

## Report of the ICCAT Swordfish Workshop

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### ABSTRACT

An International Commission for the Conservation of Atlantic Tunas (ICCAT) Workshop on Swordfish was held at the ICCAT headquarters in Madrid, Spain, from October 6 - 13, 1987. An overview of the results follows.

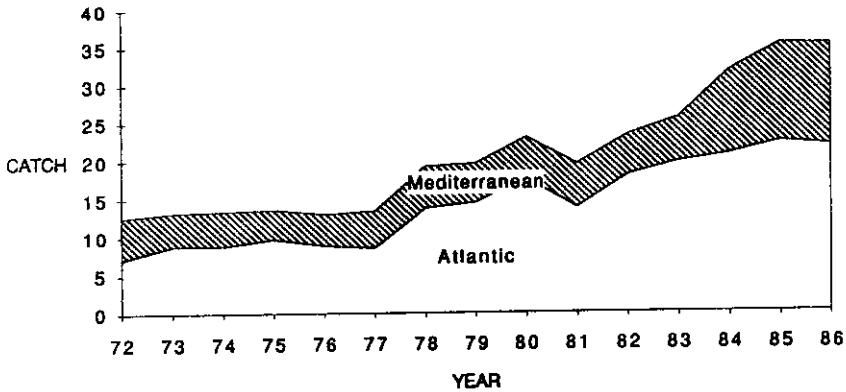
### BACKGROUND

The meeting was chaired by Mr. J.C. Rey from Spain. Scientists from Brazil, Canada, Italy, Japan, Mexico, Portugal, Spain, United States, and Uruguay attended the workshop, as did the ICCAT Assistant Executive Director. The workshop was proposed at the 1986 meeting of the Standing Committee on Research and Statistics (SCRS) and the objective was to assess the status of stocks of swordfish in the Atlantic Ocean. This was later expanded to include the Mediterranean based on additional data and research results provided by Italian scientists. Twenty-five working documents were submitted to the workshop and are available from ICCAT (Principe de Vergara, 17-28001, Madrid, Spain). National scientists provided a description of swordfish fisheries in their respective countries.

### LANDINGS/GROWTH/CATCH-AT-AGE

Landings data by gear type are converted to round weight (Figure 1) and combined with size frequency samples to produce numbers caught at-size by area. The Group agreed on equations to convert from dressed weight to lower jaw—fork length which is used in the size frequency data base. Sex ratio data were examined, however, due to limited time-area strata sampling and the significant variability in time-area sex ratios samples, the Group concluded that it was not appropriate to divide the catch at size into separate male and female catch-at-size tables. Sufficient size data were available from 1978 onwards and for areas lacking sufficient size data, the Group established substitution procedures using data from the United States, Japan, and Spain.

Growth information from mark/recapture, hard parts (anal spines, otoliths and vertebrae) and modal progression analyses were examined. The Group concluded that "the hard-part studies could not yet be validated and that the Mediterranean data on sizes of swordfish were too limited to permit the construction of an adequate growth curve. Thus, the Workshop agreed that the growth curve obtained from the mark-recapture analysis, based on the change in



**Figure 1.** Atlantic swordfish catch (thousands of metric tons) from the Atlantic Ocean and the Mediterranean Seas. (Source: Report of the ICCAT Swordfish Workshop, COM-SCRS/87/15, Madrid, Spain, October 6-13, 1987.)

estimated weight of fish at liberty for a known period of time, was the only available source for estimating age-at-size over a reasonable range of sizes. The Workshop agreed to use this information to age the catch. However, it was recognized that the use of this information could lead to substantial misassignment of fish by age, particularly for the larger fish in the catch (due to substantial individual variation in size-at-age).” It is also important to note that the mark/recapture growth curve does not account for the sexually dimorphic growth observed for swordfish.

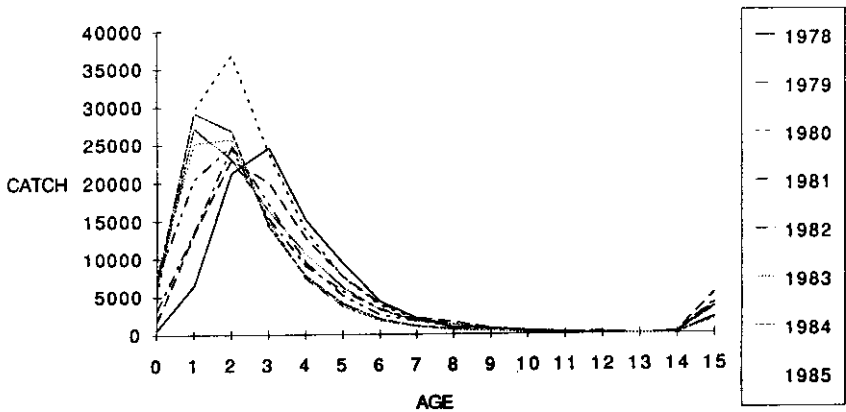
Catch-at-age was calculated from catch-at-size using the mark/recapture growth equation and is shown for years 1978—1985 in Figure 2. The annual shift of the catch-at-age data to the left documents the reduction of older fish in the catch. The change is even more apparent when 1978 and 1985 are compared.

### STOCK STRUCTURE

Catch-per-unit-effort data, size composition data, spawning season information, tagging data, and differences in growth, meristics, or morphology were examined to determine stock structure. The Group concluded that the single stock hypothesis for the North Atlantic should be the working hypothesis, but also felt that they should not discard the two stock hypothesis (east and west Atlantic). The Group considered the South Atlantic as one stock but separate from the North Atlantic.

### STATUS OF STOCKS

Sufficient time to conduct analytical assessments was not available after examining the data available and constructing catch-at-size tables. Preliminary



**Figure 2.** Swordfish catch-at-age (numbers of fish) from the western North Atlantic in 1978-85. (Source: Report of the ICCAT Swordfish Workshop, COM-SCRS/87/15, Madrid, Spain, October 6-13, 1987.)

analyses indicated the following:

1. In the Northwest Atlantic, general stability in the number of fish caught (8,000—9,000, with increased harvest of ages 0 and 1 from 1978 to 1985.
2. In the Northcentral Atlantic, the number of fish caught was maintained at the same level up to 1983. However, in 1984 and 1985 the number of fish increased, partly due to increased effort in this area by the Spanish fleet. The range of ages exploited remained constant.
3. In the East Atlantic, the number of fish caught increased, particularly after 1983. A majority of the catch consisted of fish 1 to 4 years old.
4. In the South Atlantic, there was a constant increase in the number of fish caught after 1978, whereas the range of ages exploited (2-6) was similar throughout the period.
5. For the Mediterranean, the number of fish caught remained relatively stable (160,000 to 200,000) up to 1982. After that, there was a big increase in catches, reaching a maximum of 621,00 in 1984. A part of the increase should be attributable to the improvement of catch statistics. However, the Group observed these fluctuations with caution due to the general lack of precise information on the catches and size distribution in the Mediterranean. The majority of the catches correspond to ages 0 and 1.

#### RECOMMENDATIONS ON STATISTICS

1. All countries should report swordfish catch and effort statistics by five-degree rectangles (or smaller area) by month.
2. All countries catching swordfish (directed or by-catch) should carry out adequate levels of size sampling and sample for sex, when possible.
3. All countries which have a major swordfish fishery should submit a

1986 catch-at-size table by a set date agreed upon by the SCRS. The table should be in the format agreed upon at this meeting, i.e., by sampling areas, month, gear, and size (in original units). Size measurements should be kept in the smallest increments possible.

4. Because of under-reporting problems for the Mediterranean, the Secretariat should contact the appropriate governments to acquire more accurate, current, and historical data.

5. Selected length to weight conversion equations for specific areas should be used for calculating landings.

6. Detailed size frequency data should be made available so that substitutions can be matched at the smallest time-area strata possible.

#### RECOMMENDATIONS ON RESEARCH

1. Emphasis should be placed on developing additional estimates of growth rates based on validated information. Modal analysis of size composition in conjunction with hard-part studies is encouraged, especially for the Mediterranean region; and if possible, the ages associated with the modes should be established.

2. All the techniques to identify stock(s) should be used, including age, growth, maturity, etc., particularly for South Atlantic and Mediterranean fish.

3. Scientific tagging should be intensified in the future, particularly in view of increasing commercial value and expanding fisheries for this species. The Group acknowledged the large number of releases made by U.S. observers aboard Japanese longliners and hoped that this program would continue.

4. Analysis of changes in the effectiveness of fishing effort should be continued in order to improve indices of abundance.

5. Since CPUE information submitted by the different countries comes from different time-area strata, gears, and fishing methods and is expressed in different units, the Group recommended as a basic objective the standardization of CPUE. In order to standardize CPUE, it will be necessary to identify the time, area, gear characteristics, or other factors that affect catchability. This can be accomplished with statistical methods, such as GLM. The Group recommended a joint comparison of Japanese, Spanish, and United States CPUE data.

6. The reason(s) for the predominance of females in the large-size classes should be investigated.

It was noted that even if all countries adopted the statistical and research items, another workshop(s) in the future would be necessary. This would provide the opportunity to conduct detailed analytical assessments which could not be carried out due to time limitations.

#### RECOMMENDATIONS ON MANAGEMENT

No management recommendations were presented.