

P 437.7 M315a No.55

MONITORING OF COASTAL SHELLFISH RESOURCES, JANUARY-DECEMBER 1982

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Government Publications
Texas State Documents

APR 15 1987 *rl*

Management Data Series Number 55
1983

Texas Parks and Wildlife Department
Coastal Fisheries Branch



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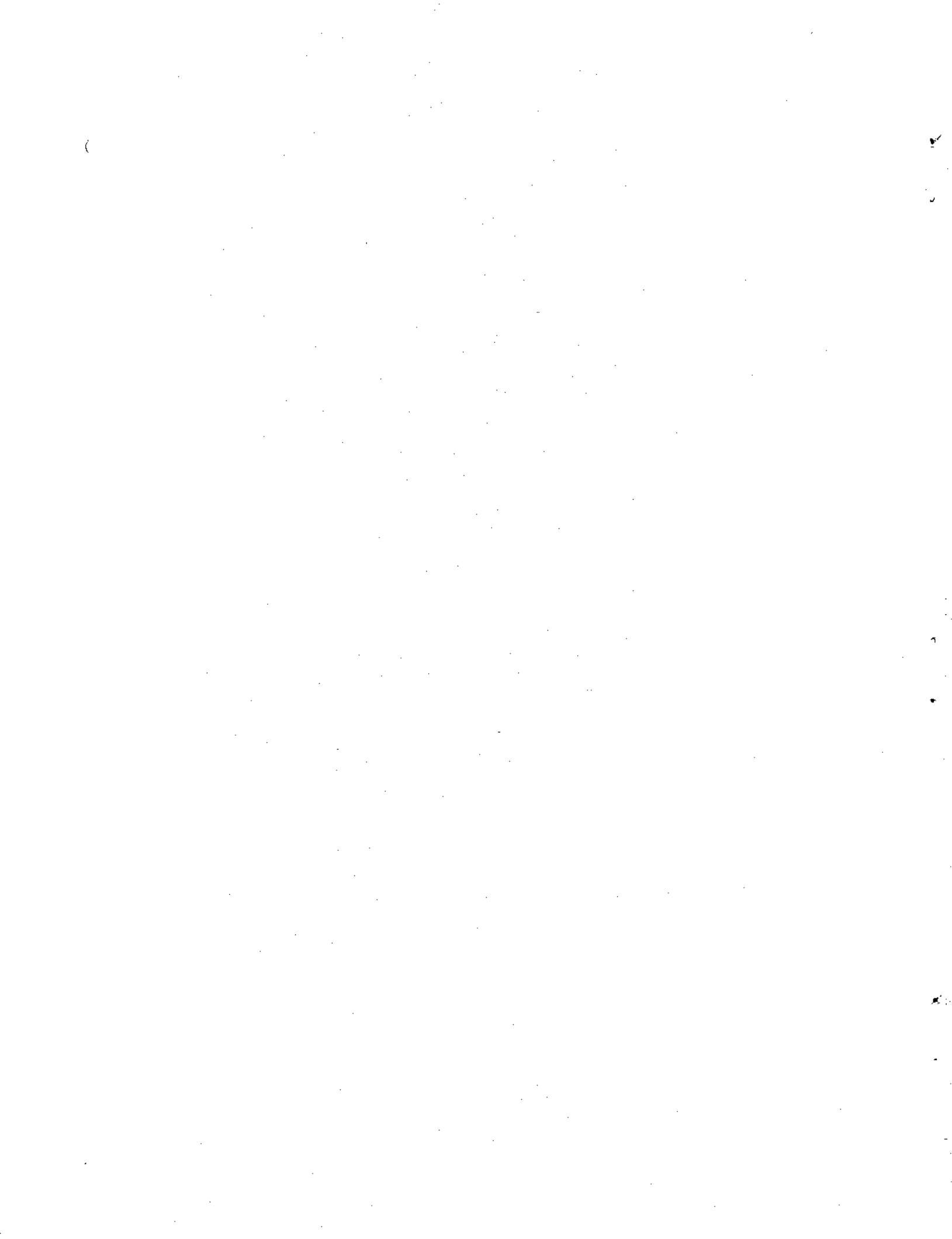
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MANAGEMENT DATA SERIES

No. 55

1983

Texas Parks and Wildlife Department
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ACKNOWLEDGEMENTS

We would like to express our appreciation to each member of the Shellfish and Finfish Monitoring Programs who so conscientiously collected scheduled samples. Appreciation is extended to C. E. Bryan, Tom Heffernan, Roy Johnson and Ed Hegen for reviewing the manuscript. Lanelle Hayes and Pamela Dalton typed the manuscript. This study was conducted with partial funding from the U.S. Department of Commerce; National Oceanic and Atmospheric Administration, National Marine Fisheries Service, under P. L. 88-309 (Project 2-385-R).

ABSTRACT

Trends in relative abundance and size of brown shrimp (Penaeus aztecus), white shrimp (P. setiferus), pink shrimp (P. duorarum) and blue crabs (Callinectes sapidus) in Texas bay systems and the Gulf of Mexico (shrimp only) were monitored from January-December 1982. Bag seines (18.3-m long) were used to sample along shorelines of bays, 6.1-m wide otter trawls were used to sample the deeper (> 0.1 m) portion of bays and passes leading from the bays to the Gulf of Mexico, and 12.2-m wide trawls were used to sample Gulf waters.

Shorelines and deeper portions of bays were sampled in Galveston, Matagorda, San Antonio, Aransas and Corpus Christi Bays and the upper and lower Laguna Madre. 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.

Data summarized in this report represent the initiation of a program that will yield long term trends in abundance and stability of shellfish in Texas waters. Improved information on trends will result as the peaks of seasonal abundance are identified through time in the different areas sampled.

INTRODUCTION

The shrimp fishery is the most valuable commercial fishery in Texas. The 1981 harvest was 43.5 million kg having a dockside value of \$165.0 million (Hamilton 1982). Reported landings of shrimp species by weight consisted of 71% brown shrimp (Penaeus aztecus), 27% white shrimp (P. setiferus) and 2% other species including pink shrimp (P. duorarum).

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 blue crab (Callinectes sapidus) fishery is the third most valuable fishery in Texas following shrimp and oysters. From 1977-1981, reported landings of hardshell blue crabs averaged 3.6 million kg and were valued at \$2.0 million dockside (Hamilton 1982). 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.

Penaeid shrimp populations have been monitored in at least some bay systems since 1958 (Benefield and Baker 1980) while blue crab populations have been monitored since 1977 (Hammerschmidt 1982). The present bay and Gulf shellfish monitoring program which was expanded to include seven of the eight major bay systems was designed to establish long term trend information on relative abundance and size of penaeid shrimp and blue crabs in Texas coastal waters. This report summarizes data collected during calendar year 1982.

MATERIALS AND METHODS

Bay Sampling

Bag Seines

During January-December 1982, samples were collected with bag seines in Galveston, Matagorda, San Antonio and Corpus Christi Bays and the upper and lower Laguna Madre (Figures 1-9). Ten different shoreline stations were sampled each month in each bay system. 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).

Five different stations were sampled with bag seines during each of the first two and last two fullest weeks of each month. Each sampling week extended from sunrise Monday through sunset of the following Sunday. Samples were collected during daylight hours. The randomly selected stations for the bag seines could not always be sampled as scheduled. If a preselected station could not be sampled, an alternate randomly selected station was substituted.

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.

Bag seines were 18.3-m long and 1.8-m deep with 19-mm stretched nylon multifilament mesh in the ends 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) were 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 (nearest 1 mm as described above) was calculated using the ratio estimator:

$$\bar{L} = \frac{\sum_{i=1}^n L_i}{n}$$

\bar{L} = mean monthly length

L_i = individual sizes

n = number of individuals numbered.

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).

Hydrologic variables including salinity (o/oo) and water temperature (C) were measured at the time and location of each sample. Monthly means of these variables are summarized in Appendix A, Tables 1-2.

Trawls

During January-December 1982, samples were collected with trawls in the Galveston, San Antonio and Aransas Bay systems. During May-December 1982, samples were also collected in Matagorda and Corpus Christi Bays and the upper and lower Laguna Madre.

Trawl stations were established using grids on National Oceanic and Atmospheric Administration (NOAA) Nautical Charts (Figures 10-19). 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 no known obstructions, snags or reefs which would hinder sampling, damage equipment or compromise safety were present.

Bay systems were divided into three sampling zones: Zone I (upper bay), Zone II (lower bay) and Zone III (passes) (Figures 10-19). 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 (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. Two stations were sampled in Zone III each week and the sample week extended from Monday-Sunday. All stations to be sampled were selected at random for each zone and each sample period. Samples were collected during day only.

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 throughout. 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 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.

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 of each bay system's surface area in water ≥ 1.2 -m deep contributed to the coastwide area (Matlock and Ferguson 1982).

Hydrologic variables including salinity (o/oo) and water temperature (C) were measured at the time and location of each tow. Monthly means of these variables were summarized in Appendix A, Tables 3-8.

Gulf Sampling

During January 1982 through February 1983, TPWD conducted a penaeid shrimp monitoring program in the Gulf of Mexico along the Texas coast from latitude 26°40'N to latitude 28°40'N.

For long-term trend data two different trawls were used; one was 12.2-m wide (used exclusively after September 1981) and the other 13.7-m wide measured along the cork line between the rear margins of the trawl doors. No adjustments were made in catches in the two nets because no differences were found in catch rates between the 12.2 m and 13.7 m trawls (Matthews 1982). Both trawls were constructed of #18 nylon multifilament thread in the body with a stretched mesh of 51 mm and of #36 nylon multifilament thread in the bag with a stretched mesh of 44 mm. Both trawls were equipped with tickler chains and spread with wooden doors, 2.1-m long and 0.9-m high. Sampling was conducted aboard the 21.9-m steel-hull shrimp trawler research vessel WESTERN GULF.

Night samples were collected twice monthly from January through April 1982 along a 4-station transect adjacent to Port Aransas, Texas, in depths of 11-18 m, 20-27 m, 29-37 m and 38-46 m (Figure 20). During June and July 1982, 34 randomly selected stations out to a depth of 54.9 m were sampled as part of the Southeastern Area Monitoring and Assessment Program (SEAMAP). From November 1982 through February 1983, 10 night samples per month were collected within randomly selected 1-minute sample grids along the central Texas coast from latitude 27°00'N to latitude 28°40'N in depths ranging from 5.5 m to 23.8 m.

Day samples were collected twice monthly in the Gulf of Mexico adjacent to the Port Aransas Jetties during January through April 1982 in depths ranging from 7.3 m to 11.0 m. During May and June 1982 and again during November 1982 through February 1983, day samples were collected within randomly selected sample grids along the central Texas coast from latitude 27°00'N to latitude 28°40'N in depths ranging from 5.5 m to 23.8 m.

All penaeid shrimp were removed from the catch and sorted by species. No more than 50 randomly selected shrimp of each species were divided by sex, weighed en masse and measured individually. All remaining shrimp of each species were weighed en masse and estimates of the total number were calculated:

$$\frac{T}{S} \times n = N$$

T = total weight of species
S = subsample weight of species
n = number of shrimp in subsample
N = total number of shrimp in sample.

Shrimp were measured to the nearest 1 mm from tip of rostrum to tip of telson.

Catch rates were calculated in the same manner used for bag seines except total hours fished (h to nearest 0.1) was used instead of total area fished. Mean size of each species was calculated in the same manner as for bag seines.

Hydrologic variables including salinity (‰) and water temperature (C) were measured at the time and location of each trawl sample. Monthly means of these variables are summarized in Appendix A, Table 9.

This report summarizes data collected during calendar year 1982. Data collected during January-February 1983 for bag seines and bay trawls are summarized in Appendix B, Tables 1-16. Data collected in Gulf trawls during January 1982-February 1983 in Gulf Statistical Area 21 and the Fishery Conservation Zone (FCZ) are summarized in Appendix C, Tables 1-4. 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.

Ranges of coefficients of variation were calculated using the formula (Sokal and Rohlf 1981):

$$CV = \frac{S \times 100}{\bar{X}}$$

CV = coefficient of variation
S = standard deviation of the mean
 \bar{X} = mean.

RESULTS

Bay Sampling

Bag Seines

Annual Trends: Coastwide annual mean catch rates of brown shrimp increased from 248.18/ha during 1978 to 514.42/ha during 1982 (Table 1). Annual mean catch rates ranged from 53.47/ha in upper Laguna Madre during 1979 to 994.89/ha in lower Laguna Madre during 1981. Brown shrimp annual mean catch rates in Galveston Bay increased each year since 1979 whereas Matagorda Bay catch rates decreased each year since 1979. There was also a general increase in catch rates for the lower Laguna Madre from 1978 to 1981. No trends were apparent in the remaining bay systems. Coastwide annual mean lengths of brown shrimp averaged about 60 mm except in 1981 when the mean was 50 mm. Brown shrimp annual mean lengths ranged from 49 mm in San Antonio and Corpus Christi Bays to 72 mm in upper Laguna Madre.

Coastwide annual mean catch rates of white shrimp ranged from 319.66/ha during 1980 to 1261.72/ha during 1982 (Table 1). Annual mean catch rates of white shrimp ranged from 4.86/ha in the upper Laguna Madre during 1979 to 3549.72/ha in Galveston Bay during 1982. Coastwide annual mean lengths ranged from 54 mm to 61 mm. Mean annual lengths of white shrimp ranged from 42 mm in Corpus Christi Bay to 74 mm in Matagorda Bay.

Coastwide annual mean catch rates of pink shrimp increased from 3.28/ha during 1978 to 24.73/ha during 1982 (Table 1). Annual mean catch rates ranged from 0.00/ha in six of the seven bays to 118.83/ha in Aransas Bay during 1982. Coastwide annual mean lengths of pink shrimp ranged from 55 mm to 82 mm and generally decreased during 1978-1982. Annual mean lengths ranged from 46 mm in Aransas Bay to 106 mm in lower Laguna Madre.

Coastwide annual mean catch rates of blue crabs in bag seines increased from 48.42/ha in 1978 to 109.29/ha in 1982 (Table 1). Mean catch rates in individual bay systems ranged from 10.10/ha during 1978 in Matagorda Bay to 192.56/ha during 1982 in Aransas Bay. Coastwide annual mean widths approximated 50 mm. Mean blue crab widths among individual bays ranged from 34 mm in the lower Laguna Madre to 63 mm in Aransas Bay and fluctuated without discernible pattern.

Monthly Trends: Coastwide monthly mean catch rates of brown shrimp were generally highest (943.99-2011.64/ha) during April-June (Table 2). Monthly mean catch rates of brown shrimp ranged from 0.00/ha in each bay to 4493.33/ha in Galveston Bay. Coastwide monthly mean lengths varied from 28 mm during March to 65 mm during June. Monthly mean lengths ranged from 15 mm in Galveston Bay during March to 80 mm during July in the upper Laguna Madre.

Coastwide monthly mean catch rates of white shrimp were higher (1947.43-9194.10/ha) during September-November (Table 3). Mean monthly catch rates ranged from a low of 0.00/ha in each bay to a high of 28016.67/ha in Galveston Bay. Coastwide mean lengths of white shrimp were larger (71-144 mm) during March-May. Mean monthly lengths ranged from 32 mm in Aransas Bay to 144 mm in Corpus Christi Bay.

Coastwide monthly mean catch rates of pink shrimp were highest (106.89/ha) during August (Table 4). No pink shrimp were collected in Galveston, Matagorda and San Antonio Bays. Monthly mean catch rates ranged from 0.00/ha in each bay to 622.92/ha in Aransas Bay. Coastwide mean monthly lengths of pink shrimp ranged from 33 mm in Aransas Bay to 85 mm in the lower Laguna Madre.

Coastwide mean monthly catch rates of blue crabs were generally higher (193.03-331.47/ha) during March-April than the remainder of the year when catch rates ranged from 30.93/ha to 128.27/ha (Table 5). Catches in these months were among the highest in each bay system. Monthly mean catch rates within individual bay systems ranged from 0.00/ha in the upper Laguna Madre to 910.20/ha in Aransas Bay.

Coastwide mean widths ranged from 32 mm to 67 mm. Mean widths in individual bay systems ranged from 16 mm to 107 mm, both extremes in Corpus Christi Bay.

Coefficients of variation (CV), calculated from bag seine abundance values were 25-167% for brown shrimp, 0-400% for white shrimp, 33-404% for pink shrimp and 24-138% for blue crabs. Coefficients of variation calculated for mean sizes of species caught in bag seines were 0-42% for brown shrimp, 0-30% for white shrimp, 0-21% for pink shrimp and 0-55% for blue crabs.

Trawls

Semimonthly Trends: Coastwide semimonthly mean catch rates of brown shrimp from Zone I during 16 May-31 July were higher (19.0-31.6/tow) than during other periods of the year (Table 6). Coastwide mean lengths ranged from 65 mm during 16-31 December to 102 mm during 1-15 August. During the period of highest abundance mean lengths ranged from 90-99 mm. Mean semimonthly catch rates ranged from 0.0/tow in each bay to 105.8/tow in Corpus Christi Bay during 16-31 May. Mean lengths of brown shrimp ranged from 43 mm in Aransas Bay to 128 mm in San Antonio Bay.

Coastwide semimonthly mean catch rates of brown shrimp from Zone II during 16 May-15 August were higher (9.4-34.3/tow) than during other periods of the year (Table 7). Coastwide mean lengths ranged from 78 mm during 1-15 May to 107 mm during 1-15 August. During the period of highest abundance mean lengths ranged from 89-107 mm. Mean semimonthly catch rates ranged from 0.0/tow in each bay to 167.0/tow in Aransas Bay. Mean lengths of brown shrimp ranged from 22 mm in Galveston Bay to 132 mm in the upper Laguna Madre.

Mean semimonthly catch rates of brown shrimp in Zone III were highest during two periods: 16 May-15 July and 16 October-31 December (Table 8). Mean lengths of brown shrimp ranged from 41 mm in Corpus Christi Ship Channel to 125 mm in Bolivar Roads. Mean lengths associated with higher catch rates (> 3.0 /tow) ranged from 64 mm in Brazos Santiago Pass to 99 mm in Bolivar Roads.

Coastwide semimonthly white shrimp catch rates from Zone I during 1 November-31 December were higher (26.7-73.0/tow) than during other periods of 1982 (Table 9). Coastwide mean lengths ranged from 75 mm in December to 137 mm in June. Mean semimonthly catch rates ranged from 0.0/tow in Galveston, San Antonio and Aransas Bays to 156.0/tow in Galveston Bay. Mean lengths ranged from 65 mm in Galveston Bay to 158 mm in Corpus Christi Bay.

Coastwide semimonthly catch rates of white shrimp from Zone II were higher (17.0-75.4/tow) during October-November than during other periods of 1982 (Table 10). Coastwide mean lengths ranged from 85 mm during December to 158 mm during June. Mean semimonthly catch rates ranged from 0.0/tow in all bays to 233.8/tow in Matagorda Bay.

Mean semimonthly catch rates in Zone III were higher during two periods: 1 January-15 March and 1 October-31 December (Table 11). Mean catch rates ranged from 0.0/tow in all pass areas to 97.3/tow in Bolivar Roads. Mean lengths were generally > 100 mm during March-October and < 100 mm in the remainder of the year.

Coastwide semimonthly catch rates of pink shrimp from Zone I and Zone II were ≤ 0.5 /tow except in Zone II during 16-31 November (Tables 12 and 13). Coastwide mean sizes ranged from 33 mm in August to 110 mm in May in Zone I and from 71 mm to 108 mm (both extremes in December) in Zone II. Mean catch rates were ≤ 1.0 /tow in all bays, except Aransas and Corpus Christi

Bays. The highest catch rate was 29.0/tow during April in Aransas Bay. Mean lengths ranged from 33.0 mm in Aransas Bay to 110 mm in Galveston Bay.

Semimonthly catch rates of pink shrimp in Zone III ranged from 0.0/tow in each pass area to 6.3/tow in Lydia Ann Channel (Table 14). Mean lengths ranged from 53 mm in Lydia Ann Channel to 114 mm in Bolivar Roads.

Coastwide semimonthly mean catch rates of blue crabs in Zone I were generally higher (12.9-23.3/tow) during May-July than during the remainder of the year (0.3-6.7/tow) (Table 15). This general pattern was similar in each bay system. Mean semimonthly catch rates ranged from 0.0/tow in all bays except San Antonio Bay to 44.4/tow in Galveston Bay. Coastwide mean widths ranged from 73 mm to 140 mm. Mean widths in individual bay systems ranged from 22 mm to 180 mm both occurring in Galveston Bay. Trends in mean widths showed no apparent pattern.

Coastwide semimonthly mean catch rates of blue crabs from Zone II were generally higher (6.5-12.2/tow) during May-June than during the remainder of the year (0.3-3.9/tow) (Table 16). This general pattern was similar in each bay system. Mean semimonthly catch rates ranged from 0.0/tow in all bays except Aransas and lower Laguna Madre to 53.2/tow in Aransas Bay. Coastwide mean blue crab widths ranged from 55 mm to 140 mm. Mean widths in individual bay systems ranged from 21 mm to 180 mm both occurring in Galveston Bay. Trends in mean widths showed no apparent pattern.

Mean semimonthly catch rates of blue crabs in Zone III ranged from 0.0/tow in all passes to 14.2/tow in Bolivar Roads (Table 17). Greatest catch rates generally occurred during May-August. Mean widths ranged from 21 mm in Corpus Christi Channel to 167 mm in Bolivar Roads. Trends in mean widths showed no apparent pattern.

Coefficients of variation calculated for catch rates from bay trawls were 21-138% for brown shrimp, 21-100% for white shrimp, 26-281% for pink shrimp and 14-71% for blue crabs. Coefficients of variation calculated for mean sizes of shellfish caught in trawls were 0-28% for brown shrimp, 0-21% for white shrimp, 0-20% for pink shrimp and 2-37% for blue crabs.

Gulf Sampling

Seasonal Trends

15 June-15 July: Mean catch rates of brown shrimp in the Gulf fluctuated without pattern, and ranged from 134.0/h in 1979 to 2608.6/h during 1978 (Table 18). Mean lengths approximated 100-110 mm except in 1979 when the mean was 122 mm. Except in 1979 when only one sample per depth zone was collected, mean lengths of brown shrimp were generally smaller (90-117 mm) in 11-27 m than in 29-46 m (101-140 mm). Catches were also generally greater (725.3-3617.7/h) in the shallower depths than in the deeper depths (57.0-1649.0/h).

Seasonal mean catch rates of white shrimp in the Gulf ranged from 0.0/h during 1979 to 19.9/h during 1978 with no discernible trend (Table 18). White shrimp were caught primarily in the 11-18 m depth zone. Mean lengths generally approximated 165-190 mm with no consistent pattern in mean length fluctuations.

Seasonal mean catch rates of pink shrimp in the Gulf generally increased from 3.0/h during 1978 to 71.0/h during 1982 (Table 18). Pink shrimp were caught primarily in 11-18 m with no consistent trend in catch rate. Mean lengths of pink shrimp among individual depth zones ranged from 110 mm in 11-18 m zone to 172 mm in 29-37 m zone. Mean annual lengths fluctuated without discernible pattern.

November-February: Mean catch rates of brown shrimp in the Gulf ranged from 0.0/h during 1978-79 to 26.0/h during 1977-78 with no apparent trend among years (Table 19). Mean lengths of brown shrimp ranged from 88 mm to 109 mm. There was no consistent pattern in mean length fluctuations.

Seasonal mean catch rates for white shrimp in the Gulf ranged from 166.5/h during 1980-81 to 854.6/h during 1978-79 (Table 19). There were no apparent trends in catch rates. Mean lengths of white shrimp ranged from 103 mm to 120 mm and fluctuated without discernible pattern.

Seasonal mean catch rates of pink shrimp in the Gulf ranged from 4.1/h during 1982-83 to 19.4/h during 1980-81 with no discernible pattern in trends (Table 19). There were no consistent trends in catch rates. Mean lengths of pink shrimp approximated 90-105 mm without discernible patterns.

Monthly Trends

Monthly mean catch rates of brown shrimp within the Texas territorial sea (within 16.7 km) were highest (up to 3669.2/h) during June 1982 in both statistical areas 19 and 20 (Table 20). During June, mean catch rates were greater during the night than during the day. Monthly mean lengths of brown shrimp in day samples ranged from 87 mm in January and December to 169 mm in November (area 19, Table 20) while those in night samples ranged from 73 mm in November to 129 mm in April. Mean lengths fluctuated without discernible pattern. Mean catch rates outside of the Texas territorial sea are presented in Appendix C, Table 1.

Monthly mean catch rates of white shrimp within the Texas territorial sea were generally lowest (0.0-60.8/h) and mean lengths largest (135-174 mm) during April-June (Table 21). For the most part mean lengths were > 100 mm. Day and night catch rates were approximately equal.

Monthly mean catch rates of pink shrimp within the Texas territorial sea were highest during April-November 1982 (Table 22). Catch rates were generally higher in area 20 than area 19. Monthly mean lengths of pink shrimp in day samples ranged from 75 mm in March to 156 mm in June while those in night samples ranged from 92 mm in November to 144 mm in April.

Coefficients of variation calculated for catch rates from Gulf trawls were 7-100% for brown shrimp, 16-100% for white shrimp and 39-100% for pink shrimp. Coefficients of variation were not calculated for mean lengths.

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 represent the initiation 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 of data, but outlines general trends in abundance and size of organisms. Data gathered were analyzed to recommend the seasonal closure data for the flexible Gulf shrimping season and relative abundance of brown shrimp (Bryan 1983), and to determine the feasibility of increasing sampling efficiency (Cody and Fuls 1983 a, b). Improved information on trends for all organisms will result as the peaks of seasonal abundance are identified through time in different areas.

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Table 1. Annual mean catch rate (No./ha) and mean sizes (mm) of shellfishes caught with bag seines in Texas bay systems during calendar years 1978-1982 (blank = no measurement taken).

Bay system	Year	Number samples	Brown shrimp		White shrimp		Pink shrimp		Blue crabs	
			No./ha	Length	No./ha	Length	No./ha	Length	No./ha	Width
Galveston	1978 ^a	66	555.98	59	857.61	60	0.00		66.30	52
	1979	72	377.78	57	1440.37	61	0.00		78.15	55
	1980	72	585.98	57	635.05	64	0.00		124.77	54
	1981	84	718.73	54	1393.22	65	0.00		57.77	57
	1982	120	923.87	52	3549.72	56	0.00		100.63	52
Matagorda	1978 ^a	66	167.17	62	554.04	66	0.00		10.10	39
	1979	72	219.84	64	439.42	71	0.00		32.01	52
	1980	72	158.10	56	544.22	74	0.00		25.93	56
	1981	84	156.86	63	804.57	63	0.00		43.53	49
	1982	120	122.08	56	1748.06	66	0.00		81.11	50
San Antonio	1978 ^a	66	102.02	62	130.30	60	0.50	100	52.02	51
	1979	72	69.44	62	211.57	57	0.00		75.93	49
	1980	72	635.19	64	381.48	53	6.02	51	125.46	50
	1981	84	123.14	59	66.26	59	27.78	61	51.19	55
	1982	120	742.78	49	506.39	54	0.00		109.63	38
Aransas	1978 ^a	68	147.48	59	89.32	50	0.30	63	55.49	57
	1979	72	438.11	62	98.85	59	0.00		83.95	63
	1980	72	415.45	64	142.42	60	13.48	50	67.70	55
	1981	84	352.22	58	181.28	65	85.96	46	84.48	51
	1982	120	513.46	53	298.77	44	118.83	48	192.56	49
Corpus Christi	1978 ^a	66	258.49	52	62.42	50	0.00		33.03	47
	1979	72	499.42	60	816.81	51	57.97	50	152.17	46
	1980	72	213.84	60	141.24	65	57.63	56	82.20	39
	1981	84	681.71	49	168.05	42	69.27	50	86.34	42
	1982	120	412.39	56	405.02	63	66.93	47	50.09	45
Upper Laguna Madre	1978 ^b	66	188.26	64	229.17	55	26.14	79	97.73	62
	1979	72	53.47	61	4.86	53	12.50	78	90.28	51
	1980	72	64.93	64	63.19	62	9.72	60	65.63	40
	1981	84	104.46	72	19.05	65	8.33	69	41.96	58
	1982	120	61.66	65	13.96	50	7.29	58	33.54	58
Lower Laguna Madre	1978 ^a	66	119.70	53	129.92	49	0.00		18.94	34
	1979	72	155.05	56	143.00	48	0.43	106	61.24	53
	1980	72	245.21	53	29.45	45	2.40	75	177.06	46
	1981	84	994.89	55	264.44	60	5.56	64	167.33	35
	1982	120	555.42	55	347.05	48	3.36	64	175.04	41
Coastwide	1978 ^a	464	248.18	59	359.21	56	3.28	80	48.42	48
	1979	504	265.26	60	528.75	58	7.00	82	77.61	53
	1980	504	355.82	59	319.66	61	9.59	59	97.30	50
	1981	588	465.16	50	526.69	61	24.06	58	74.43	50
	1982	840	514.42	55	1261.72	54	24.73	55	109.29	48

^aNo samples collected in June 1978.

Table 2. Mean catch rate (No./ha) and mean length (mm) of brown shrimp caught with bag seines in Texas bay systems during calendar year 1982 (blank = no measurement taken).

Month	Number samples ^a	Galveston		Matagorda		San Antonio		Aransas		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
Jan	(10)	13.33	37	0		0		0		0		0		24.14	53	6.32	42
Feb	(10)	0		0		0		0		0		0		0		0	
Mar	(10)	23.33	15	0		3.33	40	0		0		0		47.37	39	12.18	28
Apr	(10)	1246.67	45	240.00	45	510.00	38	630.10	38	1728.00	56	20.00	52	2242.86	63	943.99	48
May	(10)	4100.00	64	691.67	65	3143.33	50	2310.42	50	1864.00	58	520.00	61	850.91	61	2084.18	59
Jun	(10)	4493.33	67	113.33	69	1396.67	60	2108.51	61	941.67	59	42.50	69	1349.12	66	2011.64	65
Jul	(10)	256.67	61	76.67	70	543.33	46	361.70	53	218.75	54	32.50	80	663.27	59	352.71	61
Aug	(10)	483.33	51	298.33	58	103.33	48	558.33	58	82.00	52	17.50	54	494.00	56	325.93	54
Sep	(10)	30.00	64	18.33	36	1060.00	54	124.49	57	25.00	60	45.00	58	240.91	55	198.91	55
Oct	(10)	96.67	66	8.33	49	1923.33	56	50.00	67	80.00	58	57.50	74	414.00	59	123.44	62
Nov	(10)	343.33	52	0		230.00	50	18.00	40	9.30	54	5.00	71	274.51	59	147.30	54
Dec	(10)	0		0		0		0		0		0		40.00	40	5.51	40

^a10 samples per month in each bay system; 70 samples per month coastwide.

Table 3. Meancatch rate (No./ha) and mean length (mm) of white shrimp caught with bag seines in Texas bay systems during calendar year 1982 (blank = no measurement taken).

Month	Number samples ^a	Galveston		Matagorda		San Antonio		Aransas		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
Jan	(10)	50.00	51	0		0		0		0		0		62.07	67	19.78	57
Feb	(10)	0		0		0		0		0		0		0		0	
Mar	(10)	6.67	74	0		0		0		4.00	64	0		0		1.87	71
Apr	(10)	0		1.67	110	0		0		2.00	122	0		0		0.45	114
May	(10)	0		0		0		0		2.00	144	0		0		0.19	144
Jun	(10)	3.33	42	21.67	39	0		134.04	32	222.92	37	0		168.42	45	67.47	40
Jul	(10)	776.67	78	325.00	55	146.67	40	595.74	49	20.83	34	12.50	58	118.37	45	303.31	54
Aug	(10)	1020.00	52	1975.00	64	183.33	47	81.25	47	68.00	64	7.50	42	704.00	54	674.93	53
Sep	(10)	3270.00	51	1331.67	67	5363.33	44	1289.80	35	411.36	39	55.00	47	836.36	38	1947.43	47
Oct	(10)	28016.67	62	14396.67	64	203.33	69	1360.42	48	682.50	62	85.00	52	1114.00	56	9194.10	59
Nov	(10)	8523.33	47	2925.00	64	176.67	69	70.00	51	3397.67	56	7.50	49	1168.63	49	2881.54	54
Dec	(10)	930.00	49	18.33	61	3.33	57	54.00	45	48.94	54	0		0		224.54	53

^a10 samples per month in each bay system; 70 samples per month coastwide.

Table 4. Meancatch rate (No/ha) and mean length (mm) of pink shrimp caught with bag seines in Texas bay systems during calendar year 1982 (blank = no measurement taken).

Month	Number samples ^a	Galveston		Matagorda		San Antonio		Aransas		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
Jan	(10)	0		0		0		0		0		0		0		0	
Feb	(10)	0		0		0		4.26	43	12.50	52	0		0		1.78	47
Mar	(10)	0		0		0		0		0		7.50	67	7.02	85	4.18	64
Apr	(10)	0		0		0		57.14	66	284.00	49	0		0		34.80	59
May	(10)	0		0		0		0		94.00	44	0		0		8.80	44
Jun	(10)	0		0		0		208.51	56	0		0		0		30.02	56
Jul	(10)	0		0		0		76.60	33	0		0		0		10.95	33
Aug	(10)	0		0		0		622.92	44	184.00	39	0		0		106.89	42
Sep	(10)	0		0		0		281.63	47	27.73	39	0		0		42.67	44
Oct	(10)	0		0		0		108.33	57	112.50	55	50.00	63	0		51.15	59
Nov	(10)	0		0		0		128.00	41	79.7	47	2.50	45	33.33	44	30.72	44
Dec	(10)	0		0		0		0		10.64	47	27.50	57	0		4.34	53

^a10 samples per month in each bay system; 70 samples per month coastwide.

Table 5. Mean catch rate (No./ha) and mean width (mm) of blue crabs caught with bag seines in Texas bay systems during calendar year 1982 (blank - no measurement taken).

Month	Number samples ^a	Galveston		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
Jan	(10)	26.67	47	6.67	27	23.33	21	22.00	25	14.29	18	0		410.34	37	70.92	32
Feb	(10)	93.33	35	3.33	30	70.00	42	51.06	36	8.33	20	2.50	73	282.14	38	77.78	39
Mar	(10)	113.33	45	91.67	34	200.00	36	452.00	45	6.00	26	97.50	53	371.93	49	193.03	42
Apr	(10)	410.00	32	101.67	54	180.00	54	910.20	48	198.00	38	40.00	40	341.07	45	331.47	44
May	(10)	103.45	73	38.33	45	223.33	44	283.33	46	24.00	57	47.50	52	165.45	39	128.27	52
Jun	(10)	106.67	73	21.67	75	136.67	58	106.38	54	118.75	60	35.00	61	145.61	37	95.63	61
Jul	(10)	73.33	68	36.67	72	250.00	33	165.22	51	93.75	55	77.50	57	36.73	64	99.97	59
Aug	(10)	37.50	58	22.92	96	70.00	42	195.83	52	64.00	49	52.50	57	32.00	51	65.21	58
Sep	(10)	26.67	74	1.67	63	43.33	62	55.10	73	15.91	107	0		52.27	29	30.93	67
Oct	(10)	26.67	79	18.33	48	46.67	22	29.17	76	15.00	71	37.50	56	38.00	48	33.25	59
Nov	(10)	60.00	26	26.67	21	36.67	24	24.00	30	4.65	66	2.50	93	60.78	30	34.71	38
Dec	(10)	130.00	52	1.67	27	3.33	19	10.00	47	17.02	16	10.00	31	56.00	25	41.83	34

^a10 samples per month in each bay system; 70 samples per month coastwide.

Table 6. Mean catch rate (No./tow) and mean size (mm) of brown shrimp caught in Zone I with 6.1-m trawls in Texas bay systems during calendar year 1982 (blank = no measurement taken).

Month	Day	Number samples ^{a,b}	Galveston		Matagorda		San Antonio		Aransas		Corpus Christi		Coastwide	
			No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length
Jan	1-15	(5)	0.0				0.0			0.0				
	16-31	(5)	0.0				0.0			0.0				
Feb	1-15	(5)	0.2	68			0.0			0.0				
	16-31	(5)	0.0				0.0			0.0				
Mar	1-15	(5)	0.0				0.0			0.0				
	16-31	(5)	0.0				0.0			0.0				
Apr	1-15	(5)	0.4	86			0.0			0.0				
	16-30	(5)	0.2	93			0.0			0.4	43			
May	1-15	(5)	1.6	87	1.6	79	1.4	75	21.4	65	28.0	84	7.0	81
	16-31	(5)	18.4	83	1.4	110	32.0	92	65.0	78	105.8	89	31.6	90
Jun	1-15	(5)	10.6	96	36.6	96	13.0	104	73.8	79	31.2	84	26.4	93
	16-30	(5)	12.4	91	16.0	89	3.2	121	15.8	76	2.0	82	11.5	90
Jul	1-15	(5)	16.6	97	56.2	88	18.4	104	31.4	84	28.8	90	29.4	93
	16-31	(5)	25.8	103	12.6	101	26.8	99	2.4	90	16.2	89	19.0	99
Aug	1-15	(5)	17.8	104	0.0		4.4	102	3.4	100	4.6	99	9.1	102
	16-31	(5)	1.4	83	0.0		0.4	128	0.6	66	1.2	72	0.9	84
Sep	1-15	(5)	1.8	98	0.0		0.0		0.6	95	0.6	85	0.9	95
	16-30	(5)	0.0		0.0		0.8	77	0.8	89	0.0		0.2	83
Oct	1-15	(5)	0.2	98	0.0		1.2	89	1.2	72	0.0		0.3	92
	16-31	(5)	0.0		0.2	73	0.2	103	3.2	86	1.4	85	0.6	83
Nov	1-15	(5)	0.4	86	0.0		1.4	89	1.6	88	0.4	80	0.4	86
	16-30	(5)	0.4	93	0.0		0.0		2.8	90	0.6	90	0.5	92
Dec	1-15	(5)	2.4	78	0.0		0.2	83	2.0	81	0.0		1.3	79
	16-31	(5)	0.6	65	0.0		0.0		0.0		0.0		0.3	65

^aNumber samples per each bay system per each sampling period.

^bCoastwide sampling began May 1982.

Table 7. Mean catch rate (No./tow) and mean size (mm) of brown shrimp caught in Zone II with 6.1-m crawls in Texas bay systems during calendar year 1982 (blank = no measurement).

Month	Day	Number of samples ^{a,b}	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	1-15	(5)	0.0				0.0		1.0	72								
	16-31	(5)	0.0				0.0		0.0									
Feb	1-15	(5)	0.0				0.0		0.0									
	16-28	(5)	0.0				0.0		0.0									
Mar	1-15	(5)	0.0				0.0		0.0									
	16-31	(5)	0.0				0.0		0.0									
Apr	1-15	(5)	13.0	22			1.0	35	6.0	94								
	16-30	(5)	0.8	113			0.0		9.4	94								
May	1-15	(5)	0.0		0.8	79	0.2	83	38.8	63	6.4	79	19.6	80	0.0		4.3	78
	16-31	(5)	45.2	78	5.2	104	1.6	92	142.4	79	28.0	86	91.6	104	0.0		32.0	89
Jun	1-15	(5)	28.0	90	47.6	99	26.8	107	167.0	83	9.2	91	12.8	102	1.0	68	34.3	93
	16-30	(5)	34.2	97	15.2	98	13.2	96	20.8	78	0.4	76	5.6	105	2.0	56	17.6	91
Jul	1-15	(5)	13.4	95	0.4	106	27.4	104	20.4	84	2.6	97	4.0	122	0.8	86	10.3	100
	16-31	(5)	6.8	108	5.2	106	8.0	111	8.8	96	39.4	98	2.0	108	0.4	63	9.0	103
Aug	1-15	(5)	16.8	101	0.4	108	15.4	110	4.4	100	11.6	103	2.8	132	0.0		9.4	107
	16-31	(5)	2.4	93	0.0		0.0		0.4	103	1.2	100	1.2	106	0.0		1.0	98
Sep	1-15	(5)	0.4	100	0.0		0.0		2.6	98	0.2	63	1.2	85	0.0		0.4	91
	16-30	(5)	0.0		0.0		0.0		0.0		0.0		0.8	98	0.0		<0.1	98
Oct	1-15	(5)	0.2	90	0.0		0.2	93	5.6	92	0.4	83	0.0		0.2	63	0.5	87
	16-31	(5)	1.4	89	0.0		0.0		2.0	85	1.8	87	3.6	85	3.0	64	1.2	85
Nov	1-15	(5)	0.4	83	0.2	98	1.2	98	0.8	89	2.4	94	2.8	102	1.8	71	0.9	91
	16-30	(5)	0.2	78	0.2	88	0.2	88	6.8	88	0.6	90	0.8	96	12.4	56	1.6	83
Dec	1-15	(5)	0.0		0.2	98	0.2	83	0.2	93	0.0		2.1	98	3.2	63	0.4	89
	16-31	(5)	0.0		0.0		0.0		0.0		0.0		1.2	85	0.0		<0.1	85

^aNumber samples per each bay system per each sampling period.

^bCoastwide sampling began May 1982.

Table 8. Mean catch rate (No./tow) and mean length (mm) of brown shrimp caught in Zone III with 6.1-m trawls in Texas bay systems during calendar year 1982 (blank = no measurement taken).

Month	Day	Number samples ^a	CALVESTON		MATACORDA			ARANSAS			CORPUS CHRISTI		LOWER LAGUNA MADRE		
			Bolivar Roads		Number samples	Pass Cavallo		Lydia Ann Channel		Corpus Christi Channel		Number samples	Brazos Santiago Pass		
			No./tow	Length		No./tow	Length	No./tow	Length	No./tow	Length		No./tow	Length	
Jan	1-15	(4)	0.0												
	16-31	(4)	0.0												
Feb	1-15	(4)	0.0												
	16-28	(4)	0.0												
Mar	1-15	(4)	0.0												
	16-31	(6)	0.0												
Apr	1-15	(4)	0.0					0.3	103						
	16-30	(4)	0.0					0.0							
May	1-15	(4)	0.3	125	(4)	0.0		0.5	73	(4)	1.3	41	(4)	0.3	60
	16-31	(4)	6.3	86	(4)	0.5	95	11.3	90	(4)	0.0		(4)	3.8	76
Jun	1-15	(6)	3.3	91	(4)	10.0	97	10.7	82	(6)	0.3	88	(4)	0.5	55
	16-30	(4)	0.3	103	(6)	2.0	108	0.5	90	(4)	0.0		(4)	0.3	105
Jul	1-15	(4)	0.3	103	(4)	0.5	115	0.5	88	(4)	0.0		(4)	4.3	82
	16-31	(4)	0.3	123	(4)	0.0		0.0		(4)	0.0		(4)	0.0	
Aug	1-15	(4)	0.3	108	(4)	0.8	106	0.0		(4)	0.8	96	(4)	0.0	
	16-31	(6)	0.7	110	(6)	0.0		0.0		(6)	0.0		(6)	0.0	
Sep	1-15	(4)	0.5	84	(4)	0.0		0.0		(4)	0.0		(4)	0.3	113
	16-30	(4)	0.0		(4)	0.0		0.0		(4)	0.0		(4)	0.0	
Oct	1-15	(4)	5.3	99	(4)	4.3	82	5.8	91	(4)	0.3	62	(4)	0.0	
	16-31	(4)	0.3	88	(4)	0.0		3.3	86	(4)	0.0		(4)	3.0	64
Nov	1-15	(4)	1.0	97	(4)	0.5	100	11.8	91	(6)	0.5	76	(4)	3.5	75
	16-30	(6)	0.2	88	(6)	0.2	88	0.3	88	(4)	0.0		(4)	1.3	72
Dec	1-15	(4)	0.0		(4)	0.0		2.5	91	(4)	0.0		(4)	0.5	68
	16-31	(4)	0.0		(4)	0.5	95	0.0		(4)	0.0		(4)	2.0	88

^a Number of samples per each bay system per each sampling period.

Table 9. Mean catch rate (No./tow) and mean size (mm) of white shrimp caught in Zone 1 with 6.1-m trawls in Texas bay systems during calendar year 1982 (blank = no measurement taken).

Month	Day	Number samples ^{a b}	Galveston		Matagorda		San Antonio		Aransas		Corpus Christi		Coastwide	
			No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length
Jan	1-15	(5)	0.4	98			8.0	76	8.4	79				
	16-31	(5)	0.8	87			0.0		0.0					
Feb	1-15	(5)	3.8	65			0.0		0.2	73				
	16-28	(5)	1.0	84			0.0		0.0					
Mar	1-15	(5)	0.8	83			0.0		0.2	88				
	16-31	(5)	0.8	91			1.0	93	3.2	88				
Apr	1-15	(5)	45.2	108			0.6	108	1.2	116				
	16-30	(5)	13.2	114			0.0		5.6	119				
May	1-15	(5)	23.6	87	9.2	104	0.0		8.6	130	7.2	144	14.3	104
	16-31	(5)	14.0	118	10.8	94	0.2	152	5.4	146	4.0	154	9.8	123
Jun	1-15	(5)	2.8	115	0.2	157	0.0		0.8	157	2.2	158	1.6	137
	16-30	(5)	0.0		0.4	73	0.0		0.0		0.2	153	0.1	101
Jul	1-15	(5)	0.0		5.4	97	0.8	94	1.0	76	1.2	136	1.6	101
	16-31	(5)	11.2	101	6.2	103	14.6	100	2.6	104	27.8	99	11.5	101
Aug	1-15	(5)	40.8	97	2.0	131	15.8	106	3.2	106	8.4	102	20.1	107
	16-31	(5)	25.8	107	1.6	106	5.2	112	0.0		72.2	97	21.2	106
Sep	1-15	(5)	6.2	101	7.4	112	4.4	116	4.4	121	22.0	99	8.1	107
	16-30	(5)	9.2	104	14.4	105	12.4	115	0.8	136	3.2	86	8.7	106
Oct	1-15	(5)	8.2	99	4.4	115	12.4	96	1.0	91	5.2	85	6.5	100
	16-31	(5)	23.8	100	5.8	84	20.6	102	16.6	95	21.4	94	18.1	95
Nov	1-15	(5)	156.0	95	7.8	112	24.6	92	3.6	96	4.8	92	73.0	98
	16-30	(5)	66.2	89	0.4	73	4.8	98	21.4	87	4.2	90	32.1	86
Dec	1-15	(5)	134.4	78	3.6	92	1.5	78	5.6	93	1.4	79	60.0	83
	16-31	(5)	61.0	74	0.2	83	1.6	71	0.0		0.2	68	26.7	75

^a Number of samples per each bay system per each sampling period.

^b Coastwide sampling began May 1982.

Table 10. Mean catch rate (No./tow) and mean size (mm) of white shrimp caught in Zone II with 6.1-m trawls in Texas bay systems during calendar year 1982 (blank = no measurement taken).

Month	Day	Number of samples ^{ab}	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	1-15	(5)	11.4	84			2.6	89	11.6	75								
	16-31	(5)	1.8	92			0.0		0.0									
Feb	1-15	(5)	4.6	85			0.0		0.2	83								
	16-28	(5)	0.4	98			0.0		0.0									
Mar	1-15	(5)	2.0	86			0.0		0.0									
	16-31	(5)	1.8	104			0.8	107	1.2	87								
Apr	1-15	(5)	12.2	110			0.0		5.2	111								
	16-30	(5)	7.0	121			0.0		2.2	122								
May	1-15	(5)	2.4	141	0.0		0.0		0.4	126	0.2	148	0.0		0.0		0.8	140
	16-31	(5)	5.2	132	0.4	152	0.0		0.6	150	0.4	140	0.0		0.0		1.8	140
Jun	1-15	(5)	0.6	133	1.0	154	0.0		0.4	156	0.0		0.0		1.0	128	0.4	141
	16-30	(5)	0.0		0.2	158	0.0		0.0		0.0		0.0		0.0		<0.1	158
Jul	1-15	(5)	0.0		0.0		0.0		3.0	68	0.2	168	0.4	113	0.0		0.3	123
	16-31	(5)	0.0		0.2	123	5.4	101	0.4	93	0.4	181	3.2	92	0.0		1.2	119
Aug	1-15	(5)	4.6	109	3.2	133	4.6	108	3.6	123	2.0	130	10.4	102	0.0		4.2	116
	16-31	(5)	14.6	106	0.0		1.0	129	0.0		1.4	139	1.0	111	0.0		5.1	117
Sep	1-15	(5)	0.6	125	0.4	148	0.2	153	0.8	134	0.2	168	12.6	119	0.0		1.6	139
	16-30	(5)	10.8	94	1.0	110	0.8	136	0.4	130	0.2	113	1.4	119	0.0		4.0	111
Oct	1-15	(5)	51.2	90	0.0		0.0		0.6	108	2.6	110	1.8	132	0.0		17.0	103
	16-31	(5)	30.2	95	2.0	104	2.2	113	10.8	91	2.8	107	1.0	70	25.6	56	12.5	95
Nov	1-15	(5)	30.4	94	1.2	104	13.8	97	1.4	103	5.8	114	0.2	78	0.4	68	12.8	95
	16-30	(5)	84.2	85	233.8	81	4.8	98	54.6	86	1.4	108	0.2	108	0.4	88	75.4	91
Dec	1-15	(5)	12.2	76	2.6	98	0.6	93	3.6	72	0.8	93	0.4	88	3.2	97	5.0	87
	16-31	(5)	28.4	80	2.8	86	0.0		0.0		0.0		0.4	106	0.0		<0.1	85

^aNumber of samples per each bay system per each sampling period.

^bCoastwide sampling began in May 1982.

Table 11. Mean catch rate (No./tow) and mean length (mm) of white shrimp caught in Zone III with 0.1-m trawls in Texas bay systems during calendar year 1982 (blank = no measurement taken).

Month	Day	Number ^a samples	GALVESTON		MATAGORDA		ARANSAS		CORPUS CHRISTI		LOWER LAGUNA MADRE				
			Bolivar Roads		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	1-15	(4)	13.8	92			(4)	30.5	88						
	16-31	(4)	0.8	93			(4)	0.3	78						
Feb	1-15	(4)	6.3	87			(4)	4.5	82						
	16-28	(4)	12.8	92			(4)	0.3	88						
Mar	1-15	(4)	8.3	98			(4)	0.0							
	16-31	(6)	1.7	139			(6)	0.0							
Apr	1-15	(4)	5.0	145			(4)	0.5	130						
	16-30	(4)	2.0	148			(4)	0.0							
May	1-15	(4)	2.5	145	(4)	0.0	(4)	0.0		(4)	0.0	(4)	0.3	138	
	16-31	(4)	1.0	124	(4)	0.0	(4)	0.0		(4)	0.0	(4)	0.0		
Jun	1-15	(6)	8.7	147	(4)	0.3	183	(6)	0.3	165	(6)	0.0	(4)	0.0	
	16-30	(4)	0.5	143	(6)	1.3	167	(4)	0.0		(4)	0.0	(4)	0.5	167
Jul	1-15	(4)	0.3	168	(4)	0.0		(4)	0.0		(4)	0.0	(4)	0.0	
	16-31	(4)	0.3	143	(4)	0.0		(4)	0.0		(4)	0.0	(4)	0.0	
Aug	1-15	(4)	0.3	133	(4)	0.0		(4)	0.0		(4)	0.0	(4)	0.0	
	16-31	(6)	0.7	130	(6)	0.0		(6)	0.0		(6)	0.0	(6)	0.0	
Sep	1-15	(4)	2.8	134	(4)	0.0		(4)	1.3	140	(4)	0.0	(4)	0.3	113
	16-30	(4)	0.0		(4)	0.0		(4)	0.3	148	(4)	0.0	(4)	0.0	
Oct	1-15	(4)	35.5	108	(4)	4.5	84	(4)	0.3	148	(4)	0.0	(4)	0.0	
	16-31	(4)	34.5	120	(4)	0.5	138	(4)	1.5	120	(4)	0.0	(4)	0.3	138
Nov	1-15	(4)	48.0	104	(4)	0.8	126	(6)	28.5	87	(6)	0.0	(4)	0.0	
	16-31	(6)	80.3	93	(6)	14.5	98	(4)	3.6	89	(4)	0.3	53	(6)	0.3
Dec	1-15	(4)	14.0	89	(4)	0.5	95	(4)	65.3	81	(4)	0.0	(4)	0.8	78
	16-31	(4)	97.3	84	(4)	2.0	95	(4)	1.3	74	(4)	0.0	(4)	0.0	

^aNumber of samples per each bay system per each sampling period.

Table 12. Mean catch rate (No./tow) and mean size (mm) of pink shrimp caught in Zone I with 6.1-m trawls in Texas bay systems during calendar year 1982 (blank = no measurement taken).

Month	Day	Number of samples ^{ab}	Galveston		Matagorda		San Antonio		Aransas		Corpus Christi		Coastwide	
			No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length
Jan	1-15	(5)	0.0				0.0		0.0					
	16-31	(5)	0.0				0.0		0.0					
Feb	1-15	(5)	0.0				0.0		0.0					
	16-28	(5)	0.0				0.0		0.0					
Mar	1-15	(5)	0.0				0.0		0.0					
	16-31	(5)	0.0				0.0		0.2	68				
Apr	1-15	(5)	0.0				0.0		1.8	84				
	16-30	(5)	0.0				0.0		0.0					
May	1-15	(5)	0.0		0.0		0.0		0.2	83	1.8	124	0.2	105
	16-31	(5)	0.0		0.0		0.0		0.0		4.0	110	0.5	110
Jun	1-15	(5)	0.0		0.0		0.0		0.0		0.0		0	
	16-30	(5)	0.0		0.0		0.0		0.0		0.0		0	
Jul	1-15	(5)	0.0		0.0		0.0		0.0		0.0		0	
	16-31	(5)	0.0		0.0		0.0		0.0		0.0		0	
Aug	1-15	(5)	0.0		0.0		0.0		0.0		0.0		0	
	16-31	(5)	0.0		0.0		0.0		0.2	32	0.0		<0.1	33
Sep	1-15	(5)	0.0		0.0		0.0		0.0		0.0		0	
	16-30	(5)	0.0		0.0		0.0		0.0		0.0		0	
Oct	1-15	(5)	0.0		0.2	108	0.0		0.0		0.0		<0.1	108
	16-31	(5)	0.0		0.0		0.0		0.2	58	0.0		<0.1	58
Nov	1-15	(5)	0.0		0.0		0.0		0.0		0.6	91	<0.1	91
	16-30	(5)	0.2	88	0.0		0.0		0.0		0.2	68	0.1	83
Dec	1-15	(5)	0.0		0.0		0.0		0.2	83	0.2	103	<0.1	94
	16-31	(5)	0.0		0.2	123	0.0		0.2	73	0.0		<0.1	108

^aNumber of samples per each bay system per each sampling period.

^bCoastwide sampling began May 1982.

Table 13. Mean catch rate (No./tow) and mean size (mm) of pink shrimp caught in Zone II with 6.1-m trawls in Texas bay systems during calendar year 1982 (blank = no measurement taken).

Month	Day	Number of samples ^{ab}	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	1-15	(5)	0.0				0.0		0.2	48								
	16-31	(5)	0.0				0.0		0.0									
Feb	1-15	(5)	0.0				0.0		0.0									
	16-28	(5)	0.0				0.0		0.0									
Mar	1-15	(5)	0.0				0.0		0.2	48								
	16-31	(5)	0.0				0.0		1.8	71								
Apr	1-15	(5)	0.2	99			1.0	92	25.0	89								
	16-31	(5)	0.2	110			0.0		29.0	97								
May	1-15	(5)	0.0		0.0		0.0		3.0	97	1.6	98	0.0		0.0		0.3	98
	16-31	(5)	0.0		0.0		0.0		0.0		3.8	89	0.0		0.0		0.4	89
Jun	1-15	(5)	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
	16-30	(5)	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Jul	1-15	(5)	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
	16-31	(5)	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Aug	1-15	(5)	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
	16-31	(5)	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Sep	1-15	(5)	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
	16-30	(5)	0.0		0.0		0.0		0.0		0.0		0.0		0.0		0.0	
Oct	1-15	(5)	0.0		0.0		0.0		0.2	78	0.0		0.0		0.0		<0.1	78
	16-31	(5)	0.0		0.0		0.0		0.6	76	0.0		0.0		0.0		<0.1	76
Nov	1-15	(5)	0.0		0.0		0.0		0.2	88	1.0	107	0.2	78	0.0		0.1	76
	16-31	(5)	0.4	86	0.0		0.0		17.0	81	0.4	86	0.2	108	0.0		1.3	88
Dec	1-15	(5)	0.0		0.0		0.0		0.8	69	0.6	55	0.4	88	0.0		0.2	71
	16-31	(5)	0.0		0.0		0.0		0.0		0.0		0.4	108	0.0		<0.1	108

^aNumber of samples per each bay system per each sampling period.

^bCoastwide sampling began May 1982.

Table 14. Mean catch rate (No./tow) and mean length (mm) of pink shrimp caught in Zone III with 6.1-m trawls in Texas bay systems during calendar year 1982 (blank = no measurement taken).

Month	Day	GALVESTON			MATAGORDA			ARANSAS			CORPUS CHRISTI			LOWER LAGUNA MADRE		
		Number samples	Bolivar Roads		Number samples	Pass Cavallo		Lydia Ann Channel		Number samples	Corpus Christi Channel		Number samples	Brazos Santiago Pass		
			No./tow	Length		No./tow	Length	No./tow	Length		No./tow	Length		No./tow	Length	
Jan	1-15	(4)	0.0						0.0							
	16-31	(4)	0.0						0.0							
Feb	1-15	(4)	0.0					0.3	83							
	16-28	(4)	0.0					0.0								
Mar	1-15	(4)	0.0					0.3	53							
	16-31	(6)	0.7	112				0.0								
Apr	1-15	(4)	0.0					5.0	87							
	16-30	(4)	0.7	114				0.3	78							
May	1-15	(4)	3.5	113	(4)	0.0		0.3	108	(4)	0.5	85	(4)	0.0		0.0
	16-31	(4)	0.0		(4)	0.0		0.0		(4)	0.0		(4)	0.0		0.0
Jun	1-15	(6)	0.0		(4)	0.0		0.0		(6)	0.0		(4)	0.0		0.0
	16-30	(4)	0.0		(6)	0.0		0.0		(4)	0.0		(4)	0.0		0.0
Jul	1-15	(4)	0.0		(4)	0.0		0.0		(4)	0.0		(4)	0.0		0.0
	16-31	(4)	0.0		(4)	0.0		0.0		(4)	0.0		(4)	0.0		0.0
Aug	1-15	(4)	0.0		(4)	0.0		0.0		(4)	0.0		(4)	0.0		0.0
	16-31	(6)	0.0		(6)	0.0		0.0		(6)	0.0		(4)	0.0		0.0
Sep	1-15	(4)	0.0		(4)	0.0		0.0		(4)	0.0		(4)	0.0		0.0
	16-30	(4)	0.0		(4)	0.0		0.0		(4)	0.0		(4)	0.0		0.0
Oct	1-15	(4)	0.5	92	(4)	0.3	93	0.3	78	(4)	0.0		(4)	0.8		83
	16-31	(4)	0.0		(4)	0.0		0.0		(4)	0.0		(4)	1.5		76
Nov	1-15	(4)	0.0		(4)	0.0		0.3	93	(6)	1.0	62	(6)	0.0		0.0
	16-31	(6)	0.2	113	(6)	0.7	85	4.3	81	(4)	0.5	65	(4)	0.0		0.0
Dec	1-15	(4)	0.3	98	(4)	0.0		6.3	88	(4)	0.0		(4)	0.0		0.0
	16-31	(4)	0.3	113	(4)	0.0		1.3	77	(4)	0.3	83	(4)	0.0		0.0

^aNumber of samples per each bay system per each sampling period.

Table 15. Mean catch rate (No./tow) and mean width (mm) of blue crabs caught in Zone 1 with 6.1-m trawls in Texas bay systems during calendar year 1982 (blank = no measurement taken).

Month	Day	Number of samples ^{ab}	Galveston		Matagorda		San Antonio		Aransas		Corpus Christi		Coastwide	
			No./tow	Width	No./tow	Width	No./tow	Width	No./tow	Width	No./tow	Width	No./tow	Width
Jan	1-15	(5)	0.0				0.6	70	1.8	50				
	16-31	(5)	0.4	98			24.8	45	39.2	43				
Feb	1-15	(5)	2.6	44			0.8	28	5.2	58				
	16-28	(5)	0.2	22			5.6	79	1.2	97				
Mar	1-15	(5)	0.6	170			1.4	69	11.6	39				
	16-31	(5)	0.4	180			27.0	55	27.0	49				
Apr	1-15	(5)	9.8	93			6.6	76	2.8	91				
	16-30	(5)	1.6	50			4.6	78	18.8	79				
May	1-15	(5)	24.2	76	3.2	83	1.6	91	29.8	77	6.0	86	15.4	80
	16-31	(5)	27.8	92	8.0	84	5.8	107	15.8	92	20.0	79	18.8	90
Jun	1-15	(5)	44.4	112	4.2	96	15.4	87	12.0	84	2.0	120	23.3	140
	16-30	(5)	34.8	98	1.8	80	3.6	113	2.2	70	0.4	134	16.2	97
Jul	1-15	(5)	20.8	116	4.2	96	18.2	86	4.8	84	5.6	89	12.9	102
	16-31	(5)	8.6	93	2.4	101	9.6	114	0.2	56	4.2	129	5.8	97
Aug	1-15	(5)	13.4	85	0.2	138	1.0	103	7.0	78	0.0		6.7	101
	16-31	(5)	7.4	93	0.2	51	0.2	65	0.4	55	0.2	65	3.4	73
Sep	1-15	(5)	4.0	74	0.0		1.2	103	0.8	118	3.4	108	2.4	89
	16-30	(5)	2.8	90	0.0		2.2	148	1.0	141	0.6	142	1.6	113
Oct	1-15	(5)	1.6	69	0.0		1.2	135	0.8	124	0.6	163	1.0	100
	16-31	(5)	3.2	90	0.0		2.6	101	2.0	109	0.0		1.8	95
Nov	1-15	(5)	2.6	132	0.4	100	3.0	70	0.0		0.0		1.5	114
	16-30	(5)	1.6	128	0.0		0.6	150	5.2	153	0.0		1.3	135
Dec	1-15	(5)	3.2	53	0.2	90	1.0	114	1.4	124	0.2	174	1.7	90
	16-31	(5)	0.4	116	0.0		1.0	64	0.0		0.0		0.3	107

^aNumber of samples per each bay system per each sampling period.

^bCoastwide sampling began May 1982.

Table 16. Mean catch rate (No./tow) and mean width (mm) of blue crabs caught in Zone II with 6.1-m trawls in Texas bay systems during calendar year 1982 (blank = no measurement taken).

Month	Day	Number of samples ^a	Calveston		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	1-15	(5)	2.6	153			0.0		4.0	40								
	16-31	(5)	0.0				2.2	38	1.4	56								
Feb	1-15	(5)	0.2	21			0.0		2.0	106								
	16-28	(5)	0.4	180			0.0		0.2	35								
Mar	1-15	(5)	0.4	118			0.2	27	1.4	32								
	16-31	(5)	1.0	112			13.4	64	17.6	44								
Apr	1-15	(5)	13.8	35			6.0	70	53.2	54								
	16-30	(5)	4.0	55			2.4	80	28.8	67								
May	1-15	(5)	0.8	79	0.2	85	1.0	104	10.4	61	3.8	82	0.2	127	5.6	97	1.7	89
	16-31	(5)	12.4	73	4.4	94	1.4	99	12.8	75	2.2	110	0.6	174	10.8	76	6.5	95
Jun	1-15	(5)	28.8	75	3.0	127	9.6	100	4.8	82	3.2	120	0.4	102	7.2	96	12.2	98
	16-30	(5)	29.0	96	4.2	127	6.2	112	4.0	102	1.0	116	1.4	83	4.8	86	11.7	105
Jul	1-15	(5)	6.0	105	1.2	132	7.4	115	1.2	69	1.0	99	0.2	109	11.2	112	3.9	110
	16-31	(5)	2.0	92	1.4	132	2.2	95	3.0	92	4.0	127	1.6	170	6.6	106	2.2	112
Aug	1-15	(5)	4.4	84	0.2	127	5.0	131	1.8	100	0.4	132	1.4	141	10.0	97	2.9	112
	16-31	(5)	3.6	77	0.0		0.0		1.2	74	0.0		2.6	157	5.2	93	1.7	93
Sep	1-15	(5)	3.8	74	0.4	114	0.2	136	0.4	102	0.0		2.0	157	4.0	134	1.7	109
	16-30	(5)	0.4	94	1.0	70	0.0		0.4	71	0.0		0.6	147	2.0	151	0.5	99
Oct	1-15	(5)	1.8	71	0.0		0.0		0.2	82	0.6	150	2.0	165	4.4	106	1.0	102
	16-31	(5)	1.8	92	0.0		0.0		0.8	106	0.0		1.2	151	1.2	135	0.8	110
Nov	1-15	(5)	0.8	85	0.0		1.0	93	0.2	164	0.4	148	1.2	142	2.0	137	0.7	113
	16-30	(5)	0.6	106	0.4	72	0.2	39	1.0	116	0.0		1.6	154	4.0	89	0.7	93
Dec	1-15	(5)	0.4	31	0.0		0.0		1.0	120	0.2	16	0.6	149	1.2	27	0.3	55
	16-31	(5)	0.8	140	0.0		0.0		1.0	127	0.0		0.0		1.6	154	0.4	140

^aNumber of samples per each bay system per each sampling period.

^bCoastwide sampling began May 1982.

Table 17. Mean catch rate (No./tow) and mean width (mm) of blue crabs caught in Zone III with 6.1-m trawls in Texas bay systems during calendar year 1982 (blank = no measurement taken).

Month	Day	Number samples ^a	Galveston		Number samples	Matagorda		Aransas		Number samples	Corpus Christi		Lower Laguna Madre		
			Bolivar Roads No./tow	Roads Width		Pass Cavallo No./tow	Width	Lydia Ann Channel No./tow	Width		Corpus Christi Channel No./tow	Width	Number samples	Brazos Pass No./tow	Santiago Width
Jan	1-15	(4)	2.5	67				0.8	118						
	16-31	(4)	0.0					0.2	78						
Feb	1-15	(4)	1.8	60				0.5	114						
	16-28	(4)	0.5	42				0.2							
Mar	1-15	(4)	2.0	147				2.2	157						
	16-31	(6)	3.3					5.3	98						
Apr	1-15	(4)	3.5	125				12.8	139						
	16-30	(4)	1.2	119				0.2	162						
May	1-15	(4)	2.0	99	(4)	0.0		1.5	86	(4)	9.0	72	(4)	0.2	158
	16-31	(4)	1.2	133	(4)	0.2	84	4.0	94	(4)	1.0	153	(4)	2.8	83
Jun	1-15	(6)	7.5	138	(4)	1.8	84	3.3	105	(6)	6.2	91	(4)	0.5	123
	16-30	(4)	14.2	137	(6)	2.2	88	7.0	121	(4)	8.8	112	(4)	3.8	123
Jul	1-15	(4)	1.8	138	(4)	1.5	146	2.0	103	(4)	4.0	126	(4)	2.5	119
	16-31	(4)	6.5	148	(4)	0.0		4.8	134	(4)	4.0	126	(4)	1.8	142
Aug	1-15	(4)	12.2	125	(4)	0.2	127	2.2	126	(4)	8.2	134	(4)	2.8	140
	16-31	(6)	0.2	167	(6)	0.2	114	0.2	163	(6)	2.7	134	(6)	1.5	131
Sep	1-15	(4)	0.2	78	(4)	0.0		0.8	125	(4)	0.8	134	(4)	4.2	135
	16-30	(4)	0.0		(4)	0.0		0.0		(4)	0.0		(4)	0.5	146
Oct	1-15	(4)	0.0		(4)	0.0		0.8	127	(4)	0.2	26	(4)	0.2	165
	16-31	(4)	0.0		(4)	0.0		1.0	118	(4)	0.5	126	(4)	0.0	
Nov	1-15	(4)	1.5	119	(4)	0.0		0.5	66	(6)	0.2	133	(4)	0.0	
	16-30	(6)	0.7	149	(6)	0.3	49	1.8	126	(4)	0.2	21	(6)	0.2	99
Dec	1-15	(4)	0.8	52	(4)	0.0		1.5	106	(4)	0.2	92	(4)	0.0	
	16-31	(4)	4.2	103	(4)	0.5	52	0.5	164	(4)	0.5	110	(4)	0.2	165

^aNumber of samples per bay system per sampling period.

Table 18. Seasonal (June 15–July 15) mean catch rate (No./h) and mean length (mm) of shrimp caught with Gulf trawls during night along the central Texas coast, 1978–1982 (blank = no measurement taken).

Depth zone (m)	Year	Number samples	Brown shrimp		White shrimp		Pink shrimp	
			No./h	Length	No./h	Length	No./h	Length
11-18	1978	6	2618.7	90	63.0	174	8.3	110
	1979	1	4.0	135	0.0		0.0	
	1980	3	3059.7	100	6.0	168	29.3	131
	1981	3	1965.3	96	47.3	167	19.3	127
	1982	5	2496.2	105	6.4	178	232.8	137
20-27	1978	7	3617.7	98	0.0		1.1	122
	1979	1	358.0	120	0.0		0.0	
	1980	3	725.3	100	0.0		27.3	130
	1981	3	2469.3	112	3.3	188	0.0	
	1982	5	1978.8	117	0.0		8.8	141
29-37	1978	3	1352.0	109	0.0		0.0	
	1979	1	94.0	122	0.0		0.0	
	1980	3	803.3	112	0.0		0.7	172
	1981	2	1649.0	115	0.0		0.0	
	1982	5	689.2	101	0.0		0.0	
38-46	1978	3	1490.7	112	0.0		0.0	
	1979	1	80.0	132	0.0		0.0	
	1980	3	114.0	135	0.0		0.0	
	1981	1	380.0	111	0.0		0.0	
	1982	2	57.0	140	0.0		0.0	
11-46 combined	1978	19	2608.6	98	19.9	174	3.0	112
	1979	4	134.0	122	0.0		0.0	
	1980	12	1175.3	103	1.5	168	14.3	131
	1981	9	1886.9	107	16.9	168	6.4	127
	1982	17	1525.6	109	1.9	178	71.0	137

Table 19. Seasonal (November-February) mean catch rate (No./h) and mean length (mm) of shrimp caught in the Gulf during day along the central Texas coast in 5-18 m deep water, 1977-78 through 1982-83 (blank = no measurement taken).

Year	Number samples	Brown shrimp		White shrimp		Pink shrimp	
		No./h	Length	No./h	Length	No./h	Length
77-78	17	26.0	90	353.0	120	18.9	98
78-79 ^a	7	0.0		854.6	107	4.6	106
79-80 ^b	10	1.4	88	446.7	103	7.9	98
80-81	21	9.1	109	166.5	117	19.4	98
81-82	38	8.7	90	470.5	104	7.9	89
82-83	34	4.0	93	264.5	110	4.1	101

^aNo samples in February

^bNo samples in November

Table 20. Mean catch rate (No./h) and mean length (mm) of brown shrimp caught with Gulf trawls in the Texas territorial sea (within 16.7 km) during January 1982-February 1983 (blank = no measurement taken).

Month	Year	AREA 19						AREA 20					
		DAY			NIGHT			DAY			NIGHT		
		No. of samples	No./h	Mean length	No. of samples	No./h	Mean length	No. of samples	No./h	Mean length	No. of samples	No./h	Mean length
Jan	1982	0			0			8	6.0	87	4	26.0	125
Feb		0			0			8	0.0		4	2.5	102
Mar		0			0			8	0.0		4	7.5	126
Apr		0			0			6	49.0	151	2	30.0	129
May		10	68.0	95	0			10	60.0	93	0		
Jun		10	13.2	88	4	3669.2	102	5	992.8	110	4	2532.0	104
Jul		0			0			0			7	1755.9	116
Aug		0			0			0			0		
Sep		0			0			0			0		
Oct		0			0			0			0		
Nov		5	0.8	169	5	0.8	73	5	35.2	110	5	8.0	100
Dec		5	5.6	87	5	1.6	105	5	6.4	96	5	4.8	83
Jan	1983	5	0.0		5	4.0	90	5	6.4	85	5	7.2	86
Feb		5	0.0		5	6.4	113	5	0.8	98	5	1.6	126

Table 21. Mean catch rate (No./h) and mean length (mm) of white shrimp caught with Gulf trawls in the Texas territorial sea (within 16.7 km) during January 1982-February 1983 (blank = no measurement taken).

Month	Year	AREA 19						AREA 20					
		DAY			NIGHT			DAY			NIGHT		
		No. of samples	No./h	Mean length	No. of samples	No./h	Mean length	No. of samples	No./h	Mean length	No. of samples	No./h	Mean length
Jan	1982	0			0			8	999.9	99	4	56.5	133
Feb		0			0			8	334.5	96	4	287.0	106
Mar		0			0			8	111.0	114	4	109.0	126
Apr		0			0			6	33.0	135	2	28.0	170
May		10	16.8	174	0			10	60.8	166	0		
Jun		10	17.2	164	4	3.8	173	5	39.2	170	4	20.2	174
Jul		0			0			0			7	0.0	
Aug		0			0			0			0		
Sep		0			0			0			0		
Oct		0			0			0			0		
Nov		5	682.4	111	5	488.0	118	5	188.6	110	5	552.0	112
Dec		5	180.8	124	5	448.8	126	5	85.6	126	5	793.5	105
Jan	1983	5	241.6	104	5	196.0	121	5	96.8	124	5	526.0	111
Feb		5	37.6	133	5	21.6	148	5	365.6	102	5	299.2	108

Table 22. Mean catch rate (No./h) and mean length (mm) of pink shrimp caught with Gulf trawls in the Texas territorial sea (within 16.7 km) during January-1982-February 1983 (blank = no measurement taken).

Month	Year	AREA 19						AREA 20					
		DAY			NIGHT			DAY			NIGHT		
		No. of samples	No./h	Mean length	No. of samples	No./h	Mean length	No. of samples	No./h	Mean length	No. of samples	No./h	Mean length
Jan	1982	0			0			8	7.5	90	4	14.0	99
Feb		0			0			8	0.8	97	4	0.0	
Mar		0			0			8	0.8	75	4	20.0	114
Apr		0			0			6	140.8	91	2	19.0	144
May		10	3.2	124	0			10	114.8	102	0		
Jun		10	0.8	156	4	11.2	138	5	46.4	133	4	206.0	135
Jul		0			0			0			7	57.1	141
Aug		0			0			0			0		
Sep		0			0			0			0		
Oct		0			0			0			0		
Nov		5	0.0		5	1.6	92	5	0.8	108	5	156.0	99
Dec		5	3.2	110	5	0.8	110	5	21.6	100	5	41.6	98
Jan	1983	5	0.0		5	6.4	99	5	3.2	104	5	23.8	116
Feb		5	0.0		5	0.0		5	13.6	84	5	8.0	96

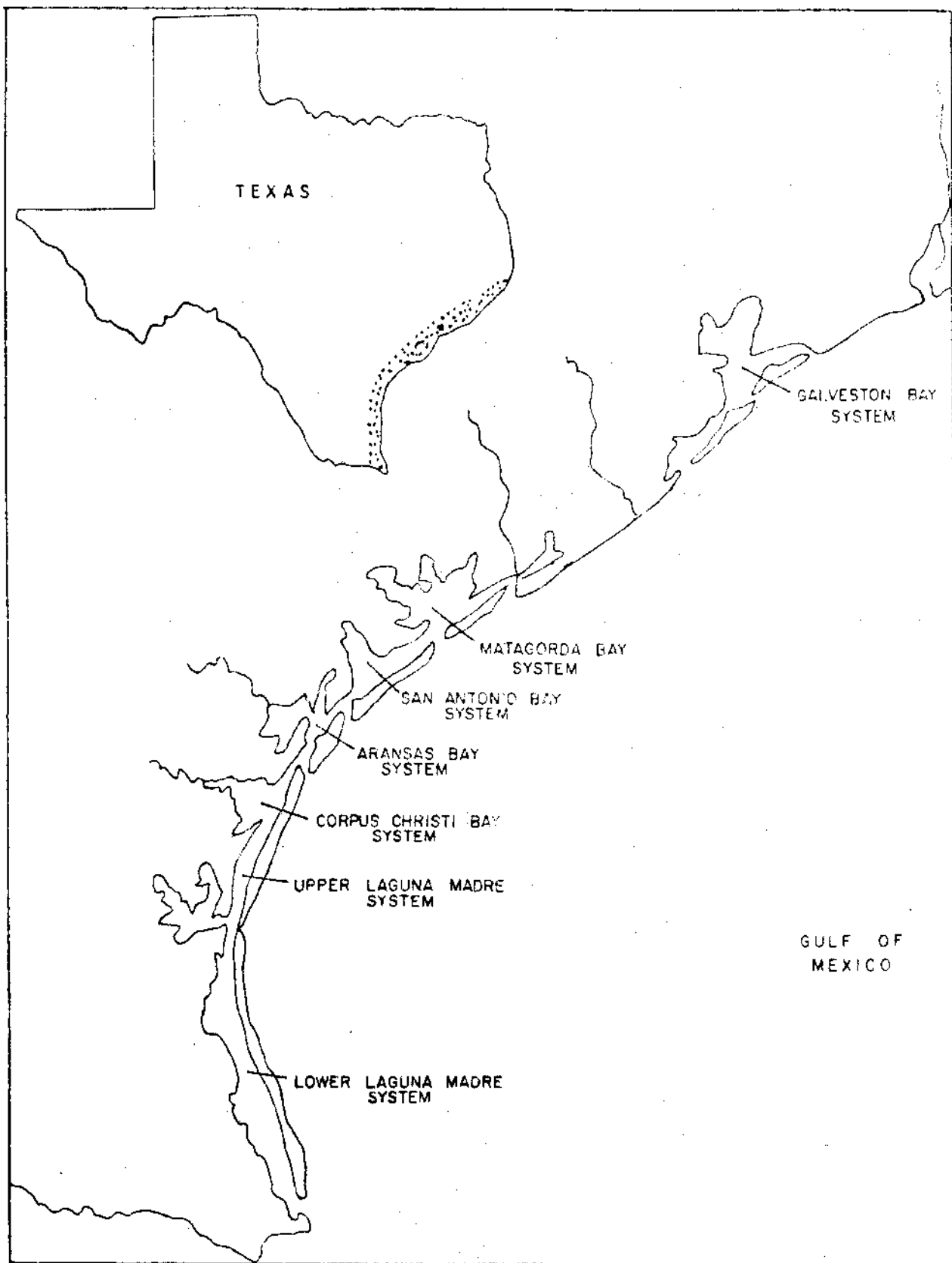


Figure 1. Map of the Texas coast.

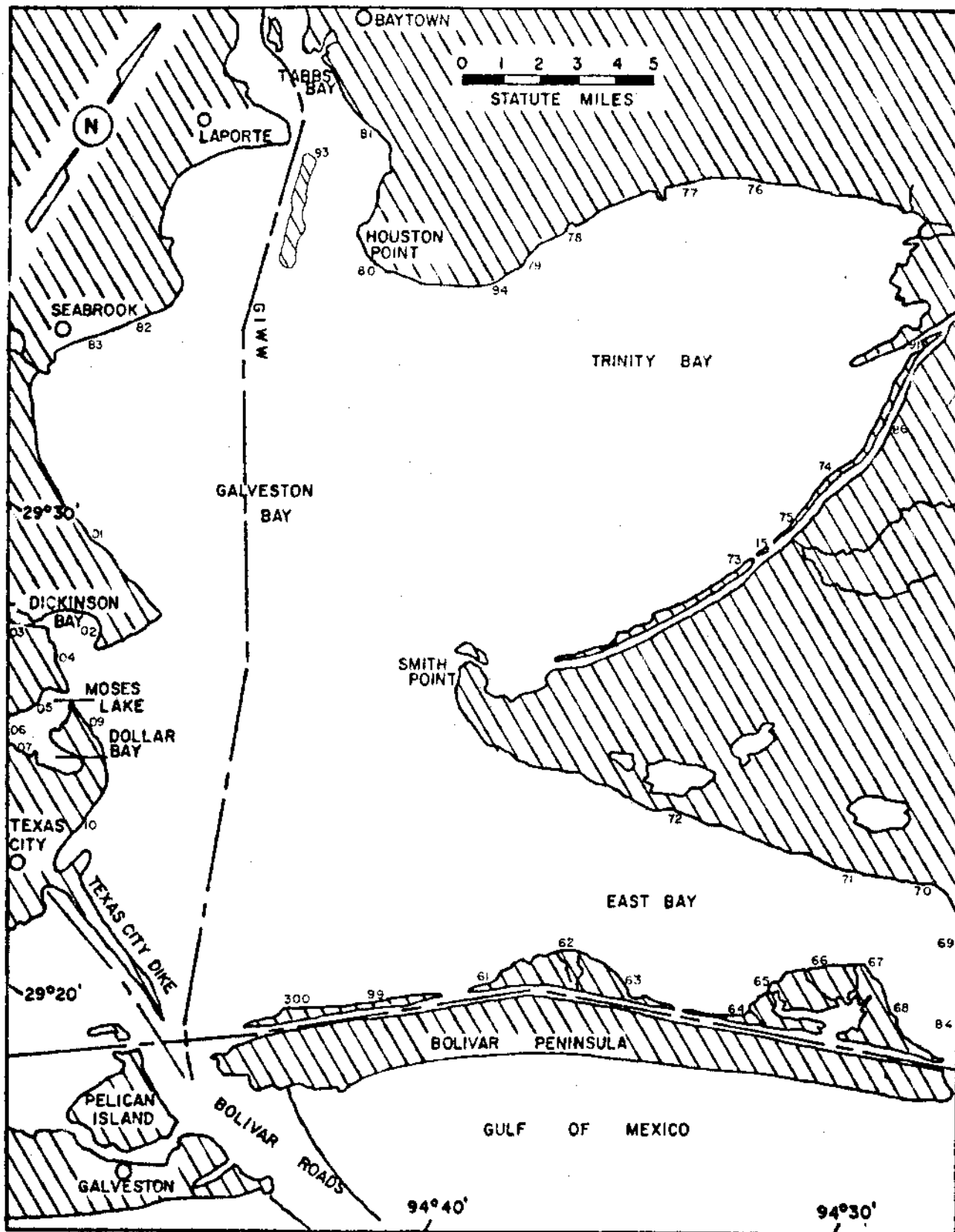


Figure 2. 18.3-m bag seine sample sites in the Galveston Bay system during 1982 (each station number should be preceded by the digit 2).

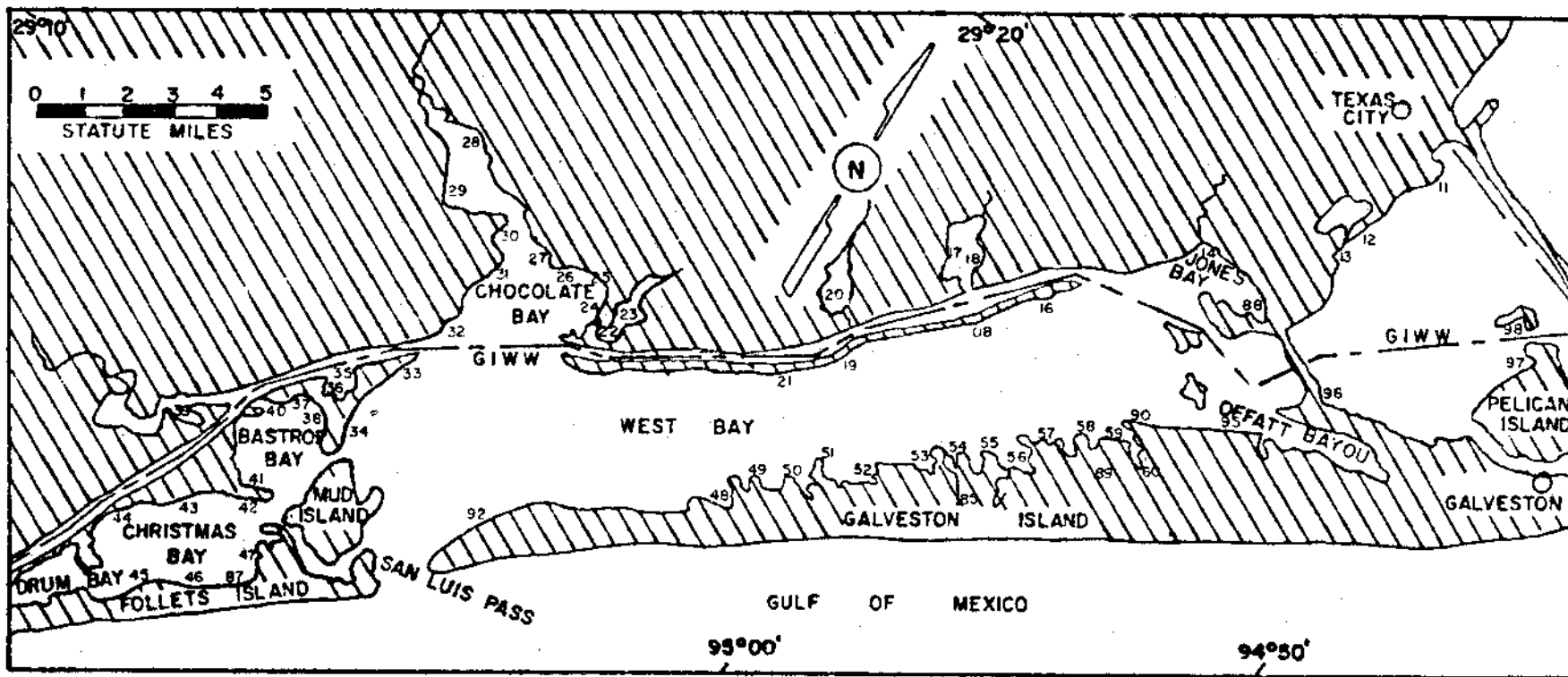


Figure 3. 18.3-m bag seine sample sites in the Galveston Bay system during 1982 (each station number should be preceded by the digit 2).

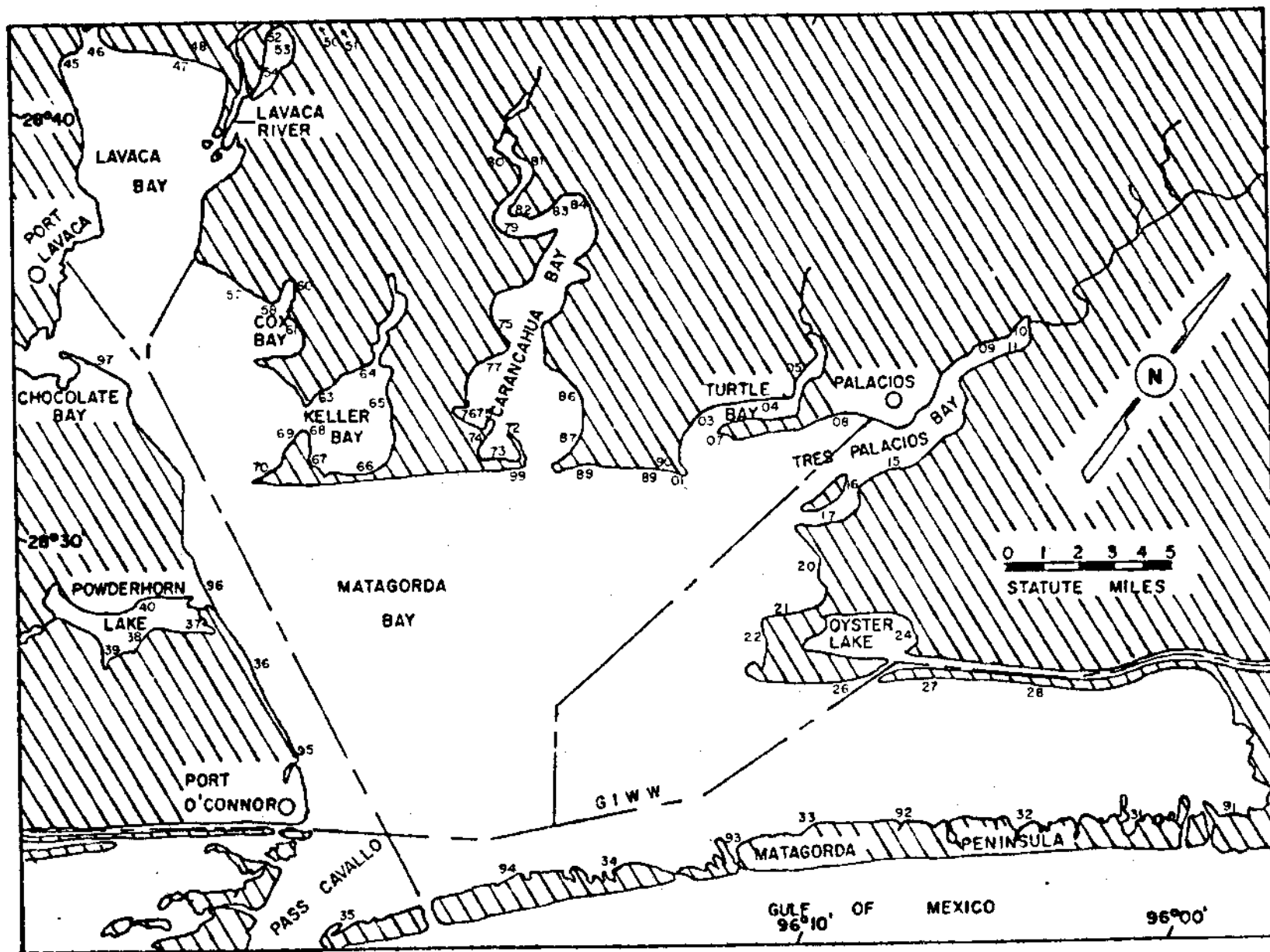


Figure 4. 18.3-m bag seine sample sites in the Matagorda Bay system during 1982 (each station number should be preceded by the digit 2).

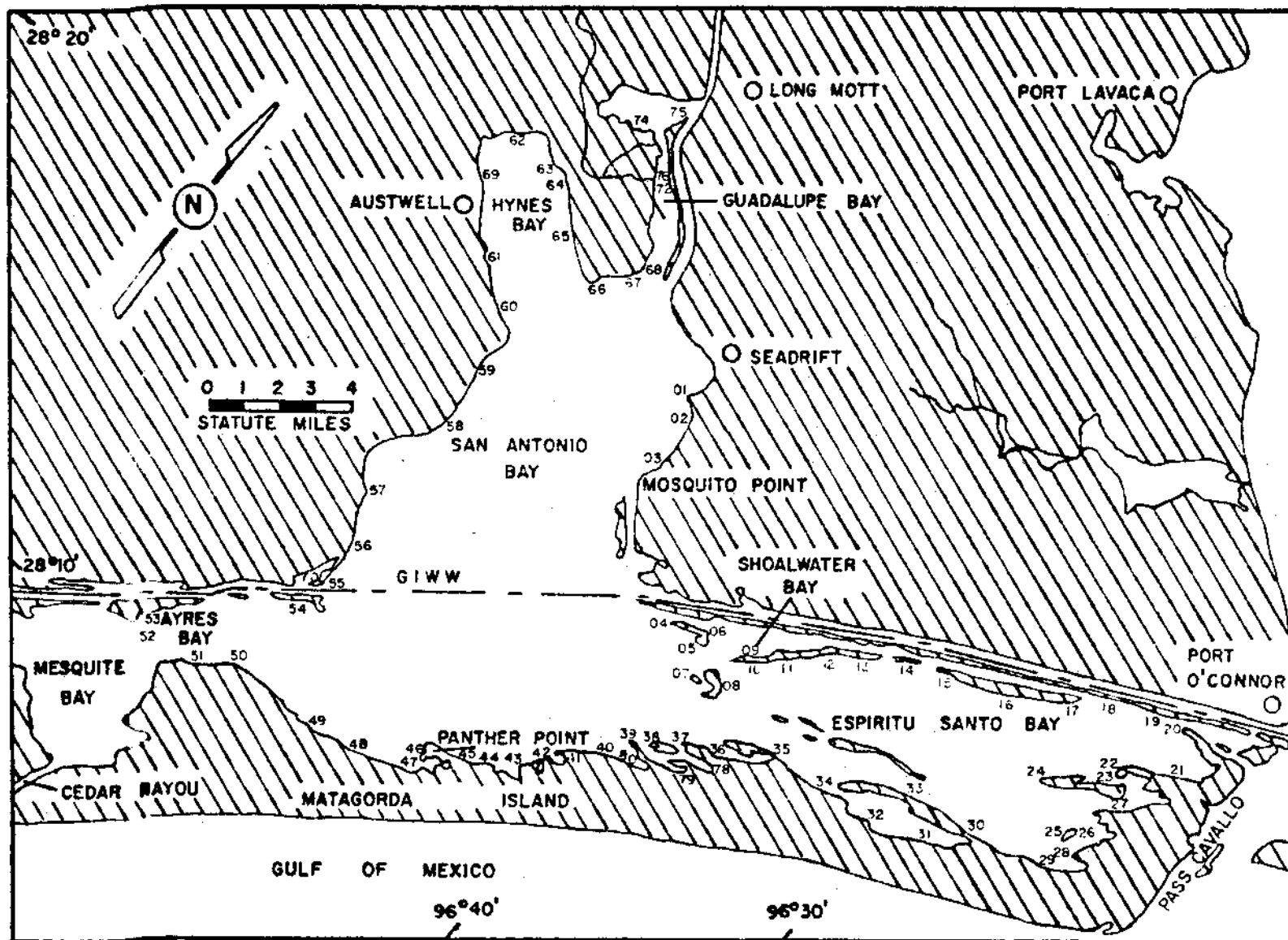


Figure 5. 18.3-m bag seine sample sites in the San Antonio Bay system during 1982 (each station number should be preceded by the digit 2).

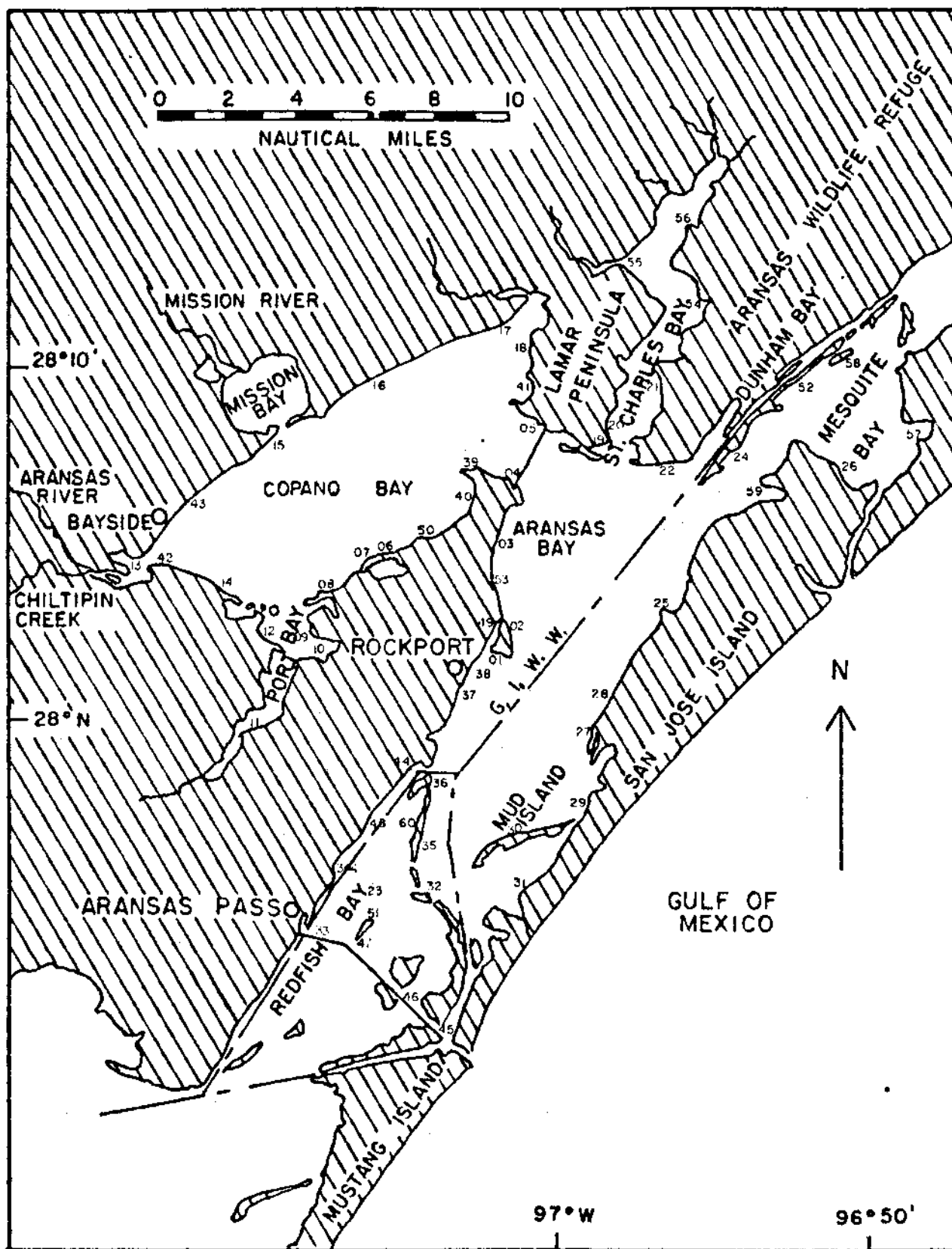


Figure 6. 18.3-m bag seine sample sites in the Aransas Bay system during 1982 (each station number should be preceded by the digit 2).

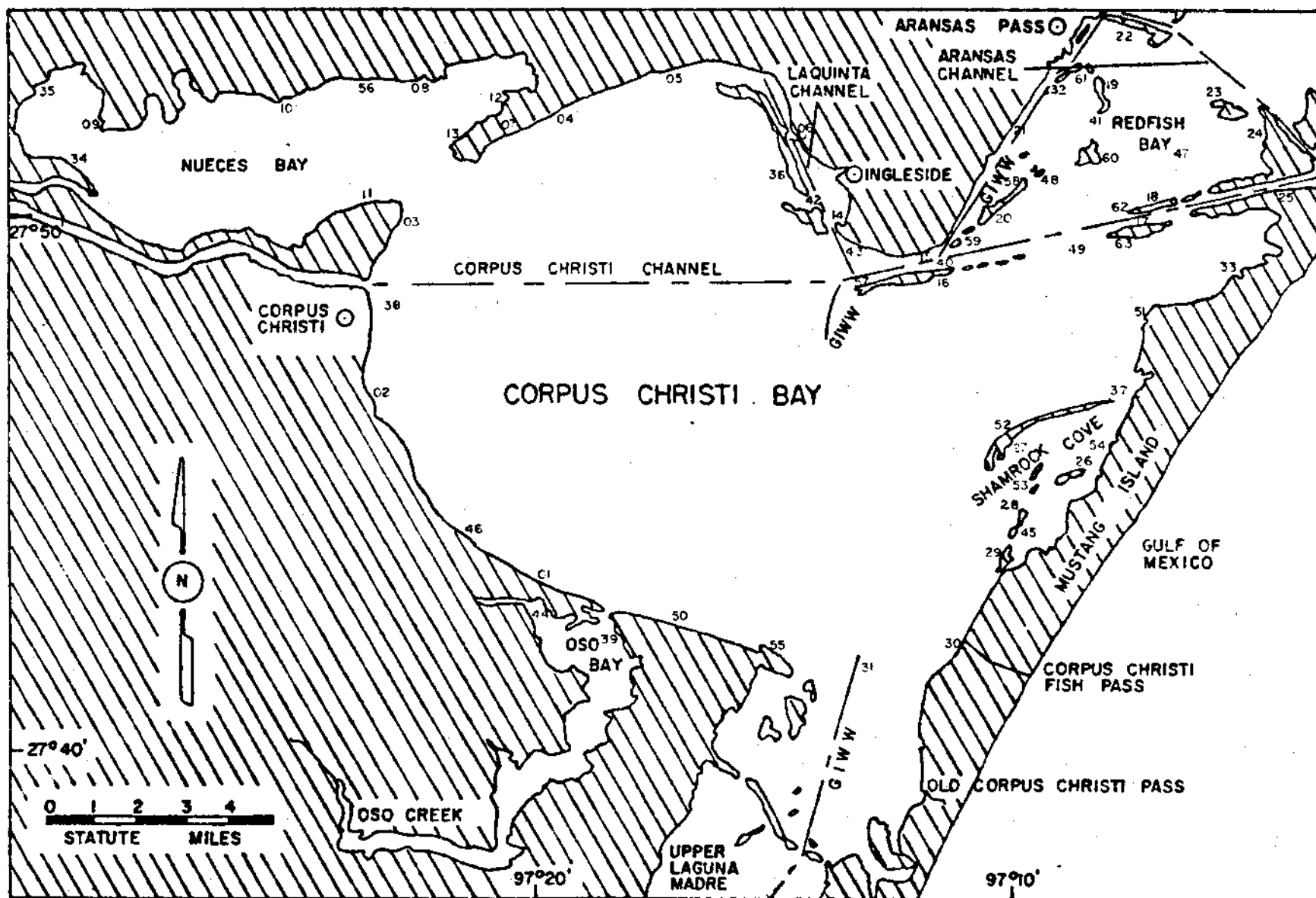


Figure 7. 18.3-m bag seine sample sites in the Corpus Christi Bay system during 1982 (each station number should be preceded by the digit 2).

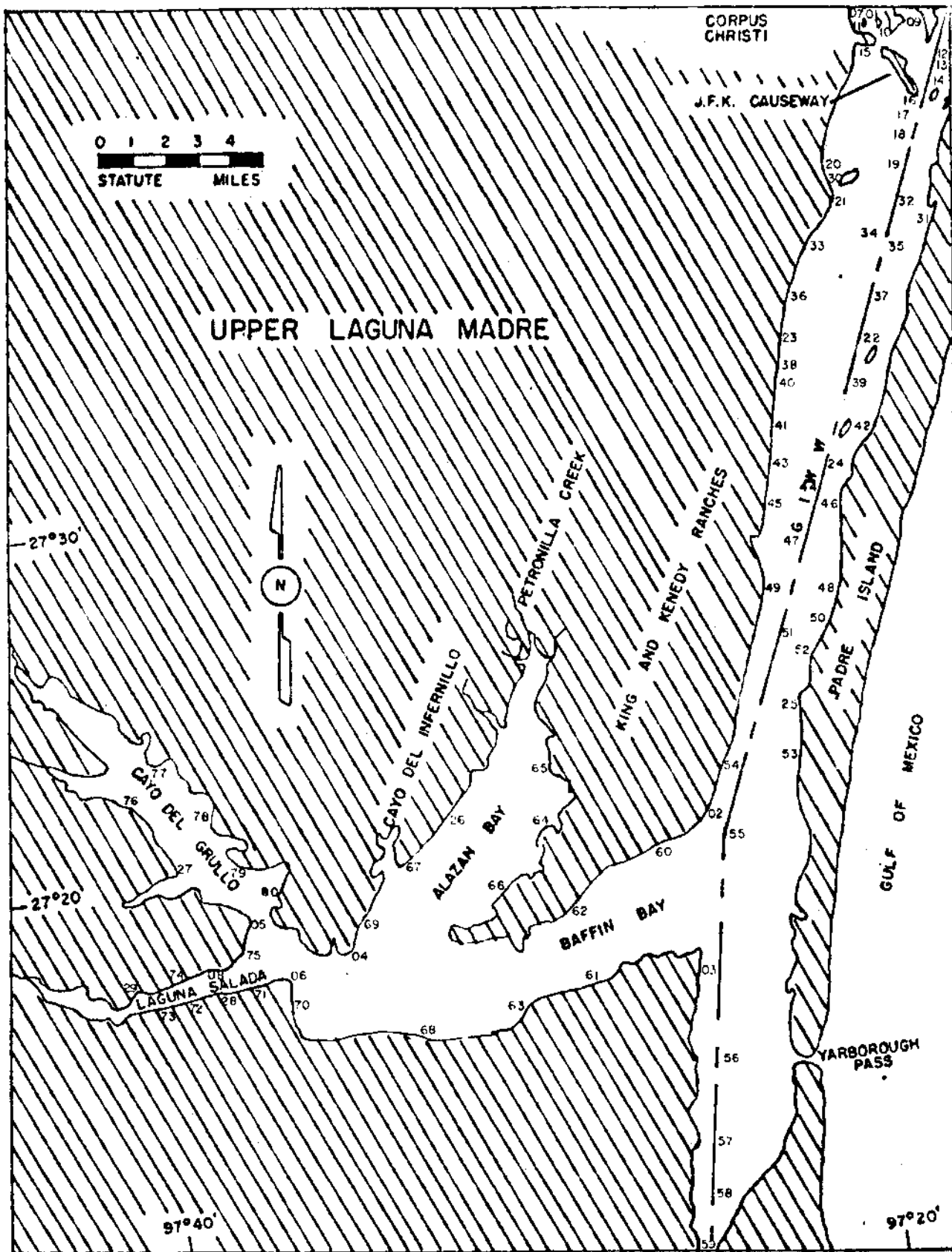


Figure 8. 18.3-m bag seine sample sites in the upper Laguna Madre during 1982 (each station number should be preceded by the digit 2).

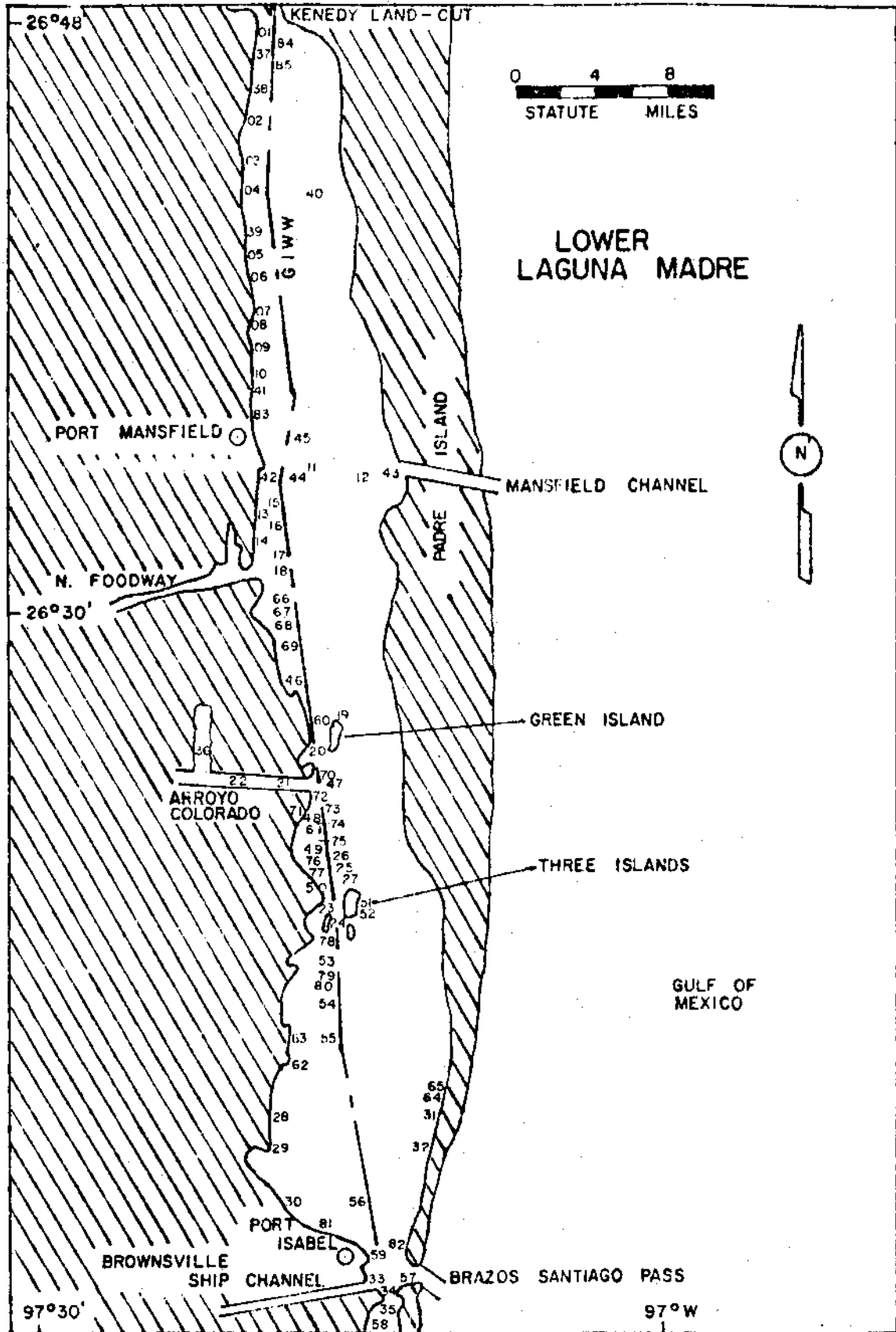


Figure 9. 18.3-m bag seine sample sites in the lower Laguna Madre during 1982 (each station number should be preceded by the digit 2).

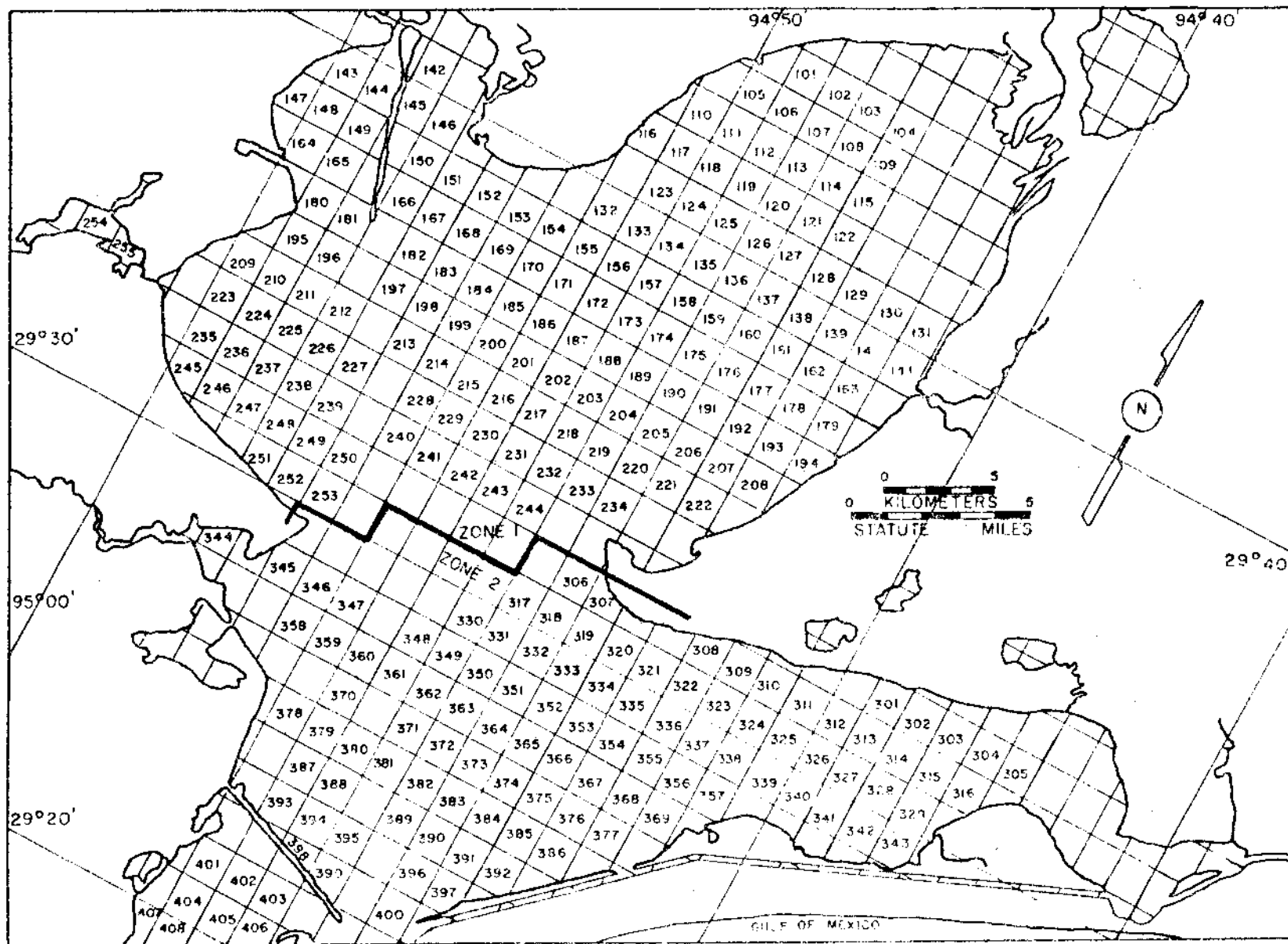


Figure 10. 6.1-m bay trawl sample sites in the Galveston Bay system during 1982.

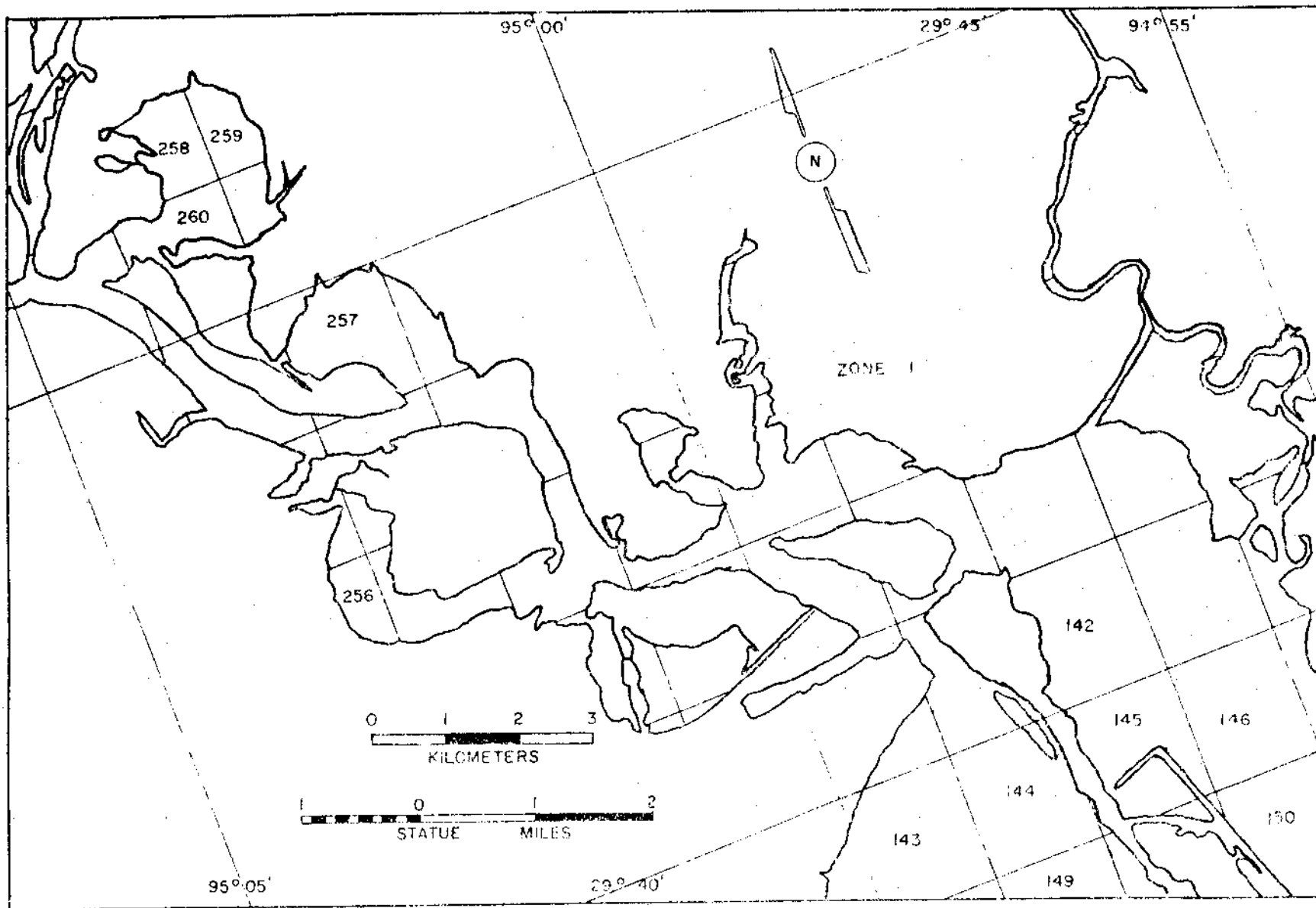


Figure 11. 6.1-m bay trawl sample sites in the Galveston Bay system during 1982.

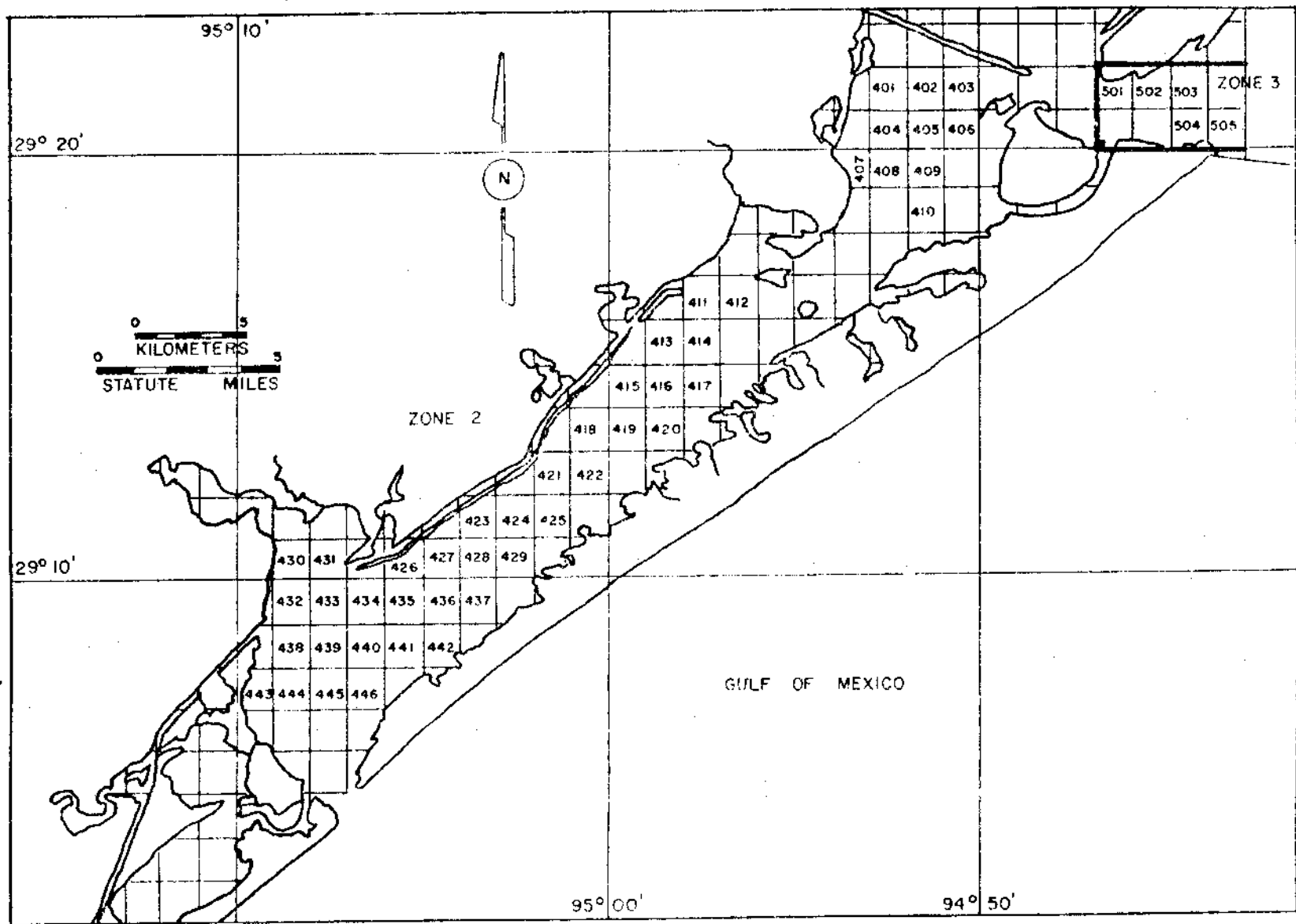


Figure 12. 6.1-m bay trawl sample sites in the Galveston Bay system during 1982.

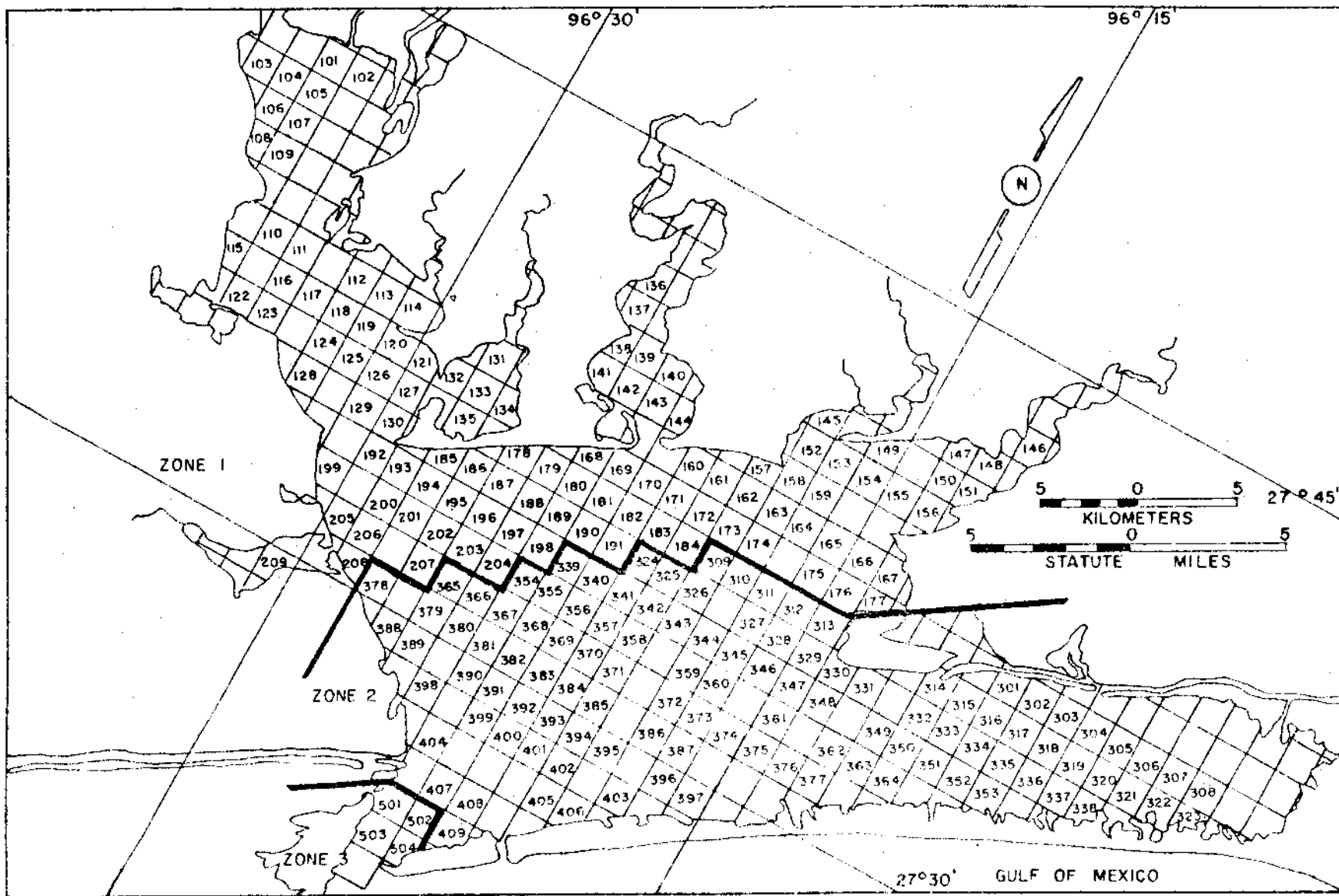


Figure 13. 6.1-m bay trawl sample sites in the Matagorda Bay system during 1982.

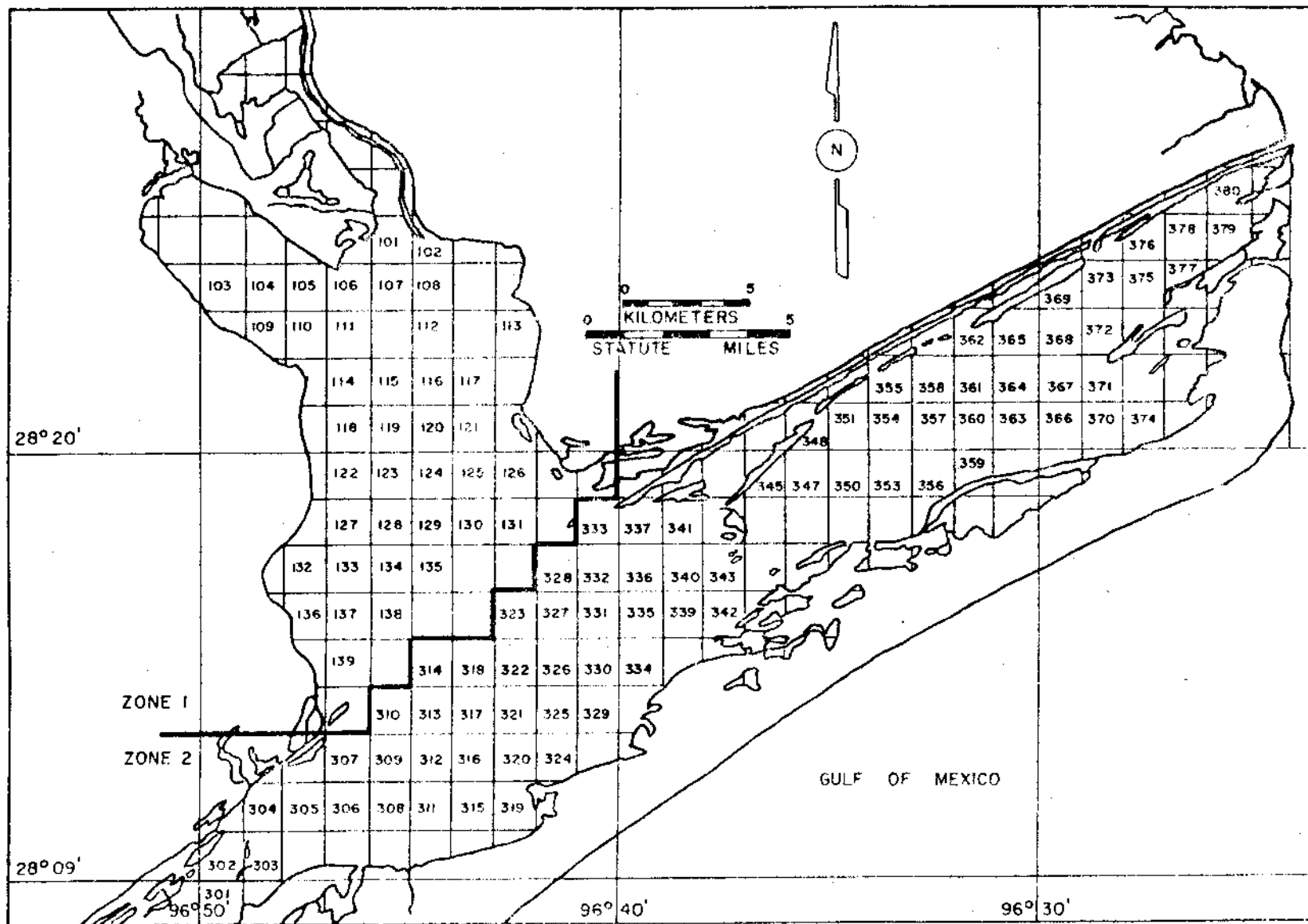


Figure 14. 6.1-m bay trawl sample sites in the San Antonio Bay system during 1982.

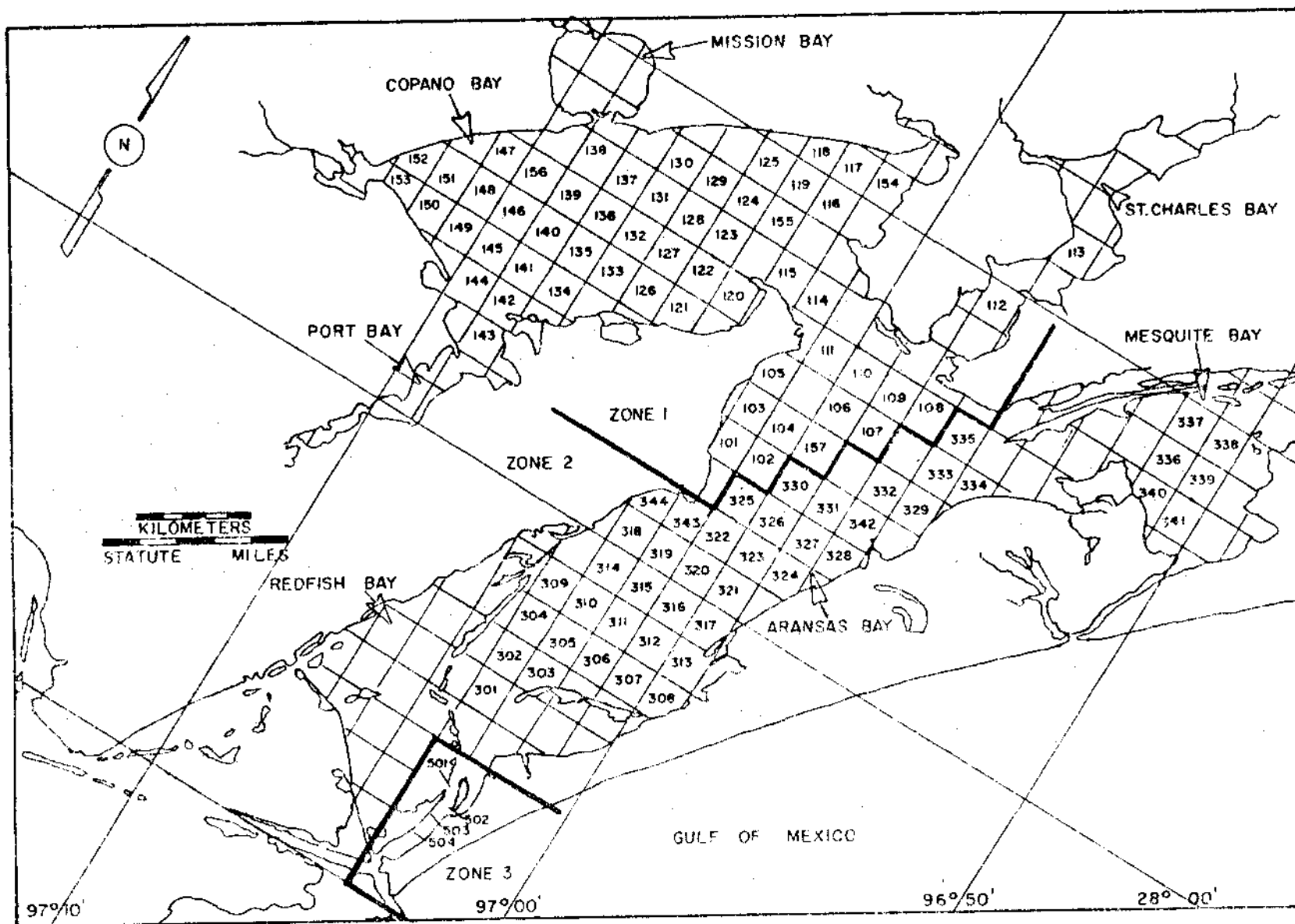


Figure 15. 6.1-m bay trawl sample sites in the Aransas Bay system during 1982.

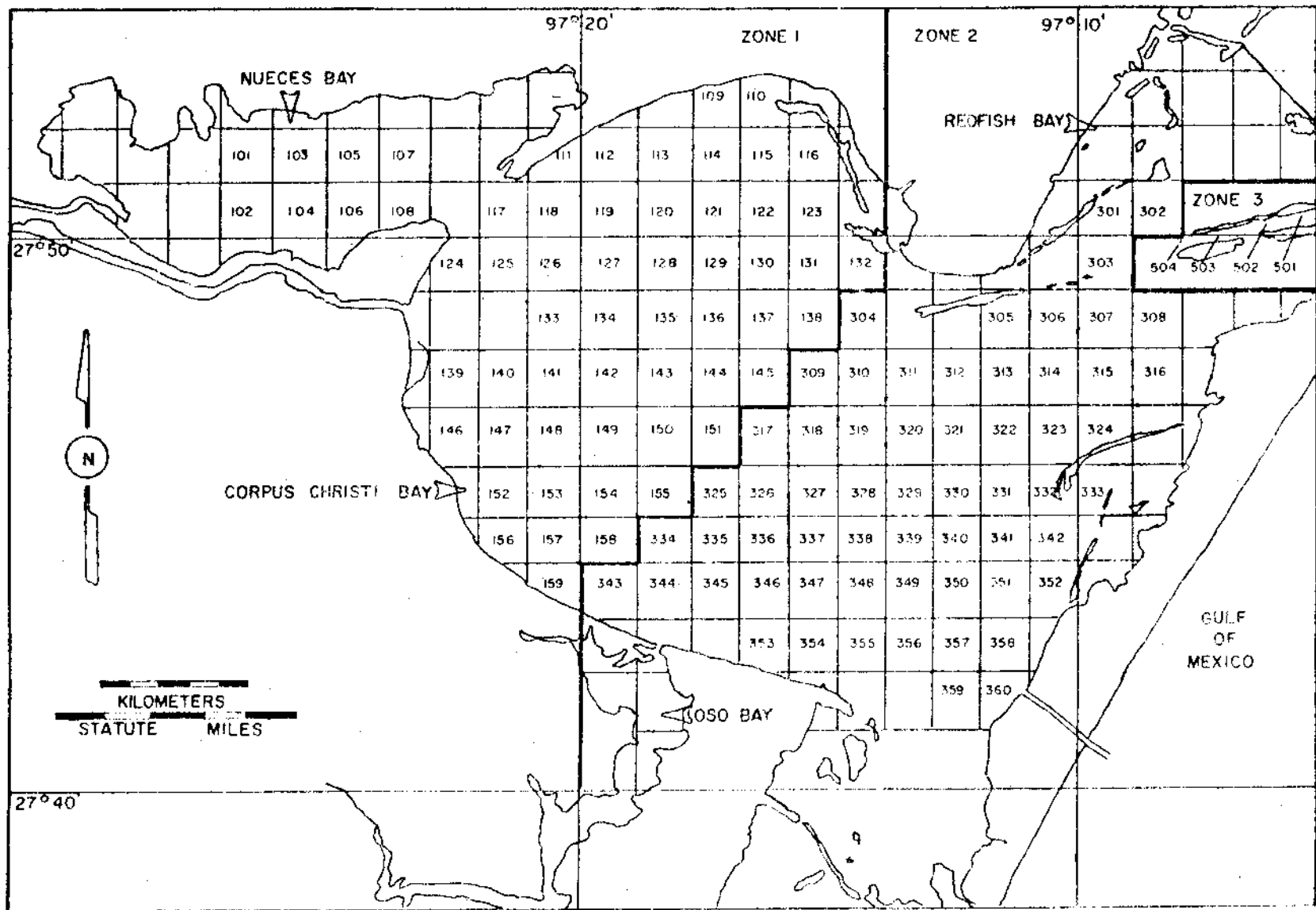


Figure 16. 6.1-m bay trawl sample sites in the Corpus Christi Bay system during 1982.

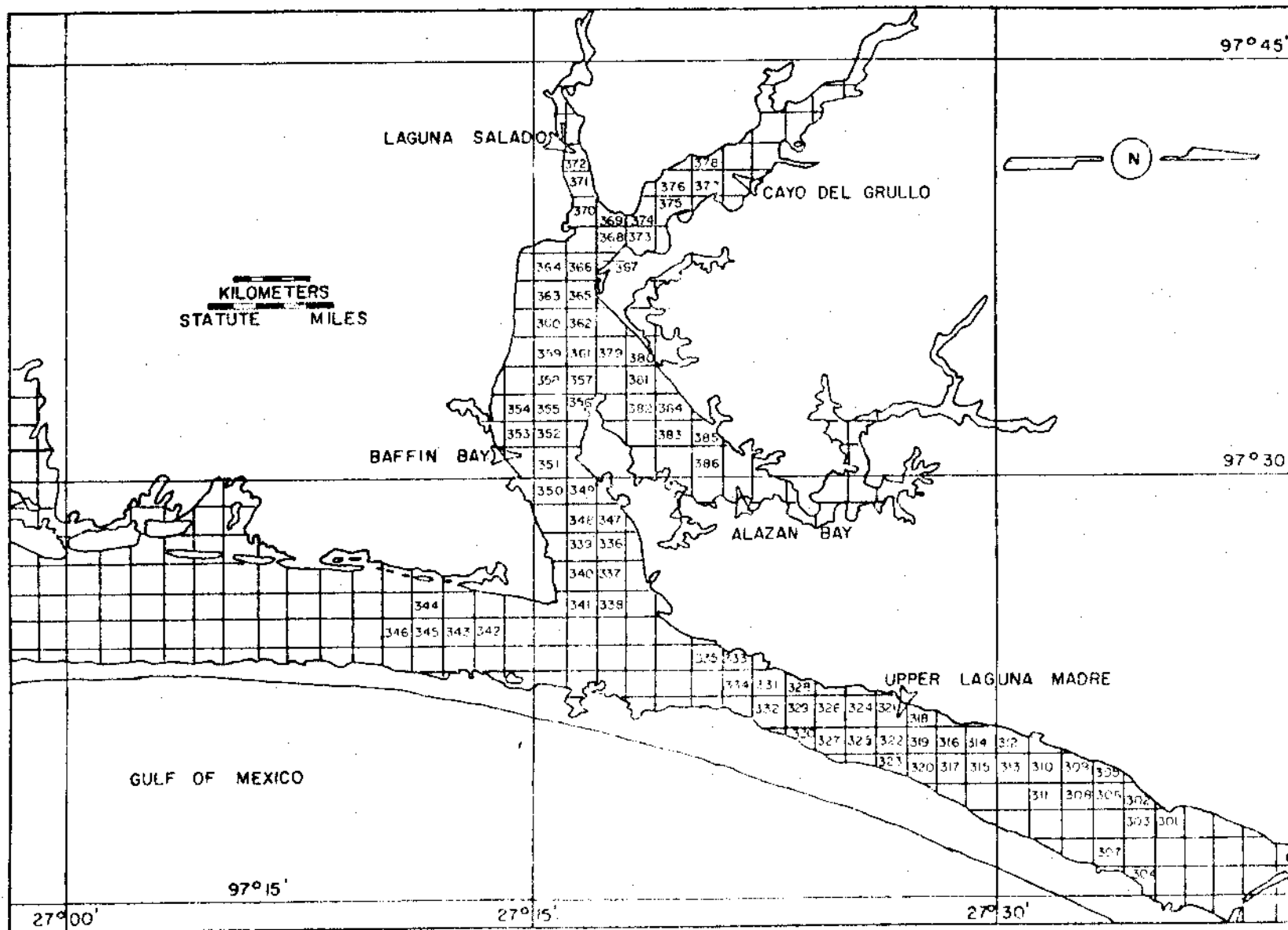


Figure 17. 6.1-m bay trawl sample sites in the upper Laguna Madre during 1982.

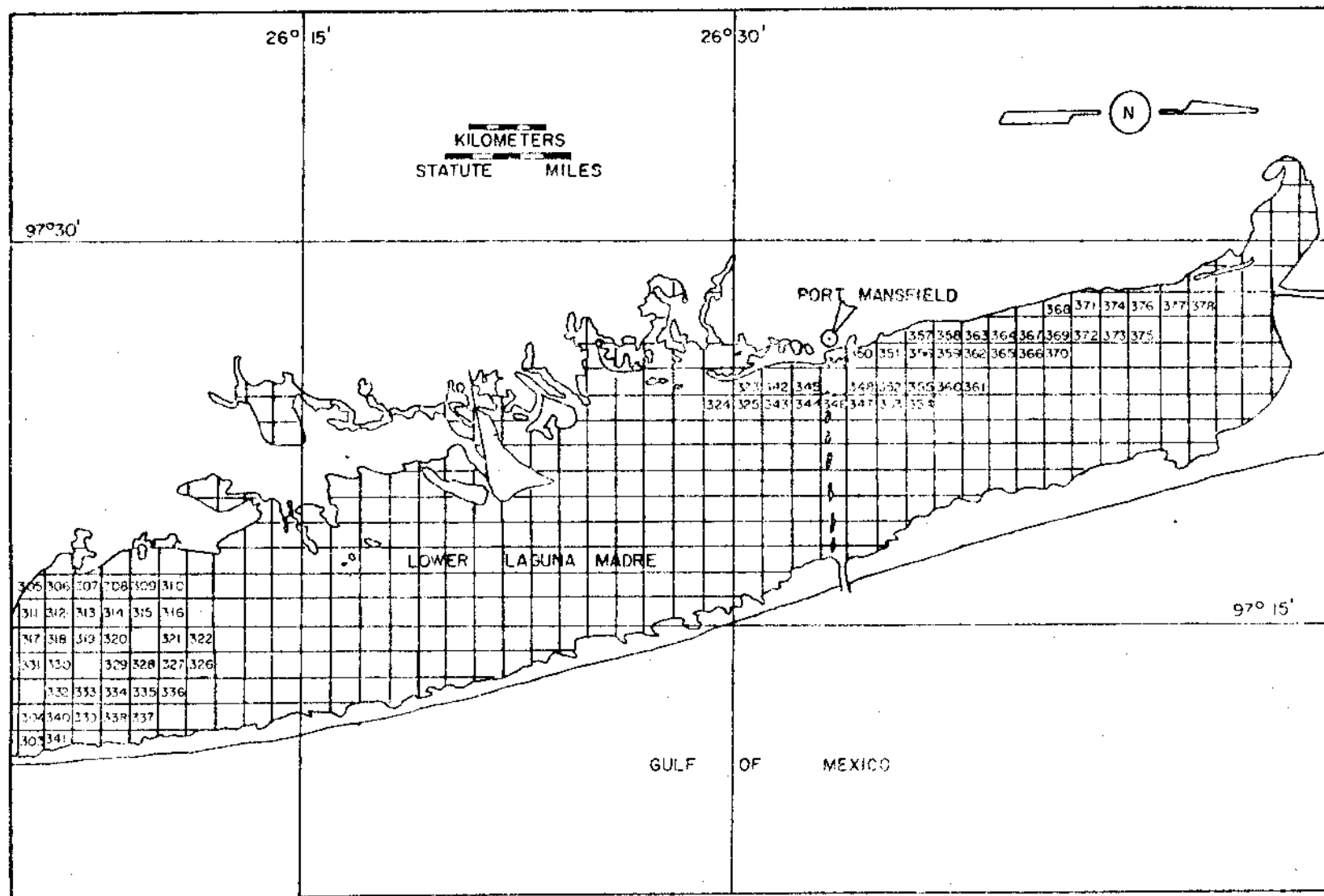


Figure 18. 6.1-m bay trawl sample sites in the lower Laguna Madre during 1982.

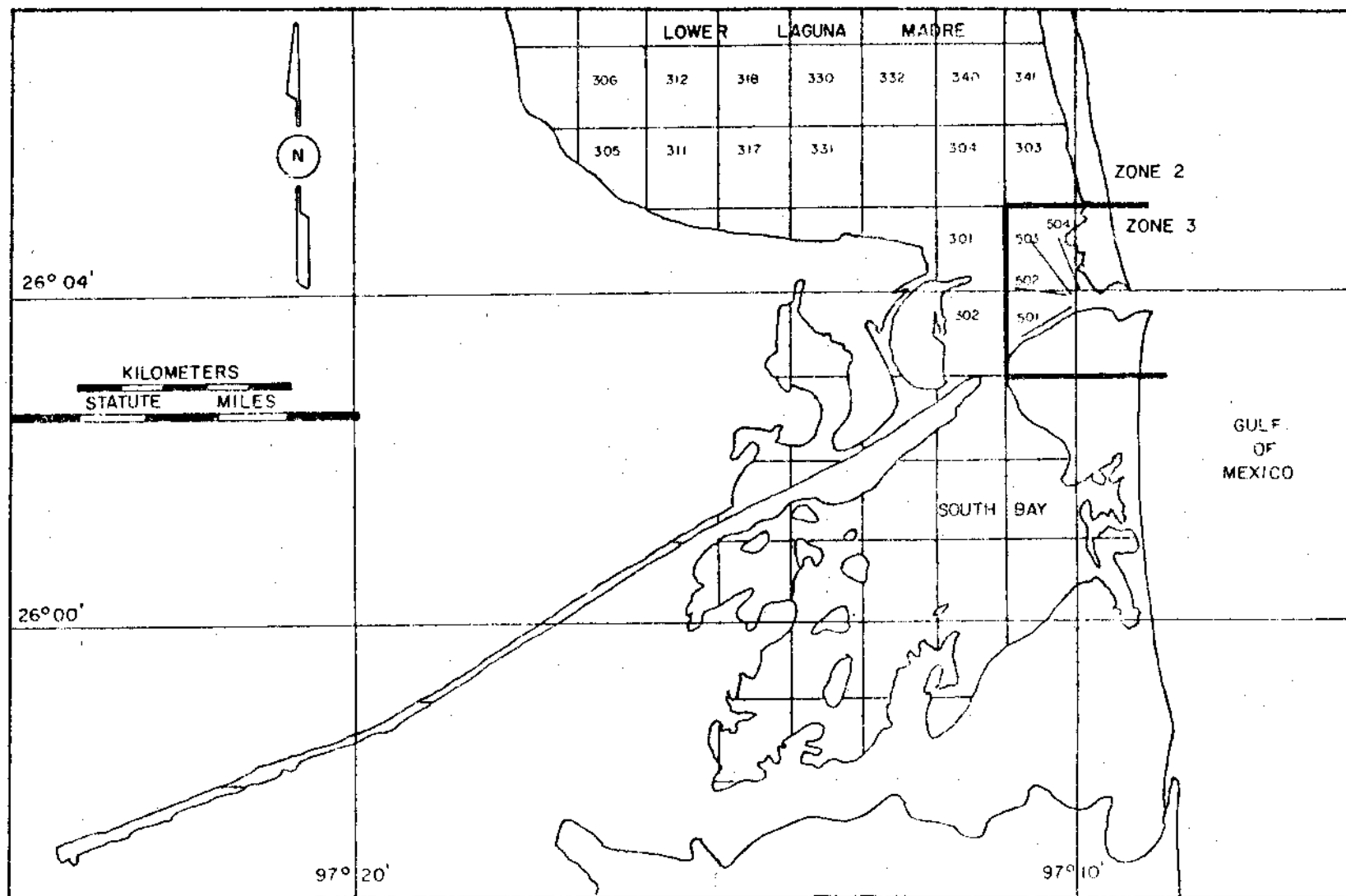


Figure 19. 6.1-m bay trawl sample sites in the lower Laguna Madre during 1982.

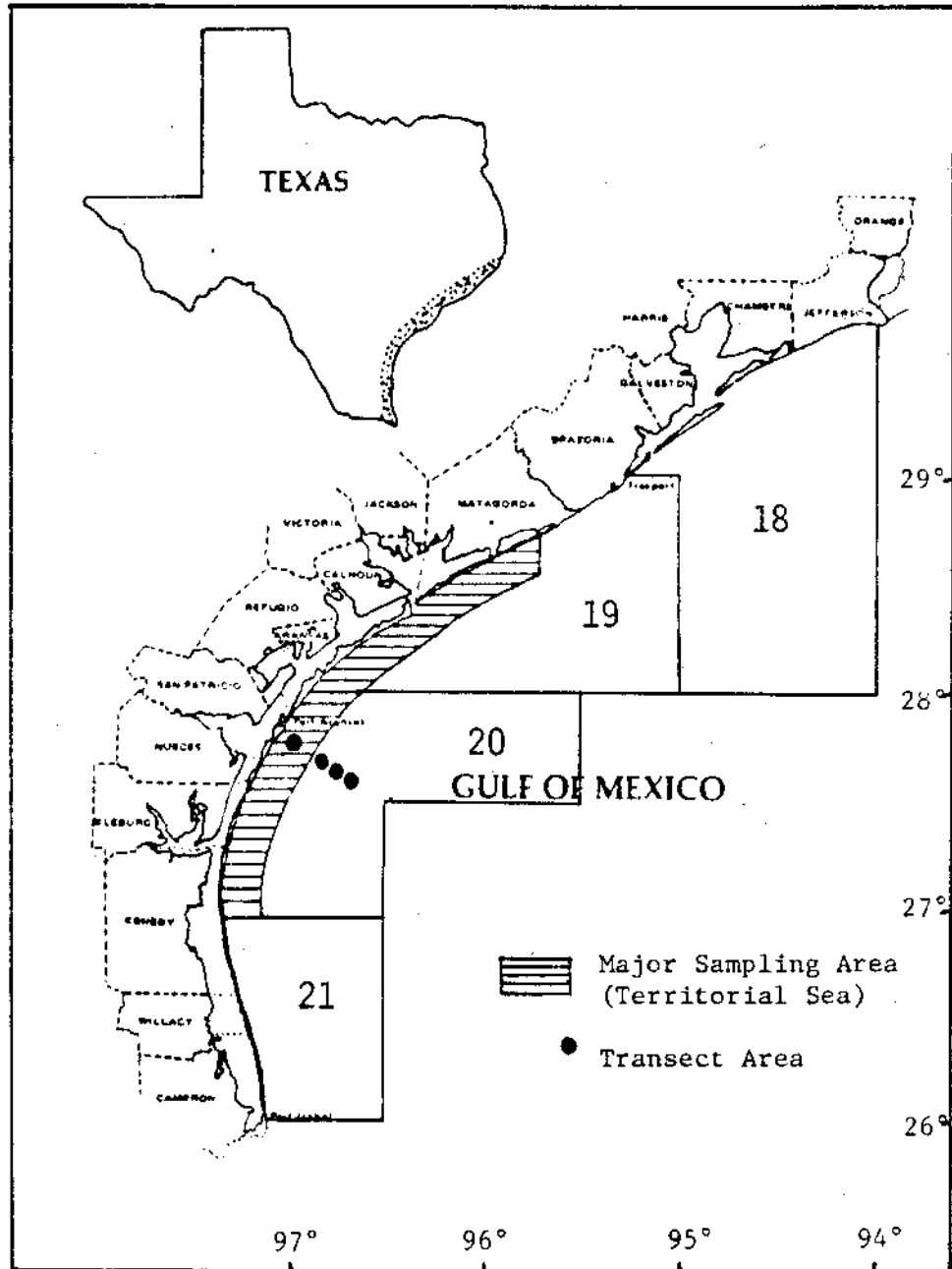
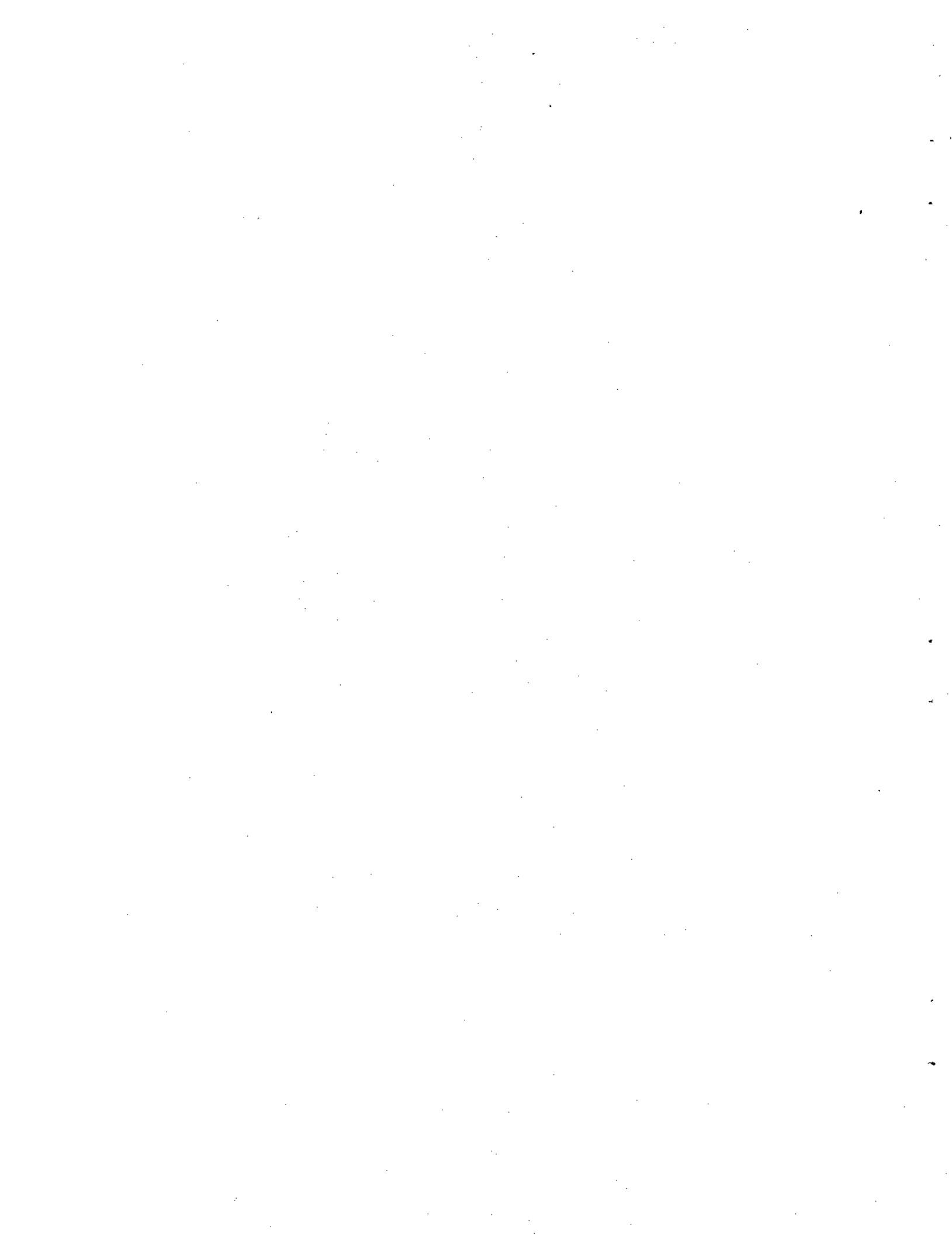


Figure 20. Major Gulf trawl sampling areas along the Texas coast during 1982. (Numbers indicate Gulf area codes).



APPENDIX A: Hydrological Data Summary



Table 1. Monthly mean surface water temperature (C) at sampled bag seine stations in each Texas bay system during calendar year 1982 (blank = no measurement taken).

Month	Galveston	Matagorda	San Antonio	Aransas	Corpus Christi	Upper Laguna Madre	Lower Laguna Madre
Jan	15.2	12.9	14.0	16.0	14.5	14.9	16.7
Feb	16.2	14.7	16.8	18.5	15.4	14.6	16.8
Mar	21.1	17.4	19.7	20.9	20.2	21.9	21.4
Apr	23.2	21.6	23.3	24.4	23.1	25.6	24.3
May	26.7	26.5	25.5	26.9	27.2	27.5	28.4
Jun	30.7	29.9	29.1	30.3	30.2	30.8	28.6
Jul	32.9	33.4	29.2	30.9	29.6	31.9	28.3
Aug	32.2	31.5	27.2	29.2	29.9	31.6	29.4
Sep	28.1	29.8	27.2	27.0	28.5	30.1	28.3
Oct	21.3	19.4	24.6	24.2	24.2	23.5	25.9
Nov	22.7	23.4	18.8	21.3	22.1	22.1	23.4
Dec	15.0	17.2	14.8	14.2	17.2	18.8	17.8

Table 2. Monthly mean surface salinity (‰) at sampled bag seine stations in each Texas bay system during calendar year 1982 (blank = no measurement taken).

Month	Galveston	Matagorda	San Antonio	Aransas	Corpus Christi	Upper Laguna Madre	Lower Laguna Madre
Jan	14.1	20.3	12.4	10.0	24.9	26.3	29.5
Feb	13.7	23.8	13.4	10.4	26.0	25.4	24.6
Mar	16.7	18.6	12.0	8.2	24.4	23.1	18.5
Apr	11.7	18.6	21.1	12.6	24.4	21.5	29.5
May	7.6	11.7	17.8	11.2	24.0	22.6	27.2
Jun	14.2	10.5	9.2	13.9	21.0	22.5	26.2
Jul	17.0	16.9	17.6	20.8	28.9	29.0	37.2
Aug	21.3	18.0	19.0	25.4	30.6	34.2	36.6
Sep	25.4	23.8	21.2	22.9	35.0	42.9	36.4
Oct	20.5	24.6	22.2	24.7	32.9	38.4	36.7
Nov	16.8	16.7	20.1	24.4	31.8	37.9	35.3
Dec	13.8	20.4	22.4	25.3	31.5	37.0	34.4

Table 3. Monthly mean bottom water temperatures (C) recorded in Zone I at 6.1-m trawl stations in Texas bays during calendar year 1982 (blank = no measurement taken).

Month	Day	Galveston	Matagorda	San Antonio	Aransas	Corpus Christi
Jan	1-15	13.5		17.6	14.1	
	16-31	12.1		14.1	15.3	
Feb	1-15	9.8		9.4	11.8	
	16-28	13.2		16.0	14.7	
Mar	1-15	15.4		14.8	17.0	
	16-31	21.2		20.4	22.7	
Apr	1-15	19.0		20.8	21.2	
	16-30	19.4		21.0	24.8	
May	1-15	24.3	23.5	24.0	25.1	23.9
	16-31	26.2	26.0	26.0	26.9	27.0
Jun	1-15	28.9	28.6	28.0	28.1	27.7
	16-30	30.5	30.2	29.8	29.7	30.0
Jul	1-15	29.0	28.6	30.6	28.8	28.9
	16-31	30.2	28.6	30.6	29.8	29.2
Aug	1-15	30.4	27.8	31.4	30.0	29.3
	16-31	30.6	29.2	31.5	30.2	29.6
Sep	1-15	30.2	29.8	30.4	30.2	29.7
	16-30	24.9	28.7	26.7	30.0	29.0
Oct	1-15	27.2	25.2	28.3	27.7	28.2
	16-31	23.6	20.0	20.0	24.2	24.1
Nov	1-15	18.2	25.6	16.4	25.3	19.5
	16-30	16.6	17.6	21.2	15.7	16.1
Dec	1-15	17.0	17.6	18.2	18.4	16.6
	16-31	13.1	14.6	17.0	13.1	12.9

Table 4. Monthly mean water temperatures (C) recorded in Zone II at 6.1-m trawl stations in each Texas bay system during calendar year 1982 (blank - no measurement taken).

Month	Day	Galveston	Matagorda	San Antonio	Aransas	Corpus Christi	Upper Laguna Madre	Lower Laguna Madre
Jan	1-15	15.2		9.6	14.6			
	16-31	13.1		15.3	16.2			
Feb	1-15	9.9		10.8	14.7			
	16-28	13.4		16.6	13.0			
Mar	1-15	13.8		16.0	15.4			
	16-31	21.6		21.0	22.4			
Apr	1-15	18.9		21.4	19.9			
	16-30	22.9		21.8	24.4			
May	1-15	23.8	24.4	24.6	24.7	23.3	26.7	24.2
	16-31	26.2	26.0	25.4	26.6	26.7	28.0	25.2
Jun	1-15	28.7	27.7	27.2	28.6	27.7	28.2	28.4
	16-30	29.4	28.7	30.0	30.1	29.2	28.0	28.9
Jul	1-15	29.7	29.0	29.8	29.8	28.9	29.4	27.8
	16-31	29.9	28.6	30.0	29.8	29.0	30.4	26.4
Aug	1-15	30.3	26.8	30.8	30.0	29.5	29.7	28.7
	16-31	30.4	29.2	31.5	30.5	29.2	30.1	29.2
Sep	1-15	30.3	29.4	31.0	30.0	30.0	30.2	28.3
	16-30	27.2	26.6	28.5	29.2	31.0	25.8	28.9
Oct	1-15	26.6	26.2	28.5	28.0	27.7	27.4	28.3
	16-31	23.6	25.4	19.3	23.8	24.5	20.4	22.7
Nov	1-15	20.2	24.4	17.8	25.0	19.5	26.6	26.3
	16-30	16.1	15.4	21.8	15.4	16.8	18.1	19.5
Dec	1-15	17.3	19.2	17.8	16.1	17.9	18.6	15.3
	16-31	12.8	15.2	15.0	15.0	13.6	14.6	18.5

Table 5. Monthly mean bottom water temperatures (C) recorded in Zone III at 6.1-m trawl stations in Texas bay systems during calendar year 1982 (blank = no measurement taken).

Month	Day	Galveston	Matagorda	Aransas	Corpus Christi	Lower Laguna Madre
Jan	1-15	11.0		11.4		
	16-31	11.0		12.1		
Feb	1-15	10.3		11.1		
	16-28	14.0		15.0		
Mar	1-15	13.5		15.6		
	16-31	18.5		19.2		
Apr	1-15	19.0		19.1		
	16-30	21.5		22.0		
May	1-15	23.4	24.5	23.6	23.8	23.5
	16-31	26.6	25.5	26.4	26.4	24.0
Jun	1-15	27.5	27.0	26.7	26.9	26.8
	16-30	28.5	28.7	27.5	27.9	27.0
Jul	1-15	28.8	29.9	26.9	26.5	24.5
	16-31	30.1	30.6	29.5	29.0	25.1
Aug	1-15	29.6	29.0	27.4	27.4	26.5
	16-31	30.3	29.3	29.8	29.9	26.5
Sep	1-15	28.6	30.0	29.5	29.9	28.5
	16-30	28.0	28.5	24.0	28.4	28.3
Oct	1-15	24.5	23.0	26.8	24.9	27.3
	16-31	21.6	21.8	22.3	22.0	24.5
Nov	1-15	21.8	23.3	22.8	23.0	24.6
	16-30	17.7	17.6	17.0	17.7	19.6
Dec	1-15	16.5	16.6	13.9	14.1	15.3
	16-30	13.8	14.0	14.6	14.8	16.4

Table 6. Monthly mean bottom water salinity ($^{\circ}/_{\infty}$) recorded in Zone I at 6.1-m trawl stations in Texas bay systems during calendar year 1982 (blank = no measurement taken).

Month	Day	Galveston	Matagorda	San Antonio	Aransas	Corpus Christi
Jan	1-15	4.6		14.6	6.8	
	16-31	4.8		4.8	9.0	
Feb	1-15	6.0		6.0	5.4	
	16-28	12.8		12.8	7.8	
Mar	1-15	15.4		4.2	4.2	
	16-31	11.0		3.8	7.0	
Apr	1-15	6.6		10.0	7.2	
	16-30	4.4		14.8	5.6	
May	1-15	3.1	21.6	10.2	8.4	23.8
	16-31	5.0	3.8	16.0	11.2	24.0
Jun	1-15	0.6	12.4	1.0	12.8	20.2
	16-30	0.4	15.8	3.2	14.2	25.2
Jul	1-15	3.6	21.0	9.0	14.0	26.0
	16-31	4.2	20.6	8.0	16.4	28.8
Aug	1-15	4.4	25.6	11.0	22.4	31.2
	16-31	2.3	27.7	12.2	20.2	32.4
Sep	1-15	8.0	25.8	14.2	19.0	34.2
	16-30	25.8	24.2	18.5	29.2	35.1
Oct	1-15	13.6	28.6	24.6	25.8	35.1
	16-31	16.8	25.2	23.2	25.2	33.6
Nov	1-15	15.2	26.0	21.8	26.2	34.5
	16-30	17.0	27.2	20.0	23.2	32.8
Dec	1-15	10.0	22.2	16.2	22.6	33.5
	16-31	7.8	20.8	14.4	22.0	31.0

Table 7. Monthly mean bottom water salinity ($^{\circ}/\text{oo}$) recorded in Zone II at 6.1-m trawl stations in Texas bay systems during calendar year 1982 (blank = no measurement taken).

Month	Day	Galveston	Matagorda	San Antonio	Aransas	Corpus Christi	Upper Laguna Madre	Lower Laguna Madre
Jan	1-15	20.6		20.6	12.6			
	16-31	18.0		18.0	14.4			
Feb	1-15	24.6		24.6	16.0			
	16-28	25.4		25.4	20.6			
Mar	1-15	19.8		18.4	13.4			
	16-31	17.6		13.2	14.8			
Apr	1-15	15.6		21.2	12.0			
	16-30	15.6		21.8	18.0			
May	1-15	10.2	22.0	22.8	17.6	24.6	20.6	25.2
	16-31	10.7	12.0	24.4	18.6	24.0	25.0	28.0
Jun	1-15	10.2	12.2	12.0	18.0	24.2	22.8	28.6
	16-30	21.0	21.6	14.6	24.6	28.0	20.0	32.5
Jul	1-15	22.4	29.0	19.2	26.0	28.6	24.8	38.0
	16-31	22.4	26.2	17.0	33.0	30.4	29.8	38.8
Aug	1-15	18.8	26.0	20.2	34.0	31.6	34.4	39.8
	16-31	23.2	30.6	23.8	35.8	33.1	31.5	41.4
Sep	1-15	28.4	31.0	31.0	34.8	36.2	36.5	38.5
	16-30	24.6	30.8	33.6	34.6	35.2	41.3	40.0
Oct	1-15	22.2	28.8	32.0	32.0	34.8	41.2	38.8
	16-31	23.8	27.4	29.0	28.6	34.9	38.3	40.6
Nov	1-15	20.8	28.2	27.2	27.6	33.4	43.4	37.4
	16-30	20.6	24.4	25.3	26.2	31.6	42.2	40.0
Dec	1-15	16.2	22.8	23.8	24.8	32.6	40.5	36.8
	16-31	15.4	24.4	22.4	24.8	30.8	40.8	36.6

Table 8. Monthly mean bottom water salinity ($^{\circ}/_{\infty}$) recorded in Zone III at 6.1-m trawl stations in Texas bay systems during calendar year 1982 (blank = no measurement taken).

Month	Day	Galveston	Matagorda	Aransas	Corpus Christi	Lower Laguna Madre
Jan	1-15	25.3		22.5		
	16-31	29.8		27.5		
Feb	1-15	26.5		27.0		
	16-28	28.8		19.8		
Mar	1-15	24.5		23.5		
	16-31	19.0		25.7		
Apr	1-15	20.3		20.3		
	16-30	21.3		25.5		
May	1-15	17.5	23.5	23.0	25.8	30.0
	16-31	15.8	26.8	22.5	25.3	35.2
Jun	1-15	29.2	29.3	31.7	30.3	37.0
	16-30	27.3	33.0	35.0	33.5	38.5
Jul	1-15	30.0	35.0	35.8	35.8	39.0
	16-31	27.0	34.0	35.3	34.8	39.0
Aug	1-15	31.3	33.8	35.5	35.5	40.0
	16-31	31.0	35.5	35.8	35.7	37.7
Sep	1-15	27.0	34.0	37.0	37.0	38.5
	16-30	23.7	30.7	35.8	33.0	38.0
Oct	1-15	22.5	28.3	33.5	30.3	35.8
	16-31	25.3	29.0	29.8	31.0	35.0
Nov	1-15	26.8	28.3	29.8	30.5	35.5
	16-30	24.5	27.3	27.8	30.0	34.0
Dec	1-15	24.0	29.0	25.3	29.0	35.5
	16-31	19.3	29.5	28.0	30.0	35.0

Table 9. Monthly mean bottom water temperature (C), salinity (‰) and depth (m) at sampled Gulf trawl stations during January 1982-February 1983 (blank = no measurement taken).

Month	Area 19 Territorial sea ^a						Area 20 Territorial sea						Area 19 FCZ ^b < 46 m			Area 20 FCZ < 46 m			Area 20 FCZ 46-91 m						
	Day			Night			Day			Night			Night			Night			Night						
	Depth	Salin.	Temp.	Depth	Salin.	Temp.	Depth	Salin.	Temp.	Depth	Salin.	Temp.	Depth	Salin.	Temp.	Depth	Salin.	Temp.	Depth	Salin.	Temp.	Depth	Salin.	Temp.	
	(m)	(‰)	(C)	(m)	(‰)	(C)	(m)	(‰)	(C)	(m)	(‰)	(C)	(m)	(‰)	(C)	(m)	(‰)	(C)	(m)	(‰)	(C)	(m)	(‰)	(C)	
Jan 82							9	32.4	15.4	19	31.9	15.8				38	35.1	18.9	65	35.9	20.0				
Feb 82							9	31.6	12.2	19	32.1	13.1				38	34.6	14.8	65	35.3	16.4				
Mar 82							9	28.9	17.4	19	32.0	17.1				38	35.0	18.1							
Apr 82							9	29.1	20.7	19	32.0	21.0				38	34.5	22.0	65	35	21.3				
May 82	13	33.0	25.0				16	31.5	24.8																
Jun 82	12	37	25.4	17	36.2	26.4	14	38.0	25.1	13	37.2	25.7	33	36.7	24.7	32	40.0	23.8							
Jul 82										11	37.0	25.8				34	37.0	26.6	48	36.5	27.6				
Aug-Oct	-	-	-	-	-	-	-	-	-	NO SAMPLES	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nov 82	15	32.6	19.0	12	31.4	18.6	16	33.4	20.4	15	31.0	19.6													
Dec 82	14	31.6	17.2	15	31.6	18.2	17	33.8	18.7	16	31.8	18.0													
Jan 83	11	28.4	14.1	15	30.2	14.4	15	30.8	15.5	13	28.2	14.8													
Feb 83	16	33.2	15.8	17	31.8	15.7	18	33.0	15.3	13	28.4	14.5													

Month	Territorial Sea			Area 21 FCZ < 46 m			FCZ 46-91 m		
	Night			Night			Night		
	Depth	Salin.	Temp.	Depth	Salin.	Temp.	Depth	Salin.	Temp.
	(m)	(‰)	(C)	(m)	(‰)	(C)	(m)	(‰)	(C)
Jul 82	19	37	24.8	37	37.0	28.0	55	37.0	27.0

^aTerritorial sea = 16.7 km

^bFCZ = Fishery Conservation Zone (> 16.7 km to 370.6 km)



APPENDIX B: Summary of data collected in January-February 1983.



Table 1. Mean catch rate (No/ha) and mean length (mm) of brown shrimp caught with 18.3-m bag seines in Texas bay systems during January-February 1983 (blank = no measurement taken).

Month	Number samples	Galveston		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
Jan	10	16.67	35	0.00		0.00		0.00		0.00		0.00		0.00	
Feb	10	0.00		8.33	33	0.00		2.04	31	0.00		0.00		20.41	57

Table 2. Mean catch rate (No/ha) and mean length (mm) of white shrimp caught with 18.3-m bag seines in Texas bay systems during January-February 1983 (blank = no measurement taken).

Month	Number samples	Galveston		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
Jan	10	6.67	46	0.00		0.00		0.00		0.00		0.00		0.00	
Feb	10	6.67	43	5.00	70	0.00		0.00		4.76	28	0.00		0.00	

Table 3. Mean catch rate (No/ha) and mean length (mm) of pink shrimp caught with 18.3-m bag seines in Texas bay systems during January-February 1983 (blank = no measurement taken).

Month	Number samples	Galveston		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
Jan	10	0.00		0.00		0.00		0.00		0.00		10.00	56	0.00	
Feb	10	0.00		0.00		0.00		2.04	27	7.14	52	80.00	52	0.00	

Table 4. Mean catch rate (No/ha) and mean width (mm) of blue crabs caught with 18.3-m bag seines in Texas bay systems during January-February 1983 (blank = no measurement taken).

Month	Number samples	Galveston		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
Jan	10	40.00	41	14.81	23	26.67	31	93.88	44	29.55	20	2.50	31	4.00	28
Feb	10	340.00	30	151.67	22	46.67	22	53.06	26	33.33	21	35.00	37	75.51	31

Table 5. Mean catch rate (No./tow) and mean length (mm) of brown shrimp caught in Zone I with 6.1-m trawls in Texas bay systems during January-February 1983 (blank = no measurement taken).

Month	Day	Number samples	Galveston		Matagorda		San Antonio		Aransas		Corpus Christi	
			No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length
Jan	1-15	(5)	0.4	70	0.0		0.4	60	0.2	88	0.0	
	16-31	(5)	0.2	78	0.0		0.0		0.0		0.0	
Feb	1-15	(5)	0.0		0.0		0.8	66	0.0		0.0	
	16-28	(5)	0.0		0.2	83	0.4	80	0.4	93	0.0	

Table 6. Mean catch rate (No./tow) and mean length (mm) of brown shrimp caught in Zone II with 6.1-m trawls in Texas bay systems during January-February 1983 (blank = no measurement taken).

Month	Day	Number of samples	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	1-15	(5)	0.0		0.0		0.0		0.0		0.0		0.8	96	0.2	68
	16-31	(5)	0.0		0.0		0.0		0.0		0.0		0.0		0.6	75
Feb	1-15	(5)	0.0		0.0		0.0		0.2	38	0.0		1.6	106	0.0	
	16-28	(5)	0.0		0.0		0.6	71	0.0		0.0		0.4	93	0.3	73

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Table 7. Mean catch rate (No./tow) and mean length (mm) of brown shrimp caught in Zone III with 6.1-m trawls in Texas bay systems during January-February 1983 (blank = no measurement taken).

Month	Day	Number samples	Galveston		Matagorda				Aransas		Corpus Christi		Lower Laguna Madre		
			No./tow	Length	MC ^a	PC ^b	No./tow	Length	No./tow	Length	No./tow	Length			
Jan	1-15	(4)	0.3	73	(4)	0.0		0.0	(4)	0.0	(4)	0.0	(4)	0.3	63
	16-31	(4)	0.0		(4)	0.0		0.0	(4)	0.0	(4)	0.0	(4)	0.0	
Feb	1-15	(6)	0.0		(4)	0.5	88	0.0	(6)	0.0	(6)	0.0	(6)	0.0	
	16-31	(2)	0.0		(4)	0.0		0.0	(2)	0.0	(4)	0.0	(4)	0.3	73

^a Matagorda Ship Channel
^b Pass Cavallo

Table 8. Mean catch rate (No./tow) and mean length (mm) of white shrimp caught in Zone I with 6.1-m trawls in Texas bay systems during January-February 1983 (blank = no measurement taken).

Month	Day	Number of samples	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	1-15	(5)	2.0	74	0.2	83	0.2	68	2.8	74	0.0		-		-	
	16-31	(5)	0.8	70	0.0		0.2	58	0.0		0.2	108				
Feb	1-15	(5)	2.0	76	0.0		1.2	62	0.0		0.0		-		-	
	16-28	(5)	1.6	77	0.0		2.8	79	0.8	74	0.0					

Table 9. Mean catch rate (No./tow) and mean length (mm) of white shrimp caught in Zone II with 6.1-m trawls in Texas bay systems during January-February 1983 (blank = no measurement taken).

Month	Day	Number of samples	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	1-15	(5)	1.8	74	4.4	81	1.4	71	0.4	76	0.0		0.0		0.2	118
	16-31	(5)	1.4	77	0.6	70	0.2	73	0.0		0.4	108	0.4	88	0.0	
Feb	1-15	(5)	49.2	82	1.0	80	0.2	88	0.2	83	0.0		0.0		0.0	
	16-28	(5)	2.4	75	0.0		0.0		0.0		0.0		0.0		0.0	

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Table 10. Mean catch rate (No./tow) and mean length (mm) of white shrimp caught in Zone III with 6.1-m trawls in Texas bay systems during January-February 1983 (blank = no measurement taken).

Month	Day	Number of samples	Galveston		Matagorda				Aransas		Corpus Christi		Lower Laguna Madre		
			No./tow	Length	MC ^a	PC ^b	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	
Jan	1-15	(4)	2.8	77	(4)	1.3	78	1.0	82	(4)	0.0	(4)	0.0	(4)	0.0
	16-31	(4)	15.3	76	(4)	9.0	107	1.0	92	(4)	0.0	(4)	0.0	(4)	0.5
Feb	1-15	(6)	15.3	84	(4)	1.5	84	0.0		(6)	0.0	(6)	0.0	(6)	0.0
	16-28	(2)	30.5	82	(4)	0.0		0.0		(2)	0.0	(4)	0.0	(4)	1.0

Table 11. Mean catch rate (No/tow) and mean length (mm) of pink shrimp caught in Zone I with 6.1-m trawls in Texas bay systems during January-February 1983 (blank = no measurement taken).

Month	Day	Number samples	Galveston		Matagorda		San Antonio		Aransas		Corpus Christi	
			No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length
Jan	1-15	(5)	0.0		0.0		0.0		0.0		0.0	
	16-31	(5)	0.0		0.0		0.0		0.4	80	0.2	103
Feb	1-15	(5)	0.0		0.0		0.0		0.2	93	0.0	
	16-28	(5)	0.0		0.0		0.0		0.4	93	0.2	98

Table 12. Mean catch rate (No/tow) and mean length (mm) of pink shrimp caught in Zone II with 6.1-m trawls in Texas bay systems during January-February 1983 (blank = no measurement taken).

Month	Day	Number of samples	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	1-15	(5)	0.0		0.0		0.0		0.0		0.0		0.0		0.0	
	16-31	(5)	0.0		0.0		0.0		0.0		0.2	103	0.4	63	1.2	98
Feb	1-15	(5)	0.0		0.2	138	0.0		0.2	78	0.0		0.0		0.0	
	16-28	(5)	0.0		0.0		1.2	90	0.0		0.0		0.4	113	0.0	

Table 13. Mean catch rate (No/tow) and mean length (mm) of pink shrimp caught in Zone III with 6.1-m trawls in Texas bay systems during January-February 1983 (blank = no measurement taken).

Month	Day	Number samples	Galveston		Matagorda				Aransas		Corpus Christi		Lower Laguna Madre	
			No./tow	Length	MC ^B	PC ^B	No./tow	Length	No./tow	Length	No./tow	Length	No./tow	Length
Jan	1-15	(4)	0.0		0.0		0.0		0.0		0.2	77	0.0	
	16-31	(4)	0.0		0.0		0.0		0.0		0.0		0.0	
Feb	1-15	(6)	0.0		0.0		0.0		0.0		0.0		0.0	
	16-28	(2)	0.0		0.0		0.0		0.0		0.0		0.8	86

Table 14. Mean catch rate (No./tow) and mean width (mm) of blue crabs caught in Zone I with 6.1-m trawls in Texas bay system during January-February 1983 (blank - no measurement taken).

Month	Day	Number samples	Galveston		Matagorda		San Antonio		Aransas		Corpus Christi	
			No./tow	Width	No./tow	Width	No./tow	Width	No./tow	Width	No./tow	Width
Jan	1-15	(5)	0.4	176	0.0		0.6	64	0.8	106	0.0	
	16-31	(5)	1.2	72	0.2	31	3.0	53	0.0		0.0	
Feb	1-15	(5)	0.4	161	0.0		2.0	49	1.0	106	0.2	148
	16-28	(5)	1.4	134	0.8	158	23.6	62	4.6	40	0.0	

Table 15. Mean catch rate (No./tow) and mean width (mm) of blue crabs caught in Zone II with 6.1-m trawls in Texas bay systems during January-February 1983 (blank - no measurement taken).

Month	Day	Number of samples	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	1-15	(5)	0.6	119	0.2	82	1.2	55	0.4	130	0.0		0.0		0.0	
	16-31	(5)	0.2	163	0.2	45	1.2	82	0.6	29	0.2	166	0.0		0.2	130
Feb	1-15	(5)	0.6	84	0.0		1.4	35	2.0	29	0.0		0.8	107	0.2	38
	16-28	(5)	1.4	138	0.0		0.6	44	2.2	44	0.0		0.8	172	0.0	

Table 16. Mean catch rate (No./tow) and mean width (mm) of blue crabs caught in Zone III with 6.1-m trawls in Texas bay systems during January-February 1983 (blank - no measurement taken).

Month	Day	Number samples	Galveston		Matagorda		Matagorda		Aransas		Corpus Christi		Lower Laguna Madre		
			No./tow	Width	No./tow	Width	No./tow	Width	No./tow	Width	No./tow	Width	No./tow	Width	
Jan	1-15	(4)	1.0	118	(4)	0.0	(4)	0.0	(4)	0.0	(4)	0.0	(4)	0.2	140
	16-31	(4)	1.8	127	(4)	0.0	(4)	0.0	(4)	0.0	(4)	0.2	179	(4)	0.0
Feb	1-15	(4)	9.0	70	(4)	0.0	(4)	0.0	(6)	0.2	149	(4)	0.2	(6)	0.0
	16-28	(4)	6.0	83	(4)	0.0	(4)	0.0	(2)	0.0	(2)	0.0	(2)	0.0	

APPENDIX C: Data collected in Gulf Statistical Area 21 and the Fishery
Conservation Zone, January 1982-February 1983

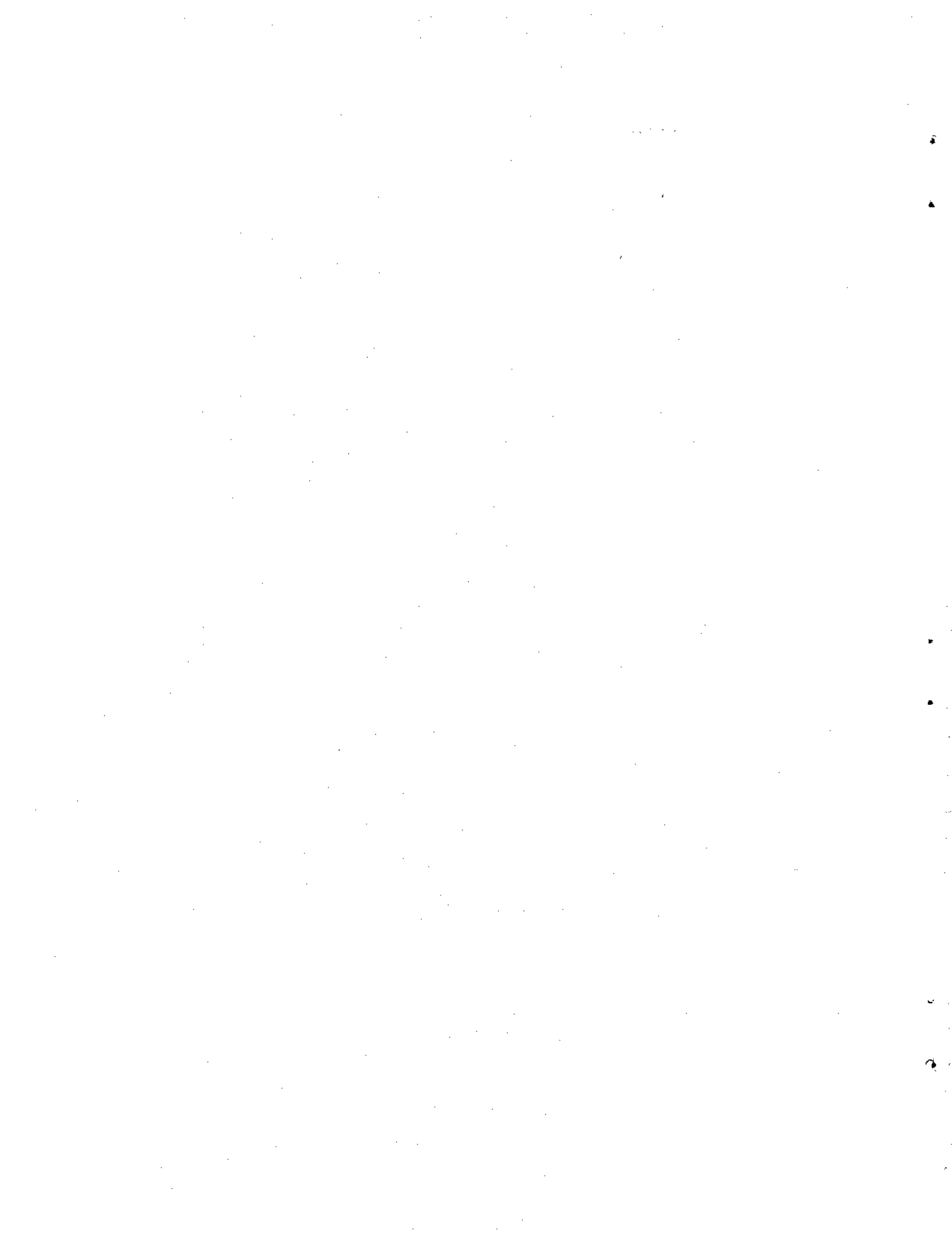


Table 1. Mean catch rate (No./h) and mean length (mm) of brown shrimp caught with Gulf trawls in the FCZ during January 1982-February 1983 (blank = no measurement taken).

Month	Area 19						Area 20					
	FCZ ^a < 46 m			FCZ 46-91 m			FCZ < 46 m			FCZ 46-91 m		
	No. of samples	No./h	Mean length	No. of samples	No./h	Mean length	No. of samples	No./h	Mean length	No. of samples	No./h	Mean length
Jan 82	0			0			4	117.0	139	4	126.0	154
Feb 82	0			0			4	29.5	144	4	120.0	154
Mar 82	0			0			4	45.0	141	0		
Apr 82	0			0			2	52.0	148	4	60.0	170
May 82	0			0			0			0		
Jun 82	3	538.3	112	0			2	1169.5	98	0		
Jul 82	0			0			5	437.0	111	2	40.0	145
Aug 82- Feb 83	0			0			0			0		

^aFCZ = Fishery Conservation Zone (> 16.7 km to 370.6 km)

Table 2. Mean catch rate (No./h) and mean length (mm) of white shrimp caught with Gulf trawls in the FCZ during January 1982-February 1983 (blank = no measurement taken).

Month	Area 19						Area 20					
	FCZ ^a < 46 m			FCZ 46-91 m			FCZ < 46 m			FCZ 46-91 m		
	No. of samples	No./h	Mean length	No. of samples	No./h	Mean length	No. of samples	No./h	Mean length	No. of samples	No./h	Mean length
Jan 82	0			0			4	0.5	158	4	0.0	
Feb 82	0			0			4	2.5	168	4	0.0	
Mar 82	0			0			4	0.0		0		
Apr 82	0			0			2	0.0		4	0.0	
May 82	0			0			0			0		
Jun 82	3	0.0		0			2	0.0		0		
Jul 82	0			0			5	0.0		2	0.0	
Aug 82- Feb 83	0			0			0			0		

^a FCZ = Fishery Conservation Zone (> 16.7 km to 370.6 km)

Table 3. Mean catch rate (Nb./h) and mean length (mm) of pink shrimp caught with Gulf trawls in the FCZ during January 1982-February 1983 (blank = no measurement taken).

Month	Area 19						Area 20					
	FCZ ^a < 46 m			FCZ 46-91 m			FCZ < 46 m			FCZ 46-91 m		
	No. of samples	No./h	Mean length	No. of samples	No./h	Mean length	No. of samples	No./h	Mean length	No. of samples	No./h	Mean length
Jan 82	0			0			4	0.0		4	0.0	
Feb 82	0			0			4	0.0		4	0.0	
Mar 82	0			0			4	0.0		0		
Apr 82	0			0			2	0.0		4	0.0	
May 82	0			0			0			0		
Jun 82	3	1.3	130	0			2	0.0		0		
Jul 82	0			0			5	0.0		2	0.0	
Aug 82- Feb 83	0			0			0			0		

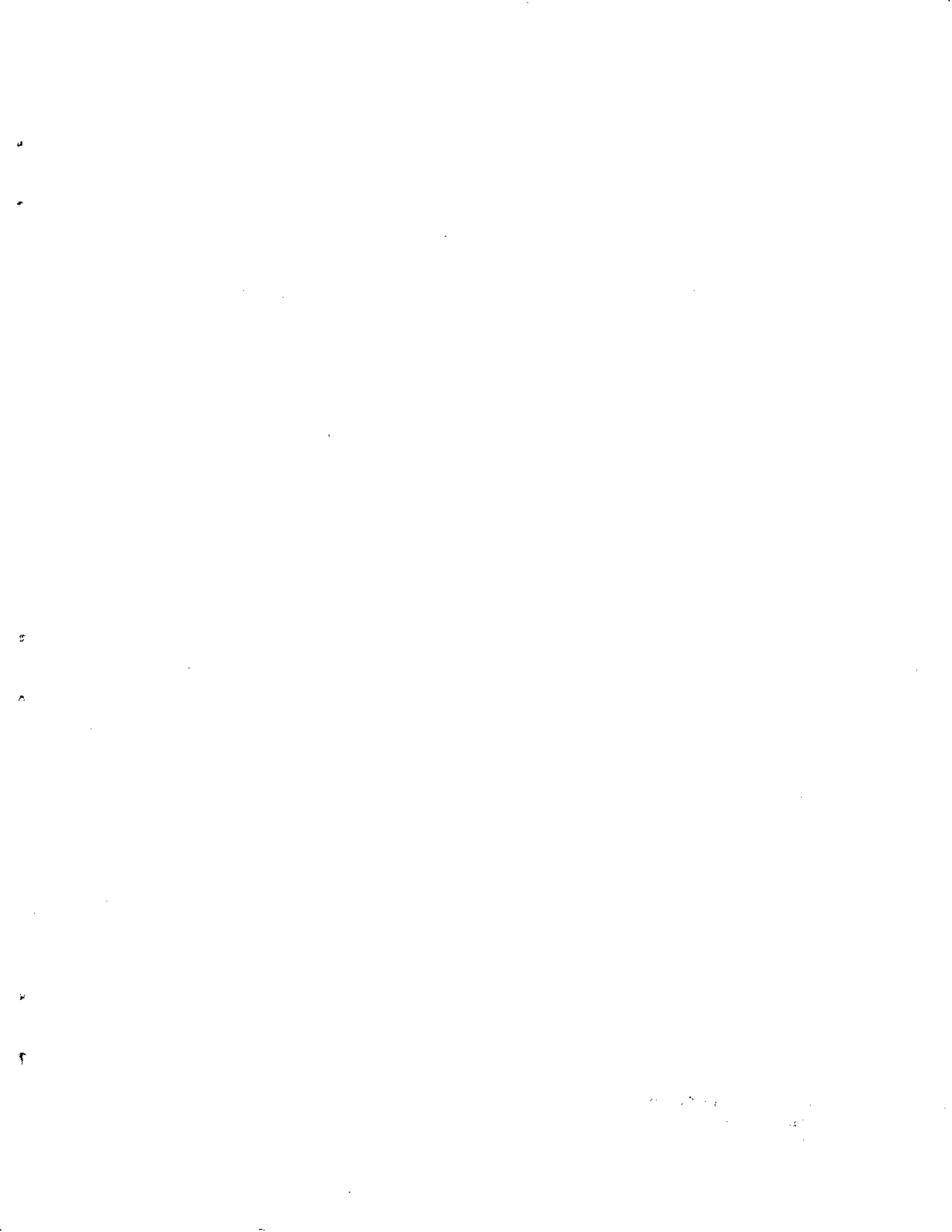
^aFCZ = Fishery Conservation Zone (> 16.7 km to 370.6 km)

Table 4. Mean catch rate (No./h) and mean length (mm) of shrimp caught with Gulf trawls in statistical Area 21 during July 1982 (blank = no measurement taken).

Species	Area 21								
	Territorial Sea ^a			FCZ ^b < 46 m			FCZ 46-91 m		
	No. of samples	No./h	Mean length	No. of samples	No./h	Mean length	No. of samples	No./h	Mean length
Brown Shrimp	5	771.0	122	1	266.0	133	1	55.0	171
White Shrimp	5	13.8	146	1	0.0		1	0.0	
Pink Shrimp	5	428.5	132	1	0.0		1	0.0	

^aTerritorial Sea = ≤ 16.7 km

^bFCZ = Fishery Conservation Zone (>16.7 km to 370.6 km)



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