PROGRESS MADE IN RESEARCH AND DATA COLLECTION IN AUSTRALIA

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 (Pepperell and Grewe, 1998).

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 age determination using otoliths; estimating growth rates from tagging and age determination 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.

CSIRO is conducting research on operational regimes and efficiency of Western Australian longlining operations with the intention of further developing a bigeye tuna and broadbill swordfish fishery. This project considered longline fishing techniques and effort being deployed off Western Australia. Hook monitors, which recorded the effective fishing depths and associated water temperatures of the longline hooks, were deployed from vessels fishing off Western Australia (Australian), Tasmania (Japanese and Australian) and off Bali (Indonesian). Evidence seems to suggest that the most effective fishing for bigeye tuna was in the deeper tropical waters where the water temperature was between 10 and 18 degrees centigrade. A distinct lunar periodicity was noted in the catches of bigeye tuna and broadbill swordfish with catches increasing significantly with the full moon. This was not so obvious with yellowfin tuna.

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 pearlirig 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. A., G.N. Tuck, J.G. Pepperell and J.W.P. Larcombe (1998) Synopsis on the billfish stocks and fisheries within the western AFZ and the Indian Ocean. AFMA, Canberra, 123 pp.(in press)

Pepperell, J.G. and P. Grewe (1998). A Field Guide to the Indo-Pacific Billfishes. AFMA, Canberra, 19 pp. (in press)

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 collection 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