

though catches have tended to be spotty and less consistent than in 1989-90.

ATLANTIC BLUEFIN TUNA FISHERY

The U.S. Atlantic bluefin tuna fishery is regulated with an ICCAT annual catch quota of 1,387 mt. As of April 4, the total commercial landings for 1991 stood at 108 mt, down 21% from the 1990 landings (136 mt) for the same period. (Data provided by Ann Favazza, NMFS Northeast Region)

Gary Rensink and John Childers, SWFSC, contributed to this article.

REPORTS

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STATUS OF WORLD YELLOWFIN TUNA FISHERIES AND STOCKS

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Introduction

During the past quarter century, total production of commercially important tunas (southern bluefin, northern bluefin, albacore, bigeye, yellowfin and skipjack) nearly doubled from 1 million tons (metric tons) in 1965 to about 2 million tons in 1988, the increases mainly coming from the purse seine fisheries for yellowfin and skipjack. It is the yellowfin stocks harvested by purse seine fisheries for which the increase in catches is a cause for concern.

The possibility that yellowfin stocks might be overfished was actually raised as early as the mid-1960s for both the eastern Pacific and eastern

Atlantic stocks. It became apparent, however, that the increase in catches over the years was the result of expansion of the fishing grounds to offshore areas and the introduction of various technological innovations. Sustainable catches for the eastern Pacific and eastern Atlantic yellowfin stocks now appear much higher than formerly estimated.

World fisheries for yellowfin tuna have developed rapidly through a series of innovative changes. Previously, the species had been taken mainly by the Japanese longline fishery and, to a much lesser degree, by artisanal coastal fisheries in the western Pacific and western Indian oceans. In the western Pacific in the mid-1970s, Japanese fishermen found that yellowfin and skipjack schools that associate with drifting objects (mainly logs) could be captured by purse seining. This led to a revolutionary change there to purse seining for tropical tunas. This development was comparable to the earlier discovery of the efficiency of purse seining for dolphin-associated yellowfin schools in the eastern Pacific, which revolutionized the eastern Pacific fishery. In the western Indian Ocean, the change came in the early 1980s, when Spanish and French tuna fishermen initiated experimental surface fishing there, seemingly in search for substitutes for the already heavily exploited eastern Atlantic yellowfin stock. World production of yellowfin by purse seine fishing soon outgrew the production by longlining.

In the following sections of this report, the fisheries and status of stocks of yellowfin, and topics pertinent to each, are briefly described.

Eastern Pacific

This stock has long been closely monitored by the Inter-American Tropical Tuna Commission (IATTC). The surface fishery here developed from an earlier baitboat fishery which transformed to the modern purse

seine fishery at the end of the 1950s. Technological improvements to purse seining followed, along with expansion of the fishing grounds to offshore areas and the development of techniques to catch dolphin-associated yellowfin schools. Both fishing effort and catch increased rapidly from the late 1960s to the mid-1970s (Fig. 3—showing yield in short tons). After that period, the fishery appeared to be operating on the overfishing side of the surplus production curve. A drastic change occurred, beginning in 1983, when substantial numbers of purse seiners left the eastern Pacific for the western Pacific. The low catch rates in the eastern Pacific that triggered this departure were associated with the occurrence there of one of the strongest El Niño events in this century. Fishing effort was reduced by nearly half, and the catch also decreased sharply. Fishing effort has remained more or less constant since 1983, and therefore it was anticipated that catches would increase again. This recovery did occur, but the catches from 1986 onwards were much higher than expected according to the production model (Fig. 3). Maximum sustainable yield (MSY), as indicated by the model with data for recent years included, would appear to be much higher than estimated before. The reasons for the higher yields are now attributed to increases in recruitment and yield-per-recruit, the latter resulting from catching bigger fish.

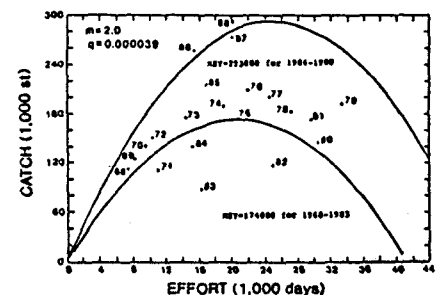


Figure 3. Relationship between fishing effort and catch for the yellowfin fishery in the eastern Pacific (inside the CYRA), from 1968 to 1988 (IATTC Annual Report for 1988).

Western Pacific

Total catch of yellowfin in 1987 from the western Pacific (FAO area 71, roughly 20°N-25°S and west of 175°W) is about 250 thousand tons, comparable to that of the eastern Pacific stock (Fig. 4). There are three major types of fishing gears used in yellowfin fisheries in this area: longlining, purse seining, and the various artisanal methods. Japan, U.S., Philippines and Indonesia are the major fishing countries.

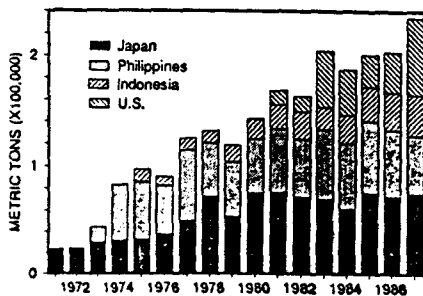


Figure 4. Yellowfin tuna catch in metric tons by major fishing countries in the western Pacific (FAO Area 71).

Longlining is still an important traditional fishery for Japan, but the relative importance, in terms of catch, between the Japanese longline and Japanese purse seine fisheries has been reversed. Since 1983, the purse seine catch has exceeded that of the longline catch for most of the years. As mentioned earlier, purse seining in the western Pacific heavily depends on log-associated schools.

The U.S. catch, shown in Figure 4, is taken by the U.S. purse seine fishery, and is the highest among the purse seining countries. The U.S. became a major fishing country in the western Pacific after the 1983 influx of U.S. purse seiners from the eastern Pacific.

Other fisheries also contribute substantially to total production from the area. Although not shown, Korean and Taiwanese purse seine catches of yellowfin have been increasing; their combined catch of yellowfin was about 20 thousand

tons in 1988 (SPC Regional Tuna Bull.) Artisanal/coastal fisheries also produce substantial yellowfin catches, especially in the Philippines and Indonesia. These fisheries depend on payaos (fish aggregating devices). Their major fishing gears are, in the Philippines, purse seine, ringnet (small scale purse seine) and handline; and, in Indonesia, purse seine, baitboat, gillnet, and handline.

Status of the western Pacific yellowfin stock remains mostly unknown, mainly due to lack of a common database covering the entirety of the fisheries. However, there is indication from the catch per unit of effort (CPUE) trend of yellowfin in the Japanese longline fishery that, by the mid-1980s, a moderate decline of the stock to about one half of that at the beginning of the fishery had occurred (Fig. 5). There is some variation in the declining trend of CPUE after 1976, but this cannot be simply attributed to the rapidly

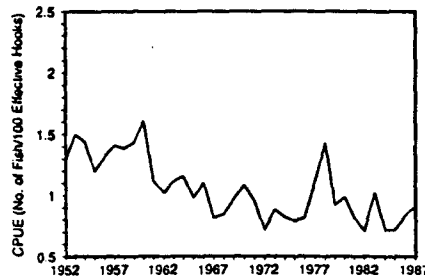


Figure 5. Trend of CPUE for yellowfin tuna caught by the Japanese longline fishery in the western Pacific.

developing catches by purse seiners; the decline started before those surface catches had become significant. Moreover, the longline CPUE appears not to show further decline after 1983, when the purse seine catch became substantial.

At present, there is no reliable CPUE series for the western Pacific surface purse seine fisheries to reflect changes in stock abundance; the CPUE based on nominal fishing effort by the Japanese boats shows no consistent increasing or decreasing trend. In this regard there is evidence that the CPUE derived from fishing on free swimming schools is a valid indicator of the CPUE for the entire purse seining operations. In the eastern Pacific and eastern Atlantic purse seine fisheries, it has been noted that environmental conditions, especially depth of the thermocline, have a large influence on fishing efficiency of the purse seine fleet. Plots of the Southern Oscillation Index (which monitors the conditions associated with El Nino events) against CPUE of the Japanese purse seine fishery suggest an inverse correlation (Fig. 6). This indicates the importance of accounting for environmental conditions in developing a reliable CPUE index from the surface fishery.

The Philippine fishery is one of the most important of the component fisheries that must be considered in assessing the western Pacific stock. In this regard, the

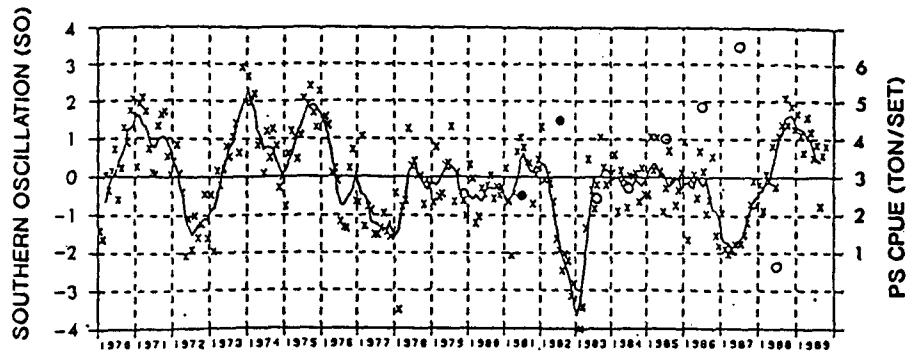


Figure 6. Comparison of the Southern Oscillation Index and yellowfin CPUE for free swimming schools taken by the Japanese purse seine fishery. Open and solid circles denote the CPUE of fish above 10 kg and 20 kg, respectively. Cross signs show standard deviations of the observed Southern Oscillation Index (the smoothed values are shown by the curve).

Indo-Pacific Tuna Development and Management Programme (IPTP), under United Nations assistance, has been collecting the basic fisheries statistics for more than 10 years. Detailed catch/effort and size measurement data are available from 1980 onwards. Preliminary analyses of the Philippine data show several aspects of interest concerning the yellowfin stock in this region. Very small yellowfin, ranging from 20 to 30 cm, are dominant in the coastal ringnet fishery, while the handline fishery takes both small fish (40-60 cm) and very large fish (130-160 cm). There is a general lack of middle sized fish (60-120 cm) which, in fact, are taken in the offshore, eastern part of the western Pacific by the industrial purse seine and longline fisheries. This and recent tagging experiments, by Tohoku National Fisheries Research Institute, indicate that the yellowfin in the western Pacific probably belong to a single stock. Fish tagged and released in far offshore areas were recovered in Philippine coastal areas.

Fishing performance of the major yellowfin fisheries of the western Pacific has been fairly good to date; catches have been sustained in recent years. Various circumstantial information indicates that the stock is probably healthy.

Eastern Atlantic

The yellowfin fisheries in the eastern Atlantic followed a development similar to that of the eastern Pacific. However, the surface fisheries here were preceded by a longline fishery that had become substantial by the mid 1960s. The MSY estimated in the early 1970s (about 60 thousand tons) was nearly doubled in the late 1970s (Fig. 7), due mainly to expansion of the fishing grounds to offshore areas. As exploitation increased, there began a shift of eastern Atlantic purse seine fleets to the western Indian Ocean. By 1984, this shift was significant and resulted in a marked

reduction of eastern Atlantic fishing effort. The resulting catch fell to half that of previous years (Fig. 7). Both catch and CPUE have increased again since the mid 1980s, and the catch is now close to the present estimate of MSY (120 thousand tons).

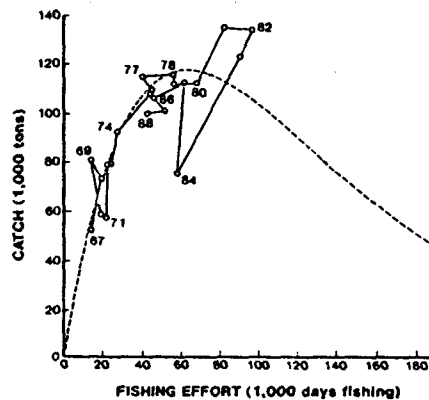


Figure 7. Relationship between fishing effort and catch for the yellowfin fishery in the eastern Atlantic (ICCAT SCRS Report for 1989).

Recent intensive studies under the Yellowfin Year Programme of the International Commission for the Conservation of Atlantic Tunas have demonstrated that the surplus production model does predict the changes in the catch and fishing effort relationship. However, it was also noted that the environment has important influences on the catchability experienced by purse seine boats, hence on observed CPUE.

Western Indian Ocean

The purse seine fishery started quite recently, in 1983, in the western Indian Ocean. Before that, the longline fishery was dominant (Fig. 8). As mentioned previously, the purse seine fishery was recently initiated by the French and Spanish boats from the eastern Atlantic, which moved to the western Indian Ocean in search of more productive fishing grounds. The Indian Ocean purse seine fishery that developed has been very successful. Large amounts of higher valued, big yellowfin tuna are taken.

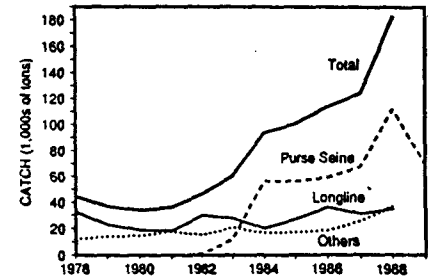


Figure 8. Yellowfin catch in metric tons by major fishing gears in the Indian Ocean.

Like in the western Pacific case, purse seine fishing here appears to so far have had no appreciable adverse effect on the longline fishery, as of 1988. However, both catch and CPUE for the purse seine fishery showed a significant decrease in 1989, despite a smaller fishing effort compared with the previous year. Preliminary analysis suggests that the 1989 anomaly (drop) in the purse seine catch was related to an environment-induced effect and is not a manifestation of overfishing.

Some Comments on the Future

In general, one can note that the condition of yellowfin tuna stocks of the world is good. There is no yellowfin stock for which presently there is serious concern with respect to overfishing. However, lack of a management body with practical binding force in the western Pacific and western Indian Ocean is one serious hazard of the near future. Specifically, the continued increase in the demand for tunas, hitherto absorbed by increased catches from purse seine fishing and the finding of new fishing grounds, will eventually create problems. Previous development of the fisheries resulted in diffusion of fishing effort by transfer of purse seine fleets from the eastern Pacific to the western Pacific and from the eastern Atlantic to the western Indian Ocean. It is obvious that if such uncontrolled increases of regional fishing effort were to continue, especially for the western Pacific yellowfin stock and

to a lesser degree for the western Indian Ocean yellowfin stock, there would inevitably be a destructive impact upon the stocks. It is an open question of how much further the catches of yellowfin from the surface fisheries can be increased and still be sustainable. Additionally, it must be realized that the outlook for finding new fishing grounds elsewhere is dim. At present, only the tuna stocks of the Atlantic, with exception of its circumpolar southern bluefin stock, are under a practical management scheme for effectively dealing with such problems.

The present unsatisfactory situation in management of the yellowfin stocks was noted more than a quarter century ago, and what needs to be accomplished is clear. Both coastal and distant water fishing nations need to discard self-interests regarding exploitation of the highly migratory species and to initiate discussions regarding their rational conservation. Particular emphasis should be placed on sharing of fishing data. This would be a minimum requirement for continuation of fishing. Establishment of a competent management structure in the western Pacific and western Indian Ocean is urgently needed, in particular. Concerted activities among regional management bodies is desirable, given the high mobility of the tuna fishing fleets.

DOLPHIN MORTALITY IN U.S. TUNA FISHERY DECLINES IN 1990

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The estimated number of dolphins killed in the U.S. eastern tropical Pacific tuna purse seine fishery in 1990 was 5,083, down 60% from the estimated 1989 kill of 12,643, according to data collected by on-board observers from the National Marine Fisheries Service (NMFS). The 1990 dolphin kill was well below

the allowable annual quota of 20,500, and was the lowest recorded for the U.S. fleet since coming under dolphin regulations in 1972.

The major reasons for the low dolphin kill in 1990 were the reduction in the size of the U.S. fleet in the eastern Pacific and an increase in the fishing effort by the remaining fleet on non-dolphin-associated tuna, both consequences of the U.S. tuna canners' decision in April 1990 to purchase only "dolphin safe" tuna.

In 1990, NMFS observers were on-board 92 U.S. tuna purse seiner fishing trips, and monitored 1,845 sets on dolphins. Forty-four of those trips were observed entirely under the direction of the NMFS while the remainder (48 trips) were observed in cooperation with the Inter-American Tropical Tuna Commission.

The observed dolphin kill-per-set rate in 1990 was 2.8, down 22% from the 1989 rate of 3.6. It was the lowest rate achieved by the U.S. fleet since 1979, when the kill-per-set rate was 2.7 dolphins per set (Figure 9). The dolphin kill-per-ton rate in 1990 was 0.14, down 26% from the 1989 rate of 0.19. This is the lowest per-ton rate on record (Figure 10). The average tuna catch per observed dolphin set in 1990 was 19.1 short tons, virtually the same as in 1989 (Figure 11).

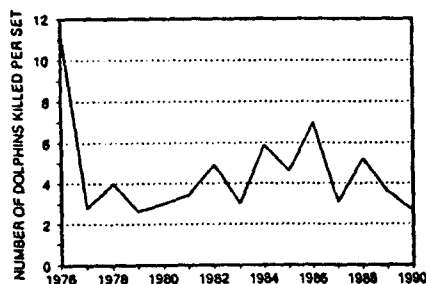


Figure 9. Average number of dolphins killed per set on dolphins for observed U.S. trips, 1976 to 1990.

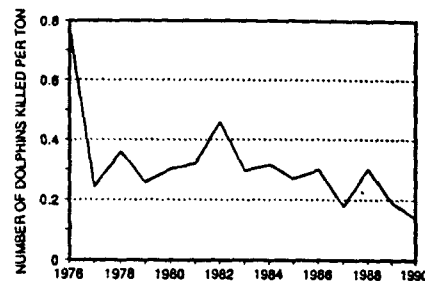


Figure 10. Average number of dolphins killed per ton of tuna caught in dolphin sets for observed U.S. trips, 1976 to 1990.

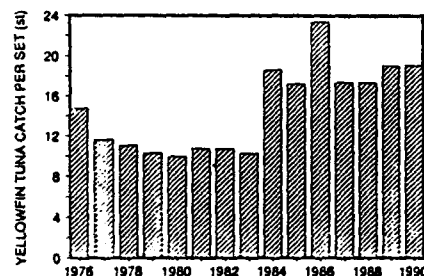


Figure 11. Average tuna catch per set on dolphins for observed U.S. trips, 1976 to 1990.

RECENT DEVELOPMENTS IN TUNA FISHERIES

Editor's note: The following news items, compiled from fishery trade and industry journals, newspapers and NMFS reports, are provided only as a service to our readers. The NMFS does not guarantee their accuracy. (P. Kleiber)

UNITED STATES

San Diego Skipper Captures Golden Porpoise Award—For his record of successful porpoise releases, U.S. tuna purse seiner captain Manuel Jorge of San Diego was recently awarded the 1990 Golden Porpoise Award by the American Tunaboat Association. The Golden Porpoise Award is given to the captain in the U.S. tuna fleet who consistently maintains a high rate of successful porpoise releases during the course of tuna seining opera-