

Implication of U.S. Swordfish Operations in the Eastern Caribbean

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ABSTRACT

During the 1983-84 season several U.S. mainland longline vessels initiated the first attempts at the commercial exploitation of swordfish stocks in the Eastern Caribbean. In 1986 the number of vessels increased to at least 40 with U.S. landings of 1,902,750 pounds. In addition to the target species, the incidental by-catch of marlin, tuna, wahoo, dolphin fish, and a number of shark species have been reported.

The sudden influx of participants and technology to the region have resulted in a variety of user conflicts and associated policy issues. In the United States Virgin Islands and Puerto Rico, the landing of longliner by-catch and the incidental by-catch of marlin have put longliners at odds with local commercial and recreational fishermen. Issues involving access of foreign fishing vessels have become a pressing policy consideration of OECS because longliners have fished in their fishing zones either illegally or in a manner which was inconsistent with prior agreements. Embedded within the formulation of policy is the realization that the local fishing is impeded from development of a pelagic longline industry by the lack of expertise, experience, and capital. The most wide ranging issue involves the management of the swordfish resource of the West-Central Atlantic which has received drastic annual increases in fishing effort, but remained essentially unregulated throughout its range.

This paper will examine these issues and attempt to develop approaches which might promote their resolution. Alternatives which are explored include regionalistic institutions, development of the local industry, and management requirements such as enforcement, permitting, and research.

INTRODUCTION

In the early 1980's, the growing number of participants and associated effort, coupled with a trend of declining swordfish stocks in traditionally fished waters in the Northwest Atlantic, encouraged fishing operations to seek out new fishing grounds. The lifting of the mercury ban in 1978 and growing U.S. consumer demand for swordfish also encouraged expansion of the fishery. Although swordfish were known to exist in the Caribbean region, the degree of stock concentrations and commercial viability of stock exploitation remained unknown until several U.S. vessels made attempts during the 1983-84 season. In 1985 U.S. swordfish landings reported by the Caribbean Fisheries Management Council reached 652,635 pounds which increased by nearly 300% to 1,902,750 in 1986 (SAFMC, 1987) accounting for over a quarter of U.S. landings.

THE FISHERY

Longlining takes the majority of the U.S. commercial catch of swordfish and is the primary gear strategy employed in the Eastern Caribbean. Sets of up to 40 miles are made in the evening and retrieved the next morning by vessels which usually range from 50 to 85 feet in length (Berkeley *et al.*, 1981). In the Caribbean sets are commonly made in areas adjacent to the shelf or oceanic frontal zones where the depth may be 1000 feet or more. The technical factors which lead to the fishery's success in the Caribbean are gear which utilizes mono-filament line, deeper fishing depths, greater gangion spacing, and the use of cyalume chemical lights. On board ice making capability and relatively larger vessel size have enabled boats to stay at sea for two to three weeks with catches ranging between 10,000 and 20,000 pounds. Dressed swordfish are then delivered to Puerto Rico where they command a price approaching \$5.00 per pound before being air freighted to U.S. markets. Although swordfish are present in the area throughout the year, the majority of fish are taken between November and April.

EXAMINATION OF ISSUES

The majority of commercial fishing vessels which exploit large pelagics such as swordfish and tuna in the Eastern Caribbean are of foreign origin. Most swordfish vessels come from the continental United States while the far ranging tuna fleets are from Taiwan or Korea. Conflict or problem areas related to the U.S. swordfish fishery in the Caribbean fisheries management region and much of the Eastern Caribbean can be broken down into the following categories:

1. The local landing and sale of incidental by-catch which has been cited as detrimental to the markets of local fishermen of the U.S. Virgin Islands and Puerto Rico.
2. Gear that does not discriminate among large pelagics which results in the taking of by-catch which includes species which are the target of recreational fishermen.
3. U.S. fishing vessels that are operating in neighboring island nations' waters either illegally or in a manner which is inconsistent with prior agreements.
4. Revenues which are not being realized by local economies because foreign vessels are operating illegally and the local industry has been impeded in developing the fishery due to the lack of experience, expertise, and capital.
5. The effects of drastic annual increases of effort on swordfish stocks in parts of their range where they were not previously exploited while the fishery remains essentially unregulated throughout its range.

The effects of longliner by-catch sales on local markets is the major source

of conflict between longliners and local fishermen of the U.S. Virgin Islands and Puerto Rico. An analysis of the problem requires an examination of the volume of landings, composition, and markets of each fishery. Swordfish longline gear is only as selective in the capture of other pelagic species as the strategy with which it is fished. The fishing depth and the time of deployment are instrumental in the determination of catch composition.

Incidental catch from the New England swordfish fishery, NMFS exploratory data, Japanese longline data, and results of the Caribbean Pelagic Fisheries Development Project all illustrate a predominance of swordfish and sharks for night sets while daytime sets for tuna show a greater percentage of billfishes and assorted teleosts. In addition, in 1986 the incidental catch of tuna and billfish in the Caribbean longline swordfish fishery show a catch of 287,863 pounds of tuna and 110,077 pounds of billfish with an unspecified catch of wahoo, dolphin fish, and shark species (SAFMC, 1987). The data substantiate the occurrence of temporal segregation between tuna and billfish which are more vulnerable to daytime sets in contrast to swordfish and sharks which are more vulnerable to nighttime effort (SAFMC, 1985a).

It seems reasonable to expect a great deal of variation in amount and composition of landed by-catch, depending on each vessel's objectives and fishing strategy. Set retrieval may extend into the afternoon of the next day resulting in a greater occurrence of billfish, tuna, and other teleosts. If space and time permit, their retention and subsequent sale may be an attractive incentive for local sale if the stateside price of certain species does not merit the cost of air freight.

The longliner can undercut prices of local fishermen because the marginal cost of retention and marketing of species such as dolphin fish is low or near zero. Longliner operation costs are dictated by their primary target species such as swordfish and tuna. Therefore, they are not constrained by the same factors which dictate costs of production for local fisherman. Longliner by-catch is also landed in greater quantities than catches of local fishermen, and it is sometimes of higher quality due to on-board ice making capacity. This factor makes their product more attractive to the prospective dealer, hotel, or restaurant. Another factor is related to the lack of infrastructural facilities for product storage and marketing. The local St. Croix market can be flooded by the by-catch of one or two swordfish vessels due to the relatively low demand for pelagic fish during certain times of the year (CFMC Memorandum, 1986). This temporary influx of fish may leave the local fisherman without an alternative on a given day. Although these problems may be seasonal and local in nature, this disruption can be significant to fishermen whose income averages below \$300 per month in this region (SAFMC, 1985b).

Another area of concern is the possible effect of swordfish longlining on recreational species such as marlin, sailfish and spearfish. Expenditures by

participants in the U.S. recreational billfish fishery were estimated at approximately \$100 million in 1977-78 while the total economic value of the fishery is even larger and has certainly increased since then (SAFMC, 1988). In 1979 a National Marine Fisheries study done by the Clapp and Mayne Consulting Firm indicated that the recreational marine fleet was composed of 8,200 vessels with an investment of \$85.3 million. The value of the billfish recreational fishery in the Caribbean Fisheries Management Region is not available, but it is undoubtedly a significant sector of the tourist industry. In addition to revenues obtained directly from charters, bait, and equipment, indirect revenues for goods and services utilized during the charter's stay in the region are important factors which should be accounted for.

The studies cited above illustrate that nighttime sets are less likely to result in billfish capture although variability exists depending on time of set retrieval. Landings in the Eastern Caribbean resulting from swordfish effort in 1986 were 110,000 pounds of marlin retained and marketed (SAFMC, 1988). This figure probably does not account for the actual percentage of billfish by-catch for two reasons. First, much of the by-catch may not have been accounted for in the report because the illegal landing of by-catch has been reported. Second, due to the low, although rising, value (\$.60 to \$1.20) of many fish, numerous fish may be released due to the lack of on board space. An accurate survival rate for released marlin may vary markedly although a 50% figure may be close according to observer reports from Japanese longline operations (SAFMC, 1988). The potential negative effects of swordfish longlining on these stocks cannot be discounted, especially in light of the potential variability of incidental by-catch composition.

Another, more far reaching, problem relates to uncooperative or illegal fishing of U.S. longliners in other Eastern Caribbean states' waters. The most immediate problem involves the British Virgin Islands (BVI). Although the BVI began permitting boats during the 1984-85 season, many have not lived up to provisions governing their entry. Reporting of catch and the landing of all by-catch in the BVI were conditions which were agreed upon for entry to BVI waters. Some boats were slow or failed to report landing while others were suspected of landing their by-catch elsewhere.

The problem extends beyond the immediate area of the USVI and Puerto Rico to other Eastern Caribbean island states where illegal fishing is taking place. This problem was demonstrated by the seizure of a U.S. vessel within 12 miles of St. Vincent in 1986. This incident may indicate that longliner fishing is more wide spread than previously reported and that a sizable portion of landings reported in U.S. waters originates elsewhere. The magnitude of this activity and the concentration of the resource in the rest of the Eastern Caribbean is presently unknown. It is a difficult problem for these nations to deal with due to the lack of scientific information and concerted action and funds for enforcement.

A local pelagic longline fishery in the Eastern Caribbean is practically nonexistent. Revenues of the fishery are not currently being realized by the local economies of both the U.S. Virgin Islands and Puerto Rico, and other Eastern Caribbean states. The larger nations with distant water fishing fleets utilize their advantage in areas such as expertise, experience, and available capital to exploit pelagic resources to gain revenues and a high quality protein source. Island states outside the Caribbean Fishery Management Council's region are entitled to these pelagic resources according to the current norms of international law and UNCLOS III.

The most controversial and all encompassing problem involves swordfish stock health. Information concerning stocks and management is complicated by the large range of swordfish and the number of countries which participate in the fishery either directly or indirectly. Although opinions vary widely concerning current stock condition, certain factors are generally agreed upon. The average dressed weight of swordfish landed in the U.S. fishery has declined as fishing pressure has increased. Effort in the Caribbean and off the Grand Banks has increased dramatically in the previous two seasons. Yield per recruit (YPR) analysis indicates growth over-fishing while recruitment over-fishing has not yet occurred (SAFMC, 1985b). The meaning of these and other factors related to current stock condition and appropriate management have not been agreed on. The U.S. National Marine Fishery Service has not fully implemented the Swordfish Fishery Management Plan including the component involving variable season closures, which is an integral part of the management measure. Further research, compromise, and international cooperation will be required in the near future before overexploitation becomes reality.

DISCUSSION

All of the issues cited above have implications for the people of the Eastern Caribbean. Generally, the region's island nations lack development alternatives in many economic sectors due to a limited resource base. These nations can be characterized as having a small land area which is surrounded by relatively large fishing zones. UNCLOS III and current international customary law have given the coastal state jurisdiction over its marine resources within its respective 200 mile zone or Exclusive Economic Zone. The least developed fishery resources in the region are the highly migratory species such as tuna, swordfish and other large pelagics.

The problem for nations of the region is to realize the potential benefits which can accrue from the rational utilization of the resource. The initial difficulty involves the definition of benefits and determination of how they can be obtained. The answers to these questions will ultimately depend on the nations of the region which will undoubtedly seek to maximize benefits while maintaining integrity in respect to independence and self-sufficiency. The

purpose of the following section is to develop some perspectives and alternatives which might be valuable as institutions are built for the development and management of the highly migratory pelagic fishery resources in the Eastern Caribbean.

In the case of highly migratory species of which swordfish is included, the initial requirement is the management of the resource throughout its entire range. This policy will require management within areas of national jurisdiction and on the high seas. It will also require tagging and recapture studies to increase knowledge of migration, population differentiation, and age structure of stocks. These studies would have special significance to the Caribbean because the swordfish fishery is still relatively new and this area is believed to be the spawning region for the species. In this case, the International Commission for the Conservation of Atlantic Tuna is the vehicle by which the resource must be managed to ensure that highly migratory stocks can be maintained at optimal levels over time.

The states of the Eastern Caribbean must act as a regional entity in dealing with distant water fishing fleets and local development. A management unit under the authority of the Organization of Eastern Caribbean States (OECS) will require a mutually beneficial relationship under which the costs and benefits of resource management and exploitation are shared in an equitable manner among the concerned parties. It will require a large degree of compromise by the governments concerned, although the potential benefits under such a system would outweigh the costs of attempting to initiate and manage the required institutions independently. In areas such as data collection, enforcement, and development, a joint effort is required to minimize costs while avoiding duplication. The first step is the development of goals and the means by which they can be met. Then, a legal regime can be developed which is in harmony throughout the region's fishing zones. Under this regime, components involving enforcement, development, permitting, and management can be implemented. Initial problems involve the strengthening of the OECS as the vehicle through which political compromise can be accomplished for the division of tasks which will be required for implementation of the project. A practical point to start might be the decision of whether to permit foreign fishing, determination of the direction and pace of local development, and the allocation of costs and benefits among member nations.

The permitting of vessels may be the first step in gaining revenues from the resource. Fees could be established for a fishing license and landings of respective operations. Revenues obtained through permitting could then be utilized for development of the local fishery. To obtain the resource rent, fees must be set at levels where the vessel operator's willingness to pay is captured, but not so high as to discourage him from entering the fishery. One possibility is to open the fishery to the highest bidder. If collusion between participants is

absent, the region would be guaranteed the market value of the resource. The permitting regime could require development of a registry of participants under which vessels which did not live up to agreements required for entry could be black listed from fishing in the region. This policy would act as a self-regulating device for those vessels which value continued entry into the fishery.

Another important area will involve enforcement for regulation of those vessels which enter the fishing zone. The marginal costs of enforcement cannot exceed the marginal benefits derived through the action. In this case, costs include the personnel, vessels, and administration required to carry out the operation. The benefits derived through the action are the fines obtained through prosecution of offenders and the change in behavior of fishermen so that revenues derived through landing fees are realized by the host nations. Although some vessels may continue cheating, it is not in the best interest of the nations concerned to add another patrol vessel if its costs outweigh the benefits which will be derived. The costs of patrolling an area as large as the combined fishing zones of the OECS would be large. As a better understanding of the spacial distribution of the fishery develops, enforcement efforts can be concentrated on those areas of greater swordfish concentrations.

The use of observers is a less expensive alternative which could assist in several areas including enforcement, data gathering, and training. The onboard observer could cite violations which might involve underreporting, fishing in restricted areas, and retention of species which were to be delivered to the nation in question or released. Observers would also be at sea in areas where the greatest amount of fishing activity would be taking place. This positioning would enable them to report other vessels which are operating in violation of OECS law. In respect to data collection, the observer would be able to document areas of swordfish concentrations, biological data, species composition of incidental catch and catch rates. Much of this data will be indispensable for subsequent local development. It could also assist regional and international scientific organizations in answering some of the questions that currently plague management such as stock differentiation, migratory patterns, and population age structure. Finally, the observer would be able to acquaint himself with the operation of a longlining vessel first hand. Familiarization with technical aspects such as electronics, hydraulics, and strategies involved in making sets would be possible. The British Virgin Islands is currently putting observers on board swordfish vessels for this purpose. Supplemental training programs would allow observers to understand the operation to the point where they could work as extension officers or as fishermen.

The data obtained through these operations could assess the size, composition, and distribution of the resource. This information would allow for proper planning and investment for the local industry so that over-capitalization and inappropriate technology can be avoided.

Potential benefits which might be derived from local development of the fishery include employment, additional domestic fishery products, and export earnings. Although these factors are attractive, the track record of hastily developed fishery projects is dismal. The effort will require a steady methodical process under which information collection and development should proceed hand in hand.

Experiences in the U.S. Virgin Islands and Puerto Rico with incidental by-catch and local markets should be taken into account by the OECS region. Although nearly all Eastern Caribbean states import fishery products, this potential source of fish could disrupt traditional markets. If a portion of the catch is landed domestically, strategies must be adopted which can guarantee its assimilation into the local economy without negative effects to local fishermen.

In the USVI and Puerto Rico situation, U.S. longliners have the right to fish in the Caribbean Fishery Management Council's region although the landings of fish to be sold locally can be regulated. Recently, CODREMAR, the local department concerned with fisheries in Puerto Rico, and the Caribbean Fisheries Management Council have directed efforts at recording by-catch volume and composition. Market studies are also needed to identify how by-catch can be utilized to reduce imports without disruption of the local fishing industry. Perhaps the results could be applied to improvements in the islands' marketing infrastructure.

Another area which surfaced in the USVI and Puerto Rico involved the concerns of recreational fishermen. The potential for recreational fishing exists in other parts of the Eastern Caribbean. Its role as part of the tourist industry can not be discounted as a potential revenue earner. The Fishery Councils of the Atlantic United States, including the Caribbean, are proposing a ban on the commercial sale of billfish as part of a fisheries management plan to ease fishing pressure on these species. The value of billfish currently landed by the U.S. commercial longliners is estimated to be \$134,282 compared to the recreational estimate of \$100 million in 1978 (SAFMC, 1988). It may also be in the best interest of Eastern Caribbean states to recognize the value of conservation of these stocks for future development.

CONCLUSION

The steady growth in demand for fishery products in the U.S. is evidenced by higher consumption and prices. The Caribbean has become an attractive region to U.S. fishermen seeking underutilized fishery resources. During the last season U.S. longliners began concentrating on yellowfin and bigeye tuna to a greater degree than during the previous season due to higher stateside prices. Dolphin fish are also becoming a highly prized commodity in most U.S. markets. In addition to the nations already mentioned, Spain and Venezuela are reported to be initiating longline operations in the region. This trend makes the

action of concerned states urgent because the entry of more participants is a near certainty.

The United States should recognize that illegal fishing by U.S. nationals in Eastern Caribbean waters is detrimental to the political good will of the states in the Eastern Caribbean. Effort and dollars spent to rectify the situation through enforcement under the Lacey Act and joint cooperation with the nations concerned could create more understanding, local development, and political benefits for both the nations of the region and the United States.

In many cases underlying problems with current management systems are left unsolved until an issue becomes controversial enough to bring the situation to the forefront. In the case of the swordfish, it has increased awareness of other fishing operations of Korea and Taiwan which operated in adjacent waters for decades. It has also helped to galvanize the Eastern Caribbean nations to take concerted action at the regional level on common concerns related to their development. International and regional cooperation and planning still has the potential to allow for positive solutions for the mutual benefit of concerned parties.

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