

ORIGINAL : ENGLISH

SOUTH PACIFIC COMMISSION

EIGHTEENTH REGIONAL TECHNICAL MEETING ON FISHERIES  
(Noumea, New Caledonia, 4-8 August 1986)

REVIEW OF TUNA AND BILLFISH ASSESSMENT PROGRAMME

(Paper prepared by the Secretariat)

The past year has been a very active one for the Programme. Considerable attention has been paid to the revised priorities approved at the last Technical meeting, and substantial progress has been made on many of the technical problems that the Programme has experienced. Developments in the area of institutional arrangements offer promise for a solution to the longstanding problems of the Programme's existence and relations with distant-water fishing nations.

A. Progress on Priorities

1. Collection and evaluation of fisheries data and maintenance of regional oceanic fisheries assessment data base.

The volume of daily catch records held by the SPC continues to grow. Over the past year data holdings increased to approximately 360,000 daily records, an increase of roughly 60,000. In terms of computer usage, the total volume of daily records occupies 42 megabytes of disc storage, an increase of 7 Mbytes over the last year.

Serious gaps in data coverage from DWFNs persist. Tuna Programme staff calculate that catches reported to the SPC may be as low as about 50% of the actual total catches in the region (SPC/Fisheries 18/WP.5). Not only is data coverage incomplete, the existing reporting system does not permit accurate estimation of either the percent coverage or of a 'raising factor'. This situation impedes the Programme's ability to rigorously assess trends in the fishery. The most significant known gaps are lack of information on Japanese catches in international waters, United States catches prior to 1984, and United States catches in some high seas areas. Naturally, illegal and unlicensed fishing are usually not reported. The situation has not improved during the last year despite numerous appeals from the SPC to both Japanese officials and the American Tunaboat Association. It is hoped that better progress in this area can be achieved through the work of the Standing Committee on Tuna and Billfish.

The SPC has been assessing data holdings on landings by locally based commercial and artisanal fleets. This information is important if the Programme is to be of assistance to countries in assessing productivity of local resources, interaction between local and distant-water fleets, and performance of local fleets. Furthermore, landing statistics would enable calculation of percent coverage and cross-checking of daily catch records. SPC data holdings for locally based fleets are presented in Table 1. Most countries have responded by supplying what data are available and coverage appears to be good. Nevertheless, an important difficulty has been in local data collection systems where countries do not have systems in place to collect data from local fleets or lack manpower to implement such systems.

A number of major improvements have been made to the statistical system. These improvements are largely behind the scenes and consist of improvements in error detection, system documentation, automation of several processes, and modernization of computer operating system software. Every component of the system has been analysed and revisions planned or implemented. In some cases, revisions have been so complete that the old components were discarded. As an example, there are over 550 different computer files containing daily catch records. These files have been completely indexed and restructured into a common format that does not depend on which of the many different logsheet forms was used as the data source. Although these changes are invisible they have the effect of increasing data accessibility, decreasing errors, increasing staff productivity, and improving timeliness of reports.

Missing average weight data is a lingering problem, particularly for longline data. The "missing data" problem is a longstanding general problem in all areas of statistics and seems to have no satisfactory solution. Its effects on Tuna Programme reports are seen when attempts are made to summarize data. In cases where a large proportion of logsheets lack average weight, estimates of total weight caught over a period of time have little meaning. As a practical problem of designing computations, this problem will continue to cause difficulties. Users of summaries should be aware that totals involving missing data are likely to be unreliable in proportion to the amount of data missing.

Inconsistencies in log form accounting have caused problems with the statistical system. On several occasions duplicate copies of log forms have been forwarded to the SPC, often with a delay of several months. Duplicate forms are routinely processed and sometimes only noticed because of anomalously high catch per trip totals. Similarly, the SPC has been unable to accurately summarize trips because the necessary log forms were not sent. Tuna Programme staff have revised procedures for duplicate form detection and have provided assistance to one country in establishing a log form accounting system. Similar assistance could be extended to other countries if requested. Meanwhile, fisheries officers are requested to carefully examine the tabulation of log forms forwarded with the catch acknowledgement letter.

Occasional difficulties have occurred in producing data summaries on short notice. This problem is caused by time lags between receipt of log sheets in fisheries offices and forwarding to the SPC and also by insufficient advance notice of deadlines. The result is that reports may arrive in fisheries offices too late or are sent off without adequate checking. Fisheries officers are encouraged to forward log sheets regularly rather than hold them until just before a report is required.

The Tuna Programme is continually seeking ways to improve summary reports and staff depend almost entirely on feedback from fisheries officers to improve contents of reports. Fisheries officers are encouraged to examine reports carefully to ensure that contents meet requirements and that errors have not slipped through undetected.

One significant reporting innovation is the ability to produce "snapshots" of the current status of the fishery. Table 2 shows the catch of the four major tuna species by gear. These will be published regularly in the Fisheries Newsletter.

Another significant improvement is the ability to transfer data files from SPC computers to other machines over telephone lines. This ability has proved very useful for transferring data to the FFA on short notice.

Data summaries are beginning to be successfully transferred to countries in a format readable by microcomputer. This ability gives officials greater flexibility in producing data summaries in more useful forms. In a pilot test, data were forwarded to Federated States of Micronesia on diskette with the software required to transform the data to the format used by a popular data base management program (dBase II) on their computer. Fisheries officers should be able to produce data summary reports tailored to their specific requirements. A survey of microcomputer hardware and software available in fisheries offices has been completed. Programme staff are reviewing the results and will extend this activity in the coming year.

The currently used forms for reporting daily catch were devised in 1978 and adopted as the regional standard by the Eleventh Regional Technical Meeting on Fisheries in 1979. In the intervening years, these forms have become widely used throughout the region, and most of the data reported to the SPC are now supplied on these forms. While they have been and continue to be useful, a number of improvements have been suggested over the years. The SPC has prepared draft versions of purse-seine, longline and pole-and-line logsheet forms. Copies have been widely circulated for comment; revised forms and detailed descriptions of the revisions are presented as a separate working paper (SPC/Fisheries 18/WP.3).

Action required: discussion of proposed revisions and recommendation for their adoption as regional forms.

The Programme is investigating possibilities for the initiation of a programme to sample tuna catches at ports of landing. Port sampling provides accurate information at relatively low cost on size and species composition of catches. It provides an opportunity to cross-check true catches with those reported on logsheets enabling more accurate interpretation of logsheet data. Examination of unloading statistics allows direct calculation of percentage coverage of the catches by logsheet reporting. Port samplers also have the opportunity to collect biological samples for specific programmes. Finally, port sampling allows Tuna Programme staff to have direct contact and closer cooperation with the fish producing sector and to conduct such routine tasks as logsheet distribution and observer placement.

The prospects for establishing such a programme will depend on similar programmes already in place in ports of landing. It is expected that any programme initiated by the SPC would be done in cooperation with existing programmes. Further, such a programme would depend heavily on the willing cooperation of the fishing industry. Such cooperation exists in other regions and the SPC is optimistic that it can be achieved in the SPC region as well.

Action required: endorsement in principle of establishing port sampling programme.

2. Assessment of interaction between fisheries for oceanic species.

The SPC has not been successful in attracting funding for the tagging study proposed to address the problem of fisheries interaction. Therefore work on this priority has been confined to general theoretical analyses, further reexamination of Skipjack Programme tagging results, and reviews of studies done by other organizations.

Programme scientists are now confident that they have identified most of the major factors which control fisheries interaction and mediate its effects. Mobility is obviously important, and while all tuna are mobile, some appear to move greater distances than others. Equally important is the distance between fisheries and their relative areas. Widely separated fisheries are less likely to interact with one another than those which are close together. Mortality rate is very important. Fisheries for short-lived fish are less likely to interact than fisheries for long-lived fish. The degree of exploitation is also important. A fishery which harvests a large proportion of its target stock will obviously have a larger impact on other fisheries than one which harvests only a small proportion of the stock. Less obviously, a fishery which harvests a very small proportion of its target stock will be relatively lightly affected by distant-water fisheries.

The relative influence of the biological factors (migration rate, natural mortality, and exploitation rate) depend on the physical scale of the fisheries involved. Thus, although tuna are highly mobile, the time to move from one fishery to another depends on the size of the areas involved. Furthermore, the mortality rate mediates the process so that the potential for interaction between fisheries for relatively short-lived fish (such as skipjack) in large EEZs (such as are found in the Pacific) is low.

Unfortunately this optimistic conclusion is based on incomplete information. The high mortality rate estimate for skipjack is based on the results of the skipjack tagging study. Data from this study have not been analysed in such a way that the effects of emigration and mortality can be separated with confidence. Such an analysis requires access to detailed fisheries statistics not available to the SPC. Furthermore, very little information is available on yellowfin movement in the western Pacific. Two major tasks must be completed to definitively analyse the question of fisheries interaction in the region. A major tagging study on both yellowfin and skipjack is required and some mechanism is needed to enable SPC scientists to utilise detailed catch and effort data in all tag recovery areas.

Action required: endorsement of large-scale tagging project as regional priority.

3. Assessment and monitoring the levels of exploitation of stocks of commercially important tuna and billfish species.

The Programme data base is now in a condition to be used for the analysis of fisheries on a regional basis. A paper was presented at the INFOFISH Tuna Trade Conference (reproduced as working paper SPC/Fisheries 18/WP.1) outlining recent trends in fisheries for the four major tuna species in the SPC region (skipjack, yellowfin, bigeye and southern albacore). The conclusions of the paper are that skipjack stocks in the region are still relatively lightly exploited and could support increased fishing pressure. Yellowfin stocks are relatively more heavily exploited, particularly in some highly localized fisheries. Any increases in fishing pressure on yellowfin should be undertaken with caution and the effects carefully monitored. Bigeye stocks also appear to be in good condition and capable of increased exploitation. The scanty data for southern albacore suggest that the longline fisheries for these stocks are fully saturated. As is often the case with MSY estimates from longline data, however, there may be an opportunity for increasing total yield by development of fisheries using other types of gear. Indications are particularly favourable for troll fisheries for surface stocks in the region of the sub-tropical convergence.

4. Studies on the biology and ecology of commercially important tuna, billfish and bait species.

Good progress in preparing fisheries data (monthly CPUE by 1° square) for analysis in conjunction with physical oceanographic data (surface temperature, surface salinity, chlorophyll content and temperature profile) along a line between New Caledonia and Japan. Further physical oceanographic data are to be prepared on sea level and wind stress. Progress on data analysis was limited due to delays in arrival of counterpart staff at ORSTOM and computer programming bottlenecks at the SPC. Further progress is expected in September when new staff and equipment will arrive at ORSTOM.

The Programme received no requests for assistance with baitfish studies.

5. Provision of fisheries observers and advice on development of observer programmes.

Requests were received to assist in training observers in Federated States of Micronesia, Kiribati and Solomon Islands. Three one-week training workshops were held for these countries with the participation of Mr. Robert Gillett from FAO/UNDP in the first two sessions and of Mr. Don Aldous from FFA in the third. As is to be expected, existing programmes were found to differ between countries depending on levels of staffing, preponderance of gear types, and national priorities including overall importance of industrial fishing development. In general, existing observer programmes served to maintain a national presence in commercial fleets and to gather general information. The workshops emphasized systematic collection of data for both national and regional objectives, scientific methods of sampling catch, and the use of proper reporting procedures.

A draft observer manual has been prepared (SPC/Fisheries 18/Info.1) and will be published as a regional document in a format that can be conveniently revised and improved. The manual is intended to serve both as a guideline for observer activities and as a convenient model for development of observer manuals in country. It is still very much in the development stage and suggestions for improvement are solicited.

6. Monitoring the use of fish aggregating devices.

The proposal to study the mechanism of FAD operation and optimize FAD management procedures received excellent support from countries. The many suggestions offered however indicated that the whole concept needed to be revised. Revisions are being incorporated into a modified study plan which is more regional in scope. Preliminary work is planned for New Caledonia in collaboration with New Caledonia and ORSTOM staff to take advantage of existing equipment for development and testing of acoustic techniques for estimating aggregation size.

7. Provide assistance to countries in the implementation of appropriate systems to monitor artisanal and subsistence fisheries.

The Programme continues to provide assistance to the Tuvalu Fisheries Division by monitoring the results of the artisanal data gathering system and providing advice on data analysis. This project is beginning to produce useful information on general artisanal catch rates. Two further requests have been received to review in-country fisheries data collection systems.

8. Provide assistance to countries in training fisheries biologists in various aspects of quantitative fisheries methods.

There has been considerable activity under this new priority. As a follow-up to the 1984 Training Course in Fisheries Statistics, a series of four small "on-the-job" workshops were conducted in Noumea for groups of 4 to 6 trainees each and the lecture notes from the 1984 course were published (SPC Handbook No.26, 1985). These activities were funded by the Asian Development Bank, FAO/UNDP and SPC. Workshops emphasized the use of microcomputers for analysis of real statistical problems in fisheries using, where possible, data supplied either by the trainees themselves or from TBAP files for the trainee's home country. Many trainees (and their supervisors) report that the training has assisted in the conduct of daily activities.

A two-week workshop of stock assessment methods was conducted by TBAP staff and Dr. Carl Walters of the University of British Columbia, Canada. This workshop was designed to give fisheries officers an introduction to stock assessment methods, their strengths and weaknesses and to enable them to evaluate stock assessments in terms of accuracy and credibility. The role of stock assessment in developing fisheries was a major topic. Consultant fees and travel expenses for four trainees were paid by FAO/UNDP South Pacific Regional Fisheries Development Programme, and travel expenses for three trainees were paid by the British Development Division in the Pacific.

#### B. Other Areas

There have been a number of developments which directly affect the ability of the SPC to address TBAP priorities. The most important of these is the decision of the Twenty-fifth South Pacific Conference to continue the Tuna and Billfish Assessment Programme within the South Pacific Commission for a further five years beginning in September 1986. The Conference further called for an extensive review of the Programme and its institutional position to occur during the third year of this extension.

The South Pacific Conference also endorsed the rejuvenation of the so-called "Expert Committee on Tropical Tuna" but left the decision on its terms of reference, composition and procedures to the May 1985 meeting of the Committee of Representatives of Governments and Administrations (CRGA). The CRGA approved the creation of a "Standing Committee on Tuna and Billfish" to supersede the former Expert Committee. Its primary function will be to assist the Technical Meeting in its task of overseeing the work of the TBAP by providing expert technical advice, and assist in securing data and funding. The terms of reference, composition and procedures are described in full in SPC/Fisheries/WP.4.

The SPC sponsored a workshop on southern albacore research in June in Auckland, New Zealand. Longline fisheries for southern albacore are important for several SPC countries and there is a good possibility for developing a troll fishery for surface stocks of this species. Research by French, New Zealand and United States scientists have given preliminary indications of substantial surface stocks. Unfortunately, very little is known about southern albacore, and the purpose of the workshop was to identify a research programme to provide the necessary information for assessment of existing fisheries and development of future possibilities. The report of the workshop is presented in (SPC/Fisheries/Info.2).

A new computer system was purchased and installed in June. The new computer is a Hewlett Packard 9000/550 running under the UNIX operating system. In its present configuration it supports 5 users and can be easily and economically expanded to support 20. Currently both the old and new computer systems are operating, and it is planned to phase out the old system over the next year. The HP9000 operating under UNIX will give SPC access to a wide variety of software and will greatly facilitate development of new special purpose programs. Further, the hardware is more up to date than the current HP1000 and maintenance and upgrade costs will both be lower.

TABLE 1. STATUS OF STATISTICS FOR LOCALLY BASED COMMERCIAL TUNA OPERATIONS WITHIN THE SPC REGION

Country	Fishery	Statistics Collected	Data Provided to TBAP	Comments
American Samoa	Korean & Taiwanese longline	Daily catch records collected by NMFS	Summary statistics for large areas provided for 1960 to 1981	Daily records requested from NMFS - refused; update of summary statistics promised. Summary statistics not very useful or compatible with regional data base.
	Purse seine (unloading)	Length frequency data collected by NMFS.  Unloadings??	None	Data requested - refused
Cook Islands	None			
Federated States of Micronesia	Local pole-and-line vessels for local consumption (Truk & Yap)	Some catch statistics collected but details unknown		
Fiji	Local pole-and-line	Daily catch records	Provided in full	Some confusion with forms - historically some most likely missing
	Taiwanese	SPC forms	Provided in full	Some problems locally collecting forms
	Purse seine (New Zealand)	SPC forms	Provided in full	
French Polynesia	Bonitiers	Daily catch records	Published summaries	Requested magnetic tape version - no reply
		Length frequency	Published tables	
	Transshipment	???		
Guam	Transshipment	???		
Kiribati	Pole-and-line	Historically monthly catches by vessel.	Provided in full	
		Commencing daily	Received first batch	
Marshall Islands	Pole-and-line	???		
Nauru	Purse seine			Non operational

New Caledonia	Pole-and-line	Daily catch records	Provided in full	No longer operating
	Longline	SPC form	Provided in full	Needs to be incorporated into data base
Niue	None			
Northern Mariana Islands	Transshipment	???		
Palau	Van Camp pole-and-line	Daily catch records	Provided in full	Lot of work to transfer to regional data base format
	Pole-and-line for local consumption	Rough unloadings	Promised	No longer operating
	Palau International Traders	Just starting - SPC forms to be completed	Promised	
Papua New Guinea	Pole-and-line (historical)	Daily records	Provided in full	Needs to be incorporated into data base
	Recent - 1985	Catch statistics?? Length frequency	Provided in full	
	Transshipment	???		
Solomon Islands	Pole-and-line Purse seine	Daily records	Initially provided in full, but discontinued. Summary statistics promised.	Problems in translating to data base format
		Length frequency	Provided in full	
	Longline	SPC form	Provided in full	
Tokelau	None			
Tonga	Longline	SPC form	Provided in full	
Tuvalu	Pole-and-line	???		
Vanuatu	Longline (Santo)	SPC form	Provided in full	
		Unloadings	Provided in full	
Wallis & Futuna	None			
Western Samoa	None			

TABLE 2. SUMMARY OF REPORTED CATCH AND EFFORT DATA BY QUARTER FOR 1985

<u>Surface Fisheries</u>											
Gear		1st quarter		2nd quarter		3rd quarter		4th quarter		Annual Total	
PS	Effort (days)	3100		2645		1806		770		8321	
		Catch (mt)	CPUE								
	Skipjack	38729	12.5	36794	13.9	22048	12.2	8003	10.4	105574	12.7
	Yellowfin	16000	5.2	13051	4.9	7455	4.1	2370	3.1	38876	4.7
	Other	111	++	159	0.1	159	0.1	54	0.1	482	0.1
	Total	54840	17.7	50003	18.9	29662	16.4	10427	13.5	144933	17.4
PL	Effort (days)	1957		1049		164		467		3637	
		Catch (mt)	CPUE								
	Skipjack	7211	3.7	4532	4.3	798	4.9	4211	9.0	16751	4.6
	Yellowfin	313	0.2	313	0.3	27	0.2	80	0.2	733	0.2
	Other	57	++	55	0.1	3	++	61	0.1	176	++
	Total	7582	3.9	4899	4.7	827	5.0	4352	9.3	17660	4.9
Total Surface Catch	Skipjack	45940		41325		22846		12214		122326	
	Yellowfin	16313		13364		7481		2450		39608	
	Other	168		214		162		115		659	
	Total	62422		54903		30489		14779		162593	
<u>Longline Fisheries</u>											
	Effort (hooks x 1000)	23086		19936		15175		7067		65264	
		Catch (nos.)	CPUE								
	Albacore	22909	1.0	68669	3.4	56220	3.7	28807	4.1	176605	2.7
	Bigeye	119057	5.2	87208	4.4	75198	5.0	39401	5.6	320864	4.9
	Yellowfin	206570	8.9	250648	12.6	202795	13.4	74588	10.6	734601	11.3
	Billfish	21784	0.9	15996	0.8	12368	0.8	6032	0.9	56180	0.9
	Other	10814	0.5	4514	0.2	4260	0.3	1664	0.2	21252	0.3
	Total	381134	16.5	427035	21.4	350841	23.1	150492	21.3	1309502	20.1
++ represents catch per effort less than 0.1.											

