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**TUNA AND BILLFISH ASSESSMENT PROGRAMME**  
**WORK PROGRAMME REVIEW 1991-92**

## TUNA AND BILLFISH ASSESSMENT PROGRAMME (TBAP)

1. The Tuna and Billfish Assessment Programme (TBAP) was established by the 1980 South Pacific Conference to continue the work initiated by its predecessor project, the Skipjack Survey and Assessment Programme (SSAP). The Programme is funded by extra-budgetary contributions from Australia, France, New Zealand, the United States of America, the European Community (EC) and the International Centre for Ocean Development (ICOD).

2. The TBAP mission, as drafted by the Fourth SCTB and endorsed by the Twenty-third Regional Technical Meeting on Fisheries, is "to provide member countries with the scientific information and advice necessary to rationally manage fisheries exploiting the region's resources of tuna, billfish and related species". The structure of the TBAP recommended at the Fourth SCTB, i.e. Statistics and Monitoring, Biological Research, Stock Assessment and Modelling, Reporting and Liaison, has been used to review work programme activities for 1991-92. The Albacore Research Project, which draws on each of these areas, is described separately, as is the TBAP involvement, on a consultancy basis, in the Philippines Tuna Research Project. Note that this Programme structure is yet to receive the official approval of the CRGA and South Pacific Conference, however it is anticipated that this will be forthcoming.

### 1. STATISTICS AND MONITORING

#### 1.1 *Regional Tuna Fisheries Databases*

##### 1.1.1 Daily catch and effort logbook data

3. Since its inception in 1981, the Tuna and Billfish Assessment Programme has maintained a database on industrial tuna fisheries in the region. The main sources of data have been daily catch and effort logsheets provided to SPC by member countries; the logsheets have been obtained either from distant-water fishing nations (DWFN's) under access agreements or from vessels of domestic fleets.

4. The database is used for research and monitoring purposes and in particular to assess the state of exploitation of the stocks and to study interactions between the different fleets operating in the region. Monitoring of the fisheries is accomplished through quarterly publication of the SPC Regional Tuna Bulletin.

5. In addition to research and monitoring conducted at SPC, data summaries are provided to member countries on a quarterly basis. For several member countries, the processed data are returned on diskettes for incorporation into databases which are maintained on computers within each country.

6. In 1991, daily catch and effort data for tuna vessels fishing in the region were received from Australia, the Cook Islands, the Federated States of Micronesia, Fiji, French Polynesia, Kiribati, the Marshall Islands, New Caledonia, New Zealand, Palau, Papua New Guinea, Solomon Islands, Tonga, Tuvalu and the United States.

7. Coverage of domestic fleets by the logbook data held at SPC has remained high. During 1991, data from several new fleets were received, including longliners and purse seiners from the Federated States of Micronesia and Fijian-registered longliners.

### 1.1.2 Standing Committee database

8. At the meeting of the Standing Committee on Tuna and Billfish held in Suva on 19-21 June 1989, the Committee considered the problem of inadequate statistical coverage of the fishing activities of DWFN's in the region, including Indonesia, Korea, Japan, Philippines, Taiwan and the USSR. The Standing Committee is an advisory sub-committee of the Regional Technical Meeting on Fisheries and is composed of most DWFN's which fish for tuna in the South Pacific, as well as SPC member countries. The Standing Committee discussed the establishment of a common database consisting of aggregated data provided by all fishing nations (including DWFN's), which would be separate from the data currently assembled by SPC in the Regional Tuna Fisheries Database (which are contributed only by SPC member countries).

9. At present, data have been provided to the Standing Committee Database by Australia, Fiji, Japan, Kiribati, Korea, New Caledonia, New Zealand, Papua New Guinea, Solomon Islands, Taiwan, Tonga and the United States. During 1991, data were received covering American purse seiners active during 1981-1985. SPC was informed in February 1992 that the Fisheries Agency of Japan would soon release data for 1981-1990 for longliners, pole-and-line vessels and purse seiners.

10. During 1991, data from the Standing Committee Database and from other sources were used to compile a technical report on the status of tuna fisheries in the SPC region, including annual catch statistics for all fleets from 1952 to 1991.

### 1.1.3 SPAR database

11. At the Second South Pacific Albacore Research (SPAR) Workshop, held in June 1989, the participants agreed to the offer made by SPC to act as a clearinghouse for the receipt and distribution of albacore data. At present, catch and effort data have been provided by Australia, Japan, Korea, New Caledonia, New Zealand, Taiwan, Tonga and the United States. Size frequency data have been provided by the Australia, Fiji, French Polynesia, Japan and the United States. The most recent update of the database was distributed in December 1991.

## 1.2 *Transshipment Data*

12. In 1988, the TBAP began to compile statistics on tuna landings for delivery to canneries or for transshipment to markets outside the region. Data on landings have been received from the Federated States of Micronesia, Fiji, French Polynesia, Guam, Marshall Islands, New Caledonia, Northern Marianas and Palau. Submission of transshipment data to SPC has been sporadic.

## 1.3 *Port Sampling*

13. During 1991, port sampling programmes to collect biological data from landings by longliners were initiated in the Federated States of Micronesia, Fiji, French Polynesia, Marshall Islands, New Caledonia and Palau. The sampling data are forwarded to SPC on a quarterly basis, where they are then processed. Length frequency data from ongoing sampling of the domestic Solomon Islands fleets are regularly received and processed at SPC.

## 1.4 *Observers*

14. Processing of observer data collected aboard American purse seiners under the multilateral treaty is carried out on a regular basis. Reports summarising the observer data are routinely forwarded to the Forum Fisheries Agency.

### *1.5 SPC Regional Tuna Bulletin*

15. The SPC Regional Tuna Bulletin has been distributed on a quarterly basis since the first quarter 1988 to fisheries officers within the region and to research institutions and industry within the region and beyond. The contents and the format of the Tuna Bulletin continued to improve during 1991.

### *1.6 National Fishery Statistics Systems*

16. Commencing in 1988, tuna fishery databases have been developed and installed in thirteen SPC member countries. During 1991, all thirteen countries were visited to provide programming support for their in-country fisheries databases.

### *1.7 Statistical Support for Other SPC Fisheries Projects*

17. Statistical support is provided to other SPC fisheries projects, in particular the Deep Sea Fisheries Development Project, the Inshore Fisheries Research Project and the Regional Fisheries Training Programme. Support is also provided to the biological research and assessment activities within the TBAP, including management of TBAP tagging data.

## **2. BIOLOGICAL RESEARCH**

18. The focus of the TBAP's biological research continued to be the Regional Tuna Tagging Project and associated in-country tagging projects.

### *2.1 Regional Tuna Tagging Project*

19. The Regional Tuna Tagging Project (RTTP) is a three-year project being undertaken by the TBAP, with 3.5 million ECU in funding from the European Community Sixth European Development Fund (Lomé III). The project is expressly designed to provide practical answers to questions raised by tuna fisheries interaction and tuna exploitation generally within the region. The project will provide information on the population characteristics of yellowfin, skipjack and, to a lesser extent, bigeye, so that these questions can be addressed using various modelling approaches. Tagging has been carried out predominantly from the chartered Tuvaluan pole-and-line vessel, Te Tautai, although various locally-based vessels have been used on an opportunistic basis for specific in-country components in Solomon Islands, Kiribati and Fiji (which also contribute to the overall objectives of the project). The operations of the Te Tautai began in December 1989, following initial work in Solomon Islands during the second half of 1989 on Solomon Taiyo Ltd pole-and-line vessels.

20. At the time of writing, approximately two weeks of Te Tautai charter time remained. Following this, the project field activities, consisting mainly of tag releases and biological sampling of untagged tuna, will be completed. As at 31 May, a total of 123,551 tuna had been tagged, of which 11,748 (9.5%) had been recaptured and the tags returned to SPC headquarters (Table 1). More details of the current status of the tagging data are given in the July 1992 Monthly Tagging Summary (RTMF 24/Information Paper 4)

21. The release numbers are substantially in excess of the targets quoted in the original Project Proposal -- 80,000 tuna over the two-year charter period, to be released widely throughout area of the existing fishery. Both in terms of release numbers and their geographical distribution it can be reasonably concluded that the RTTP has either met or exceeded its operational objectives.

Table 1. RTTP tag releases and returns as at 31 May 1992.

	<u>Yellowfin</u>	<u>Skipjack</u>	<u>Bigeye</u>	<u>Total</u>
Releases	32,112	85,278	6,161	123,551
Returns	2,883	8,631	234	11,748
Return rate	9.0%	10.1%	3.8%	9.5%

22. Similarly, the collection of a large amount of biological data from tuna caught during fishing operations, but not tagged because of hook or other injury, has been pleasing (Table 2). These data will provide the basis for several important investigations, including age and growth, stock structure, feeding behaviour and reproductive biology.

Table 2. Biological data collected during the RTTP, as at 31 May 1992.

	Length	Weight	Sex and gonad stage	Otolith sample	Stomach contents	Morphometrics
Yellowfin	2,999	1,666	1,285	682	1,284	930
Skipjack	5,697	2,572	1,319	0	1,314	0
Bigeye	207	158	140	61	139	81

23. Various analyses of this large amount of data have now either begun in earnest or are planned to begin in the coming year.

## 2.2 *In-Country Tagging*

24. During the course of the RTTP, tagged tuna have been released both in country EEZ's and in high-seas areas. The in-country releases, and associated recoveries, will be extremely valuable for the analysis of country-specific interaction and exploitation questions. In-country releases and associated recoveries are shown in Table 3. In three cases, Solomon Islands, Kiribati and Fiji, locally-based commercial tuna fisheries operate. In these countries, Te Tautai releases have been bolstered by substantial numbers of releases from local vessels (with financial assistance from AIDAB in the case of the Solomon Islands).

25. The analyses of these country-specific tagging data will ultimately be incorporated into future National Fisheries Assessments (Country Reports). Substantial progress has been made in the analysis of Solomon Islands tagging data and a draft report is expected to be available for the Solomon Islands Government by 30 September 1992.

Table 3. In-country tag releases and associated recoveries.

Country	Releases			Recoveries			Rate (%)		
	SKJ	YFT	BET	SKJ	YFT	BET	SKJ	YFT	BET
Australia	3,993	2,515	3,712	4	11	48	0.1	0.4	1.3
Fiji	2,830	974	4	186	7	0	6.6	0.7	0.0
FSM	8,713	2,573	267	862	193	59	9.9	7.5	22.1
Indonesia	5,714	2,716	46	831	484	9	14.5	17.8	19.6
Kiribati	8,972	2,177	82	310	29	1	3.5	1.3	1.2
Marshall Is.	1,386	17	--	4	0	--	0.3	0.0	--
New Caledonia	2,359	--	--	3	--	--	0.1	--	--
Nauru	--	4	--	--	0	--	--	0.0	--
PNG	26,577	13,637	830	3,040	1,343	86	11.4	9.8	10.4
Philippines	5,073	1,017	19	551	99	0	10.9	9.7	0.0
Palau	4,582	2,625	67	489	280	6	10.7	10.7	9.0
Solomon Is.	11,892	2,724	53	1,537	219	8	12.9	8.0	15.1
Tuvalu	319	36	--	30	1	--	9.4	2.8	--
Vanuatu	72	--	--	0	--	--	0.0	--	--

### 2.3 By-catch and Discards in Western Pacific Tuna Fisheries

26. This activity, which commenced during 1991-92 following a recommendation of the SCTB 4, will continue in 1992-93. The objective of the study is to review by-catch and discard practices of the industrial tuna fisheries operating in the western Pacific, using logsheet data provided to SPC member countries, observer data, and published and unpublished reports. Work has so far concentrated on reviewing available data on by-catch and discards in the purse seine and longline fisheries, and on the construction of estimates of total by-catch and discards for those fisheries. A draft of the work completed to date was considered by SCTB 5. This work will be completed during 1992-93, circulated prior to SCTB 6 and presented to RTMF in 1993.

### 2.4 Study on Tuna and their Environment

27. No progress on this study was made during 1991-92. The ORSTOM scientist undertaking the work (M. Renaud Pianet) departed Noumea in early 1992 and is yet to be replaced.

## 3. ASSESSMENT AND MODELLING

28. Work has now commenced on the detailed analysis of RTTP results, and TBAP research will focus on this in 1992-93. Brief descriptions of assessment and modelling work undertaken in 1991-92 are as follows:

### 3.1 Skipjack and Yellowfin Assessment

29. A preliminary analysis of aggregate RTTP results, for the purpose of evaluating the status of the stocks and their exploitation potential, has been undertaken and this will continue to be refined as new data come to hand and technical feedback is received. The preliminary results of this work suggest that both the skipjack and yellowfin stocks can withstand substantially increased exploitation.

### 3.2 *Development of Skipjack Movement Model*

30. This work is being undertaken in collaboration with Otter Research Ltd. of Canada. A working version of a prototype model was presented at the FAO Expert Consultation on Interactions of Pacific Tuna Fisheries, held in Noumea in December 1991; a detailed report of this work is available as document TIC/91R#4 of that meeting. The model has been tested using simulated data and appears to be robust under a variety of experimental conditions. Work will continue in 1992-93.

### 3.3 *National Fisheries Assessments (Country Reports)*

31. During 1992-93, one NFA was completed (Kiribati) and work has commenced to two others (PNG and Fiji). This work was undertaken by an Australian scientist seconded to the TBAP with financial assistance from AIDAB. The draft Kiribati report was presented to the Kiribati Government and industry by the TBAP Chief Fisheries Scientist.

32. As noted earlier, work has continued on the analysis of the Solomon Islands in-country tagging data, which will form the basis of a NFA for that country. Substantial progress has been made in the development of the complex and novel methodology required for the analysis of these data, in particular the incorporation of FAD effects on tuna movement patterns in Solomon Islands. This work has been undertaken by Dr Pierre Kleiber of the US National Marine Fisheries Service, and we are grateful to that organisation for enabling the secondment of Dr Kleiber to the TBAP. A progress report on this work was given to SCTB 5.

33. Further NFA's are planned for 1992-93. Funding proposals (to AIDAB and the EC) are currently under consideration for this work.

## 4. REPORTING AND LIAISON

34. Results of TBAP work were reported back to member countries at several levels - in broad outline to regional meetings (RTMF (August 1991), CRGA (May, October 1991), and FFC (April 1991), in greater detail to the Fourth Standing Committee on Tuna and Billfish as the nominated peer review group of the scientific aspects of the programme (June 1991), and as a contribution to the work of specialist research groups (South Pacific Albacore Research group (November 1991) and the inaugural Western Pacific Yellowfin Research Group (June 1991)). The TBAP functions as secretariat to these research groupings, and additionally hosted other international scientific meetings during 1991 i.e., the FAO Expert Consultation on Interactions of Pacific Tuna Fisheries (December 1991).

35. Reporting was provided to specific countries in the form of national assessments (see above), and responses to specific queries on current status of stocks, likely effects of different harvest strategies etc. Technical input to regional review processes e.g the US Multilateral Treaty on Fisheries, management consultations (Albacore, December 1991), and sub-regional bodies e.g. PNA (April 1992) also occurs, at the request of countries. Statistical reporting occurred at formal publication level (the Regional Tuna Bulletin) and directly to countries on receipt of data (see earlier).

36. Reporting to countries involved in RTTP activities was provided by a series of timely Activity Reports (there have now been 18 of these), and informal customized reports to countries on interim tagging results. Detailed reports in the TBAP Technical Report series continued to be published.

37. Regular liaison was maintained with other regional and international organizations, particularly the Forum Fisheries Agency, but also NMFS, WPRFMC, IATTC, ITPP, NRIFS, TNFRI and organizations in Australia and New Zealand, to promote collaborative research and exchange information. Participation in consultations held by several of these organizations occurred.

## 5. ALBACORE RESEARCH PROJECT

38. The TBAP has continued its research on South Pacific albacore during the past twelve months. Efforts have concentrated on the following:

### 5.1 SPAR Workshop

39. The Fourth SPAR Workshop was held in Taipei, Republic of China on 4-8 November 1991. The major outcomes of the meeting were:

- (i) Estimated total catch for 1990 was 39,870 mt, 38% lower than the historical high of 55,040 in 1989;
- (ii) Longline CPUE has been stable since 1975 and remains at an average level about 45% below that recorded at the beginning of the fishery. Similarly, no significant trend in troll fishery CPUE could be detected;
- (iii) There appears to be no need for further effort reductions at present, although there remains uncertainty about the potential yield and fishery interactions.

### 5.2 Albacore Fishery Observers

40. Six observers were placed on albacore troll vessels during the 1991-92 season for the purposes of collecting length-frequency and other biological data, for monitoring fishing conditions and for tagging (see later). Observer trips were made in the Tasman Sea, in New Zealand waters and in the subtropical convergence zone (STCZ) in the central-eastern Pacific. During the season, more than 20,000 albacore were measured (including tagged fish). A detailed report of this activity is currently in preparation.

### 5.3 Albacore Port Sampling

41. In order to obtain further information on the size distribution of albacore caught in various fisheries, fork-length measurements have been collected regularly at various landing ports. Current port sampling activities conducted or coordinated by the TBAP include:

• Noumea (New Cal.)	Longline
• Levuka (Fiji)	Troll and longline
• Suva (Fiji)	Longline
• Papeete (Fr. Pol.)	Troll and longline
• Westport (NZ)	Troll
• MV Lofa	Longline

### 5.4 Albacore Tagging

42. EC-funded albacore tagging continued during the 1991-92 season, using observers on commercial troll vessels as taggers. During the season, approximately 6,500 albacore were tagged, bring the total for the last two seasons to approximately 10,000. The majority of albacore were tagged in the STCZ, however a limited number were also tagged off the east coast of Tasmania for the first time.

43. Efforts continued to assemble a reliable tagging database that includes tag releases and recaptures reported by a number of agencies, including NMFS, the New Zealand Ministry of Agriculture and Fisheries (MAF), ORSTOM, the Australian Bureau of Rural Resources and the NSW Fisheries Research Institute. Five albacore tag recaptures were reported during the year, bringing the total number of South Pacific albacore returns from all sources to 28. Several instances of tags being recovered by fishermen but not being returned have been documented.



### 5.5 *Sampling of Albacore Gonads*

44. The TBAP continued to collect albacore gonad samples in Noumea and aboard the MV Lofa for analysis by a NMFS scientist. The results indicate that there is a distinct annual spawning season from November to March.

### 5.6 *Age and Growth Study*

45. Length-frequency, vertebral ring counts and tag-recapture data used to estimate growth rates of South Pacific albacore. These independent data provided consistent estimates of growth, about 0.5 cm per month for 80 cm fish. These results are currently being prepared for publication.

### 5.7 *Development of an Age-Structured Model*

46. This work, in collaboration with Otter Research Ltd., will extend the existing MULTIFAN model to undertake a full age-structured analysis, i.e. provide estimates of mortality rates, population sizes, and availability and gear selectivity parameters. The model will analyse length frequency data, with the ability to incorporate ancillary data such as fishing effort, length-age and length-increment data. This model will be a primary research tool for evaluation of stock status and fishery interaction. Development of the software and preliminary analyses are expected to be completed prior to the next SPAR meeting.

## 6. **PHILIPPINES TUNA RESEARCH PROJECT**

47. The TBAP, with the approval of SPC management and under the auspices of the WPFCC, has been contracted as consultant to the Philippines Tuna Research Project, which has as its goal an assessment of the skipjack and yellowfin tuna resources of Philippines waters. The work, to span a two year period from December 1991, will be based on tagging experiments using the Te Tautai, under an extension of the present RTTP arrangement. It will involve existing TBAP staff, as well as additional short term recruitment as necessary.

48. Activities to date have mainly been concerned with project planning and the logistics of the three-month tagging cruise, to begin in August 1992. Trial tagging of ringnet-caught tuna was carried out, suggesting that this may be an effective alternative tagging method in the Philippines.

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