

ELEVENTH MEETING OF THE
STANDING COMMITTEE ON TUNA AND BILLFISH

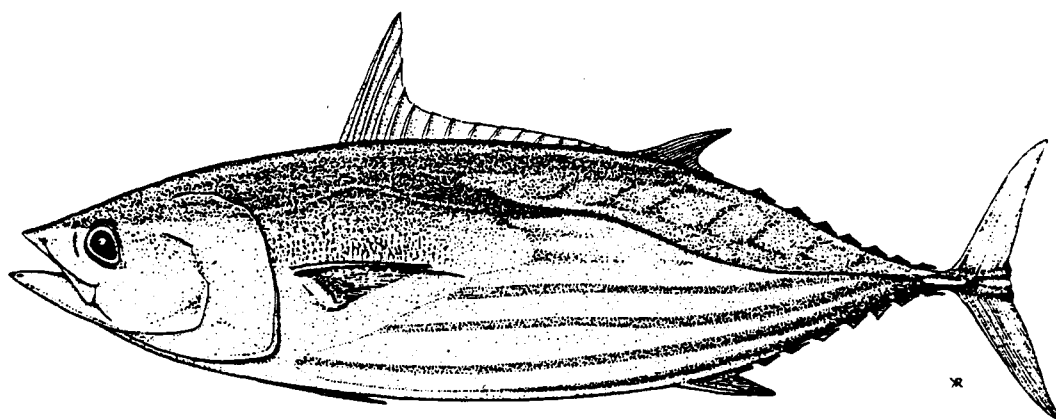
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WORKING PAPER 3

ISSUES CONCERNING THE STATISTICS WORKING GROUP OF THE
STANDING COMMITTEE ON TUNA AND BILLFISH

Timothy A. Lawson



Oceanic Fisheries Programme
Secretariat of the Pacific Community
Noumea, New Caledonia

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INTRODUCTION

Under an agenda item on the future of the Standing Committee on Tuna and Billfish (SCTB) introduced at the ninth meeting of the SCTB, held in July 1996 in Noumea, New Caledonia (South Pacific Commission 1996a), participants at the tenth meeting of the SCTB, held in June 1997 in Nadi, Fiji, agreed to revise the terms of reference of SCTB, and to form the Statistics Working Group and species research groups (South Pacific Commission 1997). The introduction of the agenda item concerning the future of SCTB occurred in response to issues identified at the Technical Consultation on the Collection and Exchange of Fisheries Data, Tuna Research and Stock Assessment (South Pacific Commission 1996b), which was held a week prior to SCTB9.

The Technical Consultation was held in response to a recommendation of the first Multilateral High-Level Conference on the Conservation and Management of Highly Migratory Tuna Stocks of the Western and Central Pacific Ocean (MHLC), which was held in December 1994 in Honiara, Solomon Islands (Forum Fisheries Agency 1995). The deliberations of SCTB10 were further influenced by the second MHLC, held a week prior to SCTB10 in Majuro, Marshall Islands (Forum Fisheries Agency 1997).

The second MHLC indicated a preference for utilising existing structures in establishing a regional management arrangement, including the associated scientific arrangements. Other factors relevant to the future of SCTB which were considered by SCTB10 included (i) a decision by the 1996 SPC Conference that future reviews of SPC programmes should occur no more frequently than once every three years, which made unnecessary the former SCTB function of reviewing the SPC Oceanic Fisheries Programme (OFP); (ii) concern that non-SPC members were not full participants in SCTB meetings; and (iii) the need to streamline the activities of former working groups, such as the Western Pacific Yellowfin Research (WPYR) Group and the South Pacific Albacore (SPAR) Group.

The objective of the SCTB Statistics Working Group is expressed in the first of the five revised SCTB terms of reference, i.e. to coordinate fisheries data collection, compilation and dissemination according to agreed principles and procedures. It is further stated that the SWG will compile, evaluate and disseminate fisheries data, particularly in the form required by the species research groups.

Participants at the eleventh meeting of SCTB will consider the adoption of principles and procedures for coordinating data collection, compilation and dissemination. This document has been prepared by the Chairman of the SWG in order to provide background information and to present options for consideration by the SWG.

BACKGROUND

Two recent initiatives concerned with principles and procedures for data collection, compilation and dissemination are the United Nations (UN) Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks, which concluded in August 1995, and the Technical Consultation on the Collection and Exchange of Fisheries Data, Tuna Research and Stock Assessment, held in July 1996.

UN Conference on Straddling Fish Stocks and Highly Migratory Fish Stocks

The sections of the UN Implementing Agreement which are relevant to the SWG are given in Appendix 1. It should be noted that the first of the revised SCTB Terms of Reference, i.e. to coordinate fisheries data collection, compilation and dissemination according to agreed principles and procedures, is consistent with Articles 5 (General principles) and 10 (Functions of subregional and regional fisheries management organizations and arrangements) of the Implementing Agreement.

Annex I of the Implementing Agreement (Standard Requirements for the Collection and Sharing of Data) is referred to in several Articles in regard to the data which should be collected and exchanged. The Annex, which is given in full in Appendix 2 of this document, covers general principles; principles of data collection,

compilation and exchange; basic fishery data; vessel data and information; reporting; data verification; and data exchange. The following summarises certain statements in the Annex which are particularly relevant to the SWG:

- Flag states are responsible for the collection of data (Article 2), in areas under national jurisdiction and on the high seas (Article 1). Flag states shall ensure that vessels send catch and effort data to its national fisheries administration and, where agreed, to the relevant subregional or regional fisheries management organisation or arrangement, at sufficiently frequent intervals (Article 5).
- The data should be collected on an operational level (i.e. longline and purse-seine set, pole-and-line school fished, troll day fished) (Article 2). These data include catch and effort data, nominal catches of target and non-target species, discards, effort, and time and location (Article 3). Other data that should be collected, where appropriate, include, *inter alia*, the composition of the catch according to length, weight and sex, and other biological data (Article 3), and vessel data and information (Article 4).
- The data should be collected and made available to the relevant subregional or regional fisheries management organisation or arrangement in sufficient detail to facilitate effective stock assessment (Article 3). Data should be provided to a subregional or regional fisheries management organisation or arrangement in an agreed format and in a timely manner (Article 2). States should agree on the specification of the data and the format in which they are to be provided to a subregional or regional fisheries management or arrangement, in accordance with Annex I (Article 2).
- Data collected by flag states must be shared with other flag states and relevant coastal states through appropriate subregional or regional fisheries management organisations or arrangements. Such organisations or arrangements shall compile data and make them available in a timely manner and in an agreed format to all interested states under the terms and conditions established by the organisation or arrangement, while maintaining confidentiality on non-aggregated data. (Article 7)

It is of interest to note the comments made by the Coordinating Working Party on Fishery Statistics (CWP) regarding Annex I (Anon. 1995). CWP is composed of experts nominated by intergovernmental organisations which have a competence in fishery statistics. In the report of the sixteenth session of the CWP, we note that:

CWP stressed that the standards in Annex I of the Draft Agreement should be considered as the minimum standards for stock assessment and to support management objectives. It was recognised that, for particular fisheries, additional standards might apply.

CWP recognised that the collection of certain types of data listed in Annex I, such as data on discards and by-catch, are not being undertaken by the majority of flag States at present. Nevertheless, CWP considered that all of the types of data listed in Annex I were necessary for stock assessment, and that flag States which do not already collect the types of data listed in Annex I should be encouraged to do so in the future.

CWP recognised that assessments must apply to the biological unity of fish stocks. CWP therefore considered that the minimum standards in Annex I should apply over the geographic range of fish stocks, whether it be within areas of national sovereignty or in international waters.

Technical Consultation on the Collection and Exchange of Fisheries Data, Tuna Research and Stock Assessment

Principles for data collection and compilation for western and central Pacific Ocean (WCPO) tuna fisheries were considered at the Technical Consultation. The recommendations from the Technical Consultation in this regard are given below:

In recognition of the need to progress the development of scientific support for future conservation and management of highly migratory species in the WCPO, the Consultation affirmed its support for:

- Collection by flag states of catch (target and non-target species), effort and other data at a vessel operation level, i.e. logbook data;*
- Provision of such data for both waters under national jurisdiction and the high seas at a degree of detail and at a level of resolution to be agreed upon to enable effective stock assessment; and*
- Cooperation in scientific programmes to generate other data required for effective stock assessment.*

Regarding the future data needs of WCPO fisheries, the consultation recommended that any future cooperative scientific data collection in the WCPO be consistent with the guidelines and requirements of the UN Implementing Agreement, especially as set out in Annex I of that agreement, and be established pursuant to a regional fisheries management organisation or arrangement, taking into account the nature of the stocks and the fisheries involved.

Regarding the specification of agreed minimum requirements of any future scientific data collection programme, the Consultation also recommended that the following elements be included in any such future programme:

- (1) Flag states should compile annual catch statistics by species, covering all activities for each fleet.*
- (2) Flag states fishing for tuna in the WCPO should collect catch, effort and other data at the fishing operation level (i.e. logbook data in a format to be agreed upon) for all commercial tuna fishing activity, regardless of whether such activity takes place in waters under flag state jurisdiction, other national jurisdiction or on the high seas. The logbook data should be validated with landings or other information.*
- (3) Annual catch statistics should be made available as soon as possible to all parties involved in the arrangement. Agreement should be reached on how to consolidate logbook and other data for all fleets in a confidential database. Access to such data should be under conditions determined by international agreement.*
- (4) A data repository system for length-frequency and associated data should be established so that such data can be used under agreed conditions for stock assessment and other tuna research projects. A coordinated sampling plan for all major species should be developed and implemented through the cooperation of the parties involved in the arrangement.*
- (5) A scientific observer programme, based on a regionally coordinated sampling design, should be developed and implemented through an agreement among the parties involved in the arrangement. Observers should collect data on fishing operations, including bycatch and discards; they should also conduct biological sampling of both the target and non-target catch, and collect other operational data as appropriate.*
- (6) All parties involved in the arrangement should cooperate in developing and implementing scientific research programmes of relevance to stock assessment of target and non-target species caught by tuna fisheries in the WCPO.*

Key elements in the above recommendations include flag state responsibility for data collection; the compilation of catch, effort and other data at a level of resolution to enable effective stock assessment; regionally coordinated collection and compilation of length-frequency and associated data; and regionally coordinated collection and compilation of observer data, including bycatch and discards.

At this point in time, the SCTB is not formally related to the MHLC. Nevertheless, the above discussion of the Implementing Agreement and the Technical Consultation provide useful guidelines for the principles and procedures for data collection, compilation and dissemination, which are to be established by the SWG.

COORDINATION OF FISHERIES DATA COLLECTION

Fisheries data collection represents the first step in the process leading to data compilation and dissemination. Catch and effort data are collected on logsheets, which are completed onboard the fishing vessel or transcribed by the fishing company from the captain's log. Landings data are collected from the vessel's agent in the port of transshipment, from the stevedoring company, or from the cannery. Species composition and length data are collected through port sampling programmes, and these two and several other types of data are collected through observer programmes. Factors which can affect fisheries data collection and which could be considered by the SWG include the data collection forms and the coverage rate. For port sampling and observer programmes, for which complete coverage is unnecessary or impractical, the sampling design should be considered.

The issues with respect to the coordination of fisheries data collection by the SWG concern the types of data with which the SWG should be concerned, and the manner in which the SWG should coordinate data collection. The data for which the collection could be coordinated by the SWG are discussed below.

Logsheets data

Logsheets data include information relating to the fishing trip and to each fishing operation. The trip data can include certain fields relating to the vessel (such as the vessel name, country of registration, fishing permit or license number, etc.), to the dates and ports of departure and return, and also to effort (such as the number of hooks between floats for longline sets, etc.). The operational data includes the date and time of the operation, the location, the retained catch of target and non-target species, discards by species, and other information relating to the operation (such as the number of hooks for longline sets, and the school association for purse-seine sets, etc.). Logsheets data are used to estimate annual catches by fleet, for monitoring catch rates by fleet, for the standardisation of catch rates, and for stock assessment based on catch and effort.

The coordination of logsheets data collection by the SWG could be accomplished through (1) periodic reviews of all logsheets in use, in order to ensure that they include a minimum standard of data; (2) periodic reviews of the level of coverage by logsheets data for each of the fleets, in order to ensure that a minimum level of coverage is being achieved; and (3) periodic reviews of the level of accuracy and reliability of the logsheets data, in order to ensure that the logsheets data have been subject to a minimum level of verification.

Landings Data

Landings data consist of information regarding the catch unloaded from the vessel. They usually include information concerning the vessel (name, flag, and registration number), the port of unloading, the vessel's agent in the port of unloading, the dates of unloading, and the amounts unloaded (in number of fish and metric tonnes for longline and troll, and metric tonnes for pole-and-line and purse seine), by species. Landings data can be used to verify logsheets data. For fleets for which coverage of logsheets data is incomplete, landings data can be used in conjunction with logsheets data, port sampling data and/or observer data to estimate annual catches by the fleet.

The coordination of landings data collection by the SWG could be accomplished through (1) periodic reviews of the relevant landings data collection forms in use, in order to ensure that they include a minimum standard of data; (2) periodic reviews of the level of coverage by landings data for each of the relevant fleets, in order to ensure that a minimum level of coverage is being achieved, and (3) periodic reviews of the level of accuracy and reliability of the landings data, in order to ensure that the landings data have been subject to a minimum level of verification.

The minimum level of coverage will depend on the usage of the landings data. If total catches for a fleet are estimated from landings data, then the coverage rate for landings data should be complete. If total catches for a fleet are not estimated from landings data, then the coverage rate for landings data need only be sufficient to verify a proportion of the catch and effort logsheet data.

Port Sampling Data

Port sampling data includes species composition samples and length samples taken as the catch is unloaded. The species composition samples can be used to verify logsheet data and landings data. The length samples can be used for stock assessment, together with other types of data.

The coordination of port sampling data collection by the SWG could be accomplished through (1) periodic reviews of all port sampling data collection forms in use, in order to ensure that they include a minimum standard of data; (2) periodic reviews of the level of coverage by port sampling species composition data for each of the fleets, in order to ensure that a minimum level of coverage is being achieved; and (3) the establishment of a regional sampling design for length data. The level of coverage of species composition data and the sampling design for length-frequency data should take into account the fact that species composition and length data may also be collected through observer programmes.

Observer Data

Scientific observer data include a wide range of information concerning the vessel, the fishing gear and electronic aids, the crew, vessel activities, operational data in greater detail than reported on logsheets, in particular concerning bycatches and discards, length samples, and other information. Observer data are used to verify logsheet data, to estimate catches of non-target species, to estimate discards, for length-based stock assessment, for standardisation of catch rates, and for other purposes.

The coordination of observer data collection by the SWG could be accomplished through (1) periodic reviews of all observer data collection forms in use, in order to ensure that they include a minimum standard of data; and (2) the establishment of a regional sampling design for the collection of bycatch and discards data and length data. The sampling design should take into account the relationship, if any, between catch rates of bycatch species, discard rates or length frequencies, on the one hand, and, on the other, potential covariates, such as area fished, season, year, vessel nationality, etc. The sampling design should also take into account the fact that length samples may also be collected through port sampling.

SWG Committees

If the approach suggested above is taken by the SWG, committees could be formed to accomplish those tasks which would be difficult for the SWG to address during its regular meetings. For example, the establishment of minimum standards for data collection forms, and the review of data collection forms, would be difficult for the SWG as a whole to address, due to the large number of participants and to time constraints, but these tasks could be accomplished for all types of data by a single committee.

In this regard, it should be noted that the Tuna Fishery Data Collection Forms Committee, which was established by SPC and the Forum Fisheries Agency (FFA), has for several years been involved in the review of data collection forms for catch and effort data, port sampling data, and observer data. Standardised forms were developed by the Forms Committee in collaboration with fisheries scientists from coastal states and fishing nations; these forms are presented in South Pacific Commission and Forum Fisheries Agency (1997).

The SWG may wish to consider adopting the Forms Committee, and hence expanding its membership to interested SCTB participants, in order to provide a mechanism for establishing minimum standards for forms, developing standardised forms, and reviewing data collection forms developed by national agencies and by the Forms Committee. The Forms Committee currently meets on a biannual basis; the next meeting is tentatively scheduled for December 1998.

It should be noted that the development of standardised forms by the SWG would not preclude the use of national forms. The standardised forms would be developed and supported for those fishing nations and coastal states that wish to make use of them. The standardised logsheets developed by the Forms Committee are currently in use by several domestic fleets and by several foreign fleets operating under access agreements, while the standardised port sampling and observer forms are used by several port sampling and observer programmes in the region.

The Forms Committee, if adopted, could also be charged with establishing minimum levels of coverage and reviewing the coverage of logsheet and landings data. In this regard, SCTB11 Working Paper 4, Coverage of Western and Central Pacific Tuna Fisheries by Data Held by the SPC Oceanic Fisheries Programme, is of interest. This document could be expanded to include similar tables developed by national agencies, and then updated on a periodic basis.

Regional sampling designs for port sampling and observer programmes could be developed by one or more individuals nominated by the SWG, or a separate committee could be formed to accomplish these tasks.

COORDINATION OF FISHERIES DATA COMPILATION

Fisheries data compilation is considered here to be the process wherein data are gathered together from national agencies. The compiled data will be those available for dissemination; however, the format in which the data are disseminated may differ from that in which the data are compiled, in order to preserve confidentiality.

The issues with respect to the coordination of fisheries data compilation concern the types of data which should be compiled and the level of resolution at which the data should be compiled. The types of data for which the compilation could be coordinated by the SWG include estimates of annual catches; catch and effort data; and length data. Other types of data, such as data on bycatches and discards, and tagging data, could also be considered.

The coordination of the compilation of data by the SWG could be accomplished through (1) specifying the data items that should be compiled for each type of data and (2) reviewing the data which have been compiled on an annual basis, for each type of data.

Annual catch statistics

Estimates of the annual catch of target species, for each fleet, by statistical area, are used to determine trends in the fishery and for stock assessment. Annual catch statistics for south Pacific albacore have previously been compiled in the South Pacific Albacore Research (SPAR) database, which has been maintained by the OFP. The compilation of tables of annual catch statistics for bigeye, skipjack and yellowfin, and the number of vessels active, has previously been coordinated by the Western Pacific Yellowfin Research (WPYR) Group. The tables cover the entire WPYR area and, for yellowfin, WPYR sub-areas. The WPYR tables of annual statistics were maintained by the United States National Marine Fisheries Service until February 1998, when the task was passed by the Chairman of the WPYR Group to the OFP.

The annual catch statistics to be compiled should satisfy the needs of each of the species research groups, and also the needs of SCTB as a whole, for annual catch estimates. To this end, the annual catch statistics compiled by the SWG could include (1) catch statistics by species, covering an area and sub-areas to be defined by each of the SCTB species research groups, and (2) catch statistics by species covering a broad area of interest to SCTB for statistical purposes, to be defined by the SWG. The data items could include the following:

- The annual catch of albacore (tonnes), by fishing nation and gear type, for the area and possibly sub-areas to be established by the Albacore Research Group.

- The annual catch of bigeye (tonnes), by fishing nation and gear type, for the area and possibly sub-areas to be established by the Bigeye Research Group.
- The annual catch of skipjack (tonnes), by fishing nation and gear type, for the area and possibly sub-areas to be established by the Skipjack Research Group.
- The annual catch of yellowfin (tonnes), by fishing nation and gear type, for the area and sub-areas to be established by the Yellowfin Research Group.
- The annual catch (tonnes) of albacore, bigeye, skipjack and yellowfin, and the number of vessels active, by fishing nation and gear type, for the area of interest to SCTB for statistical purposes.

Annual catch estimates for certain species could possibly also be compiled for the Billfish and Bycatch Research Group.

The "area of interest to SCTB for statistical purposes" should take into account the areas covered by organisations in neighbouring ocean areas. The Inter-American Tropical Tuna Commission compiles statistics for the Pacific Ocean to the east of 150°W. The border of the area covered by the Indian Ocean Tuna Commission (IOTC) is defined by a line extending east from the tip of Java, Indonesia, along 08°S, to 129°E, then south to the north coast of Australia, and by a line extending south from the south coast of Australia along 141°E.

The Southeast Asian Fisheries Development Center (SEAFDEC) collects fisheries statistics from ten member countries: Brunei, Indonesia, Hong Kong, Kampuchea, Malaysia, Philippines, Singapore, Taiwan and Vietnam. The SEAFDEC statistics cover all catches by those fishing nations in FAO area 71. The most recent statistics published by SEAFDEC, for 1994, indicate that, of the ten countries, only Indonesia, Philippines and Taiwan catch albacore, bigeye, skipjack or yellowfin (Southeast Asian Fisheries Development Center 1997). It should be noted that there is a considerable delay in publication of the SEAFDEC statistics.

Figure 1 proposes an area of interest to the SCTB for statistical purposes. The proposed area differs only slightly from the WPYR area. As for the WPYR area, the proposed area is bordered in the east by 150°W, or the limit to the area for which IATTC compiles statistics, and in the west by 120°W, which includes the main tuna fishing areas of Indonesia, Philippines and Taiwan, but which excludes the other countries for which SEAFDEC compiles statistics. The border which runs along 08°S from 120°E to 129°E is the border of the area covered by IOTC; this border is slightly different from the WPYR area. The other minor changes to the WPYR area are the northern and southern borders, which extend to 50°N and 50°S, rather than to 40°N and 40°S. This was done to more completely cover the seasonal skipjack fishery in the northern waters of Japan and to correspond to the southern limit of the SPAR area.

For comparison, the WPYR area, the SPAR area, the SPC Statistical Area, and areas of the Food and Agriculture Organization (FAO) are shown in Figures 2-5 respectively.

At the First Meeting of the Interim Scientific Committee for Tuna and Tuna-Like Species in the North Pacific Ocean (ISC), held in May 1996 in Tokyo, Japan, the area of interest to the ISC was defined as the north Pacific Ocean, although it was noted that the area of interest could extend beyond the north Pacific depending on the species and issues being addressed by the ISC (Anonymous 1996). The ISC has formed a Statistical Working Group, lead by Japan, to address fisheries data collection, format, processing and distribution matters.

An annual review of estimates of annual catches compiled by the SWG could be accomplished as part of the annual meeting of the SWG, which would be similar to the procedure adopted by the former SPAR and WPYR groups.

Catch and effort data

The Technical Consultation affirmed its support for the compilation of catch and effort data at a degree of detail and at a level of resolution to be agreed upon to enable effective stock assessment. During the Technical Consultation, the case was made for compiling catch and effort data at the finest degree of resolution, i.e. logsheet data. The advantages of compiling logsheet data, rather than data grouped by time-area, are as follows:

- Certain analyses, such as the standardisation of catch rates and the development of indices of abundance based on catch rates, require information concerning environmental conditions, vessel and gear characteristics, and the species composition of the set, each of which in most cases are only available from logsheet data.
- Certain analyses, such as spatially disaggregated analyses of tagging data, require catch and effort data grouped at a high level of resolution, often smaller than 1° latitude by 1° longitude, and several grouping schemes are usually tested in the course of the analysis. For such analyses, the compilation of logsheet data is preferred, since logsheet data will allow catch and effort data to be grouped in any size of time-area strata. Logbook data are also essential for verification and editing of tagging data, and for estimating reporting rates.
- Certain analyses, such as length-based age-structured models, work best with standardised effort data, which, in turn, require logsheet data.

It should be noted that the OFP, which will process the data compiled by the SWG, has demonstrated the technical capacity to process large amounts of logsheet data, and the ability to maintain confidentiality of logsheet data. The logsheet data held by the OFP cover a high percentage of the total catch in the SPC Statistical Area, 78 per cent of the total catch during 1995. The percentages by gear type are 52 for longline, 79 for pole-and-line and 83 for purse seine. The proportion that is not covered corresponds primarily to fishing on the high seas.

It is expected that many participants of the SWG will prefer that logsheet data be compiled. However, if certain fishing nations cannot agree at present to provide logsheet data, then the SWG will compile catch and effort data grouped by time-area. The level of resolution should, at a minimum, be 5° latitude by 5° longitude by month. For surface gears, a finer resolution would be appropriate, such as 1° latitude by 1° longitude by month. For purse-seine, the catch and effort data should also be grouped by school association (e.g. log, drifting FAD, anchored FAD, unassociated, etc.).

Length data

The Technical Consultation also supported the compilation of length-frequency data.

The length-frequency data to be compiled by the SWG on a regular basis should cover albacore, bigeye, skipjack and yellowfin, and they should be grouped by gear type. Length-frequency data for billfish and other bycatch species could be compiled as the need arises.

The resolution at which the length-frequency data can be provided will depend on the information which is available to allocate a sample to a particular time-area strata. In some cases the sample can be allocated to the time and location at which the fish were caught, i.e. to the date and time, and the nearest minute of latitude and longitude. In other cases, the time and location at which the fish were caught cannot be identified and only the general time period and area can be assigned to the sample.

For this reason, the SWG may not wish to specify the resolution at which length-frequency data should be compiled. Instead, the SWG could take a more flexible approach and specify a minimum and a maximum level of resolution, together with the recommendation that the data be provided in as fine a resolution as possible. A

flexible approach would allow the maximum amount of information to be provided in the data, and the data could then be used at a level of resolution appropriate to the analysis for which they are required.

For example, the minimum level of resolution could be the number of fish sampled grouped by two cm length interval, year and quarter, and the sub-area specified by the species research group. For purse-seine, the length-frequency data should also be grouped by school association. The maximum resolution could correspond to an individual fishing operation (i.e. longline or purse-seine set or pole-and-line or troll day fished), i.e. the number of fish sampled grouped by one cm size interval, and the time and location at which the fishing operation occurred, to the nearest date and time, and minute of latitude and longitude.

COORDINATION OF FISHERIES DATA DISSEMINATION

Dissemination of fisheries data is required in order to make information concerning trends in annual catches available to those concerned with the fishery, and to provide researchers with the data required for stock assessment and other analyses.

The issues with respect to the coordination of fisheries data dissemination concern the types of data which should be disseminated and the policies for data dissemination.

The data for which the dissemination could be coordinated by the SWG include annual statistics, catch and effort data, length-frequency data, and possibly other types of data.

Coordination of the dissemination of data by the SWG could be accomplished by (1) establishing policies for the dissemination of data and (2) reviewing the instances of the dissemination of data on an annual basis. Information concerning policies of data dissemination are discussed below.

Annual Catch Statistics

Annual catch statistics compiled by the SWG for the Species Research Groups, and for an area of interest to the SCTB for statistical purposes, should be considered as being in the public domain. Dissemination of annual catch estimates could be accomplished through publication in the reports of SCTB meetings, or possibly as a separate document, due to the large number of tables, which would accompany the reports of SCTB meetings.

The annual catch statistics could also be made available on an Internet site, either the SPC site or a new site developed for the SCTB. Once the statistics are finalised, notification of their availability on the Internet would go out to all those SCTB participants with email, and individuals with Internet or email access would not have to wait for printing and mailing.

Annual statistics should also be made available on a request basis, in either hardcopy or various computer formats.

Estimates of annual catches and other information are currently published for each fleet in the Tuna Fishery Yearbook. The Yearbook covers the SPC Statistical Area, while the SWG tables cover the WPYR area for bigeye, skipjack and yellowfin, and the SPAR area for albacore. Nevertheless, much of the information contained in the Yearbook and the SWG tables is exactly the same.

If the SWG compiles statistics for an area of interest to the SCTB, then it may be appropriate to revise the Tuna Fishery Yearbook to cover the SCTB area, rather than the SPC Statistical Area. Such a revision would result in the modification of statistics only for the four distant-water longline and pole-and-line fleets, and thus should be easily accomplished. If the statistics in the SWG tables for the coastal fisheries of Japan and certain unclassified fleets are included in a revised Yearbook, then the Yearbook could be published in place of the SWG tables for the SCTB area. The advantages of using the Yearbook is that (1) in addition to the SWG

tables for the SCTB area, the Yearbook also contains estimates of annual fishing effort and catch rates, and maps of fishing effort and histograms of annual catches, for each fleet; and (2) duplication of work would be avoided.

If the bigeye, skipjack and yellowfin species research groups were to adopt the SCTB area, then the only SWG tables which would not be included in a revised Yearbook would be the two SWG tables for longline and surface catches of albacore, which cover the SPAR area. If these tables were also included in the Yearbook, then the Yearbook would contain all the information contained in the SWG tables. The SWG tables would exist in much the same format as at present, but they would be accompanied by a large amount of additional information.

Catch and Effort Data

Catch data for commercially important tuna species of the Pacific Ocean, covering 1967–1993 and grouped by year and quarter, and 5° quadrangle, for each gear type and all fishing nations combined, were recently published by FAO on a diskette included with Carocci & Majkowski (1996). Hence, catch and effort data at this level of resolution should be considered as being in the public domain. The SWG could make data at this level of resolution, or perhaps slightly finer, i.e. by year and month rather than by year and quarter, available on the Internet.

Dissemination of catch and effort data at a higher level of resolution, whether in regard to the stratification by time, area or fishing nation, should be subject to certain conditions in order to ensure confidentiality and the proper use of the data.

In order to provide a starting point for discussion, the following summarises the conditions concerning the release of catch and effort data that has been applied by the OFP for many years:

- Catch and effort data grouped by time-area (usually 5° longitude by 5° latitude by month) for individual fleets are available for release. Data grouped by time-area are available for release at the discretion of the OFP (except for data for the fleets of Japan and New Zealand, and the purse-seine fleet of Korea, for which data are only released upon receipt of authorisation from those countries).
- On the rare occasions when logsheet catch and effort data (i.e. data that have not been grouped) are requested (usually by a consultant contracted by the source of the data), the logsheet data are released only upon receipt of authorisation from the source of the data.
- Catch and effort data grouped by time-area are released for research purposes only. The person requesting the data is required to provide a brief description of the research project. The data are released only for use in the specified research project; data are not released for general usage. The person requesting the data is required to destroy the data upon completion of the research project.
- Catch and effort data grouped by time-area are released only to persons known by staff of the OFP, or referred by persons known to staff of the OFP. The person requesting the data is required to specify the names of any other persons, such as research assistants, who will have access to the data.
- The person requesting the data is required to agree to provide a final report of the research project, either directly to the sources of the data or to the OFP for subsequent forwarding to the sources of the data.

It should be noted that the OFP does not distribute catch and effort data to all sources of the data on a regular basis. Past experience has shown that such an exercise is time-consuming and not particularly useful, since many recipients never actually use or even examine the data. Releasing catch and effort data in response to individual requests has been found to be the most efficient practice.

In regard to data compiled by the SWG, the SWG may wish to consider variations on the above:

- Those sources of data which so desired could authorise the SWG Chairman to release catch and effort data grouped by 5° longitude by 5° latitude by month, for all fleets, at his discretion, in accordance with the other conditions agreed upon by the SWG.
- Those sources of data which so desired could authorise the SWG Chairman to release data for surface fleets grouped by 1° longitude by 1° latitude by month, at his discretion, in accordance with the other conditions agreed upon by the SWG.
- Catch and effort data could be released to certain individuals or agencies for general usage, rather than just for specific research projects, upon receipt of authorisation from the source of the data.
- The provision of a report of the research project could be made a preference, rather than a condition for the release of data.

Once the policy for the dissemination of catch and effort data has been agreed by the SWG, coordination of the dissemination of catch and effort data will involve a review of the instances of the dissemination of catch and effort data. This could be accomplished at each meeting of the SWG. As an example, a list of catch and effort data, together with length-frequency data, released by the OFP during 1997 is given in Appendix 3.

Length-Frequency Data

Requests for length-frequency data occur much less frequently than requests for annual catch statistics or catch and effort data. For example, only one of the eleven releases of data made by the OFP in 1997, listed in Appendix 3, was for length-frequency data.

The current OFP policy with respect to releases of length-frequency data is similar to that for catch and effort data (see above).

The SWG may wish to adopt a policy for the dissemination of length-frequency data which is similar to that for the dissemination of catch and effort data.

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APPENDIX 1: EXTRACTS FROM THE UN IMPLEMENTING AGREEMENT

The agreement¹ which resulted from the UN Conference is known as the “Implementing Agreement”. Several articles are concerned with fisheries data, and these are presented below:

Article 5. General principles

In order to conserve and manage straddling fish stocks and highly migratory fish stocks, coastal States and States fishing on the high seas shall, in giving effect to their duty to cooperate in accordance with the Convention: ... (j) collect and share, in a timely manner, complete and accurate data concerning fishing activities on, inter alia, vessel position, catch of target and non-target species and fishing effort, as set out in Annex I, as well as information from national and international research programmes ...

Article 6. Application of the precautionary approach

3. In implementing the precautionary approach, States shall: ... (d) develop data collection and research programmes to assess the impact of fishing on non-target and associated or dependent species and their environment, and adopt plans which are necessary to ensure the conservation of such species and to protect habitats of special concern.

5. Where the status of target stocks or non-target or associated or dependent species is of concern, States shall subject such stocks and species to enhanced monitoring in order to review their status and the efficacy of conservation and management measures ...

Article 10. Functions of subregional and regional fisheries management organizations and arrangements

In fulfilling their obligation to cooperate through subregional or regional fisheries management organizations or arrangements, States shall: ... (e) agree on standards for collection, reporting,

¹ Agreement for the implementation of the provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the conservation and management of straddling fish stocks and highly migratory fish stocks. See Lévy & Schram (1996).

verification and exchange of data on fisheries for the stocks; (f) compile and disseminate accurate and complete statistical data, as described in Annex I, to ensure that the best scientific evidence is available, while maintaining confidentiality where appropriate; ...

Article 14. Collection and provision of information and cooperation in scientific research

1. States shall ensure that fishing vessels flying their flag provide such information as may be necessary in order to fulfil their obligations under this Agreement. To this end, States shall in accordance with Annex I: (a) collect and exchange scientific, technical and statistical data with respect to fisheries for straddling fish stocks and highly migratory fish stocks; (b) ensure that data are collected in sufficient detail to facilitate effective stock assessment and are provided in a timely manner to fulfil the requirements of subregional or regional fisheries management organizations or arrangements; and (c) take appropriate measures to verify the accuracy of such data.

2. States shall cooperate, either directly or through subregional or regional fisheries management organizations or arrangements: (a) to agree on the specification of data and the format in which they are to be provided to such organizations or arrangements, taking into account the nature of the stocks and fisheries for those stocks; ...

Article 18. Duties of the flag State

2. A State shall authorize the use of vessels flying its flag for fishing on the high seas only where it is able to exercise effectively its responsibilities in respect of such vessels under the Convention and this Agreement.

3. Measures to be taken by a State in respect of vessels flying its flag shall include: ... (e) requirements for recording and timely reporting of vessel position, catch of target and non-target species, fishing effort and other relevant fisheries data in accordance with subregional, regional and global standards for collection of such data; (f) requirements for verifying the catch of target and non-target species through such means as observer programmes, inspection schemes, unloading reports, supervision of transshipment and monitoring of landed catches and market statistics; (g) monitoring, control and surveillance of such vessels, their fishing operations and related activities by, inter alia: ... (ii) the implementation of national observer programmes and subregional and regional observer programmes in which the flag State is a participant, including requirements for such vessels to permit access by observers from other States to carry out the functions agreed under the programmes; and (iii) the development and implementation of vessel monitoring systems, including, as appropriate, satellite transmitter systems, in accordance with any national programmes and those which have been subregionally, regionally or globally agreed among the States concerned; ...

Article 23. Measures taken by a port State

2. A port State may, inter alia, inspect documents, fishing gear and catch on board fishing vessels, when such vessels are voluntarily in its ports or at its offshore terminals.

Article 25. Forms of cooperation with developing States

3. Such assistance shall, inter alia, be directed specifically towards: (a) improved conservation and management of straddling fish stocks and highly migratory fish stocks through collection, reporting, verification, exchange and analysis of fisheries data and related information...

APPENDIX 2: ANNEX I OF THE IMPLEMENTING AGREEMENT, STANDARD REQUIREMENTS FOR THE COLLECTION AND SHARING OF DATA

Article 1. General Principles

1. *The timely collection, compilation and analysis of data are fundamental to the effective conservation and management of straddling fish stocks and highly migratory fish stocks. To this end, data from fisheries for these stocks on the high seas and those in areas under national jurisdiction are required and should be collected and compiled in such a way as to ensure statistically meaningful analysis for the purposes of fishery resource conservation and management. These data include catch and fishing effort statistics and other fishery-related information, such as vessel-related and other data for standardising fishing effort. Data collected should also include information on non-target and associated or dependent species. All data should be verified to ensure accuracy. Confidentiality on non-aggregated data shall be maintained. The dissemination of such data shall be subject to the terms on which they have been provided.*

2. *Assistance, including training as well as financial and technical assistance, shall be provided to developing States in order to build capacity in the field of conservation and management of living marine resources. Assistance should focus on enhancing capacity to implement data collection and verification, observer programmes, data analysis and research projects supporting stock assessments. The fullest possible involvement of developing State scientists and managers in conservation and management of straddling fish stocks and highly migratory fish stocks should be promoted.*

Article 2. Principles of data collection, compilation and exchange

The following general principles should be considered in defining the parameters for collection, compilation and exchange of data from fishing operations for straddling fish stocks and highly migratory fish stocks:

(a) *States should ensure that data are collected from vessels flying their flag on fishing activities according to the operational characteristics of each fishing method (e.g., each individual tow for trawl, each set for longline and purse-seine, each school fished for pole-and-line and each day fished for troll) and in sufficient detail to facilitate effective stock assessment;*

(b) *States should ensure that fishery data are verified through an appropriate system;*

(c) *States should compile fishery-related and other supporting scientific data and provide them in an agreed format and in a timely manner to the relevant subregional or regional fisheries management organization or arrangement where one exists. Otherwise, States should cooperate to exchange data either directly or through such other cooperative mechanisms as may be agreed among them;*

(d) *States should agree, within the framework of subregional or regional fisheries management organizations or arrangements, or otherwise, on the specification of data and the format in which they are to be provided, in accordance with this Annex and taking into account the nature of the stocks and the fisheries for those stocks in the region. Such organizations or arrangements should request non-members or non-participants to provide data concerning relevant fishing activities by vessels flying their flag;*

(e) *such organizations or arrangements shall compile data and make them available in a timely manner and in an agreed format to all interested States under the terms and conditions established by the organization or arrangement; and*

(f) *scientists of the flag State and from the relevant subregional or regional fisheries management organization or arrangement should analyse the data separately or jointly, as appropriate.*

Article 3. Basic fishery data

1. States shall collect and make available to the relevant subregional or regional fisheries management organization or arrangement the following types of data in sufficient detail to facilitate effective stock assessment in accordance with agreed procedures: (a) time series of catch and effort statistics by fishery and fleet; (b) total catch in number, nominal weight [i.e. live-weight equivalent of landings], or both, by species (both target and non-target) as is appropriate to each fishery; (c) discard statistics, including estimates where necessary, reported as number or nominal weight by species, as is appropriate to each fishery; (d) effort statistics appropriate to each fishing method; and (e) fishing location, date and time fished and other statistics on fishing operations as appropriate.

2. States shall also collect where appropriate and provide to the relevant subregional or regional fisheries management organization or arrangement to support stock assessment, including: (a) composition of the catch according to length, weight and sex; (b) other biological information supporting stock assessments, such as information on age, growth, recruitment, distribution and stock identity; and (c) other relevant research, including surveys of abundance, biomass surveys, hydro-acoustic surveys, research on environmental factors affecting stock abundance, and oceanographic and ecological studies.

Article 4. Vessel data and information

1. States should collect the following types of vessel-related data for standardizing fleet composition and vessel fishing power and for converting between different measures of effort in the analysis of catch and effort data: (a) vessel identification, flag and port of registry; (b) vessel type; (c) vessel specifications (e.g., material of construction, date built, registered length, gross registered tonnage, power of main engines, hold capacity and catch storage methods); and (d) fishing gear description (e.g., types, gear specifications and quantity).

2. The flag State will collect the following information: (a) navigation and position fixing aids; (b) communication equipment and international radio call signs; and (c) crew size.

Article 5. Reporting

A State shall ensure that vessels flying its flag send to its national fisheries administration and, where agreed, to the relevant subregional or regional fisheries management organization or arrangement, logbook data on catch and effort, including data on fishing operations on the high seas, at sufficiently frequent intervals to meet national requirements and regional and international obligations. Such data shall be transmitted, where necessary, by radio, telex, facsimile or satellite transmission or by other means.

Article 6. Data verification

States or, as appropriate, subregional or regional fisheries management organizations or arrangements should establish mechanisms for verifying fishery data, such as: (a) position verification through monitoring systems; (b) scientific observer programmes to monitor catch, effort, catch composition (target and non-target) and other details of fishing operations; (c) vessel trip, landing and transshipment reports; and (d) port sampling.

Article 7. Data exchange

1. Data collected by flag States must be shared with other flag States and relevant coastal States through appropriate subregional or regional fisheries management organizations or arrangements. Such organizations or arrangements shall compile data and make them available in a timely manner and in an agreed format to all interested States under the terms and conditions established by the

organization or arrangement, while maintaining confidentiality of non-aggregated data, and should, to the extent feasible, develop database systems which provide efficient access to data.

2. At the global level, collection and dissemination of data should be effected through the Food and Agriculture Organization of the United Nations. Where a subregional or regional fisheries management organization or arrangement does not exist, that organization may also do the same at the subregional or regional level by arrangement with the States concerned.

APPENDIX 3: CATCH AND EFFORT DATA AND LENGTH-FREQUENCY DATA RELEASED BY THE OFP DURING 1997

1. On 24 January 1997, Dr Jacek Majkowski, Fishery Resources Officer, Marine Resources Service, Fishery Resources and Environment Division, Fisheries Department, Food and Agriculture Organization of the United Nations, Rome, requested catch data grouped by gear type, year/quarter and 5° longitude by 5° latitude, for use in producing global maps of tuna catches. Similar data were also requested of the Indo-Pacific Tuna Programme (IPTP), the Inter-American Tropical Tuna Commission (IATTC) and the International Commission for the Conservation of Atlantic Tunas (ICCAT). The deadline for submission of data was 28 February 1997; the data were provided on 26 February 1997.
2. On 21 March 1997, Dr Chilu Sun, National Taiwan University, requested Taiwanese offshore longline catch and effort data grouped by 1° longitude by 1° latitude by month, for a study on yellowfin CPUE, in preparation for the Seventh Meeting of the Western Pacific Yellowfin Research Group, 19–20 June 1997, Nadi, Fiji; these data were released on 24 March 1997.
3. On 25 March 1997, Dr Chilu Sun, National Taiwan University, requested Taiwanese purse-seine catch and effort data grouped by 1° longitude by 1° latitude by month, for a study in preparation for the Tenth Meeting of the Standing Committee on Tuna and Billfish, 16–18 June 1997, Nadi, Fiji, and the Seventh Meeting of the Western Pacific Yellowfin Research Group, 19–20 June 1997, Nadi, Fiji; these data were released on 18 April 1997.
4. On 26 March 1997, Dr Tom Polacheck, CSIRO Division of Marine Research, Hobart, Australia, requested public domain catch and effort data grouped by 5° longitude by 5° latitude, covering Korean and Taiwanese longliners during 1993, for a study of trends in longline effort in the southern Pacific Ocean; these data were released on 2 April 1997.
5. On 3 April 1997, Mr Régis Etaix-Bonnin, Ingénieur chargé des pêches, *Service territorial de la marine marchande et des pêches maritimes*, Noumea, New Caledonia, requested length-frequency data sampled by the SPC Oceanic Fisheries Programme covering longliners of New Caledonia; length-frequency data stratified by species, year-month, and one centimetre length class, and the average, minimum and maximum weight for each strata, were provided on 4 April 1997.
6. On 16 April 1997, Geoff Tuck, CSIRO Division of Fisheries, Hobart, Australia, requested longline effort data, stratified by year/quarter for 1962–1994, and by 5° longitude by 5° latitude for the Pacific Ocean south of 30°S, for all vessel nationalities combined, for an assessment of wandering albatross; these data were provided on 18 April 1997.
7. On 26 June 1997, Dr Michael Hinton, Inter-American Tropical Tuna Commission (IATTC), requested longline catch and effort data, grouped by 5° longitude by 5° latitude, covering the Korean distant-water longline fleet during 1993 and the French Polynesian longline fleet during 1992–1995; these data were released on 27 June 1997.
8. On 8 July 1997, Mr Jody Bright, consultant, Honolulu, Hawaii, United States of America, requested longline catch and effort data, grouped by 5° longitude by 5° latitude by month, for marlin species, for 1962–1997, for all fleets combined; these data were released on 8 July 1997.

9. On 9 July 1997, Dr Chilu Sun, National Taiwan University, requested catch and effort data covering the Korean longline fleet in the Pacific Ocean, grouped by 5° longitude by 5° latitude by month; these data were released on 11 July 1997.
10. On 25 November 1997, Dr Shui-Kai Chang, Director, Fisheries Data Division, Overseas Fisheries Development Council (OFDC), Taiwan, requested Taiwanese purse-seine catch and effort data for 1994–1995, grouped by 1° longitude by 1° latitude by month, in order to verify similar data held by OFDC; these data were released on 25 November 1997.
11. On 26 November 1997, Dr Richard Lu, Specialist, Fisheries Data Division, Overseas Fisheries Development Council (OFDC), Taiwan, requested Taiwanese purse-seine catch and effort data for 1983–1997, grouped by 1° longitude by 1° latitude by month, in order to verify similar data held by OFDC; these data were released on 26 November 1997.

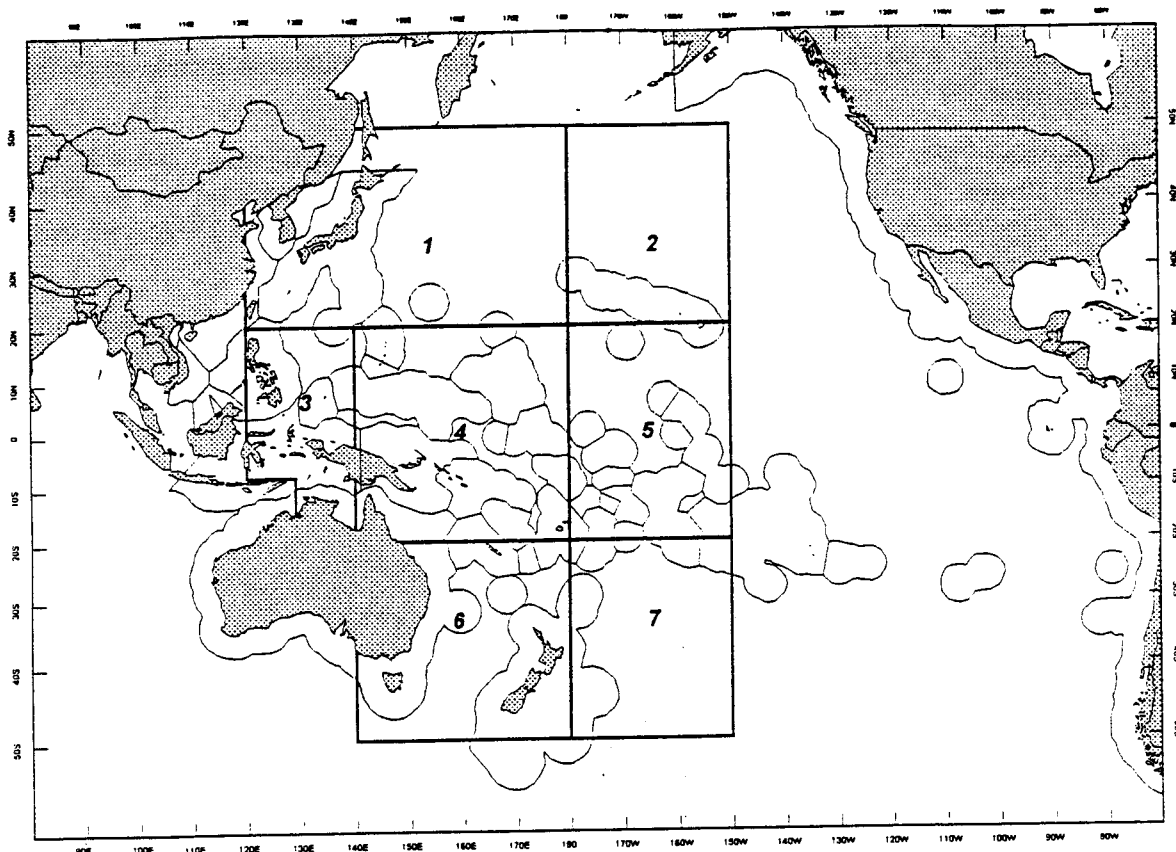


Figure 1. Proposed SCTB area of interest for statistical purposes

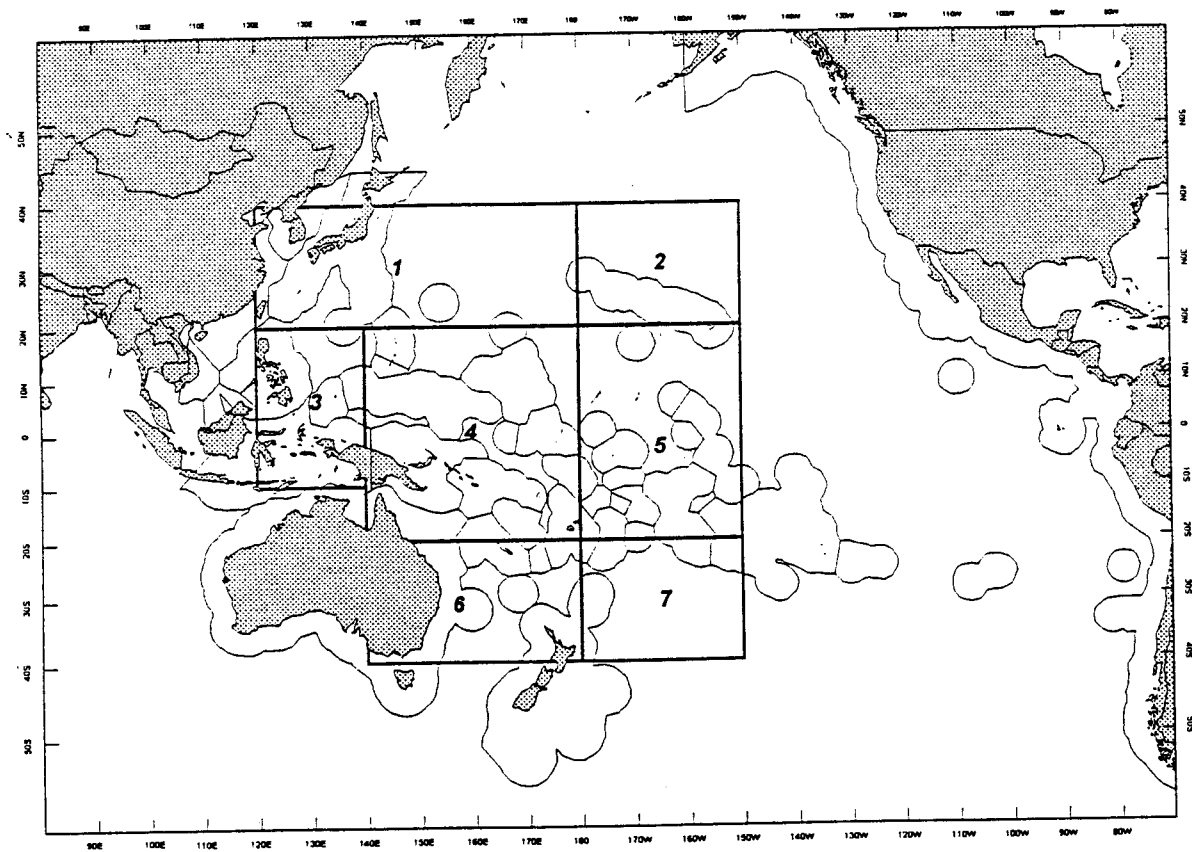


Figure 2. Western Pacific Yellowfin Research (WPYR) Area and Sub-Areas

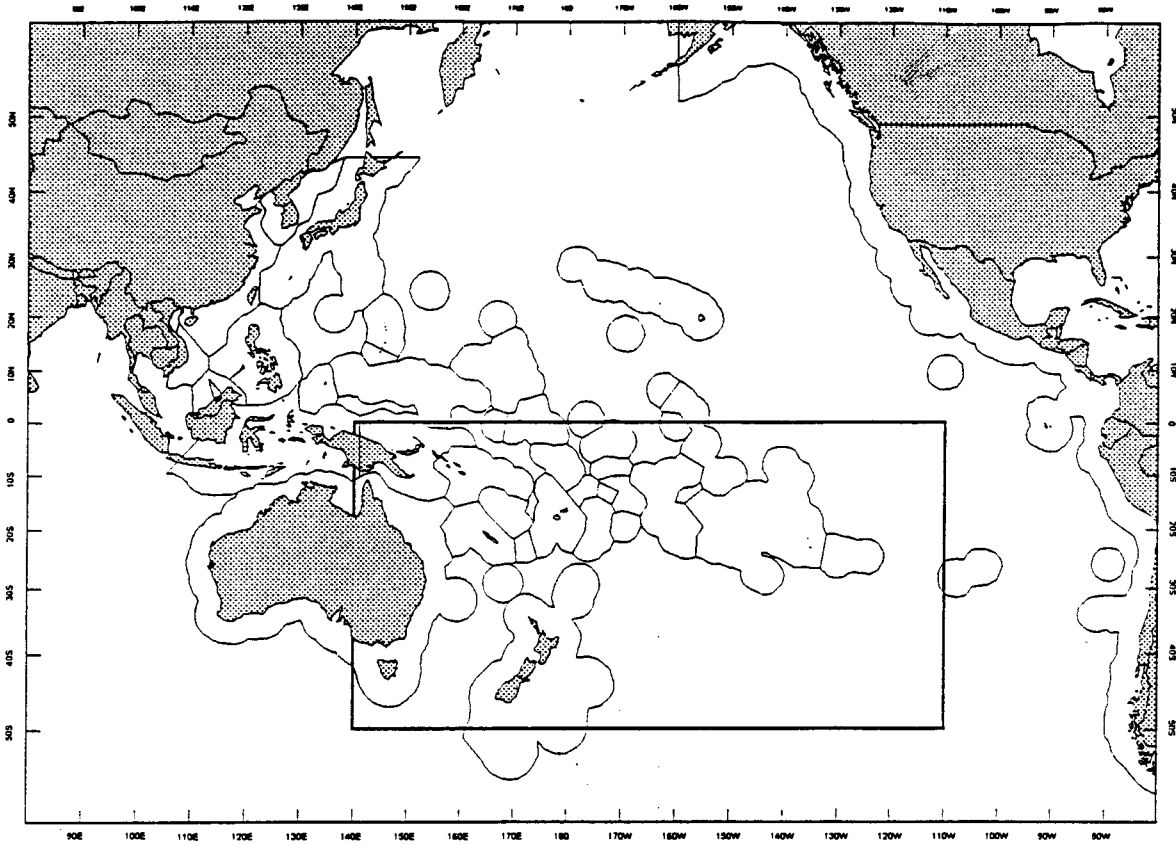


Figure 3. South Pacific Albacore Research (SPAR) Area

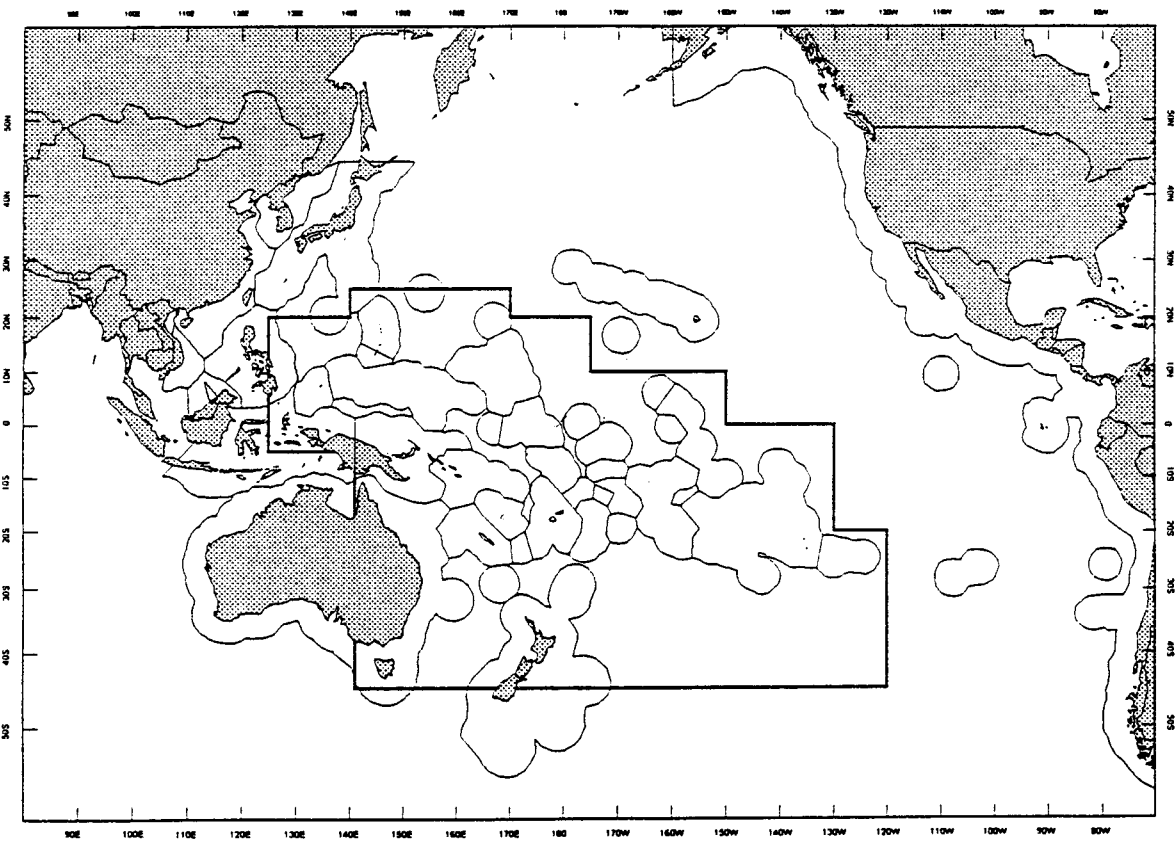


Figure 4. SPC Statistical Area

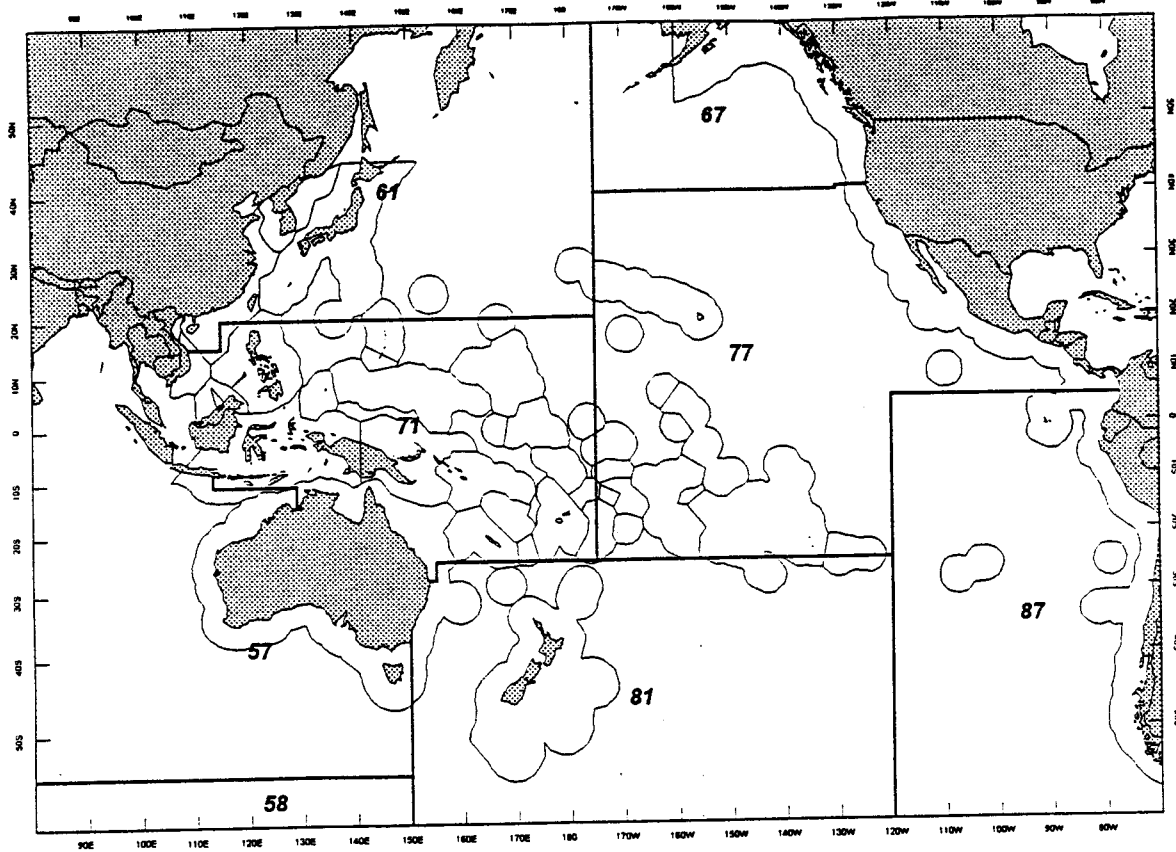


Figure 5. FAO Areas