REPORT OF MEETING

REPORT OF THE FIFTH SOUTH PACIFIC ALBACORE RESEARCH WORKSHOP

(Papeete, Tahiti, French Polynesia, 29 March-1 April 1993)

SOUTH PACIFIC COMMISSION
NOUMEA, NEW CALEDONIA

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I INTRODUCTION

The first South Pacific Albacore Research (SPAR) Workshop was held in Auckland, New Zealand in June 1986. It provided a forum to review existing albacore fisheries in the South Pacific, identify types and availability of albacore fishrey statistics, review research and research findings on albacore, identify and assign priorities for future albacore research and finally provide for coordination of research on albacore in the South Pacific. The first SPAR Workshop took place in an atmosphere of 'development', emphasising exploratory trolling to identify distribution of the resource in time and space, and to assess resource potential. In addition to survey work, studies on age and growth, reproductive biology, mortality rates and stock identity were highlighted as requiring priority attention.

In the years following the first SPAR Workshop, the fishery underwent substantial changes. The troll fishery developed steadily and, in 1988/89, a large fleet of driftnet vessels, primarily from Japan and Taiwan, entered the South Pacific fishery. These developments resulted in the surface catch of albacore reaching an estimated 33,559 mt in 1988/89, doubling the total catch that had been taken by all fisheries at the time of the first SPAR Workshop. Because of these events the second SPAR Workshop, held in Suva, Fiji, in June 1989, focused more on the status of the stock and the possible effects of the increase in surface-fishery catches, although research review and coordination remained important functions.

Partly because of the uncertainty expressed by the second SPAR Workshop regarding the sustainability of the increased surface catches and their possible effects on the longline fishery, Pacific Island countries and the distant-water fishing nations concerned began a series of consultations on arrangements for management of the South Pacific albacore fishery. At the second of these consultations in Honiara, Solomon Islands, in March 1990, it was agreed that the SPAR group would function as an interim Scientific Advisory Group on Albacore (SAGA), advising future management consultations on the status of the stock and other scientific matters.

Since then, SPAR workshops have been held regularly, the third in Noumea, New Caledonia (9–12 October 1990), the fourth, in Taipei, Republic of China (8–12 November 1991), and the fifth, the subject of this report, in Papeete, French Polynesia (29 March–1 April 1993).

II. AGENDA

1. PRELIMINARIES

   1.1 Opening address
   1.2 Election of officials and rapporteurs
   1.3 Adoption of the agenda

2. REVIEW OF THE FISHERIES

   2.1 Additional information on the 1990–91 season
   2.2 Review of the 1991–92 season
   2.3 Update on the 1992–93 season
   2.4 Plans for the 1993–94 season

3. REVIEW OF AVAILABLE FISHERY DATA

   3.1 Update of best estimates of total catch and effort
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4. REVIEW OF RECENT RESEARCH PROJECTS AND DATA ANALYSIS

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   4.3 Reproductive biology investigations
   4.4 Age and growth studies
   4.5 Research on driftnet fisheries
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5. STATUS OF THE SOUTH PACIFIC ALBACORE STOCK

6. FUTURE RESEARCH PRIORITIES AND RESEARCH COORDINATION

7. OTHER BUSINESS

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III. SUMMARY OF DISCUSSIONS

1. PRELIMINARIES

1.1 Opening address

1. The President of the French Polynesia Economic, Social and Cultural Council, Mr. Hugh Laughlin, welcomed all participants to the fifth South Pacific Albacore Research (SPAR) Workshop, and expressed his pleasure at offering the Council's facilities for hosting the meeting.

2. Mr. Edouard Fritch, Minister of Fisheries, welcomed the participants on behalf of the Government of French Polynesia. He acknowledged the financial contributions of Canada, France and the territory for hosting the meeting. After reviewing the history and accomplishments of the SPAR groups, the Minister noted that the local fishing industry was undergoing rapid development, which would be facilitated by a high level of collaboration between fishermen and scientists. The Minister noted that the two primary issues of concern to French Polynesia at this stage are determining the maximum sustainable yields, and identifying the appropriate exploitation strategies. It was hoped that the SPAR meeting would reveal new information that would help formulate policies for the future.

3. On behalf of the SPAR participants, Mme Hélène Courte, Director of Programmes at the South Pacific Commission (SPC), thanked all officials for their assistance and hospitality. She noted that this meeting was important for several reasons, and would hopefully catalyse further cooperation between French Polynesia and SPC in areas of mutual interest.

4. The meeting expressed sadness that one of the SPAR group's long time research scientists Kevin Bailey, had died recently.

1.2 Election of chairperson and rapporteurs

5. Mr Albert Caton was elected as chairman of the SPAR group. He will succeed the departing chairman, Dr. Tim Adams.

6. Dr Marc Labelle was selected as co–ordinating rapporteur, and the following rapporteurs were appointed:

– Agenda Item 1	Dr Marc Labelle	
– Agenda Item 2	Mr Peter Williams	
– Agenda Item 3	Mr. Andrew Richards	
– Agenda Item 4	Dr Garry Sakagawa	(sections 4.1–4.3)
	Dr Talbot Murray	(sections 4.4–4.6)
	Dr John Hampton	(sections 4.7–4.8)
– Agenda Item 5	Drs John Hampton, Gary Sakagawa and Talbot Murray	
– Agenda Item 6	Dr Peter Craig	
– Agenda Item 7	Mr Ian Bertram	

1.3 Adoption of the Agenda

7. The agenda was adopted as circulated. A tentative timetable was established to ensure that Agenda Items 1–7 would be completed by Wednesday evening, leaving one full day for discussing and adopting the meeting's report.

8. The chairman established a small working group to convene at the end of the first day to update the catch and effort statistics submitted by the various participants. It consisted of T. Murray, G. Sakagawa, M. Labelle and P. Williams.

2. REVIEW OF THE FISHERIES

9. Each participant was asked to report briefly on their country's albacore fisheries covering any further information on the 1990–91 season, outcome of the 1991–92 season, progress of the 1992–93 season and plans for the 1993–94 season.

American Samoa

10. Albacore accounted for 15% of total tuna landings at canneries in American Samoa during 1988–92. Albacore landings averaged 25,600 mt, from longliners (75%), jig/trollers (9%) and transshipment vessels (16%). Landings in 1992 were 33,600 mt. By mid–1992, the longline fleet consisted almost exclusively of Taiwanese vessels, while most troll deliveries were made by U.S. vessels.

Australia

11. Albacore landings in Australia are mainly from by–catches in the licensed Japanese longline fishery that operates within the 200–mile fishing zone (AFZ), and the smaller domestic longline fisherey that operates off the southern east coast.

12. Given indications that a considerable albacore resource existed beyond the AFZ in the Tasman Sea, a survey was undertaken in 1991–92 to examine the commercial feasibility of target albacore trolling within the AFZ. Useful results were obtained and a comprehensive information document was developed for interested fishermen. However, the general outcome of the survey was inconclusive. It illustrated that target trolling for albacore within 50 miles of the coast might not be commercially viable, but gave no indications of the potential further offshore in the AFZ. Nevertheless, the survey stimulated interest and enthusiasm among fishermen and processors to the extent that some have begun albacore trolling during 1992–93. Off southern New South Wales, an ex–survey vessel conducting sporadic fishing caught one tonne on one day but no further test fishing was conducted. Other trolling activity in the area was directed at *Seriola* on the Continental Shelf. In north–eastern Tasmania, an experienced ex–New Zealand albacore troll fisherman started fishing in December. Catch rates were poor initially because of low surface temperature was cold. Five other vessels joined in,and by February catch rates improved, with some vessels having days when more than 1 mt was caught. Total catch to date is in the order of 35 mt, with albacore averaging about 5 kg. Catch rates have declined recently and some fishermen are losing interest. Water temperature has increased to more than 19.5C in the area, to the extent that some yellowfin have been trolled. Closer to Hobart a small commercial troll fishery for southern bluefin has also recently started to target albacore. Catch rates have usually been less than 20 fish per day.

Cook Islands

13. Albacore are not usually caught in surface waters but incidental catches have been made during vertical longline and dropline operations around FADs. These fish range from 15 to 28 kg, and average about 19 kg.

14. Foreign fishing activity has declined over the years from the 200 licensed Taiwanese and Korean longliners in 1980 to the present 50 Taiwanese longliners. These vessels unload in Pago Pago, receiving approximately US$2,000 per ton, with fish averaging 20 kg. In the past, Korean longliners have supplied the Cook Islands with catch and effort logsheets, but Taiwanese vessels have not done so. The actual proportion of albacore and other species caught in Cook Islands waters by foreign vessels is not known with certainty. Based on the limited information gathered, it appears there may be potential for a sizeable domestic longline fishery.

Republic of China (Taiwan)

15. Two types of fisheries (purse seine and longline) are operating in the South Pacific Ocean. Only longline fishing is targeted on albacore. In 1991, total landings collected from all Pacific base ports (including Kaoshiung) was about 14030 mt.

16. Recent coverage rates of logbook data from the commercial fishery have been comparatively low. Such low coverage may affect the total catch estimate. Efforts will be made to improve the coverage rate in the future.

17. Research into CPUE trends and stock assessment carried out since the end of last year is continuing.

Fiji

18. Albacore has been landed in Fiji for canning in Levuka since 1975. Previously Levuka was a transshipment base for longliners. A fleet of largely Taiwanese vessels is charted by PAFCO and the number of vessels unloading each year has ranged from 5 to 35 with 25 vessels unloaded in 1992.

19. Catch report forms were received from Taiwanese longline vessels, whose cooperation was gratefully acknowledged, and from domestic longline vessels engaged in the sashimi tuna fishery. A domestic joint venture longline fleet of 23 vessels now operates within the 12–mile zone. It targets bigeye and yellowfin, but has substantial albacore by–catch which amounted to 243 mt in 1992. Taiwanese longliners unloaded an additional 4480 mt of albacore at the PAFCO cannery in Levuka.

20. A port sampling program set–up by the South Pacific Commission in 1990 has continued to operate effectively, involving Fiji fisheries staff and SPC staff based at the PAFCO cannery and Lami. Length frequency samples and gonad samples from longline vessels and domestic tuna vessels have been collected.

French Polynesia

21. Thirty–one Japanese longliners and seventy–nine Korean longliners fished in the French Polynesia EEZ in 1991, catching 534 mt of albacore. Fifty–five Korean vessels fished during 1992 and caught 227 mt of albacore. The Japanese fleet 1992 catch was very low because the fleet's access agreement was suspended in June 1992 (only 3 mt of albacore were caught by 8 vessels).

22. The Polynesian longline fleet increased from 5 active vessels in 1991 to 20 in 1992. Most are small (12m) vessels ex–skipjack using monofilament longline. Their total estimated albacore catch including that of one of the artisanal handline fleet, was 300 mt in 1992. Albacore represents more than 50% of the longline catch around the Society Islands.

23. Only 2 Polynesian trollers fished in 1992, taking 72 mt of albacore in the surface fishery at 40°S. The total catch landed in Papeete was 489 mt, which included 475 mt by US trollers and 14 mt by 1 Polynesian troller.

Japan

24. Japanese longline, pole–and–line and driftnet fisheries have operated in the SPAR area in recent years (WP.4). The pole–and–line fishery catch in 1991/92 was only 49 mt. It is a very minor fishery operated sporadically in the SPAR area. There have been no driftnet fishery operations in the SPAR area since July 1990 after the UN resolution. The longline fishery takes albacore in the SPAR area as a bycatch in operations targeting bigeye and southern bluefin tunas. The longline albacore catch has fluctuated around 5,000 tons in the recent three years. More than 60% of the albacore catch came from the western area (the Coral Sea, Tasman Sea and around New Zealand), though the percentage of effort in this area was minor.

New Caledonia

25. In the New Caledonia EEZ, albacore is a by–catch species although about 40% of the total catch (in weight) of the local longliners is albacore. New Caledonian longliners owned by joint venture companies (French–Japanese) mainly target sashimi species (yellowfin, striped marlin, bigeye) for the Japanese market.

26. The low prices on the market of frozen tuna over the past years has led to discussions about processing albacore in New Caledonia before sending it on to the market. In some countries up to one third of a daily catch is processed onboard fishing boats as either fresh or frozen loins before dispatch to the markets. If this example was followed, it would be necessary to increase freezing capacity at port.

27. Plans to build a cannery have been contemplated. It is expected that 6 new longliners (using the Hawaiian technique) will operate out of Nouméa from 1993. However, it is doubtful that trollers targeting South Pacific albacore 40°S could be based at Nouméa because the fishing zone is too distant and the fishing season short. With the programme carried out by SPC on albacore biology there is now a lot of information on this species but still a need for information on post–harvest procedures such as marketing, processing etc. A lot more work needs to be done in this domain to enable rational exploitation of the albacore fishery in New Caledonia.

28. This could influence changes in albacore CPUE, in fisheries strategies, and the evolution of the industry in general.

New Zealand

29. Tuna fisheries operating within the EEZ are described in Working Paper 8. Since the declaration of the 200 mile EEZ three DWFN longline fleets have caught albacore; a Korean fleet has targeted albacore while two Japanese fleets (one targeting southern bluefin and one targeting bigeye) catch albacore as a by–catch species chiefly in waters north of 40°S. The Korean fleet has not fished in the EEZ since 1989, and no licences have been offered for the 1993 fishing season. The Japanese fleet targeting bigeye failed to take up the licences offered in 1992 but have accepted 15 licences for 1993. Vessels targeting southern bluefin have declined to 17 vessels in 1993 from the previously stable level of about 30 vessels. In addition,

4 to 5 Japanese longliners have been chartered by a New Zealand company to use New Zealand's national catch allocation for southern bluefin. These charter vessels have not generally fished in areas where albacore are abundant and hence have had a small albacore by–catch (7–40 mt.). Domestic owned and operated longliners also increased activity in recent years, chiefly with monofilament gear in waters north of 38°S. These vessels primarily target bigeye but have an albacore by–catch that increased from about 250 to 700 mt. In the past three years, vessel numbers have steadily increased from 13 to 20. Further expansion of the domestic fleet is expected with reports of at least another three vessels having been purchased recently.

30. The troll fishery for juvenile albacore has operated off the west coast of the South Island since the mid 1960s, and generally lands 1,500 – 3,000 mt during the December to April/May season. The main area of fishing is along the continental shelf 40–70 miles offshore. During the 1991/92 season 3,156 mt of albacore was caught within the EEZ, and a further 750 mt was caught by 7 vessels in the high seas STCZ fishery. The 1992/93 troll fishery season is still underway. Although mid–season catches were extremely poor, recent high catches suggest that the total landing within the EEZ will be 2,000 mt, while New Zealand vessel catches in the STCZ will probably be less than 100 mt. The reduced catches in the STCZ reflect unusually low catch rates this season. Fishermen reported that fish were further offshore in the EEZ than in previous years, and fewer small fish were present in the landings. In 1992/93 SST was cooler than average for most of the season and fish failed to appear in the usual fishing areas, appearing for much of the season about 300 miles to the north.

31. New Zealand chartered carrier vessels operated as trans–shipment and supply vessels for the combined US, French Polynesian, Fiji, and New Zealand troll fleet in the STCZ during both 1991/92 and 1992/93. Estimates of albacore transhipments are currently unavailable.

32. The trend towards overwintering by US albacore trollers continues in New Zealand ports and interest in the potential for an early season (November–December) Tasman Sea high seas fishery continues. However, limited trials in 1991/92 and 1992/93 have not proved successful although exploratory fishing is expected in 1993/94.

Solomon Islands

33. Foreign longlining for albacore was common in the Solomon Islands prior to the declaration of the country's 200 mile EEZ in 1978. Since then the albacore fishery has very much depended on foreign longline access arrangements. Considerable quantities of albacore were taken from the Solomon Islands waters by foreign longliners, notably Taiwanese and Japanese, which have either taken albacore as targeted species or as incidental catch. The highest albacore catch in the Solomon Islands EEZ was 2,674 mt in 1971.

34. Most longlining in the Solomon Islands has been carried out around the Eastern Outer islands. Currently, Japanese and Taiwanese longliners have fishing access to Solomon Islands waters. The status of the albacore resource in the Solomon Islands waters is currently unknown.

Tonga

35. Tonga's tuna resource includes albacore, bigeye, yellowfin and other tunas. The albacore resource within Tonga waters and waters immediately to the South of Tonga, and means by which the fish are captured are well known. The Lofa has been fishing for the past 10 years, and has accumulated a useful amount of fishing statistics. Catch rates by the Lofa and historical data from other fishing boats indicate that the resource level in the intended fishing grounds is sufficient to support a fishing fleet working out of Tonga.

36. The government's stated objectives for fisheries under the country's Sixth Five–year Development Plan (DPVI) are to increase catches, improve marketing and create more job opportunities. Greater emphasis has been placed on the exploitation of offshore pelagic fisheries, with the aim of increasing the number of longline vessels.

37. The Tonga Government has established a newly formed public fishing company with a majority government ownership, known as Sea Star Fishing Co. Ltd (SSFCL) to own and operate the country's only tuna longliner MFV 'Lofa'. This company, which aims at assisting the government in undertaking a high priority development programme in the fisheries, thus contributes to employment, incomes and foreign exchange earnings, and can help the fishing industry to open new investment opportunities in tuna fishery and other related activities.

United States of America

38. During 1990–91, 58 U.S. troll vessels fished for albacore in the South Pacific (WP.6). This fleet caught 5,494 mt of albacore at an average rate of 256 fish per day fished. Catches were concentrated in the STCZ South of Tahiti, and consisted of fish ranging from 38 cm to 109 cm FL. A single modal size at 66 cm made up the catch.

39. Fewer U.S. vessels (55) participated during the 1991–92 season (WP.14). The catch was 3,016 mt, or 46% less than that landed in 1990–91. The average catch rate was 132/day and the average weight was 7.53 kg. Albacore in the catch ranged from 41 to 102 cm in size with modes at approximately 62 and 72 cm.

Forum Fisheries Agency

40. At the SPAR4 meeting the FFA representative made a commitment to coordinate preparation of an outline of historical perspectives and trends of the South Pacific albacore fleets. Inputs to this document were invited from other participants.

41. Many SPAR4 participants provided tabular data together with explanatory notes which were included in the text. Data on vessel numbers was organised into Deep Water Fisheries (longline and handline) and surface fisheries (driftnet and troll). Much of the data presented in WP.22 was also presented in country papers.

3. REVIEW OF AVAILABLE FISHERY DATA

42. The South Pacific Commission's Assistant Fisheries Statistician presented WPs 1 and 2.
Summaries of the available fishery data are attached to this report as follows:

Annex 2(a)	Availability of data for the SPAR catch and effort database.
Annex 2(b)	Availability of data for the SPAR size frequency database.
Annex 3	Longline catches (mt) of South Pacific albacore.
Annex 4(a)	Surface fishery catches (mt) of South Pacific albacore
Annex 4(b)	Troll fishery catches (mt) by area.
Annex 5(a)	Longline catch rates for South Pacific albacore
Annex 5(b)	Longline catch rates for South Pacific albacore by area
Annex 6	Surface fishery catch rates for South Pacific albacore

Points to note from the presentation and subsequent discussions were:

- Data from domestic longline vessels from Australia, New Caledonia, New Zealand, Fiji and Tonga for 1991 have been aggregated from the SPC regional tuna fisheries database

and included in the SPAR database. Data for the domestic fleet operating in French Polynesian waters for 1992 is complete and has also been included.

- A new entry into the database is the addition of catch data from domestic troll vessels of Australia for the 1991/92 season.

- The most significant submission of data to the SPAR database in the past year has been the Japanese longline data; the latest submission covers catch in numbers and effort to 1990. The SPAR database previously did not contain any catch data for this fleet for the years after 1980.

- The most notable omission of catch data from the SPAR database is for Korean longline vessels for 1988 to 1990. These data have been requested on more than one occasion in the past however, they are yet to be made available. Estimates for the 1988–91 longline catches were recently provided to SPC by Korea. It is hoped that data will be submitted regularly in the future.

- There was no driftnet activity in the 1991–92 season.

- Outstanding New Zealand troll catch data is unavailable but will be sent to SPC in the near future. Outstanding US troll catch data will be provided by June this year. Japanese longline catch data from 1962–1990 noted in Table 1 as being published by the Fisheries Agency of Japan, is in fact published data up until 1980. Data from 1981 to 1990 has been provided separately to SPC.

- There has been a considerable amount of size composition data collected from longline vessels unloading at the port sampling sites in Fiji during the last 2 years. Korean, Taiwanese, Tongan and the Fiji domestic fleet were sampled during this period. There is more work required in allocating area stratification to some of these data.

- As in the previous years, size composition data collected from New Caledonian longliners by port samplers in 1991–1992 and data collected from American, French Polynesian and New Zealand troll vessels by the port samplers and observers in the 1991/92 season have been made available for the SPAR database.

- The distribution of the SPAR database should normally have occured in October 1992, however, due to the lack of data submissions at that time, there was little change to the database since the previous distribution and it was considered prudent to wait until some data were received. Most submissions of data were only received in the last few months.

- The SPAR database and documentation were distributed to each of the fishing parties during the course of the meeting.

43. The meeting was asked whether the guidelines for the timing of submission of data in WP.1 are adequate or require amendment. It was suggested that the number of guidelines be reduced from 4 to 3 and these should read;

1. **'Provisional estimates of the total annual catch for longline and surface fisheries of the immediate past calendar year and season, respectively, should be made available on September 1st'.**

2. **'Catch and effort data for longline and surface fisheries aggregated by 5° square and month should be made available on September 1st,12 and 18 months after the end of the calendar year and season respectively'.**

3. **'Length–frequency data stratified by 5° latitude by 10° longitude by month should be made available at the same time as aggregated catch and effort data'.**

44. Attention was drawn to differences in the catch time series provided by Taiwan at SPAR4 and those in WP.3. It was explained that this arose from the use of different data systems, and that a check would be undertaken in Taiwan. To assist in checking, a sub–group (P. Williams, M. Labelle, C. Wang) developed a format (Annex 9) for detailing data sources and estimation procedures. The format will be used for annual reporting of Taiwanese data. It was suggested that other data contributors could adopt this method of indicating the source of data provided to SPC.

45. The SPC Assistant Fisheries Statistician noted that the landings data provided by Fiji and American Samoa would serve for future verification of catch data. It was noted that although much of the albacore catch is landed in Pago Pago, some goes to Thailand and other ports. The question of whether or not the SPAR group should monitor transhipments of albacore was left unresolved.

4. REVIEW OF RECENT RESEARCH PROJECTS AND DATA ANALYSIS

4.1 Tagging experiments

46. A review of tagging programs for South Pacific albacore was presented in WP.10. Tagging programmes have been conducted in the South Pacific since the early 1960s by various fishery agencies to obtain information on the demographic traits of South Pacific albacore. A total of over 20,000 albacore was tagged and released. Less than 3,000 of these were tagged in the recreational fishery along the south–east coast of Australia. About 17,000 albacore were tagged from commercial troll fishing vessels, mainly along the New Zealand coast and the Sub–Tropical Convergence Zone. Less than one per cent of all tags released have been recovered so far. Tagged albacore were recovered primarily in the longline fishery, after a period at large that ranged from one month to 4.9 years. Preliminary analysis of data from double tagging experiments suggest that tag loss during the period at large are ~16 %. Albacore tagged in areas east of 155°W were usually recovered to the east and north of the release site. By contrast, albacore tagged in areas west of 155°W were usually recovered at locations to the west and north of the release site. Growth rates during the period at large averaged about 0.8 cm per month for 68–70 cm albacore.

47. Participants noted the following:

- The scattered distribution of tag returns from their release sites and no returns so far from the north Pacific supports the hypothesis of a stock in the South Pacific that does not mix with the north Pacific stock.

- The Pago Pago cannery does not process all South Pacific albacore catches by the Tawianese longline fleet, yet nearly all the Taiwanese longline tag recoveries reported to SPC recently have come from Pago Pago canneries. There is therefore concern that vessels landing their catches elsewhere do not report recoveries.

- The effect of tetracycline on estimated growth rates need to be assessed.

- Despite considerable effort in publicizing the SPC tagging program and working with the fishing industry, tag returns remained disappointingly low. This indicated that non–reporting in the troll fleet is less of a causal factor for the low return rate than first suspected. Very low tag recovery rates by surface troll fishing (<0.01%) suggests the level of exploitation by this fishery is minimal.

4.2 Observer programs

48. The results of the observer program on South Pacific albacore troll vessels were reported in WP.9. The program began in 1988 with three observer trips and continued through the 1991–92 season. The total number of observer trips was 36 for the four years. The major conclusions were:

- Significant differences in average daily catch rates were detected between years, months and areas for the same levels of fishing effort.

- Catch rates in the STCZ during the 91/92 season were at the lowest level reported since 1986.

- A fraction of the albacore hooked each day became unhooked prior to being hauled on board. To estimate this loss rate, observers monitored fishing operations on 17 vessels for a total of 3,620 hours. The vessel–specific loss rate ranged from 6% to 36%. The overall loss rate averaged across all vessels and years was 24%. Observers noted higher losses were associated with greater transom height, faster cruising speed, upcurrent vessel orientation, greater albacore size, harsh ocean conditions and small hook size.

- Length frequency histograms based on troll catch samples revealed that albacore caught in the Tasman Sea tend to be smaller than those caught in the STCZ.

- In the STCZ, about 90% of the albacore handled by observers since 1988 were examined for injuries. During the 1988–89 season, 11% of the albacore examined had net marks, but by the 1991–92 season, this fraction decreased to less than 1% as would be expected given the departure of the driftnet fleet. Similar trends were observed in catch samples from the Tasman Sea.

- In terms of by–catch, the most common species caught were skipjack, mahi mahi and kingfish but these made up less than 1% of the total catch. This fraction was usually higher in coastal waters.

49. Participants also discussed Island Government's observer program plans for South Pacific longliners. Both New Zealand and Australia intend to place observers aboard longline vessels fishing in their EEZs in 1993. Fiji is planning to place observers on domestic longliners in the near future. These three observer programs were recognised as opportunities for collecting special biological samples or fishery information to support SPAR recommendations.

4.3 Reproductive biology investigations

50. In order to determine the spawning seasonality of albacore in the South Pacific, ovaries and testes were collected from longline vessels operating in the waters of New Caledonia (21–23°S, 164–166°E) and Tonga (16–29°S, 171–177°W) over the period January 1990 to February 1992. Gonad pairs from 264 females and 444 males were weighed and gonosomatic indices (GSI) were calculated. A subset of 167 ovary pairs were examined histologically to determine the extent of meiotic activity. The monthly variation in GSI values and mean oocyte diameters clearly showed that albacore are annual rather than semestral spawners, with spawning limited to the austral summer months. No advanced, mature or spawned ovaries were observed in the sample. Most albacore showed increased levels of meiotic activity after they had reached a fork length of 80 cm. However, the highest GSI values were seen in a small group of 70 to 80 cm males and females caught in Tongan waters in Jan–Feb 1992. Unfortunately gonads were not collected from these fish for histological examination, so evidence of early spawining must at present be treated with caution. Asymmetry in the weight of the left and right gonads was apparent in the samples from the two collection areas, with

most of the right ovaries being larger. However, an examination of oocyte diameter showed no significant difference in size between right and left ovaries.

51. A question was raised about the possible significance of previous reports of STCZ troll–caught small males with motile sperm. It was not clear what significance could be attached to this observation; however, from a population perspective, there would be an expectation of some proportion of males and females smaller than those reported in WP.13 to be reproductively active. From a population dynamics point it would probably be more important to consider the size at which some significant part (eg, 50%) of the population was mature.

4.4 Age and growth studies

52. Length frequency data and vertebral ring counts/length measurements were analysed to independently estimate *von Bertanlanffy* growth parameters for South Pacific albacore. As a working hypothesis, it was assumed that length frequency modes and vertebral rings were annual features. The MULTIFAN model fitted to length frequency data provided estimates of $L\infty$ and K of 97.1 cm and 0.239 –1 YR, respectively. Nine significant age classes were detected in the data. A seasonal component to growth was significant, with growth rate decreasing to almost zero in March. Two to thirteen growth rings were visible in vertebrae and estimates of $L\infty$ and K of 121.0 cm and 0.134 yr–1 respectively, were obtained. No significant differences in growth parameters were detected between males and females. The growth rates predicted by length frequency and vertebral ring count models were very similar over the presumed range of age classes present in both data sets. These growth rates were consistent with length increment observations from 28 tag returns, which lends support to the assumptions of annual vertebral rings and length frequency modes.

53. The meeting noted the pressing need to complete analysis of the hard parts collected from oxytetracycline–injected albacore for further verification of the annual periodicity of vertebral rings. Results had been expected for the meeting but had been delayed by Dr J. Kalish's move from MAF Fisheries to the Australian National Unversity. It was noted that Dr Kalish still intended to complete the work and results were expected soon.

54. Uncertainty was expressed as to whether the vertebral rings could be used to estimate ages given the apparently high variance. It was noted that the variance in lengths at a given vertebral ring number was expected because of errors in determining age. The apparent variance was exagerated because all lengths attained between ring depositions were assigned to a particular ring count (eg. fish lengths at age 3.1 and at age 3.9 would be assigned to age 3.0 if the vertebral rings equate with ages). This was not viewed as detracting from the technique or the working paper but reinforced the need for further investigation of hard parts ageing procedures to analyse hard parts.

4.5 Research on driftnet fisheries

55. Driftnet fishing has reportedly stopped since July 1991 in the South Pacific and no research had been undertaken since SPAR 4. There were no presentations or discussions under this agenda item.

4.6. Analyses of catch and effort data

56. Action items arising from SPAR4 were reviewed (see Annex 1).

57. Working Paper 5 presented the results of an analysis of examination of albacore catch rate for the South Pacific using a GLM to take account of area and season influences. The catch rates in the tropical area were generally stable across the time span of the data (1960–

90). However, in the temperate area, after relatively stable catch rates in 1980 a marked increase was again followed by fairly stable rates through the 1980s. The meeting was advised that areas 5 and 7 in Figure 1 had been intensive target areas for Southern Bluefin Tuna (SBT) in recent years but were marginal areas for albacore fishing. Dr Uozumi was asked if this had been taken into account in the General Linear Model (GLM) analysis. He explained that albacore is caught as a by–catch species in almost all the operations in the SPAR area, and the difference in the target species may reflect in the difference in gear types. The lack of deep water longlining in areas 5 and 7 would sufficiently account for this in the model.

58. When asked if it was possible to determine when longliners targeted yellowfin, bigeye or southern bluefin tuna, Dr Uozumi explained that fishermen did not include such information on logs. In general terms however, SBT is targeted near New Zealand and the Tasman Sea, the Coral Sea was a multi–species fishery ground, and bigeye tuna is targeted in the north–east of the SPAR area.

59. Figure 3 of WP.5 gives CPUE in number of fish per 1000 hooks, but the trend in CPUE is more important than the absolute (and low) CPUE values.

60. Attention was drawn to the confidence limits around the CPUE values. SPAR4 had highlighed the need for such refinements, and the hope was expressed that their incorporation would become routine in such studies.

61. Adjusted CPUE for the 'temperate' area exhibited an abrupt increase in the early 1980s. The basis of this increase was questioned, namely whether it represented a real change in CPUE, or an artefact of regulations relating to SBT, or a change in fishing style or fishing grounds which may not have been accounted for in the analysis. The chairman commented that reduced Japanese longliner access to the coastal region of southern New South Wales in the early 1980s forced vessels offshore to areas of higher albacore CPUE.

62. Dr Uozumi pointed out that the GLM showed a general CPUE decline over time rather than an abrupt SBT stock response in the period concerned. However, there was still a possibility that some unrecognised industry response might have resulted in the diversion of vessels to the yellowfin and bigeye tuna fisheries.

4.7. Population modelling

63. Drs D. Fournier and J. Hampton presented the preliminary findings of the SPAR catch–at–length estimation model, now known as SPARCLE. The model is designed to integrate the available size composition, catch and effort data for the various fisheries to provide some information on the stock dynamics and the effects of fishing. Preliminary fits of the model to the SPAR data suggest a declining trend in stock biomass in recent years, although the wide confidence limits on the estimates may mean that the trend is not statistically significant. Similarly, recruitment estimates have wide confidence limits, but there appears to be a very strong signal in the data suggesting abnormally low recruitment of 3–year old albacore in 1985 and 1990. It was noted that both of these year classes would have originated during the 1982–83 and 1987–88 ENSO events. If low recruitment are induced by ENSO events as hypothesized, then low recruitment should occur during the 1993–94 season as a result of the 1991–92 ENSO event. Catchability trends estimated by the model were also discussed; these suggest that longline catchability has declined since the late 1960s, which would at least partially explain the CPUE decline during the same period, while surface fishery trends are more variable.

64. The above results from fits of the model to SPAR catch, effort and length frequency data demonstrated the model's potential to estimate albacore abundance, recruitment, fishing mortality and catchability. Conclusions drawn from model results will be possible after simulation testing of the model using data sets generated from known values for the parameters.

65. In discussion, it was generally agreed that the SPARCLE model would be helpful, but further work was required to fully understand its complex features, such as treatment of stock availability. It was noted that efforts should be made to incorporate data on dropout and tag loss rates. SPC plans to undertake further work with the model, with the intention of completing its stock assessment objectives by the end of 1993.

4.8 Other research

A Pilot Study on Albacore Stock Structure

66. During 1992, the TBAP initiated a pilot study of albacore stock structure in the Pacific ocean by means of an electrophoretic analysis of blood proteins. Blood was collected from freshly caught albacore in 5 locations; Tasmania, New Zealand, Fiji, French Polynesia and New Caledonia. Additional samples were also collected from the north eastern and north western Pacific to provide contrast.

67. Only about half of the samples had been processed (by Dr L. Brown at LaTrobe University, Melbourne, Australia). No significant heterogeneity in GPI, Pgm, Est–1 and Est–2 was detected amongst all three South Pacific samples, as well as these samples plus the north eastern Pacific sample. However, when the small north western Pacific sample was added, there was significant heterogeneity in Pgm allele frequencies. The preliminary results provide no evidence of structuring amongst South Pacific samples (all from the western South Pacific), and amongst South Pacific/north eastern Pacific material. The investigation is continuing and the final results will be published as a TBAP technical report in the next few months.

68. MAF Fisheries described the application of satellite SST imagery for locating areas suitable for albacore trolling. The maps have been distributed on a cost recovery basis to fishermen in the STCZ for the past two years and have had good acceptance. The area covered from the Wellington receiving station stretches from the coast of Australia east to about 150°W and at the latitude of New Zealand cover the area from Antarctica to the Fiji EEZ. The basic processing includes reception of 2–4 satellite passes per day which are composited over a 3–5 day period. Clouds are eliminated by excluding which were colder on previous satellite passes. Atmospheric water vapour is then removed using an algorithm based on data from a separate sensor on the satellite (TOVs data). SST is then estimated using two band in the infrared range. Algorithms for correcting for atmospheric water vapour and estimating SST were developed jointly by scientists in New Zealand and the US. The resulting SST estimates have been verified by actual measurements in the upper 1 m and found to be within +/– 0.1°C per nautical mile. This threshold had previously been found to be associated with above average troll catch rates while areas of weaker gradients usually did not result in albacore being caught during line transect surveys. These surveys covered a wide range of areas and seasons with SST bracketing the normal range fished.

69. Dr I. Leleu of Meteo France (SMPF) provided an information paper on a similar SST information service for French Polynesian fishermen.

5. STATUS OF THE SOUTH PACIFIC ALBACORE STOCK

5.1 Fishery outlook

70. Since 1989, the fisheries for South Pacific albacore have undergone major changes that are continuing. In 1989, the fisheries produced a historically high catch of about 55,000 mt before declining to about 30,000 mt in 1991, due largely to the moratorium on driftnet fishing. In 1992, the catch declined further as a result of reduced fishing effort in the troll fishery and to overall poor fishing conditions.

71. In the coming years, further changes are anticipated. In particular, development of small–scale longline fisheries by island nations will likely accelerate. These fisheries take advantage of new longline technology (e.g. monofilament mainline on stern reels) that are easily adapted to small vessels at modest cost, and are effective on targeting albacore as well as other large pelagic species.

72. The distant–water longline fishery is also likely to change, but will likely continue to take a significant portion of the total South Pacific albacore catch, if the current high prices are maintained. The main uncertainty for this fishery is the number of former driftnet vessels being converted to longliners and being deployed in the South Pacific.

73. The STCZ troll fishery has been experiencing declining catch rates since 1991. If this continues and as stock condition of the North Pacific albacore stock continues to improve, less effort is likely to be deployed by this fishery in the near term. Nonetheless the outlook is for stable or slowly increasing overall catches of albacore from the South Pacific.

5.2 Indicators of stock condition

74. The meeting discussed a series of indicators potentially useful for evaluating stock condition.

- Taiwanese longline CPUE (Annex 7) and possibly relative abundance has declined since 1986. However, the time series has been highly variable since 1975 and factors other than stock abundance may have contributed to this variation.

- Taiwanese longline CPUE, in principal, is the most valuable indicator of the relative abundance of larger albacore. Work is currently in progress at NTU both to improve the accuracy of the catch and effort data and to provide an associated standardised index of abundance. Indices based on Japanese and Korean longline CPUE are also available, but unlike the Taiwanese fleet, these fleets have not consistently targetted albacore and the interpretation of their CPUE trends is therefore confounded to some extent.

- Notwithstanding the uncertainties associated with interpretation of the longline CPUE time series, a clear impact of the strong pulse in surface fishery catches in 1988–89 (primarily due to the driftnet fishery) upon the longline CPUE time series cannot be detected at this stage.

- Nominal CPUE in the STCZ has declined in recent seasons, while CPUE in the New Zealand EEZ over the same period was highly variable (Annex 8). These differences cannot be adequately explained at present. CPUE trends in the surface troll fishery (Figure y) appear to be influenced by oceanographic conditions and therefore may be more indicative of availability to the troll fishery than of juvenile abundance.

- Tagging experiments in the STCZ, New Zealand coastal waters and the Tasman Sea have been carried out since 1985–86, resulting in low tag recoveries mostly returned from the longline fishery. With little evidence of non–reporting in the troll fishery at least, these results are suggestive of low surface fishery exploitation in comparison to the longline fishery. The low overall number of returns, the possibility of significant tagging mortality, the possibility of reduced vulnerability of tagged albacore immediately after tagging and other uncertainties complicate further interpretation of results at present.

- Age and growth studies show that albacore are relatively slow growing and long lived. This suggests that albacore are not likely to be as productive as shorter–lived, faster–growing tropical tunas.

5.3 Condition of the stock

75. Since the moratorium on driftnet fishing in 1990/91, catches of South Pacific albacore have remained near or below their historical average. There is no evidence from the stock indicators that current levels of fishing are adversely affecting the stock, although the available nominal CPUE time series *per se* are limited in the information they can provide in this respect. Accordingly, rapid expansion in the catch of South Pacific albacore should not be encouraged at this time.

6.0. FUTURE RESEARCH PRIORITIES AND RESEARCH COORDINATION

76. Discussions about future research efforts focused on research questions facing the SPAR group at this time. The principal research questions are:

1. What are the broad stock abundance trends for the South Pacific albacore resource?

    a) What is the current status of the resource?
    b) To what extent do surface and longline fisheries interact?
    c) What levels of catch are supportable?

2. What determines the availability and changes in availability of albacore to regional and local fisheries.

3. Are there local sub–units of albacore that are prone to local depletion?

    a) What levels of fishing can they support?
    b) What mixing of exchange occurs within the broader stock?
    c) Is the development of domestic albacore fisheries economically viable?

77. There was general agreement on the importance of these questions, although there were differences in research approach. The overall status of the stock was considered to be of primary importance. Some participants expressed the view that albacore catches could be greatly increased based on comparisons with North Pacific stocks. Other participants indicated a specific interest in the development of island domestic fisheries for albacore. The principal issue in this regard is to improve fishery monitoring including coverage of developing small–scale longline fisheries, to more precisely determine status of stocks and fishery impacts on the resource.

78. Some difficulties in addressing these questions were noted. For example, the quantification of interactions between the surface and longline fisheries was suggested to be an unrealistic objective for directed research because it would be prohibitively expensive to execute sucessfully. In addition, two problems of non–reporting were raised as serious concerns: (a) the lack of catch and effort data from some major fleets (e.g. Korea), and (b) the problem of non–reporting of tag recoveries by fishing fleets.

79. General research approaches were discussed. For stock trends, continued monitoring of catch and effort are essential, and continued length–frequencey modeling and tag analyses are providing useful insight into stock trends. Data collection by on–board observers and port samplers will be useful in this respect. Regarding the development of domestic longline albacore fisheries, some uncertainty was expressed about the extent that SPAR should depart from providing regional coordination on albacore issues to examining propects of local interest such as this. It was generally felt that SPAR might act in an advisory capacity on matters such as the development of a particular island's longline fishery.

80. Current plans for data collection are summarized in Annex 10.

81. Monitoring programs (CPUE and length frequency) for current surface and longline fleets are listed in Annex 11. Attention was drawn to three longline fleets which are not adequately monitored for length–frequencies of albacore catches. The Australian and New Zealand longline fisheries were noted in this regard. The most significant deficiency, however, was length monitoring for the Taiwan fleet based in American Samoa. At present, the fleet is monitored by NMFS but continued funding for this exercise is uncertain. This is a directed albacore fishery that has the longest–term database. It is consequently considered to be the most critical longline fleet to monitor. Thus it was strongly recommended that ways to continue monitoring this fishery be actively explored.

82. Finally, the group recognised the need for a comprehensive research strategy for albacore research, but more detailed discussions of research projects seemed premature at this time, pending a more thorough analysis of population modeling and associated work at SPC. At the next SPAR meeting, results from this work should permit a more detailed review of the future direction of albacore research in which the research actually conducted can be more thoroughly integrated with the research needed.

7. OTHER BUSINESS

83. The future of SPAR was raised and it was agreed that the group meet on a biennial basis unless circumstances warrented holding SPAR meetings earlier. It was also agreed that should there be a need for more frequent meetings, these would be arranged through consultation with SPAR.

84. It was suggested that the current Chairman of SPAR would keep members informed of important events concerning the albacore fishery through a selected newsletter (e.g. SPC Fisheries Newsletter).

85. It was also suggested that at venues such as the Standing Committee on Tuna and Billfish (SCTB) and the Regional Technical Meeting on Fisheries (RTMF) matters concerning SPAR could be raised.

IV. LIST OF PAPERS PRESENTED AT THE MEETING

WP.1 Current status of the SPAR database.
Tuna and Billfish Assessment Programme - SPC

WP.2 Longline, troll and driftnet catch rates of South Pacific albacore.
Tuna and Billfish Assessment Programme - SPC

WP.3 Overview of Taiwan fishing of South Pacific albacore.
C-H. Wang.

WP.4 Recent status of the Japanese albacore fisheries in the SPAR area.
Y. Uozumi.

WP.5 The recent CPUE trend for South Pacific albacore caught by Japanese longline fishery.
Y. Uozumi.

WP.6 Summary of the 1990-91 U.S. South Pacific albacore fisheries data.
G. Sakagawa.

WP.7 Albacore landings in American Samoa, 1987-92.
P. Craig.

WP.8 Review of the New Zealand albacore fishery.
T. Murray.

WP.9 Review of the South Pacific albacore troll fishery 1985-92.
Tuna and Billfish Assessment Programme - SPC

WP.10 A review of South Pacific albacore tagging in the South Pacific.
Tuna and Billfish Assessment Programme - SPC

WP.11 Age and growth of South Pacific albacore (Thunnus alalunga) from analyses of length frequencies, vertebral ring counts and tagging data.
M. Labelle, J. Hampton, K. Bailey, T. Murray, D. A. Fournier and J. R. Sibert.

WP.12 SPARCLE, South Pacific Albacore Research Catch-at-length estimators.
D. Fournier.

WP.13 Reproductive patterns of South Pacific albacore (Thunnus alalunga) as indicated by gonosomatic index and meiotic activity.
G Sakagawa for *D. Ramon and K. Bailey.*

WP.14 Report of the SWFSC research activities for South Pacific albacore during 1991-92 and plans for 1993.
G. Sakagawa.

WP.15 Prospects for an albacore fishery in Australia.
A. Caton.

WP.16 Notes on the Fiji albacore.
S. Sharma.

WP.17 Evolution future de la pêche au germon en Nouvelle Calédonie.
R. Etaix-Bonnin.

WP.18 Expansion of albacore fishing in Tonga.
T. Koloa.

WP.19 L'exploitation des germons en Polynésie Française
S. Yen

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ANNEX 1

PROGRESS ON SPAR 4 ACTION ITEMS

Item

(a) MAF (NZ) will analyse hard parts returned from the oxytetracycline tagging experiment and report on the usefulness of the vertebral ageing technique.

MAFs work on analysis of hard parts was delayed but should be completed in the next few months.

(b) SPC will investigate the use of length-frequency data in population modelling.

A model (SPARCLE) has been developed and appears to offer good scope for length based analyses. Testing is in progress.

(c) SPC and NMFS (US) will produce a report on analysis of gonad macroscopic and histological patterns.

A joint SPC–NMFS (U.S.), study on the reproductive biology of South Pacific albacore was completed (WP.13). The results indicate that peak spawning activity occurs during the austral summer, from December to February.

(d) MAF will investigate methods of standardising domestic troll fishery CPUE for use as an index of abundance.

MAF was unable to compete this action item to identify ways of standardising troll fishery CPUE due to ongoing difficulties with access to New Zealand fisheries statistics. It was reported that domestic fishermen misinterpreted logbook instructions and reported catches in estimated weights or pieces without declaring the units used. This created a serious estimation problem. A small advance was made to develop a CPUE index using a mixture of landings records from factories and days fished from MAF logbooks. This approach was not wholly successful, and led to higher CPUE estimates than previously recorded by observers, possibly due to days with zero catches not being recorded.

(e) MAF will develop a standardised longline CPUE series comparing the Honma method with a generalised linear model approach using a subset of 5–degree square data assembled for Japanese, Korean and Taiwanese fleets.

A comparison of the Honma method and GLM as a means of standardising CPUE was proposed at SPAR4 since the earlier Honma method had been used in SPAR4 and the behaviour of the two had not been examined. Limited progress was made to standardise longline CPUE using a GLM approach applying it to southern bluefin tuna in the New Zealand EEZ since this data set was readily available and its characteristics were well described. The application of the GLM and Honma method was not extended to albacore due to uncertain access to some data and insufficient time. The comparison of the Honma and GLM approaches now appears to have taken on a lower priority since the more versatile GLM is gaining wider acceptance for standardising CPUE. Consequently MAF will not pursue this action item..

(f) NTU (ROC) will produce an index of abundance for the longline fishery.

NTU staff deferred work on an index of abundance for the Taiwanese longline fishery because the catch and effort statistics were recently adjusted for deficiencies. However, this work will continue and is expected to be complete by the end of 1993.

(g) NMFS will report on the analysis of CPUE data from the high seas SCTZ troll fishery for juvenile albacore.

NMFS reported on the analysis of CPUE data for the STCZ troll fishery through the 1990/91 season for which data were complete and gave a preliminary estimate for the 1991/92 season. These data indicated that the slight downward trend in CPUE seen in 1989/90 and 1990/91 is continuing. This preliminary estimate will be finalised in June and an updated report distributed.

(h) NTU will produce a stock assessment paper estimating yields for South Pacific albacore.

This awaits finalisation of longline CPUE data and will be completed by the end of 1993.

(i) SPC will provide a preliminary stock assessment of albacore based on the application of an age-structured model.

Development and use of the 'SPARCLE' model had resulted in deferral of work on an age-structed model.

(j) SPC and MAF will conduct further tagging of juvenile albacore in the Tasman Sea and STCZ in 1991/92 surface fishery.

During 1990–92, SPC and MAF conducted albacore tagging in the Tasman Sea, along the coast of New Zealand and in the STCZ. A total of 10,149 albacore were tagged (WP.10).

(k) BRR (Australia) will summarise oceanographic/albacore catch correlations as a component of its survey report.

This item has been completed.

(l) MAF will prepare a report describing use of satellite-derived SST maps identifying areas of high seas albacore catch rate.

These results were reported to the meeting.

(m) SPC will contact NRIFSF (Japan) for estimates of driftnet CPUE promised at previous SPAR meetings.

(n) NTU will contact companies formerly involved in driftnetting in order to provide estimates of Taiwanese driftnet fleet historic CPUE.

NTU staff contacted companies previously engaged in driftnet fishing in the South Pacific in an attempt to reconstruct an historic time series of CPUE. However, companies were not cooperative and no further approach is planned at this stage.

(o) SPC will analyse tag recovery data to better describe surface/longline fishery interactions.

(p) MAF will report on albacore data collected in the longline fishery (1987/1991).

(q) SPC will report on observer programme results from the high seas albacore surface fishery (1988–89 to 1991–92).

(r) Council of Agriculture (ROC) will describe and report on the impact of economic factors on longline fishery patterns (geographical and seasonal).

This awaits finalisation of longline CPUE data and will be completed by the end of 1993.

(s) FFA will co-ordinate preparation of an outline of historical perspectives and trends of the South Pacific albacore fleets; other SPAR participants will contribute relevant inputs.

The information provided by many of the SPAR4 participants was used to prepare a paper on this topic which was presented to the meeting (WP.22).

Availability of data for the SPAR Catch and Effort Database

SOURCE	VESSEL NATIONALITY	GEAR TYPE	TIME PERIOD	STATUS	COMMENTS
AUSTRALIA	AUSTRALIA	L	1985-1991	✓	Transferred from the Regional Tuna Fisheries Database.
AUSTRALIA	AUSTRALIA	T	1991/92	✓	Provided by Bureau of Resource Sciences.
FIJI	FIJI	L	1989-1991	✓	Transferred from the Regional Tuna Fisheries Database.
FRENCH POLYNESIA	FRENCH POLYNESIA	L	1992	✓	Provided by EVAAM.
FRENCH POLYNESIA	FRENCH POLYNESIA	T	1991/92	✓	Provided by EVAAM.
JAPAN	JAPAN	G	1983/84-1987/88	x	Requested of NRIFSF.
JAPAN	JAPAN	G	1988/89-1989/90	✓	Provided to SPC during SPAR 3, Oct/90.
JAPAN	JAPAN	L	1952-1961	x	Requested of NRIFSF.
JAPAN	JAPAN	L	1962-1990	✓	Published by the Fisheries Agency of Japan (1962-1980); Provided to SPC (1981-1990).
KOREA	KOREA	L	1958-1974	x	Requested of NFRDA.
KOREA	KOREA	L	1975-1980	✓	Published by the National Fisheries Research and Development Agency.
KOREA	KOREA	L	1981-1982	x	Requested of NFRDA.
KOREA	KOREA	L	1983-1987	✓	Published by the National Fisheries Research and Development Agency.
KOREA	KOREA	L	1988-1990	x	Requested of NFRDA.
NEW CALEDONIA	NEW CALEDONIA	L	1983-1991	✓	Transferred from the Regional Tuna Fisheries Database.
NEW ZEALAND	NEW ZEALAND	L	1979-80,1989-91	✓	Transferred from the Regional Tuna Fisheries Database.
NEW ZEALAND	NEW ZEALAND	T	1968/69-1981/82	x	Catch data only for 1968/69-1981/82. Requested of MAF.
NEW ZEALAND	NEW ZEALAND	T	1982/83-1990/91	✓	Provided by MAF.
NEW ZEALAND	NEW ZEALAND	T	1991/92	x	Requested of MAF.
SPC	NEW ZEALAND	T	1991/92	✓	Catch and effort data collected during SPC observer and port sampling activities.
SPC	UNITED STATES	T	1991/92	✓	Catch and effort data collected during SPC observer and port sampling activities.
TAIWAN	TAIWAN	G	1987/88	x	Data are unavailable at Tuna Research Center, Taiwan National University.
TAIWAN	TAIWAN	G	1988/89	✓	Provided by the Tuna Research Center, Taiwan National University.
TAIWAN	TAIWAN	G	1989/90-1990/91	x	Requested of the Tuna Rsearch Center, Taiwan National University.
TAIWAN	TAIWAN	L	1954-1966	x	Data are unavailable at Tuna Research Center, Taiwan National University.
TAIWAN	TAIWAN	L	1967-1985	✓	Published by the Tuna Research Center, National Taiwan University.
TAIWAN	TAIWAN	L	1986-1990	✓	Unpublished data provided by the Tuna Research Center, National Taiwan University.
TONGA	TONGA	L	1982-1991	✓	Transferred from the Regional Tuna Fisheries Database.
UNITED STATES	UNITED STATES	T	1986/87-1990/91	✓	Data provided by NMFS.
UNITED STATES	UNITED STATES	T	1991/92	x	Data requested of NMFS.

Key: G, driftnet; L, longline; T, troll; ✓ available; x unavailable

ANNEX 2(a)

Availability of data for the SPAR Size Frequency Database

SOURCE	VESSEL NATIONALITY	GEAR TYPE	TIME PERIOD	STATUS	COMMENTS
AUSTRALIA	AUSTRALIA	T	1991/92	✓	Test fishing sponsored by BRR; some data are missing.
AUSTRALIA	JAPAN	L	1979-1991	x	Australian Fishing Zone (AFZ) observer programme sampling; to be included in database.
FIJI	FIJI	L	1991	✓	Port sampling in Suva.
FIJI	KOREA	L	1991	✓	Port sampling in Levuka.
FIJI	TAIWAN	L	1989-1991	✓	Port sampling in Levuka.
FIJI	TONGA	L	1990	✓	Port sampling in Levuka.
FIJI	NEW ZEALAND	T	1989/90	✓	Port sampling in Levuka.
FIJI	UNITED STATES	T	1989/90	✓	Port sampling in Levuka.
FRENCH POLYNESIA	UNITED STATES	T	1986/87-1991/92	✓	Port sampling in Papeete. Weights available. Number of fish injured available.
JAPAN	JAPAN	G	1988/89-1989/90	✓	Provided by NRIFSF.
JAPAN	JAPAN	L	1954-1961	x	Requested of the Fisheries Agency of Japan.
JAPAN	JAPAN	L	1962-1980	✓	Published by the Fisheries Agency of Japan.
JAPAN	JAPAN	L	1981-1985	x	Requested of NRIFSF.
JAPAN	JAPAN	L	1986-1988	✓	Provided by NRIFSF.
JAPAN	JAPAN	L	1989-1991	x	Requested of NRIFSF.
NEW ZEALAND	NEW ZEALAND	T	1972/73-1985/86	x	Requested of MAF.
NEW ZEALAND	NEW ZEALAND	T	1986/87-1991/92	✓	MAF observer and port sampling data.
SPC	FIJI	T	1990/91	✓	Observers aboard chartered vessels.
SPC	JAPAN	G	1988/89	✓	Port sampling in Nouméa by SPC staff.
SPC	JAPAN	G	1989/90	✓	Sampled by SPC observers on JAMARC vessel.
SPC	NEW CALEDONIA	L	1990-1991	✓	Port sampling in Nouméa by SPC staff.
SPC	NEW ZEALAND	T	1988/89-1991/92	✓	Sampled by SPC observers.
SPC	COOK ISLANDS	T	1991/92	✓	Sampled by SPC observers.
SPC	UNITED STATES	T	1988/89-1991/92	✓	Sampled by SPC observers.
UNITED STATES	JAPAN	L	1962-1972, 1987	✓	Pago-based vessels: annual data; no area.
UNITED STATES	KOREA	L	1962-1989	✓	Pago-based vessels: annual data; no area.
UNITED STATES	TAIWAN	L	1964-1989	✓	Pago-based vessels: annual data; no area.
UNITED STATES	UNITED STATES	T	1986/87-1990/91	✓	Provided by NMFS.
UNITED STATES	UNITED STATES	T	1991/92	x	Requested of NMFS.

Key: G, driftnet; L, longline; T, troll; ✓ available; x unavailable

Longline catches (mt) of South Pacific albacore

YEAR	AUSTRALIA	FIJI	FRENCH POLYNESIA	JAPAN	KOREA	NEW CALEDONIA	NEW ZEALAND	TAIWAN	TONGA	OTHER	TOTAL
1952				154							154
1953				803							803
1954				9,578							9,578
1955				8,625							8,625
1956				7,281							7,281
1957				8,757							8,757
1958				18,490	146						18,636
1959				17,385	456						17,841
1960				21,638	610						22,248
1961				23,412	330						23,742
1962				34,620	599						35,219
1963				29,120	1,367						30,487
1964				19,390	2,911						22,301
1965				17,793	6,405						24,198
1966				21,627	10,817						32,444
1967				15,104	13,717			11,723			40,544
1968				6,659	10,138			12,375			29,172
1969				4,894	9,963			9,557			24,414
1970			+	5,297	11,599			14,682			31,578
1971			+	3,472	14,482			15,880			33,834
1972			+	3,027	14,439			16,780			34,246
1973			+	2,550	17,452			17,742			37,744
1974			+	1,868	12,194			17,246			31,308
1975			+	1,333	9,015			16,939			27,287
1976			+	2,054	12,212			13,653			27,919
1977			+	2,328	13,176			21,452			36,956
1978			+	2,845	10,989			20,935			34,769
1979			+	2,274	8,682			14,952			25,908
1980			+	2,216	10,852			25,579			38,647
1981			+	4,203	14,793			14,367			33,363
1982			+	4,899	12,586			12,644	106		30,235
1983			+	5,723	6,669	12		12,106	143		24,653
1984			+	3,804	5,730	112		11,155	135		20,936
1985			+	3,868	14,267	131		9,601	174		28,041
1986	40		+	4,426	18,799	179		11,913	206		35,563
1987	164		+	4,490	8,646	563		15,009	252	...	29,124
1988	142		+	7,469	5,600	584		17,120	242	...	31,157
1989	600	5	100	5,365	3,997	566	19	10,867	195	...	21,714
1990	300	263	156	6,428	2,586	1,053	249	9,689	152	...	20,876
1991	195	416	146	4,401	1,225	909	325	15,186	174	...	22,977
1992	154	310	174	3,700	1,556	520	706	29,325	199	...	36,644

Provisional estimates are shaded; "+" denotes small catches of unknown size

SOURCES

Australia	Bureau of Resource Sciences (Caton). Catches for 1986–1988 were derived by raising logbook data to take account of limited coverage prior to 1989. Australian catches includes an estimated 500 mt taken by Australia/Japan joint-venture vessels in 1989, 150 mt in 1990, 20 mt in 1991 and 5 mt in 1992.
Fiji	Fisheries Division (Sharma). Catches for 1989-1992 have been raised to account for non-reporting from some vessels. Data for years prior to 1989 are available.
French Polynesia	EVAAM (Yen).

SOURCES

Japan	NRIFSF, Fisheries Agency of Japan (Uozumi).
Korea	NFRDA (Uk Lee). Estimates for 1958–1987 were taken from the report of SPAR 2; these estimates include some catch from the North Pacific. Catch estimates for 1988–1991 for the entire Pacific Ocean were provided by NFRDA (Uk Lee). These were adjusted to reflect the proportion of albacore catch taken annually in the South Pacific for 1984–1987. Catch estimate for 1992 taken from aggregated data provided by NFRDA (unraised) for the SPAR area.
New Caledonia	Marine Marchande (Etaix-Bonnin).
New Zealand	Ministry of Agriculture and Fisheries (Murray).
Taiwan	National Taiwan University. Wang (pers. comm. Apr 19, 1993) provided estimates for 1967-1991. Provisional catch estimate for 1992 obtained from aggregated data provided by the National Taiwan University (Hsu) for the SPAR area.
Tonga	Ministry of Fisheries (Latu). Albacore catch estimates were derived by applying the species composition determined from daily logsheet data held in the SPC Regional Tuna Fisheries Database to estimates of the total annual catch for all species combined provided by the Ministry of Fisheries. Catch estimates for 1990-1992 obtained from the daily logsheet, provided by the Ministry of Fisheries.
Other	Catches estimates of other fleets that have not been described in this table.

(a) Surface fishery catches (mt) of South Pacific albacore

YEAR	AUSTRALIA	CHILE	FR POL TROLL	JAPAN P/L	JAPAN DRIFTNET	KOREA DRIFTNET	TAIWAN DRIFTNET	NZ TROLL	USA TROLL	OTHER TROLL	TOTAL
1960				45							45
1961											0
1962											0
1963				16							16
1964											0
1965											0
1966											0
1967											0
1968											0
1969											0
1970	100										100
1971	100										100
1972	100										100
1973	100										100
1974	100							898			998
1975	100							646			746
1976	100							25			125
1977	100							621			721
1978	100							1,686			1,786
1979	100							814			914
1980	100			19				1,468			1,587
1981	50			8				2,085			2,143
1982	50			1				2,434			2,485
1983	50			2	32			744			828
1984	50				1,581			2,773			4,404
1985	50				1,928			3,253			5,231
1986	50				1,936			1,911	89		3,986
1987	50				919			1,227	859		3,055
1988	50				4,271		1,000	330	3,339	170	9,160
1989	50		90		13,263	172	8,520	5,161	3,563	192	31,011
1990	50	...	359		5,667	0	1,859	2,525	3,758	30	14,248
1991	50	...	326		0	0	821	2,464	5,494	133	9,288
1992	100	...	72	49	0	0	0	3,856	(3,016)	(133)	7,226

(b) Troll fishery catches (mt) by area

SEASON	STCZ FP TROLL	STCZ NZ TROLL	STCZ US TROLL	STCZ TOTAL	AUNZ AU TROLL	AUNZ NZ TROLL	AUNZ US TROLL	AUNZ TOTAL
1966/67						5		5
1967/68						14		14
1968/69						...		...
1969/70						50		50
1970/71						...		...
1971/72						268		268
1972/73						484		484
1973/74						898		898
1974/75						646		646
1975/76						(25)		25
1976/77						(621)		621
1977/78						(1,686)		1,686
1978/79						(814)		814
1979/80						(1,468)		1,486
1980/81						(2,085)		2,085
1981/82					50	(2,434)		2,484
1982/83					50	(744)		794
1983/84					50	(2,733)		2,783
1984/85					50	(3,253)		3,303
1985/86			(89)	89	50	(1,911)		1,961
1986/87			(859)	859	50	(1,227)		1,277
1987/88			(3,339)	3,339	50	(330)		380
1988/89	90	361	(3,563)	4,014	50	4,800		4,850
1989/90	359	740	(3,758)	4,857	50	1,785		1,835
1990/91	326	838	(5,758)	6,922	50	1,626		1,676
1991/92	72	(700)	(3,016)	3,788	100	3,156		3,256

Estimates where stratification by area are not yet avaliable are given in parentheses

SOURCES

Australia	Bureau of Resource Sciences (Caton). Incidental catches of albacore in the Southern bluefin pole-and-line fishery declined after 1980. Recreational fishery catches from 1982 are estimated to be about 50 mt. Catches during 1992 include 55 mt taken by commercial trollers.
Chile	(FAO statistical bulletins to be reviewed for Chilean catch).
French Polynesia	EVAAM (Yen) provided catch estimates for 1990/91 and 1991/92 seasons. US - National Marine Fisheries Service (Sakagawa) provided estimates for years previous to these seasons.
Japan	National Research Institute of Far Seas Fisheries (Uozumi).
Korea	National Fisheries Administration (Kim). The estimate presented for the 1989 calendar year represents the catch during the 1988/89 season, during which one vessel was active.
Other	U.S. - National Marine Fisheries Service (Sakagawa). "Other Troll" includes catches by Canadian and Fijian trollers. The estimate for 1991 has been used as the provisional estimate for 1992. Includes estimate of 30 mt each year since 1988 for the artisanal fishery in the Easter Islands. SPC (Labelle).
Taiwan	National Taiwan University (Hsu). Catch estimates are for the fishing season, e.g., the estimate presented for the 1988 calendar year represents the catch during the 1987/88 season. The catch estimate for the 1987/88 season was estimated by the TBAP and reported to SPAR 3. The estimate for 1988/89 was determined from catch and effort data processed by the National Taiwan University (Hsu). Estimates for the 1989/90 and 1990/91 seasons were reported to SPAR 4 by the National Taiwan University (Wang).
New Zealand	Ministry of Agriculture and Fisheries (Murray). Catch estimates are for the fishing season, e.g., the estimate for the 1974 calendar year is the catch during the 1973/74 season. The figure for 1991/92 season includes a provisional estimate of 700 mt albacore catch in the STCZ. ***Need 1992's estimate.***
United States	National Marine Fisheries Service (Sakagawa). The estimate for the 1991/92 fishing season (3,016 mt) has been used as the estimate for the 1992 calendar year, which is not yet available. ***Need 1992's estimate.***

(a) Longline catch rates for South Pacific albacore

YEAR	AUSTRALIA	FIJI	JAPAN	KOREA	NEW CALEDONIA	TAIWAN	TONGA
1962	-	-	2.272	-	-	-	-
1963	-	-	1.654	-	-	-	-
1964	-	-	1.409	-	-	-	-
1965	-	-	1.420	-	-	-	-
1966	-	-	1.442	-	-	-	-
1967	-	-	1.482	-	-	-	-
1968	-	-	0.800	-	-	-	-
1969	-	-	0.485	-	-	-	-
1970	-	-	0.596	-	-	-	-
1971	-	-	0.399	-	-	3.440	-
1972	-	-	0.269	-	-	3.381	-
1973	-	-	0.246	-	-	3.004	-
1974	-	-	0.211	-	-	2.619	-
1975	-	-	0.132	0.229	-	2.497	-
1976	-	-	0.132	0.833	-	3.039	-
1977	-	-	0.129	0.906	-	3.327	-
1978	-	-	0.146	1.752	-	3.785	-
1979	-	-	0.141	1.043	-	2.761	-
1980	-	-	0.103	0.753	-	2.903	-
1981	-	-	0.202	-	-	2.345	-
1982	-	-	0.232	-	-	2.650	0.874
1983	-	-	0.281	1.168	0.720	3.202	1.438
1984	-	-	0.217	0.838	1.904	2.315	1.488
1985	0.078	-	0.223	0.891	1.190	2.918	1.882
1986	0.257	-	0.209	0.979	1.383	4.055	3.757
1987	0.737	-	0.179	0.439	1.599	3.015	3.358
1988	0.681	-	0.265	...	3.730	2.852	3.064
1989	1.097	0.560	0.252	...	1.944	1.752	2.100
1990	0.906	0.862	0.255	...	1.969	1.630	2.659
1991	1.073	0.837	0.229	...	1.735	1.930	2.379
1992	...	...	...	...	...	...	...

Units: number of fish per 100 hooks

(b) Longline catch rates for South Pacific albacore by area

YEAR	North of 10°S			STCZ			South of 10°S (excl STCZ)		
	JAPAN	KOREA	TAIWAN	JAPAN	KOREA	TAIWAN	JAPAN	KOREA	TAIWAN
1962	0.881	-	-	5.567	-	-	3.190	-	-
1963	0.554	-	-	4.431	-	-	2.314	-	-
1964	0.595	-	-	4.932	-	-	1.944	-	-
1965	0.543	-	-	4.844	-	-	1.957	-	-
1966	0.436	-	-	5.541	-	-	1.891	-	-
1967	0.242	-	-	4.879	-	-	1.746	-	-
1968	0.130	-	-	2.111	-	-	1.195	-	-
1969	0.057	-	-	5.180	-	-	0.650	-	-
1970	0.054	-	-	4.645	-	-	0.730	-	-
1971	0.045	-	-	2.519	-	-	0.539	-	-
1972	0.036	-	-	0.127	-	-	0.396	-	-
1973	0.026	-	-	0.129	-	-	0.425	-	-
1974	0.017	-	-	0.109	-	-	0.305	-	-
1975	0.017	0.135	-	-	-	-	0.209	0.789	-
1976	0.018	0.218	-	0.172	1.170	-	0.205	1.639	-
1977	0.035	0.382	1.772	0.335	2.286	6.526	0.229	1.429	3.284
1978	0.029	0.811	1.407	2.174	4.110	6.257	0.289	2.526	3.618
1979	0.045	0.326	1.395	0.739	2.805	4.158	0.245	1.994	2.858
1980	0.044	0.363	1.399	0.680	2.682	3.915	0.168	1.317	3.160
1981	0.059	-	1.202	0.028	-	4.074	0.239	-	2.279
1982	0.076	-	1.692	-	-	3.692	0.387	-	2.400
1983	0.046	0.494	1.316	0.273	2.545	4.072	0.432	1.983	3.041
1984	0.034	0.217	0.948	-	2.739	3.940	0.380	1.744	2.026
1985	0.045	0.185	1.482	0.429	3.395	4.827	0.429	1.719	2.406
1986	0.025	0.294	1.942	-	4.062	7.889	0.359	1.741	3.404
1987	0.016	0.272	1.420	-	3.999	3.780	0.332	0.775	2.870
1988	0.040	...	0.998	-	...	4.061	0.446	-	2.479
1989	0.016	...	0.385	0.973	...	2.653	0.468	-	1.653
1990	0.007	...	0.712	-	...	2.993	0.506	-	1.745
1991	...	...	0.801	-	...	2.450	...	-	2.030
1992	...	...	...	-	...	...	...	-	...

Units: number of fish per 100 hooks
Areas: 'STCZ' defined as area between between longitudes 165°W and 100°W and south of latitude 30°S

ANNEX 6

Surface fishery catch rates for South Pacific albacore

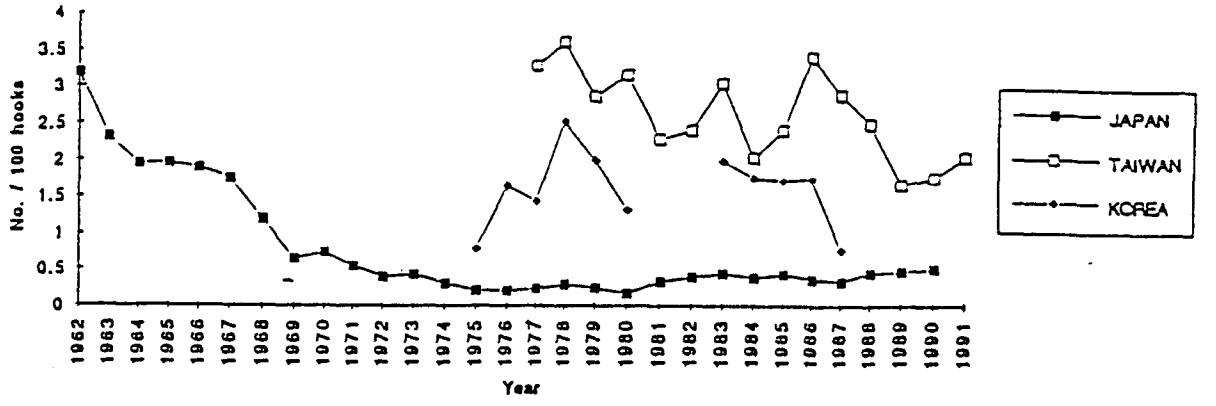
SEASON	JAPAN DRIFTNET	TAIWAN DRIFTNET	AUNZ AU TROLL	AUNZ NZ TROLL[1]	AUNZ NZ TROLL[2]	AUNZ US TROLL	STCZ NZ TROLL[2]	STCZ US TROLL
1982/83	–	–	–	(20)	–	–	–	–
1983/84	–	–	–	(11)	–	–	–	–
1984/85	–	–	–	(18)	–	–	–	–
1985/86	–	–	–	(18)	9	–	–	–
1986/87	–	–	–	(27)	19	–	-	339
1987/88	–	–	–	(26)	34	24	-	266
1988/89	621	99	–	(38)	44	14	220	231
1989/90	697	...	–	(32)	97	24	330	318
1990/91	–	...	–	(33)	29	16	256	202
1991/92	–	–	35	(104)	21	13	185	132

Units: fish per day
Areas: 'AUNZ' defined as west of 165°W; 'STCZ' defined as east of 165°W and between latitudes 35°S and 47°S

1 Catch data available in metric tonnes only (MAF); Estimates of number of fish determined from length-frequency data (Provisional).

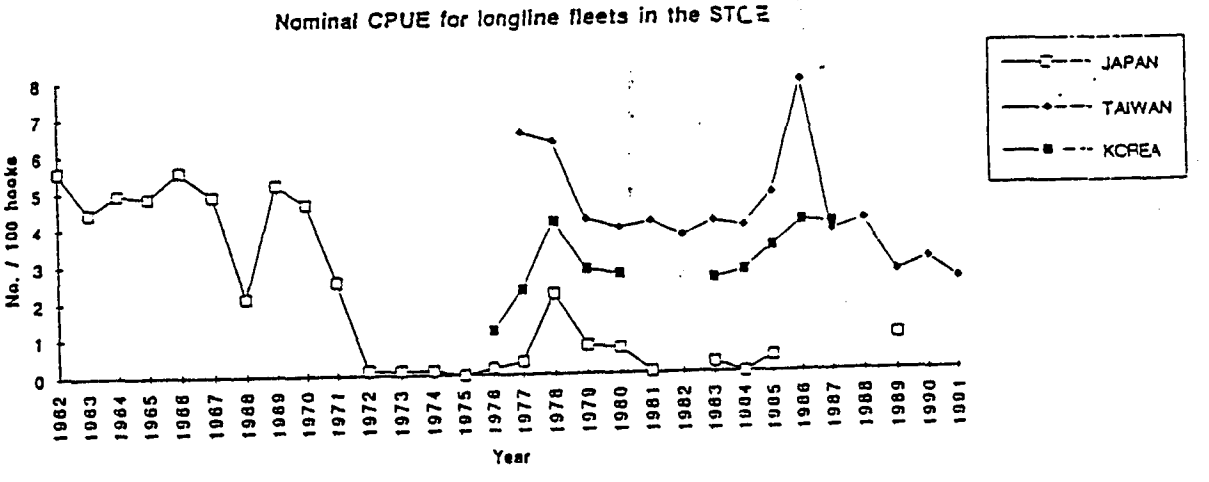
2 Logsheet data provided to SPC from observer and port sampling activities.

Nominal CPUE for DWFN longline fleets south of 10 S excl. the STC



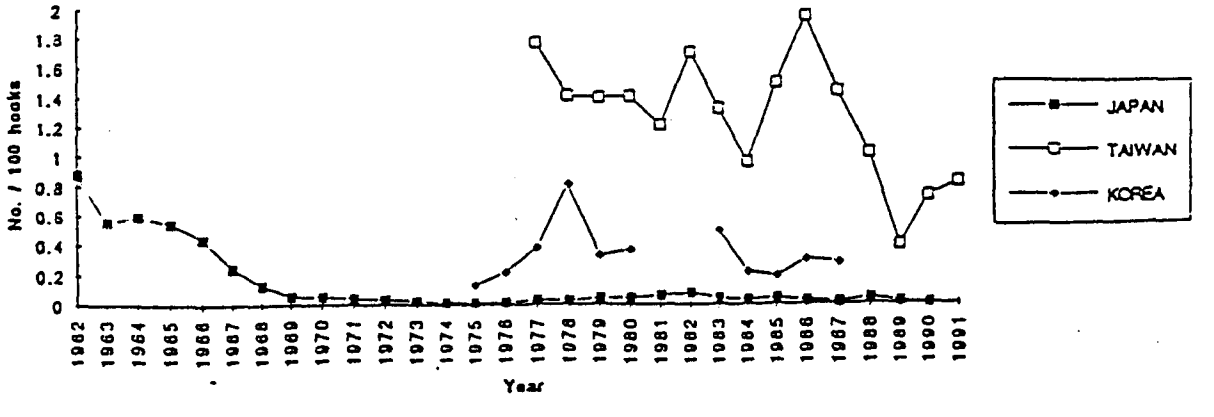
(b)

Nominal CPUE for longline fleets in the STC

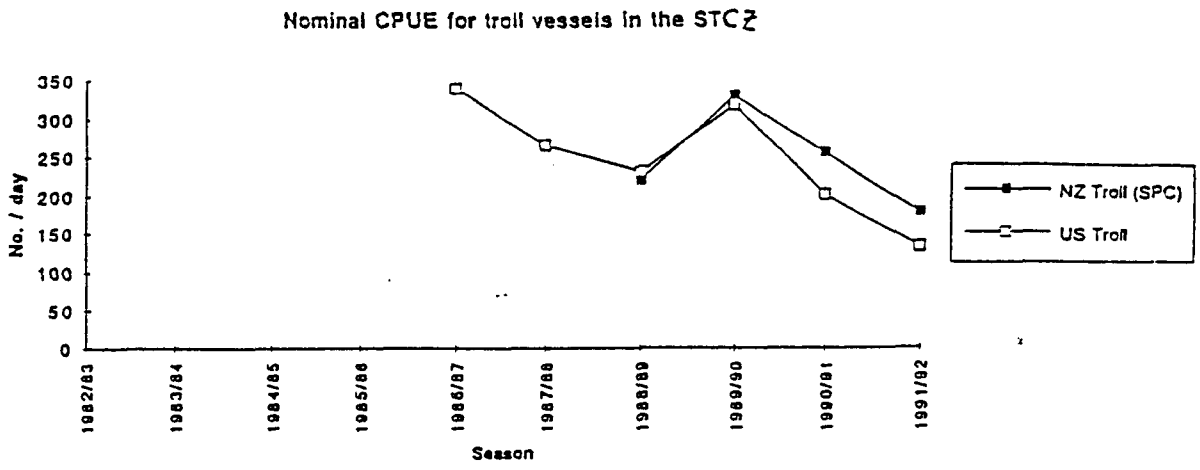


(c)

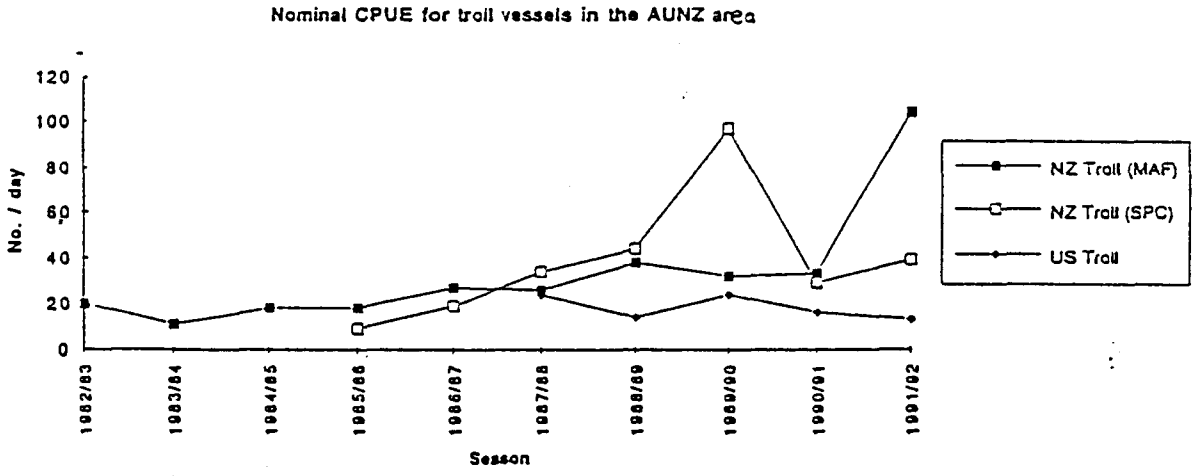
Nominal CPUE for DWFN longline fleets north of 10°S



(a)


Nominal CPUE for troll vessels in the STCZ
No. / day
350
300
250
200
150
100
50
0
1982/83
1983/84
1984/85
1985/86
1986/87
1987/88
1988/89
1989/90
1990/91
1991/92
Season
NZ Troll (SPC)
US Troll

(b)


Nominal CPUE for troll vessels in the AUNZ area
No. / day
120
100
80
60
40
20
0
1982/83
1983/84
1984/85
1985/86
1986/87
1987/88
1988/89
1989/90
1990/91
1991/92
Season
NZ Troll (MAF)
NZ Troll (SPC)
US Troll

ANNEX 9

Sources of estimates for South Pacific albacore catch

Fleet	Years	Source of this estimate
TAIWAN	1967-1990	Estimates are calculate annually (1) Albacore landings data for the entire Pacific Ocean are provided by Taiwanese Fisheries Bureau? (TFB) (2) Entire Pacific albacore catch and effort are estimated by the Tuna Research Centre, National Taiwan University (TRC) from available logbook data (3) North Pacific albacore catch and effort are then estimated by TRC from available logbook data (4) The estimates for the North Pacific albacore catch and effort are taken from the estimates for the entire Pacific albacore catch and effort to give the estimates for the South Pacific albacore catch and effort. (5) The estimates for the South Pacific albacore catch and effort are then raised using the North Pacific logbook estimates (see (3) and the landings data for the entire Pacific (see (1)).

Albacore research commitments of SPAR member countries and organisations

Research activity	American Samoa DMWR	Australia BRS	Japan NNRIFSF	New Zealand MAF	China-Taiwan NTU	U.S.A. NMFS	SPC TBAP	Fiji FD	French Polynesia EVAAM ORSTOM IFREMER	New Caledonia MMAM	Tonga MoF	Cook Islands MMR	FFA
Age and Growth - Length frequency - Hard parts	X	X X		X XX				X	X (X) 1	X	X	X	
Reproductive biology									(X) 2				
Indices of abundance		X	(XX)	XX	XX	XX	X		X	X			
Stock boundaries		(X)					(XX)						
Population dynamics models & stock assessment methods including longline/surface fishery interaction					XX		XX						
Tagging/Recovery		X	X		X	X	XX		X	X			
Oceanography				XX					(X) 3				
Observer programme		X		XX			(XX)	X 5	X				
Albacore behaviour									XX 4				
Exploratory and economic analysis	X								X	X		X	X

KEY: (X = collaborator, XX = principal investigator, indicating a commitment to produce a report for the next SPAR meeting; brackets indicate possible activities; letters in brackets refer to action items listed under agenda item 6)

Other Code Notes

1. ORSTOM and IFREMER are currently studying how they can use their common laboratory located at Brest (France) to analyse hard parts.
2. EVAAM, ORSTOM and IFREMER intend to take part of tuna fecondity and spawning, studying in the EEZ of French Polynesia.
3. Oceanographic data will be collected during STCZ surface fishery monitoring.
4. EVAAM, ORSTOM and IFREMER plan to carry out studies on albacore behaviour as well as the spatial distribution of albacore (and other tunas)
5. Possibility.

FISHERIES MONITORING PROGRAMMES

FLEET	NO OF VESSELS	MONITORING IN PROGRESS		COMMENTS
SURFACE	1991–1992	CPUE	LENGTH	
Australia recreational	N/A*	Occasional survey	No	Catch minor - No plans currently
Australia troll	39 (might increase)	No soon	No	Catch minor, length monitoring if development occurs
Fiji troll	2	Yes	No	Monitoring US purse seine transshipment catches
French Polynesia troll	2	Yes	Yes	Port sampling (length frequency)
New Zealand troll	252	Yes	Yes	Port sampling (length frequency) some research logbook coverage
US troll	53	Yes	Yes	Continue current monitoring
LONGLINE		CPUE	LENGTH	
Australia	84	Yes	No	Action needed - length monitoring
(JV and Japanese longliners)	~90	Yes	Yes	Observer programme gathers length frequency data
Fiji	23	Yes	Yes	Monitoring catch landing data plus logsheet (observer programme)
French Polynesia	20	Yes	Yes	CPUE and port sampling
Japan	351	Yes	Yes (YAIZU)	CPUE monitoring from logbooks
Korea	68	N/A	N/A	
New Caledonia	6 (might increase)	Yes	Yes	Port sampling for length frequency plus CPUE monitoring
New Zealand	20	Yes	No	Bigeye target, small vessel, albacore bycatch
(Joint Venture)	4–5	Yes	Yes	Observer programme
(Foreign-licensed)	15–30	Yes	Yes	For length frequency plus biology
Taiwan	[80]	Yes	No	CPUE monitoring from logbooks - US monitoring of CPUE & length frequency
Cook Islands	1			
Tonga	1	Yes	Yes	Port sampling during unloading at Pago Pago

* N/A = Not available