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**EVALUATION OF THE
TUNA AND BILLFISH ASSESSMENT PROGRAMME
OF THE SOUTH PACIFIC COMMISSION: PHASE II**

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SUMMARY OF RECOMMENDATIONS

Work Programme

1. A mission statement be prepared for the TBAP setting out its goals and scope of operation.
2. A work programme with specific objectives be prepared for the TBAP. This programme should have a time scale and expected output, and the relationship of its objectives to the mission statement should be clearly indicated.
3. SPC consult urgently with FFA and member countries to resolve the likely duplication of effort concerning the collection and processing of tuna log sheet data resulting from the Forum Fisheries Committee decision to establish a data base at FFA, and to define the roles of the two data bases.
4. A Fisheries Co-ordinator responsible for all SPC activities in fisheries, including the TBAP, be appointed.
5. Responsibility for priority activity 7 (dealing with artisanal statistics) be transferred from the TBAP to the inshore research project of SPC.
6. Responsibility for priority activity 8 (dealing with training) be transferred from the TBAP to the SPC Fisheries Training Officer.
7. The work programme and priority activities of the TBAP be set by the RTMF.
8. A scientific committee on tuna be appointed to act as a technical review body to the TBAP and assist it in its work.

Information services and communications

9. SPC review its policy on publications of the TBAP and permit publication of scientific results in outside journals where appropriate.
10. Summaries be produced in non-technical language of all major TBAP scientific reports.
11. Following important work done on behalf of countries and on publication of the report, the TBAP staff member responsible visit the country concerned to discuss the results with government officials.
12. The SPC Fisheries Co-ordinator make regular visits to member countries to ascertain their needs and discuss ways in which the SPC fisheries programmes can assist them.

Staffing and finance

13. Staffing requirements of the TBAP be reviewed taking into account planned future activities and any reorganisation of SPC fisheries projects as a whole. In this review new job descriptions should be prepared for each post relating each of them to the priority activities of the TBAP.
14. Consideration be given to appointing TBAP staff on contracts of 3 years.
15. Provision of funds for attachment fellowships to the TBAP be made as a regular part of its budget.
16. Sufficient funds be allocated from the SPC budget to meet the cost of the core functions of the TBAP for its scheduled duration.
17. Increased funds be allocated within the TBAP budget for travel by Programme staff.

EVALUATION OF THE TUNA AND BILLFISH ASSESSMENT PROGRAMME OF THE SOUTH PACIFIC COMMISSION : PHASE II

1. PROCEDURE

1.1 *Introduction*

1.1.1 The evaluation of the Tuna and Billfish Assessment Programme (TBAP) was requested by the 1986 Committee of Representatives of Governments and Administrations (CRGA) of the South Pacific Commission (SPC) and approved by the South Pacific Conference of that year.

1.1.2 This evaluation was carried out by Mr T.B. Curtin in early 1987 and the report of his study was considered by the May 1987 CRGA.

1.1.3 Due to time constraints Mr Curtin was not able to visit all Pacific Island countries which are members of SPC. On receiving his report the 1987 CRGA directed SPC to extend the study to include those countries not previously covered.

1.1.4 This report covers the second phase of the evaluation of the TBAP.

1.2 *Terms of Reference*

1.2.1 The terms of reference for the second phase were identical to those for the Curtin report, namely:

- (1) Evaluate the Programme as a whole, as well as its various activities and assess how these activities have met with island country aspirations and Programme priorities.
- (2) Assess whether the Programme priorities meet island country needs on the one hand and the long term research needs of the region on the other.
- (3) Given (1) and (2) above, assess the efficiency and effectiveness of Programme staff in carrying out project activities and comment on the adequacy of Programme staff, division of duties and working methodologies.
- (4) Identify problem areas and make proposals for improvement.

1.3 *Consultants*

1.3.1 The consultants for the second phase of the evaluation were Mr James Crossland, a private fisheries consultant from Auckland, New Zealand and Mr S.T. Cavuilati, Chief Fisheries Officer, Fisheries Division, Fiji.

1.4 Timing and scope

1.4.1 Mr Crossland commenced the study on 20 June and was joined by Mr Cavuilati on 8 July. Field work was completed on 24 July and the week following was spent finalising the report which was to be tabled at the Regional Technical Meeting on Fisheries (RTMF) beginning at SPC headquarters on 3 August 1987.

1.4.2 Countries consulted and visited during the second phase were: New Caledonia, French Polynesia, Cook Islands, Tuvalu, Northern Marianas, Guam, Palau and Nauru. The views were sought of representatives of Pitcairn Islands, Wallis and Futuna, Tokelau and Niue. Taking advantage of travel routes which passed through countries visited during the first phase, informal discussions were held in Western Samoa and Marshall Islands.

1.4.3 Discussions were also held with staff from the Forum Fisheries Agency (FFA), the regional fisheries programme of the Food and Agriculture Organization (FAO) and the Office de la recherche scientifique et technique outre-mer (ORSTOM).

1.4.4 A list of persons consulted is given in Appendix 1.

2. EVALUATION

2.1 *Introduction*

2.1.1 The origins of the TBAP and the evolution of its work programme have been well described in the Curtin report and will not be repeated in detail here. However, because they will frequently be referred to in this study, the current list of TBAP activities is given below.

- (1) Collection and evaluation of fisheries data and maintenance of the regional oceanic fisheries assessment data base.
- (2) Assessment of interaction between fisheries for oceanic species.
- (3) Assessment and monitoring of the levels of exploitation of stocks of commercially important tuna and billfish species.
- (4) Studies on the biology and ecology of commercially important tuna, billfish and bait species.
- (5) Provision of fisheries observers and advice on development of observer programmes.
- (6) Monitoring the use of fish aggregating devices.
- (7) Provision of assistance to countries in the implementation of appropriate systems to monitor artisanal and subsistence fisheries.
- (8) Provision of assistance to countries in training fisheries biologists in various aspects of quantitative fisheries methods.

2.1.2 This section of the report begins with the activities of the TBAP, follows on with its operation and management. Section 3 concludes the evaluation with the views and aspirations of island member countries. This sequence does not imply that any one part is more important than another but follows the order in which the study was conducted. It was also necessary to prepare parts of the report along the way because of the tight schedule to have it complete in time for the RTMF beginning on 3 August 1987.

2.2 *Publications*

2.2.1 One way of looking at the performance of the TBAP is through an evaluation of its written output. This is of course only one aspect of the Programme's work, but it is a useful starting point.

2.2.2 The full list of publications and other documents produced by the TBAP from its beginning up to June 1987 is given in Appendix 2. Publications total 106 and are summarised by type in Table 1.

TABLE 1. Publications and other documents produced by the Tuna and Billfish Assessment Programme, 1981-June 1987.

Final country reports (SSAP)	20
Technical reports	17
Working papers (RTMF)	31
Conference papers	18
Fisheries Newsletter articles	9
Handbooks	3
Other articles	8
TOTAL	106
Internal reports (TBAP)	9
Unpublished country reports	8

2.2.3 By any measure the publication output by the TBAP is a major achievement. The documents cover a wide range of topics from purely scientific to records of the Programme's activities. An outstanding feature of the TBAP is the meticulous attention to detail in its reports and the full descriptions of its methods.

2.2.4 The first major task of the TBAP was to prepare the 20 final country reports relating to the work of the Skipjack Survey and Assessment Programme (SSAP). Bearing in mind the magnitude of the task, their production over a three year period is timely. Each document contains within its covers the fullest and most up-to-date record of information on skipjack and baitfish in the country concerned at that time. The amount of this information varies greatly from country to country, depending not only on the amount of time spent there, but also the state of development of the fishery. Having made the commitment to visit every SPC country it was inevitable that for some the results which could be reported would be meagre.

2.2.5 It has been observed that some countries have been disappointed in these reports because they did not provide the hard figures on how much skipjack was in their zones, or how much could be harvested. This can in part be put down to a misconception of what the SSAP could achieve and a failure in communicating what output was possible, and what was not. In addition, there appears to have been little attempt made by the TBAP to visit countries when their reports were published to explain the results in detail to government officials.

2.2.6 The technical report series contains the most important of the scientific work of the TBAP. For example, Technical Report No.8 contains the overall assessment of skipjack stocks in the Pacific. It uses mathematical symbols to develop a model to estimate standing stock, fishing rate, attrition rate, and a number of other factors. Only through the use of the model could the huge accumulation of data from the tagging programme be used to provide the actual numbers. This report and others with a strong scientific content were sent to outside experts for comment before publication. This effort by TBAP staff to check the soundness of their scientific work is to be commended.

2.2.7 There has been criticism from countries concerning documents containing mathematical models. It is the consultants' view that this is unfair to TBAP staff. It is considered that future criticism of this kind could be avoided through a revised publications policy. This is discussed in more detail in 4.7.

2.2.8 Other documents of the TBAP are concerned with information about the Programme and items of general interest (working papers at meetings, conference papers and Fisheries Newsletter articles). It is pleasing to note that TBAP staff have increased their contribution to the Fisheries Newsletter in recent issues. The working papers prepared for the 1987 RTMF contain a detailed account of TBAP activities during the previous year and valuable analysis on the present state of tuna stocks and their fisheries in the region.

2.2.9 From this brief review it is clear that the Programme has made consistently strong efforts to write up its results and to publicise its activities to member countries and elsewhere. Some further evaluation of the TBAP written output in relation to its list of activities is given in 2.3.42 - 2.3.46 below.

2.3 *Priority activities*

2.3.1 The analysis carried out by Curtin showed that 52% of Programme effort was spent on the data base. If the balance were equally divided amongst the seven other activities this would only allow 7% for each. As some activities are considered significantly more important than others they are allocated more effort. It does not necessarily follow that only a token effort is being made on the lower priority activities because they receive 3 or 4% of TBAP effort. What should be of more concern is the number of vacancies in the Programme, the high turnover of staff, and the effect this has on the total effort.

Data base

2.3.2 The establishment of a regional data base was the first priority of the TBAP since its beginning in 1981. The maintenance, operation and improvement of the data base has continued to constitute the Programme's core function.

2.3.3 The setting up of the data base proved to be a much larger task and to be more difficult than was anticipated. Early work was carried out by TBAP staff not specifically trained in this specialised field, and as a result some of its systems were unsatisfactory. Any major development on this scale supported by limited resources can expect to encounter problems in its early stages and it would be unreasonable to expect otherwise. Because of these difficulties it was not easy to alter programs to accept different kinds of data, and in addition many dirty data were entered into the system.

2.3.4 It is easy to be critical with hindsight of the way the system was set up but this is unduly hard on Programme staff of that time. Furthermore, at the same time as the data base was being established, the TBAP was under heavy pressure to complete the final country reports and the scientific findings of the SSAP.

2.3.5 Recently the data base capability has been significantly upgraded with the installation of a new computer system. Major efforts have been made to clean up the data, which are reported to be much improved.

2.3.6 Problems of achieving full coverage of tuna catches in the region continue, and there are major gaps in the data from distant water fishing nations (DWFNs). The SPC as a non-political organisation has limited power to improve this situation.

2.3.7 The TBAP relies on member countries sending in the regionally uniform log sheets. Out of 23 island member countries log sheets have been received from 12 of them. Not all of the others have statistics to record, but some have collected data which have not been forwarded to SPC. When the decision to set up the data base was made it was agreed that all countries would forward the standard regional log sheets to SPC for processing. Whether all who agreed to do so had the power to do this or had considered the full implications is not clear.

2.3.8 The proposal for the FFA to establish its own data base which was approved by the 1986 Forum Fisheries Committee has been covered extensively in the Curtin report. We concur that this will result in a major duplication of effort. Such duplication as well as being expensive brings a number of problems. In particular, it is most unlikely that the two data sources will coincide because of differences in collecting data, different sources and data input variation.

2.3.9 To try to resolve this problem it is useful to consider the purposes for which statistics are collected. The principal uses for such data are for management (setting catch levels, etc.), for economic purposes (setting fees, etc.), or for scientific purposes (fisheries or biological research).

2.3.10 Often statistics are collected and used for a mixture of purposes. In the case of the TBAP data base it appears that it was originally set up for scientific purposes and that data from it were later used by states for economic reasons (e.g. during access negotiations). As a result some DWFNs which originally supplied data for a scientific programme now no longer do so.

2.3.11 It would seem preferable to collect statistics firstly for economic purposes and then make them available for research studies. The vessels of countries supplying the data can then be under no illusions concerning their purpose, nor disagree with their subsequent use. At the same time there is no reason why these statistics should not be suitable for research use, particularly if the standard log sheets continue to be used.

2.3.12 When collected for economic or regulatory purposes the statistics in most cases will be required under a bilateral access agreement or the multilateral treaty recently signed between FFA states and the U.S. In such cases the supply of statistics will be obligatory and the state or agency collecting them will have considerable leverage in ensuring that they are supplied, and in consequence they will be more comprehensive than those presently supplied to SPC.

2.3.13 It has been impossible to carry out the evaluation of the TBAP data base without also considering the effects on it of the new data base proposed for FFA. A solution to the duplication of effort, which appears to be imminent, is vital. This matter is discussed further in 4.3 and possible solutions suggested.

2.3.14 We would not like to conclude the review of the data base activity without recording that we consider that its establishment and operation, despite some difficulties, has been a major achievement of the TBAP.

Fisheries interactions

2.3.15 An important reason for giving this activity first priority after the data base at the inception of the TBAP was because it was thought the interaction between the rapidly developing purse seine fishery for skipjack and the traditional pole-and-line fishery could be detrimental to the latter, and possibly also to artisanal fisheries.

2.3.16 The continued decline in the share of the skipjack catch taken by pole-and-line and rise in catches by purse seiners because of their greater efficiency and economy has reduced the need for this work. This conclusion was also affected by the findings that the skipjack population was very large and that the proportion taken by fishing was only a small part of the total attrition.

2.3.17 Never explicitly stated as one of the original 13 priorities of the TBAP but nevertheless studied was the possible interaction between skipjack fisheries in different countries or areas.

2.3.18 The finding that the proportion of skipjack which made long distance movements was small and that there was only limited mixing between areas showed that national fisheries, particularly in countries with large EEZs, were largely independent of one another.

2.3.19 These conclusions, which now seem to be taken for granted, were at the time a major breakthrough in knowledge on the biology and fisheries for skipjack.

2.3.20 Interactions between surface and longline fisheries for yellowfin has received some study through analysis of catch statistics. Results so far are inconclusive, although not indicating cause for alarm. Significant progress cannot be expected until the proposed tagging programme has been started. The theoretical work on interactions reported in Technical Report No.13 has proved valuable in the planning for this activity.

2.3.21 During the past 18 months exploratory troll fishing for albacore on the southern fringes of the SPC area has shown promising results. It is possible a significant fishery may develop and interactions with existing longline fisheries may occur. The TBAP organised a workshop on southern albacore in June 1986, and amongst other agreed activities, the above situation is being monitored.

Stock assessment and fishing levels

2.3.22 It is assumed because of work done by the TBAP that the third priority activity includes assessment of stocks as well as the level of their exploitation, although the wording for this activity (see 2.1.1) does not indicate so.

2.3.23 The assessment of skipjack stock size and its level of exploitation have already been covered in this report. A similar assessment for yellowfin from SSAP tag data was not possible because of the low number of fish tagged and few returns. However, TBAP staff have continued to work on this subject through data analysis and monitoring of fishing activities. A summary of TBAP conclusions on yellowfin (and skipjack) is given in the paper "Is international management of tuna necessary?" by R. Hilborn and J. Sibert (no.72 in Appendix 2). The authors consider that under current economic conditions unregulated fisheries will not overexploit skipjack, nor seriously overexploit yellowfin. While these conclusions may well be correct there does not appear to be much data on yellowfin, and this is an area requiring further work. However, it is noted in this respect that the future tagging programme does not specifically include amongst its objectives stock assessment for yellowfin or exploitation rate estimates.

2.3.24 TBAP staff, while noting that data coverage is incomplete and that it has so far not been possible to validate the accuracy of log sheets, appear not to give much weight to these factors when making their assessments.

2.3.25 In the case of albacore the TBAP has only recently begun to include directed studies on this species in its work programme. The workshop convened by the TBAP is to be commended for its timeliness although it was largely at the prompting of member countries. The future role of the TBAP is presently seen as low key coordination of field work carried out by other organisations. In view of the need to study tunas on a regional basis and the importance of albacore fisheries to many SPC member countries (an importance which is increasing), a more decisive role would appear to be needed, as well as a stepped-up research effort.

Biological studies

2.3.26 Early work by the TBAP was outstanding in providing major increases in knowledge on the biology of skipjack. Much valuable work was also done on baitfish, including the production of a detailed handbook on baitfish species of the region. This is likely to remain a standard reference for many years.

2.3.27 Most of the TBAP's biological work has derived from data collected by the SSAP. Since these results have been written up the lack of a new field programme has reduced its output under this heading.

2.3.28 However, several studies have been carried out on baitfish following specific country requests. Not all of this work has been biological but has involved development of fishing techniques and statistical services. This form of assistance has proved of much practical value.

2.3.29 Current biological studies on tuna concern the relationship between tuna concentrations and oceanographic and environmental factors, but no results have so far been published. Bearing in mind that most tuna are caught by purse seiners fishing around floating objects, it is difficult to see the practical value of this work.

2.3.30 Biological studies on billfish have not been undertaken by the TBAP.

Fisheries observers and observer programmes

2.3.31 This activity is one in which much useful work has been done, and which has been well received by member countries.

2.3.32 TBAP staff have made observer trips on purse seiners from the US and Japan and a longliner from Tonga. These trips have enabled the TBAP to make direct biological observations on tunas and billfishes, and on vessel and fishing gear operation. Such information is a valuable additional tool when making scientific assessments and planning data collection through log sheets.

2.3.33 The TBAP has also organised observer training and produced a detailed observers handbook. This activity has been useful to member countries in training staff for the monitoring of fishing activities, validation of log sheets and collecting scientific data. In this activity the TBAP has collaborated closely with FFA as many aspects of an observer programme relate to enforcement and other activities not falling within the scope of a scientific programme.

FAD studies

2.3.34 There appears to be some confusion about the work to be undertaken in regard to this activity – whether it involves research or monitoring, a study of fish in relation to FADs or of the devices themselves. This may explain why minimal progress has been made.

2.3.35 A proposal for a FAD study was made to the 1985 RTMF but has not proceeded. A new draft proposal has since been prepared and is awaiting action. A small number of skipjack and yellowfin were tagged around a FAD in Kiribati by a TBAP scientist during 1987. This was apparently on an opportunistic basis.

2.3.36 FADs are very important to tuna fisheries in the SPC region – nearly all purse seine sets are made around floating objects and they are vital to many artisanal fishermen. The lack of positive action under this activity is disappointing, although the reasons for this may not all be under the control of the TBAP, including the fact that it has a wide ranging programme and several staff vacancies.

Monitoring artisanal fisheries

Training in quantitative methods

2.3.37 The last two priority activities will be treated together because they overlap in many areas, and neither activity relates directly to a tuna and billfish programme. These activities were included at the request of member countries which considered that the TBAP as a whole lacked output with practical application to their own fisheries needs. The 1986 RTMF recommended that these activities be transferred to the proposed inshore fisheries research project.

2.3.38 A considerable number of requests for assistance with artisanal statistics have been received and several field visits made by TBAP staff. There appears to be considerable demand for these services which are not being fully satisfied.

2.3.39 In training the TBAP has achieved a useful output, conducting two training courses on statistics and a workshop on stock evaluation. Parts of the observer training course also relate to this activity.

2.3.40 Fisheries staff from island countries have received attachment training with the TBAP, sometimes working on data brought with them and relating to their own fisheries. This training is considered valuable both for the skills transferred and for providing an insight to the work of the TBAP.

2.3.41 Considering that TBAP staff were not recruited for the specific activities under this heading they have performed creditably.

Publications relating to TBAP activities

2.3.42 In concluding the evaluation of TBAP activities an analysis of its written output is given in Table 2, which categorises this in relation to the list of priority activities. An additional three categories have been included to cover publications not directly attributable to separate activities.

2.3.43 The number of publications in each category partly reflects the historical evolution of the Programme. Activities recently added are under-represented. Despite these limitations, several observations can be made from the table.

2.3.44 Publications on the data base are almost entirely descriptive: its main output is provided on a bilateral basis in the form of data summaries. A summary of output for 1985 and 1986 is given in Table 3.

2.3.45 Most publications occur in the categories stock assessment, and biology. The biology category was subdivided into tuna and baitfish. There were no publications relating to billfish.

2.3.46 The number of publications on fisheries interactions are few, although important work has been done. Until further field work (such as the planned tagging programme) much additional output cannot be expected. A similar situation applies to the FAD category.

TABLE 2. Publications and articles of the TBAP in relation to its work programme and priority list of activities.

Category or activity	Publication number*
Data base	7,20,25,26,39,48,50,51,59,80,82
Fisheries interactions	10,44,46,64
Assessment	15,16,19,23,24,27,30,34,36,55,63,67,68,75,76
Biology - tuna	1,9,10,11,12,21,27,28,38,45,71
- baitfish	2,6,13,14,23,24,37,52,53,84
Observers	42,67,69,70,85,86
FADs	65
Artisanal statistics	(several country reports, not published)
Training	58,77
TBAP	4,8,17,22,33,40,47,49,61,62,66,79,81
Tuna fisheries (general)	3,5,18,31,32,35,41,43,56,57,60,72,73,78,83
Other	29,54,77

Notes: This table does not include the 20 final country reports.
Publications may occur under more than one category.

* Refer to Appendix 2 for list of publications.

TABLE 3. Output from the data base of TBAP on behalf of individual countries, 1985 and 1986.

Country	TYPE OF SUMMARY				
	Gear Type	Catch/ Effort	Trip	Port	Map Sets
New Caledonia	LL	9	8	2	2
	PL	9	8	1	
Cook Islands	LL	4	4	1	1
Fiji	LL	7	7	2	1
	PL	4	4	1	
FSM	PS	5	5	1	1
	LL	8	10	2	2
	PL	6	7	1	2
Kiribati	PS	22	22	7	4
	LL	6		3	8
	PL	8		4	5
Marshall Islands	LL	5		1	2
	PL	5	4	1	2
	PS	6	5	1	
Palau	LL	7	8	2	3
	PL	4	4	1	
	PS	4	4	1	2
Papua New Guinea	LL	6	4	1	
	PL	5	5	1	
	PS	48	43	11	
Solomon Islands	LL	21	22	8	1
	PL	4	4	1	
Tonga	LL	5	5	1	
Tuvalu	LL	7	7	2	
Vanuatu	LL	4	4	1	1
TOTALS		219	215	58	37
LL	longline				
PL	pole-and-line				
PS	purse-seine				

Overview of TBAP activities

2.3.47 The TBAP followed on from the high profile SSAP with its major programme of field activities which included visits to every country in the SPC area. In comparison, the work programme of the TBAP has been less glamorous, but nevertheless important in different ways.

2.3.48 The knowledge and skills developed within the TBAP represent a repository of expertise available to the region which no individual country could provide for itself. This has enabled research into topics which would otherwise be impossible, and has made the results available to all countries. Unfortunately, as will be discussed in the next section, much of this expertise is being lost to the region because deterioration in the conditions of service for TBAP staff has caused a number of them to leave the Programme.

2.3.49 The major achievements of the TBAP have been the final country reports and analysis of tagging data, and the establishment of the data base.

2.3.50 While other parts of the Programme have individually been well carried out, there has been little achieved in the way of new research initiatives. The TBAP has latterly tended to drift along collecting few new data or making scientific advances.

2.3.51 The lack of a major field programme has been a major disappointment because new knowledge cannot be achieved without research data. This has also tended to isolate the TBAP from member countries and their needs. To try to remedy this situation activities have been added to its work programme which are not compatible with its original aims.

2.4 *Staffing, operation and management*

2.4.1 Since its beginnings the TBAP has been able to recruit high calibre, dedicated staff. In recent times the Programme has not been able to retain these staff; there is serious doubt that it will be able to recruit at its previous high levels in the future.

2.4.2 There are 15 positions in the TBAP (Table 4) of which 11 are at the professional level and 4 are support staff. Out of the 11 professional positions, 6 are currently vacant (July 1987). One of these vacancies is covered by a consultant on attachment from ORSTOM. One of the positions has been vacant for 5 years and another for more than 3 years.

2.4.3 Various reasons have been put forward as to why some positions have been vacant for long periods; these include lack of active recruitment and the use of salary savings to pay for equipment. One of the vacant positions will be transferred to the inshore fisheries research project.

2.4.4 During 1987 two senior staff have left 22 months and 16 months respectively before the end of their contracts. The Programme Co-ordinator will be leaving during August 1987, 14 months before his contract expires.

TABLE 4. Staff of the TBAP, July 1987.

<i>Designation of Established</i>	<i>Grade</i>	<i>Post Status</i>	<i>Needed 1987</i>	<i>Contract Expires</i>	<i>Salary CFP Francs Per Month</i>	<i>Name</i>
<i>Position</i>						
Co-ordinator	P Special	Filled	Yes	30.09.88	539073 (Departing Aug. 1987)	Dr J.R. Sibert
Senior Fisheries Scientist (Consultant)		Vacant	Yes	31.05.87	880/Day	Mr R. Pianet
Fisheries Scientist	P1	Vacant	Yes	08.01.89 (Departed March 1987)		
Fisheries Scientist	P1	Last occupied 1974				
Fisheries Statistician	P1	Vacant	Yes	(Last occupied Nov. 1986)		
Research Scientist	P2	Filled	Yes	08.02.88	316651	Mr J. Ianelli
Research Scientist	P2	Vacant	Yes	(Last occupied in 1982)		
Research Scientist	P3	Filled	Yes	30.09.88	339625	Mr R.S. Farman
Assistant Fisheries Statistician	P2	Vacant	Yes	04.03.87	334151	
Computer Systems Manager	P2	Filled	Yes	23.06.87	316651	Mr J. Stander
Programmer Research Assistant	P5	Filled	Yes	01.08.89	238539	Mr S. Taufao
Research Project Assistant	AT4	Filled	Yes	30.09.88	193651	Ms V. van Kouwen
Data Entry Technician	AT5	Filled	Yes	30.01.88	141028	Mlle H. Hnepeune
Data Entry Technician	AT6	Vacant	Yes			
Programme Secretary	S3	Filled	Yes	04.01.89	182294	Mme H. Wolfgramm Page

2.4.5 One of the support staff positions (data entry technician) is also vacant. This is an area where current workload is heavy.

2.4.6 The above situation is indicative of serious problems which have affected the ability of the TBAP to carry out its functions as effectively as it would have liked and to meet the requirements of SPC member countries.

2.4.7 Discussions with present and past staff have revealed a long list of problems which they see as contributing to this situation.

2.4.8 Within the TBAP there is seen to be a lack of leadership and direction, little team work and poor communications between staff.

2.4.9 Difficulties with the management structure of SPC and lack of support by past management have been repeatedly cited as contributing problems. These include: uncertainty about the budget; lack of delegation for financial and travel planning; lack of support staff; no continuity of employment or notice of contract renewal; publication of scientific papers outside SPC not permitted; reduction in salaries and downgrading of senior positions.

2.4.10 Another significant problem area is seen as being a lack of understanding of the long term research role of the TBAP within a large organisation whose main role is development and technical assistance and not research.

2.4.11 It is considered that several of the problems referred to above are real and have worsened during the latter years of the Programme. The cumulative effect is now such that the TBAP faces a crisis of confidence, both within itself, and as will be discussed in the next section, in the eyes of a number of the countries it serves.

3. ISLAND COUNTRY ASPIRATIONS AND NEEDS

3.1 *Introduction*

3.1.1 The countries visited during this study have been listed in section 1.4. None of them has a large domestic tuna fishery and only a few have significant DWFN activity within their zones. The views recorded in this section apply to the countries visited, which may not be representative of the full SPC membership. However, they are generally in agreement with those reported in phase one.

3.1.2 The aspirations and needs of island countries and how they have changed since the TBAP began its work have been fully described in the Curtin report. Findings during the second phase of the evaluation concur with his conclusions. In particular, the evolution from a generalised interest in stock assessment and fisheries interactions into the need for practical, development-oriented activities was apparent.

3.1.3 A difficulty encountered during the field studies was that not all of the countries were regular users of TBAP services or aware of the extent of its work programme. Some of them were therefore not able to comment in detail on the list of priority activities.

3.1.4 In a few cases countries had had almost no contact with the TBAP and had attended the RTMF only rarely in recent years. Despite this lack of contact, the consultants' visit revealed that there was an interest in the Programme and identified areas where its services were required.

3.1.5 Country views were obtained through interviews and question sessions. These covered not only the priority activities of the TBAP but also related issues on which countries may have had a strong interest. This sometimes included the full range of SPC fisheries activities. Views varied from country to country. Sometimes this variation was large resulting from different aspirations and the wide range of country size and level of economic development. In all cases government representatives were frank and helpful in putting their views across.

3.2 *Operation of the data base*

3.2.1 Out of 12 countries officially covered in this evaluation only 4 were supplying log sheets to the data base (Cook Islands, New Caledonia, Palau and Tuvalu).

3.2.2 Some of the countries viewed the data base from the perspective of its long term use for the scientific analysis of historical catches and stock assessment. Others viewed it as a source of information for economic or development purposes. One country mentioned the requirement under its fisheries law to monitor catches so that they did not overexploit the stocks, and the need for the data base to provide the figures which would be used in this analysis.

3.2.3 In the countries where US tuna policy applies no licencing of tuna vessels had taken place and no recording of catches is required. Despite this, the need was seen for a regional data base and the supplying of data to it was considered desirable.

3.2.4 The performance of the TBAP in handling the log sheet data and providing summaries and other analyses was considered satisfactory by two of the countries supplying data. The other two countries expressed disappointment about the timeliness of data summaries received but otherwise were happy with the quality of the output from it.

3.2.5 Further enquiries revealed that there were sometimes delays in despatching log sheets from countries; postal delays were another factor affecting timeliness. It also became apparent that there was a lack of knowledge on the amount of time which normally could be expected in log sheet processing.

3.2.6 The question of possible data duplication and whether the processing of log sheets should be transferred to FFA was commented on by most countries. There was a wide appreciation of the different purposes for which the data could be used - economic or scientific - and how this would affect the choice of location of initial processing.

3.2.7 Two countries felt that log sheets should be handled firstly by FFA; two considered that they should continue to be sent to the TBAP (one of these was strongly opposed to any move of the data base function to FFA). Three countries considered that the log sheets could go to either the TBAP or FFA (with full exchange of data) and the remaining countries had no view.

3.2.8 One non-Forum country felt that it would be severely disadvantaged if the data base were transferred to FFA. However, this country had supplied no data to the TBAP and had made little use of its services.

3.2.9 In another country the agency responsible for collecting log sheet data expressed the view that these were collected by its own scientists and that it was unreasonable to expect the results of their work to be handed over to another organisation (in fact no log sheets had been received from this source).

3.2.10 One important result from the country visits was that three countries which had not been involved with the data base previously indicated that they had data which they wished to contribute; another country already supplying log sheet data had historical landings data which could be added to the data base.

3.3 *Fisheries interactions and stock assessment*

3.3.1 Interest in these two TBAP activities is still paramount in the majority of countries visited.

3.3.2 Of particular importance are the effects of large-scale commercial fishing (purse seining was most frequently mentioned) on small-scale fishing at the artisanal, subsistence and recreational levels.

3.3.3 Although no data were produced to substantiate their arguments, two countries strongly felt that based on observations and reports from local fishermen depletion of stocks had occurred in their waters.

3.3.4 In another country fears were expressed of deleterious interactions even though no licensed tuna fishing was authorised in its waters.

3.3.5 In general, although countries were concerned about interactions they had received little or no information that was practically useful on this matter. The complexity of possible interactions was recognised, but the difficulty of providing a quantitative measure of them was not often appreciated.

3.3.6 Concerning stock assessment, countries were generally aware of the estimate of the stock size of skipjack for the whole region, but not of the extent of the resources in their own zones. Three countries expressed disappointment at not receiving in their final country reports hard figures on resource sizes and potential catch levels. The expectation that these figures would result from the SSAP tagging programme and have not, was identified as a reason for disenchantment with the TBAP, when it succeeded the SSAP.

3.3.7 Much has been written and is known about skipjack following the completion of the data analysis from the SSAP. However, little is perceived as being known about yellowfin, albacore or billfishes. Almost all countries visited had a collective desire to see further work done on stock assessment and monitoring the levels of exploitation of these stocks.

3.3.8 Particular mention was made of the need for information on billfish from four countries. This need encompassed both basic biology and exploitation levels.

3.3.9 The absence of an active field programme was highlighted by one country as a reason for the current lack lustre performance of the TBAP. Another country recalled with appreciation its involvement with field work during the SSAP and expressed the wish to be involved again when new field programmes begin.

3.3.10 Little mention was made by countries of stock assessments and catch levels produced by the TBAP from its data base. These are frequently presented at the RTMF in the review of the Programme's activities for the past year. As previously mentioned, not all countries have regularly attended this meeting which has undoubtedly contributed to this information gap.

3.4 *Other priority activities*

3.4.1 As mentioned in 3.1.3, some countries were not aware in detail of the TBAP's priority activities. This has not necessarily arisen because the activities are not relevant but may be due to a lack of communication. This matter will be taken up in the next section (3.5).

3.4.2 Knowledge of TBAP work on the biology and ecology of commercially important tuna and billfishes was scanty. However, two countries were appreciative of the Programme's involvement in their baitfish studies. Another country noted its desire for a baitfish survey to be carried out there.

3.4.3 Studies on billfish biology as already mentioned was another area where work was needed. More information on other by-catch species was identified as necessary by one country.

3.4.4 Of the countries that commented on observer programmes, all agreed on the need for them and their importance as an information gathering mechanism. The lack of suitable staff to undertake observer duties was seen as a barrier to utilising the training and assistance provided by the TBAP. Some concern was also expressed on the limited extent of the TBAP programme and disappointment that it had not included a particular country.

3.4.5 The forthcoming implementation of the multilateral treaty between Forum countries and the US is seen as requiring an increased input to this priority item and close collaboration between the TBAP and FFA.

3.5.6 The study of FADs in general is considered important in the pursuit of increased catches. Four countries commented in some detail on this activity and interest centred on the effective design of devices and the need for an understanding of the schooling behaviour of fish around FADs. The first of these topics was considered the more important. One country was anxious to find out the results of an earlier workshop on FAD construction, while another's programme had been affected by the existence of strong currents within its waters.

3.4.7 Provision of assistance in monitoring artisanal statistics was commented on by four countries. Two of them had used the services of the TBAP in setting up their data collection systems.

3.4.8 Both were appreciative of this assistance. However, one country became disenchanted with a requested follow-up review when this involved what were considered unnecessary procedural complications required by the SPC system.

3.4.9 A third country requested and received technical assistance for monitoring its subsistence fishery through the FAO regional fisheries programme.

3.4.10 A further country requested assistance from the TBAP for statistical advice relating to its research programme on molluscan resources. This request does not appear to be directly related to the TBAP work programme. However, the country concerned looked to the TBAP as its first source of assistance and was strongly disappointed in what it considered was a less than helpful response.

3.4.11 Training in quantitative methods was considered by almost all countries to be an important priority item. A few of the small countries had not participated in the training opportunities offered because they did not have anyone to send to them.

3.4.12 The statistics training course was viewed by one country as being at too low a level, while another considered it too advanced. Other countries were satisfied with its level and content.

3.4.13 Concerns were expressed at the utilisation of courses and workshops co-ordinated or sponsored by SPC, which were felt by one country to have been restricted to Noumea or the southern part of the SPC region. To improve this situation and ensure fuller participation by its own sub-region, the country concerned was prepared to host future courses.

3.5 *Communications and information services*

3.5.1 The outstanding feature of the country visits was the demonstration of the extent of the lack of adequate communication between countries and the TBAP (and other SPC activities). This situation was recorded in country after country.

3.5.2 Responsibility for this situation lies jointly with the TBAP, the SPC system and with countries themselves.

3.5.3 Almost all the countries expressed the need for visits by TBAP staff at least on an annual basis. This is particularly important for small countries where fisheries staff are few. When few staff have many responsibilities they can be reluctant to go through the lengthy procedural channels required for SPC visits.

3.5.4 Attendance at the RTMF has been difficult for some of the countries where the US budgetary system is in force. The end of the fiscal year occurs close to the time when RTMF is held (August). Available funds are frequently exhausted by then.

3.5.5 Several countries compared the contacts made by SPC staff unfavourably with those from other fisheries organisations working in the region (FAO, FFA). Staff from these agencies are seen as readily available when assistance is required, and able to come with a minimum of protocol. These staff also make informal visits to bring countries up-to-date with their activities and discuss country requirements.

3.5.6 In contrast, one country stated that SPC responses were timely and the procedures satisfactory.

3.5.7 The need for TBAP staff to travel to the member countries much more frequently is seen as the major finding of the field studies.

3.5.8 Reports and other documents from the TBAP were generally well received by countries but some criticism was made of the technical nature of research papers. Such documents were not well understood in places where there are no fisheries scientists. Because of this, their relevance was questioned.

3.5.9 It was considered by several countries that technical reports should be summarised into non-technical language and their significance explained in terms understandable to non-scientists.

3.5.10 A repeatedly expressed wish was for TBAP staff to visit countries following the publication of important studies relating to it. Such visits would give the opportunity to go through the results with fisheries and other government personnel.

3.5.11 As a result of such visits, the justification for the TBAP and its cost (which some considered high) could more easily be made at the political level.

3.5.12 The publication of selected research papers in established scientific journals was strongly encouraged by three countries. It was considered that this was appropriate because of the subject matter, and that it could bring international attention to the scientific work of the TBAP.

3.5.13 Problems were commented on in the receipt of communications and documents from SPC. This appears to be a matter for member countries' internal systems to rectify where it occurs. The results of the recent information needs study, which will be reported to the 1987 RTMF, may provide assistance in guiding fisheries staff to better cataloguing and use of printed material.

3.6 Management and personnel matters

3.6.1 All countries which had contact with TBAP staff commented favourably on their expertise and professionalism. In four countries which had peer group scientists, the standards of Programme work were highly commended.

3.6.2 A few negative comments were received about an apparent lack of leadership and drive, particularly in the inability of the TBAP to obtain the funds necessary for the yellowfin tagging programme.

3.6.3 The high rate of staff turnover concerned a number of countries and was blamed as a contributing factor in the TBAP's declining effectiveness.

3.6.4 Some concern was expressed in the reduction in salaries experienced by the TBAP and the downgrading of certain positions. A differing view was that future work by the TBAP may not require as many scientists and that some of its activities could be performed by staff with other qualifications.

3.6.5 It was suggested by one country that a reorganisation of duties and responsibilities within the TBAP and the SPC fisheries programmes as a whole may be a way to realign the situation.

3.6.6 Another suggestion to improve staff conditions was to consider a variable contract length. In cases where field programmes were undertaken, e.g. the proposed yellowfin tagging project which has a time scale of three years, the contract length could be the same as that for the project. This would be contingent on the funding being approved for the same period.

3.6.7 An annual technical revision of the TBAP by a small group of scientists was considered desirable by three countries. This should be carried out prior to the RTMF, and a report submitted to it for consideration. One country offered to provide a member for the scientific review team.

3.6.8 The RTMF itself was not considered to be a suitable forum for the technical review by two countries. One country felt that the RTMF was no longer a purely technical meeting as it used to be, and hoped that every effort would be made to return to its original purpose.

3.7 Benefits of the TBAP and its relevance to country needs

3.7.1 The major benefit of the TBAP to island countries is generally recognised as being the establishment of the regional data base. This frees administrations from the burden of processing and analysing a large amount of data for which they may have neither the computer facilities nor trained staff to handle. Furthermore, the standardised data forms and centralised processing system increases the cost effectiveness of data handling.

3.7.2 This benefit and its relevance to country needs is widely accepted, even by those members not presently providing information to the data base or with no foreign fishing vessels operating in their waters.

3.7.3 Other activities of the TBAP are frequently considered less relevant or practical. Two countries specifically stated that the Programme was not meeting their needs. This appears to be due to the way activities are carried out (or not carried out) and the way their results are communicated rather than the lack of relevance of the activities themselves.

3.7.4 From the lack of contact between some countries and the TBAP it could be assumed that there is no interest by these countries in the Programme, and that it is irrelevant to their needs. In a few cases this would appear to be true.

3.7.5 However, because a few countries do not use TBAP services does not make it of less benefit to other countries, or to the region as a whole. As one country spokesman put it, his country was a small player in the tuna game but he could see the importance of the TBAP to those others in which tuna fishing was a major industry.

3.7.6 To conclude this section we would like to record another view, expressed by a senior fisheries officer with scientific training. It was his view that the work of the TBAP forms the basis on which many of the present developments and initiatives in tuna fisheries by island countries have been founded.

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 *Introduction*

4.1.1 One of the terms of reference for this study was to "identify problem areas and make proposals for improvement". The previous sections have identified a number of problem areas. This section sets out proposals for improvements. During the country visits valuable suggestions were received from many people and a number of them are incorporated here. However, the responsibility for the final conclusions and recommendations remains that of the consultants.

4.1.2 Problem areas have been found in staffing and conditions of service, programme direction, programme content, relationships with member countries, and with management and efficiency. It is considered that improvements are needed in all rather than some of these areas, and the recommendations have been framed to form an integrated package.

4.1.3 The proposals in this section assume that the TBAP will remain at SPC until the end of its present period of operations in October 1991.

4.1.4 Of critical importance in achieving improvements is acceptance of the need for change.

4.2 *Long term research needs*

4.2.1 The value of long term tuna research is difficult to measure. It is much less obvious than the tangible evidence of development projects, such as vessels, equipment and infrastructure, increased catches or employment. The problem of justification faces many fisheries research programmes, as it does the TBAP. It can be reduced by careful planning of goals, objectives and work programmes.

4.2.2 Country attitudes to the need for long term research appear to be contradictory. On the one hand the quick results of short term projects are desired, and the TBAP has been criticised for not providing them. At the same time none of the countries consulted disputed the need for long term research, and all but one positively recognised its importance.

4.2.3 The reason for this contradiction appears to be the expectation that the TBAP combine research, advisory, training and development functions. It is considered that the principal role of the TBAP should be research, and that the other functions, which are no less important, should be carried out through other parts of the SPC fisheries programme.

4.2.4 The need for long term research is perceived as important because of the value of tuna resources to the region, even if for some countries this value is only a potential one at this time. In addition to acknowledging this research requirement, countries also considered that it should be carried out by an organisation responsive to their needs and representative of all of them.

4.2.5 To assist in defining long term research needs we agree with Curtin that the TBAP should have a mission statement which describes its overall goals.

4.2.6 It has been stated by SPC (CRGA 7 WP.8) that the TBAP already has a mission statement in the form of the project summary which accompanies the TBAP budget proposals as presented to the CRGA. It has been further stated that the TBAP's primary mission is "to conduct biological research". If this is so, then the activities of the Programme do not match its goals since the TBAP's own analysis of staff time shows only 15% is spent on biological research. The compiling and maintenance of a regional data base of fisheries statistics is not conducting biological research (52% of staff time), nor are many of its other activities.

4.2.7 To resolve the above contradiction, which is indicative of confusion in Programme direction, a new mission statement should be prepared for the TBAP. This should be framed to take into account its expected future activities, including any changes which may result from the extensive review procedures, of which this evaluation is part.

4.2.8 A number of research areas were identified during this evaluation. Many of them are included in some form within the present list of activities. What is needed is for these generalised ideas to be translated into a programme of research. Finite objectives and a time scale are required.

4.2.9 Important research areas identified which require long term study include the following:

- (1) Tagging studies – yellowfin and albacore (stock assessment, movements, fishing rates, biology, interactions between surface and longline fisheries);
- (2) Tagging studies – skipjack (effects of purse seine fishing);
- (3) Monitoring of catches, catch rates and fishing patterns (including use of scientific observers);
- (4) FAD studies;
- (5) Billfish research (use of scientific observers to monitor catches, collect biological data);
- (6) Re-evaluation of skipjack tagging and biological data (particularly movements and stomach content analysis).

4.2.10 Concerning the yellowfin tagging programme, progress has been made and it appears likely that funding will be available, although timing is still unclear. The need for this project was frequently emphasised during the field work for this report. Also noted were some reservations about the operation and likely results of the project as presently planned. Doubts were raised about the ability to tag the required number of fish for meaningful results to be obtained. Not only are yellowfin less abundant in catches during surface fishing than skipjack, but the recovery rate is expected to be lower than during the SSAP. This is because the major part of the surface catch is now taken by purse seiners (where many tags pass unnoticed), whereas during the SSAP pole-and-line fishing was the main fishing method.

4.2.11 A new Programme Co-ordinator and Senior Scientists will have to be recruited before the yellowfin tagging project begins. To be fair to these new staff, who will be responsible for the implementation of a major project, it is thought advisable that an opportunity is given to review and modify if necessary its proposed methods and operational plan.

4.2.12 Much of the past scientific work of the TBAP has been of more value to the countries of the western central Pacific than other parts of the SPC region. The yellowfin tagging project will be centred in this area too. To counterbalance this it is suggested that an albacore research programme based on tagging should be considered. There are a number of countries in the eastern and southern parts of the SPC region (and also Australia and New Zealand) which would benefit from such a programme and have expressed interest in one.

4.2.13 The current co-ordination of research efforts on albacore which was mentioned in 2.3.25 is to be commended but cannot be considered sufficient to meet research needs. It is considered that a co-ordinated tagging project on a sub-regional basis carried out by the TBAP is more likely to provide the results required.

4.2.14 Because of the likely increase in surface fishing for albacore in the near future an early start to an albacore project seems desirable. However, funding and staffing requirements will need to be evaluated as well as the capability of the TBAP to handle such a project concurrently with its yellowfin tagging.

4.2.15 The major changes to the skipjack fishery since the time of the SSAP suggest that further tagging would be useful to detect changes in exploitation rates or fishing patterns, and interactions with small-scale fisheries. The reported (but unsubstantiated) reduction in skipjack abundance and average size in the north-western part of the SPC region since the introduction of purse seining is an area where studies are indicated.

4.2.16 Monitoring of catches will be an ongoing activity of the TBAP. There are major gaps in data from high seas areas and zones where US tuna policy is in force. It has already been recommended by Curtin that a meeting with DWFNs be called to improve this situation. It would seem desirable that this meeting be delayed until there is a resolution of the roles of the SPC and FFA data bases. If the FFA takes over the primary handling of the log sheets and SPC is provided with processed data for scientific purposes this may assist the TBAP in obtaining high seas data, when it is clear they will be used only for scientific purposes.

4.2.17 It is suggested that the TBAP produce on an annual basis maps showing summaries of catches for the SPC region for the principal tuna and billfish species.

4.2.18 The use of FADs and other floating objects in conjunction with tuna fishing is so important in the SPC region that some kind of research or involvement by the TBAP is likely on a long term basis. This has been indicated by several member countries. In addition to field studies, which may be carried out by the TBAP, the Programme could also play a role in information exchange.

4.2.19 Several workshops have been organised by SPC on the construction and deployment of FADs. A related workshop bringing together scientists, fisheries personnel and fishermen, and devoted to an exchange of ideas on how FADs attract fish, where they should be placed in relation to depth or to each other, and how frequently they can be fished, etc., would provide useful guidelines for any field work to be undertaken.

4.2.20 Research on billfish was a topic raised on several occasions by member countries. It was originally included in the list of priorities because of concern at the level of catches taken by longliners. For a number of years after this it seemed as if longline catches (particularly by albacore vessels) were in a permanent decline and pressure on billfish stocks was reducing. More recently longline catches have increased again and at the same time purse seiners have been recording an incidental catch of billfish.

4.2.21 The TBAP has never been actively involved with research on billfish and unless a specific programme is formulated it appears that this situation is likely to continue. It is suggested that after consultation with interested parties, some research priorities and a programme of field work be drawn up.

4.2.22 Research on billfish is likely to be of interest also to scientists in Australia and New Zealand where there are established gamefish industries based on what are probably shared stocks with the southern parts of the SPC region. A comparable situation exists in the northern areas.

4.2.23 A further area of ongoing research which has been suggested is a re-evaluation of the skipjack tagging data. This does not in any way imply that there are shortcomings in previous work. However, it is possible that fresh analyses of tag return data may enable more understanding to be gained of the nature and patterns (if any) of skipjack movements, which were never convincingly resolved in earlier published reports.

4.2.24 Before concluding this consideration of long term research needs we wish to emphasise that studies undertaken by the TBAP should be aimed at providing outputs of practical value to SPC countries and should not be research of an academic nature.

4.2.25 To summarise this section, two recommendations are proposed:

Recommendation Number 1

It is recommended that a mission statement be prepared for the TBAP setting out its goals and scope of operation.

Recommendation Number 2

It is recommended that a work programme with specific objectives be prepared for the TBAP. This programme should have a time scale and expected output, and the relationship of its objectives to the mission statement should be clearly indicated.

4.3 Data base

4.3.1 The problems over the data base – the extent of future duplication of effort – whether the log sheets should be processed by the TBAP or FFA, or some combination of the two – will continue to cloud the future of the TBAP until satisfactorily resolved.

4.3.2 The data base function was originally assigned to the TBAP because there was no regional organisation outside SPC which could at that time have handled the task. Since then, FFA has established itself as a dynamic and effective body. If the site of the data base were to be decided today there is a choice of location not previously available.

4.3.3 When the FFA data base becomes operational, the likely situation for handling the log sheets will be unsatisfactory. It appears that the TBAP data base will receive log sheets from all member countries (which presently supply them) except for two that have indicated that they will forward them to FFA. These log sheets will cover domestic vessels, and foreign vessels excluding US vessels. The FFA data base will receive log sheets from all its member countries where US vessels fish, and in addition, all log sheets from two countries. Thus each data base will be incomplete unless there is a full exchange of data.

4.3.4 As discussed previously, the use of data from the log sheets by member countries is now primarily for economic purposes. It follows from this that there are good reasons for making the organisation responsible for economic matters (FFA) the one which receives and processes the source documents.

4.3.5 A possible solution to the looming duplication problem would be for FFA to handle all log sheets, landings and observer data, and produce summaries as required on behalf of member countries. This would be dependent on FFA being capable of handling the greatly increased volume of data that would be involved, and being willing to do so. The data would require to continue to be collected in a suitable form for scientific analysis and made available to the TBAP for that purpose.

4.3.6 Inputs to the two data bases could then be:

FFA	SPC(TBAP)
Log sheets	Processed log sheet and landings data (from FFA)
Landings records	Tagging data
Observer records	Research cruise data
	Biological, effort data from scientific observer or landings studies
	Historical data
	High seas data

4.3.7 Under this division FFA would hold all the data relating to catches and values of catches within the EEZs of its member. The TBAP would also hold these data in agreed processed form plus additional research data collected through its own activities. It would in addition collect available data on high seas catches.

4.3.8 The position of the island members of SPC, who are not members of FFA, should also be considered in relation to the above scheme. Until now only one of the seven has supplied any data to the TBAP. As the vast majority of log sheets comes from Forum countries, the practical effects of any change in data base processing are likely to be small. Furthermore, the TBAP could continue to receive log sheets from non-Forum members of SPC.

4.3.9 The output from the two data bases under the above scheme would be complementary. From the FFA data base would come summaries of catches, catch values and economic analyses. These would frequently be required quickly and mostly for individual countries. Output from the TBAP data base would include stock evaluations, analyses of fisheries interactions, catch/effort trends, and other fisheries and biological analyses. These outputs would meet long term research needs and be largely regional in application.

4.3.10 Discussions with FFA indicated that its facilities would be able to process all log sheets within an 18-month to 2-year period from now.

4.3.11 Although any change to the present situation is some time away, we consider that the data base question needs to be dealt with urgently. This is necessary to resolve the present uncertainty and enable forward planning for computer and staff requirements which will directly affect recruitment by both organisations.

4.3.12 We have set out the situation as we see it and put forward our assessment. However, because the matter does not lie directly within the terms of reference for this study, we do not think it appropriate to make a specific recommendation, other than:

Recommendation Number 3

It is recommended that SPC consult urgently with FFA and member countries to resolve the likely duplication of effort concerning the collection and processing of tuna log sheet data resulting from the Forum Fisheries Committee decision to establish a data base at FFA, and to define the roles of the two data bases.

4.4 *Integration of SPC fisheries programmes*

4.4.1 The TBAP's predecessor, the SSAP, started off as an extra-budgetary project attached to SPC. This was at a time when almost all SPC programmes were funded from the core budget. The funding situation set the SSAP somewhat apart from other parts of the SPC work programme. This situation continued during the early years of the TBAP. The TBAP is still funded from extra-budgetary sources but from general funds made available to SPC, and not specific to the TBAP.

4.4.2 The integration of the TBAP into the mainstream of SPC activities has now been achieved, but has not yet been accompanied by a similar integration of all the component activities in the SPC fisheries programme.

4.4.3 Over recent years there has been major growth in the fisheries programmes, which in addition to tuna and billfish, include coastal fisheries development, training, fish processing, and information services. A further component will shortly be added with the inshore fisheries project. As a result of these developments, it is considered that the appointment of a Fisheries Co-ordinator responsible for all SPC fisheries activities is needed.

4.4.4 The functions of the Fisheries Co-ordinator would be to provide overall co-ordination and direction to the fisheries programmes and through on-going liaison with island countries ensuring that the programmes are responsive to their needs. He would also be responsible for identifying and obtaining funds for fisheries projects.

Recommendation Number 4

It is recommended that a Fisheries Co-ordinator responsible for all SPC activities in fisheries, including the TBAP, be appointed.

4.4.5 The appointment of a Fisheries Co-ordinator would permit the present position of Tuna Programme Co-ordinator to be redesignated Chief Tuna Scientist. This would remove some of the conflicting demands apparent in the present role expected of the Tuna Programme Co-ordinator and which have become a problem area.

4.4.6 Together with the appointment of a Fisheries Co-ordinator some reorganisation of the activities of the TBAP is needed. It is considered that priority 7 (Provision of assistance to countries in the implementation of appropriate systems to monitor artisanal and subsistence fisheries) be transferred to the inshore research project. This has already been recommended by the 1986 RTMF.

4.4.7 Despite its low rating on the original priority list this activity has frequently been raised as an important one, particularly by the small island states. Its attachment to a project working in the same resource area is more appropriate than to the TBAP. This change should enable increased effort and priority to be achieved in relation to this activity.

Recommendation Number 5

It is recommended that responsibility for priority activity 7 (dealing with artisanal statistics) be transferred from the TBAP to the inshore research project of SPC.

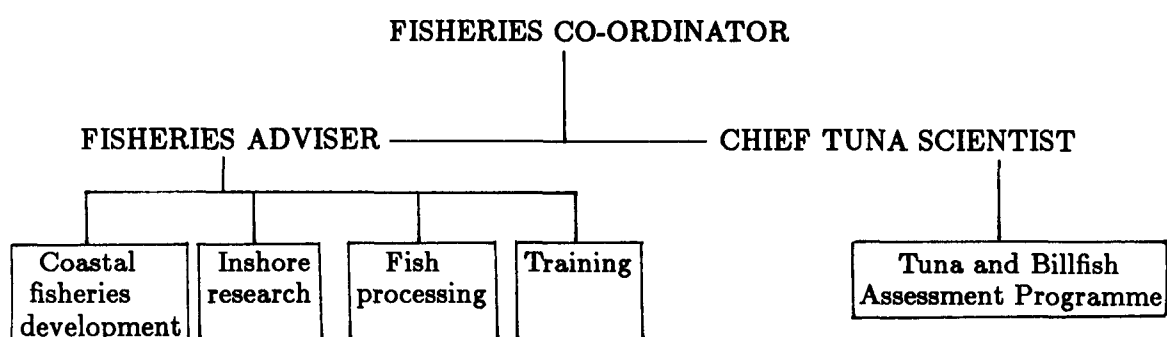
4.4.8 Another activity considered to be more appropriately located elsewhere is priority 8 (Provision of assistance to countries in training fisheries biologists in various aspects of quantitative methods).

4.4.9 The organisation of this activity should be the responsibility of the SPC Fisheries Training Officer as part of the wider programme of training in the field of fisheries. That is not to say that TBAP staff would have no role to play in this activity as they could well be involved as lecturers or in other technical areas.

Recommendation Number 6

It is recommended that responsibility for priority activity 8 (dealing with training) be transferred from the TBAP to the SPC Fisheries Training Officer.

4.4.10 A summary of the proposed changes is given in the organisational chart below.



4.4.11 The work areas and priorities of the TBAP have for a number of years been decided by the RTMF. It is considered that this is the correct procedure and should be continued.

Recommendation Number 7

It is recommended that the work programme and priority activities of the TBAP be set by the RTMF.

4.4.12 To assist this process it would be helpful if countries were consistent in their attendance at the RTMF and were represented by senior level staff.

4.4.13 The length of the RTMF has not changed for many years while the size and scope of the SPC fisheries programmes have increased greatly. This leads to a crowded agenda and frequently a shortage of time to discuss matters fully.

4.4.14 It does not seem practical to increase the length of the meeting. To assist countries in reviewing the many projects to be discussed, it would be helpful if working papers on the TBAP include detailed accounts of its activities and are circulated several weeks in advance of the RTMF.

4.4.15 In reviewing TBAP activities at the RTMF, account should be taken of the long term nature of some of them, and that it is not desirable to make major changes at short notice. This is not to say that redirection of the Programme may not be necessary from time to time.

4.4.16 A second level of input to the work of the TBAP is proposed through the establishment of a scientific committee on tuna (SCOT). The functions of the committee would be to review and guide the scientific work of the TBAP and to report to the RTMF.

4.4.17 The reasons why such a committee is considered necessary include the following:

- (1) SPC is not a research organisation with its own system of peer review;
- (2) TBAP scientists are a small, relatively isolated group;
- (3) TBAP has a high turnover of staff;
- (4) With the reduction in salaries and grading it is likely more junior staff will be recruited in future years;
- (5) Input from tuna scientists from other places will benefit the work of the TBAP.

4.4.18 It is considered that the composition of the committee should be restricted to scientists as it is a technical review body, and not a policy-making one. A suggested make up of the committee is as follows:

SPC Fisheries Co-ordinator (or Tuna Programme Co-ordinator*)
Chief Tuna Scientist (or Senior Fisheries Scientist*)
(3) SPC island country scientists
FFA Research Co-ordinator
FAO (tuna fisheries expert)
(3) Invited experts

* Depending on whether Recommendation Number 4 is accepted

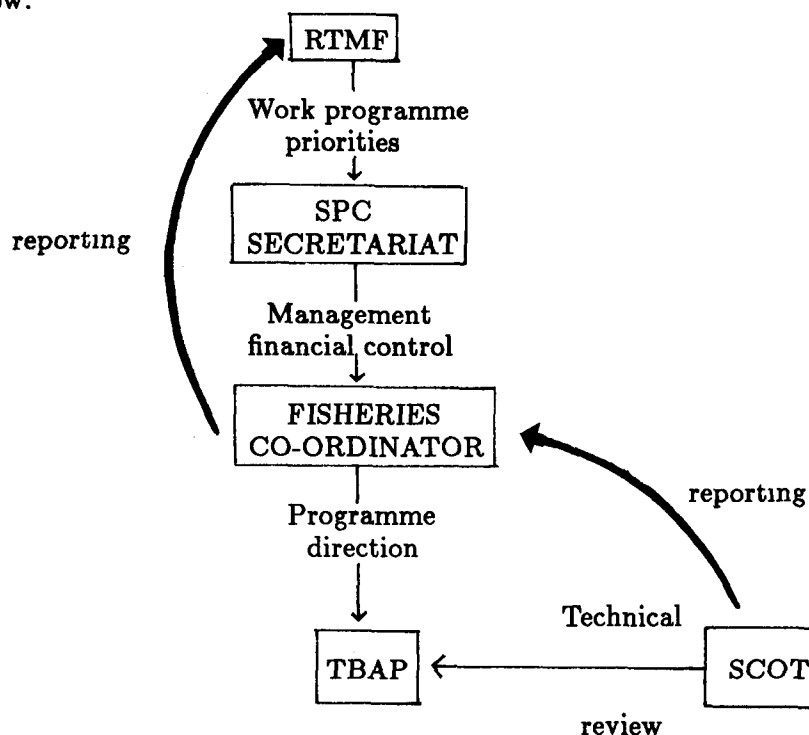
4.4.19 It is considered that the committee should be kept small (maximum 10 persons and appointed for a period of 2 or 3 years and be chaired by the SPC Fisheries Co-ordinator (or Tuna Programme Co-ordinator).

4.4.20 Nominations to the committee would be made by member countries or the TBAP. One of the island country scientists should be from a French-speaking country. The invited experts could be from research institutions of SPC member countries or from tuna organisations elsewhere in the world. Funding should be budgetted specifically for SCOT.

Recommendation Number 8

It is recommended that a scientific committee on tuna be appointed to act as a technical review body to the TBAP and to assist it in its work.

4.4.21 The proposed inputs to the TBAP would then be as shown in the organisational chart below:



4.4.22 The above organisational system will fit in the usual way within the overall control of CRGA and the South Pacific Conference.

4.5 Communications, advisory and information services

4.5.1 The communication of the results of the TBAP to member countries through its publications will continue to be an essential part of its output. It is considered that although past standards have been high there are areas where changes could be made which would benefit both TBAP staff and the users of its publications.

4.5.2 The SPC policy on scientific publications by the TBAP has in the past effectively amounted to a prohibition on publication outside its own system. This policy has been good neither for the TBAP and its staff nor for SPC as an organisation. Among the disadvantages of the present system are that it:

- (1) Results in scientific papers appearing in an inappropriate format (e.g. as part of a technical report series);
- (2) Targets the wrong audience with resulting negative feedback (e.g. when fisheries officers receive papers on population modelling);
- (3) Misses many of the audience to which it should be directed (copyrighting of publications further reduces the flow of scientific information);

- (4) May result in lower standards;
- (5) Does not protect the career aspirations of the TBAP scientists (who must within six years resume their scientific work elsewhere).

4.5.3 To overcome these problems it is suggested that a more flexible policy be adopted which better suits the needs of SPC, the TBAP and member countries. The suggested policy is:

- (1) Country reports, data reports, observer trip reports, descriptions of methods, etc., continue to be published in the Technical Report series;
- (2) Scientific papers be published in appropriate journals (such as the marine science or fisheries journals of the donor countries);
- (3) A scientific bulletin series be started to publish important scientific works which are too long for journal publication. This series would be published under the name of SPC but would be contracted out for editing and printing. Bulletins would be refereed externally;
- (4) Budgetary provision be made for publication costs in the funding for the TBAP.

4.5.4 The advantages of the proposed policy are perceived as:

- (1) Enabling the appropriate audience to be targeted for by the different types of publications produced by the TBAP;
- (2) Encouraging the publication of scientific results and the highest possible standards;
- (3) Enhancing the reputation of the TBAP in the scientific community and the reputation of SPC as a centre for tuna research.

4.5.5 Nothing in the foregoing is meant to suggest that writing scientific papers should be the main aim of the TBAP, or reduce its output in other areas.

4.5.6 If the above policy is adopted, the great majority of publications would still be produced by SPC. From the list given in Appendix 2, only six technical reports (nos. 8-13) have been identified as suitable for publication in scientific journals or as bulletins.

Recommendation Number 9

It is recommended that SPC review its policy on publications of the TBAP and permit publication of scientific results in outside journals where appropriate.

4.5.7 There is also the important need for scientists to communicate the results of their work to fisheries managers in a language they understand, as was specifically mentioned during country visits.

4.5.8 It is considered that for each major technical or scientific document produced by the TBAP a summarised version in non-technical language is required.

Recommendation Number 10

It is recommended that summaries be produced in non-technical language of all major TBAP scientific reports.

4.5.9 Such summaries could be included in the Fisheries Newsletter or sent direct to countries. It is also suggested that each edition of the Newsletter should contain a list of all fisheries publications occurring since the previous issue.

4.5.10 Also important in communicating the results of TBAP activities are follow-up visits after the completion of field studies or other major work on behalf of countries. At the time that the report is published, the staff member responsible should visit the country to explain and discuss its results with fisheries and other government personnel. This is considered an essential part of the whole exercise and should be included in the project budget.

Recommendation Number 11

It is recommended that following important work done on behalf of countries and on publication of the report, the TBAP staff member responsible visit the country concerned to discuss the results with government officials.

4.5.11 It is also suggested that each project done on behalf of a country should be costed in terms of salary, travel, and other expenses. This information should be supplied to the country on completion of the work.

4.5.12 Another area which needs to be addressed is the general communications between the TBAP (and other SPC fisheries projects) and countries. For those countries making good use of SPC services, there is regular contact through different programme officers. In other cases this is not so, and there are real barriers to communication in some places.

4.5.13 The following discussion (4.5.14) assumes that a Fisheries Co-ordinator will be appointed by SPC (Recommendation Number 4).

4.5.14 It is considered essential that the Fisheries Co-ordinator should make regular visits (perhaps annually) to most member countries. The purpose of these visits would be to consult with countries on the range of SPC services in fisheries, provide advisory services and assist local fisheries staff in preparing applications or project documents for requesting SPC services. At the same time, the Fisheries Co-ordinator could be apprised of local fisheries activities or problems.

Recommendation Number 12

It is recommended that the SPC Fisheries Co-ordinator make regular visits to member countries to ascertain their needs and discuss ways in which the SPC fisheries programmes can assist them.

4.5.15 If a Fisheries Co-ordinator is not appointed, it is suggested that the same recommendation apply, but that the Tuna Programme Co-ordinator carry out these functions in relation to the TBAP only.

4.6 Staffing, management and financial issues

4.6.1 Staffing requirements of the TBAP need to be reviewed and reassessed in light of changing circumstances and its future work programme and direction.

4.6.2 Factors to be taken into account include: any changes to TBAP work activities (e.g. if Recommendations Numbers 5 and 6 are adopted); the nature of new long term research work undertaken (e.g. requirements for field staff); any reorganisation of fisheries activities within SPC (appointment of a Fisheries Co-ordinator); any change in responsibility in relation to the regional data base function.

Recommendation Number 13

It is recommended that the staffing requirements of the TBAP be reviewed taking into account planned future activities and any reorganisation of SPC fisheries projects as a whole. In this review new job descriptions should be prepared for each post relating each of them to the priority activities of the TBAP.

4.6.3 Concern has been expressed both from countries and by TBAP staff about the effects of decreased salaries and down-grading of posts. The suggested review above will give an opportunity to consider this and could also take note of the success or otherwise of recruiting suitable people for the current vacancies.

4.6.4 In the event that unfilled positions occur because of salary problems, the Secretary-General has the power to make necessary adjustments under existing SPC regulations.

4.6.5 Another area which could help to improve staff conditions and reduce turnover in the TBAP is to appoint new staff for a period of three years. Since the TBAP is scheduled to continue at SPC until October 1991 this would provide increased security to staff and at the same time remain within the project time scale.

Recommendation Number 14

It is recommended that consideration be given to appointing TBAP staff on contracts of 3 years.

4.6.6 The involvement of island country fisheries staff in the work of the TBAP is an area where a lot of progress has been made in recent years, and the Programme is to be commended for this.

4.6.7 It is considered that the aspect of TBAP work should be strengthened by formalising it in some way so that it is an integral part of the Programme rather than an *ad hoc* one. This could be done by making budgetary provision through the TBAP or by arrangement with organisations, such as FAO, to fund a fellowship position on a regular basis.

Recommendation Number 15

It is recommended that provision of funds for attachment fellowships to the TBAP be made as a regular part of its budget.

4.6.8 It is suggested that attachment fellowships should target two levels. Firstly, short term attachments of 3-6 months for technical officers. The aim would be to familiarise them by hands-on experience with TBAP activities on the data base, statistical programmes, etc.

4.6.9 At a different level it is considered that island country scientists should also be attached to the TBAP. This attachment should be for a longer period, perhaps one year, with the aim of providing post-graduate experience in a research environment.

4.6.10 The suggestion above assumes that suitable personnel would be available for this attachment. A common concern expressed by many countries was difficulty in interpreting scientific results. In the longer term it would be in the interest of countries in their pursuit of self reliance to plan for the recruitment of fisheries scientists for their own government fisheries services. SPC may have a role in assisting this process.

4.6.11 Strong support by the SPC management for the TBAP and a close working relationship with it through the Fisheries Co-ordinator (or Tuna Programme Co-ordinator) is essential for the TBAP to successfully meet the many challenges which confront it.

4.6.12 Concern was expressed in the Curtin report about the lack of financial delegation to the Tuna Programme Co-ordinator in respect of the Programme budget. However, it appears neither practical or desirable that existing SPC procedures be changed in this regard. If the close co-operation mentioned above is maintained, no difficulties over financial control are likely to occur.

4.6.13 This process would be assisted by the preparation of a detailed annual budget by the TBAP and discussion and approval of it in principle by management.

4.6.14 On a wider scale, the continued work and credibility of the TBAP requires the assurance of the allocation of the necessary funds from the SPC budget for its core functions over its scheduled duration. Included in this should be an increased provision for duty travel (see Recommendations Numbers 11 and 12). Special projects, such as the yellowfin tagging programme, would continue to be funded on an individual basis.

4.6.15 To conclude this section, two recommendations are proposed:

Recommendation Number 16

It is recommended that sufficient funds be allocated from the SPC budget to meet the cost of the core functions of the TBAP for its scheduled duration.

Recommendation Number 17

It is recommended that increased funds be allocated within the TBAP budget for travel by Programme staff.

4.7 Assistance from countries and organisations

4.7.1 The results of this evaluation clearly show that much is expected of the TBAP. Many countries depend on the effective execution of its activities to meet their needs and aspirations in tuna fisheries development.

4.7.2 It is heartening in this regard to note the resolve by SPC management to adopt schemes and approaches which will have the flexibility to make effective and timely responses to the needs of its members.

4.7.3 It appears, however, that the above attempt would be incomplete without the corresponding support of member countries. The TBAP served countries well when they were groping in the dark for answers to their fisheries problems. It can continue to do so with their renewed assistance.

4.7.4 Ways through which countries can assist the TBAP include timely input of data, improved communications, constructive criticism and release of staff to work with the Programme.

4.7.5 Organisations can assist through proper co-ordination of their work programmes, avoidance of duplication and free exchanges when required. The overall aim would be to assist the region as a whole.

5. ACKNOWLEDGEMENTS

We gratefully acknowledge the assistance received from fisheries staff, government officials and representatives or organisations during this study.

We also thank the Secretary-General of the South Pacific Commission, the staff of the Tuna and Billfish Assessment Programme and other officers of the Commission for their help and logistical support.

APPENDIX 1: PERSONS CONSULTED

New Caledonia

Mr Philippe du Coedic de Kergoaler, Chef de la Marine
Marchande et des Pêches Maritimes
Mr Max Palladin, Service des Pêches
Mr Bernard Viu, Service des Pêches

South Pacific Commission

Mr P. Tuiososopo, Secretary-General
Mr Jon Jonassen, Director of Programmes
Mrs Hélène Courte, Deputy Director of Programmes
Dr John Sibert, Tuna Programme Co-ordinator
Mr Richard Farman, Research Scientist
Mr James Ianelli, Research Scientist
Mr Brian Moore, Assistant Fisheries Statistician
Mr Bernard Smith, Fisheries Adviser
Mr Garry Preston, Assistant Fisheries Officer
Mr Robert Powell, Assistant Finance Officer

ORSTOM (Noumea)

Mr Renaud Pianet, Research Scientist (attached to TBAP)

French Polynesia

Mr Bruno Ugolini, Chef, Département de Pêche
Mr Pierre Marchesini, Directeur Général, POMAFREX S.A.

ORSTOM (Tahiti)

Mr Jacques Chabanne, Acting Director

Cook Islands

Mr Julian Dashwood, Secretary, Ministry of Marine Resources
Mr Neil Sims, Senior Fisheries Research Officer
Mr Colin J. Brown, Director of Fisheries Management

Western Samoa

Mr Mike McCoy, Fisheries Adviser

Tokelau

Mr Foua Toloa, Director of Agriculture and Fisheries (at Apia)

Pitcairn Islands

Dr Nick Willoughby, Fisheries Adviser, British Development
Division in the Pacific (at Suva)

Fiji

Dr Antony D. Lewis, Principal Fisheries Officer

FAO (Suva)

Mr Robert Gillett, Fisheries Development Adviser

Tuvalu

Mr Elisala Pita, Chief Fisheries Officer

Marshall Islands

Mr Steve Muller, Chief, Resources and Development

Northern Mariana Islands

Mr Arnold I. Palacios, Chief, Division of Fish and Wildlife

Mr Patrick Bryan, Fisheries Biologist

Mr Nicolas Guerrero, Director, Department of Natural Resources

Mr Ray Guerrero, Special Assistant to the Governor for Administration

Guam

Mr William Fitzgerald, Chief, Division of Economic Development and
and Planning, Department of Commerce

Mr Harry Kami, Chief, Division of Aquatic and Wildlife Resources

Dr Steven Amesbury, Associate Professor of Biology, University of Guam

Dr Paul Callaghan, Associate Professor of Economics, University of Guam

Mr Jerry Perez, Economist, Division of Economic Development and Planning

Palau

Mr Victorio Uherbelau, Special Assistant to the President,
Director of Bureau of Foreign Affairs

Mr Toshio G. Paulis, Chief, Marine Resources Division

Mr Marhence Madranchar, Executive Director, Palau Maritime Authority

Nauru

Mr Pochon Lili, Senior Project Officer (Fisheries), Department
of Island Development and Industry

Forum Fisheries Agency

Mr Philipp Muller, Director

Niue

Mr John Barnes, Fisheries Officer

APPENDIX 2: LIST OF PUBLICATIONS BY THE TBAP

A. Final Country Reports (SSAP)

- C1 KEARNEY, R.E. (1982). An assessment of the skipjack and baitfish resources of Fiji. Skipjack Survey and Assessment Programme Final Country Report No.1, South Pacific Commission, Noumea, New Caledonia, viii + 47 pp.
- C2 LAWSON, T.A. and R.E. KEARNEY (1982). An assessment of the skipjack and baitfish resources of the Cook Islands. Skipjack Survey and Assessment Programme Final Country Report No.2, South Pacific Commission, Noumea, New Caledonia, vii + 28 pp.
- C3 ARGUE, A.W. and R.E. KEARNEY (1982). An assessment of the skipjack and baitfish resources of Solomon Islands. Skipjack Survey and Assessment Programme Final Country Report No.3, South Pacific Commission, Noumea, New Caledonia, x + 73 pp.
- C4 ARGUE, A.W. and R.E. KEARNEY (1982). An assessment of the skipjack and baitfish resources of Pitcairn Islands. Skipjack Survey and Assessment Programme Final Country Report No.4, South Pacific Commission, Noumea, New Caledonia, vii + 39 pp.
- C5 KLEIBER, P. and R.E. KEARNEY (1983). An assessment of the skipjack and baitfish resources of Kiribati. Skipjack Survey and Assessment Programme Final Country Report No.5, South Pacific Commission, Noumea, New Caledonia, vii + 49 pp.
- C6 ARGUE, A.W. and R.E. KEARNEY (1983). An assessment of the skipjack and baitfish resources of New Zealand. Skipjack Survey and Assessment Programme Final Country Report No.6, South Pacific Commission, Noumea, New Caledonia, ix + 68 pp.
- C7 GILLET, R.D. and R.E. KEARNEY (1983). An assessment of the skipjack and baitfish resources of French Polynesia. Skipjack Survey and Assessment Programme Final Country Report No.7, South Pacific Commission, Noumea, New Caledonia, ix + 81 pp.
- C8 ELLWAY, C.P., R.S. FARMAN, A.W. ARGUE and R.E. KEARNEY (1983). An assessment of the skipjack and baitfish resources of Tuvalu. Skipjack Survey and Assessment Programme Final Country Report No.8, South Pacific Commission, Noumea, New Caledonia, vii + 47 pp.
- C9 TUNA PROGRAMME (1983). An assessment of the skipjack and baitfish resources of the Republic of Vanuatu. Skipjack Survey and Assessment Programme Final Country Report No.9, South Pacific Commission, Noumea, New Caledonia, vii + 41 pp.
- C10 TUNA PROGRAMME (1983). An assessment of the skipjack and baitfish resources of Tokelau. Skipjack Survey and Assessment Programme Final Country Report No.10, South Pacific Commission, Noumea, New Caledonia, vii + 41 pp.

- C11 TUNA PROGRAMME (1983). An assessment of the skipjack and baitfish resources of the Kingdom of Tonga. Skipjack Survey and Assessment Programme Final Country Report No.11, South Pacific Commission, Noumea, New Caledonia, viii + 53 pp.
- C12 TUNA PROGRAMME (1984). An assessment of the skipjack and baitfish resources of Papua New Guinea. Skipjack Survey and Assessment Programme Final Country Report No.12, South Pacific Commission, Noumea, New Caledonia, x + 91 pp.
- C13 TUNA PROGRAMME (1984). An assessment of the skipjack and baitfish resources of Nauru. Skipjack Survey and Assessment Programme Final Country Report No.13, South Pacific Commission, Noumea, New Caledonia, vii + 29 pp.
- C14 TUNA PROGRAMME (1984). An assessment of the skipjack and baitfish resources of Western Samoa. Skipjack Survey and Assessment Programme Final Country Report No.14, South Pacific Commission, Noumea, New Caledonia.
- C15 TUNA PROGRAMME (1984). An assessment of the skipjack and baitfish resources of Niue. Skipjack Survey and Assessment Programme Final Country Report No.15, South Pacific Commission, Noumea, New Caledonia.
- C16 TUNA PROGRAMME (1984). An assessment of the skipjack and baitfish resources of Eastern Australia. Skipjack Survey and Assessment Programme Final Country Report No.16, South Pacific Commission, Noumea, New Caledonia.
- C17 TUNA PROGRAMME (1984). An assessment of the skipjack and baitfish resources of American Samoa. Skipjack Survey and Assessment Programme Final Country Report No.17, South Pacific Commission, Noumea, New Caledonia.
- C18 TUNA PROGRAMME (1984). An assessment of the skipjack and baitfish resources of Northern Mariana Islands, Guam, Palau, Federated States of Micronesia and Marshall Islands. Skipjack Survey and Assessment Programme Final Country Report No.18, South Pacific Commission, Noumea, New Caledonia.
- C19 TUNA PROGRAMME (1984). An assessment of the skipjack and baitfish resources of Wallis and Futuna. Skipjack Survey and Assessment Programme Final Country Report No.19, South Pacific Commission, Noumea, New Caledonia. (In press).
- C20 TUNA PROGRAMME (1985). An assessment of the skipjack and baitfish resources of New Caledonia. Skipjack Survey and Assessment Programme Final Country Report No.20, South Pacific Commission, Noumea, New Caledonia. (In press).

B. Other publications (* indicates publications using data from the SSAP)

1981----

- *1 ANON. Report of the second Skipjack Survey and Assessment Programme workshop to review results from genetic analysis of skipjack blood samples. Technical Report No.6.
- *2 ELLWAY, C.P. & R.E. KEARNEY. Changes in the Fijian baitfishery, 1974-1980. Technical Report No.5.
- 3 KEARNEY, R.E. Some economic aspects of the development and management of fisheries in central and western Pacific. Fisheries Newsletter No.22.
- 4 KEARNEY, R.E. A brief description of the South Pacific Commission Tuna and Billfish Assessment Programme. Forum Fisheries Agency, Regional Research and Development Programme Meeting, 4-8 May 1981, Honiara, Solomon Islands.
- 5 KEARNEY, R.E. A brief review of the state of the stocks of highly migratory species of fish in the central and western Pacific. Forum Fisheries Agency, Regional Research and Development Programme Meeting, 4-8 May 1981, Honiara, Solomon Islands.
- *6 KEARNEY, R.E. & M.L. RIVKIN. An examination of the feasibility of baitfish culture for skipjack pole-and-line fishing in the South Pacific Commission area. Technical Report No.4.
- *7 SKIPJACK PROGRAMME. Fishing effort and catch by the longline fleets of Japan (1962-77) and Taiwan (1967-77) within 200 miles of the countries in the area of the South Pacific Commission. Technical Report No.3.

13th Regional Technical Meeting on Fisheries

- 8 TUNA PROGRAMME. The South Pacific Commission Tuna and Billfish Assessment Programme. SPC/Fisheries 13/WP.6.
- *9 TUNA PROGRAMME. Effects of skipjack tagging procedures on subsequent tag recoveries. SPC/Fisheries 13/WP.8.
- *10 TUNA PROGRAMME. Skipjack migration, mortality and fishery interactions. SPC/Fisheries 13/WP.9.
- *11 TUNA PROGRAMME. An appraisal of the genetic analysis of skipjack blood samples. SPC/Fisheries 13/WP.10.
- *12 TUNA PROGRAMME. An overview of results from analyses of data on growth of skipjack. SPC/Fisheries 13/WP.11.
- *13 TUNA PROGRAMME. An assessment of baitfish resources in the South Pacific Commission area. SPC/Fisheries 13/WP.12.
- *14 TUNA PROGRAMME. Further observations on fishing performance of baitfish species in the South Pacific Commission area. SPC/Fisheries 13/WP.13.

1982----

- *15 KEARNEY, R.E. (ed.). Methods used by the South Pacific Commission for the survey and assessment of skipjack and baitfish resources. Technical Report No.7.
- *16 KEARNEY, R.E. SPC tagging shows big increase in skipjack tuna catch possible. Australian Fisheries 41(2).
- 17 KEARNEY, R.E. South Pacific Tuna and Billfish Programme. ICLARM Newsletter (1).
- 18 KEARNEY, R.E. Development, management key issues in fisheries of Pacific Island nations. Australian Fisheries 41(8).
- *19 KLEIBER, P., A.W. ARGUE & R.E. KEARNEY. Investigation of skipjack stock and population structuring in the western and central Pacific. Prepared for the Annual Meeting of the Standing Committee on Research and Statistics, ICCAT, 1-10 November 1982, Funchal, Madeira Islands.
- 20 WILLIAMS, M.J. The establishment of a regional catch and effort database. Paper presented at Workshop on the Harmonisation and Co-ordination of Fisheries Regimes and Access Agreements. SPEC Headquarters, 22 February-5 March 1982, Suva, Fiji.

14th Regional Technical Meeting on Fisheries

- *21 TUNA PROGRAMME. Update on the study of parasites as skipjack population markers. SPC/Fisheries 14/WP.5.
- 22 TUNA PROGRAMME. Review of progress with priority items of the Tuna and Billfish Assessment Programme. SPC/Fisheries 14/WP.10.
- *23 TUNA PROGRAMME. Update of assessment of skipjack and baitfish resources. SPC/Fisheries 14/WP.11.
- *24 TUNA PROGRAMME. An assessment of baitfish resources in the South Pacific Commission area. SPC/Fisheries 14/WP.12.
- 25 TUNA PROGRAMME. Sample statistical summaries. SPC/Fisheries 14/WP.17.
- 26 TUNA PROGRAMME. Alternative forms for the catch efforts of longline vessels and as part of the regional statistical programme. SPC/Fisheries 14/WP.18.

1983----

- *27 ARGUE, A.W., P. KLEIBER, R.E. KEARNEY & J.R. SIBERT. Evaluation of methods used by the South Pacific Commission for identification of skipjack population structure. In Proceedings of the ICCAT Conference of the International Skipjack Year Programme, 21-29 June 1983, Tenerife, Spain.
- *28 ARGUE, A.W., F. CONAND & D. WHYMAN. Spatial and temporal distributions of juvenile tunas from stomachs of tunas caught by pole-and-line gear in the central and western Pacific Ocean. Technical Report No.9.
- 29 GILLETT, R.D. A glossary of Japanese fishing terms. Fisheries Newsletter No.25.

- *30 KEARNEY, R.E. Assessment of the skipjack and baitfish resources in the central and western tropical Pacific Ocean: a summary of the Skipjack Survey and Assessment Programme. Special Publication.
- 31 KEARNEY, R.E. Fishery potentials in the tropical central and western Pacific. Paper presented at the Fifteenth Pacific Science Congress, Dunedin, New Zealand.
- 32 KEARNEY, R.E. The requirements for conservation of the tuna resources of the western and central tropical Pacific. Planning and Evaluation Committee Meeting 1983.
- 33 KEARNEY, R.E. Review of progress by the Tuna and Billfish Assessment Programme. Paper presented at Forum Fisheries Committee Meeting, 2-6 May 1983, Apia, Western Samoa.
- 34 KEARNEY, R.E. Skipjack assessment: ongoing requirements. In Proceedings of the ICCAT Conference of the International Skipjack Year Programme, 21-29 June 1983, Tenerife, Spain.
- 35 KEARNEY, R.E. The development of tuna fisheries and the future for their management in the tropical, central and western Pacific. In E.L. Miles & S. Allen (eds). The Law of the Sea and Ocean Development Issues in the Pacific Basin. Law of the Sea Institute.
- *36 KLEIBER, P., A.W. ARGUE & R.E. KEARNEY. Assessment of skipjack (Katsuwonus pelamis) resources in the central and western Pacific by estimating standing stock and components of population turnover from tagging data. Technical Report No.8.
- 37 LEWIS, A.D., B.R. SMITH & C.P. ELLWAY. A guide to the common tuna baitfishes of the South Pacific Commission area. Handbook No.23.
- *38 SIBERT, J.R., R.E. KEARNEY & T.A. LAWSON. Variation in growth increments of tagged skipjack (Katsuwonus pelamis). Technical Report No.10.
- 39 WILLIAMS, M.J. Statistical database for tuna fisheries in the central and western Pacific. SPC/Statisticians 6/WP.3.

15th Regional Technical Meeting on Fisheries

- 40 TUNA PROGRAMME. Review of progress with priority items within the Tuna and Billfish Assessment Programme. SPC/Fisheries 15/WP.4.
- 41 TUNA PROGRAMME. Regional requirements for resource assessment and conservation and some alternative institutional arrangements. SPC/Fisheries 15/WP.5.
- 42 TUNA PROGRAMME. Observer programmes. SPC/Fisheries 15/WP.10.

1984----

- 43 KEARNEY, R.E. The implication of present resource evaluations to national fisheries development. Paper presented to FFA Workshop on National Tuna Operations, 28 May-2 June 1984.

*44 KLEIBER, P., A.W. ARGUE, J.R. SIBERT & L.S. HAMMOND. A parameter for estimating potential interaction between fisheries for skipjack tuna (Katsuwonus pelamis) in the western Pacific. Technical Report No.12.

*45 LAWSON, T.A., R.E. KEARNEY & J.R. SIBERT. Estimates of length measurement errors for tagged skipjack (Katsuwonus pelamis) from the central and western Pacific Ocean. Technical Report No.11.

46 SIBERT, J.R. A two-fishery tag attrition model for the analysis of mortality, recruitment and fishery interaction. Technical Report No.13.

Meeting on Coastal States and Distant-Water Fishing Nations

47 TUNA PROGRAMME. Review of progress with priority items within the Tuna and Billfish Assessment Programme. SPC/Coastal-DWFNS/WP.2.

48 TUNA PROGRAMME. The Tuna Programme fisheries statistical system. SPC/Coastal-DWFNS/WP.3.

16th Regional Technical Meeting on Fisheries

49 TUNA PROGRAMME. Review of progress with priority items within the Tuna and Billfish Assessment Programme. SPC/Fisheries 16/WP.2.

50 TUNA PROGRAMME. The Tuna Programme fisheries statistical system. SPC/Fisheries 16/WP.4.

51 TUNA PROGRAMME. Some alternative mechanisms for obtaining additional input into the work of the Tuna and Billfish Assessment Programme. SPC/Fisheries 16/WP.9.

1985----

52 GILLETT, R.D. Tuvalu baitfish survey and development project. Technical Report No.14.

53 GILLETT, R.D. Cardinalfish and fusiliers: an alternative baitfish resource in Tuvalu. Fisheries Newsletter No.32.

54 GILLETT, R.D. Traditional tuna fishing in Tokelau. Topic Review No.27, SPREP.

55 GILLETT, R.D. & S.T. TAUFAO. The incidence of tuna schools suitable for purse seining in the central and western Pacific from Skipjack Programme records. Fisheries Newsletter No.33.

56 HILBORN, R. Spatial models of tuna dynamics in the western Pacific: is international management necessary? Paper presented at the Second Workshop of Renewable Resource Management (9-12 December 1985), Honolulu, Hawaii.

57 HILBORN, R. & J. SIBERT. Management strategies for newly developing fisheries. Fisheries Newsletter No.35.

58 HODGKINSON, P.W. & M.J. WILLIAMS. Fisheries Statistics Training Course - Lecture Notes. Handbook No.26.