

The Emergence of a Swordfish Fishery around Puerto Rico and the Virgin Islands

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INTRODUCTION

The swordfish ("pez espada" or "emperador" in Spanish; "Espadon" or "emperadour" in French), *Xiphias gladius*, is one of the most important commercially caught species of billfish in the world. Distribution of the species is worldwide in all tropical, subtropical and temperate seas from about lat. 45°N to 45°S; in the western Atlantic it occurs from Newfoundland to Argentina (Palko et al., 1981).

Although the Japanese, Cubans and others have been fishing for swordfish in the Atlantic since the 1950's, it was not until the early part of the 1960's that a commercial longline fishery began off the northeastern coast of the United States. In 1971, the U.S. Food and Drug Administration (FDA) guidelines prohibited the sale of swordfish with more than 0.5 ppm of mercury in the tissues. This caused the virtual disappearance of this fishery by U.S. vessels. In 1978, the permissible level of mercury was raised by the FDA to 1.0 ppm and this triggered a rapid expansion of the fishing fleet. In the 1980's about 200 boats were actively fishing for swordfish along the coast of Florida alone (Berkeley, 1982). However, in the same decade a declining trend in the fishery was detected (SAFMC, 1985). A management plan was developed by 5 Regional Fishery Management Councils. The fishermen in the meantime started looking for new fishing grounds of swordfish; one of these areas was the Caribbean Sea.

The purpose of this paper is to report on the new development of a swordfish fishery in waters off Puerto Rico and the Virgin Islands (U.S. and British).

SWORDFISH FISHERY OFF PUERTO RICO AND THE VIRGIN ISLANDS

The most recent exploratory fishing for swordfish around Puerto Rico and the Virgin Islands can be traced back to 1982-83, when the Department of Marine Science of the University of Puerto Rico, in the case of Puerto Rico, and the National Marine Fisheries Service, utilizing the NOAA Research Vessel OREGON II, in both Puerto Rico and the U.S. Virgin Islands, started exploratory fishing projects for swordfish.

The project of the University of Puerto Rico was very modest using a longline of about 2 miles in length (Hernandez-Avila, personal communication). In addition, the very specialized fishing technique for swordfish was not fully mastered at that time. In spite of this negative factor, the results were

promising as to the existence of swordfish stocks, since several fish were caught off the southwest coast of Puerto Rico.

In 1983, the OREGON II, also utilizing a relatively short pelagic longline (about one mile long), surveyed the offshore area to assess available oceanic fish species. Of significance was the capture of four swordfish off St. Croix and Puerto Rico. The results reaffirmed the existence of swordfish stocks.

Subsequently, in the winter months of 1983, two longliners from South Carolina, the BOBBY GAIL II and the BOBBY GAIL IV, initiated commercial fishing operations in the area, including waters off the British Virgin Islands. They found commercial potential for their operations, which prompted not only their return in 1984, but also 11 other vessels, for a total of 13 which fished for swordfish that year.

These vessels were very successful according to reports available. Only a few of the vessels reported their catch for a total of 3,621 fish with a dressed weight of 372,255 pounds. The Caribbean Fishery Management Council estimated that total catches, including unreported landings, could have been close to one million pounds.

The reported average dressed weight of the swordfish was over 100 lb, and this figure, according to fishermen interviewed, is a promising indication of the great potential of this fishery in the Caribbean.

Description of Vessels and Gear

Some modifications have been made since Berkeley's presentation at the GCFI meeting in 1981 (Berkeley, 1982). The following description is based on Mr. Campos' fishing trip aboard one of the fishing vessels visiting Puerto Rico in 1984.

The boats involved in the Caribbean fishery are longliners, which range in length from 50 to 85 feet. Construction of most vessels is in fiberglass, but the larger boats (70 to 85 feet) have steel hulls. These boats usually carry a crew of five, including the Captain, and they are equipped with sophisticated navigational, communication and fish-finding equipment.

The longline consists of a main line of "700 lb mono-filament nylon," ranging in length from 35 to 50 miles. When not in use, it is stored on a large hydraulically operated spool. The gangions (hook lines) made with 400 lb test mono-filament line are suspended from the main line. The gangions vary in length according to water temperature; most are in the 10 to 40 m range, and they are spaced from 200 to 300 feet apart. Usually 500 or more hooks per longline are deployed on each set. Cyalume lights are affixed to the gangions using rubber bands. They are suspended about 12 to 15 feet above the bait.

The above description applies to the majority of the boats fishing at present in waters off Puerto Rico and the Virgin Islands. Reference should be made to Berkeley et al. (1981) and Berkeley (1982) for a comparison of the three types of longline commonly used by fishermen in Florida, New England and Cuba.

Fishing Technique using the Longline

Swordfish fishing is carried out from dusk to dawn because of the nocturnal feeding habits of the swordfish. The most common baits used are large squid and Atlantic mackerel. Dyes are used to color the bait.

The main line is maintained at a predetermined depth by inflatable polyethylene buoys. Aluminum marker poles (15 to 20 feet long), with strobe lights and radar reflectors (called high flyers) are placed every 1/2 to 1.1/2 miles along the main line. The gangions with hooks, the floats and the high flyers are all attached to the main line with stainless steel "snap-on" connectors. The gangions like the other lines are usually stored on hydraulically or manually operated reels. Different types and sizes of hooks are used on the gangions, but the majority are big game fishing hooks ranging in size from 8/0 to 12/0.

Three men are usually needed to bait hooks, connect gangions and buoy lines to the main line, prepare high flyers and to operate the winch while the Captain usually steers the boat.

After the longline is set, the boat drifts nearby tracking it visually or by radar. "Haul back" begins before dawn the next morning. The first buoy is picked up and the main line is attached to the spool by a fair leader. As the boat moves slowly along the line, it is retrieved and gangions and floats are removed as they come aboard. When hooked swordfish are brought alongside, the boat is stopped, the fish are "hand-lined" to the side and then gaffed and brought aboard. Some sharks and other billfishes usually are tagged and cut free. Hauling may take six hours or more depending on the length of the main line. Swordfish are dressed immediately and stored on ice while the line is being hauled. Dressing consists of removing the head, tails, fins and entrails. The method most commonly used to preserve the catch is ice made out of sea water. However, there are some boats using a salt-brine technique. After the "hauling back" of the longline is completed, gear is repaired and made ready for the next set that evening. This routine is repeated daily for up to three weeks, depending on fishing success, weather, fuel use, equipment needs, and vessel maintenance needs.

POTENTIAL FOR EXPANSION OF THE SWORDFISH FISHERY IN THE CARIBBEAN AREA

The magnitude of the swordfish stocks in the Caribbean area is unknown but the average size of the fish caught tend to indicate that the stock is still in a healthy condition.

There will be a large number (25 to 40) of domestic longlining vessels operating off Puerto Rico and the U.S. Virgin Islands during 1985-86. Twelve boats have been given permits to fish off the British Virgin Islands. Although several other boats are interested in fishing in that area, the British Virgin Islands opted to authorize only twelve boats. This is to provide time for data collection and analysis so as to develop a management plan for this fishery that will allow fishing while avoiding

overfishing the stocks.

All boats operating in U.S. waters in the Caribbean after January 1, 1986 will have to report their catch to the National Marine Fisheries Service. As a result, when the 1985-86 fishing season is over there will be more data available for a more adequate stock assessment calculation of the fishery and its potential.

The possibility of overfishing the stock is always present. Thus, it is very important that the necessary stock assessment work be conducted and that the pertinent management measures for the protection of the stocks be adopted and implemented by the countries involved. For more information on the conditions of the stocks in continental U.S. waters and the management measures adopted, the reader is referred to the fishery management plan prepared by five Councils (SAFMC, 1985).

HOW CAN THE ISLAND GOVERNMENTS BENEFIT FROM THIS FISHERY?

The best available information indicates that there is a potential for a swordfish fishery throughout the Caribbean. This could be used by the Caribbean nations to increase the opportunity for better income for local fishermen. Relatively small fishing vessels could be utilized in commercial operations using artisanal longlines such as the Cubans, described by Berkeley (1982). In our opinion for local governments to develop the industry throughout the Caribbean area, it will be necessary to establish a program that will contemplate:

1. The transfer of the proper technology to interested fishermen.
2. To provide assistance to new operators in obtaining the necessary equipment and gear at reasonable prices and assist them in the pertinent economic analysis of this type of operation (Cato and Lawler, 1981).
3. To properly organize adequate marketing systems (including proper handling, warehousing and distribution) to dispose of catches that might exceed any local demand for the fish. In the continental United States and Puerto Rico there is already an active demand for swordfish.

The emerging swordfish industry presents a challenge to all of us from both the standpoint of conservation as well as of proper utilization. The future will tell us how efficient, or deficient, we are in achieving these roles.

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