

A Survey of Fish Populations in the Inshore
Gulf of Mexico off Texas
MF-R-7 (Job No. 12)

Henry Compton

Abstract: Fish populations in the inshore Gulf of Mexico off Port Aransas, Texas, Port Mansfield and Port Isabel, Texas, and briefly off Galveston, Texas, were surveyed for type, abundance and size with a flat otter trawl. In regular weekly samples, 25, 044 fish of 89 species were caught in 100 trawl samples. Atlantic croaker, Micropogon undulatus; sand trout, Cynoscion nothus; moonfish, Vomer setapinnis; bumper, Chloroscombrus chrysurus; and shoal flounder, Syacium gunteri, were the five most abundant species taken in depths ranging from 3 to 16 fathoms.

These results indicate that enough trash fish may be caught during routine shrimp trawling to sustain a profitable fishery if a market develops. No attempt was made to evaluate the abundance of larger food or game fishes.

Introduction: The large numbers of scrap fish caught in the trawls of commercial shrimpers in the Gulf of Mexico off the Texas coast are not now utilized for any economic purpose. Off Mississippi, these fish contribute millions of pounds annually to commercial fishery landings. Fish meal, fish oil, and fish solubles processed from demersal fishes are used in feed supplements and fertilizers. Whole or processed fish are valuable in the mink food, pet food, and crab bait industries.

Knowledge of the standing fish crop in the inshore Gulf available to the selectivity of standard bottom trawling gear is fundamental to any estimation of the economic worth of this crop. Seasonal abundance, distribution and size are important factors in determining changes in composition of the scrap fish catch throughout the year.

Trawl-caught fish must meet certain conditions in order to qualify as an economic sideline of an existing fishery or as a separate fishery. Any species increases its potential by meeting the requirements of size, seasonal abundance, and bodily characteristics suitable for a practical harvest. A species may be small but rich in oil or protein and abundant enough to justify use. Conversely, a species may be abundant and of suitable size but of a structural or chemical nature incompatible with utilization under the present needs and methods of processing.

The object of this study was to obtain information on the scrap fish of the inshore Gulf which can be taken with an otter trawl, and to determine those species most suitable for commercial utilization. Information obtained on the rarer species which possess no discernible economic value broadens the total ecological picture for the area. No attempt was made to evaluate larger food or game fish.

The major study of the ecology of the western Gulf of Mexico was conducted in 1950 and 1951 by Hildebrand (1954). Most of his report is on catches from 10 to 24 fathoms between Cameron, Louisiana, and Sugar Loaf Mountain on the Mexican Coast at Latitude 23° 15' N. Gunter (1954) sampled two stations in the Gulf of Mexico to 10 fathoms off Aransas Pass in 1941 and 1942 in addition to bay and Gulf beach sampling during the same period. Gunter (1958) sampled the Gulf beach area again in 1947, 1948, and 1949. MacFarland (1963) sampled the outer beach environment at Mustang Island, Texas, in 1960 and 1961. Miller (1965) made a trawl survey of fishes in the Gulf off Port Aransas, Texas, in depths of 3 to 15 fathoms between February and July 1964.

The industrial fishery program of the U. S. Fish and Wildlife Service as conducted out of the Galveston Laboratory is covered by Kutkuhn (1961, 1962, 1963, and 1964). Surveys of the industrial bottomfishes in the north-central and north-western Gulf are presented by Haskell (1960 and 1961), Ragan (1961 and 1962), Roithmayr (1962, 1963, and 1964), and Moore (1963 and 1964).

Previous research by biologists of the Texas Parks and Wildlife Department in the Gulf of Mexico from 1960 through 1963 was reported by Compton (1959, 1960-a, 1960-B and 1961) and Compton and Bradley (1961, 1962 and 1963). A report on research conducted in 1964 is in press.

Between January 1 and December 31, 1965, I examined trawl catches taken in three areas of the inshore Gulf to determine what fishes were present and their size and abundance. I took 54 samples in depths of 3 to 16 fathoms off Port Aransas, Texas and 38 samples in 3 to 16 fathoms off Port Mansfield and Port Isabel, Texas. In January I took 8 samples in 3 to 8 fathoms off Galveston and Freeport, Texas.

Description of Area: Basic papers on the Gulf of Mexico, including information on the areas sampled in this study, are presented for shorelines and coasts, geology, marine meteorology, and physics and chemistry by Price (1954), Lynch (1954), Leipper (1954), Marmer (1954), Shoemaker (1954), and Williams (1954). Excellent recent coverage of the hydrography of the water masses east of Port Aransas, Texas, was done in 1962 and 1963. (Jones, Copeland, and Hoese, 1965).

Physical locations of the areas studied were southeast of Freeport and Galveston, east southeast of Port Aransas, and east of Port Mansfield and Port Isabel (Figure 1).

Methods: Sampling was accomplished with a standard flat otter trawl of 2-inch stretch mesh nylon measuring 23-25 feet along the headline. The net was spread by 26 by 60 inch trawl doors. The foot rope was leaded and a tickler chain used. The net was a copy of those used in Texas bays and shallow Gulf by the commercial shrimp fishery. Comparative trawl research in the inshore Gulf has been conducted with a 30-foot otter trawl of 1 3/4-inch stretch mesh (Gunter, 1954), trawls of widths of 65 to 135 feet (Hildebrand, 1954), a 23-25-foot flat otter trawl of 1 1/2-inch stretch mesh and a 43-45 foot flat otter trawl of 2-inch stretch mesh (Compton, 1961 and 1962, Compton and Bradley, 1963 and 1964), and

a flat otter trawl of 19-foot width and 3/4-inch stretched mesh (Miller, 1965).

Duration of sampling was 15 minutes timed from completion of shooting the net. The trawl samples were made from the 38-foot Goby, a vessel comparable in most respects to the commercial fleet's bay and shallow Gulf boats. Estimated speed of trawling was 2 knots.

While the 43-45 foot trawl used for 30 minutes in previous studies is perhaps more comparable to the gear presently fished by the Gulf shrimp fleet (Robas, 1959), I found the 23-25-foot net and 15-minute sample more practical for ease of handling in both gear and sample estimation and closer related to the sampling gear of other research groups.

In the absence of attached net indicators and instrumentation, no effort was made to derive at a "unit of effort" figure for the trawl samples. De Boer (1959) and Binns (1959) have covered recent work on the aspects of obtaining trawl configuration during fishing.

All trawling was conducted between 7:00 a.m., and 1:00 p.m. Hydrographic and meteorological data, not covered in this report, were obtained at the time of each sample.

Information pertaining to the fish in each sample was noted on prepared forms on board. The number of specimens of any species was counted if under approximately fifty. When a species exceeded fifty individuals, the number was estimated. The size range of a species present in quantity was noted by measuring a number of the largest and smallest specimens. When only a few specimens were caught, all were measured. A standard half-meter fish measuring board was used. Weighing of fish catch was done on a thirty-pound vegetable scale.

Scientific nomenclature follows that of the American Fisheries Society (Bailey et al, 1960). Where grouping is phyletic, that used by Hoese (1958) was followed. The main authorities for keying were Breder (1948), Ginsburg (1950, 1951a, 1951b, 1952a, 1952b, 1953, and 1954), Hildebrand (1948), Jordan and Evermann (1898-1900), Norman (1934 and 1935), Rivas (1950 and 1951), and Teague (1951).

Results: Table 1 shows the fish catch for this study in comparison with that of the previous year. In 1965, 100 fifteen-minute trawl samples taken with the 23-25-foot flat otter produced 250.44 fish per trawl. In 1964, 80 thirty-minute samples made with the 43-45-foot trawl produced 281.35 fish per trawl. Six comparison trawls conducted with the two gears indicated that, on the average, the larger trawl caught between 15 and 20 per cent more poundage. This was subject to some variation and in the absence of configuration indicators can only be stated as background for further investigation.

In 1965, the five most abundant species were the Atlantic croaker, Micropogon undulatus; the Gulf sand trout, Cynoscion nothus; the moonfish, Vomer setapinnis; the bumper, Chloroscombrus chrysurus, and the shoal flounder, Syacium gunteri. In 1964, the croaker and sand trout occupied the same position of abundance; however, the shoal flounder was third in number and the fourth and fifth species were replaced by the spot croaker, Leiostomus xanthurus, and the hardhead catfish, Galeichthys felis. Most of the fish representing the top sixteen in abundance in 1965 were caught in comparable quantity the previous year.

Fish which dropped in abundance in the 1965 catch were the hardhead catfish; the threadfin, Polydactylus octonemus; the Gulf kingfish, Menticirrhus littoralis; the spotted whiff, Citharichthys macrops; the ocellated flounder, Ancylopsetta quadrocellata; the fringed flounder, Etropus crossotus; the pinfish, Lagodon rhomboides; the sand perch, Diplectrum formosum; the offshore lizardfish, Synodus poeyi; the lesser electric ray, Narcine brasiliensis; and the rough scad, Trachurus lathami.

In addition to the moonfish and the bumper, fish more abundant in 1965 were the southern hake, Urophycis floridanus; the red snapper, Lutjanus blackfordi; the southern kingfish, Menticirrhus americanus; the silver jenny, Eucinostomus gula; the largescale menhaden, Brevoortia patronus; the largescale lizardfish, Saurida brasiliensis; the Atlantic spadefish, Chaetodipterus faber; the Atlantic thread herring, Opisthonema oglinum; and the vermilion snapper, Rhomboplites aurorubens.

Occurrence of rarer fish represented by few individuals caught through the year can be compared in Table 1. Sampling in the north, middle, and south zones of the Gulf study was comparable for both years.

In Tables 2, 3, and 4, the yearly catch is broken into species caught off Port Aransas, off Port Mansfield, and Port Isabel, and off Galveston, and Freeport. The Atlantic croaker and the Gulf sand trout were most abundant in every area sampled. The bumper was caught in quantity only off Port Aransas. The moonfish was abundant off Port Aransas and in the southern area. The number of specimens per trawl decreased toward Port Mansfield and Port Isabel, while the number of species increased. The size ranges are extremes of the population for the year. No specimens smaller than 20 mm were noted. Largest fish caught were certain rays and the cutlassfish, Trichiurus lepturus.

Only the following fish were taken in all three areas: Anchoa hepsetus, Urophycis floridanus, Orthopristis chrysopterus, Cynoscion nothus, Larimus fasciatus, Menticirrhus americanus, Micropogon undulatus, Stellifer lanceolatus, Prionotus rubio, Ancylopsetta quadrocellata, Paralichthys lethostigma, Symphurus plaguisa, Spheroides nephelus, and Porichthys porossissimus.

Trinectes maculatus and Gobiesox strumosus were caught only off Galveston and Freeport. The following species were taken only off Port Aransas: Brevoortia gunteri, Synodus poeyi, Hemicaranx amblyrhynchus, Scomberomorus cavalla, Bollmannia communis, Astroscopus y-graecum, Lepophidium brevibarbe, Cyclosetta chittendeni, and Syacium papillosum.

The following species were only caught in the Port Mansfield/Port Isabel area: Sardinella anchovia, Rhomboplites aurorubens, Caulolatilus cynops, Urophycis cirratus, Menticirrhus saxitilis, Mullus auratus, Scorpaena calcarata, Prionotus ophryas, Prionotus martis, Ophidion welshi, and Citharichthys spilopterus.

Seasonal abundance of species sampled off Port Aransas and off Port Mansfield and Port Isabel is shown in Tables 5 and 6. Off Port Aransas the greatest number of specimens per trawl was noted in September and December. To the south the most productive months were June, September, and November. The most species were caught off Port Aransas in July, August, and September; while off Port Mansfield and Port Isabel more were taken in August, September, and November.

Off Port Aransas, the Atlantic croaker was most abundant in July, August, and September and off Port Mansfield/Port Isabel, in February, June, and September. The Gulf sand trout was relatively abundant from April through

November with concentrations off Port Aransas in June and July and off the southern area in June. The moonfish was most abundant in the northern zone in October, November, and December and off Port Mansfield and Port Isabel in September, November, and December.

The bumper was abundant in November off Port Aransas; only 12 specimens were taken to the south. The shoal flounder was abundant from May through September and again in December off Port Aransas. This fish was common in June, September, November, and December off Port Isabel/Port Mansfield. No samples were made in the southern area in January, April, or October. The Galveston/Freeport area was sampled only in January. The results are presented in Table 4.

In Figures 2 and 3, seasonal abundance of Micropogon undulatus, Cynoscion nothus, Leiostomus xanthurus, Stenotomus caprinus, Vomer setapinnis, Trichiurus lepturus, Chloroscombrus chrysurus, Synodus foetens, and Syacium gunteri is graphed by month for the Port Aransas area and for Port Mansfield/Port Isabel. Off Port Aransas, M. undulatus and L. xanthurus had a similar abundance pattern, being most prevalent in September. S. caprinus appeared from September through December. T. lepturus had no definite pattern, but was abundant in August in the north and June in the south. S. foetens was abundant to the south in September and off Port Aransas (not graphed) in July.

Juveniles of certain species were caught only in certain months (Table 7). In both areas, the months of March, April, and May were most productive of juveniles, followed by June, July, and August.

Figure 4 is the length-frequency data for the yearly catch of M. undulatus, C. nothus, and C. arenarius off Port Aransas. The Atlantic croaker had a steady growth rate in 3-10 fathoms of .59 mm per day from a minimum mode size of 45 mm on March 4 to a maximum mode size of 200 mm on November 19. This fish entered the catch in depths beyond 11 fathoms in mid-July at a mode of 137 mm and grew steadily to 200 mm by mid-November at a rate of .49 per day for these larger fish. The Gulf sand trout population was characterized by fairly small specimens through the year, both inshore and beyond 11 fathoms. No growth rate is readily apparent from the data. In depths under 10 fathoms, C. nothus had a peak size 50 mm below those taken at greater depths. The bay sand trout, C. arenarius were taken up to a peak size of 250 mm inshore, with individuals to 300 mm in deeper water.

Figure 5 displays the length-frequencies of M. undulatus, C. nothus, and S. caprinus taken off Port Mansfield and Port Isabel. The croaker follows the same general growth pattern found off Port Aransas, as does C. nothus. Too few C. arenarius were caught to graph. The populations of S. caprinus were of a wider size spread in depths beyond 11 fathoms.

Discussion: In the Gulf west of Mississippi, the Atlantic croaker is the principal species in commercial trash fish landings, not including menhaden. Other species which enter the market are Cynoscion nothus, C. arenarius, Stellifer lanceolatus, Trichiurus lepturus, Poronotus triacanthus, Stenotomus caprinus, Menticirrhus americanus, and M. littoralis. Off Texas, croaker and Gulf sand trout form the bulk of the scrap fish in 3 to 16 fathoms, while S. lanceolatus, C. arenarius, L. xanthurus, and S. caprinus are seasonally abundant enough for commercial exploitation.

Annual changes in the abundance of common species are not usually great. Some sporadic appearances are due to sampling gear and opportunity. In many cases, as with the frog fish, Antennarius ocellatus, an unusual sample produces the species in some abundance in the catch. Two hundred of the two hundred eighteen specimens caught in 1964 were caught in one trawl sample in April off Port Aransas. None were caught in 1965. Of the 789 bay anchovies, Anchoa mitchilli, noted in 1964, 430 were caught in two trawls in the Galveston area and 230 in one trawl off Port Aransas in January. None were noticed in 1965 samples. Such data could reflect erroneous abundance patterns.

Small schooling fish like anchovies and sardines are seldom taken in quantity by the bottom trawl. Relative abundance of surface and midwater species such as the jacks and mackerals, even as juveniles, is not correctly represented in data from flat trawl samples. Large fast swimmers escape the net. Reef and rough bottom fish are only caught from time to time without using a leadline modification. An exception is the juvenile red snapper, L. blackfordi, appearing inshore in the fall, away from the offshore bottom configurations where the adults are fished commercially.

Changes in abundance among species such as the kingfishes, the catfishes, and the various flatfishes are probably the result of small population movements for food, or because of changes in temperature or salinity. Some fish appear to move inshore of what could be considered their main habitat in deeper water. The offshore lizardfish, Synodus poeyi, was not present in the catches of 1965 to the extent of previous years. The rough-scale lizardfish, Saurida brasiliensis, which I caught previously only beyond 20 fathoms in June 1961, was fairly abundant inshore in the southern area and present off Port Aransas. Whether this small shift between related fishes represents a partial population replacement is uncertain but indicated.

Hildebrand (1954) reported S. poeyi common from generally 17 to 37 fathoms off Port Aransas and S. brasiliensis rare from 12 to 18 fathoms off Padre Island. Miller (1965) reported S. brasiliensis rare at 12 and 15 fathoms off Port Aransas, and did not take S. poeyi. The inshore lizardfish, Synodus foetens, the post-larvae of which are not uncommon in bay nurseries, is abundant in the inshore Gulf. The other two species are usually deeper water forms. Little is known of the inshore and offshore movements of Gulf fish which complete their life cycles in waters off Texas. This includes such commercial species as snapper, jackfish, and mackerel.

No tables were completed for comparison of depth zone production in species preference. Various papers already mentioned cover the fishes of the surf zone. Certainly, some species would enter trawl catches in 2 and 3 fathoms from this area; however, few mullet, pompano, bluefish, ladyfish, or silversides are ever taken in Gulf trawl samples. The depth breakdown of species caught between 3 and 16 fathoms in 1965 followed that I have found in previous trawl studies.

North-south distribution of species along the Texas coast is properly governed by general bottom habitat and water mass hydrography. The Gulf off Galveston has a shallow sloping bottom profile in comparison with that off Port Isabel. Species found on large reefs well offshore in the northern area are not found inshore. Small inshore reefs and rough bottom in the south produce more fish associated with reef habitat. Many fish, such as the scorpionfishes, snappers, tilefishes, razorfishes, and bigeyes, are caught close to shore in those waters. The same fish may be taken north off Port Aransas in deeper water. Some of the rarer

searobins, the goatfishes, and certain eels, apparently, prefer the more tropical water masses off Port Isabel. Common scrap fish are rather cosmopolitan along the Texas coast. The long spine porgy, S. caprinus, is an example of a species found further offshore on the northern part of the coast than in the south.

Many species which appear in samples from one area in a year's sampling of 3 to 16 fathoms are not in reality so restricted. The clingfish, Gobiesox strumosus, taken only from off Galveston, is common from jetties and Gulf entrances to the south.

Off Port Aransas the greatest numbers of fish were taken in September and December. These were predominantly croaker and spot croaker with a weight of 43.3 pounds per trawl. In December, large numbers of moonfish were caught, but the unit weight dropped to 33.7 pounds per trawl. October was a high month with 30.3 pounds per trawl, dominated by Gulf sand trout. November produced the fourth greatest number of fish taken for the year, but only 9.2 pounds per trawl. This was directly due to the great abundance of small bumpers and moonfish with practically none of the heavier fish present. July, a month producing less fish than in the fall and winter, had 41.7 pounds per trawl because of large croaker and sand trout. The commercial use of scrap fish is based on weight yield. Large numbers of individuals are not necessarily useful.

In the Port Mansfield/Port Isabel area, June produced the greatest number of fish and the highest poundage of 93.3 pounds per trawl primarily composed of Gulf sand trout, croaker, and cutlassfish. September produced 30 pounds per trawl and November 83.3 pounds per trawl. September was poor by comparison because the catch consisted mostly of lightweight moonfish and long spine porgy. In February, the large number of specimens weighing only 8.3 pounds per trawl was the result of many 30 mm to 60 mm croaker in the catch.

As a limited reference for later study, those fish which appeared to be juveniles were noted by date. The life histories of many gulf fishes have not been worked out, especially those of little or no present commercial value. Further research is needed on this for a better understanding of the total ecology of the area.

Much work and speculation has been done on the life history of the Atlantic croaker. The length-frequency plot on Figure 4 for croaker indicates movement of 100 mm fish into depths beyond 11 fathoms in July off Port Aransas. In March, this population is at 40-50 mm inshore and is from the spawn of the previous year. These juveniles, apparently, grow .59 mm per day, decreasing with age. A slower growth rate is indicated for the larger fish, both inshore and beyond 11 fathoms. Off Port Mansfield and Port Isabel, young from 30 mm to 100 mm were abundant in February. The smaller specimens would be 1964 year class from spawning in December and the larger fish from an earlier spawning in September. Roithmayr (1962) gives information on modal classes of croaker from south of Louisiana. Pearson (1929) and Gunter (1945) cover spawning, larvae, and year classes.

The larger specimens of Gulf and bay sand trout were found offshore. The C. nothus population off both Port Aransas and south was characterized by presence of small (50-60 mm) specimens throughout the year, with the smallest

of 25 mm in August. In depths beyond 11 fathoms, 40 mm specimens were caught in July. In the southern zone, 40 mm specimens were in depths to 16 fathoms in November. These catches indicate a long, if not continual, spawning season for Gulf sand trout regardless of depth within the sampling limits. C. arenarius off Port Aransas produced no specimens smaller than 70 mm which could be termed reasonable for a predominantly bay habitat fish.

S. caprinus, off the middle and lower Texas coast, does not appear in great numbers in less than 16 fathoms. This is a deeper water fish off the lower Texas coast and is caught further out on the shallow sloping bottom off Mississippi and Louisiana. Length-frequencies show juveniles of this fish in 11 to 16 fathoms of water off Port Mansfield and Port Isabel with only the larger adults, not maximum size, in small numbers inshore of these depths.

In the general estimation of the usefulness of scrap fish, certain points should be considered. It should be noted that the areas sampled are those fished for white shrimp by the Texas fleet. Brown shrimp are fished commercially in depths beyond 20 fathoms and mainly in 25 to 40 fathoms. All data in this study necessarily pertain to the projected use of the scrap fish caught by the white shrimp fishery, most active on the Texas coast from May through November with the greatest catches of shrimp in August, September, and October. (1965 Texas Landings).

Ragan (1961) lists industrial-type bottom fishes in sampling off the east coast of Texas in order of percentage composition as S. caprinus, T. lathami, C. nothus, M. undulatus, S. gunteri, Etrumeus sadina, P. octonemus, C. philadelphicus, S. foetens, and C. chrysurus. Of these, only M. undulatus, C. nothus, S. gunteri, S. foetens, and C. philadelphicus were taken in any quantity in the area of this study. In addition, C. chrysurus, V. setapinnis, L. xanthurus, T. lepturus, C. arenarius, and S. lanceolatus were found commercially abundant off Port Aransas. Off Port Mansfield and Port Isabel, C. chrysurus was unimportant and was displaced by U. parvus.

Fluctuations in population would bring new species into use or deprive the fishery of existing ones. For example, off Port Aransas in 1960, the rough scad, Trachurus lathami, was very abundant and formed the bulk of all catches through June. (Compton 1959-1960). This fish has steadily decreased in the catch down to three specimens in 1965. No great fluctuations were noted in populations of other common fish or in total abundance of trawl-caught fish.

Scrap fish are much less abundant than off the coasts of Mississippi, Alabama and Louisiana, but there should be enough to support a commercial fishery for many years. Their use must depend upon competition with more valuable resources in the inshore Gulf and with future developments for their processing. This study has shown that demersal fish are present in numbers and poundage sufficient for exploitation by inshore trawling vessels. Species best suited for inclusion into a proposed marketable crop category are the Atlantic croaker and the Gulf and bay sand trout.

Additional work is needed on larger fish of the Gulf. Commercial utilization of the scombrids, carangids, serranids, lutianids, sparids, and sciaenids might well be expanded if more information were available on these groups.

Literature Cited

- Bailey, R.M., E. A. Lachner, C. C. Lindsay, C. R. Robins, P. M. Roedel, W. B. Scott, and L. P. Woods. 1960. A list of common and scientific names of fishes from the United States and Canada. Amer. Fish. Soc. Comm. on Names of Fishes, Spec. Publ. No. 2:1-102.
- Binns, H. N. 1959. Trawling gear. pp. 297-299. in: Hilmar Kristjonsson, ed. Modern Fishing Gear of the World. Fishing News (Books) Ltd., London. 1959.
- Boer, P.A. de. 1959. Trawl gear measurements obtained by underwater instruments. pp. 225-233. in: Hilmar Kristjonsson, ed. Modern Fishing Gear of the World. Fishing News (Books) Ltd., London. 1959.
- Breder, C. M., Jr. 1948. Field Book of Marine Fishes of the Atlantic Coast. G. P. Putnam's Sons, New York and London, xxxvii+332 p., text illus., 16 pls.
- Compton, H. 1959-1960. Survey of the commercial shrimp and associated organisms of Gulf area 20. Project Reports, Mar. Fish. Div., Tex. Game and Fish. Comm. 1959-1960.
- _____ 1960-1961. Survey of the commercial shrimp and associated organisms of Gulf area 20. Project Reports, Mar. Fish. Div., Tex. Game and Fish. Comm. 1960-1961.
- _____ and E. Bradley. 1961-1962. Survey of the fish found in Gulf area 20 from 0-15 fathoms. Project Reports, Coast. Fish., Texas. Game and Fish Comm. 1961-1962.
- _____ 1963. Survey of the fishes found in Gulf area 20 from 2-17 fathoms and of post-larval fishes in Aransas Channel. Project Reports, Coast. Fish., Tex. Parks and Wildlife Dept. 1963.
- Ginsburg, Isaac. 1950. Review of the Western Atlantic Triglidae (fishes). Texas Jour. Sci. 2(4): 489-527.
- _____ 1951a. The eels of the northern Gulf coast of the United States and some related species. Texas Jour. Sci. 3(3): 431-485.
- _____ 1951b. Western Atlantic tongue fishes with descriptions of six new species. Zoologica. 36(3): 84-101.
- _____ 1952a. Eight new fishes from the Gulf coast of the United States, with two new genera and notes on geographic distribution. Jour. Wash. Acad. Sci. 42(3): 84-101.
- _____ 1952b. Fishes of the family Carangidae of the Northern Gulf of Mexico and three related species. Publ. Inst. Mar. Sci. Univ. Texas. 2(2): 43-117.
- _____ 1953. Ten new American gobioid fishes in the United States National Museum including additions to a revision of Gobionellus. Jour. Wash. Acad. Sci. 43(1): 18-26.

- _____ 1954. Whittings on the coasts of the American continents.
Fish. Bull. U.S.F.W.S., 56(96): 187-208, 2 figs.
- Gunter, G. 1945. Studies on the marine fishes of Texas. Publs. Inst. Mar. Sci. Univ. Tex. 1(1):190 p.
- _____ 1958. Populations studies of the shallow water fishes of an outer beach in South Texas. Publ. Inst. Mar. Sci. Univ. Tex. 5:186-193.
- Haskell, W. A. 1960. Trawl-caught industrial fishes. U.S.F.W.S., Fish. Res. Gal. Biol. Lab., Circular 92, 1960.
- Haskell, W. A. 1961. Industrial bottom-fish fishery in the north central Gulf of Mexico. U.S.F.W.S., Fish. Res. Gal. Biol. Lab., Circular 129, 1961.
- Hildebrand, H. H. 1954. A study of the fauna of the brown shrimp (Penaeus aztecus Ives) grounds in the western Gulf of Mexico. Publs. Inst. Mar. Sci. Univ. Tex. 3(2): 234-366.
- Hildebrand, S. F. 1948. A review of the American menhaden, genus Brevoortia, with a description of a new species. Smithsonian Misc. Coll., 107(18): 1-39, 9 figs.
- Hoesel, H. D. 1958. A partially annotated checklist of the marine fishes of Texas. Publs. Inst. Mar. Sci. Univ. Tex. 5:312-352.
- Jones, R. S., B. J. Copeland and H. D. Hoesel, 1965. A study of the hydrography of inshore waters in the western Gulf of Mexico off Port Aransas, Texas. Publs. Inst. Mar. Sci. Univ. Tex. 10:22-32.
- Jordan, D. S. and B. W. Evermann. 1898-1900. The fishes of North and Middle America. Bull. U. S. Nat. Mus. No. 47, 3,313 pp.
- Kutkuhn, J. H. 1961. Industrial fishery program. U.S.F.W.S., Fish, Res. Gal. Biol. Lab., Circular 129, p. 26, 1961.
- _____ 1962. Industrial fishery program. U.S.F.W.S., Fish. Res. Gal. Biol. Lab., Circular 161, p. 38, 1962.
- _____ 1963. Industrial fishery program. U.S.F.W.S., Fish. Res. Gal. Biol. Lab., Circular 183, p. 38-40, 1963.
- _____ 1964. Industrial fishery program. U.S.F.W.S., Fish. Res. Gal. Biol. Lab., Circular 230, p. 47, 1964.
- Leipper, D. F. 1954. Marine meteorology of the Gulf of Mexico, a brief review. Fish. Bull. 89 of the U.S.F.W.S. 55:39-65.
- _____ 1954. Physical oceanography of the Gulf of Mexico. Fish, Bull. 89 of the U.S.F.W.S. 55:119-137.
- Lynch, S. A. 1954. Geology of the Gulf of Mexico. Fish. Bull. 89 of the U.S.F.W.S. 55:67-86.
- MacFarland, Wm. N. 1963. Seasonal change in the number and biomass of fishes from the surf at Mustang Island, Texas. Publs. Inst. Mar. Sci. Univ. Tex. 9:91-105.

- Marmer, H. A. 1954. Tides and sea level in the Gulf of Mexico. Fish, Bull. 89 of the U. S. F. W. S. 55:101-118.
- Miller, J. M. 1965. Trawl survey of shallow Gulf fishes near Port Aransas. Publs. Inst. Mar. Sci. Univ. Tex. 10:80-107.
- Moore, D. 1963. Abundance and distribution of western Gulf bottomfish resources. U. S. F. W. S., Fish. Res. Gal. Biol. Lab., Circular 183, p. 45-47, 1963.
- _____ 1964. Western Gulf bottomfish resources. U. S. F. W. S., Fish, Res. Gal. Biol. Lab., Circular 230, p. 56-59, 1964.
- Norman, J. R. 1934. A systematic monograph of the flatfishes (Heterosomata). Vol. 1 Psettodidae, Bothidae, Pleuronectidae. British Museum (Nat.Hist.), London. viii 459 pp., 317 figs.
- _____ 1935. A revision of the lizard-fishes of the genera Synodus, Trachinocephalus, and Saurida. Proc. Zool. Soc. London, Pt. 1:99-135, 18 figs.
- Pearson, J. C. 1929. Natural history and conservation of the redfish and other commercial sciaenids on the Texas coast. Bull. Bur. Fish. Wash. 44:129-214.
- Price, W. A. 1954. Shorelines and coasts of the Gulf of Mexico. Fish. Bull. 89 of the U. S. F. W. S. 55:39-65.
- Ragan, J. G. 1961. Preliminary survey of industrial-type bottom fishes in the north western Gulf of Mexico. U. S. F. W. S., Fish. Res. Gal. Biol. Lab., Circular 129. p. 30-32. 1961.
- _____ 1962. Western Gulf bottomfish survey. U. S. F. W. S., Fish. Res. Gal. Biol. Lab., Circular 161, p. 42-44, 1962.
- Rivas, L. R. 1950. A revision of the American clupeid fishes of the genus Harengula, with descriptions of four new subspecies. Proc. U. S. Natl. Mus., 100:275-309, 41 figs. 3 pls.
- _____ 1951. A preliminary review of the western North Atlantic fishes of the family Scombridae. Bull. Mar. Sci. Gulf and Caribbean, 1 (3):209-230.
- Robas, J. S. 1959. Shrimp trawling gear as used in the Gulf of Mexico. pp. 311-316. in Hilmar Kristjonsson, ed. Modern Fishing Gear of the World. Fishing News (Books) Ltd., London.
- Roithmayr, C. M. 1962. Industrial bottomfish fishery in the north central Gulf of Mexico. U. S. F. W. S., Fish. Res. Gal. Biol. Lab., Circular 161, p. 39-41, 1962.
- _____ 1963. Industrial bottomfish fishery in the north central Gulf of Mexico. U. S. F. W. S., Fish. Res. Gal. Biol. Lab., Circular 183, p. 45-47, 1963.

- _____ 1964. Life histories of north-central Gulf bottomfish.
U. S. F. W. S., Fish. Res. Gal. Biol. Lab., Circular 230, p. 49-55, 1964.
- Shoemaker, W. S. 1954. Light penetration in the Gulf of Mexico. Fish. Bull. 89 of the U. S. F. W. S. 55: 139-141.
- Teague, G. W. 1951. The sea-robins of America. A revision of the triglid fishes of the genus Prionotus. Comun. Zool. Mus. Hist. Nat. Montevideo, 3(61): 1-53, 1 fig., 5 pls.
- Texas Landings. 1965. U. S. Dept. of the Int., F. W. S. Bur. of Comm. Fish. & Texas Parks and Wildlife Dept., 1965.
- Williams, R. H. 1954. Distribution of chemical constituents of sea water in the Gulf of Mexico. Fish. Bull. 89 of the U. S. F. W. S. 55:143-151.

Table 1
Comparison of Fish Catch of 1964 and 1965 from the Three Gulf Areas
by Order of Abundance - 1965

<u>Fish</u>	<u>1965</u>	<u>1964</u>
Micropogon undulatus	7,918	3,401
Cynoscion nothus	3,446	4,241
Vomer setapinnis	1,649	505
Chloroscombrus chrysurus	1,240	351
Syacium gunteri	1,060	2,231
Anchoa hepsetus	740	470
Trichiurus lepturus	740	496
Stellifier lanceolatus	727	342
Cynoscion arenarius	678	710
Leiostomus xanthurus	670	1,079
Synodus foetens	591	602
Stenotomus caprinus	588	230
Symphurus plaguisa	497	501
Centropristes philadelphicus	466	379
Poronotus triacanthus	423	840
Larimus fasciatus	367	291
Upeneus parvus	297	45
Galeichthys felis	261	1,058
Urophycis floridanus	228	78
Lutjanus blackfordi	204	68
Menticirrhus americanus	177	65
Eucinostomus gula	138	46
Polydactylus octonemus	128	250
Sphaeroides nephelus	128	93
Brevoortia patronus	117	55
Orthopristis chrysopterus	111	80
Saurida brasiliensis	107	
Menticirrhus littoralis	98	490
Chaetodipterus faber	90	26
Citharichthys macrops	79	372
Peprilus alepidotus	77	55
Ancylopsetta quadrocellata	70	185
Harengula pensacolae	68	81
Conodon nobilis	65	23
Lagocephalus laevigatus	64	90
Prionotus rubio	59	94
Dasyatis sabina	56	42
Etropus crossotus	56	301
Lagodon rhomboides	49	203
Diplectrum formosum	42	101
Opisthonema oglinum	37	
Scomberomorus maculatus	37	1
Rhomboplites aurorubens	32	
Synodus poeyi	27	208
Porichthys porosissimus	25	20
Narcine brasiliensis	24	110
Brevoortia gunteri	23	
Bollmannia communis	23	

Table 1--Continued

<u>Fish</u>	<u>1965</u>	<u>1964</u>
Raja texana	21	44
Paralichthys lethostigma	17	23
Balistes capriscus	17	22
Prionotus tribulus	16	23
Bagre marinus	14	20
Ophidion welshi	14	8
Paralichthys albigutta	13	27
Gymnothorax nigromarginatus	11	3
Citharichthys spilopterus	11	
Gobiesox strumosus	10	
Syngnathus louisianae	9	3
Lepophidium brevibarbe	8	3
Sphyrna guachancho	8	13
Trachurus lathamii	7	126
Prionotus ophryas	7	1
Chilomycterus schoepfii	6	32
Syacium papillosum	5	
Trinectes maculatus	5	17
Sardinella anchovia	3	4
Hippocampus obtusus	3	9
Menticirrhus saxatilis	3	1
Mullus auratus	3	
Scorpaena calcarata	3	2
Prionotus martis	3	26
Astroscopus y-graecum	3	27
Cyclopsetta chittendeni	3	8
Achirus lineatus	3	15
Ogcocephalus nasutus	3	7
Dasyatis americana	2	2
Caulolatilus cyanops	2	7
Hemicaranx amblyrhynchus	2	1
Urophycis cirratus	2	
Scomberomorus cavalla	2	9
Sphyrna tiburo	1	
Aetobatus narinari	1	
Trachinocephalus myops	1	7
Bairdiella chrysur	1	19
Gobionellus gracillimus	1	
Bellator militaris	1	
Mugil cephalus	1	
Halieutichthys aculeatus	1	3
Sphyrna zygaena		2
Rhinobatus lentiginosus		6
Gymnura micrura		1
Anchoa mitchilli		789
Mystriophis intertinctus		1
Urophycis regius		10
Serraniculus pumilio		3
Priacanthus arenatus		3
Caranx bartholomaei		1

Table 1--Continued

<u>Fish</u>	<u>1965</u>	<u>1964</u>
Caranx crysos		10
Caranx hippos		3
Selene vomer		8
Cynoscion nebulosus		5
Umbrina coroides		12
Kathetostoma albigutta		2
Gymnachirus nudus		9
Monocanthus hispidus		1
Lactophrys quadricornis		1
Sphaeroides spengleri		2
Antennarius ocellatus		218
Number of Specimens:	25,044	22,508
Number of Species:	89	94
Trawl Width:	23-25 feet	43-45 feet
Duration of Trawl:	15 minutes	30 minutes
Number of Samples:		
Port Aransas Area	54	42
Port Isabel/Port Mansfield Area	38	31
Galveston Area	<u>8</u>	<u>7</u>
Total:	100	80

Table 2
Relative Abundance and Size Range of Fishes from 3 to 16 fathoms
off Port Aransas in 1965

Fish	Number of Specimens	Size in mm.
<i>Micropogon undulatus</i>	2,176	40-250
<i>Cynoscion nothus</i>	1,918	25-250
<i>Chloroscombrus chrysurus</i>	1,228	75-200
<i>Vomer setapinnis</i>	1,012	40-175
<i>Leiostomus xanthurus</i>	640	100-230
<i>Trichiurus lepturus</i>	497	100-600
<i>Syacium gunteri</i>	486	50-150
<i>Cynoscion arenarius</i>	454	70-300
<i>Stellifer lanceolatus</i>	390	40-130
<i>Poronotus triacanthus</i>	374	30-125
<i>Anchoa hepsetus</i>	299	50-160
<i>Synodus foetens</i>	299	100-400
<i>Centropristes philadelphicus</i>	203	60-200
<i>Lutjanus blackfordi</i>	131	45-175
<i>Symphurus plagiusa</i>	129	90-150
<i>Larimus fasciatus</i>	128	50-150
<i>Polydactylus octonemus</i>	101	110-150
<i>Menticirrhus americanus</i>	85	80-250
<i>Chaetodipterus faber</i>	79	75-160
<i>Peprilus alepidotus</i>	68	75-200
<i>Urophycis floridanus</i>	60	60-150
<i>Galeichthys felis</i>	59	100-250
<i>Lagocephalus laevigatus</i>	56	40-150
<i>Dasyatis sabina</i>	54	300-600
<i>Orthopristis chrysopterus</i>	50	100-175
<i>Brevoortia patronus</i>	49	100-220
<i>Harengula pensacolae</i>	39	75-125
<i>Scomberomorus maculatus</i>	36	125-350
<i>Prionotus rubio</i>	34	40-200
<i>Ancylopsetta quadrocellata</i>	30	50-225
<i>Synodus poeyi</i>	27	100-125
<i>Stenotomus caprinus</i>	26	40-75
<i>Brevoortia gunteri</i>	23	100-150
<i>Upeneus parvus</i>	23	75-125
<i>Bollmannia communis</i>	23	65-150
<i>Diplectrum formosum</i>	19	100
<i>Lagodon rhomboides</i>	17	80-125
<i>Sphaeroides nephelus</i>	13	25-120
<i>Bagre marinus</i>	10	125-200
<i>Etropus crossotus</i>	10	100-125
<i>Opisthonema oglinum</i>	9	75-80
<i>Citharichthys macrops</i>	9	110
<i>Eucinostomus gula</i>	8	75-100
<i>Lepophidium brevibarbe</i>	8	100-200
<i>Porichthys porosissimus</i>	8	100-130
<i>Gymnothorax nigromarginatus</i>	7	200-400
<i>Menticirrhus littoralis</i>	7	150-230
<i>Balistes capriscus</i>	7	75-150
<i>Prionotus tribulus</i>	6	60-175

Table 2--continued

Fish	Number of Specimens	Size in mm.
<i>Saurida brasiliensis</i>	5	60-100
<i>Paralichthys lethostigma</i>	5	125-180
<i>Syacium papillosum</i>	5	50-130
<i>Chilomycterus schoepfii</i>	5	100-200
<i>Raja texana</i>	4	200-500
<i>Trachurus lathami</i>	4	110-120
<i>Sphyrna guachancho</i>	4	100-200
<i>Paralichthys albigutta</i>	4	150-300
<i>Conodon nobilis</i>	3	75-125
<i>Astroscopus y-graecum</i>	3	60
<i>Cyclopsetta chittendeni</i>	3	150
<i>Hemicaranx amblyrhynchus</i>	2	100, 125
<i>Scomberomorus cavalla</i>	2	175
<i>Sphyrna tiburo</i>	1	400
<i>Narcine brasiliensis</i>	1	150
<i>Aetobatus narinari</i>	1	500
<i>Dasyatis americana</i>	1	400
<i>Hippocampus obtusus</i>	1	75
<i>Achirus lineatus</i>	1	100
<i>Ogcocephalus nasutus</i>	1	75

69 Species

11,480 Specimens

54 Samples

Table 3
Relative abundance and Size Range of Fishes from 3 to 16 fathoms off
Port Mansfield and Port Isabel in 1965

Fish	Number of Specimens	Size in mm.
<i>Micropogon undulatus</i>	1,167	30-200
<i>Cynoscion nothus</i>	948	40-200
<i>Vomer setapinnis</i>	637	25-150
<i>Syacium gunteri</i>	574	70-150
<i>Stenotomus caprinus</i>	562	40-150
<i>Synodus foetens</i>	292	50-300
<i>Upeneus parvus</i>	274	80-150
<i>Centropristes philadelphicus</i>	263	90-200
<i>Trichiurus lepturus</i>	243	100-400
<i>Cynoscion arenarius</i>	224	60-300
<i>Galeichthys felis</i>	202	100-250
<i>Anchoa hepsetus</i>	185	60-125
<i>Eucinostomus gula</i>	130	90-100
<i>Larimus fasciatus</i>	123	100-160
<i>Saurida brasiliensis</i>	102	75-150
<i>Stellifer lanceolatus</i>	100	60-130
<i>Menticirrhus littoralis</i>	91	120-250
<i>Symphurus plagiosa</i>	74	100-140
<i>Lutjanus blackfordi</i>	73	40-230
<i>Citharichthys macrops</i>	70	20-150
<i>Brevoortia patronus</i>	68	100-180
<i>Conodon nobilis</i>	62	50-175
<i>Poronotus triacanthus</i>	49	40-125
<i>Sphaeroides nephelus</i>	43	40-100
<i>Menticirrhus americanus</i>	41	100-250
<i>Rhomboplites aurorubens</i>	32	50-130
<i>Lagodon rhomboides</i>	32	90-130
<i>Urophycis floridanus</i>	30	60-120
<i>Leiostomus xanthurus</i>	30	120-150
<i>Harengula pensacolae</i>	29	90-150
<i>Opisthonema oglinum</i>	28	90-120
<i>Polydactylus octonemus</i>	27	90-120
<i>Prionotus rubio</i>	25	50-200
<i>Orthopristis chrysopterus</i>	24	100-160
<i>Diplectrum formosum</i>	23	80-120
<i>Narcine brasiliensis</i>	23	150-400
<i>Ancylopsetta quadrocellata</i>	19	60-200
<i>Raja texana</i>	17	130-400
<i>Ophidion welshi</i>	14	200-250
<i>Chloroscombrus chrysurus</i>	12	120-150
<i>Chaetodipterus faber</i>	11	75-150
<i>Citharichthys spilopterus</i>	11	100
<i>Paralichthys lethostigma</i>	11	160-400
<i>Balistes capriscus</i>	10	100-180
<i>Peprilus alepidotus</i>	9	90-100
<i>Paralichthys albigutta</i>	9	180-300
<i>Lagocephalus laevigatus</i>	8	50-125
<i>Prionotus ophryas</i>	7	90-110
<i>Porichthys porosissimus</i>	6	90-110

Table 3--continued

Fish	Number of Specimens	Size in mm.
<i>Bagre marinus</i>	4	140-160
<i>Gymnothorax nigromarginatus</i>	4	400
<i>Sphyraena guachancho</i>	4	100-120
<i>Etropus crossotus</i>	4	125
<i>Sardinella anchovia</i>	3	160
<i>Trachurus lathami</i>	3	100
<i>Menticirrhus saxitilis</i>	3	150
<i>Mullus auratus</i>	3	160
<i>Scorpaena calcarata</i>	3	75-90
<i>Prionotus martis</i>	3	120-150
<i>Dasyatis sabina</i>	2	240
<i>Urophycis cirratus</i>	2	130
<i>Hippocampus obtusus</i>	2	60,110
<i>Caulolatilus cyanops</i>	2	130
<i>Achirus lineatus</i>	2	70,90
<i>Ogcocephalus nasutus</i>	2	75,90
<i>Dasyatis americana</i>	1	500
<i>Trachinocephalus myops</i>	1	150
<i>Syngnathus louisianae</i>	1	130
<i>Bairdiella chrysur</i>	1	130
<i>Scomberomorus maculatus</i>	1	250
<i>Gobionellus gracillimus</i>	1	80
<i>Bellator militaris</i>	1	75
<i>Prionotus tribulus</i>	1	100
<i>Mugil cephalus</i>	1	200
<i>Halieutichthys aculeatus</i>	1	40
75 Species	7,100 Specimens	38 Samples

Table 4
Relative Abundance and Size Range of Fishes from 3 to 8 fathoms off
Freeport and Galveston in January of 1965

Fish	Number of Specimens	Size in mm.
<i>Micropogon undulatus</i>	4,561	20-80
<i>Cynoscion nothus</i>	580	80-110
<i>Symphurus plaguisa</i>	294	90-150
<i>Anchoa hepsetus</i>	256	30-130
<i>Stellifer lanceolatus</i>	237	90-110
<i>Urophycis floridanus</i>	138	40-200
<i>Larimus fasciatus</i>	116	60-130
<i>Sphaeroides nephelus</i>	72	100-130
<i>Etropus crossotus</i>	56	90-100
<i>Menticirrhus americanus</i>	51	150-200
<i>Orthopristis chrysopterus</i>	37	100-150
<i>Ancylopsetta quadrocellata</i>	21	40-160
<i>Porichthys porosissimus</i>	11	100
<i>Gobiesox strumosus</i>	10	80-100
<i>Prionotus tribulus</i>	9	40-100
<i>Syngnathus louisianae</i>	8	130-160
<i>Trinectes maculatus</i>	5	110-120
<i>Paralichthys lethostigma</i>	1	170
<i>Chilomycterus schoepfii</i>	1	120

19 Species

6,464 Specimens

8 Samples

Table 5
Abundance of Fishes by Month from 3 to 16 Fathoms off Port Aransas in 1965

Fish	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
<i>S. tiburo</i>			1									
<i>N. brasiliensis</i>					1							
<i>R. texana</i>	2						1				1	
<i>A. narinari</i>							1					
<i>D. americana</i>											1	
<i>D. sabina</i>	38	13	3									
<i>B. patronus</i>	7			1	3	20	5	1	6	6		
<i>B. gunteri</i>	3					18	2					
<i>H. pensacolae</i>							10	17	1	11		
<i>O. oglinum</i>				8				1				
<i>A. hepsetus</i>	8			90	3	3	66	68	22	20	19	
<i>S. foetens</i>	3					3	84	47	45	28	5	84
<i>S. poeyi</i>							2	1				24
<i>S. brasiliensis</i>									2			3
<i>B. marinus</i>	2								2		6	
<i>G. felis</i>	2		32				11	2	9	1	2	
<i>G. nigromarginatus</i>					1	1	3	2				
<i>U. floridanus</i>		2	47	8	3							
<i>H. obtusus</i>							1					
<i>C. philadelphicus</i>	6			1	18	27	24	47	10	2	5	63
<i>D. formosum</i>												19
<i>L. blackfordi</i>							2	5	123		1	
<i>C. chrysurus</i>					150	185		3	23	63	650	154
<i>H. amblyrhynchus</i>	1										1	
<i>T. lathamii</i>						3	1					
<i>V. setapinnis</i>	25				4	94	25	37	38	200	333	256
<i>E. gula</i>								1		7		
<i>C. nobilis</i>								3				
<i>O. chrysopterus</i>	9		28				2	3		2	5	1
<i>C. arenarius</i>				4	24	37	52	11	204	102	20	
<i>C. nothus</i>	39		3	101	125	432	513	168	225	209	103	
<i>L. fasciatus</i>	1	3	16		9	31	42	18	8			
<i>L. xanthurus</i>	6	20			1	12	150		450		1	
<i>M. americanus</i>	16		1	5	5	12	12	2	23	5		4
<i>M. littoralis</i>	4		1				1					1
<i>M. undulatus</i>		6	70		40	105	700	514	625	111	5	
<i>S. lanceolatus</i>	52		200	1	80		6			50	1	
<i>U. parvus</i>				1			6	9	7			
<i>L. rhomboides</i>		2	1	1	1	3			3	4		2
<i>S. caprinus</i>							1	25				

Table 5--continued

Fish	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
<i>C. faber</i>	10	10	10		30	2			9	3	1	4
<i>T. lepturus</i>	17		2	1	3	86	66	265	18	25	14	
<i>S. cavalla</i>									2			
<i>S. maculatus</i>								6	29	1		
<i>B. communis</i>					16	2	4				1	
<i>P. rubio</i>				8	1	11	7	4	1	2		
<i>P. tribulus</i>			2		3						1	
<i>A. y-graecum</i>			3									
<i>L. brevibarbe</i>				8								
<i>P. alepidotus</i>	7				2	3	12	1	26	4	4	9
<i>P. triacanthus</i>	22		4	4	2		55	6	31		11	239
<i>S. guachancho</i>								1	2	1		
<i>P. octonemus</i>					1	5	50	35	3	7		
<i>C. macrops</i>							9					
<i>A. quadrocellata</i>	2	1	1	1	1	1	2	2	5	9	2	3
<i>C. chittendeni</i>									3			
<i>E. crossotus</i>								5	4			1
<i>P. lethostigma</i>	2	2							1			
<i>P. albigutta</i>				1			1		2			
<i>S. gunteri</i>	11				43	81	45	83	67	12	14	130
<i>S. papillosum</i>							3					2
<i>A. lineatus</i>						1						
<i>S. plaguisa</i>				38	80	2	2	1			6	
<i>B. capriscus</i>							1		6			
<i>L. laevigatus</i>					6		44	2	2	2		
<i>S. nephelus</i>	5	3		1				4				
<i>C. schoepfii</i>	3	1	1									
<i>P. porosissimus</i>					3	1	3			1		
<i>O. nasutus</i>									1			
Number of Specimens:	303	63	426	283	659	1184	2024	1400	2038	888	1213	999
Number of Pounds:	60	10	6	22	99	161	417	215	260	91	46	101
Number of Trawls:	2	1	2	3	3	8	10	8	6	3	5	3

Table 5--continued

Fish	Jan	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Specimens per Trawls:	151.5	63	213	94.3	219.7	148	202.4	175	339.7	296	242.6	333
Pounds per Trawl:	30	10	3	7.3	33	20.1	41.7	26.9	43.3	30.3	9.2	33.7
Number of Species:	27	11	19	19	29	29	39	35	37	27	26	18

Table 6
Abundance of Fishes by Month from 3 to 16 Fathoms off Port Mansfield/Port Isabel in 1965

Fish	Feb.	Mar.	May	June	July	Aug.	Sept.	Nov.	Dec.
<i>N. brasiliensis</i>	8					2	4	3	6
<i>R. texana</i>	1						7	3	6
<i>D. americana</i>		1							
<i>D. sabina</i>			2						
<i>B. patronus</i>	2		5	10		21	4	24	2
<i>H. pensacolae</i>						6		8	15
<i>O. oglinum</i>								28	
<i>S. anchovia</i>								3	
<i>A. hepsetus</i>	5	2	118	6		32		22	
<i>S. foetens</i>	2	8		2		15	145	64	56
<i>S. brasiliensis</i>						23	28	27	24
<i>T. myops</i>				1					
<i>B. marinus</i>		1						3	
<i>G. felis</i>	3		23			1	50	125	
<i>G. nigromarginatus</i>				3					1
<i>U. floridanus</i>			30						
<i>U. cirratus</i>			2						
<i>H. obtusus</i>			1	1					
<i>S. louisianae</i>			1						
<i>C. philadelphicus</i>	6	7	7	56		79	21	54	33
<i>D. formosum</i>			1					16	6
<i>L. blackfordi</i>						11	19	2	41
<i>R. aurorubens</i>				11			21		
<i>C. cyanops</i>				2					
<i>C. chrysurus</i>						6	6		
<i>T. lathamii</i>				3					
<i>V. setapinnis</i>		1			54	60	221	101	200
<i>E. gula</i>				2		87	23	18	
<i>C. nobilis</i>				9	19	27		7	
<i>O. chrysopterus</i>	7					7	7	3	
<i>B. chrysur</i>			1						
<i>C. arenarius</i>				150		8	2	29	35
<i>C. nothus</i>	180	12		504	24	34	3	156	35

Table 6--continued

Fish	Feb.	Mar.	May	June	July	Aug.	Sept.	Nov.	Dec.
<i>L. fasciatus</i>				65	1	23		34	
<i>L. xanthurus</i>			6			1	6	17	
<i>M. americanus</i>			24	1		3	3	4	6
<i>M. littoralis</i>	1		4	14			21	31	20
<i>M. saxitilis</i>									3
<i>M. undulatus</i>	610	2	2	320		24	201	8	
<i>S. lanceolatus</i>		1			1			98	
<i>M. auratus</i>								3	
<i>U. parvus</i>		1				50	133	70	20
<i>L. rhomboides</i>				6		11	10	5	
<i>S. caprinus</i>					10	19	223	106	204
<i>C. faber</i>			1			2	2	3	3
<i>T. lepturus</i>			2	156	24	6	1	54	
<i>S. maculatus</i>						1			
<i>G. gracillimus</i>									1
<i>S. calcarata</i>					3				
<i>B. militaris</i>				1					
<i>P. ophryas</i>				3			1	3	
<i>P. rubio</i>	3	1			2	9	4	3	3
<i>P. tribulus</i>			1						
<i>P. martis</i>						1	1	1	
<i>O. welshi</i>				14					
<i>P. alepidotus</i>							2	7	
<i>P. triacanthus</i>		6	23			5	15		
<i>S. guachancho</i>						3		1	
<i>M. cephalus</i>							1		
<i>P. octonemus</i>							27		
<i>A. quadrocellata</i>			3	4	2	2		4	4
<i>C. macrops</i>		3			7		30	17	13
<i>C. spilopterus</i>							6	3	2
<i>E. crossotus</i>						4			
<i>P. lethostigma</i>							2	2	7
<i>P. albigutta</i>		1	6						2
<i>S. gunteri</i>	8	33		120	24	63	106	110	110

Table 6--continued

Fish	Feb.	Mar.	May	June	July	Aug.	Sept.	Nov.	Dec.
A. lineatus	1						1		
S. plaguisa				23				51	
B. capriscus				8			2		
L. laevigatus						4		2	2
S. nephelus		4			10	4	3	6	16
P. porosissimus				5				1	
H. aculeatus								1	
O. nasutus						2			
Number of Specimens:	837	84	263	1500	181	656	1362	1341	876
Number of Pounds:	25	8	31	280	16	36	90	250	100
Number of Trawls:	3	7	4	3	6	6	3	3	3
Specimens per trawl:	279	12	65.8	500	30.2	109.3	454	447	292
Pounds per Trawl:	8.3	1.1	7.8	93.3	2.7	6	30	83.3	33.3
Number of Species:	14	16	21	28	13	36	38	47	29

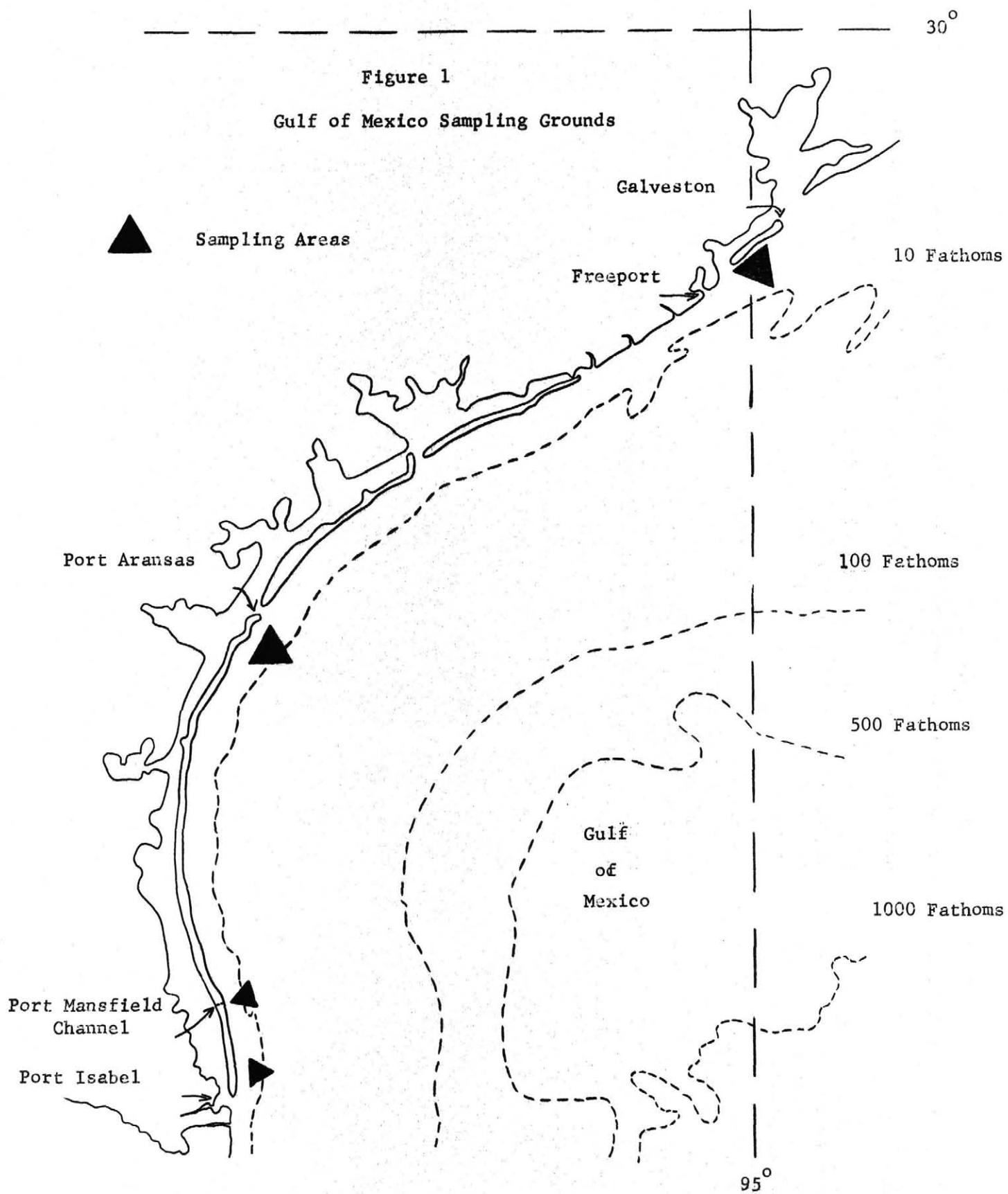
Table 7

List of Certain Fishes by Date of Occurrence of Specimens of Smallest Size in Catch

Fish	Aransas Area	Isabel/Mansfield Area	Galveston Area
<i>Micropogon undulatus</i>	40 mm, March & May	30 mm, Feb. & March	20 mm, Jan.
<i>Cynoscion nothus</i>	25 mm, Aug.	40 mm, Nov.	
<i>Vomer setapinnis</i>	40 mm, July	25 mm, July	
<i>Syacium gunteri</i>	50 mm, Aug.		
<i>Anchoa hepsetus</i>	50 mm, Apr. & May		30 mm, Jan.
<i>Trichiurus lepturus</i>	100 mm, Oct.	100 mm, July	
<i>Stellifer lanceolatus</i>	40 mm, Mar. & Oct.		
<i>Cynoscion arenarius</i>	70 mm, May		
<i>Synodus foetens</i>	100 mm, Oct.	50 mm, Mar.	
<i>Stenotomus caprinus</i>		40 mm, Sept. & Nov.	
<i>Symphurus plaguisa</i>	Obviously ripe from examination through month of May		
<i>Centropristes philadelphicus</i>	60 mm, June		
<i>Poronotus triacanthus</i>	30 mm, Mar.	40 mm, Mar.	
<i>Larimus fasciatus</i>	50 mm, Mar.		
<i>Urophycis floridanus</i>			40 mm, Jan.
<i>Lutjanus blackfordi</i>	45 mm, Aug.	40 mm, Sept.	
<i>Menticirrhus americanus</i>	80 mm, Jan.		
<i>Sphaeroides nephelus</i>	25 mm, Aug.		
<i>Citharichthys macrops</i>		20 mm, Mar.	
<i>Ancylopsetta quadrocellata</i>	50 mm, Mar.	60 mm, May	
<i>Conodon nobilis</i>		50 mm, Aug.	
<i>Lagocephalus laevigatus</i>	40 mm, May		
<i>Prionotus rubio</i>	40 mm, Apr.	50 mm, July	

Figure 1

Gulf of Mexico Sampling Grounds



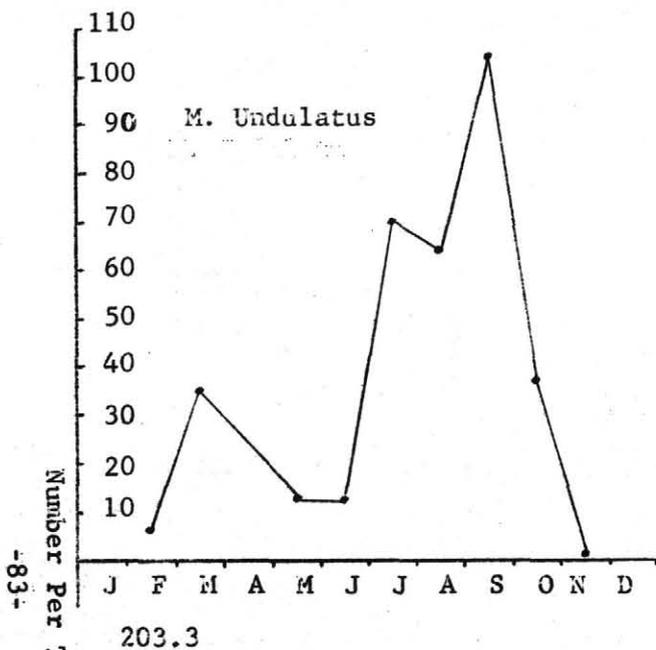
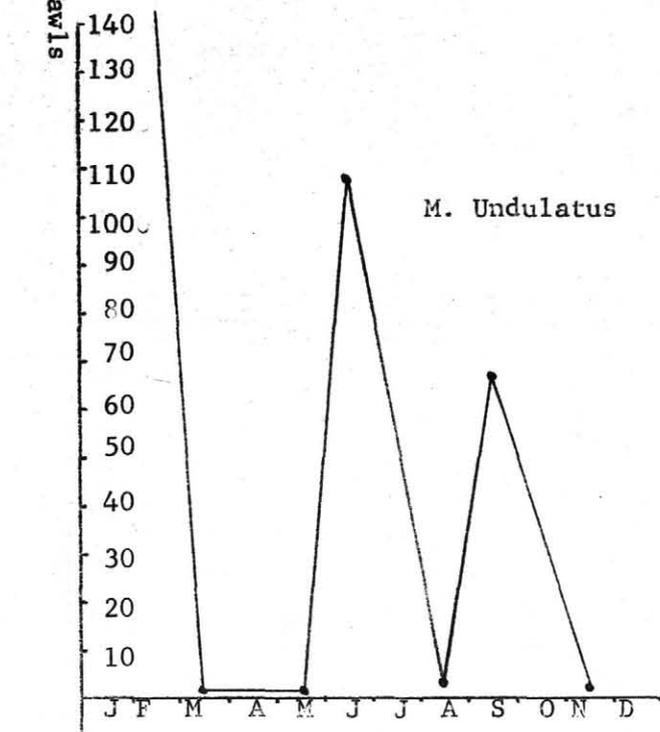
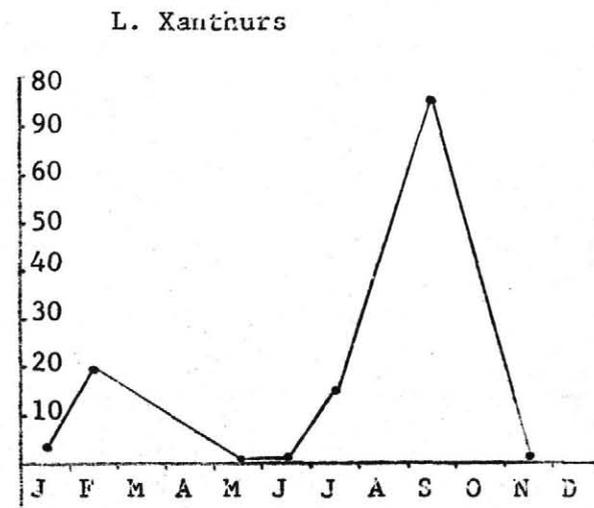
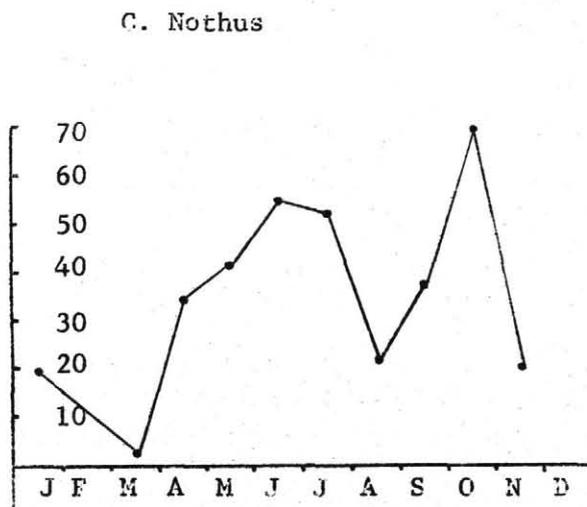
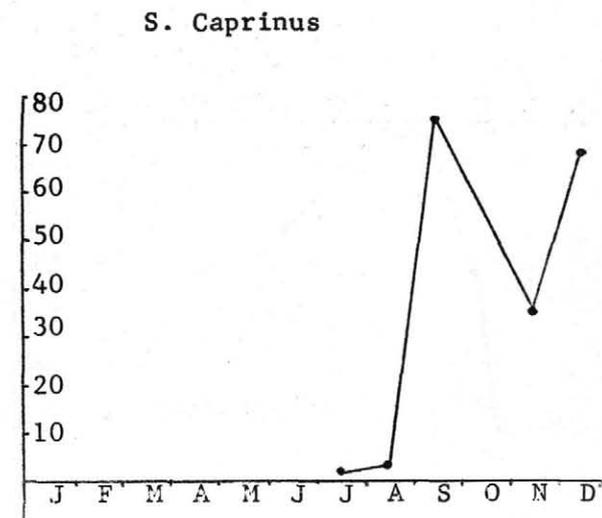
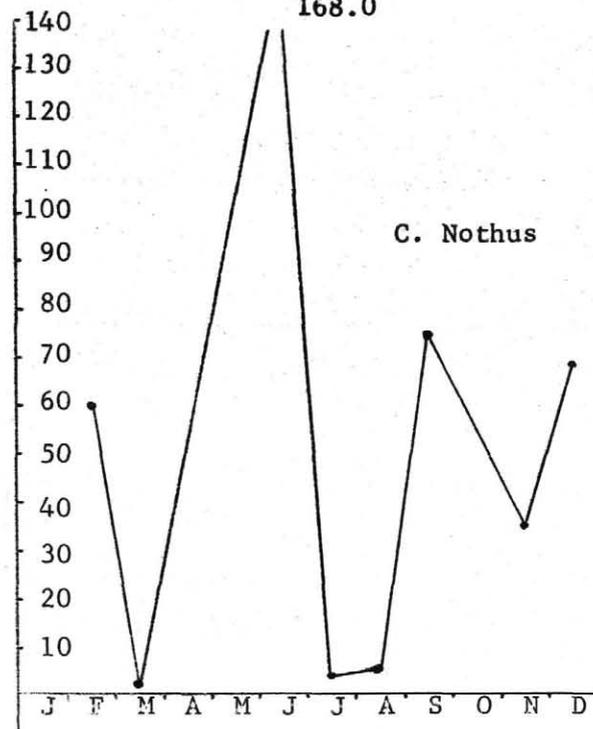


Figure 2 Port Aransas Area



Port Mansfield/Port Isabel Area
168.0



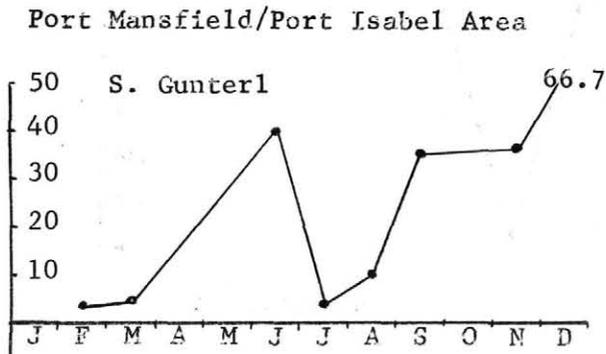
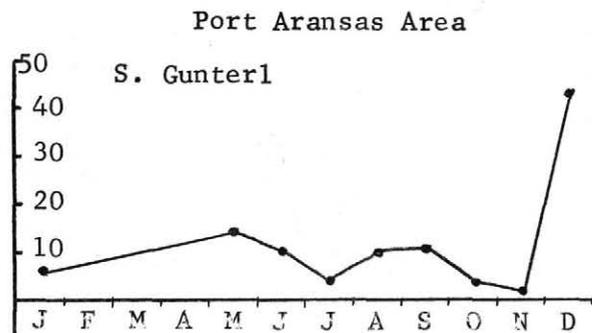
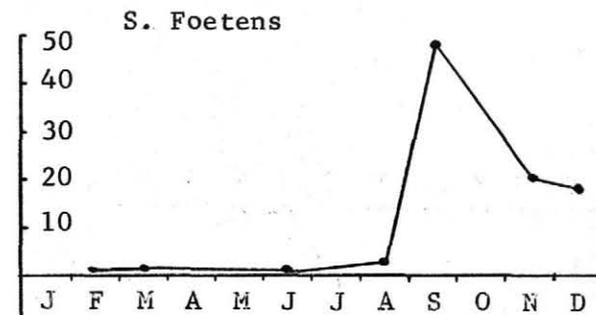
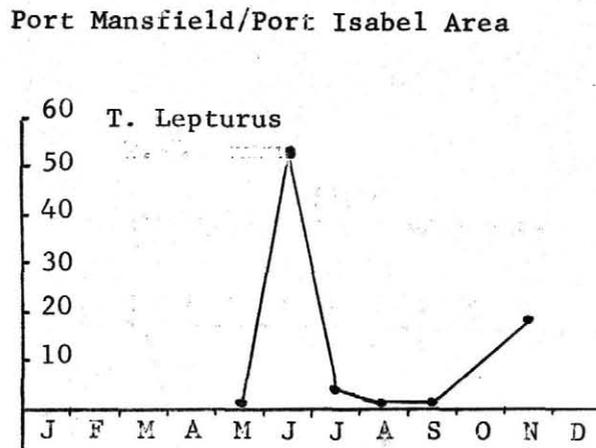
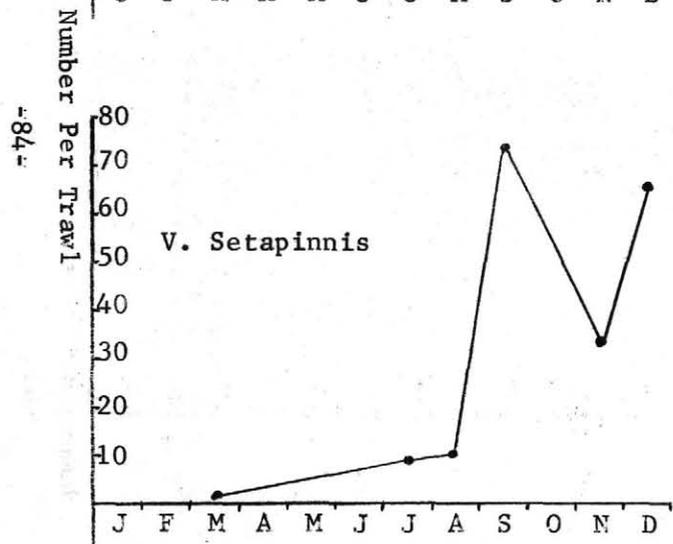
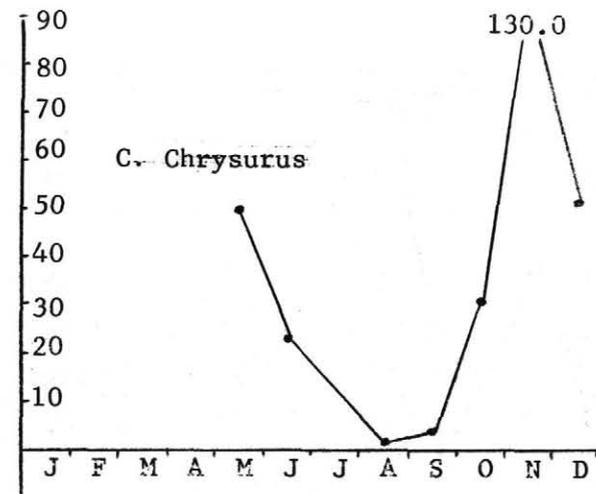
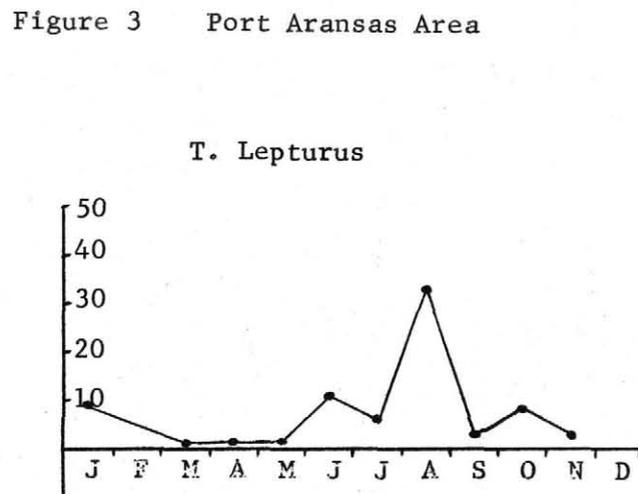
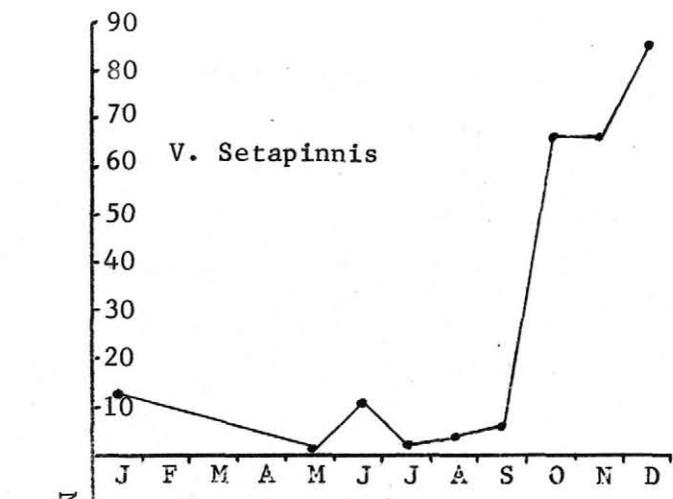
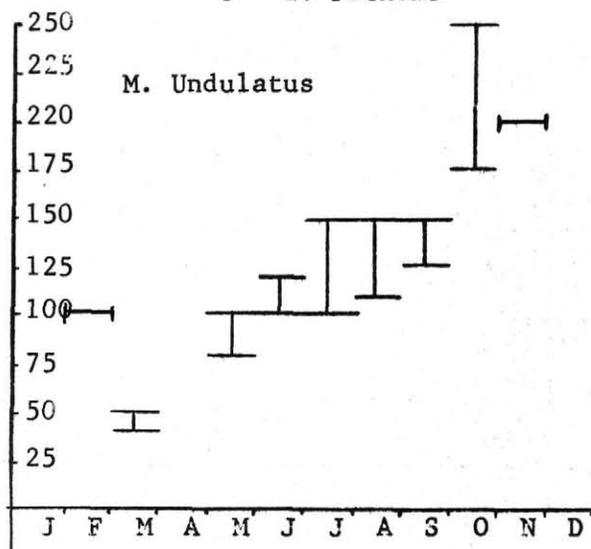
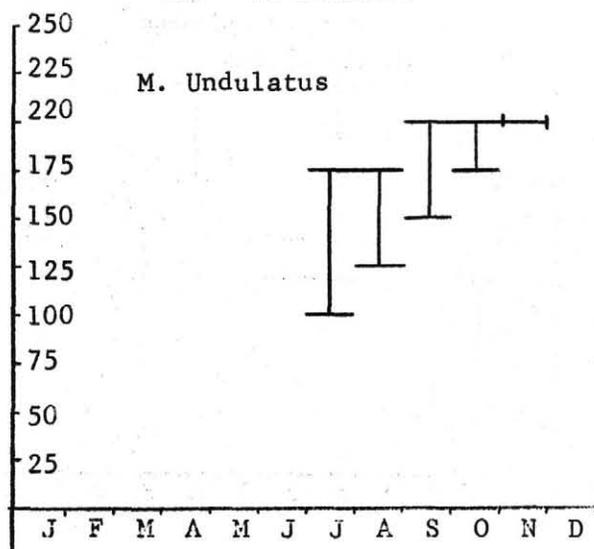


Figure 4 Yearly Length-Frequencies Off Port Aransas

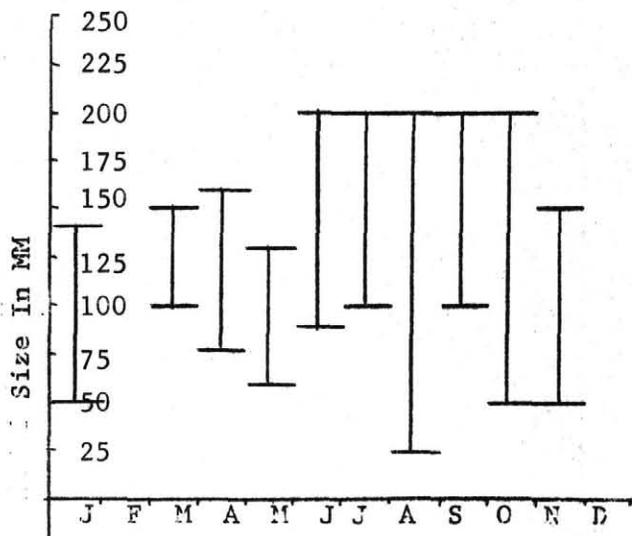
3 - 10 Fathoms



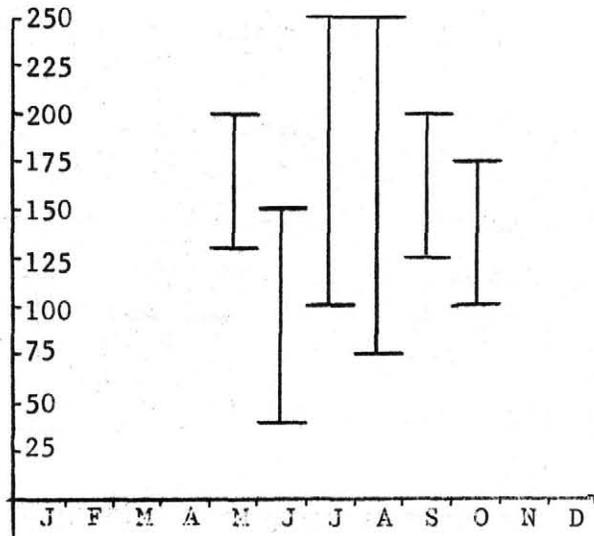
11 - 16 Fathoms



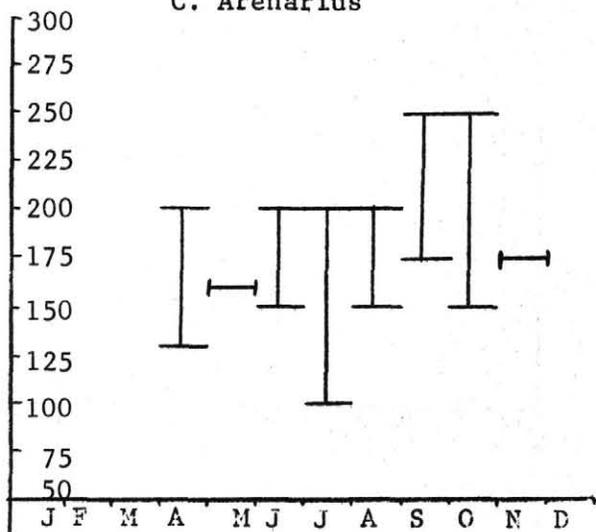
C. Nothus



C. Nothus



C. Arenarius



C. Arenarius

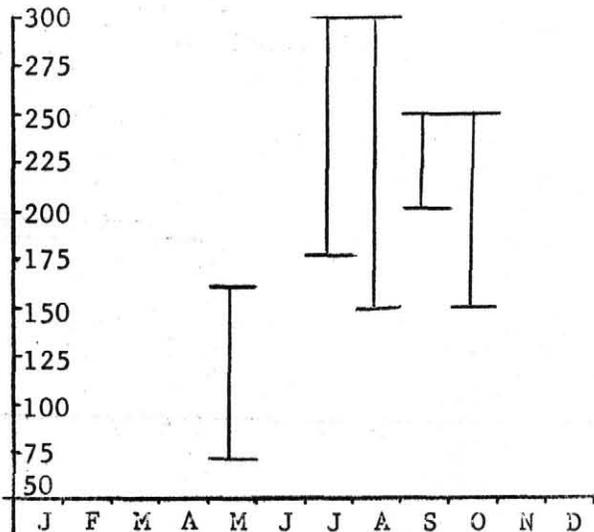
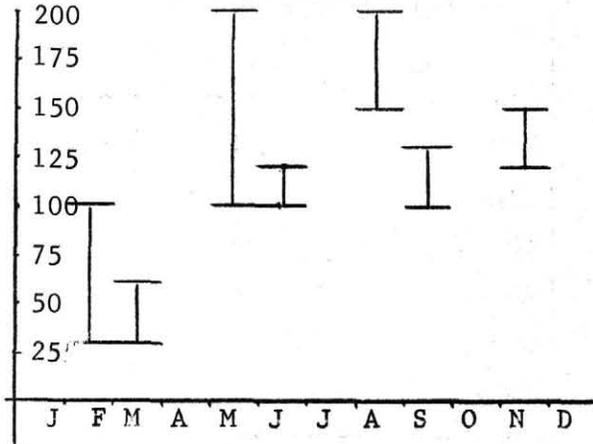


Figure 5 Yearly Length-Frequencies Off Port Mansfield/Port Isabel

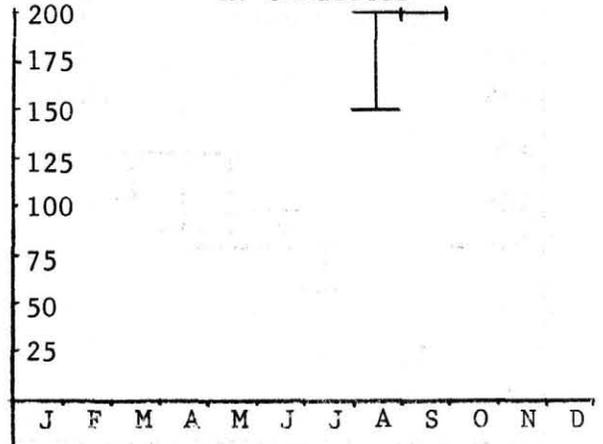
3 - 10 Fathoms

M. Undulatus

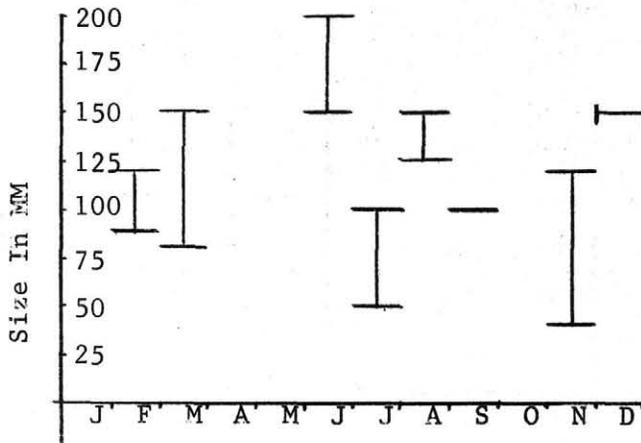


11 - 16 Fathoms

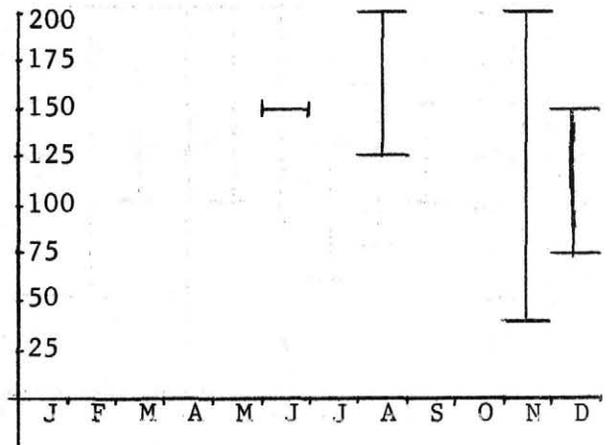
M. Undulatus



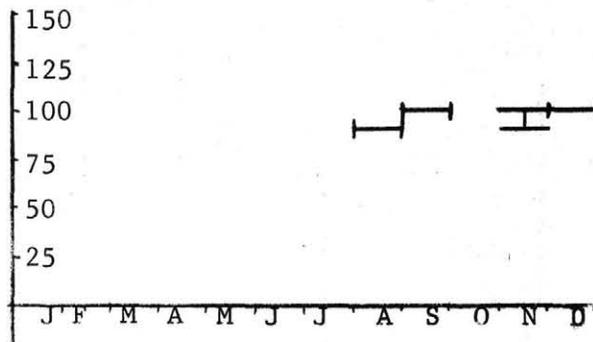
C. Nothus



C. Nothus



S. Caprinus



S. Caprinus

