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Will Tuna Research Change Direction?

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Abstract

The World Scientific Meeting on the Biology of the Tunas and Related Species was held in La Jolla, California, during July 2-14, 1962. Convened by the Food and Agriculture Organization of the United Nations, the objectives of the meeting were to appraise the present knowledge of the tunas and to recommend future lines of endeavor.

In general session and discussion groups, the participants considered the development and current commercial exploitation of the tuna fisheries and the identity, distribution, behavior and potential yields of the stocks. It was revealed that through tagging and serological studies, the distribution of some stocks was becoming apparent and that responses to subtle environmental differences may separate these stocks.

Results of research on behavior of tuna in captivity and at sea suggested the need for studies of the physiology of these fish.

The work in the eastern Pacific by the Inter American Tropical Tuna Commission on the population dynamics emphasized the need for adequate catch statistics for the expanding tuna fisheries of the world and the Meeting recognized the need for economic studies in order to achieve a more adequate understanding of these fisheries.

THE WORLD SCIENTIFIC MEETING on the Biology of the Tunas and Related Species, held at La Jolla, California, July 2-14, 1962, by the Food and Agriculture Organization of the United Nations, provided a resume of the current position of research on the tunas. The position thus developed could be compared to that of a healthy vigorous baby; a good start has been made, but the greater part of its growth and development lie ahead.

Fisheries research is a young science and research on tuna biology, as a continuing effort, is a fairly recent addition to that science with a history of 40 or possibly 50 years. However, only in the period since the end of World War II has tuna research enjoyed an effective level of support, a level that the results of the world meeting clearly demonstrates is rapidly increasing.

In the long view, research on the tunas and related species seeks an understanding of these fishes as a harvestable portion of the living organisms of the sea, resources that transforms the energy of the sun and substances in the water into usable protein. For this understanding to be complete, we must know the entire mechanism of the pelagic ecosystem and beyond that, the interactions of that ecosystem with others and with the sun and atmosphere. Although the

desired degrees of understanding will never be achieved, each additional increment of knowledge will prove valuable to man in his efforts to more wisely and efficiently harvest the marine food resources.

In addition, as a complement to the knowledge of the fish and their environment, we need knowledge of the most efficient techniques for harvesting these fish. This implies an understanding of the interactions of the fishermen, their vessels, and the gear with the pelagic ecosystem and, in particular, with the tunas. Beyond these relationships lie those of processing, distribution, and sale of the catch.

We cannot ask that our research efforts be complete, but rather that they be planned and carried out in a manner to develop our understanding of the tunas as a harvestable portion of the living resources of the sea, and further to contribute to the efficiency of that harvest. The meeting at La Jolla provided an opportunity to evaluate the level of our knowledge and where we proposed to go.

The meeting was organized into eight sections; the Chairman for each prepared a review and led the discussions. The sections were: (1) Species identification and distribution subdivided into (A) Adults and (B) Larvae and eggs, (2) Population identification, (3) Size and composition of stocks, (4) Availability (accessibility and vulnerability), (5) Physiology and behavior, (6) Fishing methods, (7) Statistics of catch and effort, and (8) Future lines of tuna research.

The last item was a summary of the possible future research in each of the preceding sections. The discussion today will be concerned with this summary, with future lines of tuna research organized on the same subject divisions, but not necessarily in the same order as the organization sections for the meeting.

Problems of the identification of the species of adult tunas were found to be largely solved. There were a few questions remaining concerning some genera such as *Sarda*, *Scomberomorus*, and *Scomber*. The identity of larval tunas was being resolved except for the albacore and for some of the bonitos; however, both additional growth stages and independent lines of evidence for the identity of the larvae of species other than albacore and bonitos were considered desirable.

The identification of tuna populations is off to a good start. The important tools have been studies of the differences in body form and the results of tagging. A recent method, the study of differences in blood group systems by immunological techniques, is showing considerable promise. Knowledge concerning independent populations, their magnitude, rates of replenishment, and boundaries, is required since the unit with which a fisheries biologist must work is the interbreeding, independent unit of population.

A large part of the information concerning tunas is available as a result of operation of commercial fisheries. A fleet of fishing vessels, by the magnitude of its activities, is, in scope, a sampling apparatus for beyond that which the research worker can hope to independently provide. Data resulting from proper documentation of the operations of tuna fleets is essential to studies concerned with the responses of fish populations to oceanographic changes, with the consequences of harvests by fishermen on the magnitude of the populations, and with life histories and growth.

Tuna fisheries in the oceans of the world are expanding, both in amount of harvest and areal extent of fishing grounds. This expansion is at such a rapid

rate that adequate documentation is badly lagging.

The history of the yellowfin tuna fishery of the eastern Pacific has provided evidence that the maximum sustainable yields for a tuna fishery can be exceeded. The catch records for this fishery are of high quality which, in general, is an unusual situation for tuna fisheries. There is a pressing need to provide some machinery, presumably of international character, to document those tuna resources fished jointly by a number of nations, such as for example, in the tropical Atlantic where no really adequate system of catch records exist. The point of maximum sustainable yield may be grossly exceeded without being plainly demonstratable as a consequence of fishing. This need will grow as the world tuna fisheries grow. The annual landings are currently about 1,000,000 short tons and are increasing at a rate that will possibly double this value within ten years.

The possibility of the continued rapid expansion of the world harvest of tunas is a major factor in the determination of the major research problems and associated priorities. As suggested above, an essential tool involves assembling data resulting from adequate documentation of the catch and of the fishing effort. These data provide a means for understanding the consequence of the existing fisheries on the stocks and will also serve to measure the effects of environmental changes. The harvest of some species of tuna may be considerably increased with development of new and more efficient methods of capture. Effective harvest of skipjack tuna, a major species that is seriously underfished, requires the development of new gear, or perhaps modifications of present gear, if skipjack fisheries are to be effectively expanded into the central and western parts of tropical oceans. Also, gear that will efficiently take some species of tuna at those ages and sizes where the population mass is greatest should be developed.

Oceanographic mechanisms that may increase the local availability of the fish need to be understood sufficiently well so that the time and place of their occurrence can be predicted. This will involve the requisite oceanographic studies and those of fish behavior, the latter both in response to the environment and to the operation of fishing gear.

Implicit in these research goals are many areas of scientific endeavor, some of which although essential, may appear to possess little immediate application. The organization and coordination of research programs, in order to provide effective progress and to prevent lost effort, are matters that require consideration on both national and international levels. More than any other fishery resource, the tunas are the property of all nations; their exclusive fishery the privilege of none.

Putting Technological Knowledge To Work in the Gulf Fishing Industry

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Abstract

A large volume of technological knowledge is available to develop the potential of the Gulf fishing industry. Data are also available to increase profits by