimp were highest (11.0-37.1/tow) during May-July (Table 7). Mean catch rates ranged from 0.0/tow in all bays to 150.1/tow in Aransas Bay during May. Mean lengths ranged from 38 mm during March to 103 mm during July. Mean lengths ranged from 25 mm in the lower Laguna Madre during March to 116 mm in the upper Laguna Madre during July.

Coastwide monthly mean catch rates of white shrimp were highest during August-December (13.4-26.3/tow) (Table 8). Mean catch rates ranged from 0.0/tow in each bay to 57.5/tow in Galveston Bay during September. Coastwide mean lengths of white shrimp were smallest (60 mm) during January and largest (165 mm) during June. Monthly mean lengths ranged from 34 mm in lower the Laguna Madre during January to 168 mm in Corpus Christi Bay during June.

Coastwide monthly mean catch rates of pink shrimp were lowest (0.0/tow) during February and highest (0.7/tow) during November (Table 9). Mean catch rates ranged from 0.0/tow in all bays to 3.3/tow in Corpus Christi Bay during June and November. Coastwide mean lengths ranged from 57 mm during July to 122 mm during June. Monthly mean lengths ranged from 33 mm in San Antonio Bay during April to 133 mm in Aransas Bay during June.

Coastwide monthly mean catch rates of blue crabs were generally higher (6.9-11.8/tow) during April-June than during the remainder of the year (0.4-4.4/tow) (Table 10). Mean catch rates ranged from <0.1/tow in Matagorda Bay to 61.5/tow in the lower Laguna Madre. Coastwide mean widths ranged from 53 mm in January to 113 mm in November. Monthly mean widths ranged from 24 mm in Matagorda Bay during January to 165 mm in lower Laguna Madre during January.

Pass Sampling. Weekly catch rates of brown shrimp were generally highest during the period of 16 April-1 July ranging from 0.0/tow in each area to 454.0/tow in Lydia Ann Channel (Table 11). Catch rates were also high (139.0/tow) during 22 October-25 November in Lydia Ann Channel. Weekly mean lengths ranged from 44 mm in Brazos Santiago Pass during 24-30 September to 129 mm in Lydia Ann Channel during 9-12 July.

Weekly catch rates of white shrimp were highest during the period 24 September-16 December ranging from 0.0/tow in each pass to 230.5/tow in Bolivar Roads (Table 12). Periods of smaller weekly catch rates of 0.0-19.5/tow during 13 February-11 March were recorded in Bolivar Roads, Lydia Ann Channel and Corpus Christi Channel. Weekly mean lengths ranged from

35 mm in Brazos Santiago Pass during 25 June-1 July to 178 mm in Corpus Christi Channel during 19-25 November.

Weekly mean catch rates of pink shrimp were generally highest during 15 October-16 December ranging from 0.0/tow in each pass to 13.0/tow in Lydia Ann Channel during 19-25 November (Table 13). Mean lengths ranged from 58 mm in Corpus Christi Channel during 22-28 October to 134 mm in Bolivar Roads during 23-29 April.

Weekly catch rates of blue crabs exhibited peaks during March in Bolivar Roads, July in Matagorda Ship Channel-Pass Cavallo, March in Lydia Ann Channel, July in Corpus Christi Channel and May in Brazos Santiago Pass (Table 14). Catch rates ranged from 0.0/tow in all passes to 102.5/tow during 19-25 March in Lydia Ann Channel. Mean lengths ranged from 25 mm during 23-29 January to 179 mm during 22-28 October in Corpus Christi Channel.

Gill Nets

Seasonal: Coastwide mean catch rates of blue crabs caught during spring gill net sampling declined slightly from 0.3/h in 1983 to 0.2/h in 1984 (Table 15). Catch rates among bay systems ranged from 0.1/h in Matagorda Bay during 1984 to 0.4/h in San Antonio and Aransas Bays during 1983. Greatest catch rates in spring occurred in the 10.2-cm mesh during both 1983 and 1984. Catch rates among mesh sizes and bay systems ranged from <0.1/h to 0.1/h without discernible pattern during both years.

Coastwide mean widths of blue crabs caught in gill nets during spring decreased from 150 mm in 1983 to 146 mm in 1984 (Table 15). Coastwide, blue crabs were generally smaller in the 7.6-cm mesh (129-138 mm) than the other mesh sizes (148-157 mm). Among bay systems, crabs ranged from 127 mm in the lower Laguna Madre (7.6-cm mesh, 1984) to 177 mm in Galveston Bay (15.2-cm mesh, 1984).

Coastwide mean catch rates of blue crabs caught during fall gill net sampling declined slightly from 0.2/h in 1983 to 0.1/h in 1984 (Table 16). Catch rates among bay systems ranged from 0.1/h in Galveston and Aransas Bays during 1984 and in Matagorda and San Antonio Bays during 1983 and 1984 to 0.3/h in the lower Laguna Madre during 1983. Greatest coastwide catch rates in fall occurred in the 7.6-cm and 10.2-cm meshes during 1983. Catch rates among mesh sizes and bay systems ranged from <0.1/h to 0.1/h and varied without discernible pattern during both years.

Coastwide mean widths of blue crabs caught in gill nets during fall increased from 145 mm in 1983 to 147 mm in 1984 (Table 16). Coastwide, blue crabs were generally smaller in the 7.6-cm mesh (138-140 mm) than in the other mesh sizes (145-153 mm). However, among bay systems, crabs ranged in size from 130 mm in Galveston Bay (15.2-cm mesh, 1983) to 169 mm in Galveston Bay (12.7-mm mesh, 1984).

Oyster Dredge

Catch rates of combined oyster size groups ranged from 9.1/sample in East Matagorda Bay to 1537.0/sample in Matagorda Bay (Table 17). Market oysters ranged from 1.7 to 64.0/sample in those same bays, respectively. Spat and small oysters were more numerous (>500/sample) in Matagorda, San Antonio and Aransas Bays than East Matagorda and Galveston Bays (<200/sample).

Monthly Trends. Catch rates of combined oyster size groups on reefs were highest (27.2/sample) in October and declined to 16.7/sample in December (Table 18). Catch rates in non-reef areas ranged from 0.0/sample in December to 1.3/sample in November. Data on fouling organisms associated with reef strata samples are presented in Table 19.

Gulf Sampling

Annual Trends. Gulf sampling was conducted only during August-September 1984. The mean catch rates and mean sizes for shrimp and crabs are as follows: brown shrimp 3.9-19.2/tow (107-113 mm), white shrimp 1.6-11.0/tow (160-178 mm), pink shrimp 0.5-0.7/tow (92-98 mm) and blue crabs 0.1-0.3/tow (132-136 mm) (Table 20).

SEAMAP. Brown shrimp catch rates by depth zones ranged from 1594/h at 19-37 m to 86/h at 74-91 m during 1984 (Table 21). Catch rates in most depth zones during 1984 were similar or exceeded those recorded during 1982 and 1983. Mean sizes of brown shrimp ranged from 116 mm at 0-37 m to 151 mm at 74-91 m during 1984. Brown shrimp were smaller (151 mm) in deeper waters (>55 m) during 1984 than during 1982 and 1983.

White shrimp were caught in waters ranging from 0-37 m during the three sample years (Table 21). Catch rates ranged from 0.0/h during each sample year to 30.0/h in 1984. Mean sizes of white shrimp ranged from 153 mm during 1983 to 174 mm during 1984.

Pink shrimp were captured in waters ranging from 0-55 m during the three sample years (Table 21). Catch rates ranged from 0.0/h each sample year to 195.0/h during 1983. Mean sizes of pink shrimp ranged from 118 mm in 1983 to 151 mm during 1984. Pink shrimp were predominate at 0-18 m during 1982 and 1983.

Blue crabs were caught primarily in the 0-18 m zone (Table 21). Catch rates ranged from 0.0/h each sample year to 8.0/h during 1982 and 1983. No mean widths were available.

DISCUSSION

The TPWD is mandated by the Texas Legislature to investigate the supply, economic value, environment, breeding habits, sex ratios, effects of fishing and any other factors or conditions causing increases or decreases in supply of shellfish in Texas waters. Long term trend data based on routine monitoring are necessary to assess changes in abundance and stability of shellfish populations in order to meet this mandate. Data in this report represented the third year of a program that will yield long term trends in abundance and stability of shellfish along shorelines, the deeper waters of the bays and in the Gulf of Mexico. This report summarizes the data collected and is not intended to be a detailed analysis, but to outline general trends in abundance and size of organisms. Data gathered were used to recommend the 1984 seasonal closure date (16 May-6 July) for the flexible Gulf shrimping season (Bryan 1985). Statistical analyses of data will provide improved information on trends for all organisms as the peaks of seasonal abundance are identified through time in different areas.

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Table 1. Annual mean catch rates (No./ha) and mean sizes (mm) of shellfishes caught with 18.3-m bag seines in Texas bay systems during calendar years 1978-1984 (blank = no measurement taken).

Bay system	Year	Number samples	Brown shrimp		White shrimp		Pink shrimp		Blue crab	
			No./ha	Length	No./ha	Length	No./ha	Length	No./ha	Width
Galveston	1978 ^a	66	555.98	59	857.61	60	0.00	0.00	66.30	52
	1979	72	481.95	57	1719.92	61	0.00	0.00	105.56	52
	1980	72	494.86	57	571.03	64	0.00	0.00	121.96	54
	1981	84	718.73	54	1393.24	65	0.00	0.00	57.77	53
	1982	120	915.05	52	3559.63	56	0.00	0.00	100.56	48
	1983	120	374.16	61	1524.17	50	0.00	0.00	148.03	43
	1984	120	572.64	64	1497.22	59	0.00	0.00	83.33	46
East Matagorda	1983 ^b	110	97.74	76	345.91	70	0.00	0.00	14.94	77
	1984	120	261.44	66	498.02	65	0.00	0.00	77.49	58
Matagorda	1978 ^a	66	172.40	62	571.36	66	0.00	0.00	10.68	38
	1979	72	194.45	64	542.83	71	0.00	0.00	27.32	52
	1980	72	144.37	56	544.36	74	0.00	0.00	23.94	56
	1981	84	156.86	63	804.58	63	0.00	0.00	43.54	44
	1982	120	206.67	56	1749.60	66	0.00	0.00	31.25	51
	1983	120	248.20	66	394.17	65	0.00	0.00	35.14	34
	1984	120	261.44	65	498.00	65	0.42	0.42	50.56	46
									25	
San Antonio	1978 ^a	66	103.13	62	134.38	60	0.52	0.52	52.65	51
	1979	72	69.44	62	211.58	57	0.00	0.00	75.93	49
	1980	72	552.78	64	290.74	53	6.02	6.02	118.98	45
	1981	84	310.32	59	66.27	59	27.78	27.78	51.19	54
	1982	120	599.45	49	649.73	54	0.00	0.00	106.95	42
	1983	120	235.15	55	147.27	64	9.70	9.70	53.33	40
	1984	120	171.11	66	168.12	56	0.62	0.62	42.53	46
									100	
Aransas	1978 ^a	68	152.46	59	92.33	50	0.31	0.31	57.06	62
	1979	72	438.11	62	98.85	59	0.00	0.00	83.96	62
	1980	72	386.24	64	133.15	60	13.48	13.48	64.61	52
	1981	84	354.84	58	182.63	65	86.60	86.60	85.11	45
	1982	120	505.33	53	296.91	44	124.40	124.40	192.61	48
	1983	120	534.45	60	129.72	53	50.70	50.70	145.28	43
	1984	120	658.39	66	419.16	56	16.48	16.48	49.83	42

Table 1. (Cont'd.).

Bay system	Year	Number samples	Brown shrimp		White shrimp		Pink shrimp		Blue crab	
			No./ha	Length	No./ha	Length	No./ha	Length	No./ha	Width
Corpus Christi	1978 ^a	66	258.49	52	62.42	50	0.00	50	33.03	43
	1979	72	499.43	60	816.82	51	57.97	50	152.17	43
	1980	72	183.34	60	140.96	60	57.63	56	79.94	38
	1981	84	679.28	49	172.93	65	66.59	50	86.34	40
	1982	120	428.05	56	369.14	44	67.20	47	52.56	49
	1983	120	299.80	56	136.31	42	31.64	47	48.18	40
	1984	120	286.68	60	310.32	63	34.19	48	56.10	40
Upper Laguna Madre	1978 ^a	66	188.26	64	20.83	55	26.14	79	97.73	61
	1979	72	53.47	61	4.86	53	12.50	78	90.28	48
	1980	72	63.99	64	62.50	62	9.72	60	64.93	40
	1981	84	101.79	72	19.05	65	8.33	69	41.96	58
	1982	120	61.88	65	13.96	50	7.29	58	35.42	54
	1983	120	40.60	65	2.75	71	13.08	54	28.67	59
	1984	120	78.49	61	17.78	59	16.63	64	44.17	58
Lower Laguna Madre	1978 ^a	66	119.70	53	129.92	49	0.00	49	18.94	59
	1979	72	155.05	56	143.00	48	0.33	106	61.24	54
	1980	72	234.25	53	17.81	45	2.40	75	176.37	46
	1981	84	1007.77	55	263.86	60	5.54	64	167.19	35
	1982	120	556.25	55	325.91	48	3.32	64	175.04	42
	1983	120	392.63	50	247.81	52	0.00	64	100.20	33
	1984	120	376.19	62	661.07	62	0.17	79	113.56	46
Coastwide	1978 ^a	464	249.90	59	337.65	60	3.28	79	48.94	52
	1979	504	284.73	60	607.83	59	6.99	55	83.03	51
	1980	504	314.43	60	288.20	64	9.59	56	94.72	47
	1981	588	489.86	55	527.46	64	23.89	51	74.51	47
	1982	840	509.65	53	1275.71	57	25.54	48	101.67	48
	1983	840	308.26	58	483.00	53	12.62	53	85.55	46
	1984	840	396.11	64	780.53	60	6.32	52	65.66	48

^aNo samples collected in June 1978.^bSampling initiated in February 1983.

Table 2. Monthly mean catch rates (No./ha) and mean lengths (mm) of brown shrimp caught with 18.3-m bag seines in Texas bay systems during calendar year 1984 (blank = no measurement taken).

Month	Samples ^a	East				Upper				Lower									
		Galveston No./ha	Galveston Length	Matagorda No./ha	Matagorda Length	San Antonio No./ha	San Antonio Length	Aransas No./ha	Aransas Length	Corpus Christi No./ha	Corpus Christi Length	Laguna Madre No./ha	Laguna Madre Length	Coastwide No./ha	Coastwide Length				
Jan	10	0.00		0.00		0.00		0.00		0.00		0.00		0.00					
Feb	10	0.00		0.00		0.00		0.00		0.00		0.00		0.00					
Mar	10	0.00		1.67	22	0.00		0.00		158.33	34	0.00		90.00	67	29.53	31		
Apr	10	443.33	41	53.70	37	470.00	42	336.67	43	2658.00	63	471.43	61	0.00	1616.00	65	835.95	48	
May	10	2190.00	60	1181.67	57	408.33	59	1429.63	70	1181.82	67	562.00	62	515.99	51	860.00	65	1136.71	61
Jun	10	2590.00	71	1114.82	69	483.33	72	163.33	63	2674.00	69	610.42	54	145.00	66	440.00	66	1194.62	66
Jul	10	803.33	70	480.00	78	185.00	58	306.67	80	738.33	69	502.17	64	137.50	85	168.00	66	441.46	71
Aug	10	340.00	63	135.00	73	350.00	50	60.00	60	262.22	66	89.13	58	2.50	102	176.00	55	206.35	66
Sep	10	255.00	56	50.00	58	56.67	44	56.67	64	110.00	59	116.67	51	73.33	65	410.00	52	161.29	56
Oct	10	210.00	63	53.33	73	16.67	63	55.56	73	20.00	69	866.67	67	6.67	91	370.00	63	187.64	70
Nov	10	40.00	69	63.33	78	83.33	50	70.00	50	176.67	68	40.00	61	43.33	71	367.65	60	113.86	63
Dec	10	0.00		3.70	30	0.00		74.07	44	56.67	55	23.33	60	18.52	65	16.67	47	23.31	50

^a10 Samples per month in each bay system; 80 samples per month coastwide.

Table 3. Monthly mean catch rates (No./ha) and mean lengths (mm) of white shrimp caught with 18.3-m bag seines in Texas bay systems during calendar year 1984 (blank = no measurement taken).

Month	Samples ^a	Galveston		East Matagorda		Matagorda		San Antonio		Arenas		Corpus Christi		Upper Laguna Madre		Lower Laguna Madre		Coastwide	
		No./ha	Length	No./ha	Length	No./ha	Length	No./ha	Length	No./ha	Length	No./ha	Length	No./ha	Length	No./ha	Length	No./ha	Length
Jan	10	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
Feb	10	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
Mar	10	0.00		0.00		1.67	85	0.00		0.00		0.00		0.00		0.00		0.25	85
Apr	10	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
May	10	0.00		0.00		3.33	122	0.00		0.00		0.00		0.00		0.00		0.05	122
Jun	10	336.67	47	66.67	46	736.67	40	46.67	42	356.00	46	4.17	42	0.00		964.00	42	369.74	43
Jul	10	9216.67	50	1520.00	63	963.33	65	1206.67	47	1741.67	45	1723.91	53	77.50	53	1530.00	41	2950.74	52
Aug	10	4333.34	73	613.33	74	7410.00	79	256.67	72	175.56	63	1089.13	74	42.50	55	1548.00	66	2439.34	70
Sep	10	1580.00	67	1773.33	66	4376.67	77	73.33	88	1163.33	58	66.67	71	66.67	56	80.00	62	1255.98	68
Oct	10	2150.00	67	303.33	84	2866.67	63	285.19	72	973.33	66	460.00	72	10.00	133	720.00	75	1215.57	78
Nov	10	280.00	70	1336.67	60	1460.00	61	126.67	55	453.33	74	356.67	66	16.67	59	644.12	68	523.64	64
Dec	10	70.00	55	362.96	60	246.67	63	22.22	46	166.67	59	23.33	62	0.00		2446.68	55	210.19	60

^a10 Samples per month in each bay system; 80 samples per month coastwide.

Table 4. Monthly mean catch rates (No./ha) and mean lengths (mm) of pink shrimp caught with 18.3-m bag seines in Texas bay systems during calendar year 1984 (blank = no measurement taken).

Month	Samples	Galveston		East		Matagorda		San Antonio		Aransas		Corpus Christi		Upper		Lower		Coastwide	
		No./ha	Length	No./ha	Length	No./ha	Length	No./ha	Length	No./ha	Length	No./ha	Length	No./ha	Length	No./ha	Length	No./ha	Length
Jan	10	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
Feb	10	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
Mar	10	0.00		0.00		5.00	25	0.00		0.00		0.00		0.00		0.00		0.75	25
Apr	10	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
May	10	0.00		0.00		0.00		7.41	81	0.00		0.00		0.00		0.00		0.88	81
Jun	10	0.00		0.00		0.00		0.00		10.00	34	0.00		0.00		0.00		1.39	34
Jul	10	0.00		0.00		0.00		0.00		13.33	51	0.00		22.50	89	0.00		4.49	70
Aug	10	0.00		0.00		0.00		0.00		77.78	43	36.96	43	0.00		2.00	79	14.42	55
Sep	10	0.00		0.00		0.00		0.00		26.67	53	153.33	48	73.33	57	0.00		26.17	53
Oct	10	0.00		0.00		0.00		0.00		30.00	50	130.00	43	86.67	63	0.00		26.09	52
Nov	10	0.00		0.00		0.00		0.00		26.67	58	60.00	60	13.33	64	0.00		10.70	61
Dec	10	0.00		0.00		0.00		0.00		13.33	72	30.00	50	3.70	62	0.00		5.00	61

^a10 samples per month in each bay system; 80 samples per month coastwide.

Table 5. Monthly mean catch rates (No./ha) and mean widths (mm) of blue crabs caught with 18.3-m bag seines in Texas bay systems during calendar year 1984 (blank = no measurement taken).

Month	Samples ^a	Galveston		East Matagorda		Matagorda		San Antonio		Aransas		Corpus Christi		Upper Laguna Madre		Lower Laguna Madre		Coastwide	
		No./ha	Width	No./ha	Width	No./ha	Width	No./ha	Width	No./ha	Width	No./ha	Width	No./ha	Width	No./ha	Width	No./ha	Width
Jan	10	10.00	30	1.67	22	10.00	32	0.00	16	2.08	13	6.12	19	0.00	2.00	30	5.25	24	
Feb	10	3.00	25	1.67	32	0.00		10.00	16	6.12	14	4.17	15	0.00	96.00	34	15.97	23	
Mar	10	136.67	34	35.00	70	110.00	36	10.00	17	81.25	27	31.25	27	62.50	290.00	46	108.61	41	
Apr	10	120.00	38	57.41	43	101.67	43	133.33	45	114.00	38	167.35	30	97.50	212.00	44	129.75	41	
May	10	126.67	48	341.67	60	55.00	45	85.19	54	36.36	58	92.00	65	35.00	60.00	70	82.96	58	
Jun	10	103.33	71	12.96	105	26.67	108	16.67	55	56.00	68	27.08	39	70.00	10.00	41	48.63	68	
Jul	10	66.67	67	66.67	76	56.67	44	63.33	60	71.67	67	63.04	58	52.50	24.00	50	57.80	60	
Aug	10	213.33	86	30.00	57	38.33	49	50.00	52	106.67	75	32.61	78	17.50	10.00	59	80.19	66	
Sep	10	125.00	64	10.00	23	86.67	39	30.00	60	36.67	38	70.00	68	26.67	43.33	51	64.38	55	
Oct	10	55.00	61	0.00		26.67	67	7.41	58	26.67	39	80.00	44	3.33	63.33	52	36.58	57	
Nov	10	25.00	29	26.67	26	16.67	77	53.33	22	60.00	71	153.33	24	30.00	78.53	50	50.68	45	
Dec	10	40.00	21	29.63	42	226.67	24	59.26	36	170.00	32	63.33	24	33.33	23.33	25	87.18	34	

^a10 samples per month in each bay system; 80 samples per month coastwide.

Table 6. Annual mean catch rates (No./tow) and mean sizes (mm) of shellfishes caught with 6.1-m trawls in Texas bay systems during calendar years 1982-1984 (blank = no measurement taken).

Bay System	Year	Brown Shrimp		White Shrimp		Pink Shrimp		Blue Crabs		
		Number Samples	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Width
Galveston	1982	240	5.7	89	20.1	91	0.3	93	7.0	91
	1983	240	3.2	99	19.4	93	<0.1	95	6.0	89
	1984	240	3.4	102	14.6	98	0.0		4.8	93
Matagorda	1982	160	6.3 ^a	95	10.3 ^a	88	<0.1 ^a	116	1.3 ^a	97
	1983	240	6.5	101	5.1	100	0.3	113	2.5	86
	1984	240	1.9	102	2.9	96	<0.1	80	0.9	85
San Antonio	1982	240	4.1	101	3.5	100	<0.1	92	4.1	81
	1983	240	7.7	99	3.2	93	1.2	95	5.3	80
	1984	240	14.7	96	2.3	99	<0.1	73	1.8	83
Aransas	1982	240	13.8	80	4.1	95	1.8	89	7.2	66
	1983	240	14.3	90	4.5	100	2.3	94	9.0	80
	1984	240	26.7	80	10.0	104	0.7	86	7.8	86
Corpus Christi	1982	160	10.2 ^a	89	6.4 ^a	102	0.5 ^a	100	1.9 ^a	98
	1983	240	2.2	98	3.6	111	0.4	102	1.3	101
	1984	240	12.6	103	5.9	106	1.0	112	2.0	89
Upper Laguna Madre	1982	80	9.5 ^a	105	2.0 ^a	109	0.5 ^a	96	1.1 ^a	148
	1983	120	0.9	102	0.8	112	0.2	113	0.7	115
	1984	120	6.4	107	3.4	126	<0.1	86	2.9	89
Lower Laguna Madre	1982	77	1.6 ^a	61	1.9 ^a	63	0.0 ^a		5.1 ^a	106
	1983	120	2.3	65	0.4	83	0.2	88	3.1	95
	1984	120	1.6	74	2.6	110	<0.1	71	12.1	84
Coastwide	1982	1197	6.8 ^b	90	11.7 ^b	91	0.4 ^b	93	5.1 ^b	94
	1983	1440	7.2	94	10.2	97	0.5	97	4.5	86
	1984	1440	7.5	92	7.9	104	0.2	97	3.7	87

^aNo samples Jan-Apr

^bBased on May-Dec samples

Table 7. Monthly mean catch rates (No./tow) and mean lengths (mm) of brown shrimp caught with 6.1-m trawls in Texas bay systems during calendar year 1984 (blank = no measurement taken).

Month	Number of samples ^a	Galveston		Matagorda		San Antonio		Aransas		Upper		Lower		Coastwide	
		No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	Corpus Christi	Laguna Madre	Laguna Madre	No./tow		Length
Jan	20	<0.1		<0.1	78	0.0	0.0	0.2	0.0	0.0	0.0	0.2	60	<0.1	64
Feb	20	0.0		0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	
Mar	20	0.0		0.0		0.0	0.0	0.0	<0.1	119	0.0	0.3	25	<0.1	38
Apr	20	0.0		0.0		0.0	34.7	50	0.1	86	0.2	0.2	69	2.9	50
May	20	12.2	94	2.6	92	115.0	94	150.1	84	32.3	98	6.1	85	37.1	86
Jun	20	14.2	104	8.7	99	33.5	100	36.8	85	87.4	103	1.6	104	25.9	101
Jul	20	11.1	111	4.2	111	10.6	104	44.6	98	4.0	102	0.0		11.1	103
Aug	20	0.7	102	1.5	112	2.2	115	32.9	102	23.4	108	5.6	52	6.6	101
Sep	20	1.6	88	2.2	100	2.6	96	6.8	91	0.5	110	0.1	58	2.0	94
Oct	20	0.2	95	0.5	98	5.0	104	3.9	97	0.4	109	1.8	70	1.2	96
Nov	20	0.1	79	0.3	90	3.9	94	8.6	91	2.0	101	2.4	80	1.6	92
Dec	20	0.1	91	0.1	99	0.4	86	1.6	88	0.6	103	0.8	102	0.4	95

^a20 samples were taken in each bay except upper and lower Laguna Madre where 10 samples were taken.

Table 8. Monthly mean catch rates (No./tow) and mean lengths (mm) of white shrimp caught with 6.1-m trawls in Texas bay systems during calendar year 1984 (blank = no measurement taken).

Month	Number of samples ^a	Galveston		Matagorda		San Antonio		Aransas		Corpus Christi		Upper Laguna Madre		Lower Laguna Madre		Coastwide	
		No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length
Jan	20	0.3		<0.1	72	0.1	97	0.5	70	0.0	0.0	0.0	0.4	34	0.2	60	
Feb	20	0.2	98	0.0		0.0		0.0		0.0	0.0	0.0	0.0		<0.1	98	
Mar	20	1.8	103	1.5	94	0.0		1.0	109	0.5	106	0.0	0.1	109	1.1	102	
Apr	20	8.8	116	0.1	92	3.7	73	2.2	112	0.8	126	0.0	1.4	120	4.1	107	
May	20	2.0	139	1.0	122	0.3	121	0.6	148	1.0	148	0.0	0.3	150	1.2	138	
Jun	20	0.0		0.3	166	0.0		0.4	163	0.3	168	0.0	0.0		0.1	165	
Jul	20	7.2	87	0.8	112	0.4	88	0.8	65	0.5	106	0.2	43		3.0	88	
Aug	20	28.8	98	3.1	108	1.6	106	20.5	102	7.4	102	4.0	118	0.1	127	14.3	102
Sep	20	57.5	99	4.7	101	2.5	110	15.2	113	15.2	98	10.8	119	0.0	26.3	103	
Oct	20	15.2	99	10.6	98	6.7	113	17.9	99	30.0	107	10.0	139	3.1	119	14.3	107
Nov	20	26.8	94	12.9	96	8.6	97	40.1	104	10.9	113	4.6	129	20.2	107	19.4	103
Dec	20	24.3	89	10.1	83	1.2	82	15.4	99	4.7	98	1.0	109	5.0	110	13.4	93

^a20 samples were taken in each bay except upper and lower Laguna Madre where 10 samples were taken.

Table 9. Monthly mean catch rates (No./tow) and mean lengths (mm) of pink shrimp caught with 6.1-m trawls in Texas bay systems during calendar year 1984 (blank = no measurement taken).

Month	Number of samples ^a	Galveston		Matagorda		San Antonio		Aransas		Corpus Christi		Upper Laguna Madre		Lower Laguna Madre		Coastwide		
		No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	
Jan	20	0.0	0.0	0.0	0.0	0.0	0.0	0.8	85	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	85
Feb	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	96
Mar	20	0.0	94	0.0	0.0	0.0	33	0.1	105	0.2	92	0.0	0.0	0.0	0.0	0.0	0.1	87
Apr	20	0.0	0.0	<0.1	0.0	<0.1	0.0	0.6	66	0.6	119	0.2	82	0.0	0.0	0.0	0.1	86
May	20	0.0	0.0	0.0	0.0	0.0	0.0	0.8	89	0.1	61	0.0	0.0	0.0	0.0	0.0	0.4	122
Jun	20	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	133	3.3	122	0.0	0.0	0.0	0.0	0.0	<0.1	57
Jul	20	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.2	57	0.0	0.0	0.0	<0.1	84
Aug	20	0.0	0.0	0.0	0.0	0.0	0.0	<0.1	72	<0.1	96	0.0	0.0	0.0	0.0	0.5	71	69
Sep	20	0.0	65	0.0	0.0	0.0	0.0	<0.1	88	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	93
Oct	20	0.0	<0.1	98	<0.1	112	112	1.3	90	0.3	97	0.0	0.0	0.0	0.0	0.0	0.7	96
Nov	20	0.0	0.2	107	0.0	0.0	0.0	3.1	85	3.3	104	0.2	119	0.0	0.0	0.0	0.3	102
Dec	20	0.0	0.0	0.0	0.0	0.0	0.0	1.3	91	1.4	113	0.0	0.0	0.0	0.0	0.0	0.3	102

^a20 samples were taken in each bay except upper and lower Laguna Madre where 10 samples were taken.

Table 10. Monthly mean catch rates (No./tow) and mean widths (mm) of blue crabs caught with 6.1-m trawls in Texas bay systems during calendar year 1984.

Month	Number of samples ^a	Galveston		Matagorda		San Antonio		Aransas		Corpus Christi		Upper Laguna Madre		Lower Laguna Madre		Coastwide	
		No./tow	Width	No./tow	Width	No./tow	Width	No./tow	Width	No./tow	Width	No./tow	Width	No./tow	Width	No./tow	Width
Jan	20	0.3	75	<0.1	24	0.2	46	3.0	37	0.1	103	0.2	152	0.2	165	0.4	53
Feb	20	0.8	134	0.2	89	0.9	52	3.6	117	0.4	27	2.2	130	1.2	120	1.0	111
Mar	20	2.2	114	2.4	79	4.6	68	15.1	63	1.6	81	6.4	109	10.7	75	4.1	78
Apr	20	9.6	76	1.4	72	4.0	71	20.0	68	4.0	76	8.6	89	61.5	80	9.6	78
May	20	15.9	83	1.8	96	6.3	86	17.2	71	10.9	88	18.4	95	25.5	78	11.8	83
Jun	20	9.9	94	2.3	94	3.5	87	9.4	90	3.2	89	8.6	107	15.5	89	6.9	93
Jul	20	6.2	102	0.7	89	1.2	114	8.2	103	1.7	112	10.6	123	7.3	107	4.4	110
Aug	20	2.9	101	0.4	74	0.2	129	6.9	96	0.9	134	1.8	103	8.7	102	2.3	101
Sep	20	3.2	101	0.3	92	0.4	119	3.9	107	0.1	86	3.8	103	2.5	104	2.0	104
Oct	20	1.5	88	0.3	116	0.6	125	2.4	126	0.4	116	2.6	103	5.3	96	1.3	104
Nov	20	3.8	116	0.4	96	0.9	100	1.9	122	0.2	133	2.4	126	5.0	103	2.1	113
Dec	20	1.7	110	1.0	95	0.8	97	2.4	130	0.1	48	3.8	116	6.1	110	1.6	112

^a20 samples were taken in each bay except upper and lower Laguna Madre where 10 samples were taken.

Table 11. Weekly mean catch rates (No./tow) and mean lengths (mm) of brown shrimp caught at 6.1-m trawl stations in Texas passes during calendar year 1984 (blank = no measurement taken).

Month	Day	Number samples	Bolívar Roads			Matagorda			Lydia Ann Channel			Corpus Christi Channel			Brazos Santiago Pass		
			No./tow	Length	No./tow	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length
Jan	2-8	2	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
	9-15	2	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
	16-22	2	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
	23-29	2	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
	30-Feb	5	0.0		0.0		0.0		0.0		0.0		0.0		0.5		72
Feb	6-12	2	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
	13-19	2	0.0		0.0		0.0		0.0		0.0		0.0		0.5		112
	20-26	2	0.0		0.0		0.0		0.0		0.0		0.0		0.5		86
	27-Mar	4	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
Mar	5-11	2	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
	12-18	2	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
	19-25	2	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
	26-Apr	1	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0
Apr	2-8	2	0.0		0.0		0.0		0.5	121	0.0		0.0		0.0		0.0
	9-15	2	0.0		0.0		0.0		1.0	108	0.0		0.0		1.5		79
	16-22	2	0.5	141	0.0		0.0		0.5	99	0.0		0.0		12.0		72
	23-29	2	0.0		0.0		0.0		0.0	84	0.0		0.0		1.0		86
	30-May	6	0.0		0.5	79		3.5		84	0.5		0.5		154.0		82
May	7-13	2	2.5	66	0.0		0.0		62.0	78	18.5		18.5		5.5		94
	14-20	2	0.0		0.0		0.0		39.0	80	1.5		1.5		0.0		0.0
	21-27	2	0.5	99	0.0		0.0		1.0	58	1.0		1.0		6.0		89
	28-Jun	3	1.5	108	0.0		0.0		0.0		0.5		0.5		22.0		92
Jun	4-10	2	30.0	94	0.5	77		0.0	0.0		0.5		0.5		0.0		0.0
	11-17	2	0.0		1.0	96		0.0		0.0	0.0		0.0		29.0		80
	18-24	2	0.0		2.5	107		0.0		0.0	0.0		0.0		0.0		0.0
	25-Jul	1	0.0		8.0	103		454.0	101		2.0		2.0		39.5		65

Table 11. (Cont'd.).

Month	Day	Number samples	Matagorda					Corpus Christi Channel	Brazos Santiago Pass
			Bolivar Roads	Ship Channel - Pass Cavallo	Lydia Ann Channel	Corpus Christi Channel	Brazos Santiago Pass		
			No./tow Length	No./tow Length	No./tow Length	No./tow Length	No./tow Length	No./tow Length	
Jul	2-8	2	0.0	4.0	0.0	0.5	0.0	0.0	
	9-12	2	0.0	0.0	1.0	1.0	1.0	0.0	
	16-22	2	0.0	0.0	0.5	0.0	0.0	4.0	
	23-29	2	0.0	0.0	0.0	0.0	0.0	2.0	
	30-Aug 5	2	0.0	0.0	3.5	0.0	0.0	0.5	
Aug	6-12	2	0.0	0.0	0.0	0.0	0.0	0.5	
	13-19	2	0.0	0.0	0.0	0.0	0.0	0.5	
	20-26	2	0.0	0.0	7.0	1.5	1.5	1.5	
	27-Sep 2	2	0.0	0.0	0.0	0.0	0.0	0.0	
					132		119		
Sep	3-9	2	0.0	0.0	0.0	0.0	0.0	0.0	
	10-16	2	0.0	0.0	0.0	0.0	0.0	0.0	
	17-23	2	0.0	0.0	0.0	0.0	0.0	2.0	
	24-30	2	0.0	0.5	0.5	0.0	0.0	1.0	
					106			44	
Oct	1-7	2	0.0	0.0	1.0	0.5	0.5	3.0	
	8-14	2	0.0	0.0	0.0	0.0	0.0	0.5	
	15-21	2	0.0	0.0	0.5	0.0	0.0	0.0	
	22-28	2	0.0	0.5	139.0	0.5	0.5	1.0	
	29-Nov 4	2	0.0	0.0	1.0	0.0	0.0	1.5	
Nov	5-11	2	1.5	2.5	6.0	1.0	1.0	1.0	
	12-18	2	1.0	0.0	1.0	0.0	0.0	0.5	
	19-25	2	0.0	0.0	28.0	0.0	0.0	0.0	
	26-Dec 2	2	0.0	0.0	2.0	1.0	1.0	0.0	
					93		81		
Dec	3-9	2	0.0	0.5	2.5	1.5	1.5	1.0	
	10-16	2	0.0	0.0	0.0	0.0	0.0	0.0	
	17-23	2	0.0	0.0	0.5	0.0	0.0	0.5	
	24-30	2	0.0	0.0	1.5	0.0	0.0	0.5	
					98		67		

Table 12. (Cont'd.).

Month	Day	Number samples	Matagorda					Brazos Santiago Pass
			Bolivar Roads	Ship Channel- Pass Cavallo	Lydia Ann Channel	Corpus Christi Channel	No./tow Length	
Jul	2-8	2	0.0	0.0	0.0	0.0	0.0	0.0
	9-12	2	0.0	0.0	0.0	0.0	0.0	0.0
	16-22	2	0.0	0.0	0.0	0.0	0.0	0.0
	23-29	2	0.0	0.0	0.0	0.0	0.0	0.0
	30-Aug 5	2	0.0	0.0	0.0	0.0	0.0	0.0
Aug	6-12	2	2.5	0.0	0.0	0.0	0.0	0.0
	13-19	2	1.5	0.0	0.0	0.0	0.0	0.0
	20-26	2	0.5	0.0	0.5	80	0.0	0.0
	27-Sep 2	2	0.0	0.0	0.0	0.0	0.0	0.0
Sep	3-9	2	11.0	0.0	0.0	0.0	0.0	0.0
	10-16	2	0.5	0.0	0.0	0.0	0.0	0.0
	17-23	2	2.5	0.0	0.0	0.0	1.49	2.0
	24-30	2	22.5	0.0	0.0	0.0	0.0	0.0
Oct	1-7	2	4.0	0.5	0.0	0.0	0.0	1.0
	8-14	2	17.5	0.5	0.0	0.0	0.0	0.0
	15-21	2	11.0	0.0	0.5	140	0.0	0.0
	22-28	2	24.0	2.5	80.0	89	0.0	0.0
	29-Nov 4	2	5.5	0.5	0.0	0.0	0.0	4.0
Nov	5-11	2	54.0	0.5	82.0	97	0.0	1.0
	12-18	2	23.5	0.0	8.0	98	0.0	0.5
	19-25	2	16.0	1.0	59.0	111	2.5	1.0
	26-Dec 2	2	9.5	5.0	2.0	101	1.0	6.5
Dec	3-9	2	230.5	19.5	32.5	110	9.0	1.5
	10-16	2	30.5	0.0	1.5	101	0.5	0.5
	17-23	2	1.0	0.0	1.0	112	0.0	0.5
	24-30	2	1.0	0.0	1.0	112	0.5	0.0

Table 13. Weekly mean catch rates (No./tow) and mean lengths (mm) of pink shrimp caught at 6.1-m trawl stations in Texas passes during calendar year 1984 (blank = no measurement taken).

Month	Day	Number samples	Bollivar Roads		Matagorda Ship Channel - Pass Cavallo		Lydia Ann Channel		Corpus Christi Channel		Brazos Santiago Pass	
			No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length
Jan	2-8	2	0.0		0.0		0.5		0.0		0.0	
	9-15	2	0.0		0.0		0.0		0.0		0.0	
	16-22	2	0.0		0.0		0.5	105	0.0		0.0	
	23-29	2	0.0		0.0		0.0		0.0		0.0	
	30-Feb 5	2	0.0		0.0		0.0		0.0		0.0	
Feb	6-12	2	0.0		0.0		0.0		0.0		0.0	
	13-19	2	0.0		0.0		0.0		0.0		0.0	
	20-26	2	0.0		0.0		0.5	75	0.0		0.0	
	27-Mar 4	2	0.0		0.0		0.0		0.0		0.0	
	5-11	2	0.0		0.0		0.0		0.5	68	0.0	
Mar	12-18	2	0.5	96	0.0		0.5		0.0		0.0	
	19-25	2	0.0		0.0		0.0		0.0		0.0	
	26-Apr 1	2	0.0		0.0		0.0		0.0		0.0	
	2-8	2	0.0		0.0		0.0		0.0		0.0	
	9-15	2	0.0		0.0		0.0		0.5	97	0.0	
Apr	16-22	2	0.0		0.0		0.0		0.0		0.0	
	23-29	2	0.5	134	0.0		1.0	119	0.0		0.0	
	30-May 6	2	0.0		0.0		0.0		0.0		0.0	
	7-13	2	0.5	118	0.0		0.0		0.0		0.0	
	14-20	2	0.0		0.0		0.0		0.0		0.0	
May	21-27	2	0.0		0.0		0.0		0.0		0.0	
	28-Jun 3	2	0.0		0.0		0.0		0.0		0.0	
	4-10	2	0.0		0.0		0.0		0.0		0.0	
	11-17	2	0.0		0.0		0.0		0.0		0.0	
	18-24	2	0.0		0.0		0.0		0.0		0.0	
Jun	25-Jul 1	2	0.0		0.0		0.0		0.0		0.0	
		2	0.0		0.0		0.0		0.0		0.0	

Table 13. (Cont'd.).

Month	Day	Number samples	Matagorda					Corpus Christi Channel	Brazos Santiago Pass
			Bolivar Roads	Ship Channel - Pass Cavallo	Lydia Ann Channel	Corpus Christi Channel	Brazos Santiago Pass		
			No./tow Length	No./tow Length	No./tow Length	No./tow Length	No./tow Length	No./tow Length	
Jul	2-8	2	0.0	0.0	0.0	0.0	0.0	0.0	
	9-12	2	0.0	0.0	0.0	0.0	0.0	0.0	
	16-22	2	0.0	0.0	0.0	0.0	0.0	0.0	
	23-29	2	0.0	0.0	0.0	0.0	0.0	0.0	
	30-Aug 5	2	0.0	0.0	0.0	0.0	0.0	0.0	
Aug	6-12	2	0.0	0.0	0.0	0.0	0.0	0.0	
	13-19	2	0.0	0.0	0.0	0.0	0.0	0.0	
	20-26	2	0.0	0.0	0.5	87	0.0	0.0	
	27-Sep 2	2	0.0	0.0	0.0	0.0	0.0	0.0	
	3-9	2	0.0	0.5	0.0	87	0.0	0.0	
Sep	10-16	2	0.0	0.0	0.0	0.0	0.0	0.0	
	17-23	2	0.0	0.0	0.0	0.0	0.0	0.0	
	24-30	2	0.0	0.0	0.0	0.0	0.0	0.0	
	1-7	2	0.0	0.0	0.0	0.0	0.0	0.0	
	8-14	2	0.0	0.0	0.0	0.0	0.0	0.0	
Oct	15-21	2	0.0	0.0	1.0	90	0.0	0.0	
	22-28	2	0.0	0.5	4.0	96	0.5	58	
	29-Nov 4	2	0.0	0.0	1.0	90	0.0	0.0	
	5-11	2	0.0	0.0	4.5	96	0.0	0.0	
	12-18	2	0.5	6.5	0.5	110	0.5	82	
Nov	19-25	2	0.0	0.0	13.0	86	0.0	0.0	
	26-Dec 2	2	0.0	0.0	5.0	80	7.0	72	
	3-9	2	0.0	0.0	10.0	91	5.0	82	
	10-16	2	0.0	0.0	0.5	80	3.0	81	
Dec	17-23	2	0.0	0.0	1.0	100	0.0	0.0	
	24-30	2	0.0	0.0	1.0	111	0.0	0.0	

Table 14. (Cont'd.).

Month	Day	Number samples	Bollivar Roads		Matagorda Ship Channel- Pass Cavallo		Lydia Ann Channel		Corpus Christi Channel		Brazos Santiago Pass	
			No./tow	Width	No./tow	Width	No./tow	Width	No./tow	Width	No./tow	Width
Jul	2-8	2	6.5	153	3.5	106	27.5	119	29.0	115	2.5	110
	9-12	2	1.0	171	16.0	117	9.5	122	20.0	110	3.5	102
	16-22	2	9.0	146	1.0	127	14.5	108	11.0	114	5.0	113
	23-29	2	1.5	149	0.0		3.0	115	2.0	101	7.0	117
	30-Aug 5	2	0.0		2.5	125	2.5	117	8.0	116	9.5	111
Aug	6-12	2	1.0	129	1.0	103	8.5	122	7.0	114	14.0	120
	13-19	2	1.5	161	0.0		8.0	104	2.5	113	1.5	123
	20-26	2	0.0		0.0		5.5	114	11.0	129	4.5	108
	27-Sep 2	2	2.0	157	0.0		2.5	118	3.5	120	0.0	
Sep	3-9	2	0.5	68	0.0		8.0	124	2.0	125	1.0	139
	10-16	2	0.0		0.0		0.0		0.0		2.5	115
	17-23	2	0.0		0.0		2.0	132	0.0		1.0	32
	24-30	2	1.5	127	0.0		1.5	124	1.0	114	0.0	
Oct	1-7	2	0.0		0.0		1.5	128	0.0		0.0	
	8-14	2	0.5	62	0.0		0.0		0.5	125	1.5	74
	15-21	2	0.5	142	0.5	58	2.0	88	0.0		0.0	
	22-28	2	0.5	152	0.0		2.5	83	0.5	179	0.0	
	29-Nov 4	2	0.0		0.0		0.0		0.5	146	1.5	90
Nov	5-11	2	3.0	86	0.0		3.0	53	0.5	162	2.0	90
	12-18	2	1.5	62	1.0	138	1.0	107	1.0	154	0.0	
	19-25	2	2.0	132	0.5	79	7.0	60	0.5	16	0.5	72
	26-Dec 2	2	1.5	166	0.0		1.5	108	4.0	41	0.0	
Dec	3-9	2	3.5	91	0.5	141	15.0	137	5.5	43	0.5	106
	10-16	2	1.0	56	0.5	48	1.5	144	1.0	91	0.0	
	17-23	2	8.5	100	1.0	126	1.5	131	0.0		2.0	95
	24-30	2	0.0		1.5	153	1.5	169	1.0	157	0.5	130

Table 15. Mean catch rates (No./h) and mean widths (mm), by mesh size, of blue crabs caught with 183-m gill nets during spring in the Texas bay systems during 1983-1984 (blank = no measurement taken).

Bay System	Year	Mesh Size				Total
		7.6-cm No./h Width	10.2-cm No./h Width	12.7-cm No./h Width	15.2-cm No./h Width	
Galveston	1983	<0.1	0.1	0.1	<0.1	0.3
	1984	<0.1	0.1	<0.1	<0.1	0.2
Matagorda	1983	<0.1	<0.1	<0.1	<0.1	0.2
	1984	<0.1	<0.1	<0.1	<0.1	0.1
San Antonio	1983	0.1	0.1	0.1	<0.1	0.4
	1984	0.1	0.1	<0.1	<0.1	0.2
Aransas	1983	0.1	0.1	0.1	<0.1	0.4
	1984	0.1	0.1	<0.1	<0.1	0.2
Corpus Christi	1983	<0.1	0.1	<0.1	<0.1	0.3
	1984	0.1	0.1	0.1	<0.1	0.3
Upper Laguna Madre	1983	<0.1	<0.1	<0.1	<0.1	0.2
	1984	0.1	0.1	0.1	<0.1	0.3
Lower Laguna Madre	1983	<0.1	0.1	<0.1	<0.1	0.3
	1984	<0.1	0.1	<0.1	<0.1	0.2
Coastwide	1983	<0.1	0.1	<0.1	<0.1	0.3
	1984	<0.1	0.1	<0.1	<0.1	0.2

Table 16. Mean catch rates (No./h) and mean widths (mm), by mesh size, of blue crabs caught with 183-m gill nets during fall in Texas bay systems during 1983-84 (blank = no measurement taken).

Bay System	Year	7.6-cm		10.2-cm		12.7-cm		15.2-cm		Total	
		No./h	Width	No./h	Width	No./h	Width	No./h	Width	No./h	Width
Galveston	1983	0.1	134	0.1	140	<0.1	135	<0.1	130	0.2	135
	1984	<0.1	141	<0.1	158	<0.1	169	<0.1	156	0.1	156
Matagorda	1983	<0.1	149	0.1	152	<0.1	154	<0.1	141	0.1	149
	1984	<0.1	145	<0.1	152	<0.1	146	<0.1	139	0.1	146
San Antonio	1983	<0.1	134	<0.1	140	<0.1	137	<0.1	160	0.1	143
	1984	<0.1	143	<0.1	149	<0.1	152	<0.1	142	0.1	146
Aransas	1983	0.1	137	0.1	149	<0.1	155	<0.1	153	0.2	148
	1984	<0.1	140	<0.1	143	<0.1	151	<0.1	157	0.1	148
Corpus Christi	1983	<0.1	139	0.1	150	0.1	147	<0.1	142	0.2	144
	1984	0.1	131	<0.1	140	<0.1	148	<0.1	150	0.2	142
Upper Laguna Madre	1983	0.1	140	0.1	146	<0.1	153	<0.1	162	0.2	150
	1984	<0.1	135	<0.1	139	<0.1	134	<0.1	143	0.2	138
Lower Laguna Madre	1983	0.1	143	0.1	145	0.1	151	<0.1	150	0.3	147
	1984	<0.1	143	<0.1	148	<0.1	149	<0.1	161	0.2	150
Coastwide	1983	0.1	138	0.1	145	<0.1	149	<0.1	149	0.2	145
	1984	<0.1	140	<0.1	146	<0.1	148	<0.1	153	0.1	147

Table 17. Mean catch rate (No./sample) by size class (mm)^a of American oyster caught with 46.0-cm wide dredges in Texas Bays during September-October, 1984. (blank = no measurement taken).

Bay System	Spat	Mean Number Oysters/Sample		Total
		Small	Market	
Galveston	38.5	159.3	51.2	249.0
East Matagorda	3.2	4.2	1.7	9.1
Matagorda	409.8	1063.2	64.0	1537.0
San Antonio	108.5	616.3	29.0	753.8
Aransas ^b		796.2	48.0	844.2

^a Spat \leq 25 mm, Small 26-75 mm, Market \geq 76 mm.

^b Spat and small combined.

Table 18. Mean catch rates (No./sample) by size class (mm)^a of American oysters caught with 46-cm dredges in Galveston Bay, October-December 1984.

Month	Number of Samples Reef	No./Sample							
		Non-reef		Reef		Non-reef			
		Spat	Small	Market	Total	Spat	Small	Market	Total
Oct	80	6.5	16.5	4.2	27.2	0.1	0.3	0.1	0.4
Nov	80	3.1	13.0	2.7	18.9	0.2	0.8	0.3	1.3
Dec	80	1.6	11.2	3.9	16.7	0.0	0.0	0.0	0.0

^a Spat \leq 25 mm, Small 26-75 mm, Market \geq 76 mm.

Table 19. Mean indices of fouling organisms on reef strata shells caught with 46-cm oyster dredge in Galveston Bay, October-December 1984.

Month	Fouling Index (1-6) ^a							Total		
	Boring sponge	Hydroids	Tube worms	Slipper shells	Mussels	Boring clams	Barnacles		Bryozoans	Other
Oct	<0.1	<0.1	0.4	0.1	0.2	0.1	0.2	2.0	<0.1	4.2
Nov	0.5	0.5	1.4	0.2	0.3	0.4	1.0	2.2	0.4	4.4
Dec	0.4	0.1	1.0	0.2	0.2	0.2	1.0	3.4	0.2	4.8

^a 1 (0-9%), 2 (10-25%), 3 (26-50%), 4 (51-75%), 5 (76-90%), 6 (91-100%).

Table 20. Annual mean catch rates (No./tow) and mean sizes (mm) of shellfish caught with 6.1-m trawls in the Texas Territorial Sea off Arkansas Bay area during August-September 1984 (blank = no measurement taken).

Month	Number of Samples	Brown Shrimp		White Shrimp		Pink Shrimp		Blue Crab	
		No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Width
Aug	20	3.9	107	1.6	178	0.7	92	0.3	132
Sep	4	19.2	113	11.0	160	0.5	98	0.1	136

Table 21. Mean catch rates (No./h) and mean sizes (mm) of shellfishes caught during SEAMAP^a sampling off the Texas coast in June-July 1982, 1983 and 1984 (Blank = No measurement taken).

Year	Depth (m)	No. samples	Brown Shrimp		White Shrimp		Pink Shrimp		Blue Crab	
			No./h	Length	No./h	Length	No./h	Length	No./h	Width
1982	0-18	22	1222	108	15	173	161	136	8	
	19-37	50	1427	115	0		20	138	1	
	38-55	29	138	145	0		<1	126	0	
	56-73	5	117	179	0		0		0	
74-91	3	79	182	0		0		0		
1983	0-18	28	254	99	20	153	195	127	8	
	19-37	47	1445	119	1	167	87	121	4	
	38-55	24	304	132	0		1	118	1	
	56-73	8	66	156	0		0		0	
	74-91	2	71	168	0		0		0	
1984	0-18	16	733	116	30	174	4	151	6	
	19-37	40	1594	116	1	168	3	150	0	
	38-55	16	544	131	0		0		0	
	56-73	12	194	138	0		0		0	
	74-91	5	86	151	0		0		0	

^a Data presented here were collected by R/V OREGON II (MMFS) and R/V WESTERN GULF (TPMD). The data were made available by the Southeast Area Monitoring and Assessment Program (SEAMAP). Samples collected with 12.2-m trawl.

Figure 1. Texas bay systems.

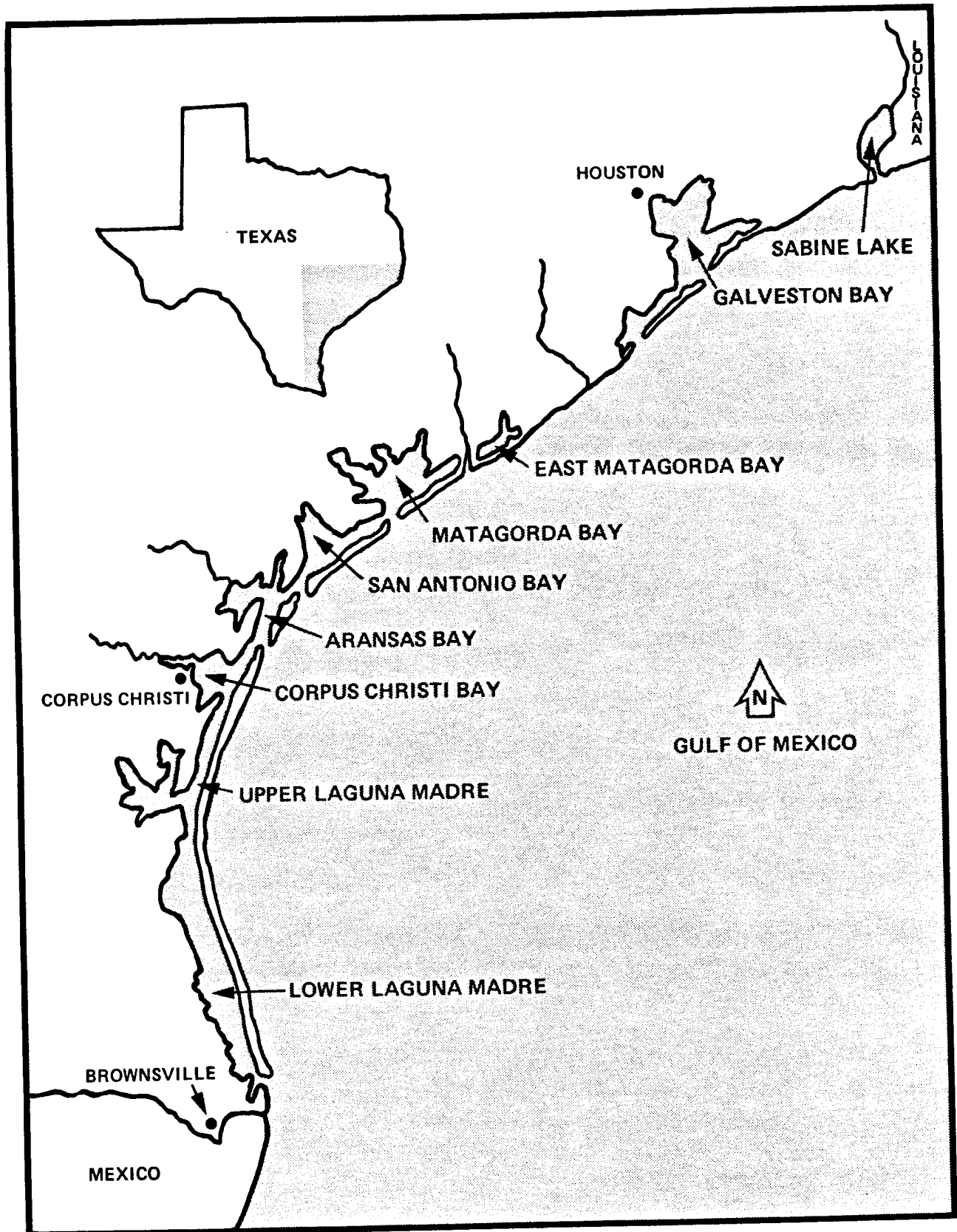


Figure 2. 18.3-m bag seine sample sites in the Galveston Bay system during January-August 1984 (each station number should be preceded by the digit 2 except station 300).

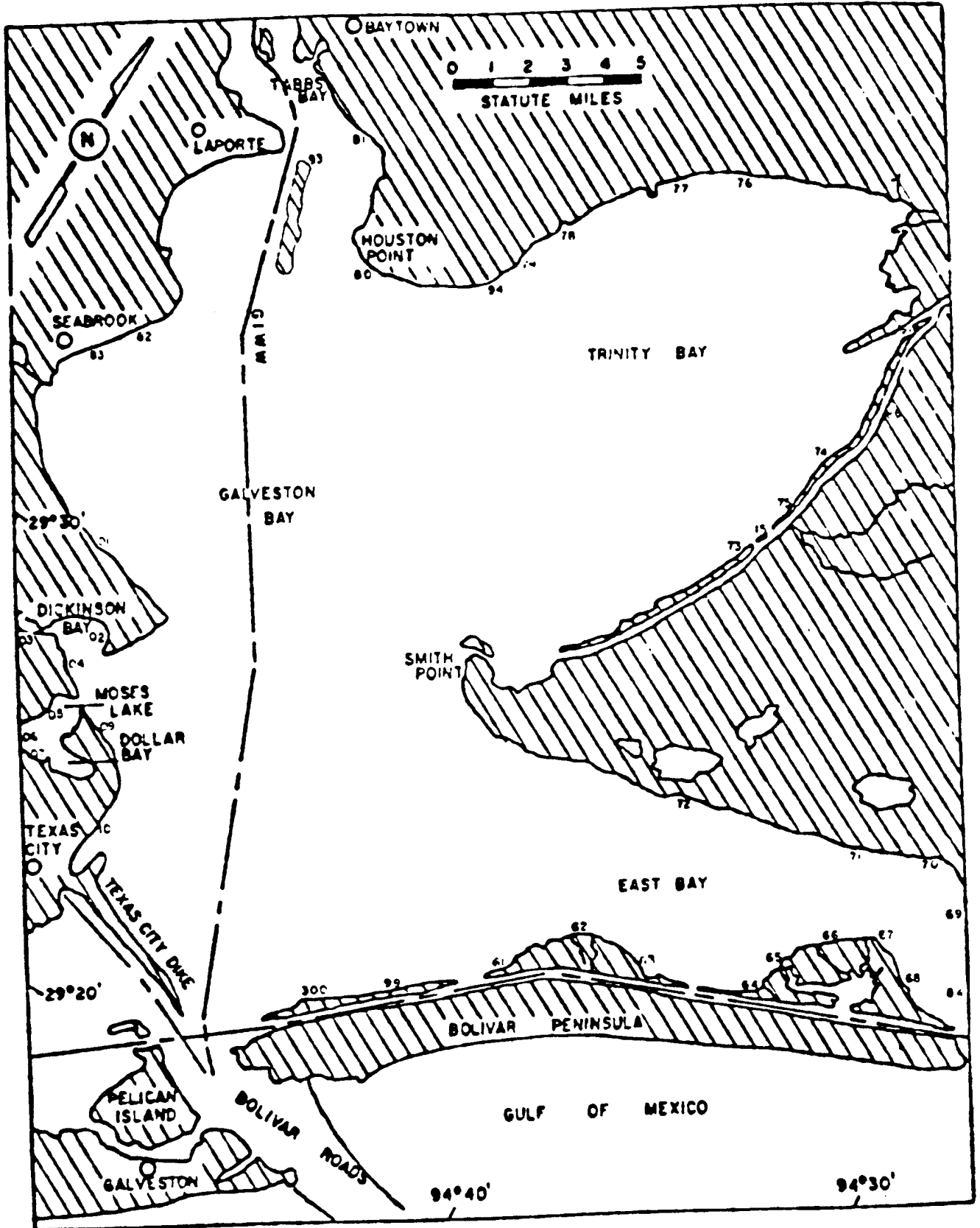


Figure 3. 18.3-m bag seine sample sites in the Galveston Bay system during January-August 1984 (each station number should be preceded by the digit 2).

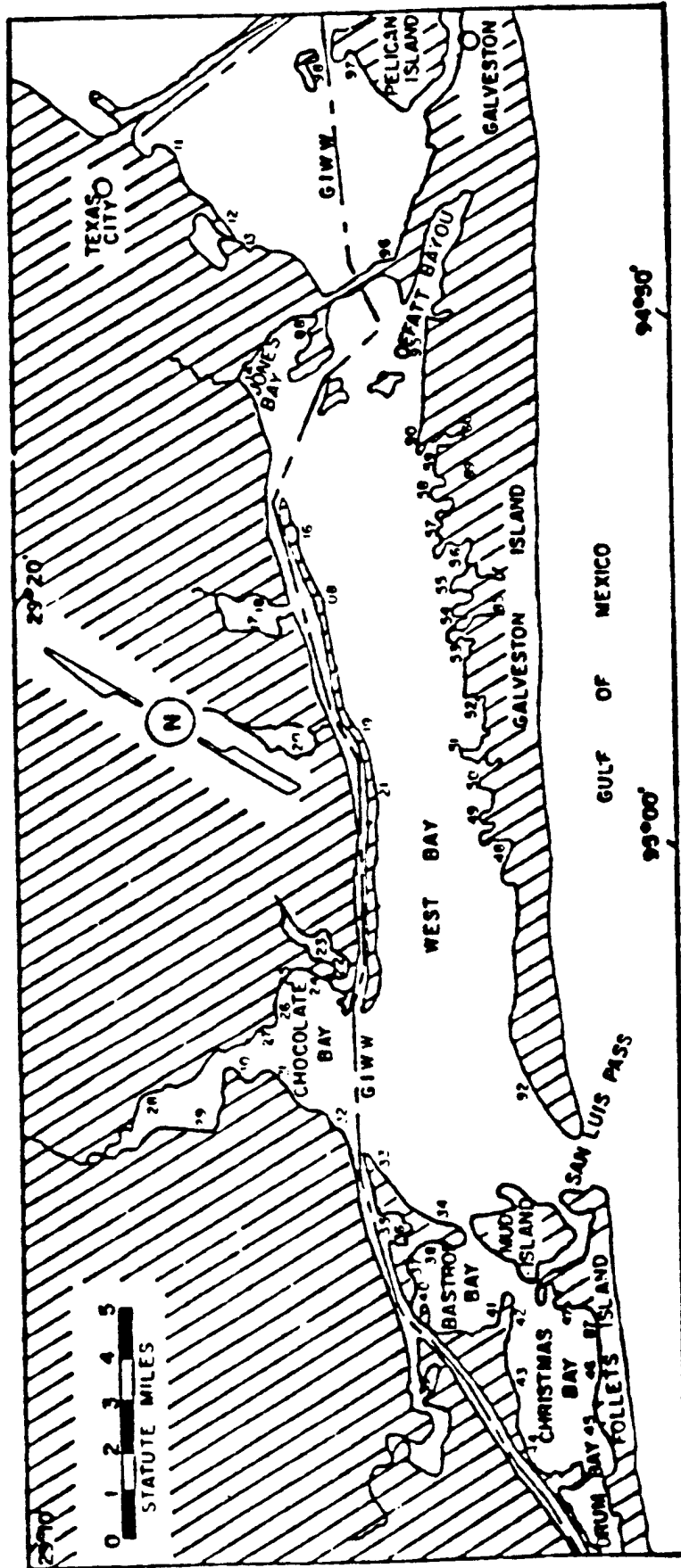


Figure 4. 18.3-m bag seine sample sites in the East Matagorda Bay system during January-August 1984 (each number should be preceded by the digit 2).

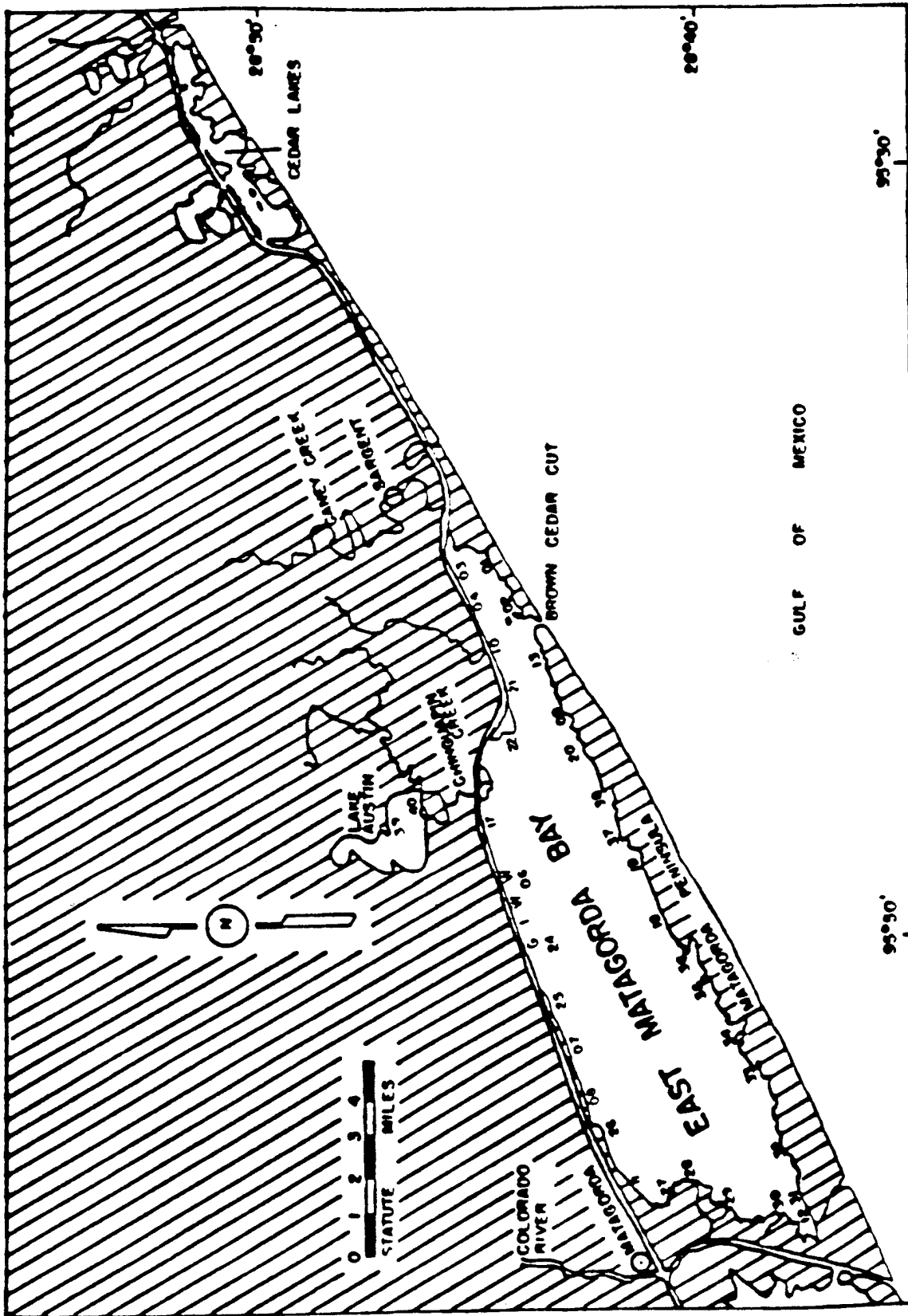


Figure 5. 18.3-m bag seine sample sites in the Matagorda Bay system during January-August 1984 (each station number should be preceded by the digit 2).

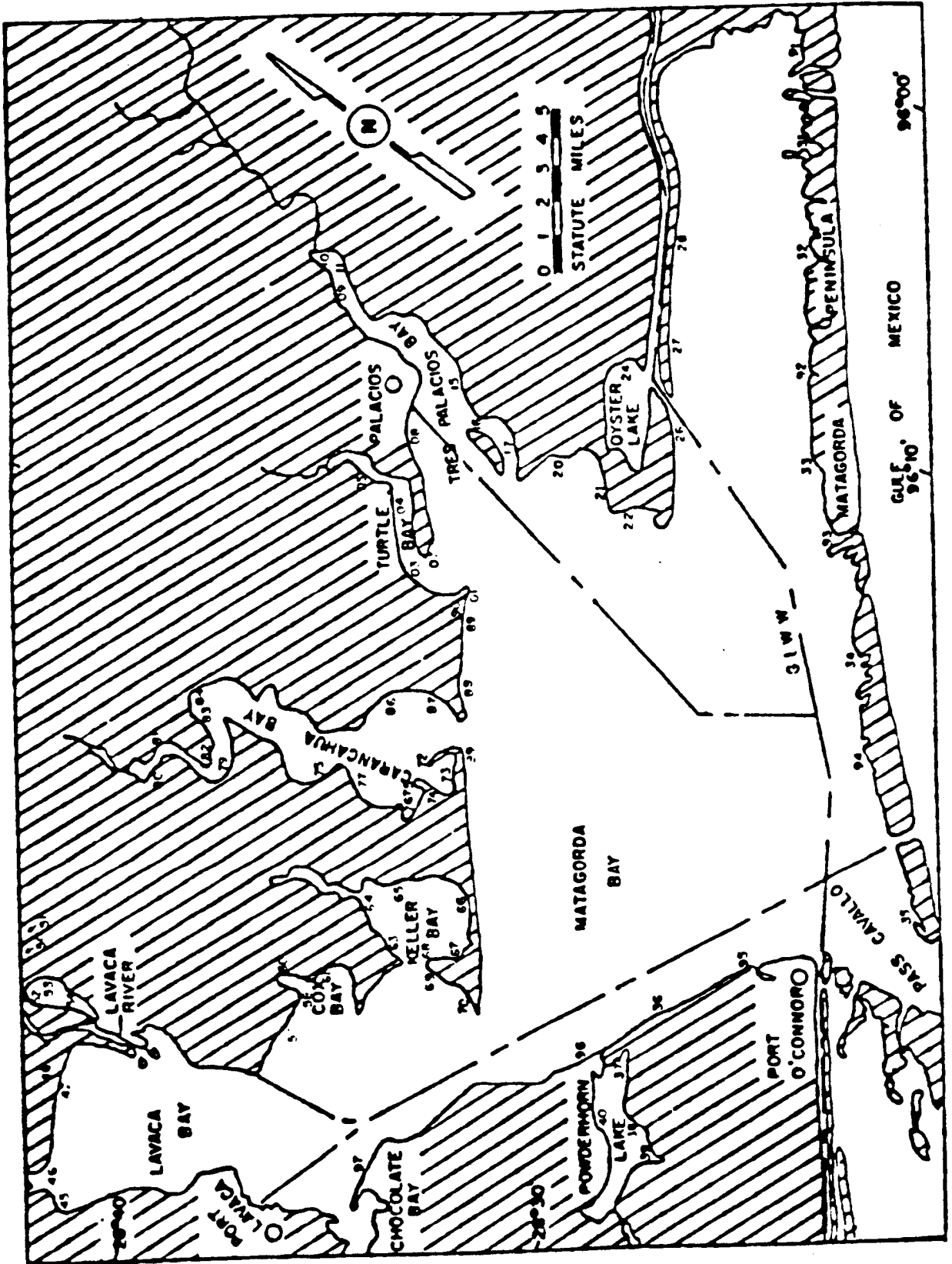


Figure 6. 18.3-m bag seine sample sites in the San Antonio Bay system during January-August 1984 (each station number should be preceded by the digit 2).

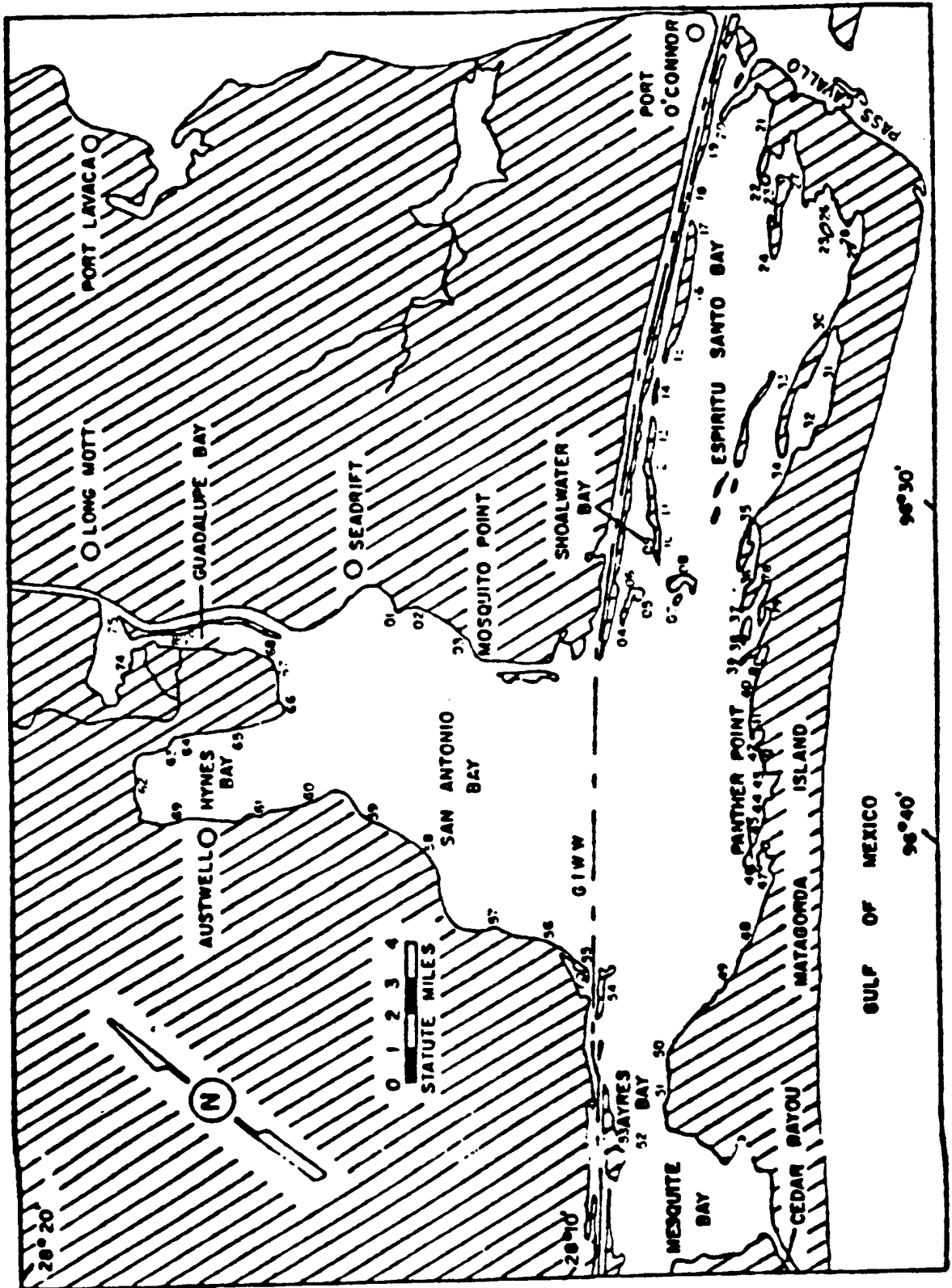


Figure 7. 18.3-m bag seine sample sites in the Aransas Bay system during January-August 1984 (each station number should be preceded by the digit 2).

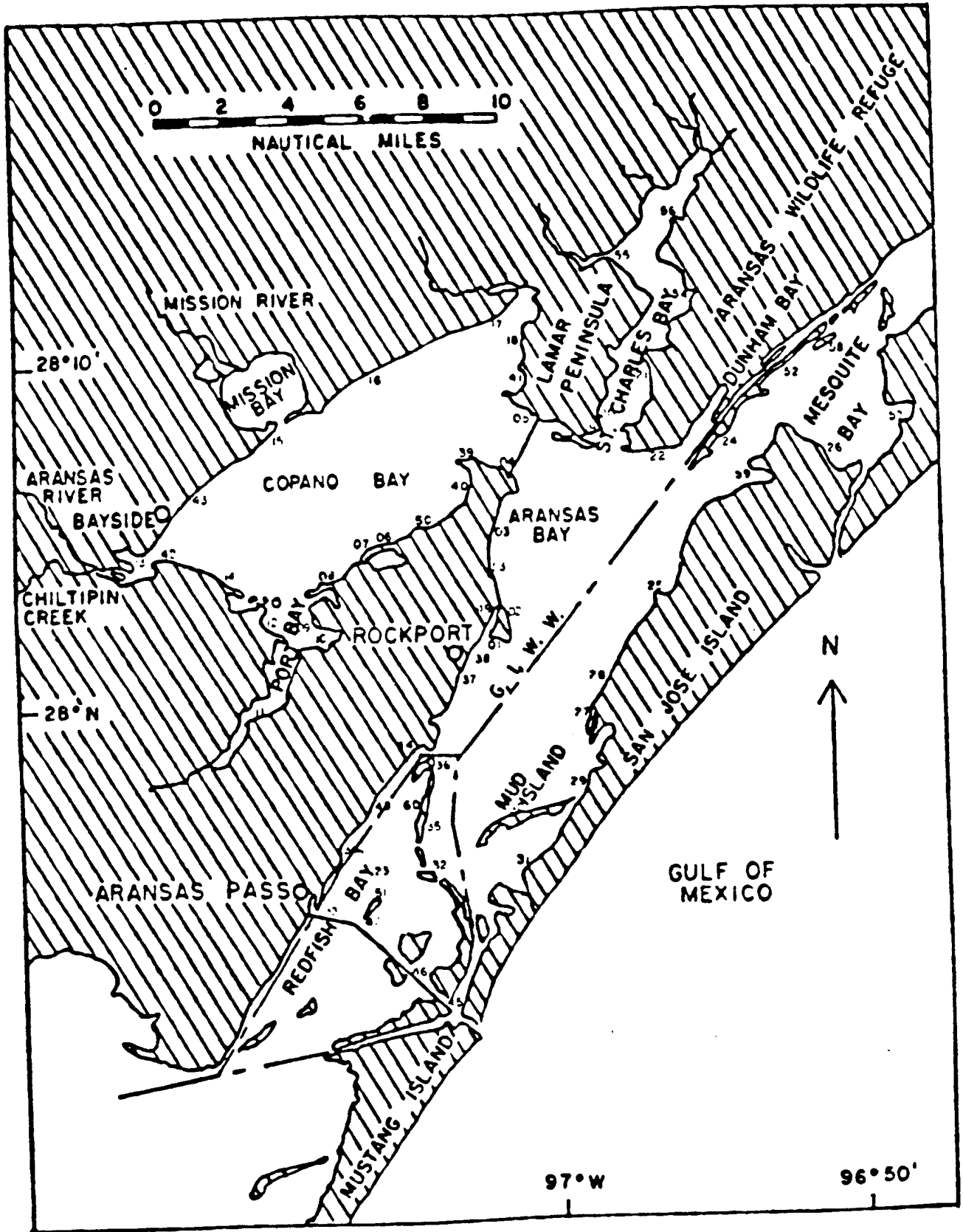


Figure 8. 18.3-m bag seine sample sites in the Corpus Christi Bay system during January-August 1984 (each station number should be preceded by the digit 2).

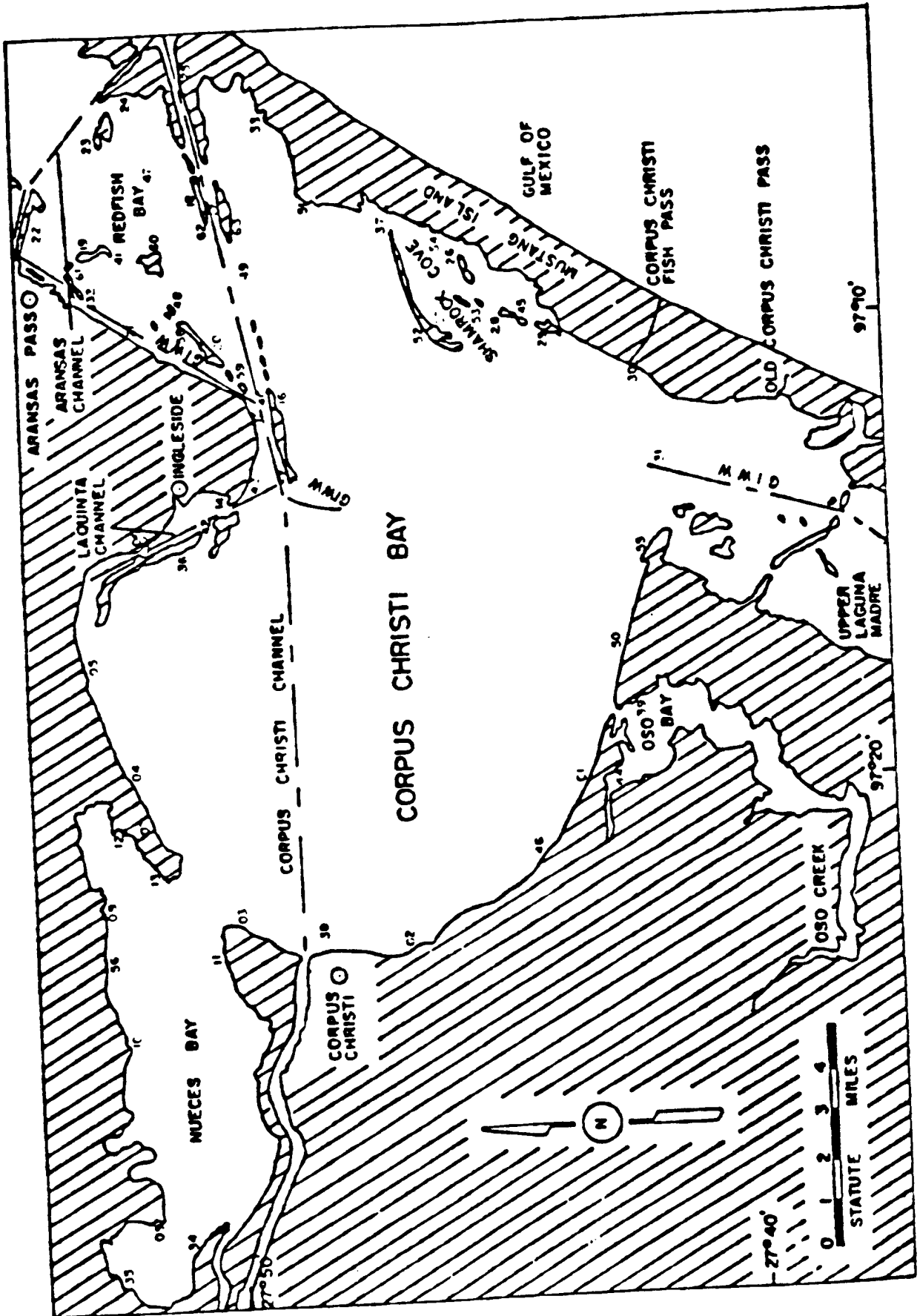


Figure 9. 18.3-m bag seine sample sites in the upper Laguna Madre during January-August 1984 (each station number should be preceded by the digit 2).

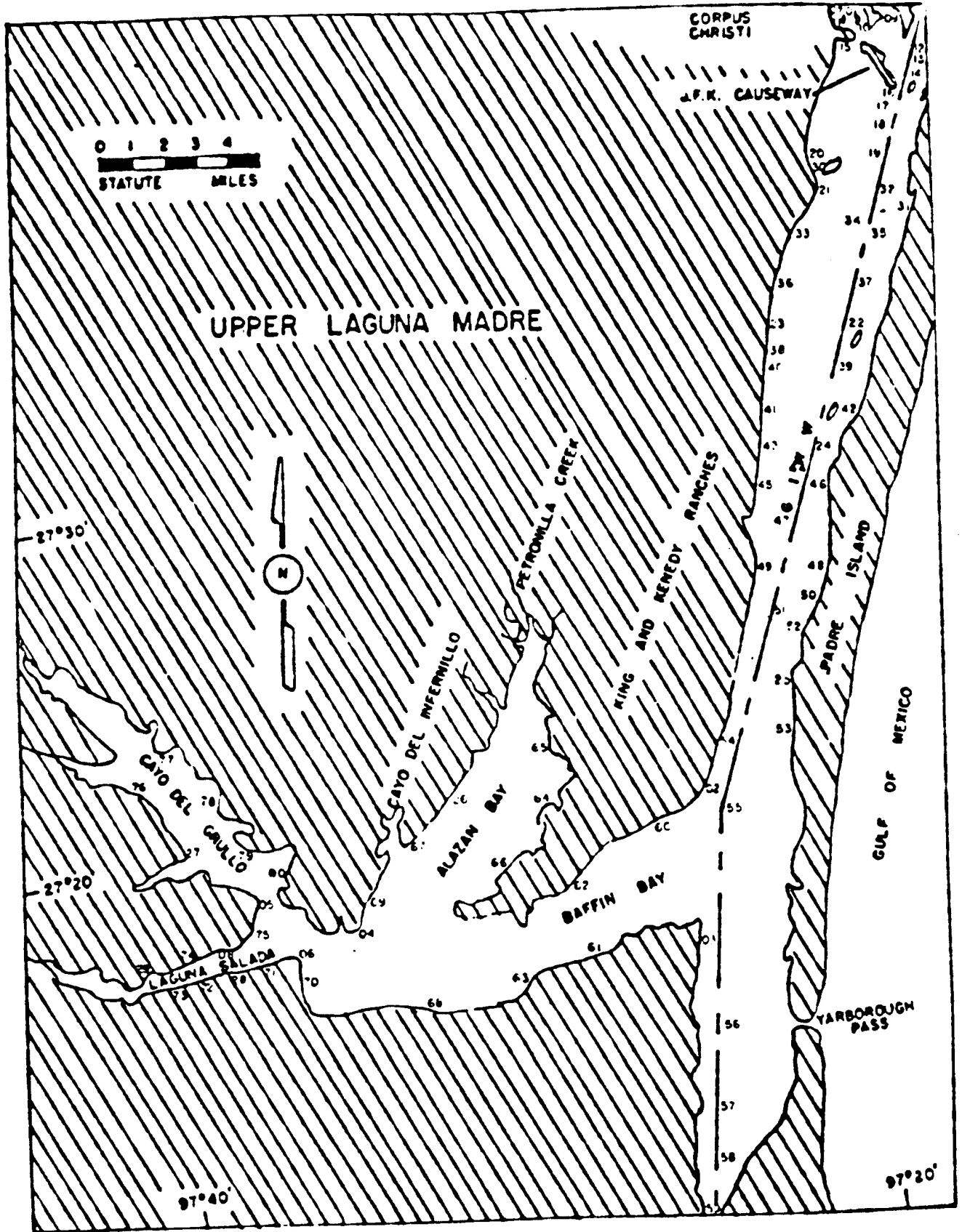


Figure 10. 18.3-m bag seine sample sites in the lower Laguna Madre during January-August 1984 (each station number should be preceded by the digit 2).

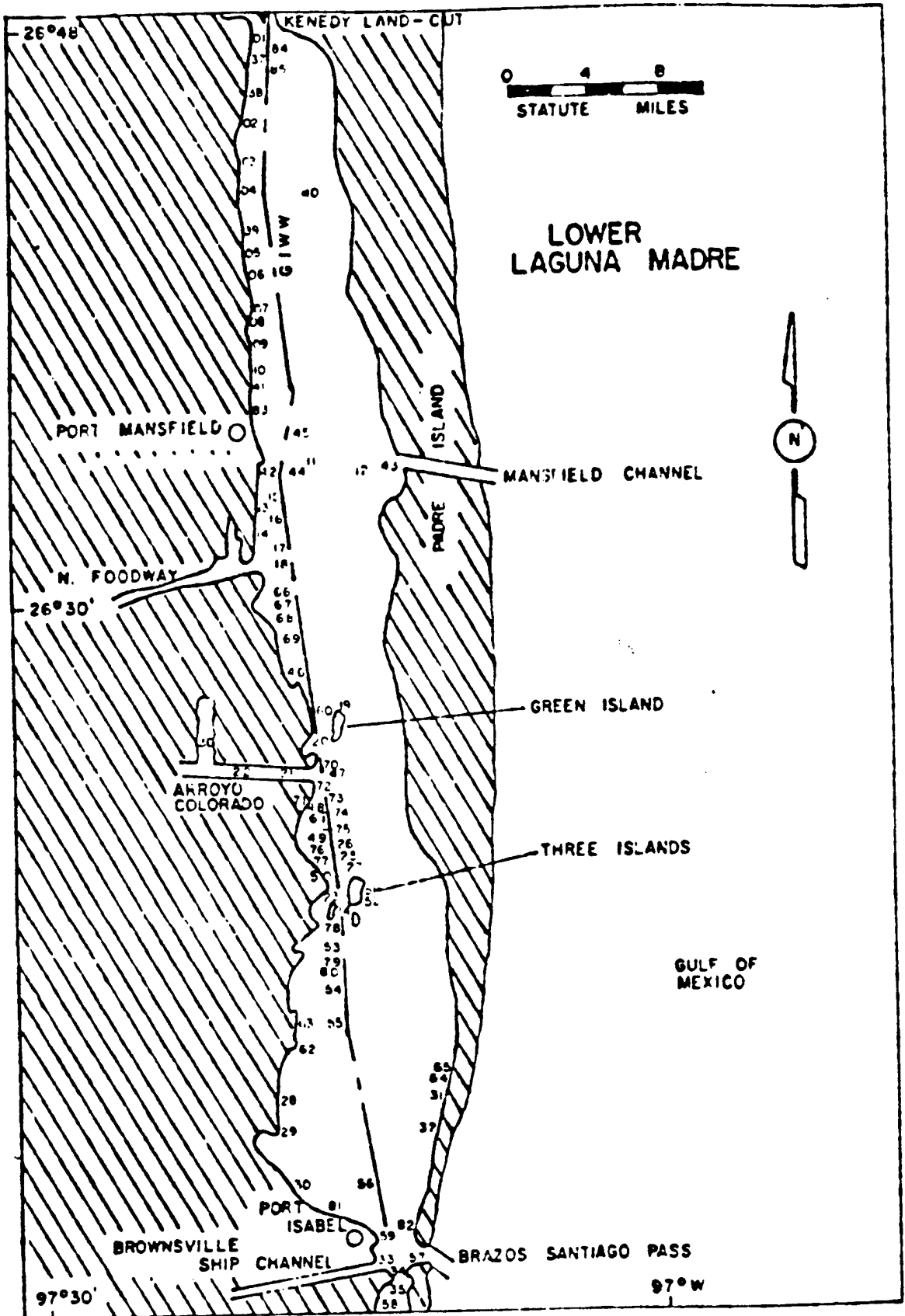


Figure 11. 6.1-m bay trawl sample sites in the Galveston Bay system during 1984.

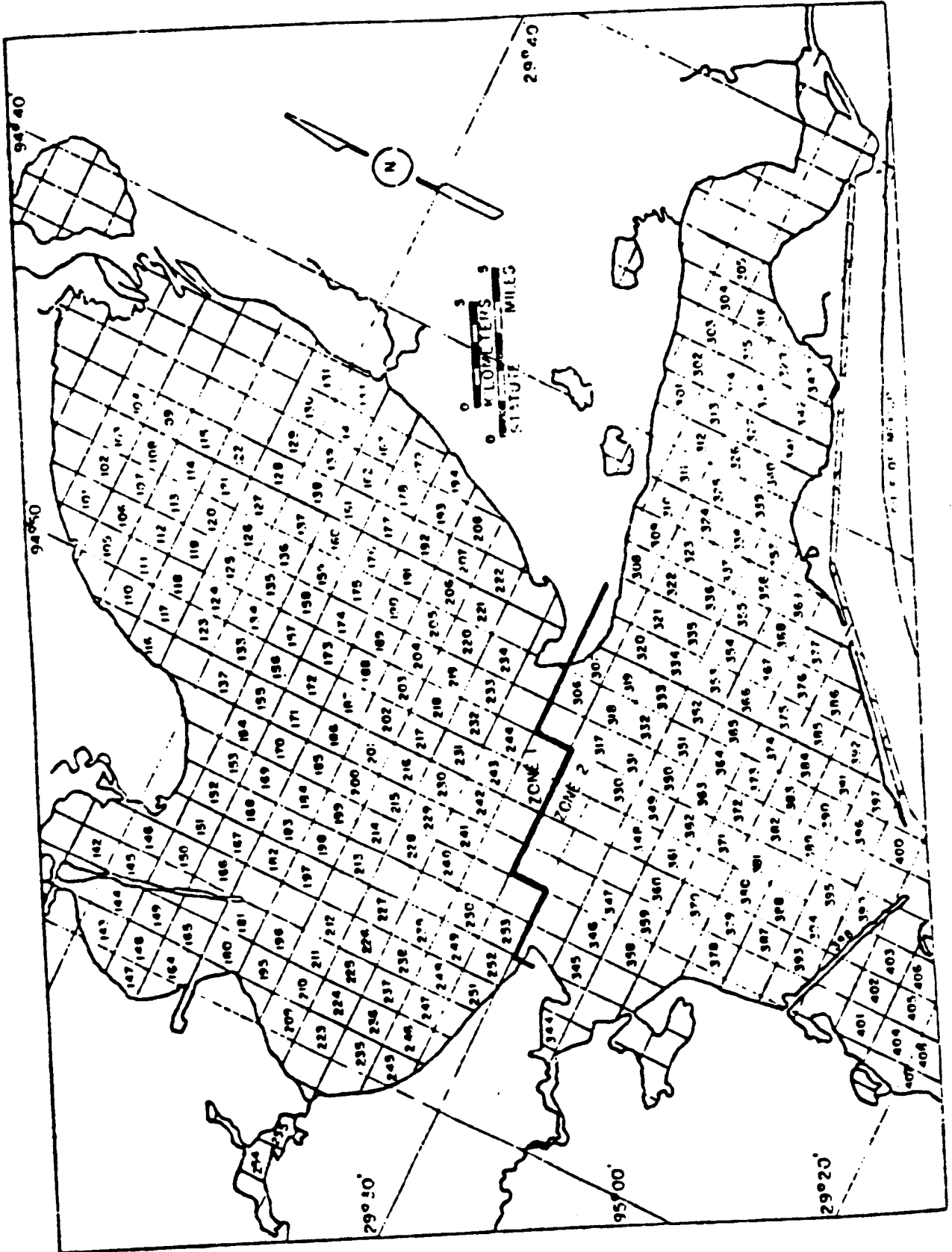


Figure 12. 6.1-m bay trawl sample sites in the Galveston Bay system during 1984.

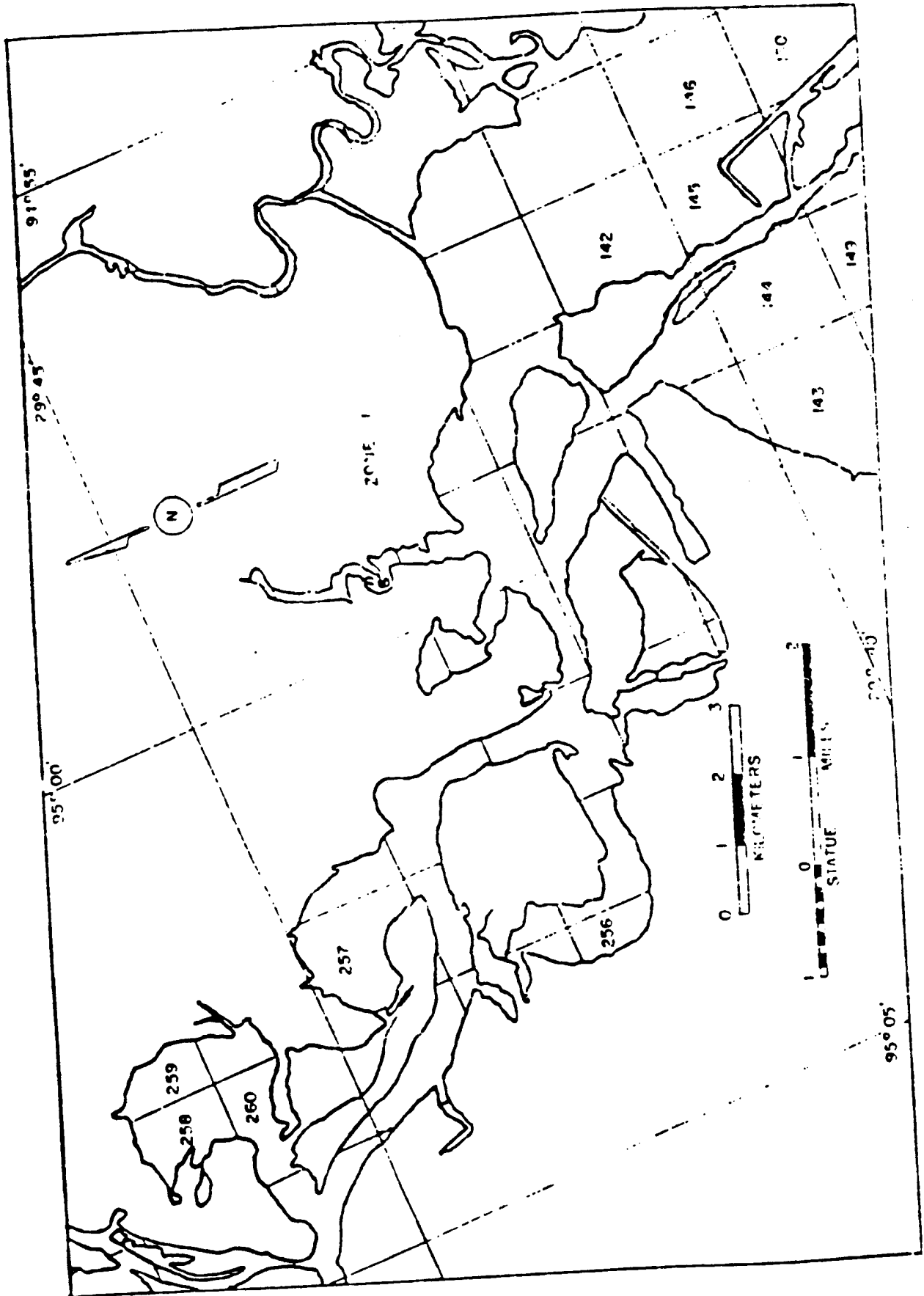


Figure 13. 6.1-m bay trawl sample sites in the Galveston Bay system during 1984.

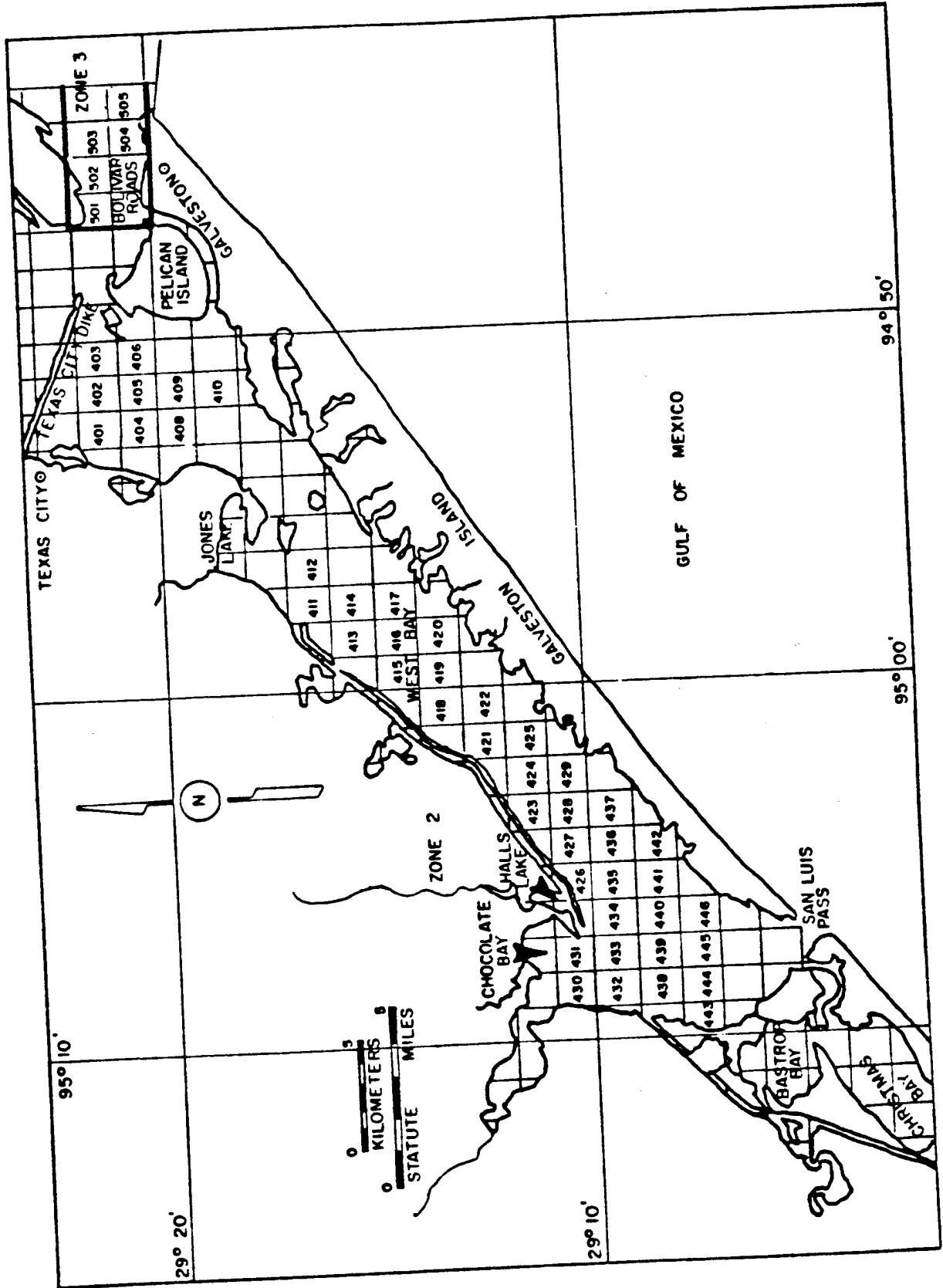


Figure 14. 6.1-m bay trawl sample sites in the Matagorda Bay system during 1984.

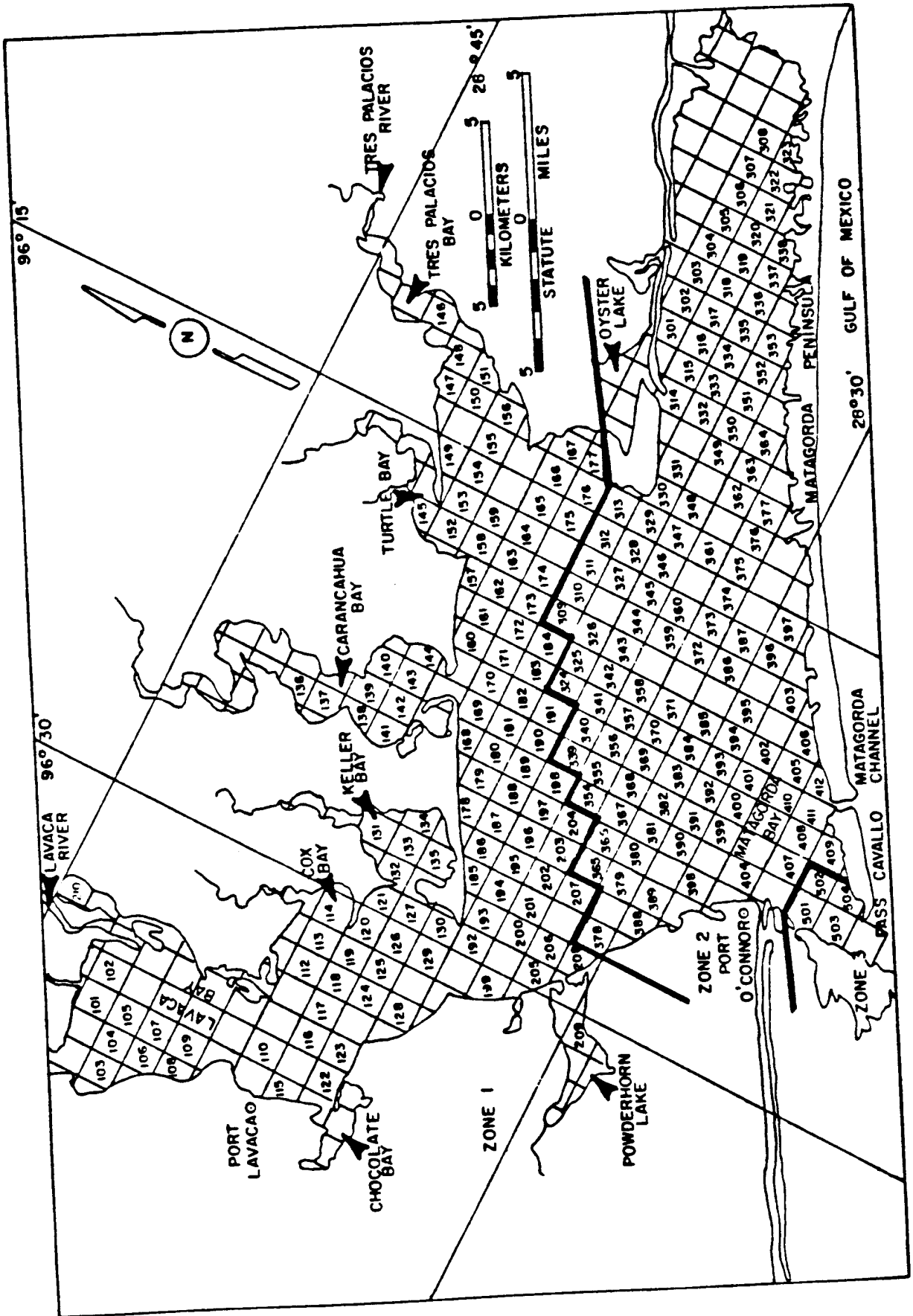


Figure 15. 6.1-m bay trawl sample sites in the San Antonio Bay system during 1984.

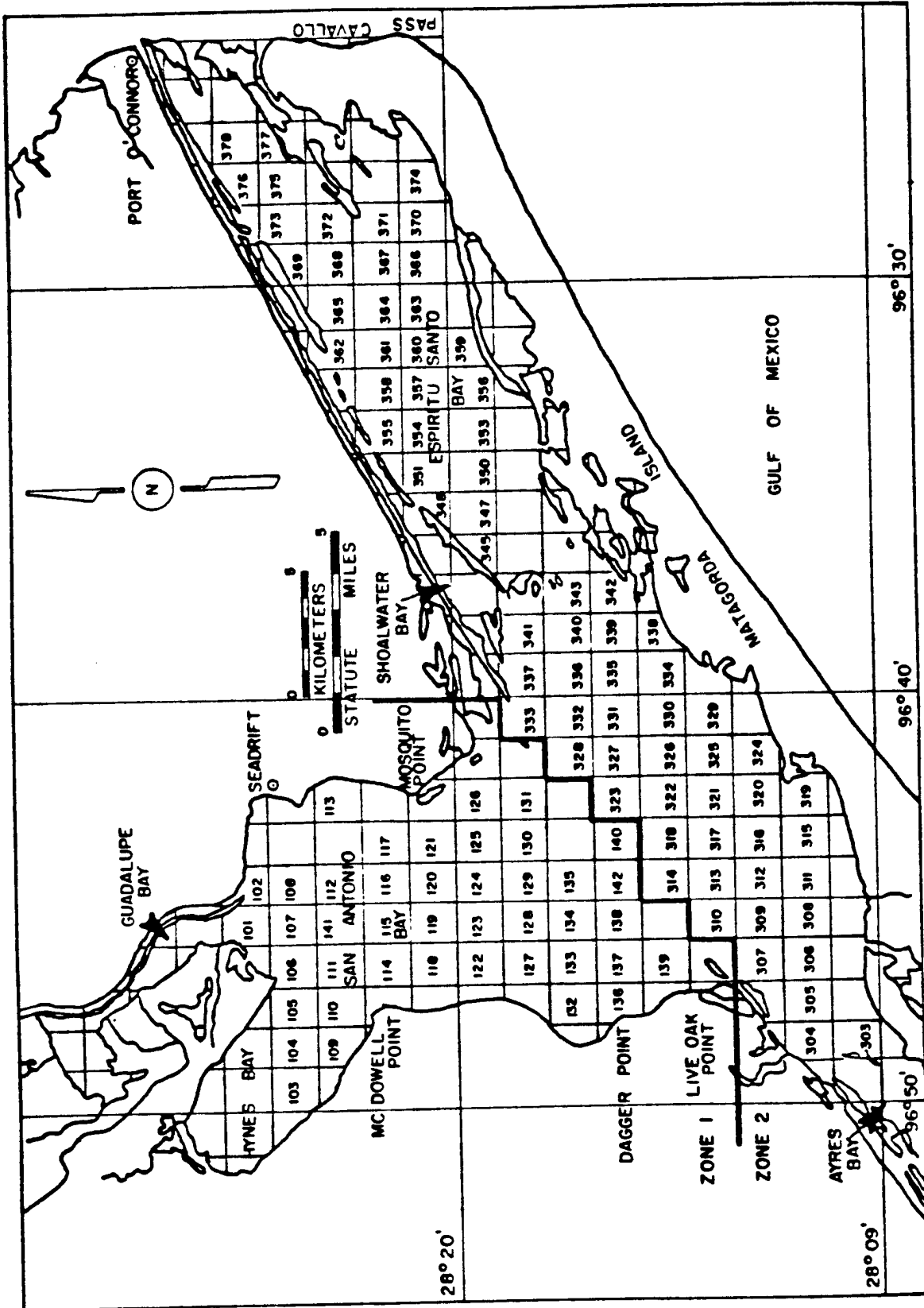


Figure 16. 6.1-m bay trawl sample sites in the Aransas Bay system during 1984.

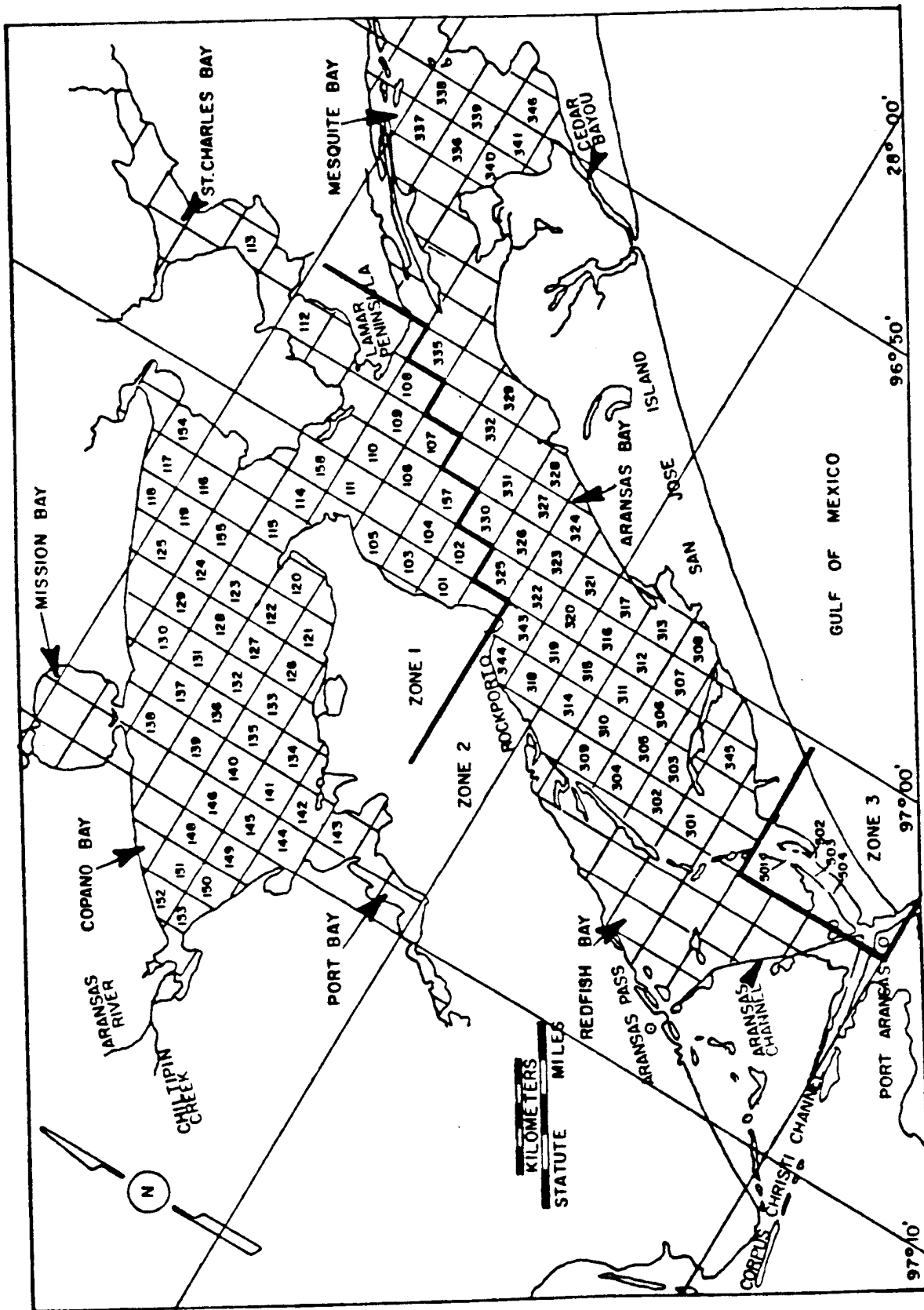


Figure 17. 6.1-m bay trawl sample sites in the Corpus Christi Bay system during 1984.

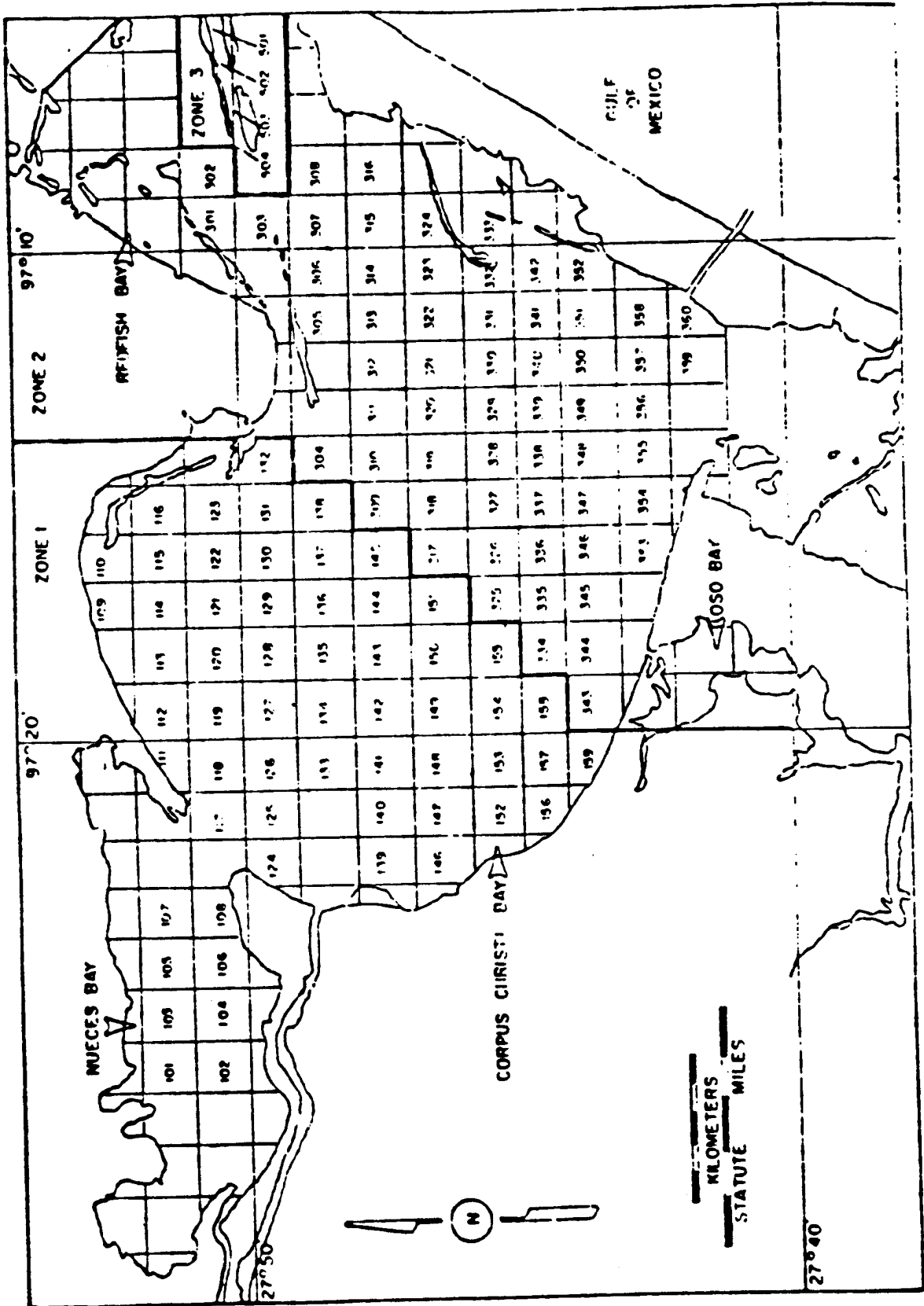


Figure 18. 6.1-m bay trawl sample sites in the upper Laguna Madre during 1984.

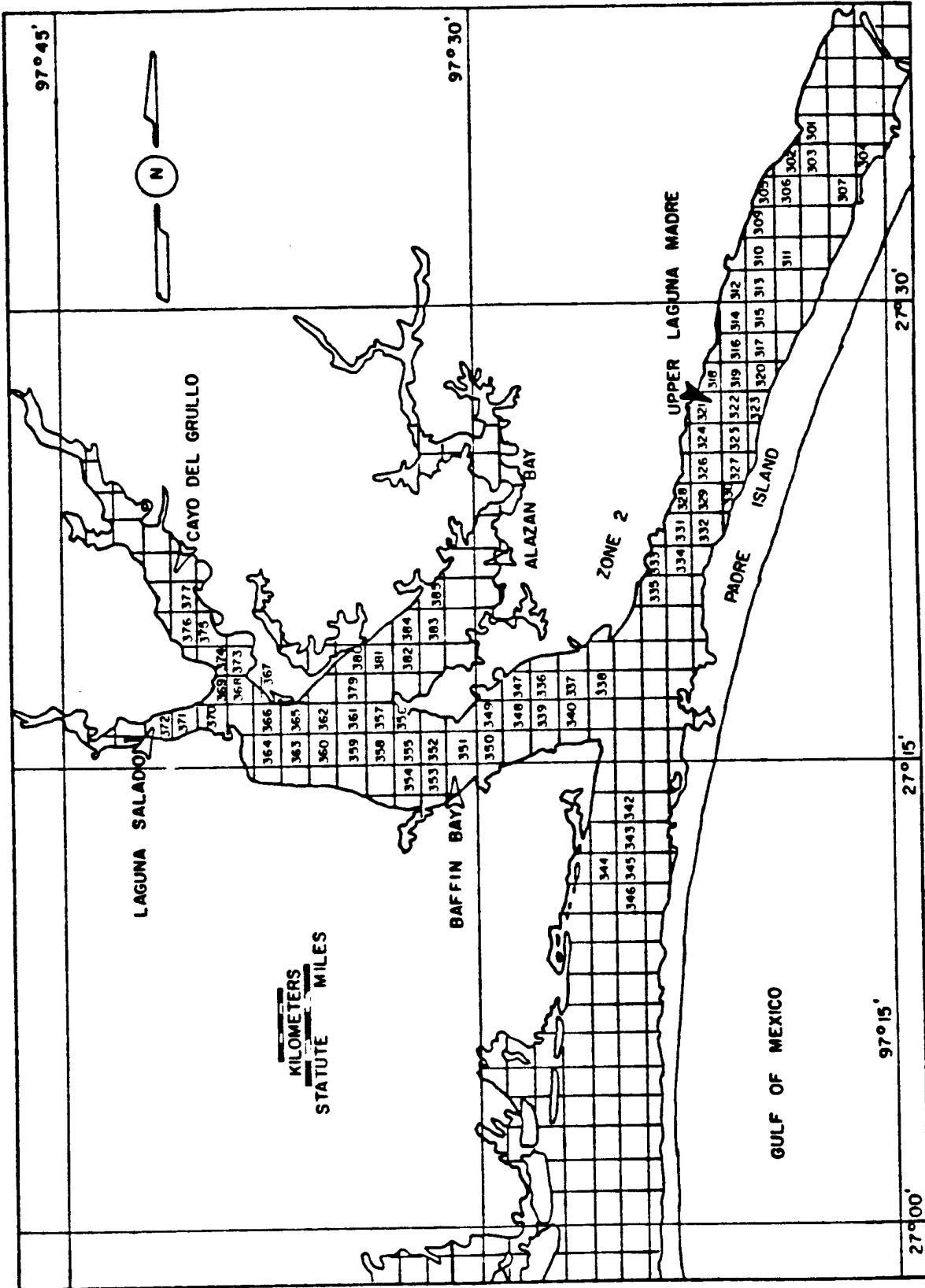


Figure 19. 6.1-m bay trawl sample sites in the lower Laguna Madre during 1984.

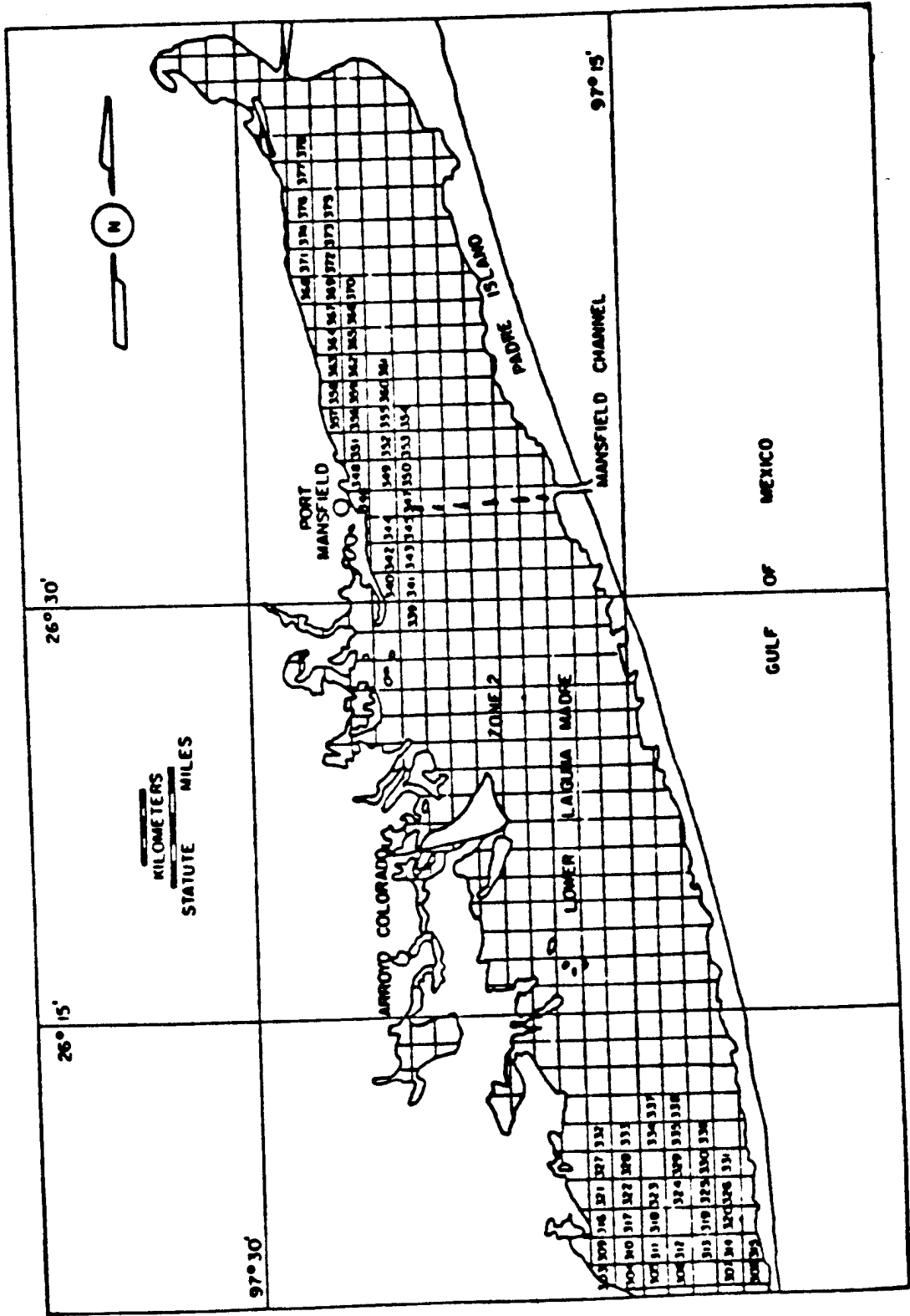


Figure 20. 6.1-m bay trawl sample sites in the lower Laguna Madre during 1984.

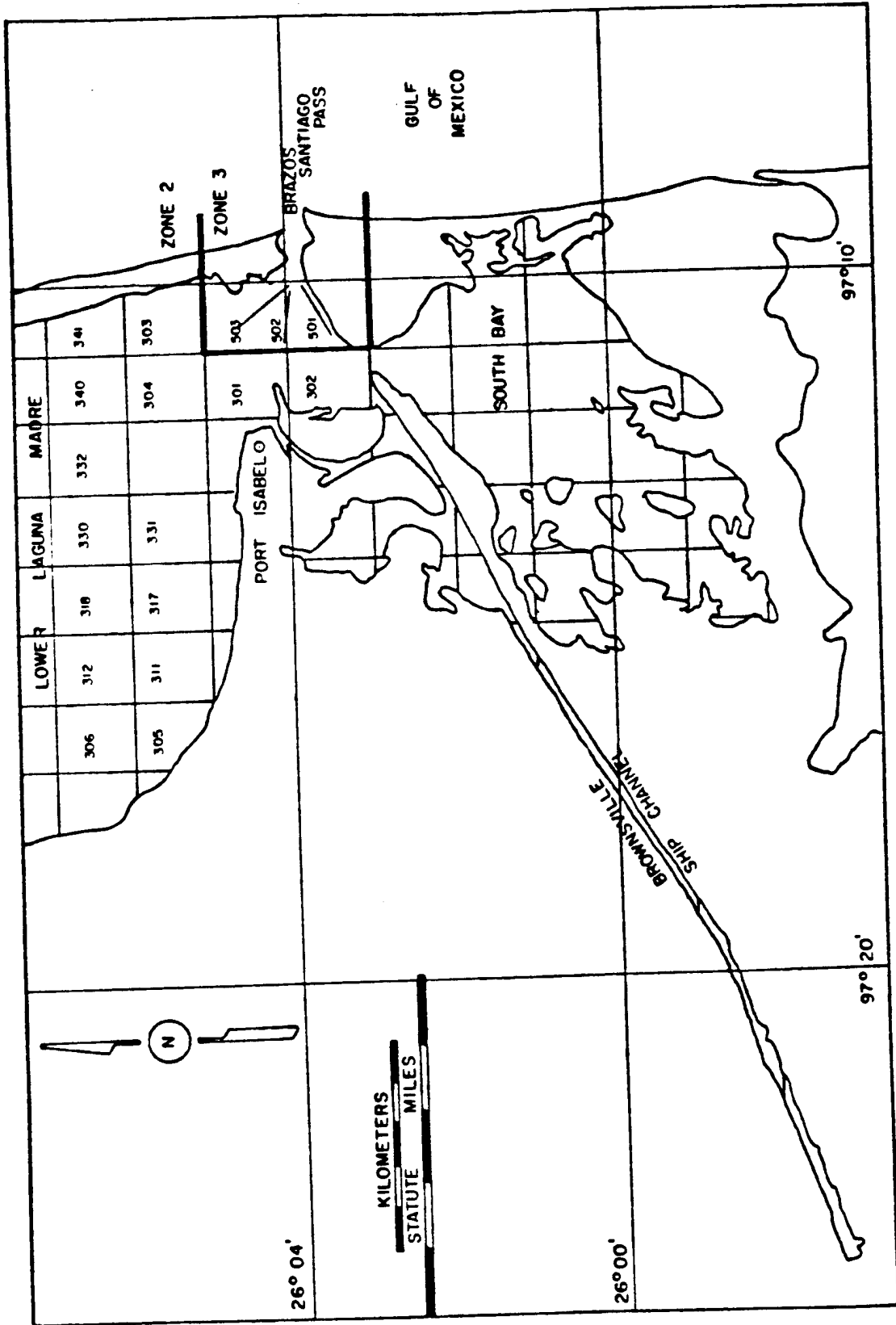


Figure 21. Statistical areas off Texas coast in which trawl samples were collected in the Southeastern Area Monitoring and Assessment Program (SEAMAP) during June-July 1982-1984.

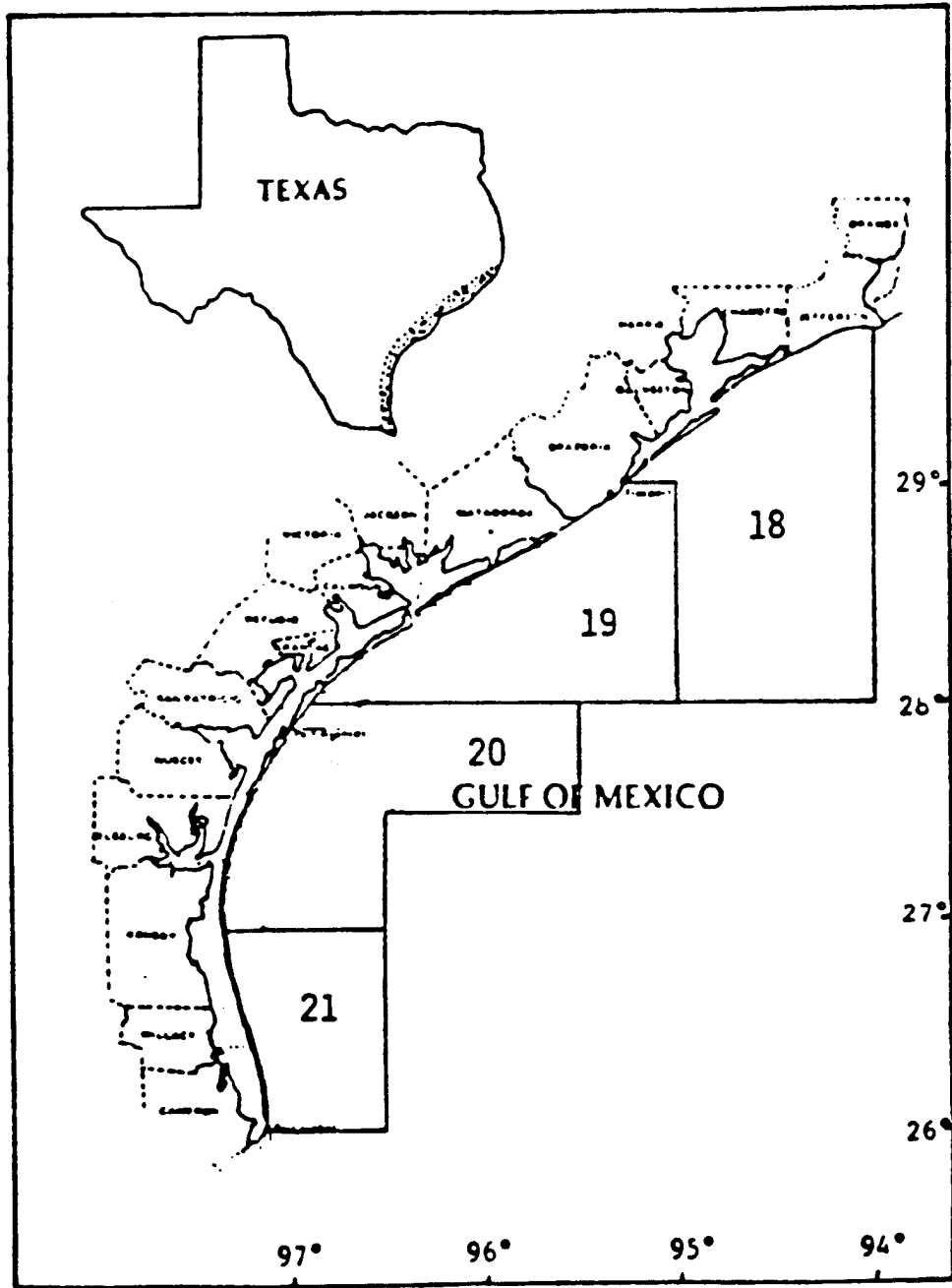


Figure 22. 6.1-m Gulf trawl sample area off Port Aransas during February-March 1985.

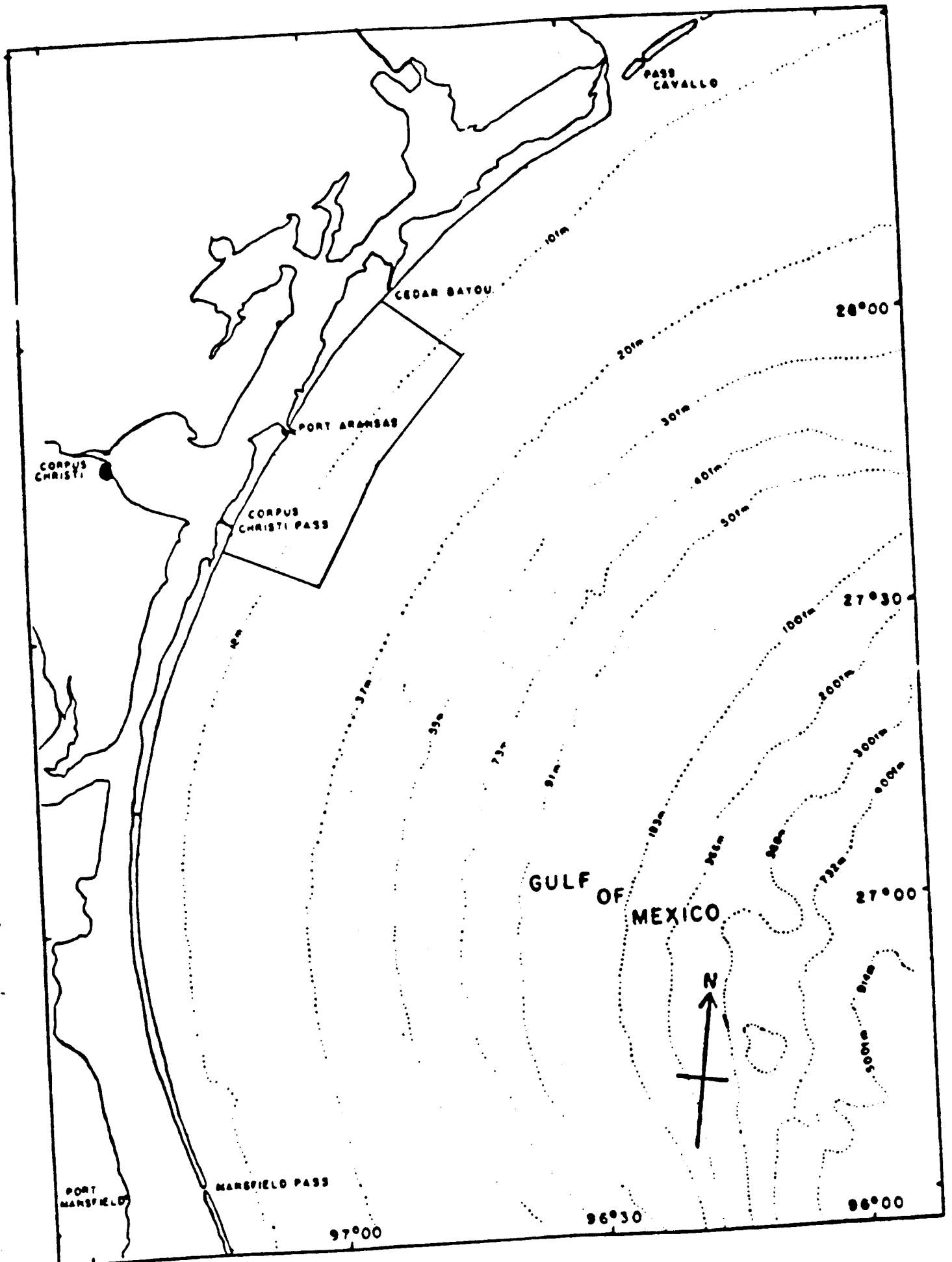


Figure 23. Gill net sample sites in the Galveston Bay system, 1983-1984.

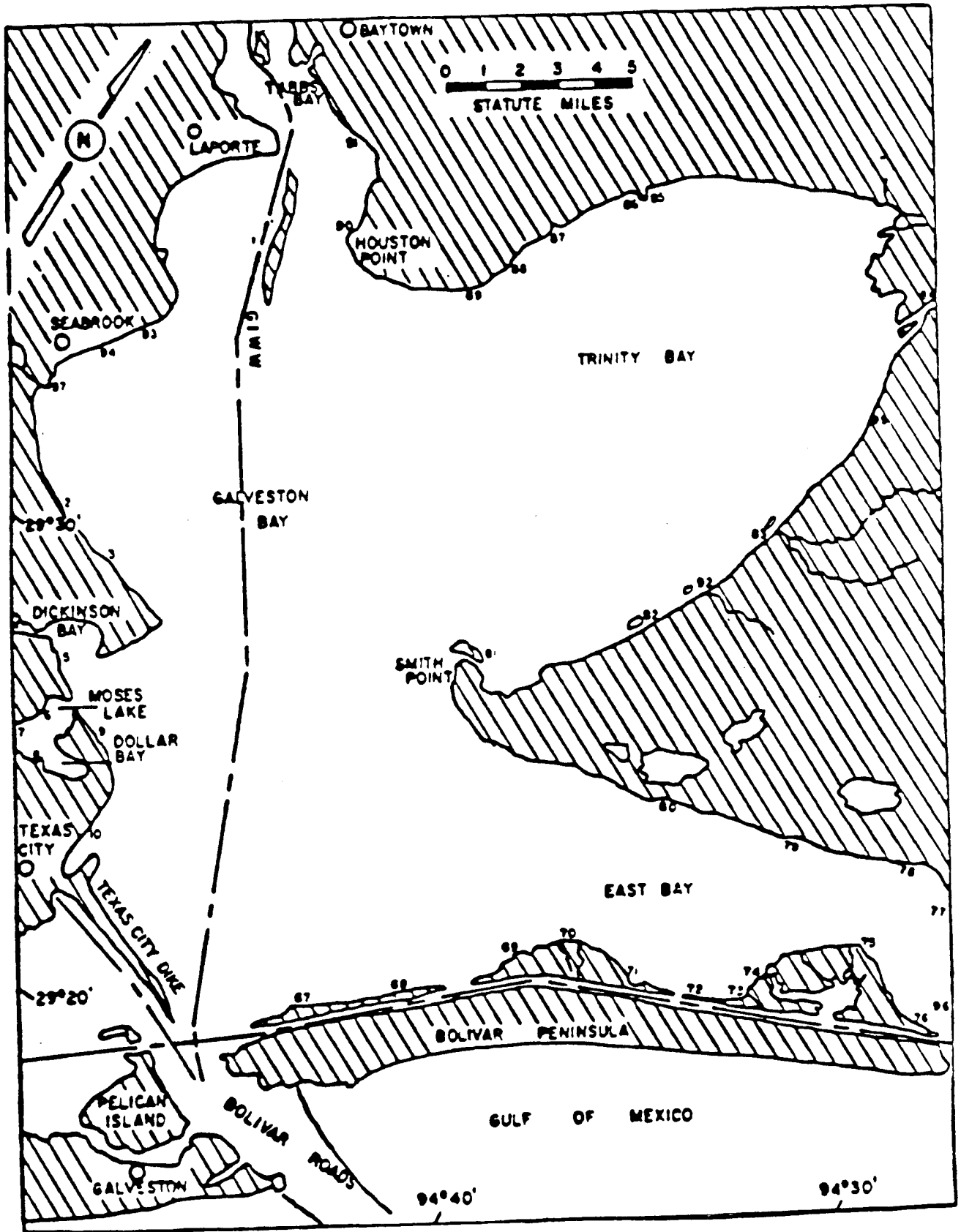


Figure 24. Gill net sample sites in the Galveston Bay system, 1983-1984.

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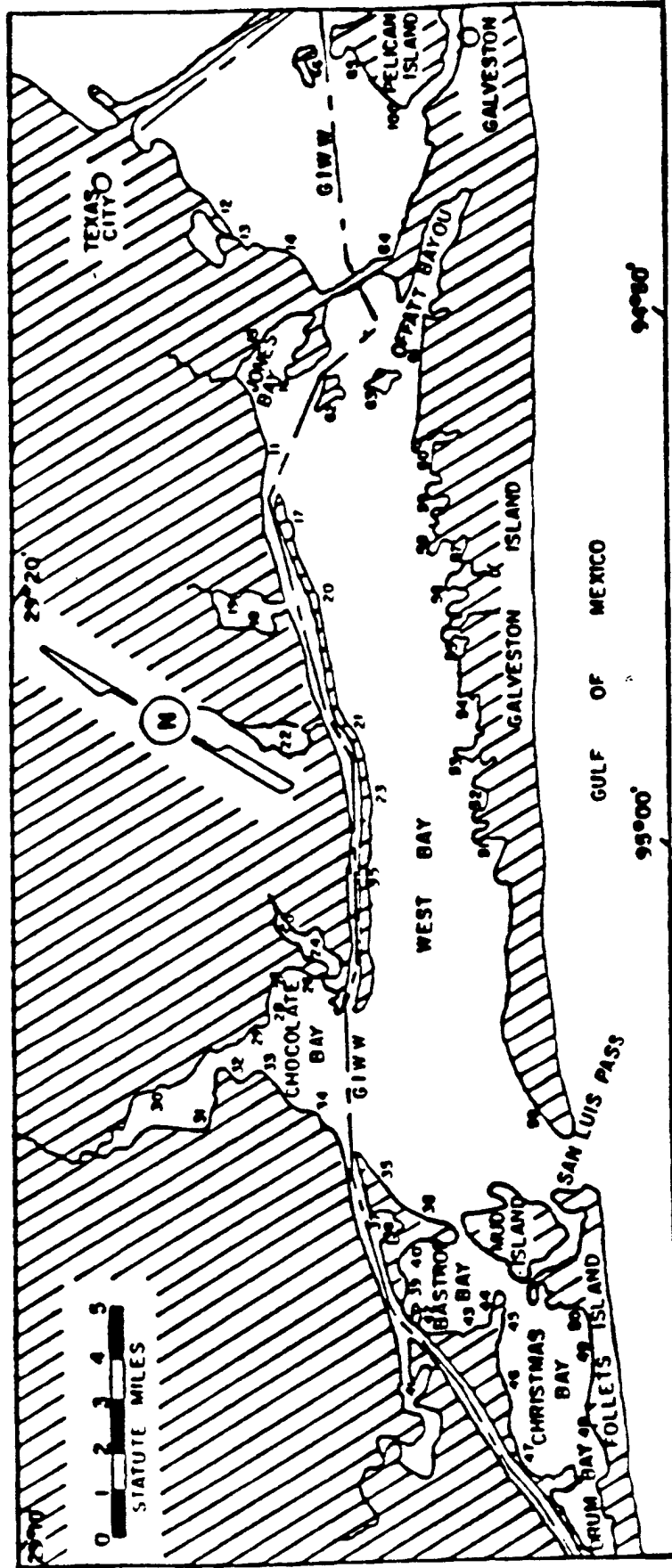


Figure 25. Gill net sample sites in the East Matagorda Bay system, 1983-1984.

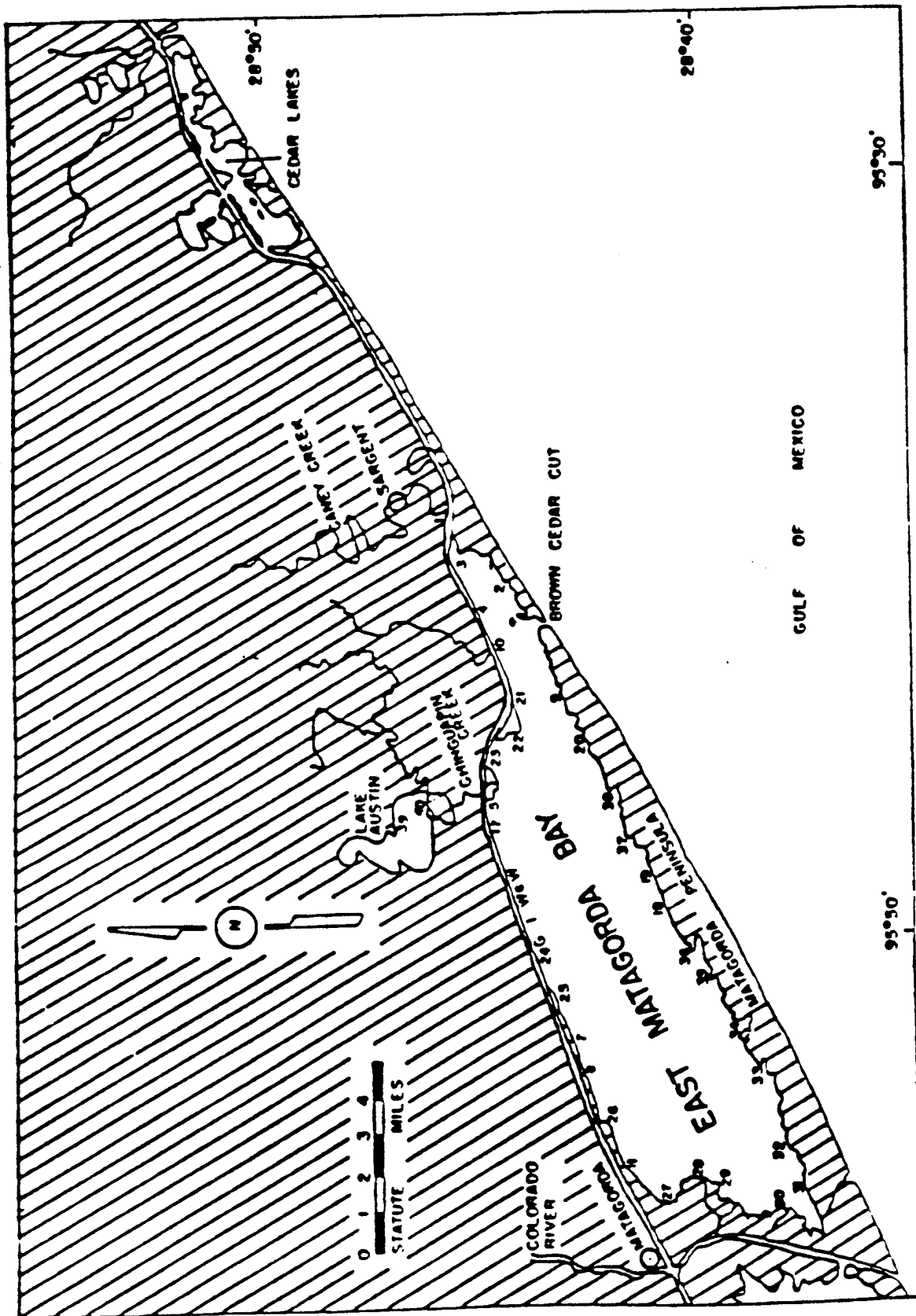


Figure 26. Gill net sample sites in the Matagorda Bay system, 1983-1984.

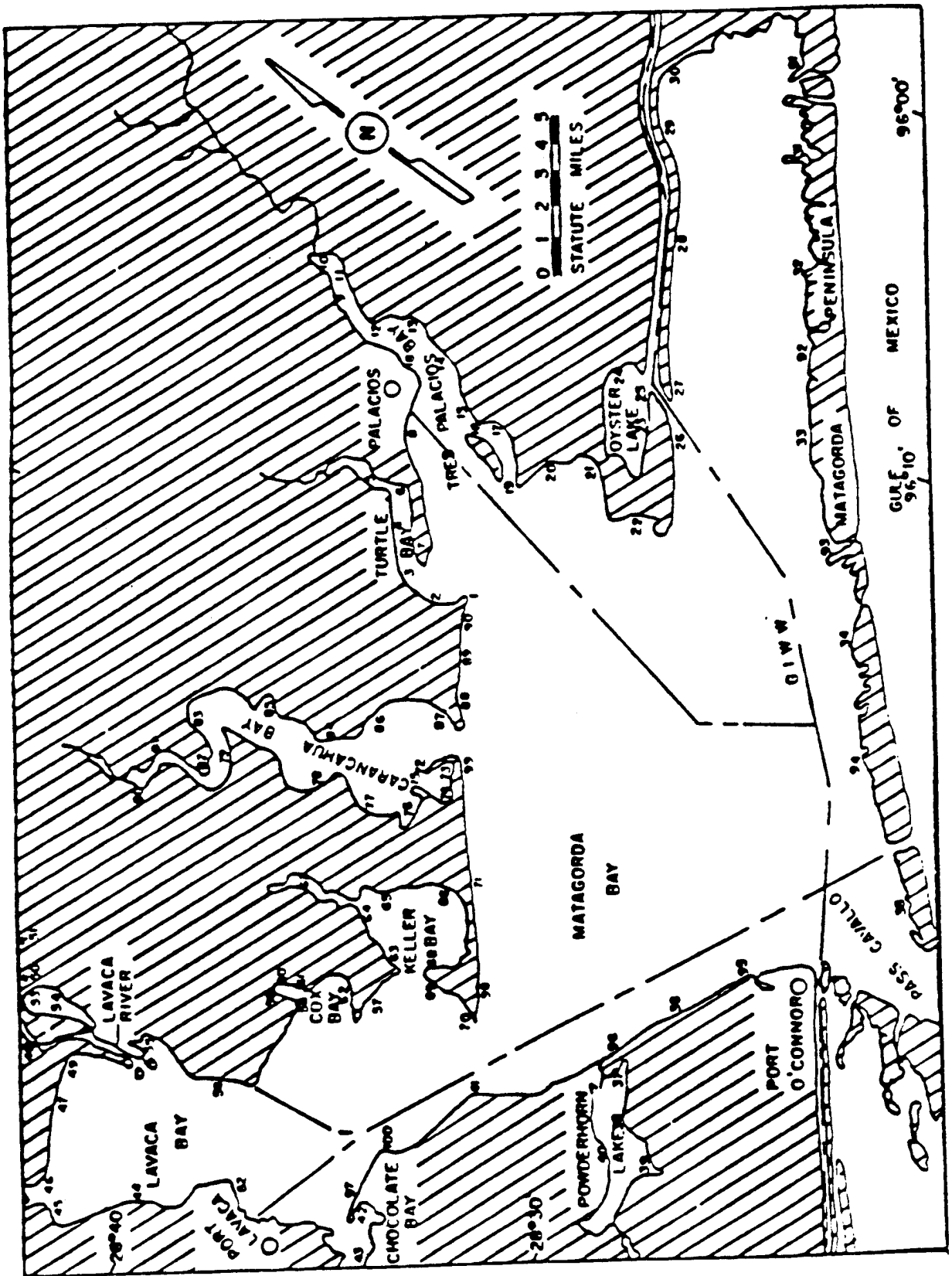


Figure 27. Gill net sample sites in the San Antonio Bay system, 1983-1984.

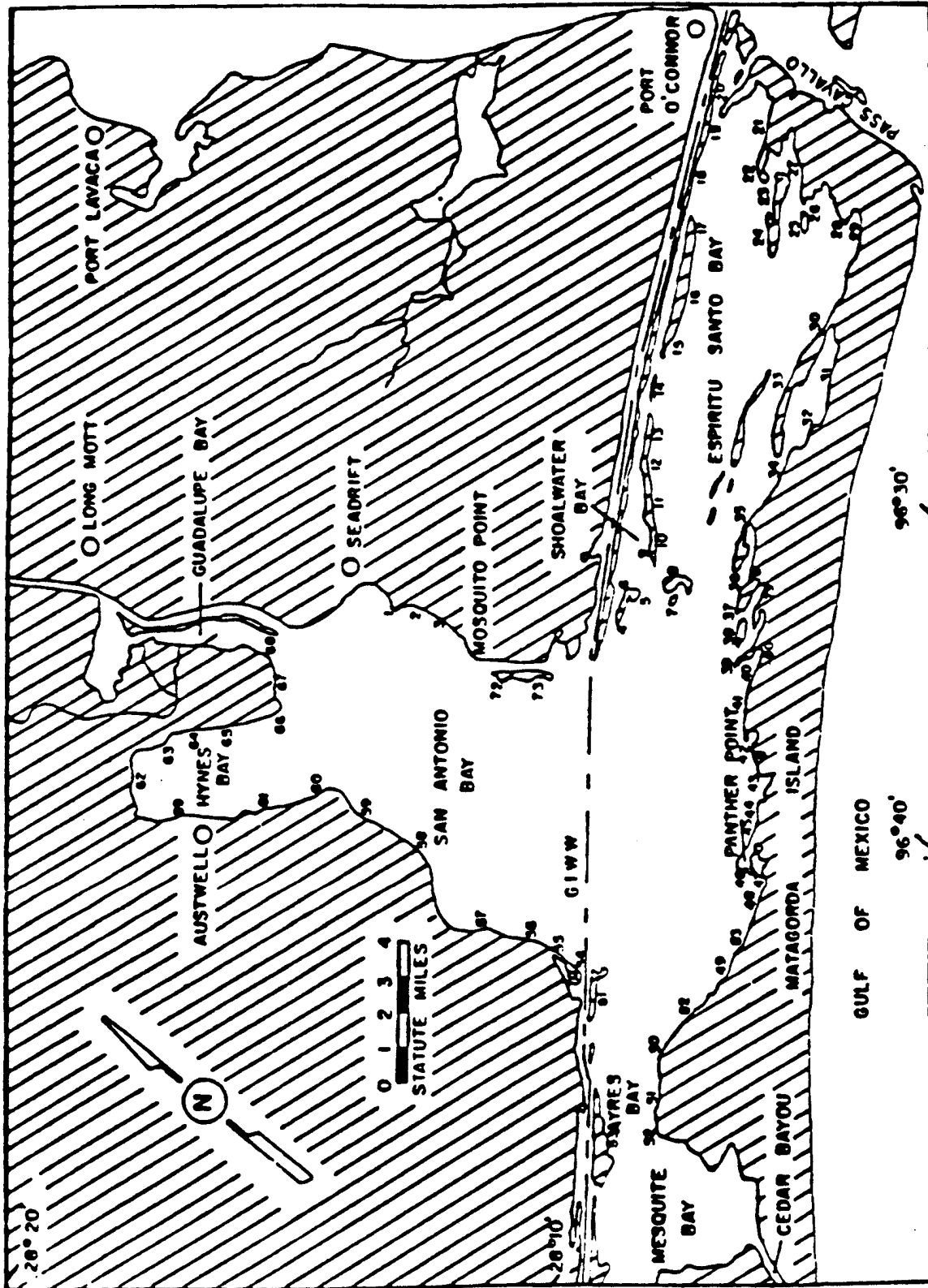


Figure 28. Gill net sample sites in the Aransas Bay system, 1983-1984.

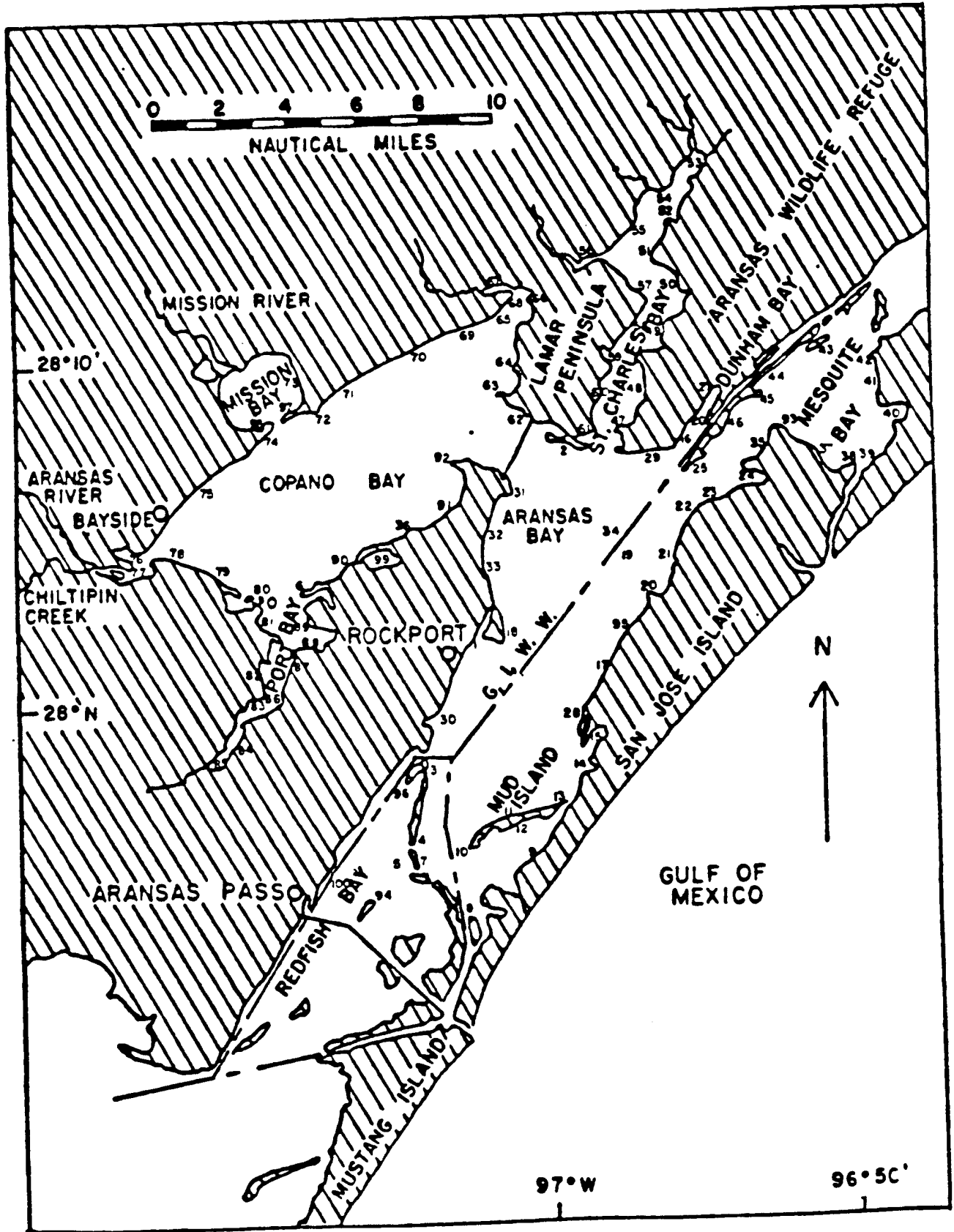


Figure 29. Gill net sample sites in the Corpus Christi Bay system, 1983-1984.

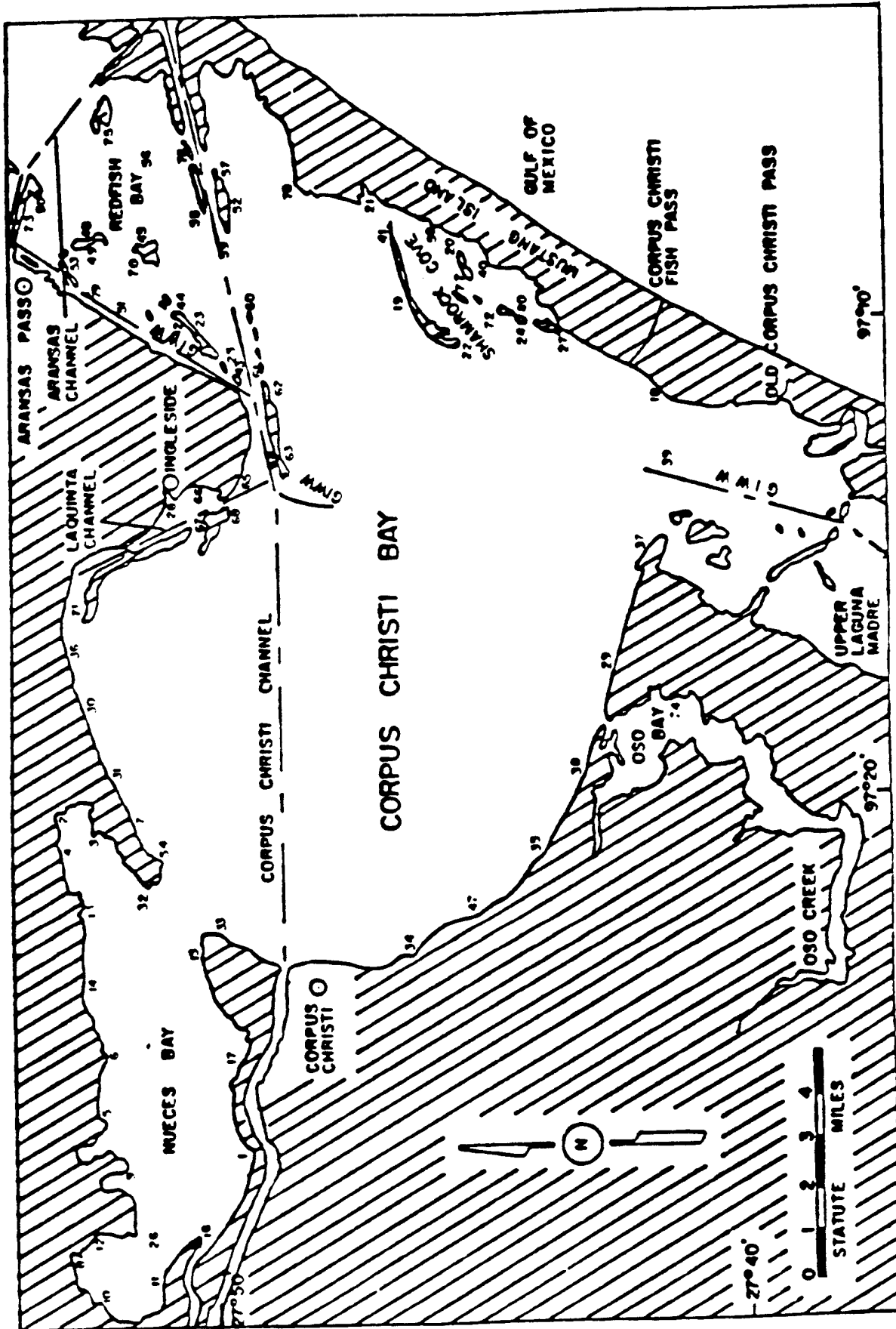


Figure 30. Gill net sample sites in the upper Laguna Madre, 1983-1984.

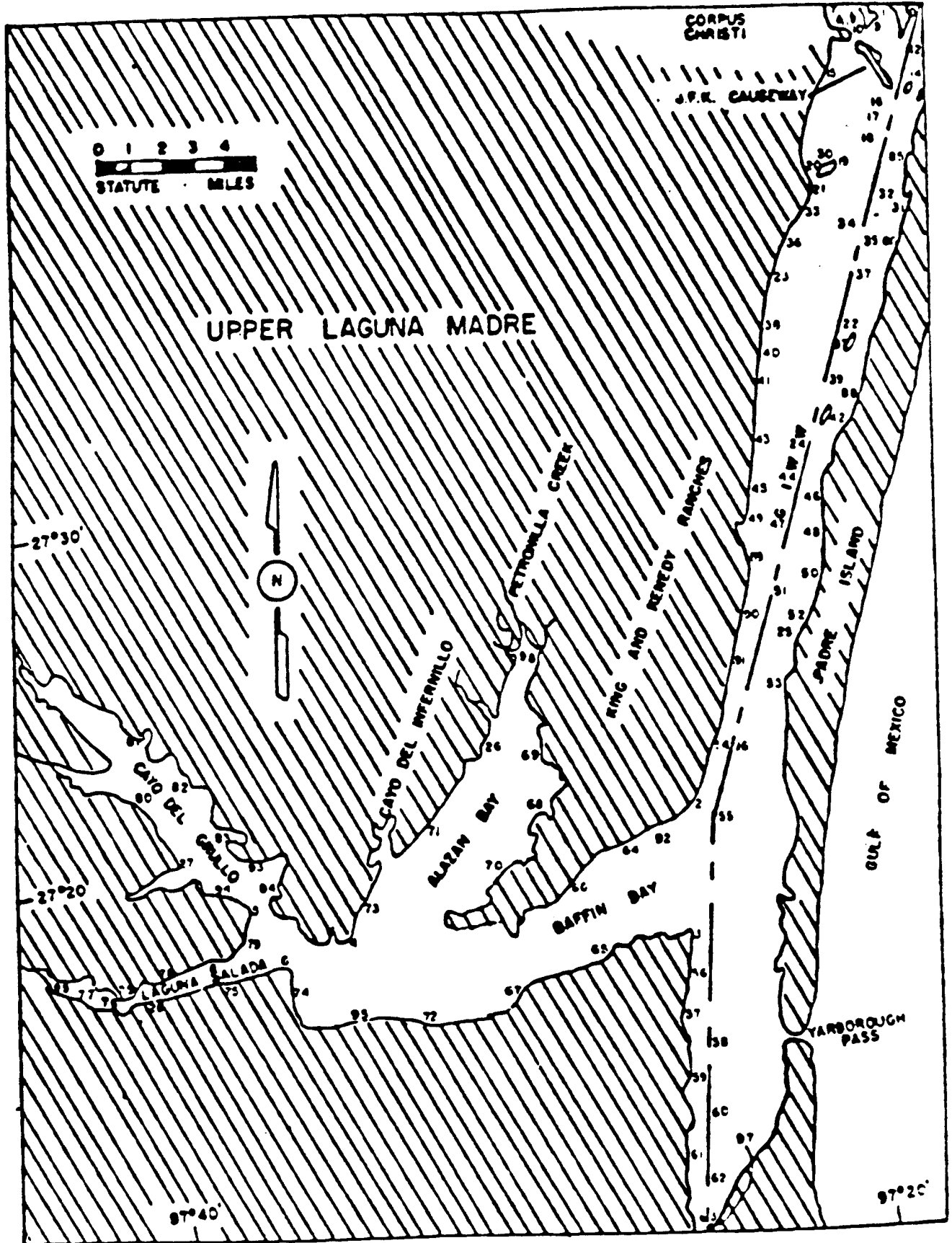
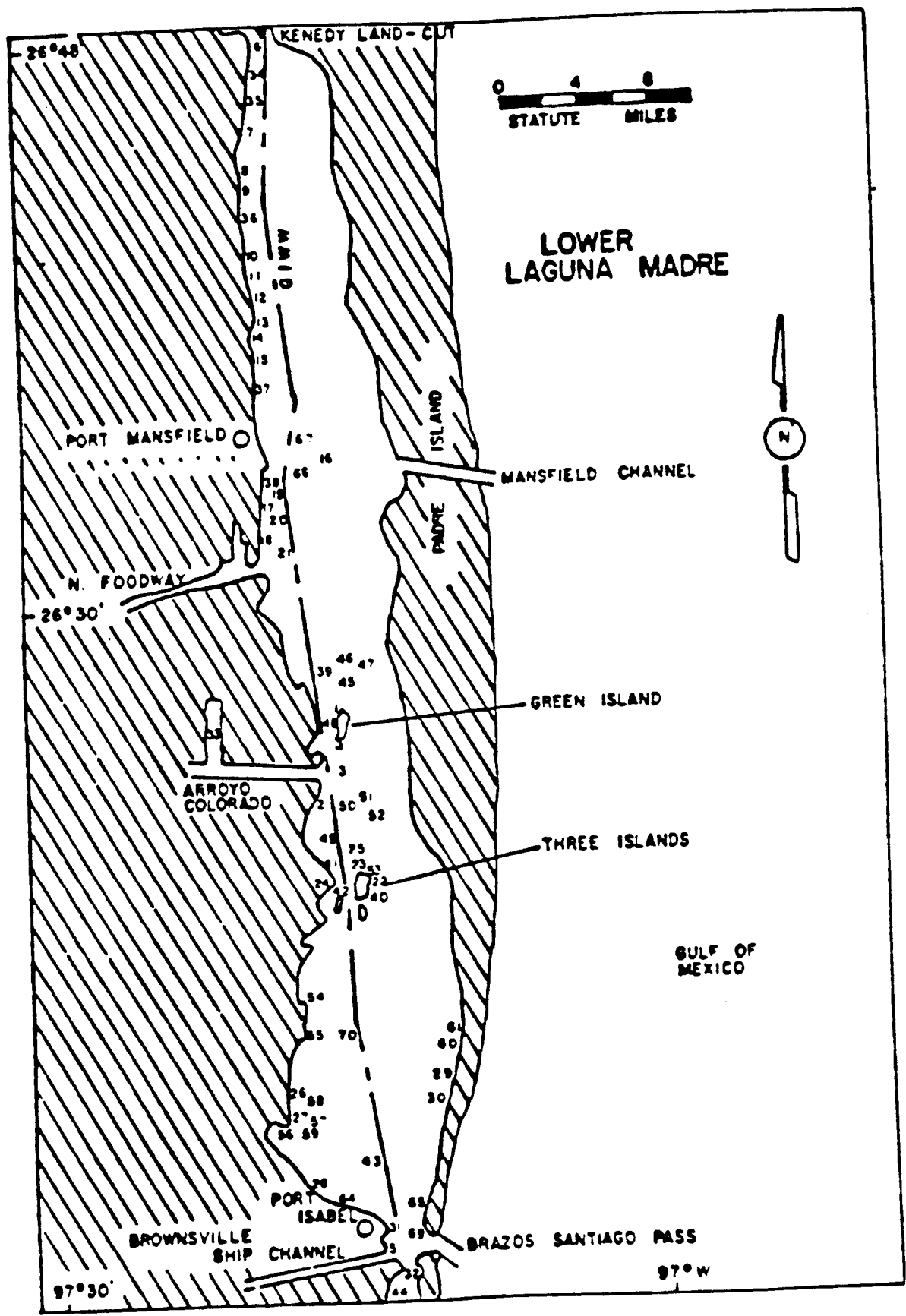


Figure 31. Gill net sample sites in the lower Laguna Madre, 1983-1984.



APPENDIX A: Hydrological data summary January-December 1984.

Table A.1. Monthly mean surface water temperatures (C) at sampled 18.3-m bag seine stations in each Texas bay system during calendar year 1984.

Month	Galveston	East Matagorda	Matagorda	San Antonio	Aransas	Corpus Christi	Upper Laguna Madre	Lower Laguna Madre
Jan	12.9	11.2	12.1	9.8	12.7	12.1	12.4	13.2
Feb	17.0	15.3	14.4	15.6	16.1	16.0	15.6	17.5
Mar	19.7	20.5	20.6	16.4	22.2	20.5	20.3	20.8
Apr	24.4	20.2	22.2	23.2	23.8	22.5	26.0	24.3
May	26.2	26.3	26.7	25.6	27.6	27.3	28.5	27.6
Jun	31.3	27.3	29.7	27.9	29.3	28.4	30.9	27.8
Jul	31.2	28.8	30.2	28.5	29.6	28.3	30.6	29.8
Aug	31.2	28.4	30.6	29.1	28.9	28.7	28.6	29.4
Sep	28.6	29.3	28.2	27.0	28.7	27.1	28.6	29.2
Oct	26.5	26.4	23.3	23.2	23.3	25.7	23.0	27.2
Nov	18.0	21.9	21.5	18.3	21.4	21.2	19.0	19.8
Dec	19.0	21.4	16.1	17.9	21.1	22.1	22.0	19.2

Table A.2. Monthly mean surface salinities (o/oo) at sampled 18.3-m bag seine stations in each Texas bay system during calendar year 1984.

Month	Galveston	East Matagorda	Matagorda	San Antonio	Aransas	Corpus Christi	Upper Laguna Madre	Lower Laguna Madre
Jan	14.4	17.4	21.5	17.4	15.6	28.2	32.9	33.8
Feb	16.5	14.5	19.2	18.0	17.1	26.3	32.0	27.8
Mar	16.1	17.5	23.5	13.5	18.1	30.4	32.1	31.2
Apr	23.7	21.8	25.2	22.6	22.7	31.3	37.8	33.1
May	23.8	25.4	23.1	24.8	23.2	32.0	37.7	37.7
Jun	18.9	23.1	24.7	27.4	21.1	30.5	40.4	34.1
Jul	23.6	22.9	27.7	26.6	26.8	34.3	45.0	36.9
Aug	26.0	25.3	24.0	30.6	29.0	37.9	50.0	39.2
Sep	25.4	20.1	25.3	31.4	30.6	38.2	46.0	15.6
Oct	19.1	13.3	15.6	27.0	24.3	34.5	40.3	17.0
Nov	13.6	10.9	12.0	20.2	20.5	27.6	40.9	22.2
Dec	13.0	10.3	15.6	17.9	23.2	34.3	39.5	27.4

Table A.3. Monthly mean bottom water temperatures (C) at sampled 6.1-m trawl stations in Texas bays during calendar year 1984.

Month	Galveston	Matagorda	San Antonio	Aransas	Corpus Christi	Upper Laguna Madre	Lower Laguna Madre
Jan	8.5	8.2	9.5	8.6	7.7	7.0	10.8
Feb	14.9	15.8	14.9	14.8	13.5	16.0	15.2
Mar	16.3	17.8	16.8	19.8	18.2	17.8	17.5
Apr	21.1	21.7	23.4	23.1	21.2	22.6	21.8
May	24.5	25.6	26.2	25.0	25.9	24.9	26.6
Jun	28.2	28.4	28.0	29.0	27.4	28.6	27.8
Jul	29.8	29.1	28.3	29.8	29.3	29.1	29.5
Aug	29.6	29.1	27.7	30.1	28.9	30.0	29.3
Sep	27.2	27.0	26.7	27.4	26.2	26.9	28.3
Oct	23.7	23.4	23.7	24.1	21.9	22.1	24.7
Nov	16.9	21.7	19.6	19.3	19.3	18.2	20.8
Dec	17.6	17.0	19.1	18.8	16.8	20.4	21.5

Table A.4. Monthly mean bottom water salinities (o/oo) at sampled 6.1-m trawl stations in Texas bays during calendar year 1984.

Month	Galveston	Matagorda	San Antonio	Aransas	Corpus Christi	Upper Laguna Madre	Lower Laguna Madre
Jan	17.1	23.2	20.6	13.4	29.1	32.7	30.6
Feb	14.3	22.8	20.7	14.2	27.5	32.0	28.7
Mar	12.9	25.3	20.2	19.7	29.1	33.1	30.8
Apr	12.9	27.4	20.4	23.2	30.6	35.5	33.1
May	18.1	26.0	24.0	24.4	32.4	37.8	35.5
Jun	18.1	26.3	25.4	26.4	32.0	40.8	34.4
Jul	20.7	28.3	28.0	28.5	34.9	42.7	36.6
Aug	21.6	28.3	28.5	30.4	37.8	47.7	39.1
Sep	22.8	31.0	30.8	31.5	38.0	46.8	27.8
Oct	19.7	25.3	30.1	28.8	36.3	44.5	20.9
Nov	11.5	16.0	21.4	23.6	31.5	42.2	28.6
Dec	15.8	21.4	22.3	24.9	32.2	41.7	27.0

Table A.5. Weekly mean bottom water temperatures (C) at sampled 6.1-m trawl stations in Texas passes during calendar year 1984.

Month	Day	Bolivar Roads	Matagorda Ship Channel- Pass Cavallo	Lydia Ann Channel	Corpus Christi Channel	Brazos Santiago Pass
Jan	2-8	8.5	8.5	8.0	8.0	12.0
	9-15	9.0	14.5	10.0	10.0	12.0
	16-22	7.5	7.5	5.3	7.0	9.0
	23-29	9.3	8.8	7.0	8.0	12.5
	30-Feb 5	9.8	12.0	10.3	10.0	14.5
Feb	6-12	10.5	12.3	13.0	14.0	14.0
	13-19	15.0	16.3	13.8	11.0	17.0
	20-26	13.8	13.5	13.8	14.0	16.5
	27-Mar 4	13.0	13.5	14.3	14.0	14.5
Mar	5-11	14.5	12.0	15.8	16.0	12.5
	12-18	18.3	16.3	20.5	22.0	21.5
	19-25	17.3	18.5	19.0	19.0	19.5
	26-Apr 1	19.0	19.0	21.3	21.0	22.0
Apr	2-8	18.0	20.0	21.0	22.0	21.5
	9-15	21.0	22.0	22.3	23.0	23.0
	16-22	21.0	20.8	23.8	23.0	23.5
	23-29	23.0	23.5	24.0	24.0	24.0
	30-May 6	24.0	23.3	24.3	24.0	25.5
May	7-13	23.8	24.5	24.5	24.0	25.0
	14-20	26.0	24.0	25.0	25.0	24.5
	21-27	26.8	27.0	28.3	28.0	25.5
	28-Jun 3	25.0	24.0	26.5	26.0	29.0
Jun	4-10	27.3	25.5	27.8	28.0	26.0
	11-12	27.8	27.5	29.0	29.0	28.5
	18-24	28.8	29.0	29.5	27.0	28.5
	25-Jul 1	27.0	27.3	27.0	27.0	28.0
Jul	2-8	28.5	28.0	26.8	28.0	26.0
	9-15	30.0	29.0	29.0	29.0	27.0
	16-22	29.3	28.5	29.8	30.0	27.0
	23-29	30.3	29.0	29.8	30.0	25.0
	30-Aug 5	29.5	28.0	30.0	30.0	29.0
Aug	6-12	29.3	28.0	30.3	30.0	29.0
	13-19	29.5	31.5	29.5	30.0	28.0
	20-26	29.8	29.0	30.5	31.0	26.5
	27-Sep 2	30.0	29.0	29.5	30.0	27.0

Table A.5. (Cont'd.).

Month	Day	Bolivar Roads	Matagorda Ship Channel- Pass Cavallo	Lydia Ann Channel	Corpus Christi Channel	Brazos Santiago Pass
Sep	3-9	27.0	27.0	28.8	29.0	27.0
	10-16	28.5	28.0	28.8	28.0	28.0
	17-23	26.0	27.0	25.8	26.0	23.0
	24-30	25.5	28.0	29.0	29.0	28.5
Oct	1-7	24.0	24.0	25.8	26.0	22.0
	8-14	25.5	24.5	26.0	26.0	28.5
	15-21	25.8	26.0	27.0	27.0	26.5
	22-28	24.5	24.0	21.5	22.0	25.0
	29-Nov 4	25.5	25.0	26.3	27.0	28.0
Nov	5-11	21.5	24.5	21.8	24.0	22.0
	12-18	19.0	23.5	22.3	23.0	23.3
	19-25	15.0	18.5	19.3	20.0	16.5
	26-Dec 2	16.0	17.5	18.0	18.0	19.0
Dec	3-9	14.0	13.0	14.0	15.0	22.0
	10-16	16.0	16.5	18.5	18.0	20.0
	17-23	19.0	20.5	21.8	22.0	24.0
	24-30	18.8	19.0	19.5	19.0	22.0

Table A.6. Weekly mean bottom water salinities (o/oo) at sampled 6.1-m trawl stations in Texas passes during calendar year 1984.

Month	Day	Bolivar Roads	Matagorda Ship Channel- Pass Cavallo	Lydia Ann Channel	Corpus Christi Channel	Brazos Santiago Pass
Jan	2-8	24.0	26.6	22.0	26.0	36.0
	9-15	25.0	23.8	18.5	27.0	28.0
	16-22	19.5	24.4	15.0	26.0	26.0
	23-29	21.0	21.1	20.5	26.0	30.0
	30-Feb 5	21.5	25.5	21.0	25.0	29.0
Feb	6-12	14.5	23.0	28.5	28.0	27.0
	13-19	22.0	28.0	25.5	28.0	30.0
	20-26	22.0	27.2	27.0	28.0	36.0
	27-Mar 4	26.5	28.3	31.5	29.0	34.0
Mar	5-11	24.0	29.4	32.5	32.0	34.0
	12-18	20.0	30.5	29.5	32.0	34.0
	19-25	24.0	27.2	27.5	30.0	38.0
	26-Apr 1	22.0	26.6	29.0	30.0	35.0
Apr	2-8	25.5	28.3	32.0	33.0	34.0
	9-15	24.0	31.3	32.5	32.0	34.0
	16-22	29.0	30.2	32.5	32.0	35.0
	23-29	27.0	32.2	29.0	28.0	36.0
	30-May 6	22.0	31.0	33.5	33.0	35.0
May	7-13	22.0	28.6	31.0	33.0	35.0
	14-20	24.0	26.7	29.5	30.0	36.0
	21-27	21.5	29.1	30.0	30.0	30.0
	28-Jun 3	27.0	25.5	28.0	28.0	32.0
Jun	4-10	20.0		30.5	30.0	32.0
	11-12	12.5	23.1	25.5	26.0	35.0
	18-24	19.0	20.5	29.5	32.0	34.0
	25-Jul 1	32.0	31.6	32.0	32.0	35.0
Jul	2-8	32.0	34.2	34.5	34.0	39.0
	9-15	34.0	34.4	33.5	32.0	35.0
	16-22	34.0	33.2	35.0	35.0	36.0
	23-29	33.0	34.4	35.0	35.0	38.0
	30-Aug 5	27.0	33.6	35.0	35.0	37.0
Aug	6-12	22.0	28.8	33.0	34.0	35.0
	13-19	27.0	30.5	35.0	34.0	37.0
	20-26	34.0	33.4	34.5	34.0	38.0
	27-Sep 2	33.0	36.1	36.5	36.0	35.0

Table A.6. (Cont'd.).

Month	Day	Bolivar Roads	Matagorda Ship Channel- Pass Cavallo	Lydia Ann Channel	Corpus Christi Channel	Brazos Santiago Pass
Sep	3-9	33.0	34.1	35.0	35.0	35.0
	10-16	32.0	33.3	35.0	36.0	36.0
	17-23	27.0	32.5	35.5	36.0	9.0
	24-30	26.0	28.0	31.0	31.0	32.0
Oct	1-7	28.0	27.7	28.5	30.0	11.0
	8-14	28.0	27.7	30.0	29.0	33.0
	15-21	25.0	27.2	31.0	30.0	33.0
	22-28	23.0	26.6	30.0	31.0	34.0
	29-Nov 4	25.0	22.2	26.5	28.0	33.0
Nov	5-11	22.0	23.9	29.0	30.0	32.0
	12-18	26.0	28.4	30.5	31.0	32.0
	19-25	19.0	21.1	26.5	31.0	32.0
	26-Dec 2	23.0	26.6	28.0	29.0	34.0
Dec	3-9	25.0	24.7	27.0	27.0	32.0
	10-16	26.0	24.2	31.0	31.0	29.0
	17-23	20.5	28.0	27.0	31.0	32.0
	24-30	21.0	32.8	25.0	26.0	32.0

Table A.7. Mean bottom water temperatures (C) and salinities (o/oo) at sampled 6.1-m trawl stations in the Texas Territorial Sea during August-September 1984 (blank = no measurement taken).

Month	Galveston		Matagorda		Aransas ^a		Lower Laguna Madre	
	Temperature (C)	Salinity (o/oo)	Temperature (C)	Salinity (o/oo)	Temperature (C)	Salinity (o/oo)	Temperature (C)	Salinity (o/oo)
Aug			29.3		33.2			
Sep			28.6		35.2			

^a Samples taken in Aransas Gulf area only.

Table A.8. Mean surface water temperatures (C) at sampled 183-m gill net stations by bay system during spring and fall, 1983-1984.

Year	Bay system																	
	Galveston		East		Matagorda		San Antonio		Aransas		Corpus Christi		Upper Laguna Madre		Lower Laguna Madre		Coastwide	
	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
1983	25.6	25.3	25.7	26.4	24.9	25.6	25.8	25.5	26.1	25.3	26.5	25.6	27.4	27.0	26.5	26.8	26.0	25.8
1984	26.6	25.0	25.3	26.0	25.0	25.0	26.0	25.0	25.8	25.0	26.2	25.0	27.1	26.0	27.5	27.0	26.3	25.5

Table A.9. Mean surface salinities (o/oo) at sampled 183-m gill net stations by bay system during spring and fall, 1983-1984.

Year	Bay system																	
	Galveston		East Matagorda		Matagorda		San Antonio		Aransas		Corpus Christi		Upper Laguna Madre		Lower Laguna Madre		Coastwide	
	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
1983	14.4	11.4	19.1	12.2	19.6	11.8	19.4	17.4	22.4	7.5	30.0	24.5	40.0	34.0	33.5	31.0	24.0	18.1
1984	21.7	18.7	23.5	15.6	24.0	18.7	27.4	29.4	22.5	26.4	31.9	33.9	39.0	44.4	35.2	22.9	27.6	25.9

Table A.10. Semi-monthly mean bottom water salinities (o/oo) and temperatures (C) at sampled 46-cm oyster dredge stations in Galveston Bay during October-December 1984.

Month	Day	Salinity (o/oo)	Temperature (C)
Oct.	1-15	23.4	26.4
	16-31	18.0	25.9
Nov.	1-15	11.9	19.5
	16-30	12.2	15.9
Dec.	1-15	15.6	16.6
	16-31	16.7	21.5

Appendix B. Summary of data collected during January-March 1985.

Table B.3. Monthly mean catch rates (No./ha) and mean lengths (mm) of pink shrimp caught with 18.3-m bag seines in Texas bay systems during January-March 1985 (blank = no measurement taken).

Month	Number samples	Galveston		East Matagorda		Matagorda		San Antonio		Aransas		Corpus Christi		Upper Laguna Madre		Lower Laguna Madre	
		No./ha	Length	No./ha	Length	No./ha	Length	No./ha	Length	No./ha	Length	No./ha	Length	No./ha	Length	No./ha	Length
Jan	10	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
Feb	10	0.00		0.00		0.00		0.00		0.00		0.00		0.00		0.00	
Mar	10	0.00		0.00		0.00		0.00		146.67		0.00		76.67		0.00	

Table B.4. Monthly mean catch rates (No./ha) and mean widths (mm) of blue crabs caught with 18.3-m bag seines in Texas bay systems during January-March 1985 (blank = no measurement taken).

Month	Number samples	Galveston		East Matagorda		Matagorda		San Antonio		Aransas		Corpus Christi		Upper Laguna Madre		Lower Laguna Madre	
		No./ha	Width	No./ha	Width	No./ha	Width	No./ha	Width	No./ha	Width	No./ha	Width	No./ha	Width	No./ha	Width
Jan	10	345.00		50.00		6.67		10.00		30.00		73.33		3.33		10.01	
Feb	10	15.00		76.67		53.33		10.00		16.67		110.00		30.00		96.67	
Mar	10	476.19		293.33		146.67		190.00		480.00		576.67		293.33		370.00	

Table B.5. Monthly mean catch rates (No./tow) and mean lengths (mm) of brown shrimp caught with 6.1-m trawls in Texas bay systems during January-March 1985 (blank = no measurement taken).

Month	Number samples ^a	Galveston		Matagorda		San Antonio		Aransas		Corpus Christi		Upper Laguna Madre		Lower Laguna Madre	
		No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length
Jan	20	0.2	84	0.3	90	0.6	89	0.3	87	0.8	101	0.2	118	0.2	87
Feb	20	0.0		0.0		0.0		0.0		<0.1	104	0.0		0.0	
Mar	20	<0.1	80	<0.1	86	0.0		0.0		0.1	101	0.0		0.0	99

^a 20 samples were taken in each bay system except in the upper and lower Laguna Madre where 10 samples were taken.

Table B.6. Monthly mean catch rates (No./tow) and mean lengths (mm) of white shrimp caught with 6.1-m trawls in Texas bay systems during January-March 1985 (blank = no measurement taken).

Month	Number samples ^a	Galveston		Matagorda		San Antonio		Aransas		Corpus Christi		Upper Laguna Madre		Lower Laguna Madre	
		No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length
Jan	20	12.8	95	2.9	88	3.0	89	1.6	108	3.0	106	9.2	124	0.2	153
Feb	20	0.8	89	0.0		0.0		0.0		0.1	69	0.0		0.0	
Mar	20	4.6	99	1.1	97	0.0		0.8	101	0.7	80	0.0		0.6	114

^a 20 samples were taken in each bay system except in the upper and lower Laguna Madre where 10 samples were taken.

Table B.7. Monthly mean catch rates (No./tow) and mean lengths (mm) of pink shrimp caught with 6.1-m trawls in Texas bay systems during January-March 1985 (blank = no measurement taken).

Month	Number samples ^a	Galveston		Matagorda		San Antonio		Aransas		Corpus Christi		Upper Laguna Madre		Lower Laguna Madre	
		No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length
Jan	20	0.0		0.2	89	0.0	0.0	0.1	74	0.4	96	0.0	0.0	0.1	76
Feb	20	0.0		0.0		<0.1	94	<0.1	103	1.8	100	0.6	106	0.0	
Mar	20	<0.1	103	0.2	98	<0.1	115	3.4	96	4.4	102	2.2	113	0.2	111

^a20 samples were taken in each bay system except the upper and lower Laguna Madre where 10 samples were taken.

Table B.8. Monthly mean catch rates (No./tow) and mean widths (mm) of blue crabs caught with 6.1-m trawls in Texas bay systems during January-March 1985 (blank = no measurement taken).

Month	Number samples ^a	Galveston		Matagorda		San Antonio		Aransas		Corpus Christi		Upper Laguna Madre		Lower Laguna Madre	
		No./tow	Width	No./tow	Width	No./tow	Width	No./tow	Width	No./tow	Width	No./tow	Width	No./tow	Width
Jan	20	1.2	107	1.1	55	1.6	53	0.9	79	0.1	181	0.0	0.0	0.8	128
Feb	20	2.5	100	0.9	65	6.5	68	1.1	61	0.3	87	0.8	127	10.6	101
Mar	20	14.4	64	3.0	63	8.0	64	16.9	64	2.4	94	2.6	120	12.4	103

^a20 samples were taken in each bay system except in the upper and lower Laguna Madre where 10 samples were taken.

Table B.9. Weekly mean catch rates (No./tow) and mean lengths (mm) of brown shrimp caught at 6.1-m trawl stations in Texas passes during January-March 1985 (blank = no measurement taken).

Month	Day	Number samples	Matagorda-				Brazos Santiago Pass			
			Bolivar Roads	Ship Channel	Lydia Ann Channel	Corpus Christi Channel				
			No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length
Jan	1-6	2	2.5	88	0.0	0.0	0.5	75	0.0	0.0
	7-13	2	0.0		0.0	0.0	0.0		0.5	75
	14-20	2	0.0		0.0	0.0	0.0		0.0	
	21-27	2	0.0		0.0	0.0	0.0		0.0	
	29-Feb 3	2	0.0		0.0	0.0	0.0		0.0	
Feb	4-10	2	0.0		0.0	0.0	0.0		0.5	85
	11-17	2	0.0		0.0	0.0	0.0		2.5	85
	18-24	2	0.0		0.0	0.0	0.0		0.0	
	25-Mar 3	2	1.0	85	0.0	0.0	0.0		2.0	90
Mar	4-10	2	0.0		0.0	0.0	0.0		2.0	105
	11-17	2	0.5	76	0.0	0.0	0.0		0.0	
	18-24	2	0.0		0.0	0.0	0.0		0.0	
	25-31	2	0.0		0.0	0.0	0.0		0.0	

Table 8.10. Weekly mean catch rates (No./tow) and mean lengths (mm) of white shrimp caught at 6.1-m trawl stations in Texas passes during January-March 1985 (blank = no measurement taken).

Month	Day	Number samples	Matagorda				Corpus Christi		Brazos Santiago	
			Bolivar Roads	Ship Channel- Pass Cavallo	Lydia Ann Channel	Corpus Christi Channel	No./tow	Length	No./tow	Length
Jan	1-6	2	72.0	31.5	102	0.0	0.0	0.0	0.0	
	7-13	2	23.5	2.0	89	0.0	0.0	0.0	0.0	
	14-20	2	195.0	3.5	100	1.0	84	0.0	0.0	
	21-27	2	6.0	8.5	84	0.5	75	0.5	82	
	28-Feb 3	2	8.5	2.0	91	0.0	0.0	0.0	0.0	
Feb	4-10	2	0.0	0.0	0.0	0.0	0.0	1.0	93	
	11-17	2	4.5	0.0	0.0	0.0	0.0	0.0	0.0	
	18-24	2	20.5	0.5	100	0.0	0.0	0.5	88	
	25-Mar 3	2	3.0	0.5	118	2.0	80	0.0	0.5	
Mar	4-10	2	12.5	0.0	0.0	4.0	95	0.0	0.0	
	11-17	2	3.0	0.5	116	0.0	0.0	0.5	85	
	18-24	2	1.5	0.0	0.0	0.5	100	0.0	0.0	
	25-31	2	0.5	0.0	0.0	0.0	0.0	0.0	0.0	

Table B.11. Weekly mean catch rates (No./tow) and mean lengths (mm) of pink shrimp caught at 6.1-m trawl stations in Texas passes during January-March 1985 (blank = no measurement taken).

Month	Day	Number samples	Bolivar Roads		Matagorda- Ship Channel Pass Cavallo		Lydia Ann Channel		Corpus Christi Channel		Brazos Santiago Pass	
			No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length
Jan	1-6	2	0.5	117	0.5	105	1.5	74	0.0		0.0	0.0
	7-13	2	0.0		0.0		0.5	98	0.0		0.0	0.0
	14-20	2	0.0		0.0		0.5	83	0.0		0.0	0.0
	21-27	2	0.0		0.0		0.5	73	0.0		0.0	0.0
	28-Feb 3	2	0.0		0.5	116	0.5	76	0.5	72	0.0	0.0
Feb	4-10	2	0.0		0.0		0.0		0.0		0.0	0.0
	11-17	2	0.0		0.0		0.0		0.5	78	0.0	0.0
	18-24	2	0.0		0.0		0.0		0.5	88	0.0	0.0
	25-Mar 3	2	0.5	122	0.0		1.0	98	0.5	121	0.0	0.0
Mar	4-10	2	0.0		0.0		4.5	105	2.0	82	0.0	0.0
	11-17	2	0.0		0.0		0.5	77	0.5	85	0.0	0.0
	18-24	2	0.0		0.0		0.0		0.0		0.0	0.0
	25-31	2	0.5	135	0.0		0.5	102	0.5	73	0.5	90

Table B.12. Weekly mean catch rates (No./tow) and mean widths (mm) of blue crab caught at 6.1-m trawl stations in Texas passes during January-March 1984 (blank = no measurement taken).

Month	Day	Number samples	Bollivar Roads		Matagorda Ship Channel-Pass Cavallo		Lydia Ann Channel		Corpus Christi Channel		Brazos Santiago Pass	
			No./tow	Width	No./tow	Width	No./tow	Width	No./tow	Width	No./tow	Width
Jan	1-6	2	109.0	77	0.5	152	0.0	162	2.5	132	0.0	155
	7-13	2	6.5	106	0.5	152	0.5	18	1.5	121	0.5	
	14-20	2	25.5	50	1.0	106	0.5		0.0		0.0	
	21-27	2	5.0	103	0.0		0.0	69	0.0	70	0.5	110
	28-Feb 3	2	2.0	72	1.5	104	2.5		1.5		0.0	
Feb	4-10	2	18.5	42	1.0	58	5.0	49	1.5	20	0.0	145
	11-17	2	11.0	67	0.0		14.5	95	16.0	17	1.5	123
	18-24	2	21.0	64	0.5	100	0.0		0.5	25	1.0	
	25-Mar 3	2	53.0	67	0.0		7.5	99	1.5	68	5.5	60
Mar	4-10	2	56.5	65	0.0		5.0	95	2.0	38	0.0	
	11-17	2	28.0	61	0.5	73	0.5	132	0.0		0.0	159
	18-24	2	1.0	101	2.5	81	2.0	114	1.0	103	8.0	
	25-31	2	45.0	74	2.0	154	4.0	100	1.0	158	1.5	135

Table B.13. Mean catch rates (No./sample) by size class (mm)^a of American oysters caught with 46-cm dredges in the Galveston Bay system, January-March 1985.

Month	Number Samples		No./Sample							
	Reef	Non-reef	Spat	Small	Market	Total	Spat	Small	Market	Total
Jan	80	20	1.2	13.5	4.0	18.7	0.1	1.5	0.1	1.7
Feb	80	20	1.1	12.4	3.1	16.6	<0.1	0.6	0.2	0.9
Mar	80	20	0.7	15.1	3.3	19.1	0.0	1.4	1.0	2.4

^a Spat ≤ 25 mm, Small 26-75 mm, Market ≥ 76 mm.

Table B.14. Mean indices of fouling organisms on reef strata shells caught with 46-cm oyster dredges in Galveston Bay, January-March 1985.

Month	Fouling Index (1-6) ^a						Other
	Boring Sponge	Hydroids	Tube Worms	Slipper Shells	Mussels	Boring Clams	
Jan	1.6	0.5	1.0	0.3	0.3	0.3	0.4
Feb	1.1	0.0	1.6	0.3	0.2	0.4	0.7
Mar	1.0	0.0	1.2	0.2	0.2	0.3	1.2

^a 1 (0-9%), 2 (10-25%), 3 (26-50%), 4 (51-75%), 5 (76-90%), 6 (91-100%).

Table B.15. Mean catch rates (No./tow) and mean lengths (mm) of brown shrimp caught with 6.1-m trawls in the Texas Territorial Sea during January-March 1985 (blank = no measurement taken).

Month	Number of Samples	Galveston		Matagorda		Aransas		Lower Laguna Madre	
		No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length
Jan. ^a									
Feb.	16					0.0			
Mar.	16					0.0			

^a Samples taken during February and March 1985 in Aransas Gulf area only.

Table B.16. Mean catch rates (No./tow) and mean lengths (mm) of white shrimp caught with 6.1-m trawls in the Texas Territorial Sea during January-March 1985 (blank = no measurement taken).

Month	Number of Samples	Galveston		Matagorda		Aransas		Lower Laguna Madre	
		No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length
Jan. ^a									
Feb.	16					9.6		105	
Mar.	16					0.4		118	

^a Samples taken during February and March 1985 in Aransas Gulf area only.

Table B.17. Mean catch rates (No./tow) and mean lengths (mm) of pink shrimp caught with 6.1-m trawls in the Texas Territorial Sea during January-March 1985 (blank = no measurement taken).

Month	Number of Samples	Galveston		Matagorda		Aransas		Lower Laguna Madre	
		No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length
Jan. ^a									
Feb.	16					0.7	110		
Mar.	16					0.0			

^a Samples taken during February and March 1985 in Aransas Gulf area only.

Table B.18. Mean catch rates (No./tow) and mean widths (mm) of blue crabs caught with 6.1-m trawls in the Texas Territorial Sea during January-March 1985 (blank = no measurement taken).

Month	Number of Samples	Galveston		Matagorda		Aransas		Lower Laguna Madre	
		No./tow	Width	No./tow	Width	No./tow	Width	No./tow	Width
Jan. ^a									
Feb.	16					0.1	54		
Mar.	16					0.0			

^a Samples taken during February and March 1985 in Aransas Gulf area only.

Appendix C. Summary of spring and fall 1984 gill net data for East Matagorda Bay.

Table C.1. Mean catch rates (No./h) and mean widths (mm), by mesh size, of blue crabs caught with gill nets during spring and fall 1984 in East Matagorda Bay (blank = no measurement taken).

Season	7.6-cm		10.2-cm		12.7-cm		15.2-cm	
	No./h	Width	No./h	Width	No./h	Width	No./h	Width
Spring ^a	0.1	120	0.2	135	0.1	151	0.0	
Fall	<0.1	137	<0.1	136	<0.1	180	<0.1	138

^a Values calculated using data collected from gill net samples taken only during the periods 15 April-17 June.

