

BOTTOM LONGLINE EXPLORATIONS IN THE GULF OF MEXICO

A Report on "Oregon II's" First Cruise

By Walter R. Nelson* and James S. Carpenter**

The BCF Exploratory Fishing and Gear Research Base at Pascagoula, Miss., has been concerned with improving the harvest and marketing methods of the snapper industry and locating stocks of bottomfish not now used for food. In 1960, Captiva and Rivers reported the practical use of roller-rigged fish traps for catching snappers and groupers, but this method has not yet been accepted by the industry.

Recent emphasis has been placed on bottomfish explorations with longline gear along the edge of the Continental Shelf and upper Continental Slope, an area that has received little coverage. Shrimp and snapper explorations have been confined generally to depths less than 50 fathoms; royal-red shrimp

explorations have been carried out mainly in depths greater than 200 fathoms. Limited sampling has been done in the 50- to 200-fathom depth range with shrimp trawls, which are not efficient for catching large mobile fish.

Segments (Trips 3 and 7) of Cruise 1 of the R/V Oregon II (fig. 1) were designed to add knowledge of bottomfish stocks within the 50- to 200-fathom depth range, to determine the availability of deepwater bottomfish to longline gear, and to evaluate the commercial feasibility of this gear.

These trips were concerned with exploring for new fishery resources in the Gulf of Mexico. Coverage, not maximum production,

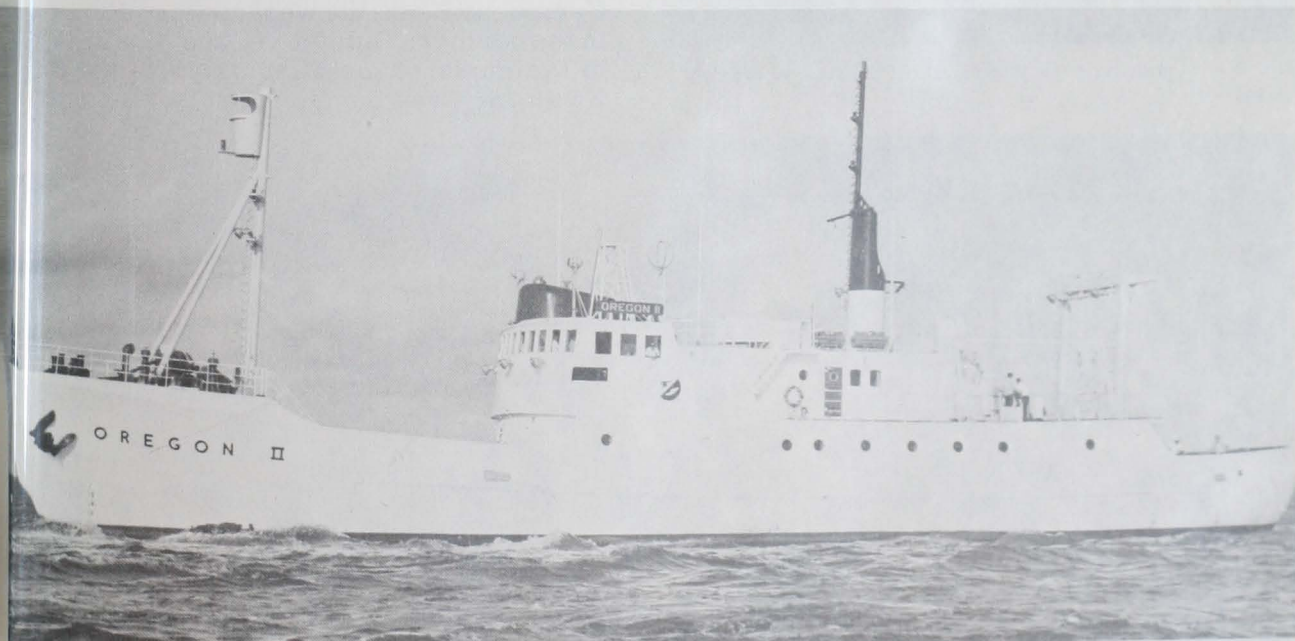


Fig. 1 - The R/V Oregon II, the new, 170-foot, multipurpose fishing vessel of BCF's Exploratory Fishing and Gear Research Base at Pascagoula, Miss. She will conduct exploratory work in the Gulf, Caribbean, and South Atlantic.

* Fishery Biologist
** Supervisory Fishery Biologist

BCF Exploratory Fishing and Gear Research Base, Pascagoula, Miss. 39567

U. S. DEPARTMENT OF THE INTERIOR
Fish and Wildlife Service
Sep. No. 826

was emphasized. The catch rates would have been higher had we sampled intensively those areas where large catches were made. Also, the gear used was a rather small sampling unit designed for a rapid survey.

GEAR

The bottom longline or "trawlline" consisted of three 100-hook baskets of gear shackled together. One basket each of sizes 6, 7, and 9 circle hooks baited with squid or ladyfish was fished at each station. Hooks on

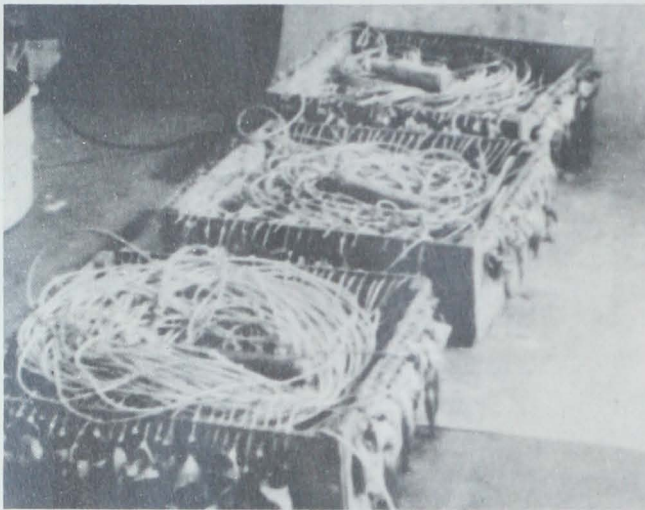


Fig. 2 - Longline gear ready to be set off the stern of the R/V Oregon II.

6- to 12-inch monofilament gangions were attached at 10-foot intervals to a $\frac{1}{4}$ -inch polydactylene or nylon mainline. The line was coiled in shallow wooden notched boxes and set off the stern (fig. 2). Fishing time varied from 1 to 2 hours. The gear was retrieved with a Japanese longline hauler designed for tuna and swordfish longlines. The short gangions and circle hooks went through the roller and hauler easily, so the fishermen had to handle the line only when removing fish (fig. 3). Including running time between stations, as many as 8 gear sets were made within a 24-hour period.

The only sizable losses of gear occurred when sets were made on snapper lumps. There, hangups were frequent. Jarvis, 1935, and Whiteleather and Brown, in 1941, reported large gear losses from bottom longline sets made on rough bottom in the Gulf and Caribbean. Most of the Oregon II sets, however, were made off coral areas and little fouling took place. Overall, only about 2 percent of the total hooks fished were lost.

AREA FISHED

Exploratory fishing was conducted off Texas and Louisiana, the northern edge of the Campeche Bank, the west coast of Florida and in the northern Gulf from Cape San Blas, Florida to the mouth of the Mississippi River (fig. 4). Fishing was done off the Texas and we



Fig. 3 - Removing small fish from longline. Short gangions went through the roller (on the rail) and longline hauler (right) with little fouling.

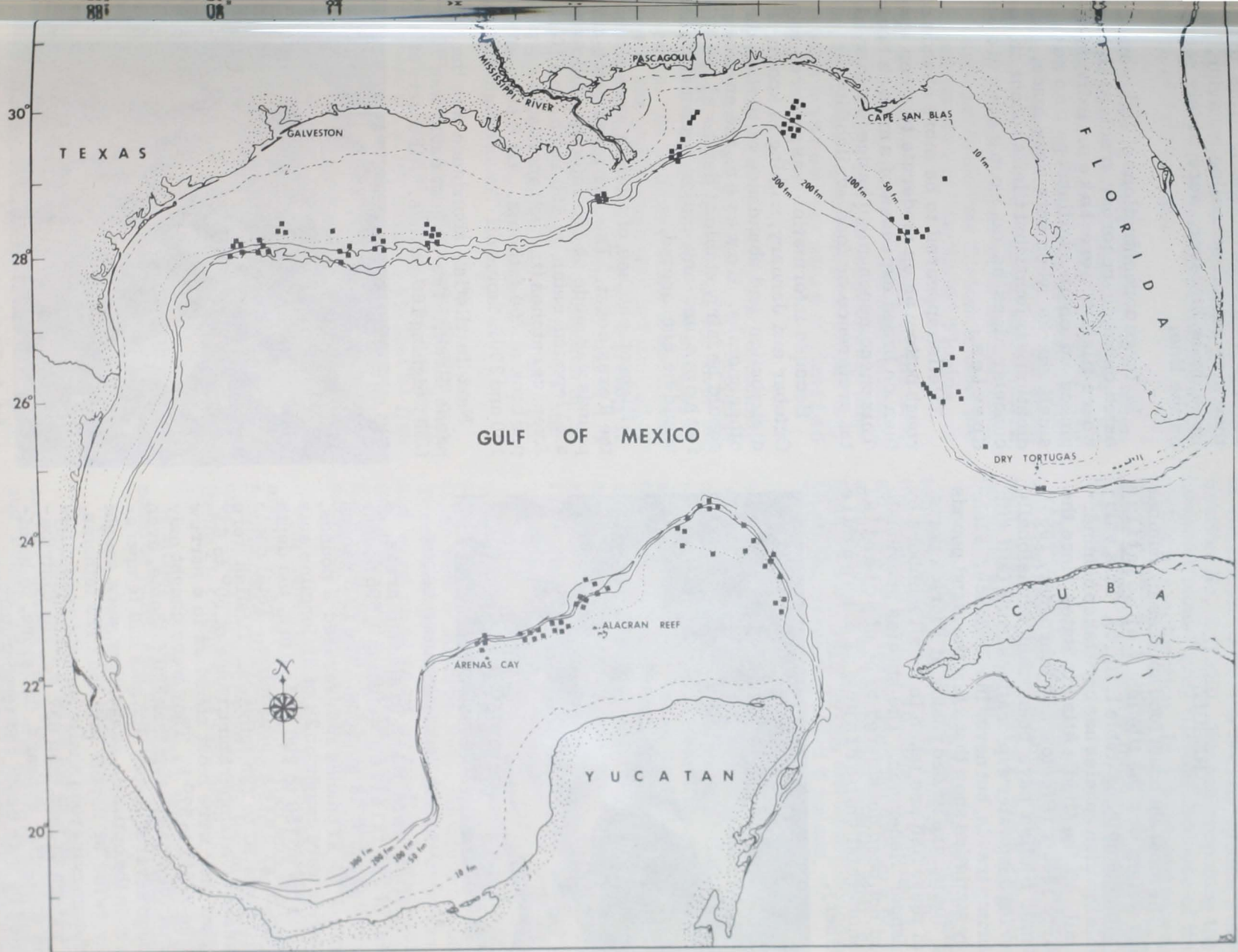


Fig. 4 - Bottom longline sets made on R/V Oregon II's Cruise 1.

Louisiana coasts in October 1967 and throughout the other areas in January 1968.

RESULTS

The most abundant food species by number and weight was the tilefish, *Lopholatilus chamaeleonticeps* (table 1, fig. 5). This valuable foodfish species has been taken commercially off the Middle Atlantic States since the early 1900's (Bigelow and Schroeder, 1953). Small tilefish have been taken occasionally during deepwater explorations in the Gulf with shrimp trawls, but never in abundance. Fishery statistics show that a few thousand pounds of tilefish are landed yearly at Florida ports, but these fish are taken in small numbers by snapper fishermen. The species previously had not been considered to be of potential commercial importance as a separate fishery.



Fig. 5 - The tilefish, *Lopholatilus chamaeleonticeps*.

Tilefish were taken in all Gulf areas. A total of 285 tilefish weighing 1,695 pounds were caught at 48 stations. The fish ranged from 1 to 27 pounds and averaged 6 pounds. Tilefish were caught on 28 of 39 longline sets in depths of 150 to 200 fathoms, the depth range of greatest abundance. Total depth range was 90 to 225 fathoms. Tilefish were taken over a temperature range of 50° to 63° F., but they were most abundant in a narrow range of 55° to 57° F. They were caught only once in depths greater than 200 fathoms, even though several deeper stations had temperatures in the optimum range; they were caught only twice at depths less than 125 fathoms, although numerous shallower sets were made in waters of less than 63° F. The distribution of tilefish appears, therefore, to be affected by both depth and temperature.

Small tilefish were taken occasionally several consecutive hooks. This indicates they may exhibit schooling behavior. Larger individuals, however, were widely separated on the line.

No large concentrations of fish were indicated on depth recorder tracings in areas where tilefish were taken. Individual fish picked up on an oscilloscope proved to be small sharks when sets were made. No indication was found that tilefish occur in dense concentrations as do some other bottom species.

Tilefish appeared to be more abundant on rough bottom or on moderate to steep slopes than on broad expanses of smooth bottom. This phenomenon might be due to either habitat preference or food availability.

Because information was gathered only in October and January, nothing is known of the distribution and abundance of tilefish during other months. However, the environment should be fairly stable at depths of 150 to 200 fathoms and any major seasonal change would be unexpected.

Highest catches of tilefish were made off the Texas coast. The largest catch of 217 pounds was made at 150 fathoms, followed by a 217-pound catch at 190 fathoms (fig. 6). Average catches (table 2) approached ½ pound per hook at 200 fathoms. All 6 sets between 150 and 200 fathoms off Texas caught tilefish.

Next in tilefish abundance was the Cape Peche Bank. The largest catch was 12 tilefish weighing 166 pounds. All 8 sets at ab-



Fig. 6 - Tilefish taken on one 300-hook set off Texas.

Thoms took tilefish. Few tilefish were east of Alacran Reef, but the catch averaged $23\frac{1}{2}$ pounds per 100 hooks west of Alacran Reef. The heaviest concentration was south of Arenas Cay.

In the northern Gulf, tilefish were taken at the mouth of the Mississippi River and along the eastern edge of DeSoto Canyon. The average catch per 300-hook set was 14 fish weighing 104 pounds at 175 fathoms, the depth of greatest abundance. Central and western portions of DeSoto Canyon were not sampled, but it is quite probable that tilefish inhabit the entire canyon area off northwest Florida.

Only 3 tilefish were caught off the west coast of Florida, from 125 to 225 fathoms. The catch, although low, at least showed tilefish in the area. Concentrated stocks may have been missed because of limited hauling.

The other foodfish found in some abundance was the yellowedge grouper, Epinephelus microdon, which accounted for over 50 percent of the total weight of all species of groupers. In contrast to most species of groupers, the yellowedge was not limited to shallow terrain. It was caught frequently in depths of flat smooth bottom. A total of 113 fish weighing 1,168 pounds was taken at 21 stations over a depth range of 70 to 150 fathoms. The fish were relatively large; average weight was 10 pounds, size range 4 to 20 inches.

Yellowedge grouper were abundant in only a few areas. Highest catches were made off the west coast of Texas--one set at 100 fathoms yielded 24 fish weighing 271 pounds. The largest catch on the Campeche Bank was a 105-pound catch made along the northwestern edge. Only 3 yellowedge groupers were caught in the northern Gulf, and none was taken from the west coast of Florida.

The warsaw grouper, E. nigritus, was next in importance to the yellowedge grouper off the west coast of Texas and on Campeche Bank. At depths of 100 to 125 fathoms, the average catch per 100 hooks for the 2 areas was 10 pounds and 12 pounds, respectively.

Moderate numbers of the gray tilefish, Caulolatilus microps, were taken on east Campeche Bank from 75 to 125 fathoms. The largest catch was 125 pounds at 125 fathoms. Average size was 6 pounds and size range

was 1 to 15 pounds. This species is not listed in American Fisheries Society Special Publication No. 2 (1960). We are proposing the common name "gray tilefish" because of its distinctive coloration. In a few instances, tilefish and gray tilefish were taken on the same set, but generally their ranges did not overlap.

Other foodfishes taken in small quantities were red snapper, vermilion snapper, wenchman, scamp, red grouper, black grouper, porgies, and Gulf hake.

Sharks constituted the largest single bottomfish component (table 1)--32 percent of the total bottomfish catch. Over half the sharks were taken from the northern Gulf area. The catch comprised dogfish sharks, Squalus and Centrophorus, and smoothhounds, Mustelus, averaging about 4 pounds.

Off the Texas coast where catch rates were highest, foodfish constituted 77 percent of the total catch; they accounted for about one-half of the total foodfish catch for all Gulf areas, although only about one-fourth the total effort was expended off Texas (table 1). Peaks in foodfish abundance off Texas were found at about 100 and 200 fathoms (table 2). Several species of groupers (mostly yellowedge grouper) were predominant in the 100- to 125-fathom depth range. They were replaced by tilefish in deeper waters.

On the Campeche Bank, the second most productive foodfish area, most foodfish were taken west of Alacran Reef. As occurred off Texas, groupers dominated shallower areas, and were replaced by tilefish beyond 125 fathoms. Foodfish constituted 74 percent of the total catch, but they were relatively abundant only around 125 fathoms (table 2).

The north Gulf catch was comprised primarily of sharks; the tilefish was the only foodfish taken in any abundance (table 1). The other foodfish category, for the most part (table 2), consisted of Gulf hake.

Catches were extremely low off the west coast of Florida for all depths and all species.

COMMERCIAL CONSIDERATIONS

Our longlining results agree with those of earlier workers (Jarvis, 1935; Whiteleather and Brown, 1945) in that longline gear does not appear commercially feasible for catching

snappers, but it may have some application for groupers. A number of sets were made on rough bottom within the depth range inhabited by red snapper, *Lutjanus campechanus*, and silk snapper, *Lutjanus vivanus*. However, only 1 silk snapper and 65 red snappers were caught during the entire cruise. Grouper catches were higher, but these approached possible commercial concentrations only off Texas in about 100 fathoms.

The apparent absence of dense schooling behavior in large tilefish makes it unlikely that they would support a handline fishery. A longline covers a relatively larger area of bottom than do handlines. It should provide higher catch rates per unit of effort. Our catch rates made in areas of greatest concentration off Texas compare favorably with an early report on longline catches of 30 to 40 tilefish per 400 to 500 hooks off the Middle Atlantic States (Bumpus, 1899).

The Texas coast is the only part of the Gulf that appears to offer commercial potential with longlines. Certainly a large number of hooks would have to be fished. Projections of catch rates presented in this paper indicate that a daily fishing effort of 5,000 hooks should result in average daily catches of about 2,000 to 4,000 pounds of tilefish.

We conclude from the results of Cruise of the R/V Oregon II that the bottom longline is more valuable as a tool for locating and assessing bottomfish stocks than as a method of commercial harvesting by present standards.

A trawling potential appears likely throughout the Gulf where the bottom is excessively rough. Tilefish are taken commercially with trawls in the Middle Atlantic States, so they should be susceptible to trawling in the Gulf. In most areas where tilefish were taken, the bottom was rough or sloped but little recorded bottom was unsuitable for the use of roller-rigged fish trawls. Certainly a tilefish potential exists. Future deep water fish trawling cruises in the Gulf by R/V Oregon II are scheduled to determine the feasibility of a trawl fishery for this foodfish.

• • •

A detailed fishing log (table 3) showing geographic position, depth, date, catch and related data for each set is available as appendix to the reprint (Sep. No. 826) of this article. Tables 1 and 2 are also in the reprint. For a free copy of the Separate, write: Branch of Reports, Publications Unit, Biological Resources Division, U. S. Fish and Wildlife Service, 1801 N. Moore St., Arlington, Va. 22209.

LITERATURE CITED

AMERICAN FISHERIES SOCIETY

1960. A list of common and scientific names of fishes from the United States and Canada. American Fisheries Society, Special Publication No. 2, 102 pp.

BIGELOW, HENRY B., and WILLIAM C. SCHROEDER

1953. Fishes of the Gulf of Maine. U. S. Fish & Wildlife Service, Fishery Bulletin, Vol. 53, 577 pp.

BUMPUS, HERMON C.

1899. The reappearance of the tilefish. Bulletin U. S. Fish Commission, Vol. 18, pp. 321-333.

CAPTIVA, FRANCIS J., and JOAQUIM B. RIVERS

1960. Development and use of otter-trawling gear for red snapper fishing in the Gulf of Mexico, June 1957-

May 1959. Commercial Fisheries Review, Vol. 30, No. 10, pp. 1-14. (Also Sep. No. 600.)

COMMERCIAL FISHERIES REVIEW

1968. "Oregon II" tests sonar and longline on first cruise. Commercial Fisheries Review, Vol. 30, No. 4, pp. 17-19.

JARVIS, NORMAND.

1935. Fishery for red snappers and groupers in the Gulf of Mexico. [U. S.] Bureau of Fisheries, Investigation Report No. 26, 29 pp.

WHITELEATHER, RICHARD T. and HERBERT H. BROWN

1945. An experimental fishery survey in Trinidad, Tobago and British Guiana. Anglo-American Caribbean Commission, Washington, D. C., 130 pp.

