

# Oceanic Game Fish Investigations at the Southeast Fisheries Center— A Status Report

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Billfish and tuna stocks are the object of an intensive commercial fishery that has been operating in the Atlantic Ocean since the late 1950's. At its peak in 1964, 3.75 million billfishes and tunas were landed, of which about 10% were reported as sailfish, blue marlin, and white marlin. Concern among U.S. sportsmen and scientists quickly developed over whether the billfish stocks in particular could withstand this rate of harvest and still provide ample numbers for satisfactory sport fishing in the coastal waters of the U.S.

In discussions with nations that have extensive longline fleets it was apparent that we had little or no statistical data from the sport fishery for billfishes in the western North Atlantic, Caribbean Sea, and Gulf of Mexico. As a result, however, of these preliminary talks in the 1960's, the Japanese agreed to restrict their fishing activities off certain areas of the U.S. It was also agreed that discussions would be resumed sometime in the late 1970's to evaluate the status of billfish stocks in the western North Atlantic, Caribbean Sea, and Gulf of Mexico. The Oceanic Game Fish Investigations Program was initiated in 1972 to examine the feasibility of using big-game fishing tournaments to provide the necessary catch and effort data needed to determine changes in relative abundance and make evaluations of the status of stocks.

At the 1972 Game Fish Conference on Miami Beach we introduced the Program and discussed some preliminary data that had been collected. This year, after almost 3 full years of sampling, we would again like to review with you our results, make a preliminary determination of the validity of our sampling method, and examine how well equipped we will be in the event we enter negotiations in a few years.

Each year program samplers attend from 30 to 40 big-game fishing tournaments from Block Island to Jamaica and from St. Thomas to Port Aransas (Fig. 1). In addition we have seasonal samplers working in the Gulf of Mexico from May to October in cooperation with big-game fishing clubs and charter-boat associations. We also have cooperative sampling arrangements with marine research agencies of the States of Florida, Georgia, and South Carolina.

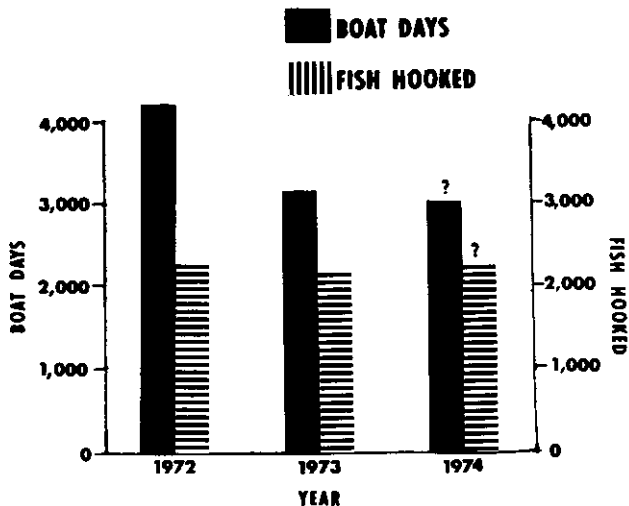


Fig. 1. Number of boat-days sampled and number of billfishes hooked in the western North Atlantic, Caribbean Sea, and Gulf of Mexico in 1972, 1973, and 1974. The data for 1974 are not complete.

Over the past 3 years we have attempted to increase our tournament coverage while refining our sampling to include only tournaments that are most meaningful to our data requirements. This year for example we were able to sample north of Cape Hatteras for the first time. Some big-game tournaments are not suitable for sampling because the boats do not return to a central location and our samplers cannot interview the angler or crew, the fishing hours are not standard, or for some other reason. The total number of fish hooked has not declined, and after all of 1974's data is included will probably increase to an alltime high in 1974. This suggests that our coverage is selective for those areas and tournaments where catches are high enough to provide meaningful results.

We separated the catch-effort data into two categories: the Gulf of Mexico and the Atlantic-Caribbean Sea (Fig. 2). Hook rates for blue marlin are very stable with the Gulf maintaining a slightly lower hook rate than the Atlantic-Caribbean area. White marlin hook rates in the Atlantic-Caribbean area were almost identical, while in the Gulf hook rates rose in 1973 then fell in 1974. We were able to sample in the northeastern U.S. for the first time this year, and we expect our white marlin data for the Atlantic to be considerably more reliable as an index of population abundance in the future. No sailfish data are presented for the Atlantic-Caribbean area because some of our most important sailfish tournaments are still ahead of us in 1974. In the Gulf, hook rates for sailfish declined over 50% from 1972 to 1973 then increased in 1974. We pointed out in our 1973 newsletter that the sharp declines in 1973 may have been a result of the heavy flooding and large runoff of fresh water in the northern Gulf which could have

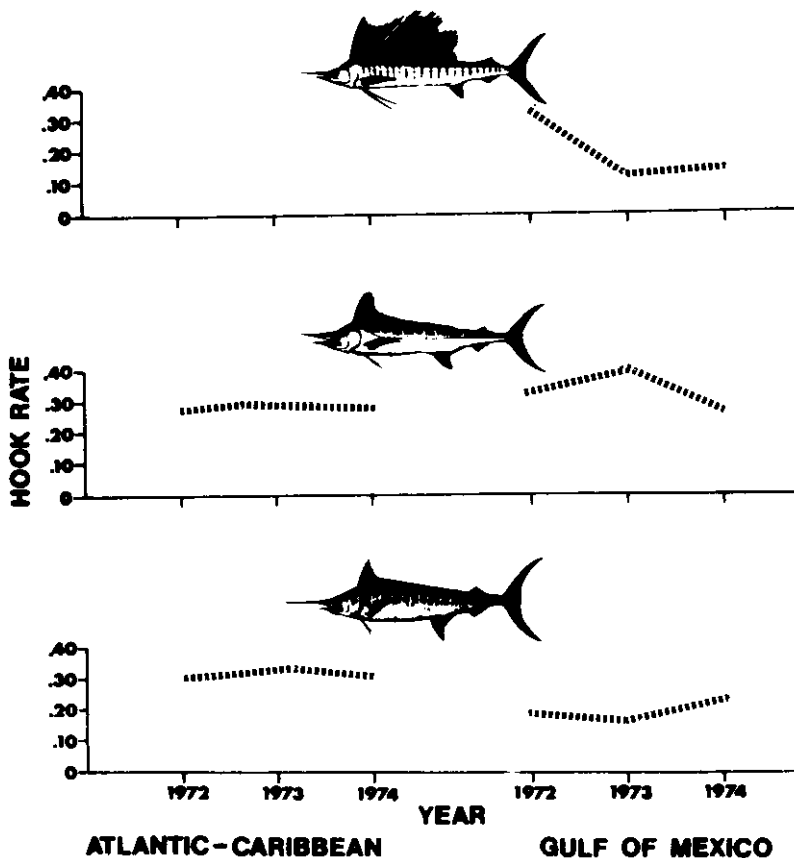


Fig. 2. Number of sailfish, white marlin, and blue marlin hooked per 8 hours of trolling in the Atlantic-Caribbean area and in the Gulf of Mexico in 1972, 1973, and 1974.

forced the sailfish out of their normal areas. It is interesting to note that the hook rates for tournaments in the Florida Keys in 1973 increased sharply over 1972. We believe that the consistency of our data indicates that our sampling is obtaining effective, reliable data and will provide us with adequate measures of changes in relative abundance of billfish stocks.

The Japanese longline data for 1972 have just been released and show the continuation of some alarming trends. We examined catch and effort data over a broad area of the western North Atlantic that includes most of the range of the sailfish, white marlin, and blue marlin populations in this area (Fig. 3).

Catch rates for white and blue marlins continued to decline with the catch rate for blue marlin reaching the lowest level since the beginning of the fishery

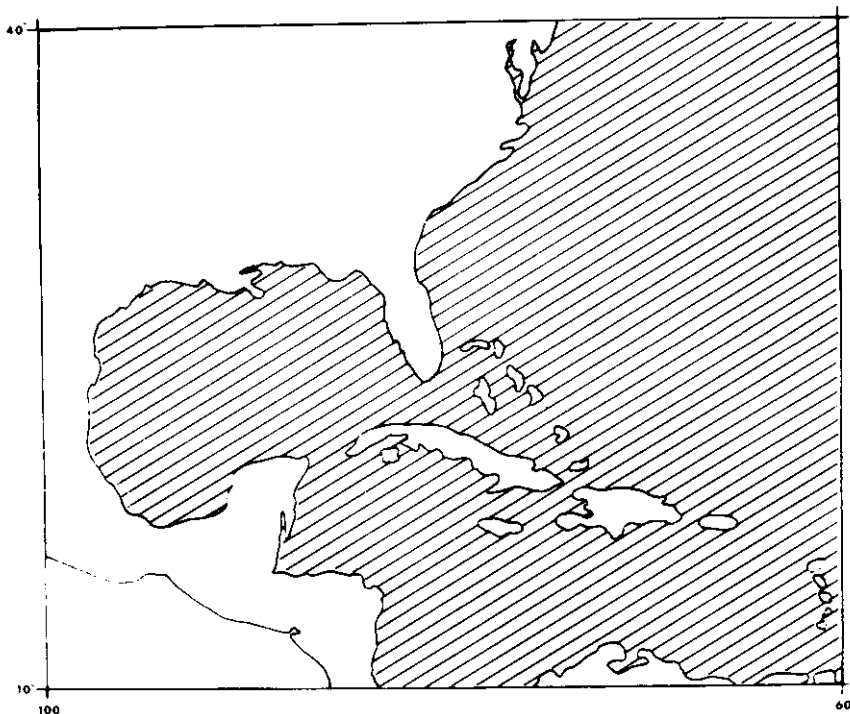


Fig. 3. The area in the western North Atlantic between 10°-40° North Latitude and 60°-100° West Longitude where longline catch rates were calculated.

in 1956 (Fig. 4). White marlin catch rates continued a decline begun in 1970. Our data from tournaments and dock sampling are comparable to the Japanese only for 1972. Even though our 3 years of data, when examined separately, suggest that the stocks of white and blue marlins are not declining in abundance, there is a very real possibility that what we are now measuring is a population that has already stabilized at a very low level of abundance.

We are actively studying other aspects of the biology and dynamics of billfish stocks in the Atlantic. We have just begun a preliminary investigation into the feasibility of using dorsal spines from white and blue marlins as indicators of age and growth. After examining a few initial samples we are very optimistic that we will be able to use these spines as an aging device, and fill a long standing gap in our knowledge of the biology of the marlins.

We are also examining size and sex distribution within season and within areas. For all three species the average length of females is greater than the males (Figs. 5, 6, and 7). This difference increases with the increase in the average size of the species and is even more pronounced when comparing weight.

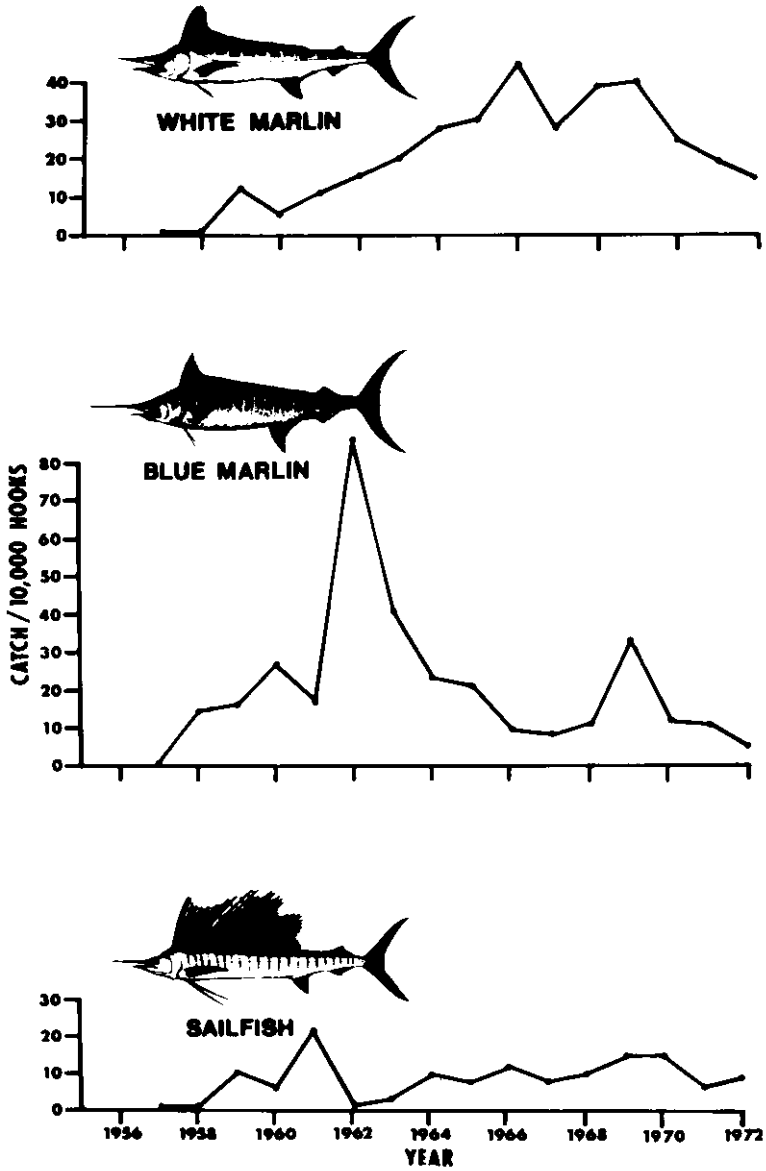


Fig. 4. Catch rates for white marlin, blue marlin, and sailfish in the western North Atlantic between 10°-40° North Latitude and 60°-100° West Longitude by the Japanese longline fleet from 1956 through 1972.

SAILFISH  
LENGTH FREQUENCY BY SEX  
(LOWER JAW)

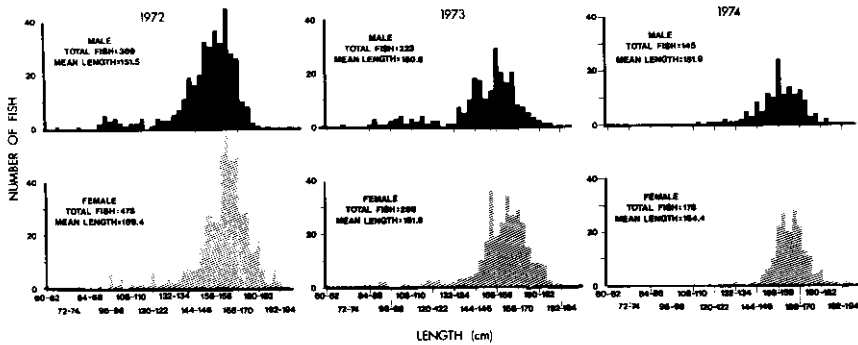


Fig. 5. Length-frequency distributions of sailfish separated by sex from 1972 to 1974. Lengths were measured from the tip of the lower jaw to the fork in the caudal fin.

WHITE MARLIN  
LENGTH FREQUENCY BY SEX  
(LOWER JAW)

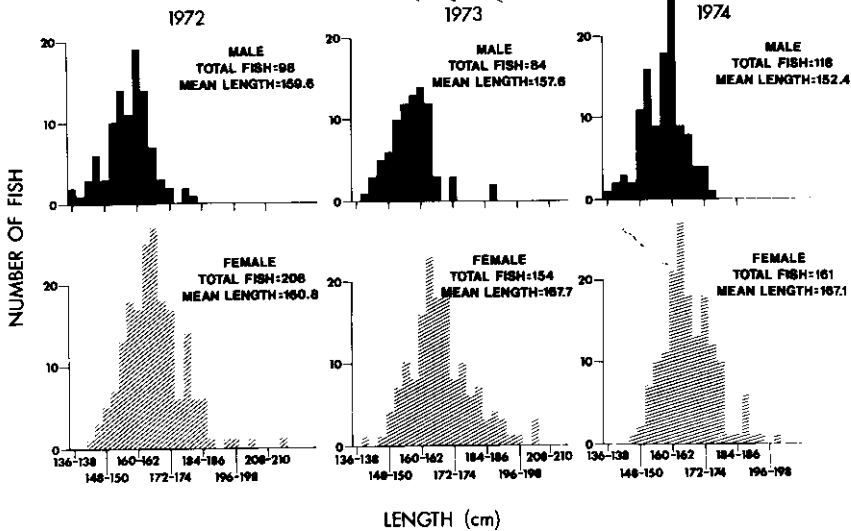


Fig. 6. Length-frequency distributions of white marlin separated by sex from 1972 to 1974. Lengths were measured from the tip of the lower jaw to the fork in the caudal fin.

BLUE MARLIN  
LENGTH FREQUENCY BY SEX  
(LOWER JAW)

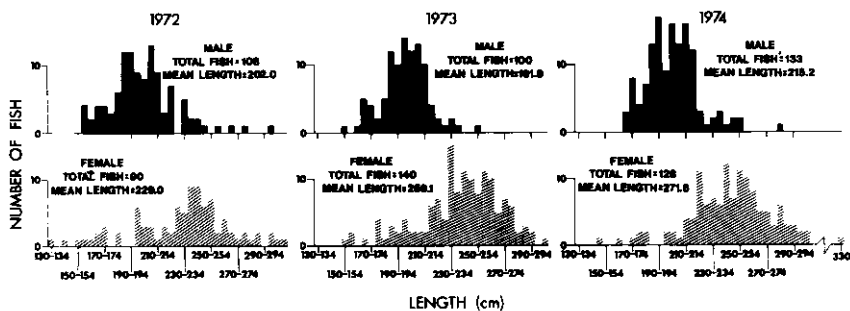


Fig. 7. Length-frequency distributions of blue marlin separated by sex from 1972 to 1974. Lengths were measured from the tip of the lower jaw to the fork in the caudal fin.

For sailfish and white marlin, females are more abundant in the samples for all 3 years. Blue marlin sex ratios are more near equal, however at certain seasons and in certain areas a pronounced dominance of one sex or the other is evident. In Puerto Rico and Jamaica in September and October, for example, small males are dominant in the catches. Over the past 3 years in the tournaments we have sampled in these areas males have constituted about 87% of the catches. In St. Thomas, however, only a month or so earlier in the year, females constitute about 80% of the catch. We are not sure of the exact significance of these differences. There is some indication that blue marlin separate by sex after the spawning season and only approach an even sex ratio during spawning season. There is evidence, however, that spawning occurs through September so we are unable to explain the differences noted in Puerto Rico and Jamaica. John Jolley with the Florida Department of Natural Resources showed recently that the sex ratio of sailfish off Florida is fairly even during the spawning season, June through October, but during November through May is about 2 to 1 in favor of the females.

One indication of declining abundance in a population of fishes as a result of heavy fishing is a decrease in average size. We examined average weights of blue marlin from the mid-Atlantic area and some rather interesting fluctuations were evident (Fig. 8). First, average weights varied greatly from year to year and similarly between fishing areas as might be expected if the same stock of marlin is being exploited. Secondly, there seems to be a fairly uniform yearly cycle between high and low points of about 3 or 4 years. This is another aspect of behavior that we are presently unable to explain. It does not appear, however, that there has been a decrease in average size of blue marlin in the mid-Atlantic

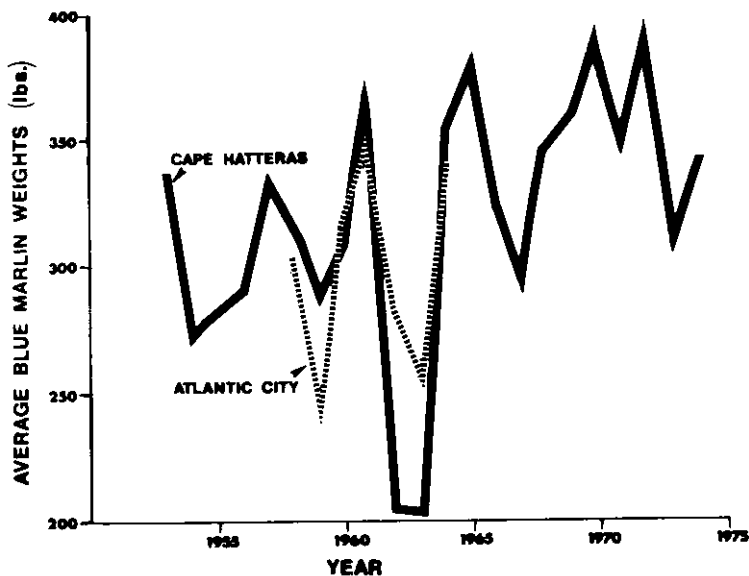


Fig. 8. Average weights of blue marlin landed at Cape Hatteras, North Carolina, and Atlantic City, New Jersey, from 1953 to 1974.

area at least. No decreases were noted in other areas of the western Atlantic either, although our data are not as extensive as in the mid-Atlantic area.

Last year plans were completed for the formation of a Cooperative National Marine Fisheries Service-Woods Hole Oceanographic Institution Game Fish Tagging Program. Mr. Chester Buchanan is the project leader for our portion of the program, and tags and tagging equipment are available from our Miami Laboratory as well as from WHOI. We hope to expand the tagging program and to identify certain problems that tagging experiments will aid in solving.

How good, then, is our data and will we be sufficiently prepared in a few years to enter international negotiations for conservation and allocation of our billfish resources if it becomes necessary? We are confident that our sampling method is valid and that we have identified a network of important and reliable tournaments throughout our area of coverage. By the late 1970's we will be fully prepared to begin talks with any foreign fishing nation. In 1977 we will have 3 full years of Japanese data available to compare with our own tournament data.

We thank all of the tournament committees, big-game fishing clubs, charter-boat associations, cooperating state agencies, anglers, and crews for their patience and assistance. Without their cooperation, and in many cases special arrangements for our samplers, our program would not be able to complete its task, a task that we feel is vital to the maintenance of viable stocks of billfish along our shores.