

RECENT STATUS OF THE SOUTHERN BLUEFIN TUNA STOCK

By

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Japanese longline fishery for southern bluefin tuna dates back to 1952. In the early years of exploitation, the longliners fished spawning group (about 6 years old, 130 cm in length, 40 kg in weight, and older) at tropical waters of the Indian Ocean, and then shifted their fishing ground to southern waters where feeding adults and young fish (4 - 6 years old, 95 - 130 cm, 15 - 40 kg) are distributed widely throughout the year. Since 1967 the major fishing grounds of longline fishery have been in the West Wind Drift area south of 40° S latitude. Up to early 1970's most of the distributional area of this species were covered by longline operations. The only known spawning ground is located off northwestern Australia. (Fig. 1).

Catch and fishing effort

The bulk of southern bluefin catch is made by two countries, Japan and Australia. (Fig. 2). Japanese catch was highest, about 1,200,000 fish and 65,000 metric ton, during 1960 and 1961 and then decreased to 450,000-650,000 fish and 22,000-30,000 ton in recent three years. Australian catch (2-5 age fish) by live-bait fishery has shown upward trend and recently reached to 800,000-1,200,000 fish and 8,000-14,000 short ton. Relation between historical catch (in number) and effort (number of hooks) for longline fishery is shown in Fig. 3. Fishing effort increased largely from 1966. After 1970 fishing effort ranges 90 and 100 million of hooks and catch is nearly the same level as that of mid 1960's in which fishing effort was about a half of recent ones. Low hook-rate observed in 1975 was due to the decrease of recruit to the longline fishery for this year, however, hook-rate in 1976 and after is expected to be upward because of recruitment by the strong year class as is shown in Fig. 4.

Status of the stock

Recent catch-per-unit-effort (catch/hook) as a whole longline stock decreased to 20-25 % of the early 1960's and that of spawning stock is assumed to have decreased to about 10-20 % of the initial level. With decrease of large fish, longline operation has been extended to the fishing grounds where younger fish are comprised. (Fig. 1). The average age of first capture was lowered to 5.8 years in 1970. (Fig. 5). Southern bluefin tuna are rather long lived fish and biomass is considered to be maximized at about age of 7. This means that lowering of age of first capture with increasing fishing effort rapidly reduce the level of adult stock as well as productivity. History of Japanese longline fishery from 1958 to 1970 is shown in relation with the isometric curves of yield per recruit and relative stock fecundity. (Fig. 6). Two series of fishing mortality after 1966 were estimated and illustrated. Relative

stock fecundity seems to be decreased to about 10-20 % of the initial level. Although there is no signs of reduction of recruitment judging from the catch of Australian surface fishery up to 1976, further decrease of stock fecundity should be prevented. Since 1971, Japanese longline fishermen have been executing voluntary regulation for the operation in the fishing grounds where younger fish are dominant in order to improve the decreasing age at first capture. The effect of regulation has not yet been observed so much, however, is likely to have kept out the further lowering of age at first capture (Fig. 5). Since the spawning stock is low level careful watch needs to be kept for the status of the recruitment.

Further works needed

Further works for assessment of the whole southern bluefin stock are now carrying out between Japanese and Australian scientists.

The following items are recommended as the further works needed. (FAO Fish.Reports, No. 174, 1975).

- 1) Detailed analysis of tagging records
- 2) Analysis of pattern of occurrence of young for a better understanding of population structure
- 3) Analysis of catchability, q , in order to account for the decreased C/E but fairly steady catch.
- 4) Recompute the parameter of the growth equation
- 5) Examine stock-recruit relationship as soon as more acceptable estimates of both are available etc.

References

- FAO : Report of the special southern bluefin tuna working party. In (Appendix F) FAO Fisheries Reports, No. 174, 29-43. (1975).
Hayasi, S. : Stock assessment of southern bluefin tuna based on information up to September 1973 - its conclusions and problems. Bull. Far Seas Fish. Res. Lab., No. 11, 51-65. (1974).

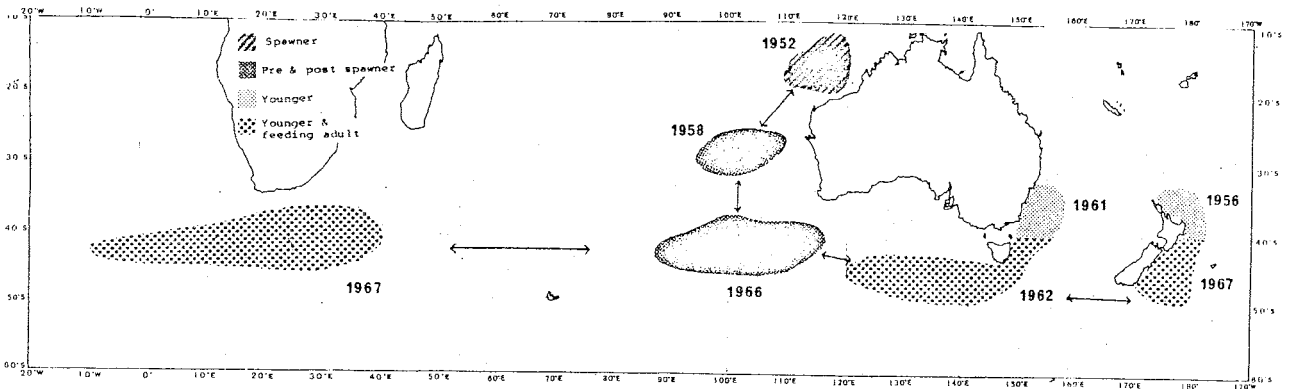


Fig. 1. Location of longline fishing ground. Number in the figure denote the first year of exploitation.

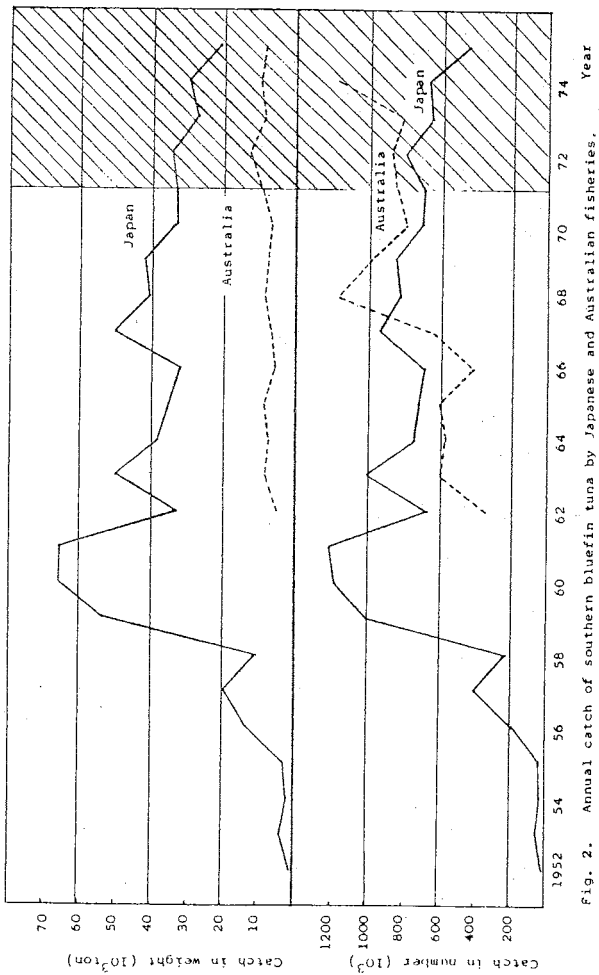


Fig. 2. Annual catch of southern bluefin tuna by Japanese and Australian fisheries.

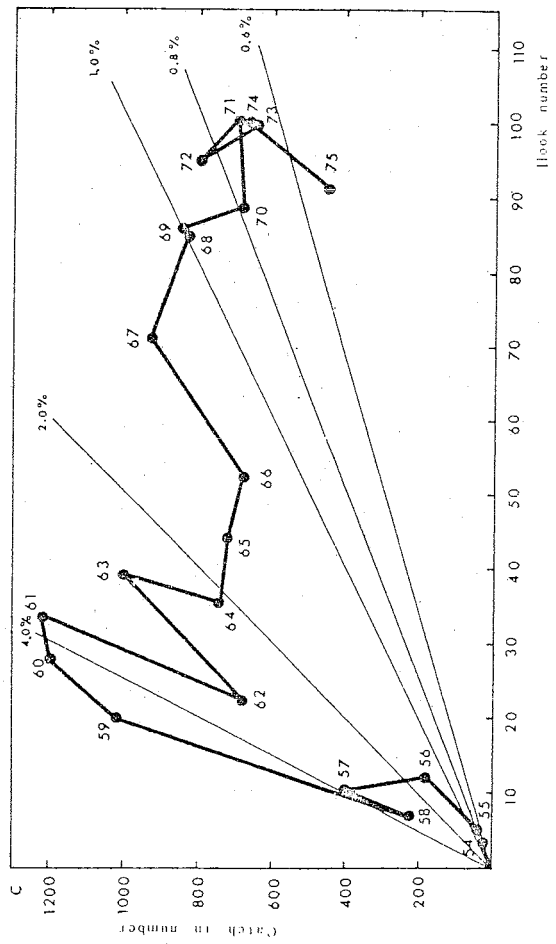


Fig. 3. Annual catch (in thousand of fish) of southern bluefin and hook number (in million) used by Japanese longline fishery. Fine lines denote catch-per-100 hooks.

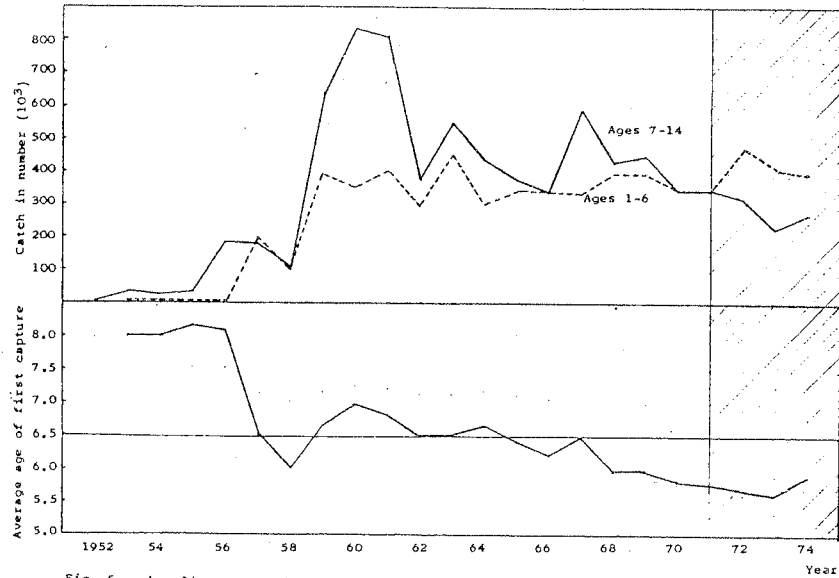


Fig. 5. Longline catch of small (Ages 1-6) and large (Ages 7-14) southern bluefin (upper panel) and average age of first capture (lower panel).

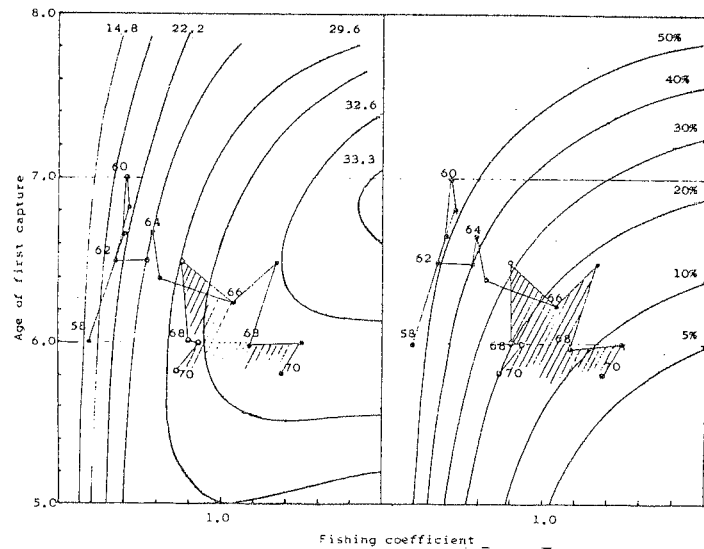


Fig. 6. Isometric curves of yield per recruit in kg (left panel) and relative stock fecundity (right panel) against fishing coefficient and average age of first capture and history of Japanese longliners from 1958 to 1970. Fishing coefficient of open circles are estimated from cohort analysis. Modified Hayasi (1974)

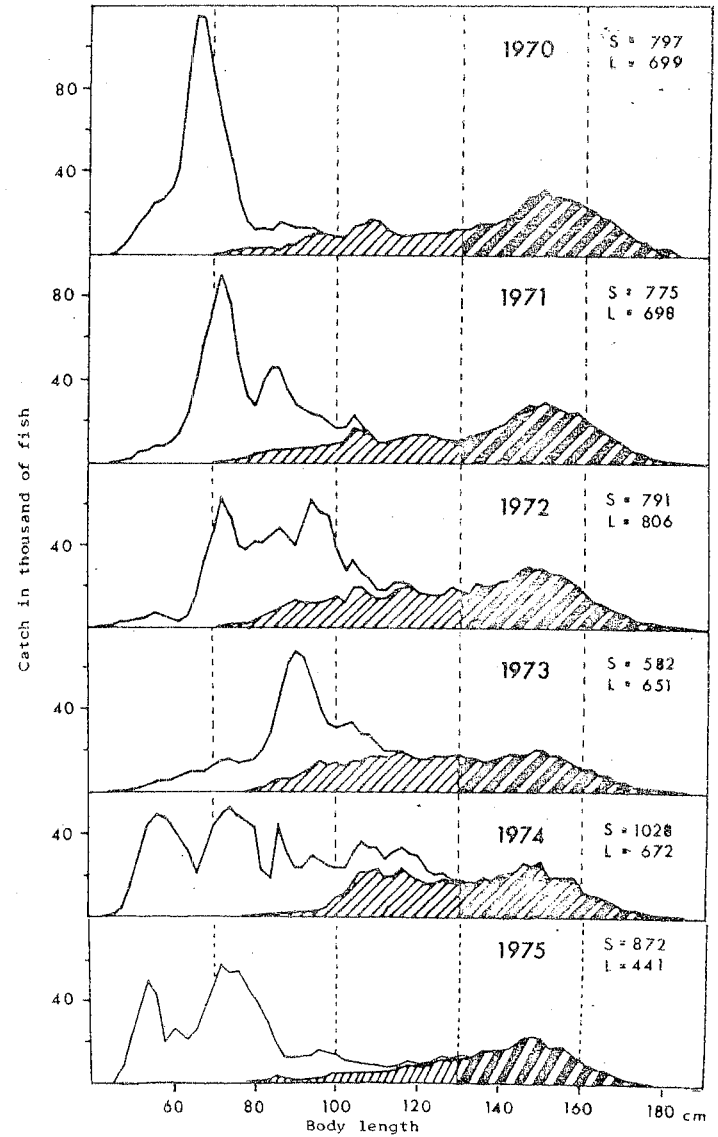


Fig. 4. Length frequency distribution of southern bluefin tuna catch by Japanese (shaded part) and Australian (white part) fisheries. S and L denote catch in thousand of fish by Australia and Japan, respectively.