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Sciaenid Fishery Resources of the Western Atlantic

by

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Due to the renewed membership of the United States in ICES and expansion of the world's fishing industry into the eastern central Atlantic, the importance of other fish groups previously disregarded by this organization may now receive increased attention. One of these groups is the sciaenids which will be reviewed forthwith. This brief review will apply in general to the more important species of the Western Atlantic including the Atlantic croaker (Micropogon undulatus), spot (Leiostomus xanthurus), seatrouts (Cynoscion sp.), and red drum (Sciaenops ocellata), and more specifically to the first, or croaker (Figure 1). Bear in mind, though, that sciaenids are common throughout the world in similar environments.

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SUMMARY

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Demersal fishes of the Western Atlantic sciaenid family, including Atlantic croaker (Micropogon undulatus), spot (Leiostomus xanthurus), seatrouts (Cynoscion sp.), and red drum (Sciaenops ocellata), are briefly reviewed. The total recorded catch is 410 million pounds; the actual catch is estimated to be over 960 million. The sciaenids are typical fishes of coastal tropical and subtropical areas. Centers of abundance include the northern Gulf of Mexico and Chesapeake Bay. Spawning occurs in the open ocean with the young developing in estuarine areas; adult croaker have been found out to 90-fathom depths (75 miles from shore) in the Gulf of Mexico. Commercially the fish are taken principally by trawl gear, in the recreational fishery with hook and line.

The shrimp trawl fleet takes a large volume of sciaenids which are discarded. The catch of sciaenids is increasing in proportion to the growth of the shrimp fleet and the expansion of the fishery into deeper water. The United States implemented a research program to assess the demersal fish resources of the Gulf of Mexico, especially the sciaenids. Results of this research may be of use in other areas where similar studies are planned.

The estimated recorded catch of sciaenids for 1970 from the Atlantic seaboard was 10 million pounds by commercial fishermen and 155 million pounds by recreational fishermen. In the Gulf of Mexico the recorded catch was 25 million pounds by the commercial sector and 220 million by the recreational group (Duel, 1973). The combined total was 410 million pounds. In the Gulf of Mexico an additional 50 million pounds are landed by the industrial fish trawlers. A unique feature with this group is that the resource in some cases is considered underutilized and to a great extent not utilized (Bullis and Carpenter, 1968). In the latter case we refer to the substantial volume taken by the U. S. shrimp trawlers as incidental to shrimp and discarded, on which we shall elaborate later (Juhl, Gutherz, Roithmayr, Russell (unpublished)).

These sciaenids are typical fishes of shallow coastal waters and estuaries of the North American coast from New England to Mexico. Centers of abundance include the Chesapeake Bay south to Georgia and the north central Gulf of Mexico. Spawning generally occurs from October to May in shallow ocean waters; the larvae enter the estuaries and normally remain there for 6 months to a year (Tabb, 1966). Owing to the variability of the estuarine environment, prediction of size of year classes is extremely difficult.

The young adults move from the estuaries in summer and early fall into oceanic waters, wintering in deeper offshore areas. On occasion, significant concentrations of croaker have been found in depths to 90 fathoms (75 miles from shore) southeast of the Mississippi Delta (Juhl et al., (unpublished)). In the eastern seaboard offshore migration

appears to be less apparent because of cooler water temperatures closer to shore. Most of the landed catch is made by recreational fishermen by hook and line. Commercially they are taken by trawl, pound net, beach seine, gill net, and hook and line.

Although the catch statistics from the years 1950-70 show, in most cases, a stable fishery as indicated in Figure 2 for three species of seatrout, its significance is misleading. This is because a large portion of the catch is not landed; it is discarded at sea by the shrimp trawling fleet operating along the east coast of the United States and Gulf of Mexico. The shrimp species (Penaeidae) taken here by these commercial trawlers share the same environment with the sciaenids. As a consequence, the latter (plus numerous other species) are taken incidental to the shrimp. After emptying the catch on deck the shrimp are culled and the fish discarded. The ratio of fish to shrimp normally varies from 4 to 1 to 20 to 1. The approximate annual catch of shrimp in "sciaenid" type grounds is about 100 million pounds. Based on an average ratio of 10 pounds of fish to 1 of shrimp, the total fish catch can be 1,000 million pounds. Sciaenids comprise about 50% or 500 million pounds of the total fish portion (Roithmayr, 1965). Inshore catch by smaller fishing boats, which is substantial, is not included here. Understandably, this incidental catch does not appear in the catch statistics; its significance, however, is quite obvious when the total sciaenid resources are considered. The Gulf of Mexico foodfish trawlers also discard a substantial portion of their catch but the small number of vessels in this

fleet adds little to the overall harvest. The sum total of the sciaenid annual catch at present, based on the foregoing, is over 960 million pounds.

The significance of the sciaenids discarded is that the overall catch of these fishes has increased in the same relative proportion as the increase of the shrimp fleet. In 1950-51 the number of shrimp trawlers over 5 net tons in the subject region was about 3,000 vessels; the average individual net tonnage was 18; in 1970 the number increased to 5,000 and the average net tonnage to 35. This is almost a three-fold increase in fishing power from 1950 to 1970 (Wheeland, 1972). The present trend is a leveling off on the number of vessels but a continued increase in net tonnage and wider operating range. An indication of this is that in the early 1960's approximately two-thirds of the resource was harvested inside the 12-mile zone; however, recent data indicate that 55% of the catch came from within 12 miles (Wheeland, 1972).

Albeit this increased fishing pressure and consequent increase in catch, especially in the Gulf of Mexico, the sciaenid stocks apparently are not overfished in contrast to most major coastal and bank fishery resources of the ICES area.

A brief description of the major sciaenid fishing grounds may strengthen our views about the relative importance of the resource, important now to the United States and of potential concern soon internationally. In the Gulf of Mexico the major fishing grounds extend from Galveston, Texas to Apalachicola, Florida (Figure 3) from shore to

depths of 60 to 70 fathoms. The average distance from shore at 10 fathoms is 12 miles, at 50 fathoms it is 50 miles and at 70 fathoms it is 65 miles. The total area is approximately 15,000 square miles (Juhl, 1974).

In the east coast the grounds extend from Cape Kennedy, Florida north to Delaware Bay (Figure 4). Owing to bottom strata characteristics, the sciaenids there are generally restricted to depths shallower than 10 fathoms, and to a distance of 10 miles from shore. The area within this region is over 7,000 square miles. The coast in these two regions is interlaced with bays, inlets, river deltas, lagoons, and tidal marshes. High productivity is maintained by river discharges, seasonal upwelling, and tidal action. As mentioned earlier all sciaenids spend a portion of their larval and juvenile stages in this environment. The need to conserve it cannot be overstressed; yet competition from other coastal user groups is a constant threat.

Two years ago a Groundfish Program, part of the United States Department of Commerce, National Marine Fisheries Service in Pascagoula, Mississippi was implemented with the objective of evaluating the groundfish stock of the northern Gulf of Mexico (Juhl et al., (unpublished)). The primary species considered were sciaenids, namely croaker, spot, and seatrout. The work was undertaken aboard the R/V OREGON II utilizing standard commercial trawl gear. A stratified sampling format was developed similar to the system in use in the northwest Atlantic ICNAF area. As shown in Figure 5, the north central Gulf was divided into

four main areas from east to west and further divided into 30-foot subareas. The depth zones were established in 5-fathom contours and extend from 5 to 50 fathoms. In designing a survey cruise, the area of interest is divided into a grid pattern of 2 1/2-mile square each. Normally, three 10-minute trawl stations are made in each square selected. The vessel track and sampling stations are selected by use of a random numbers table. To date, five cruises have been conducted. The sampling format has been slightly modified but still follows the original pattern.

Results of these cruises indicate a standing stock estimate of 160,000 tons, or 25 tons per square mile, of croaker in the primary grounds - an area of 6,500 square miles east and west of the Mississippi Delta. This area described earlier is also subject to heavy fishing pressure from the shrimp and fish trawling fleets. More than half of the 960 million pounds total annual catch afore mentioned is taken here. Other fisheries such as the small boat bait fleet, numbering in the thousands also take significant amounts of the sciaenids, as well as other species. In view of this, the standing stock estimate derived from the surveys must be qualified to reflect this ancillary yet predominant fishing pressure. Further, the sciaenids such as the croaker are short-lived. As shown in Figure 6, the bulk of the catch, about 70%, of croaker is estimated to be fish under 2 years old. In view of such a dynamic fishery resource, the difficulty of applying classic fishery assessment techniques used in northern

waters is evident. At present an evaluation of these problems is in progress in an attempt to arrive at more meaningful results. The possibility of developing predictive capabilities will also be considered. In this latter respect the critical nature of the inshore phase in the fishes' life must be considered as adverse environmental conditions such as excessive rain, drought, cold spells, hot spells, storms, contaminants, etc., can cause mass mortalities in a relatively short period. Young-of-the-year can be favorably or adversely affected by a period of strong upwelling caused by winds during their offshore migration, or held inshore by a mass of low oxygen water. Predictability of these environmental adversities, or lack of them, must also be considered.

It is our belief that the sciaenids, especially the more abundant species such as the croakers (Micropogon sp.), seatrouts (Cynoscion sp.), and spot (Leiostomus sp.) will gain in importance in the tropical and semitropical Atlantic. Where the fishery is well developed, as in the United States, more effective utilization will occur. In the developing fisheries of the northern South American and west African waters, the utilization of sciaenids will grow parallel to the expansion of the penaeid shrimp fishery. This resource assessment work on the sciaenids now underway in the Gulf of Mexico should provide a comprehensive base for research activities contemplated in the above noted areas.

In agreement with such a possibility, we shall make available to anyone interested the results of our activities and will welcome an exchange of views on the subject.

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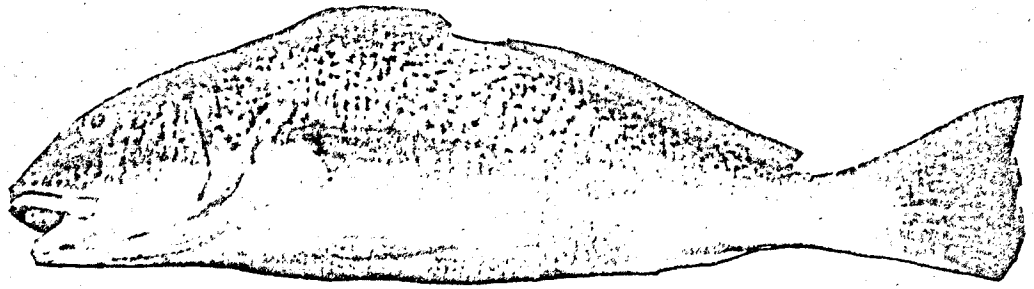
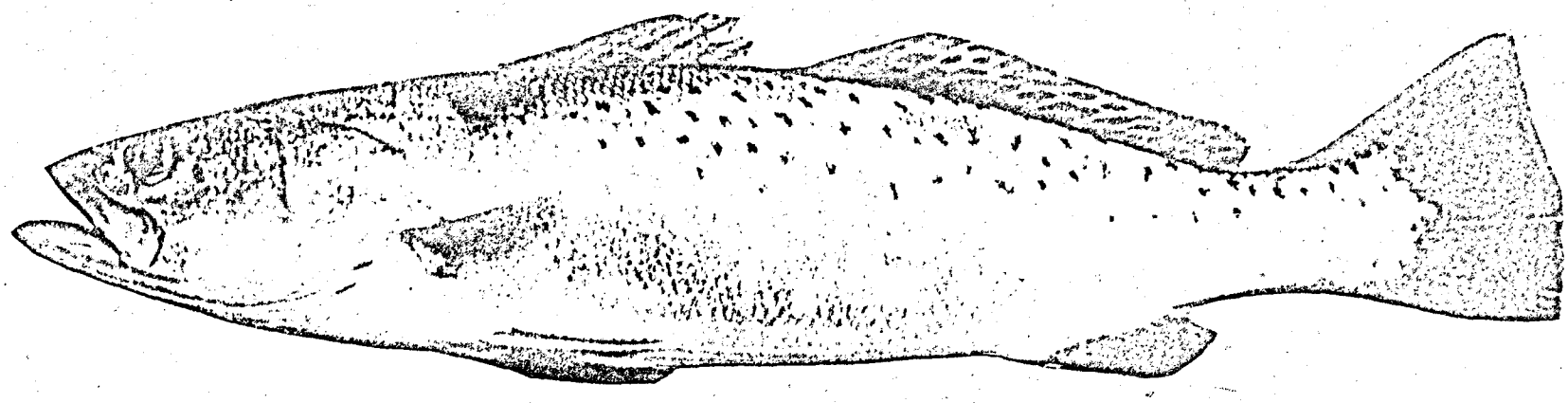
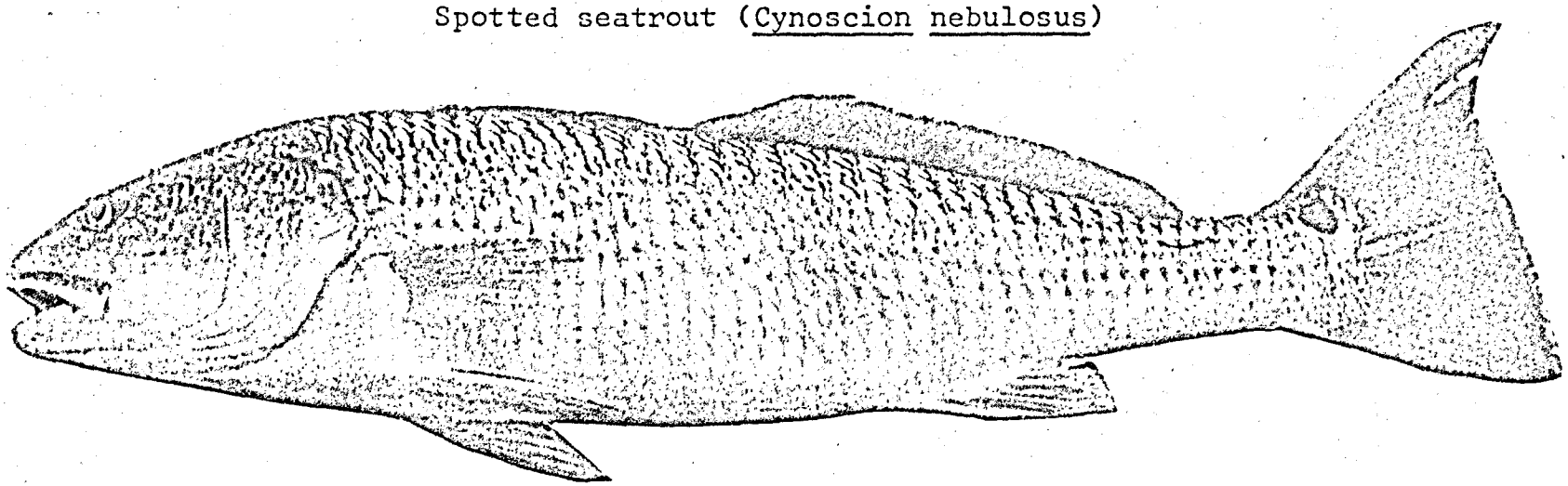


Atlantic croaker (Micropogon undulatus)



Spotted seatrout (Cynoscion nebulosus)



Red drum (Sciaenops ocellata)

Figure 1--Representative species of sciaenids

Gray, spotted, and white sea trouts, U.S. commercial catches 1950-70 (smoothed by moving average of 3).

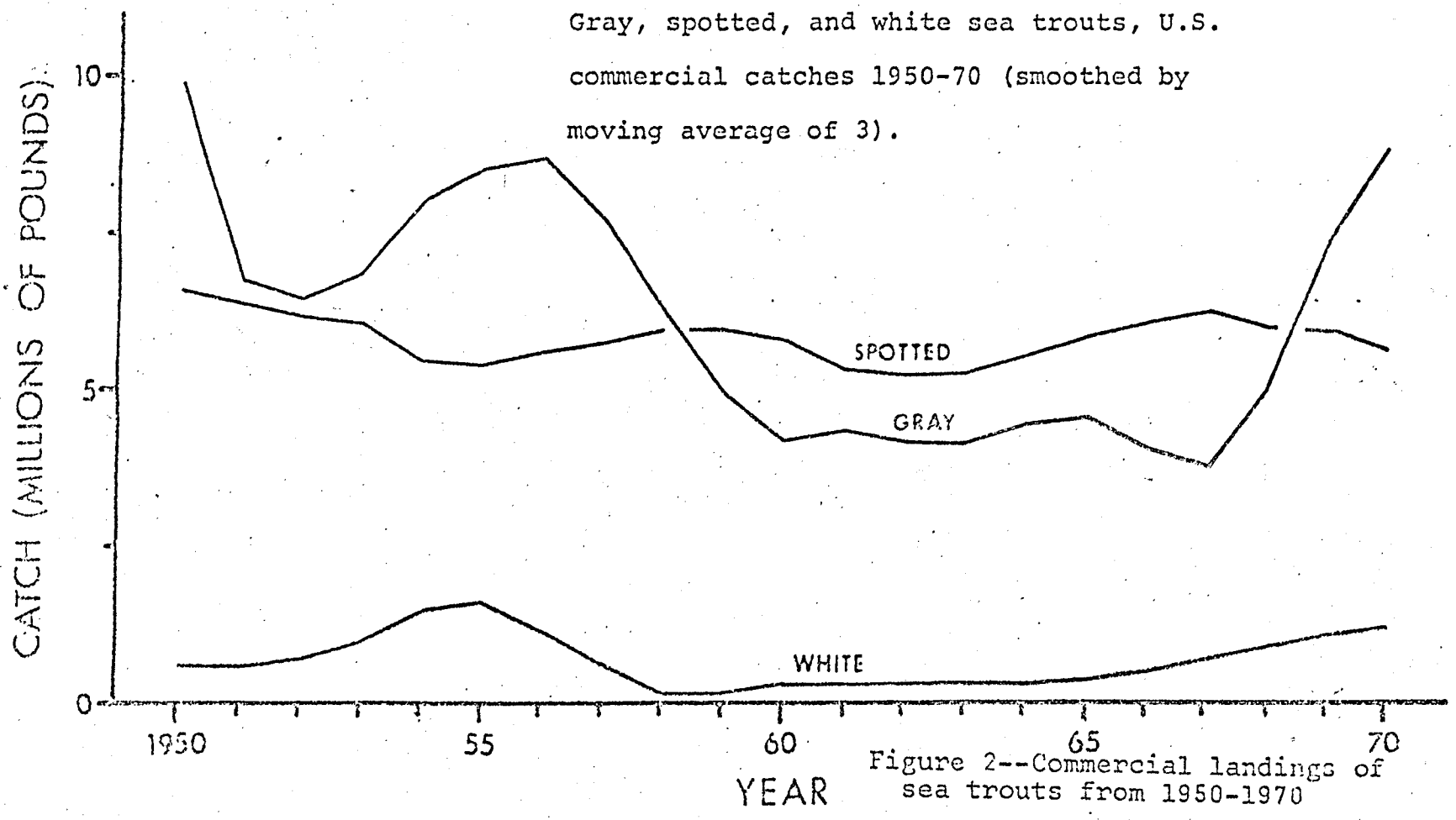


Figure 2--Commercial landings of sea trouts from 1950-1970

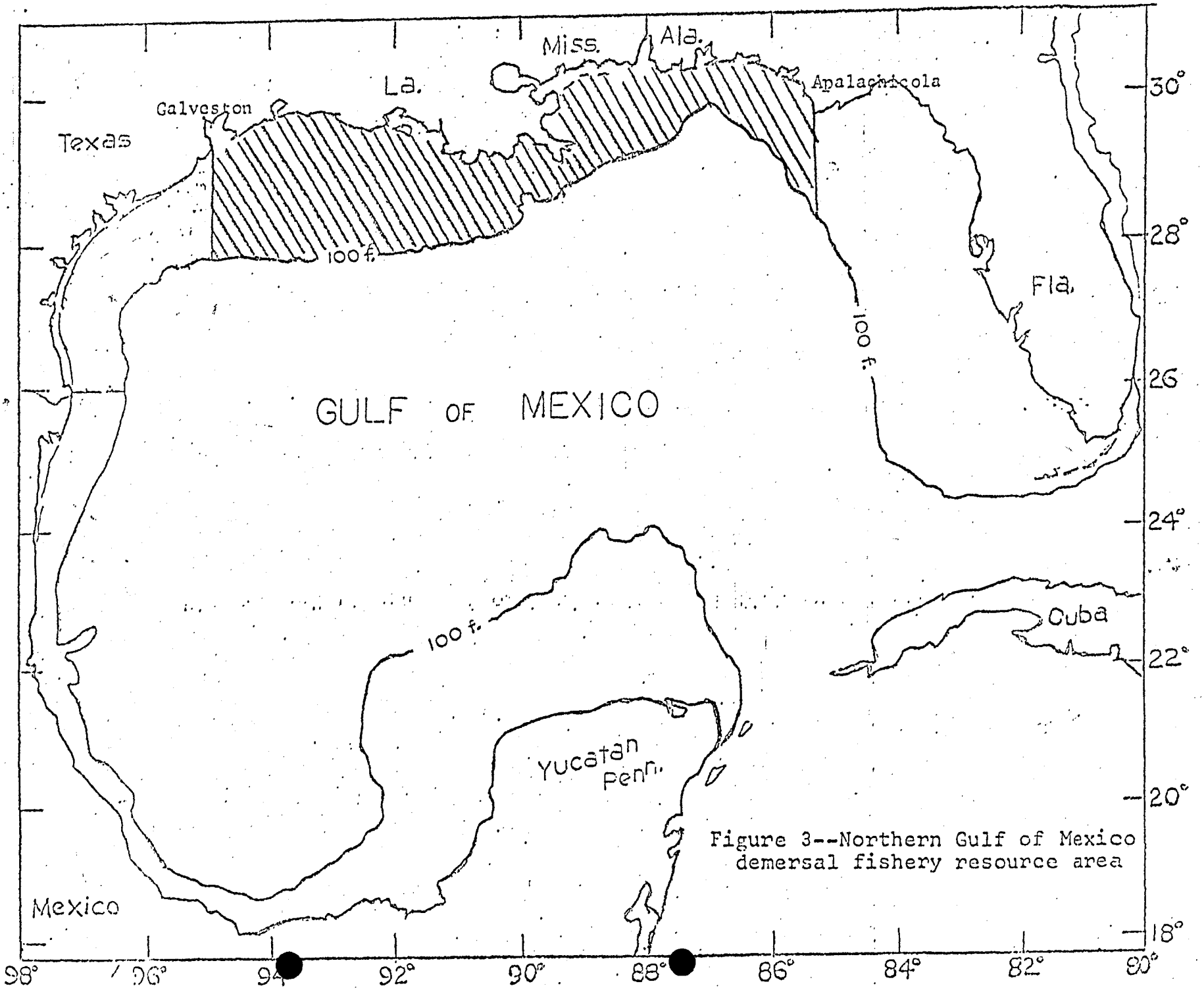


Figure 3--Northern Gulf of Mexico demersal fishery resource area

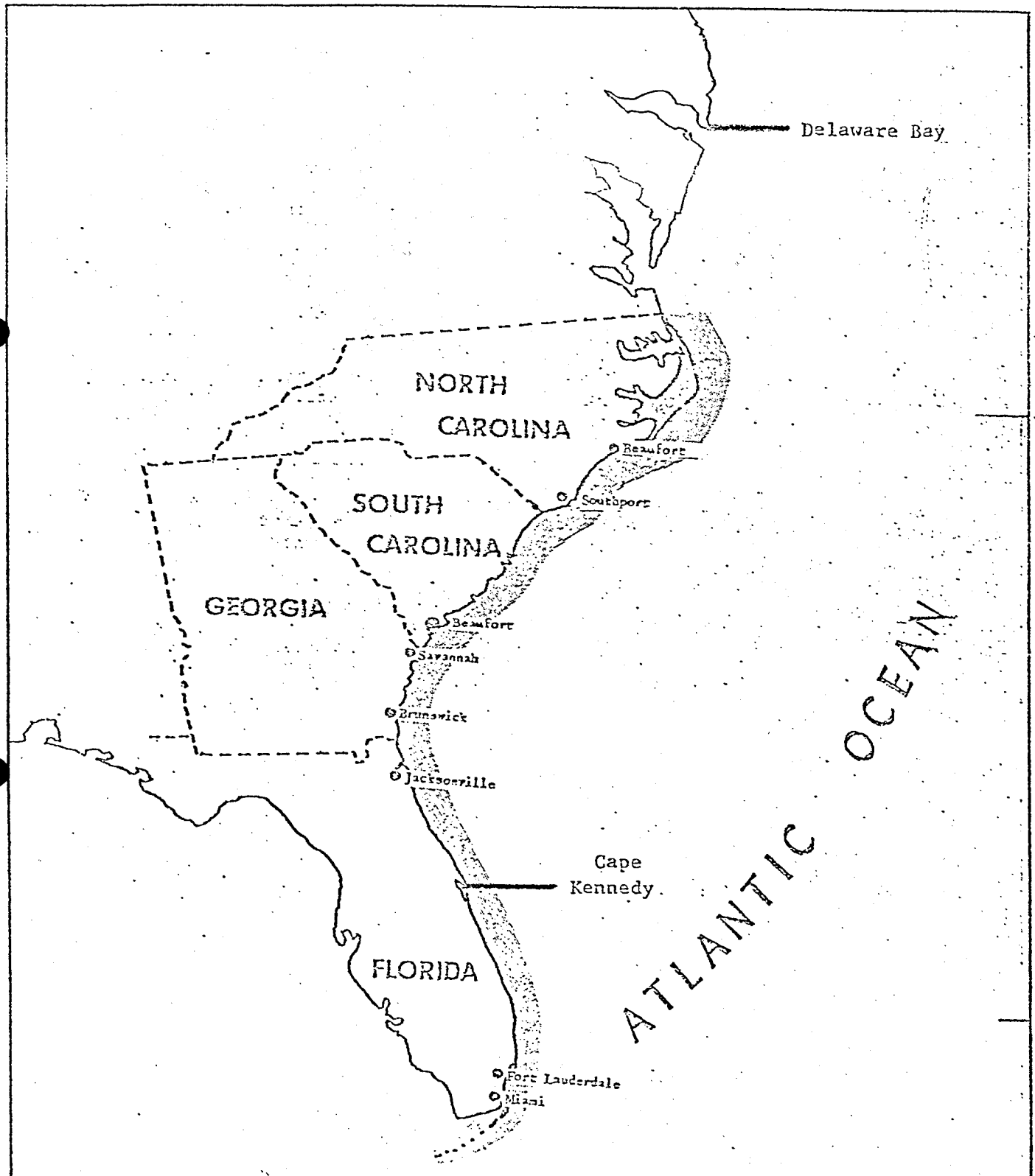


Figure 4--Western Atlantic sciaenid resource area Cape Kennedy to Delaware Bay

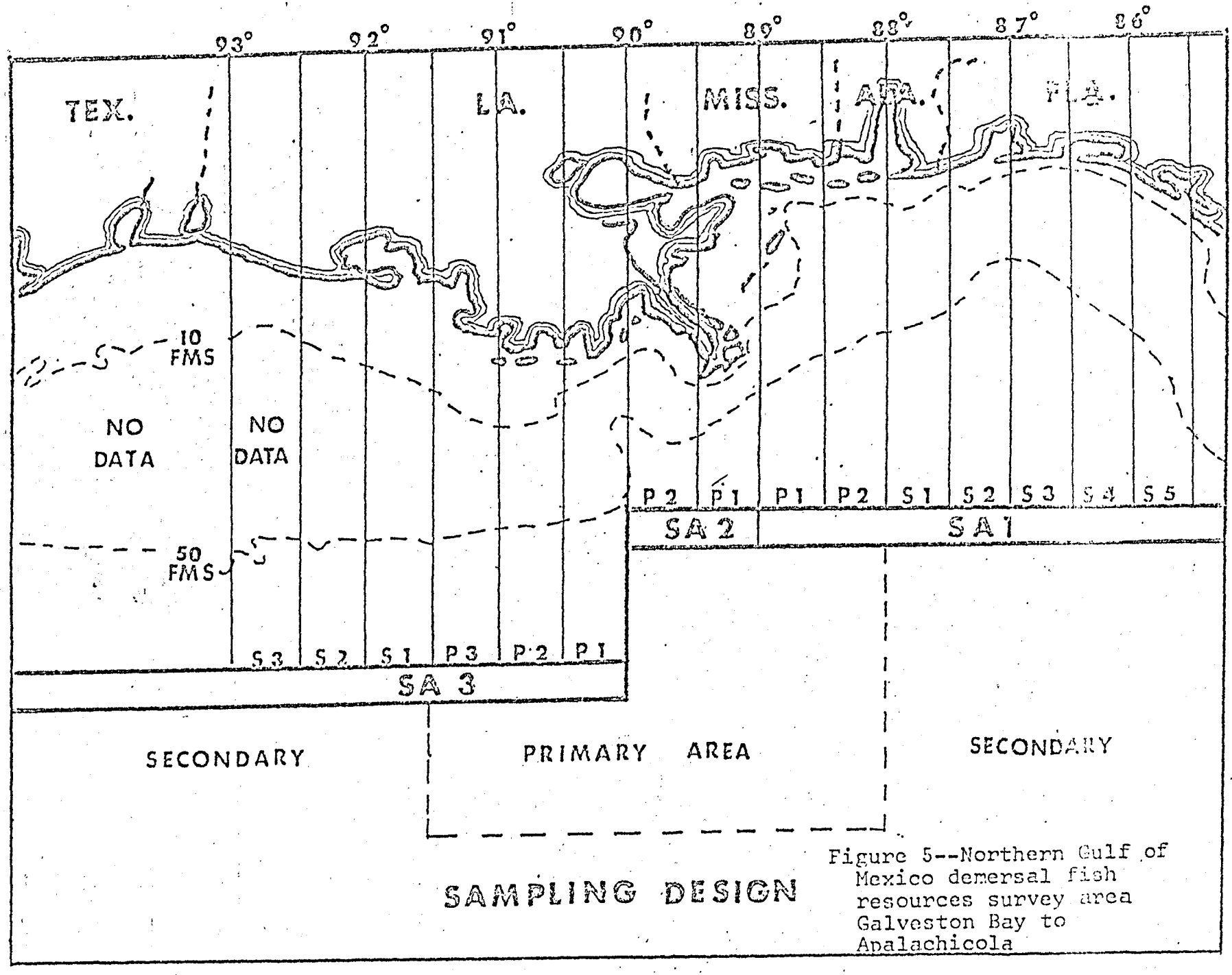


Figure 5--Northern Gulf of Mexico demersal fish resources survey area Galveston Bay to Apalachicola

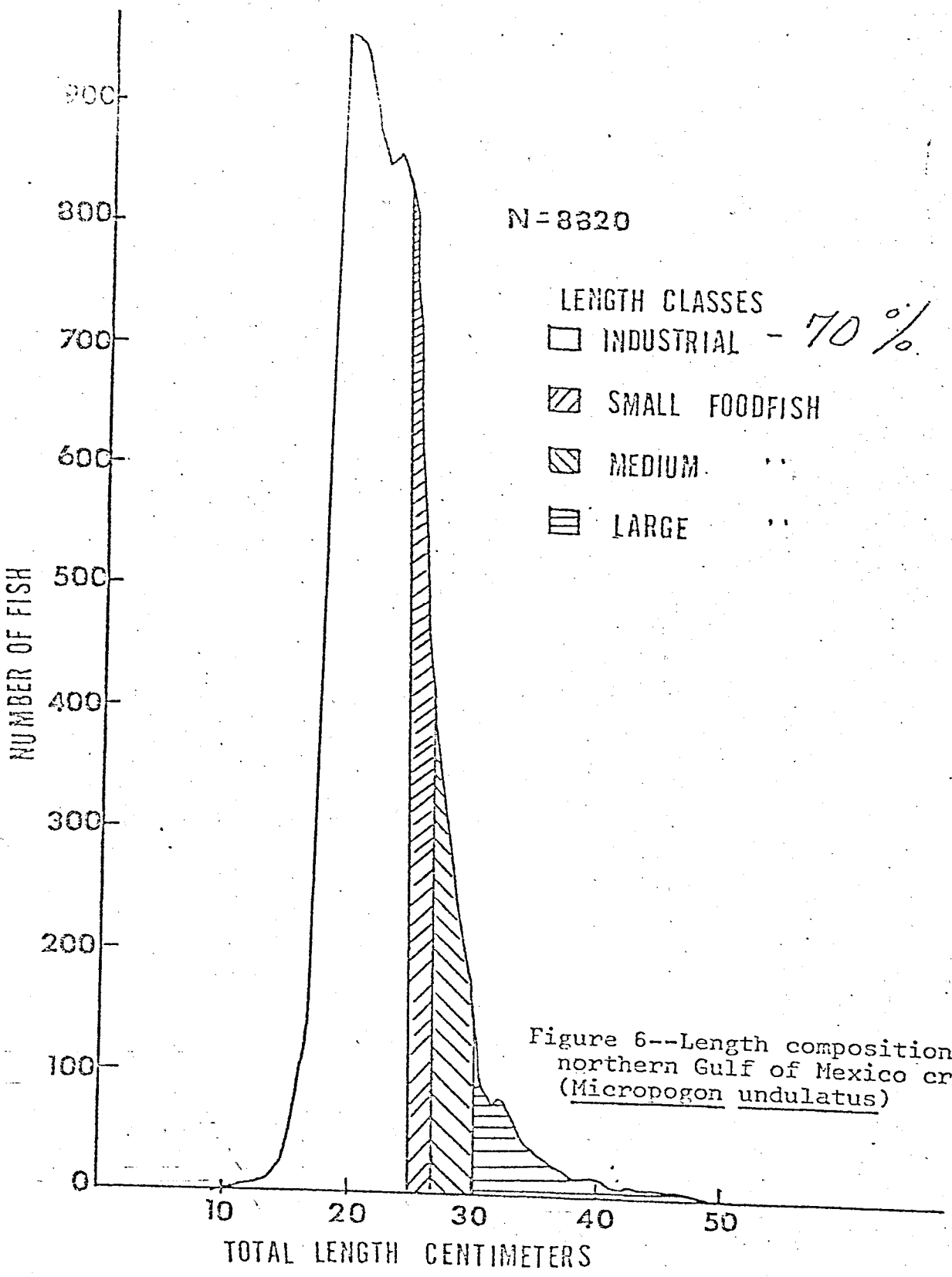


Figure 6--Length composition of northern Gulf of Mexico croaker (Micropogon undulatus)