

## RESULTS OF SOVIET FISHERIES INVESTIGATIONS ON ATLANTIC TUNA

by

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SUMMARY

This paper deals with the major directions and results of the Atlantic tuna fisheries studies initiated by Soviet scientists in 1959. Apart from solving the main task - the establishment of a required data basis for studies on the dynamics of tuna populations - Soviet investigations are aimed at the development of methods of short-term prognoses, and the improvement of tuna scouting and fishing techniques.

RESULTATS DE RECHERCHES HALIEUTIQUES SOVIETIQUES  
SUR LES THONIDES DANS L'ATLANTIQUE

par

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RESUME

Le présent document traite des orientations principales et des résultats des études halieutiques concernant les thonidés dans l'Océan Atlantique qui avaient été initiées par les experts soviétiques en 1959. Les recherches soviétiques sont orientées non seulement vers l'accomplissement de la tâche principale, qui est l'établissement d'une base nécessaire de données pour l'étude de la dynamique des populations de thonidés, mais aussi vers le développement des méthodes de pronostic à court terme et l'amélioration des techniques de pêche et de détection des bancs de thonidés.

RESULTADOS DE LAS INVESTIGACIONES SOBRE LAS PESQUERIAS SOVIETICAS DE  
TUNIDOS DEL OCEANO ATLANTICO

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RESUMEN

Este documento trata de las líneas principales y de los resultados de los estudios sobre pesquerías de túnidos del Atlántico, que fueron iniciados por los científicos soviéticos en 1959. Además de cumplir el principal objetivo - el establecimiento de unos datos básicos que sirvan para estudios sobre dinámica de poblaciones de túnidos - las investigaciones soviéticas apuntan al desarrollo de los métodos de pronósticos a corto plazo, y mejora de la técnica de localización y captura de los peces.

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RESULTS OF SOVIET FISHERIES INVESTIGATIONS  
ON TUNAS FROM THE ATLANTIC OCEAN.

Fisheries investigations on tunas began in 1959.

From the very beginning of this study as in the fisheries investigations on other fishes, the solving of the following problems was planned. 1. Study of the character of commercial concentrations distribution, of seasonal and multy-year dynamics of this distribution, and influence of environmental factors upon this. Collection of such an information is required for the determination of the main fishing areas, supposed catches, and optimum time of fishing. 2. Study of the most important biological aspects (size, age, growth, reproduction, feeding, etc.) which are required both for thorougher knowledge on the character of distribution of commercial concentration and for creating the necessary prerequisites for the investigation on abundance dynamics of these species. 3. Study on the present fishing methods and technics and creation of the new ones and search for concentrations. From the beginning of investigations considerable attention was paid to the work on systematics mainly to compile the keys.

For solving the above-mentioned problems the first half of the sixties was devoted to the carrying out of expeditions and collection of the material, and in the following five years along with the continuation of the data collection a number of reports were made which had been published in the soviet and foreign press.

Let us turn in brief to the principal results of the soviet investigation on tunas from the open Atlantic.

#### RESULTS OF INVESTIGATIONS

As to the systematics, the keys on tunas, swordfishes, other scombroids, and the revise on the majority of sharks (more than 100 species) were compiled. Besides, basing on the interpretation of some morphological characters functions a new system of scombroid fishes was proposed. This system differed from the schemes by previous authors (Kishinuye, 1923; Berg, 1955; Fraser-Brunner, 1950). In collaboration with the laboratory of physiology a study of intra-specific structure of the tuna populations was initiated.

In the field of studies on tuna commercial concentrations distribution, fishing possibilities of such vast areas as Guinea Gulf, open sea from the arquipelago de Cabo Verde to the north-east coast of South America, the North-West Atlantic, the South-West Atlantic and the South-East Atlantic were investigated. The information collected allows to control variations in the commercial concentrations distribution and to recommend these or those area and fishing terms for the industry. General and in some cases detailed hydrology of tuna fishing areas have been

studied, There have been determined some ecological aspects of tuna life cycle which are important from the standpoint of optimum organization of fishery: terms of concentrations occurrence in the zones with high productivity, optimum and extremal thermohaline ranges of particular species habitat, and as a consequence their preferable depths. The data obtained promoted to create the methods of tuna search which were approved repeatedly when working at sea. We obtained the opportunity to solve the problem of specialized fishing for some or other tuna species.

In the biological field the yellowfin tuna biology (distribution, migrations, local stocks, size, age, growth, reproduction feeding) has been investigated in detail. Biology of other species has been studied in lesser extent, nevertheless, we have some data on size-composition of concentrations, feeding, area and time of spawning, etc. of big-eyed, longfin, striped, little and frigate-mackerel tunas, as well as of sailfish, marlin and swordfish. Besides the creation of base for study on abundance dynamics, the data on the biology allow to specify our knowledge on the commercial concentrations distribution, and in sum are the prerequisite for working up the methods of short-term forecast. The relation between the dynamics of catches per effort and the variability of some biological characters was analysed. Thus, the relation between the extent of stomach filling and the dynamics of catches per effort for big-eyed tuna was established as follows: the best catches per effort were observed with the values of average index of stomach filling of 1.5-2.3, and with the index of diet variety of 1.5-2.5. When

an. increase or decrease of these values were observed the catches per effort dropped sharply.

In the field of study on the state of resources for tuna fishing in the Atlantic Ocean the material available agrees with the data obtained by foreign investigators, and is the evidence of the fact that yellowfin tuna stocks are in a tense condition, those of longfin tuna are in a satisfactory one, and the stocks of bigeyed, little and frigate-mackerel tunas are not fished enough.

As for the scouting technics in the long-line fishery, along with the main necessity of knowledge on hydrological background, there was studied a possibility of determination of tuna concentrations positions not by recording of echo impulses, but by fixing the sounds directly emitted by tunas. The interrelation between number of tunas caught by a long-line and the intensity (quantity) of sounds fixed has been established.

Besides this, there are conducted the investigations on fishing technics (automatization and mechanization of industrial processes), technology of storing and production of tuna products; practical tasks, such as the choice of an optimum period of long-line drift, its sinking at a given depth, etc, are being solved.

A characteristic feature of the investigation on pelagic fishes from the open Atlantic is the complexity of work consisting of the combination of working plans for different fields of fisheries science: biology, oceanography, hydrology, marine chemistry, etc. In our opinion, the generalization of conclusions is the most labourous stage of investigations of

applied nature, and it does not exclude the fulfillments of special theoretical study of a perspective significance.

#### CONCLUSION

Summing up the above mentioned, it can be noticed that there are general and in most cases rather detailed ideas concerning tunas geographical range, their commercial concentrations distribution, migrations, size, age, growth rate, feeding, state of resources, etc. Knowledge of all of these aspects is not full enough to cease the investigations on any of them. In future it is planned to continue fisheries investigations on tunas, paying special attention to the abundance dynamics in an estimation of stocks.