REVIEW OF AUSTRALIAN TUNA FISHERIES IN THE INDIAN OCEAN

Robins, C. M. and A. E. Caton[1]

Review of national fisheries

The development of commercial tuna fisheries in Australia in the early 1950s was preceded by many years of recreational game angling and small-scale commercial trolling. Initially, domestic commercial operations centred on a pole-and-live-bait fishery off the Pacific Ocean coast of Australia (New South Wales) targeting southern bluefin tuna (*Thunnus maccoyii*) (Figure 1). This fishery included a bycatch of skipjack tuna (*Katsuwonus pelamis*) and, to a lesser extent, yellowfin tuna (*T. albacares*) and albacore (*T. alalunga*). These operations spread south to South Australia and west to Western Australia and expanded into other methods of capture, namely longlining, purse seining and trolling.

Foreign longline fleets, primarily Japanese, were also expanding fishing operations off Australia. They were longlining in the northeast Indian Ocean and in the eastern costal waters in the 1950s and progressively expanded further south. The species targeted were the larger pelagics – yellowfin tuna, southern bluefin tuna, albacore, bigeye tuna (*T. obesus*), broadbill swordfish (*Xiphias gladius*), striped marlin (*Tetrapturus audax*), black marlin (*Makaira indica*) and blue marlin *(M. mazara*). When the Australian Fishing Zone (AFZ – Figure 1) became operative in 1979, these fleets fished under bilateral arrangements with Australia. From 1988 to 1995 a number of Japanese longliners entered into joint-venture arrangements with Australian companies. Under bilateral arrangements, Japanese pelagic longliners continued fishing until the closure of Australian waters to them in November 1997. In 1996, their catches in the Indian Ocean region of the AFZ were around 150 t of bigeye tuna, 50 t of broadbill swordfish, 50 t of albacore, 30 t of yellowfin tuna, and small numbers of marlins and southern bluefin tuna. They had only a few months fishing in 1997 before AFZ access lapsed.

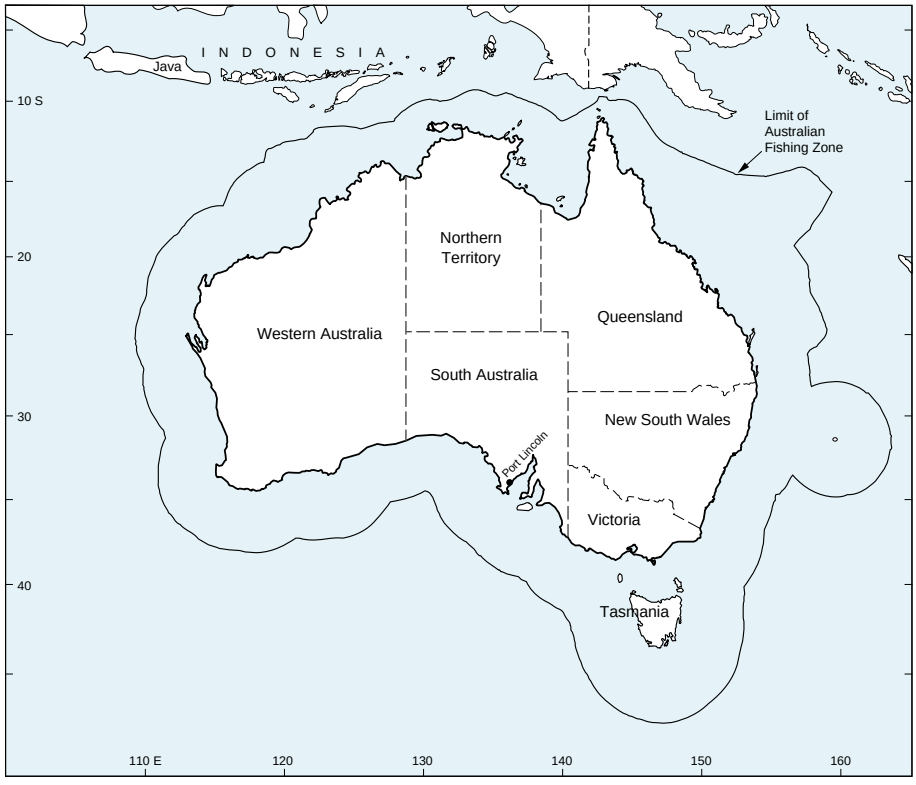

Figure 1: Map of Australia showing Territories and States and the Australian Fishing Zone (AFZ).

The structure of the domestic fishery for SBT in the western region of Australia (Western Australia and South Australia) changed markedly from the initial pole and purse seine operations. Canning operations based on purse seine catches were no longer economically viable following major reduction of the catch by the introduction of quotas. Several vessels turned to pole fishing for the fresh-chilled Japanese export market. Trolling and pole-and-line operations for southern bluefin tuna in Western Australia gradually decreased until it ceased in 1991. Experimental cage rearing of southern bluefin tuna was conducted in South Australia in 1991 and proved a success. In 1997, over half of the Australian quota for this species was utilised by tuna farms (around 2,500 t). Similar numbers were caught by pole for the fresh-chilled Japanese market (around 2,000 t).

Domestic longline operations, airfreighting fresh tuna to sashimi markets in Japan, were developed off WA in 1994 in response to good tuna export prices. There are 125 permits for this fishery, although few are currently active. The major species are yellowfin and bigeye tunas, and broadbill swordfish, with some albacore, marlin and shark also caught. In 1997, catches rose to around 300 t of yellowfin tuna, 60 t of bigeye tuna and 40 t of broadbill swordfish, from much lower catches in 1996 of 100, 25 and 22 t, respectively.

There are minor catches of tunas and tuna-like species using other methods of capture. In particular, fishers using trolling

[1] Bureau of Resource Sciences, Canberra, Australia

and handline gear target Spanish and blue mackerel (*Scomberomorus* species; i.e. seerfishes), but there are also landings from gillnets, droplining, purse seines and trawling operations. The 1997 catch of these species was almost 800 t.

There is a significant recreational fishing component in the western waters of Australia. Game fishing operations have gained in popularity in recent years with the growth in tourism. As far as pelagic species are concerned, recreational effort targets primarily Spanish mackerel, yellowfin tuna, wahoo (*Acanthocybium solandri*) and billfish, but most other pelagic species are occasionally caught.

Information on Australian Commonwealth managed fisheries can be obtained from:

Caton, A.E., McLoughlin, K. and Staples, D (ed) (1997) *Fishery Status Reports 1997*. Bureau of Resource Sciences, Canberra.

A general overview of important Australian fisheries is provided in:

Kailola, P. J., Williams, M.J., Stewart, P.C., Reichelt, R.E., McNee, A. and Grieve, C. (1993) *Australian Fisheries Resources*. Bureau of Resource Sciences and the Fisheries Research and Development Corporation, Canberra.

Progress made in research

There are a number of research organisations conducting research on tuna and tuna-like species in the Indian Ocean region of the Australian Fishing Zone (AFZ). These include the Commonwealth Scientific Research and Industrial Organisation (CSIRO), the Australian Institute of Marine Science (AIMS), the Bureau of Resource Sciences (BRS) and Fisheries Western Australia (Fisheries WA).

The Pelagic Ecosystems research group, within the CSIRO Division of Marine Research, aims to develop a quantitative and predictive understanding of the ecological, environmental and biological processes determining the temporal and spatial variation in the abundance of large pelagic fish resources. Current research projects include: the 'SeaWifs' project that aims to develop real-time methods to predict the distribution of tuna to improve both fishing operations and management; an observer program to monitor seabird bycatch in the domestic longline fishery; preliminary assessment of the bigeye and swordfish resources in the western AFZ and a genetic study into the structure of bigeye and swordfish that aims to determine the extent of genetic heterogeneity among samples collected from throughout the Indian Ocean.

Reports that have been published are:

A compilation of information on the billfish resources and fisheries that occur off western Australia (Campbell *et al*, 1998), and

A guide to the Indo-Pacific billfish to enable commercial and recreational fishers to identify species (,).

CSIRO also has a substantial research program on the biology, ecology and population dynamics of southern bluefin tuna. The focus is to improve the stock assessments and scientific basis for managing this resource. Current research projects include: direct aging using otoliths; estimating growth rates from tagging and aging studies; reproductive biology of southern bluefin tuna on the spawning ground; catch monitoring with Indonesia, Taiwan and Mauritius; recruitment monitoring using aerial surveys, conventional tagging and archival tagging; statistical modelling of catch-per-unit-effort data; spatial dynamics; population modelling; management strategy evaluation; and bycatch estimates.

AIMS is investigating relationships between the distribution and abundance of pelagic species and oceanographic conditions. This study involves comparisons of historical catch rates reported by Japan's longline fleet in the Coral Sea and the Indian Ocean. AIMS is also studying the ecology of fish larvae, including tuna and billfish, in the northeast Indian Ocean. The study involves stratified sampling using light traps, set at varying depths along a transect extending offshore from the coast.

BRS is conducting broad research that has relevance to the IOTC. The marine environment project is compiling and interpreting the effects of fishing on the environment generally; a study on the foreign longline data quality and relevance to stock assessment is comparing logbook and observer data; and bycatch research on assessments of the vulnerability of non-target species and the amount of bycatch taken in longline fisheries. In 1996 BRS, in collaboration with AIMS, produced a report summarising fisheries, research and stock status for the western Australian and Indian Ocean tuna and billfish fisheries. The report is largely based on Indo-Pacific Tuna Programme data (Larcombe *et al*, 1997).

Fisheries WA is the state fishery organisation responsible for the management of Western Australia's fish, marine and aquatic resources and pearling industry. Their Fisheries Research Division has projects on the biology and stock assessment of many commercial fishery species including mackerel.

For more information see:

Larcombe, J.W.P., Caton, A.E., Williams, D.McB. and Speare, P. J. (1997) *Western Tuna and Billfish Fisheries Research.* Bureau of Resource Sciences, Canberra.

Campbell, R., Tuck, G., Pepperell, J. and Larcombe J. (1998) Synopsis on the billfish stocks and fisheries within the western Australian Fishing Zone and the Indian Ocean. ….

Guide to the Indo-Pacific Billfish.

Progress made in data collection

Offshore constitutional settlement (OCS) arrangements have been developing since the mid-80s between the Commonwealth government and those of individual States and Territories. There are specific assignments of responsibility for management of fisheries for tunas and tuna-like species, and hence for collection of catch, effort and catch composition statistics from them. The Commonwealth has responsibility for statistics relating to most fishing activities for the larger tunas and for billfishes, whereas the States have responsibilities for collections relating to fisheries for the small tunas and several pelagic and neritic (coastal) species. An exception is the responsibility for recreational activities, which rests with the States.

All States now have comprehensive statistical collections. In some cases, however, these are limited to aggregated monthly returns.

Currently, there is no comprehensive collection of recreational fishery statistics for tuna and billfish. There is no licensing system and no Australia-wide framework for imposing mandatory logbook reporting. Most catch estimates have been based on broad estimates of boat numbers, sporadic sampling of catch, and face-to-face or interview surveys. Angling club records are also available but their nature does not always facilitate development of representative catch estimates. Progress has been made on developing a computer interface for transfer of recreational fishery data among the various State agencies. This should be of major assistance in progressing the current efforts to quantify recreational catch levels. A national Recreational Fisheries Survey is also in the design phase.

The Commonwealth government monitors the domestic surface (pole and purse seine) fisheries for southern bluefin tuna and skipjack, and the more recently developed domestic longline fishery .The foreign (Japanese) and joint venture (Australia-Japan) pelagic longline fisheries of the AFZ were also its responsibility. These are the main Australian fisheries involving pelagic species that range beyond the AFZ and which are fished by other countries or entities.

To date assessment of the quality and coverage of domestic logbooks has only been practical for the southern bluefin tuna component, where strict monitoring of a system of individual transferable quotas has occurred since the early 1980s. For this reason, these quota data are used as the authoritative southern bluefin tuna statistics base. A system of receiver permits supported by a monitoring program has been established for the southern region. This should facilitate validation of logbook reported catches of species other than southern bluefin tuna.

Until the closure of the AFZ to foreign vessels in 1997, the observer program, together with pre- and post- fishing inspections in ports, have provided the basis for calibrating the foreign and joint venture longliner logbook data. The observer program also gathered operational data and ancillary biological measurements and samples. There is currently no observer program on domestic tuna vessels. Instead, personal contact with fishers is maintained in ports by the field liaison staff of the logbook programs.

More detailed information is provided in:

Caton, A.E. (1998) Catch, effort and catch composition data collection in Australian tuna and billfish fisheries. Working Paper, 7th Exp. Cons. on Indian Ocean Tuna.