

A short history of the Skipjack Survey and Assessment Programme (SSAP) [Part 1]

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For over 20 years the Oceanic Fisheries Programme (OFP) has been arguably both the best known and the most highly regarded programme within the Pacific Community (SPC). Its reputation for excellence in data capture, science provision and resource management advice has fuelled its ability to attract funding for its continued core function and for many large-scale projects over the years. All of this has contributed to the high profile of OFP within the member countries of SPC, but also on a much wider scale within the scientific and fisheries management communities world-wide. OFP is the successor to the Tuna and Billfish Assessment Programme (TBAP), which ran from October 1981 to early 1994. TBAP, itself, had evolved from the Skipjack Survey and Assessment Programme (SSAP), which ran from September 1977 to September 1981.

Overview

The Skipjack Programme carried out tuna surveys and assessments that enabled the first estimates of the skipjack resources of the whole central and western Pacific, and evaluation of the ability of these resources to support sustainable fisheries. Over a period of three years, which began in the late seventies, the ground-breaking Skipjack Programme team tagged 160,276 skipjack and other tuna. Of these, 6,889 (4.3%) were reported as recaptured with the associated data forming the basis of vital understanding of the migratory nature of the species, the magnitude of the stocks and the variability in their genetic structure and distributions. In the process the Programme greatly expanded world knowledge of the biology of skipjack and other tuna species. In addition, the baitfish resources of SPC member countries and territories were assessed.

In 1989, OFP undertook a second major tagging programme within the region – the Regional Tuna Tagging Project (RTTP). Since then a third major tagging programme has also been completed – the Pacific Tuna Tagging Programme (PTTP), which ran from 2006 to 2013. In total, nearly 800,000 tunas have been tagged in the Western and Central Pacific Ocean (WCPO), with the three large-scale tagging projects conducted by SPC contributing about 83% of this total. Each of the large-scale projects tagged tunas throughout the equatorial WCPO, and recoveries have correspondingly been reported from across the equatorial WCPO and beyond.

Tagging data have been included in WCPO stock assessments since 1982 for skipjack tuna, since 1992 for yellowfin tuna, and since 1996 for South Pacific albacore and bigeye tuna. Since 2001, tagging data have been included routinely in WCPO tuna stock assessments using the integrated assessment model MULTIFAN-CL².

Today, neither the feasibility nor the usefulness of such large scale tagging programmes are questioned – the biggest obstacle remains the raising of the necessary funding to conduct them. But back in 1974, the concept of tagging on such a large scale, and over such a large area of relatively remote ocean, was revolutionary – it had never been attempted, and for most people, including most fisheries scientists, it was unthinkable. There were no arrangements for any regional tuna research, let alone region-wide survey and tagging studies and as for most significant scientific endeavours, gaining support for proving the concept was a major obstacle.

Therefore, there were many reasons why SSAP was a ground-breaking project. Upon its completion it was hailed as an outstanding success. Yet it almost never happened.

Notable achievements of the Programme include:

- proving that tagging could be done on a grand scale, numerically and geographically, such that sufficient tuna could be tagged and adequately distributed in both time and space over the 30 million square kilometres of the region, and that adequate recoveries would be recorded to enable region-wide resource assessments;
- quantifying for the first time the large size of the skipjack resource in the Western and Central Pacific (estimated by SSAP at around 3 million tonnes), as well as its dynamic nature (extremely rapid turnover) and associated ability to withstand fishing pressure. It is most significant from the perspective of confirmation of the quality of a truly scientific experiment (being able to repeat an experiment and confirm results) that more recent repeats by the OFP of the Skipjack Programme's original tagging experiment have confirmed the 3 million tonne estimate;

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² MULTIFAN-CL is a computer programme that implements a statistical, length-based, age-structured model for use in fisheries stock assessment.



Action during the inaugural SSAP tagging cruise in late 1977 (Bob Kearney bottom left). Note the large backpack containing the voice recorder, and the long microphone hanging on the chest. The material used these days for voice recording is MUCH more compact (image: Bob Gillett).

- documenting the migratory nature of the resource, but the relatively limited interaction between well-separated national fisheries;
- generating estimates of biological parameters (age, growth, fecundity, mortality and feeding behaviour) for skipjack, of which little was known at the time, and in the process correcting much of what had previously been postulated and/or believed;
- becoming the first extra-budgetary (XB) project managed under the auspices of SPC;
- increasing the overall budget of SPC by approximately 33% (from AUD 2.8 million in 1977);
- purchasing the first ever computer at SPC (in April 1979 at an initial cost of approximately USD 100,000), thus propelling SPC into the computer era;
- elevating the perception and profile of SPC to one of scientific and technical excellence;
- providing scientific support and insight for Pacific Island nations in the development of their individual and collective strategies in the lead up to the declaration of their 200-mile Exclusive Economic Zones under the United Nations Law of the Sea. In so doing

the Programme provided conceptual strategies and baseline analyses that underpinned the development of cooperative regional fisheries policies. This cooperation was essential for the creation of the Forum Fisheries Agency and eventually the Western and Central Pacific Fisheries Commission.

Background

In 1970, the total tuna catch in the SPC area was less than 100,000 tonnes, and was nearly all taken by foreign longline fleets. These longline catches and related catch-rates had, however, levelled out after peaking in the mid-1960s. With the development of joint-venture pole-and-line operations, first in Papua New Guinea (PNG) (1970), then the Solomon Islands (1971), interest in the skipjack resource, as one with potential to support considerable expansion of catches, intensified.

In early 1971 Dr Robert (Bob) Kearney, a young Australian with a driving interest in fisheries research, who had just graduated from the University of Queensland (UQ) with a PhD in Marine Biology, accepted a job with the Papua New Guinea (PNG) Department of Agriculture, Stock and Fisheries (DASF) as the Principal Biologist in charge of tuna

research. Two other young Australians who had also been studying at UQ accepted jobs in the DASF tuna research team within months of Dr Kearney's appointment – Bernard (Barney) Smith and Antony (Tony) Lewis (who both were later to make extremely important contributions at the most senior levels of SPC fisheries programmes).

In the development of his tuna research programme, Dr Kearney made inquiries of relevant fisheries research institutions including the Commonwealth Scientific and Industrial Research Organisation (CSIRO, Australia's national science agency) and the Inter-American Tropical Tuna Commission (IATTC, based in San Diego, California). Tagging was clearly the best option around for basing a comprehensive research effort that was to include aerial surveys and intensive biological sampling. Over the next two years, techniques specific for tagging skipjack and other tropical tunas, were developed and perfected by the team in DASF. Several thousand fish were then tagged in PNG waters.

At the time, the four tuna fishing companies in PNG were all Japanese joint-ventures, operating Okinawan pole-and-line boats out of bases in Rabaul, Kavieng and Madang. The catches by these fleets were impressive by the international standards of that era. At that time, according to Dr Kearney, the best boats caught up to 400 tonnes in a month, which for pole-and-line boats represented excellent returns. By world standards the fishery was considered to be one with great potential and its progress began to be keenly monitored by most Pacific nations.

The DASF team tagged sufficient fish and set in place tag-recovery systems to quickly generate impressive numbers of recoveries. Data from these releases and recoveries, together with daily catch information from each individual vessel operating in the PNG tuna fishery, were then computerised and subsequently analysed. Dr Kearney and his team were among the first in any discipline in PNG to computerise scientific research – a practice that is taken for granted today.

To quote Dr Kearney:

The country had an impressive Computer Centre but few excellent data sets, so if you made a case that included appropriate Departmental support, they were keen to facilitate your access to the computer. The operators of the Centre were visionary and they wanted to see their computer used to best effect for PNG. They would actually do all of the data entry and software development for you. And so I made a case, with very strong support from the Director of DASF (Bill Conroy). The fact that the tuna fishery represented an exciting development opportunity for the country at that time was clearly a major factor influencing the strength of the support we received. Senior staff of the Computer Centre took our

research really seriously, and within – oh, I don't know exactly, about a year of commencing our research we had fully computerised catch and effort data from each and every tuna boat. These data were compiled and presented in such a way that we could cross-reference all catches with our scientific sampling. The Computer Centre would deliver me monthly printouts of the daily catch by every boat, aggregated by area and any other classification I specified, combined with summaries of size-sampling of skipjack from every boat and area. So we had a very, very good handle on the tuna fishery which we could correlate with the tag return information that was also being computerised and analysed.

However, as more tag returns came in, and more analysis was done, Dr Kearney soon saw that he and his team were not able to get all the information necessary to comprehensively address the assessment of PNG's skipjack resources. The tagging techniques that had been developed were good – the fish were clearly surviving and they were being recaptured – particularly in PNG, and even in the fisheries further to the east. It was possible to determine where many of the tuna in PNG were going to, but it was impossible to determine where they were coming from, or to estimate the size of the



Bob Kearney, Papua New Guinea, early 1970s (image: Barney Smith collection).

total resource and the degree of mixing of the stocks that were being fished.

It was obvious the research team was dealing with a PNG fishery that was virtually isolated at that time. But what was the extent of the total resource that these fish were part of, and how would fisheries that might develop elsewhere impact PNG? The area-coverage of the tagging may have been impressive within PNG but it was manifestly inadequate for the analyses that were necessary, even for the assessments of only the stocks exploited in the PNG fishery. Dr Kearney realised that if the big questions were to be answered, even if only to the extent of the answers that PNG needed, it was necessary to try to expand their efforts geographically, beyond PNG's waters. There was not much point in tagging many more fish in PNG alone.

During 1973 he developed the idea of a tagging programme that was to be done on a much wider, regional scale. The initial concept was to have tagging done simultaneously in a number of other countries, such as the Solomon Islands, which was developing its own joint-venture pole-and-line fishery similar to PNG. The gaps in distribution of tags in the waters of countries that did not have pole-and-line fisheries could then be best covered by sharing a common research vessel to traverse the whole region and provide the capacity to tag reasonable numbers of skipjack, in at least,

most of the other Pacific Island countries. He wrote a one-page summary of this concept. He showed it to a few of his colleagues who initially thought it idealistic to the point of being unrealistically optimistic. He put it on hold.

In mid-1973 Dr Kearney received an unheralded visit in his office in Port Moresby from Roy (Dick) Baird. Dick was the Fisheries Officer at SPC at that time. Dr Kearney knew very little of SPC and he had a busy schedule that day, which did not include a meeting with 'a Dick Baird': they spoke for less than 30 minutes. However, this short meeting was sufficient for Dick to be most impressed with the quality of PNG's skipjack research programme, including the data printouts on the joint-venture fisheries, the tag recoveries and the results of the baitfish surveys. It also provided the opportunity for a brief discussion on the much more ambitious tagging project. Dr Kearney thought little more of their encounter, until he received a letter from Dick two or three months later together with an air ticket for travel to Tahiti to attend a meeting to discuss skipjack assessment. It was with much enthusiasm and optimism that he accepted the invitation. He attended his first truly international meeting a few months later with this optimism clearly evident.

The 'Expert Committee on Tropical Skipjack' meeting convened by Dick Baird was held in Papeete, in French Polynesia, from 25 February to 1 March 1974 under the



It was always important to raise awareness on the Skipjack programme, to make sure it would receive support from all stakeholders involved. Tony Lewis providing technical information to Fisheries College students and Fisheries Department staff. Kavieng, PNG, October 1977 (image: Bob Gillett).

chairmanship of Richard Shomura, the Director of the Hawaii office of US Government National Marine Fisheries Service. The members of the Expert Committee were easily convinced of the usefulness and appropriateness of the tagging programme mooted by Dr Kearney, the need for which they endorsed as a high priority. The introduction on page 1 of the report for the meeting states that 'After considering all available alternatives for the study of skipjack in the area, the Expert Committee strongly recommended a regional tagging programme in which approximately 100,000 skipjack would be tagged and released over a three year period (Appendix 2): Of particular note from the SPC perspective is the comment on page 11 of the proposal that constituted that Appendix: 'The international sponsorship of the project through the South Pacific Commission enables the vessel to catch both skipjack and baitfish in areas not accessible to a vessel of a single nationality.'

At Dick Baird's invitation, Dr Kearney agreed to stay on in Papeete a few more days after the meeting to expand his original one-page 'concept note' into more of a proposal, including a very preliminary estimate of possible costs. Over the next month or so, after further discussions with Dick Baird, Richard Shomura, Jim Joseph (then the Director of IATTC) and others, it was decided that it would be useful to get the Food and Agriculture Organization of the United Nations (FAO) and the affiliated Indo-Pacific Fisheries Council involved.

The SPC's Seventh Technical Meeting on Fisheries, held at Nuku'alofa, Tonga in July 1974, endorsed the Expert Committee's proposal as a 'project of the highest priority and urgency'; an endorsement that was seconded by the Indo-Pacific Fisheries Council Sixteenth Session, Jakarta, Indonesia, in November 1974.

Dr Kearney spoke to Dr John Gulland at FAO in Rome about furthering the development of the project. Gulland responded with the offer of a month's consultancy at FAO in Rome, and sent him an air ticket to that effect. Dr Kearney spent five weeks in Rome in November/December 1974, working with Gulland and other senior FAO staff, including Dr Sidney Holt and Fred Popper (the Director of the FAO Fisheries Department), on an expanded proposal. When it was published, it still did not include a detailed budget, but rather the comment: 'No attempt has been made to cost the services of a suitable vessel and crew for a two or three year period as more accurate estimates would be available from the appropriate fishing nations.' However, the proposal had expanded the project to include eleven full-time scientific staff members plus a part-time computer programmer; a major development from the four scientific staff cited in the proposal presented in February of 1974. The operational and fishing crew for the research vessel were to be additional. They were assumed to number approximately 20 but the costs of their employment would be included in the vessel charter arrangement, which remained to be determined.

The active quest for funding

With a refined proposal now endorsed by multiple bodies the search for funding could be undertaken in earnest. The first recommendation of the SPC's Seventh Technical Meeting on Fisheries, held in Tonga in July 1974, had not only stated that: 'The meeting recommends that the Tagging Programme as outlined by the Expert Committee on Tropical Skipjack be accepted as a project of the highest priority and urgency,' it went on to state that: 'The need for such a programme has been accepted, and the Meeting recommends that the South Pacific Commission make every possible effort to obtain funding for the programme from any possible sources. **It was appreciated that such funding should not interfere with the existing funding structure for South Pacific Commission projects** (emphasis added).'

The last sentence clearly reflected the reality that the SPC budget – entirely funded from core contributions at that time – could not possibly support such a large-scale project. There was considerable concern, including among the SPC Executives, that if donor country funds were directed towards this project that the outcome could have a negative influence on the quantum of funds available for SPC core support. Dick Baird and Dr Kearney, therefore, had no alternative but to seek funding totally from extra-budgetary sources. Obvious possibilities included most of the 'colonial' countries that had created SPC in 1947 – specifically Australia, France, New Zealand, the United Kingdom and the United States of America (listed in alphabetical order) – but they also included Japan. At that time, Japan was the dominant tuna fishing nation in the SPC region. Logically Japan would be the source of a great deal of the catch and effort information that would be an essential component of the assessment process and also many of the tag returns, if a tagging programme did eventuate. However, while Japan had expressed interest in increasing its support for Pacific Island nations, not only was it not a member of SPC, but it had never made a major contribution to an international organisation of which it was not a member: some kind of umbrella arrangement needed to be created to facilitate Japanese participation in the project.

Coincidentally, in 1974 the Rockefeller Foundation decided to create a new non-governmental organisation (NGO) to assist in fisheries management in the Asia-Pacific region. The new organisation would be called the International Centre for Living Aquatic Resources Management (ICLARM). Dick Baird was contacted by the Rockefeller Foundation to help with the establishment of ICLARM, and although he eventually turned down an offer to play a major role in this process he did suggest to Dr Kearney that he contact the Foundation as a possible funding source for the Skipjack Programme. This obviously bore fruit, as the Technical Advisory Committee of ICLARM met in Honolulu in February 1975, and just five days later the ICLARM Programme Coordinator sent a memo to Dr Phil

Helfrich, the Director of ICLARM, concerning the 'Skipjack Resource Assessment Project'. In it he stated:

After working out the initial details with Dick Baird (DB) ... this is where we stand at the moment. The Project Manager for this programme will be hired directly through the SPC in a staff capacity. Dick will develop a job description for the position in line with SPC requirements (even though he already intends to hire Bob Kearney) and will also handle the transfer of grant funds on the SPC end... The SPC will provide office space, housing, support personnel, and medical services. ICLARM funds will go for salary, additional expatriation allowance, and travel expenses. DB has assured me that no percentage of ICLARM funds will be deducted for administrative overhead.

In the interim, Dr Kearney had been offered another consultancy by FAO, for a period of three months working on Indian Ocean tuna fisheries, which he had accepted. With the injection of funds from Rockefeller Foundation/ICLARM, Dick Baird was eventually able to offer him an initial contract of six months with SPC, with a mission to raise the money to fund the Skipjack Survey and Assessment Programme. Dr Kearney accepted the challenge. He commenced work at SPC on 13 September 1975.

The context for obtaining commitments

It is very easy to forget just how different a place the Pacific was in the early nineteen seventies. Many people today have little or no knowledge of the major political changes that took place in the region between 1970 and 1980. During that short time-span, no less than seven South Pacific States (SPS) – Tonga, Fiji, Papua New Guinea, the Solomon Islands, Tuvalu, Kiribati and Vanuatu – obtained their independence from, or severed their voluntary ties with, various colonial powers. During the same decade, three other Pacific Island states entered voluntarily into new agreements of free association with metropolitan powers – Niue, the Northern Mariana Islands, and the Marshall Islands.

As a result, by the end of the seventies the majority of the member countries of the SPC were either independent or self-governing. During the same period, many discussions and meetings were held in the region to develop national and regional strategies and policies to protect sovereignty over, and the use of, the region's fisheries and other oceanic resources. These meetings were part of the region's preparations for the changing law of the sea. Dr Kearney, and subsequently other members of the Skipjack Programme team, were to play a major role in the preparation of discussion documents and analyses, including the first detailed proposal for a regional organisation specifically for fisheries research and management, drawing of

the first maps of the 200-mile zones of all countries and territories in the SPC region, and the first analyses of tuna catches by distant water fishing nations in the waters of each Island State. These negotiations culminated in the signature in December 1982 of the UNCLOS agreement. This convention formalised the notion of EEZs (exclusive economic zones of 200 nautical miles) around each coastal nation. UNCLOS enabled the countries to exercise sovereign rights over the living and non-living resources, particularly highly migratory species (HMS) such as tuna, within their EEZs. The tremendous importance to Pacific Island nations of sovereignty over their very substantial tuna resources is now obvious and accepted. For many countries therefore 'the concept of self-government and extended maritime jurisdiction was intrinsically interwoven virtually from the outset of nationhood' (Quote from a 1990 thesis by Transform Aqorau entitled 'Tuna Management and UNCLOS: Implementation of UNCLOS through the Forum Fisheries Agency').

SPC was the first major regional organisation of significance that was created in the Pacific. It was formed in 1947 by the six metropolitan powers of the period, namely Australia, France, New Zealand, the Netherlands, the United Kingdom and the United States of America, all of which had administrative and colonial responsibility over one or more island territory or state. The mandate of SPC was to promote the 'economic and social welfare and advancement of the peoples of the non-self-governing territories in the South Pacific Region administered by them'.

However, by 1975, SPC had major budgetary problems, as evidenced by the General Review presented to the 15th SPC conference by the Secretary-General, in which he stated:

As you are all well aware, the Commission in 1975 has been plagued with budgetary problems caused by inflation and currency fluctuations. Other organisations, and indeed Governments, have suffered from similar problems, but this does not decrease their repercussions on the Commission and its Work Programme. Although the expenditure made in 1975 and that proposed for 1976 are in excess of sums spent in previous years, the Commission's actual activities have not appreciably increased. In December last year, the Programme Directors and I made a thorough examination of the approved 1975 Work Programme and Budget; in an attempt to meet the budgetary deficit which was already looming clearly on the horizon, we 'froze' a long list of items in the administrative section of the Budget, the regular Work Programme, and the Special Projects. . . . Despite our efforts to prune expenditure, inflationary trends and devaluation have given rise to still further demands on our Budget, and we are faced with a deficit for 1975 of some seventy-five thousand dollars. . . . The outlook for 1976 is still more depressing...

On present indications, it is perfectly possible that the expenditure proposed in the draft Work Programme and Budget for 1976 will exceed available income to an alarming extent.

It was in this very difficult budgetary context that Dr Kearney commenced work at SPC in September 1975. His official title was 'Pacific Skipjack Stock Assessment Project Co-ordinator', and thanks to the Rockefeller Foundation and ICLARM, he had funding for six months – including a reasonable travel budget – to try and secure the necessary funding for a very ambitious three-year project.

After his arrival at SPC, Dr Kearney worked very closely with Dick Baird. They were both well aware that things were going to be very difficult, given that the budget they would be seeking was more than a million dollars a year, or about 33% of the total SPC budget, at a time when funding for international initiatives was extremely tight; global finances were being impacted by uncertainty following 'the oil crisis' and, closer to home, the SPC itself had admitted to serious budgetary difficulties (outlined above).

The likely possible donors for the Skipjack Programme were largely the same ones as those that funded the SPC core budget and, as was evident from the Secretary General's letter, they were clearly reluctant to give the SPC considerably more funds. There was also open expression by several emerging Pacific Island nations that SPC was more 'colonial' in its operation than they now wished. There was a ground-swell of suggestion that any major new regional undertakings should be under the auspices of organisations over which Island states had greater authority, such as the emerging South Pacific Forum, which was seen to have less 'colonial domination'.

It is also important to note that at that time SPC still did not have a single extra-budgetary project on their books – all were paid for out of consolidated revenue, known as core funding. Extra-budgetary projects had been talked about, and indeed actively sought, but at that point in time it had not been possible to obtain funding for a single one of them – not even for a few thousand dollars. If funding was to be obtained for a new multi-million-dollar project, optimism would be essential.



Figure 3. Some of the participants at the 8th Regional Technical Meeting on Fisheries, which was held in Noumea in October 1975, just one month after Dr Kearney started work at SPC.

From left to right: Mr R.H. (Dick) Baird - SPC Fisheries Adviser; Mr Luata Toatasi - Acting Chief Officer, Fisheries Division, Western Samoa; Mr B.R. (Barney) Smith - Acting Principal Biologist, Department of Agriculture, Stock and Fisheries, PNG; Mr Richard Shomura - Director, Honolulu Laboratory, Southwest Fisheries Center, Hawaii; Dr R. (Bob) Kearney - Skipjack Stock Assessment Coordinator (SPC)

End of part 1

The second part of this 'short history of the Skipjack Survey and Assessment Programme (SSAP)' will be published in the next issue (#151) of this Newsletter.

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From left to right: Barney Smith, Tony Lewis and Bob Kearney at a meeting in Cronulla in 1973, whilst all three were working for the PNG Department of Agriculture, Stock and Fisheries (image: Barney Smith collection).

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