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Pacific Skipjack

The Remarkable Story Behind the World's Biggest Tuna Fishery

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Bob Kearney

Australian National University

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The Australian National University acknowledges, celebrates and pays our respects to the Ngunnawal and Ngambri people of the Canberra region and to all First Nations Australians on whose traditional lands we meet and work, and whose cultures are among the oldest continuing cultures in human history.

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Foreword

I first came to know of the Skipjack Programme, and Bob Kearney, in 1979 or 1980, when he gave a seminar at the ANU while I was an early-career scientist at the Fisheries Division of the Department of Primary Industry in Canberra. My first impression was of a knowledgeable and driven scientist, and even at that early stage of my own professional development I could see what a huge undertaking he was in the process of pulling off with the Skipjack Programme. Little did I know at the time that, about seven years later, I would myself take up a senior scientist role at the South Pacific Commission (SPC) in Noumea, New Caledonia, and have the opportunity to build on Bob's remarkable achievements.

From the vantage point of 2026, it is easy to take Pacific tuna science for granted. But in the mid-1970s, very little was known of the potential of the skipjack resource, which was then producing about 300,000 tonnes of catch annually from a predominantly Japanese pole and line fishery. When Bob first proposed a tagging programme to measure the size of the population across more than 30 million square kilometres of ocean, many fisheries scientists were doubtful it could work, and almost nobody believed the funding could be found. That it happened at all – and that six donor governments were persuaded to hand $4 million directly to one young man – is one of the more remarkable stories in the history of fisheries science. That Bob then delivered on the promise, tagging more than 140,000 skipjack and producing a population estimate that has stood the test of nearly fifty years of subsequent assessment, is another matter altogether. That assessment gave the Pacific island governments and the tuna fishing industry of the time the confidence to allow the fishery to greatly expand, primarily through the introduction of purse seining. The region's skipjack fishery is now the largest tuna fishery in the world, having exceeded 2 million tonnes in two of the last seven years; its stocks are not overfished, and it is widely regarded as one of, if not the best-managed tuna fisheries on the planet. It generates vital revenue, employment and nutrition

for the people of the Pacific, particularly the smaller countries that have few other natural resources. None of that was inevitable prior to this remarkable story unfolding.

This fantastic book tells that story in Bob's own voice, with the candour, occasional exasperation and dry humour of someone who lived every part of it. It is fascinating and entertaining in equal measure. It is also a very human story that encapsulates friendships, adversity, inspirational leadership and the unwavering support through the whole period from his amazing wife, Hope. Readers interested in the science will be captivated by the biology of an extraordinary species, the tagging and bait-fishing methodology, the numbers behind a fishery now worth billions of dollars a year. But the book's other value lies in its unflinching account of how a novel science project was funded, how institutions resisted and eventually accommodated new ideas, and how the personal conviction of one scientist altered the trajectory of an entire region's fisheries management. Anyone with more than a passing interest in fisheries or the Pacific will greatly enjoy it.

With my colleague Peter Williams, I was glad to contribute to the chapter tracing the evolution of the Skipjack Programme into the Tuna and Billfish Assessment Programme and then into today's Oceanic Fisheries Programme — an 80-person, multimillion-dollar operation that Pacific Island nations, distant-water fishing states and regional agencies alike now depend on. It was a privilege to help carry that work forward, leading the OFP from 2002 to 2019, and it is equally a privilege to write this foreword for the man whose vision made it possible in the first place.

John Hampton
Chief Fisheries Scientist, Oceanic Fisheries Programme,
Pacific Community, 2002–2019

Acknowledgements

Many people made important contributions to the workings of the Skipjack Survey and Assessment Programme. The first were those who facilitated the creation and running of the inaugural Skipjack Program in Papua New Guinea from 1971 to 1975. Most obvious among these were the scientists Barney Smith and Tony Lewis; Reg Eginton, the skipper of the Fisheries Research Vessel *Tagula*; and James Aewai and John Tokias, the leaders of our Papua New Guinean research support team. The director of the Department of Agriculture, Stock and Fisheries, Bill Conroy, deserves special thanks for the priority his department gave to tuna fisheries research.

In the critical period of fundraising for the much bigger program, the support and advice of Dr James Joseph, the director of the Inter-American Tropical Tuna Commission (IATTC), was unwavering. So also was that of Dick Baird, the fisheries adviser for the then South Pacific Commission (SPC); Richard Shomura, director of the Honolulu Laboratory of the US National Marine Fisheries Service; Duncan Waugh, the director of the Research Division of the New Zealand Ministry of Agriculture and Fisheries; and Dr Philip Helfrich, the director of the International Center for Living Aquatic Resources Management (ICLARM, later WorldFish).

The many fisheries officers of the 23 countries and territories of the South Pacific region were enormously helpful in cementing support for the programme among the upper echelons of governments in the region, and subsequently in the minds of key individuals in potential donor governments. They also helped greatly with the procedures for the recovery of recaptured tags, with the necessary information on their recapture.

Once the programme was operational, the 30-plus scientific and technical staff who worked in and from our base in Noumea, New Caledonia, were superlative. So were the 14 Japanese and 15 Fijian crew on the two research vessels. In addition to the director Jim Joseph, numerous staff members of the

IATTC remained incredibly supportive and helpful from the middle of the Papua New Guinea program onwards, none more so than Dr Bill Bayliff. His help with overcoming the monumental problem of procuring quality tags (a critical component of a tagging program) alone was phenomenal (see Chapter 12).

The story of the SPC's involvement with tuna research post the completion of the Skipjack Programme (see Chapter 21) was drafted by two very senior SPC scientists, Peter Williams and Dr John Hampton, who were both employed by the commission to the end of 2025. I am extremely grateful for their contributions. I modified the draft to suit my style. Should there be any errors in the finished product, I accept full responsibility.

Paul Judd, still working at the SPC, has been hugely helpful in providing encouragement and advice and physical factors, such as photographs and documents from the SPC archives. Dr Johann Bell's insistence that I write this book definitely had an impact. His enthusiasm for it was infectious.

Throughout the whole of my work described in this book, the support of my late wife, Hope, was unwavering. Furthermore, without her persistence, this book would not exist. She insisted that I had to write it, if for no other reason than nobody else knew the full story of an almost incredible research project on a phenomenal species that was largely unknown to science, even though it was becoming the subject of the world's biggest tuna fishery. Much of what was 'known' was wrong. I dedicate this book to Hope.

Introduction

This book provides readers with a common language description and analysis of an enormous, revolutionary marine science research project on a truly extraordinary species of tuna – skipjack. The results of this research catalysed South Pacific regional cooperation on the management of what has now become the world's biggest tuna fishery. The research results also greatly increased the understanding in Pacific Island nations of the importance of quality science to the management of the sustainability of the region's tuna resources, including the attainment of consensus on cooperative management of these resources under the new Law of the Sea that was emerging in the 1970s.

The research and events described were hugely important in confirming Pacific Island governments' commitment to regional solidarity. The unprecedented amount of funding for this research, $35.9 million in 2026 equivalence, and the extraordinary funding arrangements put in place to manage these (see Chapter 9) also re-established faith by island nations in the willingness of the former 'colonial powers' to support projects to which Pacific Island nations gave high priority, even if this meant going around long-standing protocols. This faith was being sorely tested in the mid-1970s, a decade in which more than half of the Pacific Island territories gained their independence.

The Skipjack Survey and Assessment Programme was an extraordinary scientific experiment. The concept was initiated by the author in 1974 as the logical international expansion of the tuna research program he had designed and then directed in Papua New Guinea from 1971 to 1975 (see Chapter 1).

The design of the Skipjack Programme gave priority to the use of tag and release methodology to estimate the size and dynamics of the total skipjack resource in more than 30 million square kilometres of the South Pacific

Ocean. The programme worked in the waters of 25 different countries and territories, including Australia and New Zealand. Tag and release had never been used to determine the biomass of a tuna population anywhere in the world, let alone for what the programme was able to determine is the world's biggest tuna resource in the world's biggest ocean. Most fisheries scientists of the time thought that tagging could not be successfully used for this purpose, and certainly not over such a huge area. Most of the few who thought the concept had merit believed that it would be impossible to raise the $4 million estimated in the author's proposal in 1975.

Then began an 18-month pursuit of the necessary financial support. This was catalysed by a 'seed money' grant to the author by the Rockefeller Foundation in New York to support his employment and global travels to prospective donor countries and organisations (see Chapter 5). Potential donors – Australia, France, Japan, New Zealand, the United Kingdom and the United States of America – were quickly identified and pursued (see Chapter 7).

The author's standing in the region, and hence his ability to raise the necessary funding, was greatly increased by the prominent role he played in regional meetings on the growing importance of the emerging Law of the Sea. The two seminal papers he wrote for these meetings were republished by invitation in international law journals. They formed the basis for much of the discussion at these meetings and subsequently the draft convention for the establishment of a South Pacific regional fisheries agency (see Chapter 8).

Extraordinarily, for reasons related in Chapter 9, the donors decided to give the required $4 million to the author personally as the sole executor of the programme that was to be based at the South Pacific Commission (SPC) in New Caledonia. The money was paid into a bank account in Sydney in the author's name.

New Zealand was the first country to formally commit to funding the programme, quickly followed by the other five countries listed previously. The debate behind these decisions is dissected in detail (see Chapter 7).

The fieldwork of the programme ran for three years and included surveys of the skipjack and baitfish resources of all 23 Pacific Island countries and territories in the 30 million square kilometres of the SPC, plus the waters of eastern Australia and Aotearoa New Zealand. The programme tagged and released a total of 140,443 skipjack and 9,596 yellowfin tuna, including a world record for tuna tagging of 3,692 skipjack tagged in a single day

(see chapters 12–18). In total, enough tuna were tagged and released in excellent condition over a sufficiently wide area to result in adequate recoveries of tags with the necessary recapture information to enable the total skipjack population in the survey area to be determined to be 3 million tonnes (the 95 per cent confidence range being 2.5 to 3.7 million tonnes; see Chapter 19). Fears for the sustainability of the skipjack resource have been eliminated by the results of the research described.

The amazing physical and physiological attributes of skipjack were measured by the programme, most for the first time. These included incredibly fast growth (skipjack are big enough, approximately 3 kilograms, to enter the fishery at one year of age), extreme natural mortality (87 per cent of the adult skipjack population dies each year from natural causes), fecundity (in tropical regions, skipjack spawn six times a week, year-round and females lay approximately 300,000 eggs each time) and cannibalism (nothing eats more juvenile skipjack than adult skipjack do, and skipjack juveniles are likely the major predator of skipjack eggs and larvae). The science behind how these attributes impact the sustainability and future resilience of this amazing, evolutionary-extreme species is described in simple language. How a sustainable harvest from the 3 million tonne population can equal, or even exceed, 3 million tonnes per year is explained for the first time in this book (see chapters 19 and 20).

The skipjack fishery in the Pacific is now of huge importance to most Pacific Island countries and territories, in numerous cases representing their primary source of financial independence and export income, in addition to being a major source of sustainable food for island people. The economies of 10 of the island countries have been assessed to be 'tuna dependent': on average, 37 per cent of the taxable revenue in these countries is derived from the licensing of foreign boats to harvest tuna from their waters. Tuna fisheries and associated activities currently employ approximately 25,000 Pacific Island people (see Chapter 21).

At the time of the emergence of the concept of the Skipjack Program in 1975, the annual catch of skipjack from the central and western Pacific was approximately 230,000 tonnes; in 2023 (the most recent year for which an accurate annual measure is available), it exceeded 1.2 million tonnes valued at the first point of sale at $2.2 billion. The 1.2 million tonnes of one species, skipjack, can be put in perspective by comparison with Australia's total annual commercial fish catch, all species combined, of 170,000 tonnes. The 1.2 million tonnes is a lot less than half of the maximum sustainable annual catch of skipjack (anticipated for the first time in this book).

There are now four major international organisations in the central and western Pacific primarily concerned with the research and management of tuna fisheries, predominantly skipjack: the Central and Western Pacific Fisheries Commission, the Pacific Community (formerly the SPC), the Forum Fisheries Agency and the Parties to the Nauru Agreement. All are dependent upon current research and fisheries statistics that flowed, and expanded, from the Skipjack Programme. Skipjack in the South Pacific are not overfished, and overfishing is not occurring. The South Pacific skipjack fishery is acknowledged to be the best-managed tuna fishery in the world (see Chapter 21) because that management is based on science that has been proven to be correct.

The Skipjack Survey and Assessment Programme commenced in 1977. It began a commitment to tuna research at the SPC that continues to the present day. In 2026, tuna research at the SPC has 80 staff and an annual budget of approximately $25 million (see Chapter 21).

1

Skipjack or stripeys

From my perspective, *Katsuwonus pelamis* had not always been skipjack.

My introduction to skipjack tuna (*Katsuwonus pelamis*) occurred off the southeast coast of New South Wales (NSW). I was on the legendary Australian pole and line tuna boat, the *Catriona B* (the Cat). The skipper of the Cat, Frank Broder, widely recognised as an outstanding tuna fisherman, had agreed to take me, a PhD student at the University of Queensland, on a regulation tuna fishing cruise. Stan Hynd, the senior tuna scientist at the Cronulla laboratories of CSIRO, had convinced Frank that this would represent a contribution to fisheries science, and it was in the fishing industry's best interests to support it.

My stated responsibilities on that cruise were solely to collect tuna blood samples for my University of Queensland research project. My thesis subject was the comparative physiology of fish species with hugely variant activity levels. Skipjack were known to be one of the most highly mobile tuna species. Their blood chemistry confirms their extreme athleticism (see Chapter 19). They were the species at the top of my activity scale; flathead (*Platycephalus fuscus*) was at the bottom, for those species whose blood I had access to.

My girlfriend at the time, Hope Fraser, who was later to agree to marry me, was one of the first of many who helped catalyse my career by facilitating privileged opportunities for me. Hope had spent the previous year working at the CSIRO Division of Fisheries and Oceanography in Cronulla as Stan Hynd's research assistant. She had persuaded him that helping me would be a good thing to do.

The 10-day cruise commenced in Eden, on the far south coast of NSW, and progressed north to Sydney, then back again. Striped tuna, or 'stripeys' as they were singularly called in this area at that time, were common over much of the trip. Interestingly, they were most apparently abundant in inshore waters, not more than a few kilometres from the coast. They were not the target species for the *Catriona B*; southern bluefin tuna were. Stripeys were considered to be of little value to the crew of the Cat. We still caught more than enough for my samples.

I had lived in Kingscliff, on the far north coast of NSW, for the previous 15 years, and even though I had fished commercially for several years and was friendly with the few other commercial fishermen in the district, I had never seen a single stripey. I had never even heard of anybody catching one in the region. When I later showed my fishing friends from the area a photo of a 'skipjack', they did not know what it was, but assumed, because of its stripes, it was a bonito of some type. The French would certainly agree; the name for skipjack in French is *bonite à ventre rayé*.

My research a decade later (Kearney and Gillett 1979) confirmed that my failure to catch even a single stripey at Kingscliff was not a manifestation of gross incompetence on my part. There is a significant discontinuity in the distribution of skipjack off the east coast of Australia: they were found in subsequent research as part of the 'Skipjack Programme' (discussed in detail throughout this book) to be completely absent from 26 degrees south to 32 degrees south from the coast to an unknown, but significant, distance seaward, probably of the order of 50 kilometres. In the absence of any prior exposure to stripeys, other than on the *Catriona B* in southern NSW, my deduction up until 1971 was that the species must favour temperate waters and prefer to be coastal in its distribution.

After this rather mild introduction to this apparently 'inconsequential' species, how did I come to do stock assessment research on skipjack for the next two decades?

As I drew close to the completion of my PhD degree in fish physiology, three positions of fisheries scientist in Papua New Guinea were advertised in the Australian press. A fellow postgraduate student, Theo Helbig, who had lived in Papua New Guinea as a youth, promoted the advertisement around the University of Queensland Zoology Department. I talked to Theo about what might be in store. He was convincing. I applied, but with some uncertainty. I knew extremely little about Papua New Guinea and had

doubts about the wisdom of taking my first full-time job as a scientist in a developing country environment. Could I count on decent supervision? Or would I get any supervision? I presumed that in my first full-time job, I would need it.

Two friends of mine from the Zoology Department, Barney Smith and Tony Lewis, applied at the same time. All three of us were offered interviews in Brisbane. I thought my interview went well. I got the strong impression that my experience as a commercial fisherman with at least some knowledge and experience with tuna, coupled with the completion of my PhD program that included work on tuna, was well received. A key question asked of me was whether I would like to work on tuna or prawns, these subjects being the basis of the two biggest developing fisheries in Papua New Guinea at the time. To me, this question was a no-brainer. I was an addicted fisherman, and pole and line fishing for tuna was about as exciting a fishing experience as a 24-year-old Australian male could realistically hope for: sorting through big piles of prawns and 'trash fish' in the bottom of a trawl net paled into insignificance.

I may have taken a little 'poetic licence' in explaining the extent of my experience in burleying-up schools of long-tail tuna (*Thunnus tonggol*) in Morton Bay and the extent of my knowledge of stripey fishing on the south coast of NSW, but I was encouraged to be a little expansive by the interviewer's enthusiasm when describing the opportunity I would be presented with by moving to Port Moresby. I suspected that the Papua New Guinea Department of Agriculture, Stock and Fisheries (DASF) did not get a lot of applicants for these jobs. This suspicion was reinforced when Barney, Tony and I all received job offers. Only three positions had been advertised. Was there something wrong with these jobs that we were the only ones who did not know? The fact that my first full-time job was to be as a fisheries scientist I found very exciting, and as it was to be in a new country, about which I knew extremely little, the package was exhilarating.

My assumption that 'stripeys' were a temperate, inshore species was seriously tested when I arrived in Papua New Guinea in early 1971 to find that the tuna fishery in this country was totally dominated by *Katsuwonus pelamis*, known locally, and throughout the world's major oceans, as skipjack tuna. The rate of increase in the domination of the global catch of tuna by this species at this time was such that the addition of the word 'tuna' to the title of the species was being progressively regarded as unnecessary, even

inappropriate. It was certainly redundant. They were becoming the world's dominant tuna species. Any self-respecting fisheries scientist should know that this skipjack was a tuna.

I was surprised, but nonetheless pleased to find on arrival that my assigned title was 'principal scientist', with which came responsibility for developing the country's first tuna research program. It quickly became obvious that this exalted title, and associated attractive salary, were singularly correlated with the fact that I was the only staff member who had completed a PhD. It was immediately obvious that if I were to do justice to the faith that had been afforded me, a 'crash course' in all aspects of *Katsuwonus pelamis* was obviously at the top of my duty statement.

The embryonic development of a tuna research program

My wife, Hope, had been much more confident than I was about the benefits for both of us in me taking the job in Papua New Guinea. Throughout our long married life, she was always far more adventurous than I. She was very confident that my job would be extremely interesting, and she was optimistic about her own job prospects. Working in academic administration, which is what she assumed she would be doing, in a new university in a developing country would be nothing if not exciting.

As we descended the stairway from the plane from Brisbane onto the tarmac at Port Moresby airport, my ridiculously little knowledge of the country that we were about to declare home for an unknown period of time immediately became obvious. We had not even done enough homework to prepare us for the climate in our new home. As our feet touched the tarmac, I comforted Hope with the advice that it would be cooler once we got out of the jet stream from the plane's engines. I had failed to notice that the engines had been switched off well before we left the aircraft. What we were experiencing was the ambient temperature of Port Moresby. Should we have done more homework on what we were committing ourselves to? A bit late to worry about that now!

I at least had a job, which brought with it not only an attractive tax-free salary but also housing. Hope was comforted by her confidence that her experience in university administration at the University of Queensland

would enable her to get a job in administration at the new and growing University of Papua New Guinea. We were, after all, young and bulletproof. The prospects were exciting, and we were nothing if not optimistic.

Right from the beginning in Papua New Guinea, our ducks began to align. We were met at the airport and driven to our allocated house; it was brand new, having only been completed a week before. It was perfect for a tropical climate: excellent ventilation and large ceiling fans. The appliances were new, and the 'survival kit' of household essentials was more than adequate. The location in the Port Moresby suburb of Tokarara was lovely.

I was to be picked up and taken to the fisheries research station at Kanudi the next morning, and yes, transport could be arranged to take Hope to the university, which, as it turned out, was even closer to Tokarara than the fisheries research station.

The introduction to where my job was based, the Kanudi Fisheries Research Station, was comforting. The location was excellent, and the staff were welcoming. My office was spacious, bright and airy. Most importantly, I quickly developed a feeling of genuine acceptance of the need for somebody to begin some tuna research. I was a little surprised at the lack of knowledge of the country's tuna fisheries by my new colleagues, but from my perspective at least, there appeared to be acceptance that we needed to find out more as a matter of some priority. After all, my job was to establish the tuna research program, and I had been appointed the 'principal scientist'. It was expected that I would show some leadership.

My expectation of supervision was quickly abandoned. The bright side of this was that I had more freedom to shape tuna research than I could have dreamed of. I thought it wise not to let on that, apart from some knowledge of its cardiovascular system, I knew very little about *Katsuwonus pelamis*.

Papua New Guinea had a developing tuna fishery, which, as it entered its second year, was showing considerable promise. It had already grown from a single joint-venture company to an anticipated three, or perhaps four, by the end of its second year (1971).

There had only been one joint-venture company fishing for tuna in the previous year, 1970, but the catches of skipjack, in particular, in that year were extremely encouraging. It was not difficult to become excited about the outlook for the fishery. There was even a rather haphazard collection of catch returns on my desk, presumably in anticipation of the new tuna

scientist doing something scientific with them. The fact that nobody else wanted them was somewhat liberating. I had to quickly accept that as far as tuna research went, I was it – at least for the time being.

By the end of the first week, my crash course in skipjack fisheries research was well underway. I had a somewhat hurried meeting with the executive of the DASF, which included the director, Bill Conroy. Their enthusiasm for the developing tuna fishing was obvious. I was expected to be off and running immediately. They had planned a trip for me in the next week to the site of the first joint-venture tuna fishing company, Gollin Kyokuyo, in Kavieng, New Ireland. This visit was to include a day or two of fishing for skipjack from a standard commercial pole and line boat. They said they were looking forward to what I had to say about the fishery. Seeing that I knew almost nothing about it at the moment, this might be interesting.

During my first visit to Kavieng, which included a couple of days of skipjack fishing on their boats and observing their bait-catching techniques, I was greatly surprised to see that all of their bait was captured by the 'drive-in' method. This involved most of the crew being in the water with goggles and a very large, small-mesh net, which they manipulated around coral bommies by constant diving to 5 metres or more for as long as they could hold their breath, which was a long time. They did it every day and got very good at it. I was advised that the vessel I was on had, at that time, three of the Okinawan crew in hospital with ear infections, which were a direct outcome of the technique they used for catching bait. The vessel I was on for the second day had two crew members in the hospital. They advised me that these ear problems caused a great strain on the health of their crew and, hence, the efficiency of their total operation. It was common to have as many as five or six men in the hospital in Kavieng at the same time. Every so often, one of the crew members had to be flown back to Japan for more intensive treatment of an ear problem.

This bait-fishing technique also led to problems with local fishermen who correctly believed the fish the bait fishermen were catching included juveniles of many of the species that were the basis of their own subsistence fisheries. As the technique involved fishing in daylight around coral outcrops, it made their activities very obvious to local fishermen. It also took up time in the early mornings that were a premium for skipjack fishing.

I had had some experience with catching bait in the Australian tuna fishery and knew that baiting was mostly done at night using bright lights to attract the bait, and then lampara, or small purse seine, nets to catch them. Certainly, the crew did not have to dive for them. My crash course on *Katsuwonus pelamis* also made me aware that in Japan, underwater lights were commonly used for fishing for baitfish for tuna pole and line fishing. Why not here?

Immediately after I got off the boat, I spoke to the senior people in Gollin Kyokuyo: Geoff Clegg from the Gollin component and Ken Shiokawa from Kyokuyo. They told me that the problem with ear infections was so great that the future of skipjack fishing in Papua New Guinea was in serious danger. I told them I was very confident that the use of bright underwater lights to attract baitfish at night and appropriate nets to catch them would work. I was truly amazed they did not already know about the use of lights to catch bait. I could only conclude that there had been inadequate communication between the crews on the Okinawan boats and the Japanese component of the parent Australian–Japanese joint-venture company. As soon as I started to give details of the 1,000-watt underwater lights I thought they would need and the type of nets they might try, they both began taking notes, rather enthusiastically.

Only a week or so later, Geoff Clegg rang to tell me that after discussions with their colleagues in Japan, lights and bouke-ami nets (the very large Japanese version of a stick-held dip net) were on their way. In a matter of a few weeks, after they arrived and were tried, every boat in the fishery was transitioning to the new baiting technique. As the bait supply improved in both quantity and quality and the health of the crew took a huge turn for the better, my relations with the joint-venture companies, not surprisingly, also blossomed. As did the quality of the catch and effort data. They were extremely grateful.

Back at Kanudi, a quick scan of the pile of catch returns that had been on my desk confirmed that the joint-venture company had already been providing some data on effort and catch and a little, rather inconsistent, information on the species breakdown and size of individual fish. Working out how to get our data entered into a database that could be easily accessed and manipulated was obviously a high priority. Once we could see what we had, it would be much easier to improve the data collection and analysis

system. Determining what additional data were needed and how they could be collected was clearly going to be a major component of the research program that was my responsibility to design and then implement.

My next meeting with members of the executive of the DASF, which included the director, was most encouraging and therefore enjoyable. They had heard of my success with the Kavieng fishermen. I was definitely in their 'good books'. Included in the outcome a few days later was an introduction to the director of the National Computer Centre. His enthusiasm for getting maximum benefit from computerising what was worth computerising was infectious. Our goals were aligned.

There was only one computer in Papua New Guinea at the time, and I am now confident that there would not have been more than one or two more in all the Pacific Islands.

Under the guidance of its director, the Papua New Guinea Computer Centre had an impressive approach to the use of data compilation and analysis. But they had few datasets of sufficient size and quality to make computer analysis an obvious requirement. So, if you had quality data that could be massaged to describe an opportunity for Papua New Guineans, and you made a case for support, that included appropriate departmental backing, the staff were keen to work with you to optimise the value of the computer and their use of it.

The senior staff of the centre were visionary, particularly the director, and they wanted to see their computer used to best effect for Papua New Guinea. Once you convinced them of the value of your request, they would do all software development and data entry for you. And so I made a case, with very strong support from the hierarchy of DASF. 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 I was given from both DASF and the Computer Centre. My success at Kavieng with bait fishing was obviously contributing to my standing.

Within not much more than a few months, I was receiving fully computerised analyses of catch and effort data from each tuna boat. The backlog of data sheets had been addressed. The processed data were compiled and presented in such a way that, as the tuna research program developed, I could cross-reference all commercial catches with our scientific sampling. The Computer Centre delivered me monthly printouts of the daily catch by every boat, aggregated by area, time and any other classification

I specified. The Computer Centre also combined the catch and effort data with summaries of the limited size-sampling of skipjack from every boat and area. So, we had a reasonably good handle on the tuna fishery, which we could correlate with other scientific information as it became available. It could clearly be improved once I could work out what extra data and analyses we needed.

I had been most impressed by my introduction to the Australian–Japanese joint-venture tuna fishing companies. And after the advice I had given them on catching bait, they were definitely on my side. Their keenness to commit to the collection and analysis of data on the fishery was comforting. But the data being collected were less than perfect. My request to have size data collected from all catches was adhered to, even if I did have to work a bit to get them to provide the size data for each boat and not the daily average for the company.

My initial duty statement, imprecise though it was, was simple. I had to write it myself, and I was still very much unsure of what we were going to be able to do. I was confident I could 'evolve' my duty responsibilities as my knowledge grew. It was most unlikely that anybody was going to complain.

Canned fish, predominantly mackerel in oil, imported from Japan, was a hugely important component of the Papua New Guinean diet. Therefore, the prospect of having one or more local tuna canneries was extremely attractive, even if it was accepted that we should not get ahead of ourselves. The reality was that the knowledge of the tuna resource base was limited, but the available information was encouraging.

My initial priority was to design and implement a tuna research program that gathered the necessary extra intelligence on the tuna resources of Papua New Guinea to support the planned growth of the fishery and increased participation by Papua New Guineans in that fishery. Developing and then implementing a viable plan for assessing the size of the stocks of tuna, the species composition of them, their distribution and accessibility, and their ability to support profitable and sustainable harvests was, in essence, the job I had been given and rather gleefully accepted. I had already delivered on one major facet of the fishery: catching bait. It was much easier and safer to train Papua New Guineans to catch bait with a bouke-ami net than the now-outdated 'drive-in' technique.

My next task, after ensuring that the computerisation of the catch and effort data was as good as it could be, was to develop an outline of the type of research that was going to be necessary to supplement catch data in support of answers to the management decisions that were looming. How could we ascertain the size of Papua New Guinea's tuna resources, their distribution and dynamics, and the factors that determined their ability to withstand fishing pressure within Papua New Guinea's waters and even beyond? How much fishing pressure could they sustain? Some form of survey of at least the most promising areas of Papua New Guinea's waters was clearly necessary. But in 1971, even the extent of what qualified to be called 'Papua New Guinea's waters' was not well established. Papua New Guinea was still officially the Australian Territory of Papua New Guinea, and marine Exclusive Economic Zones were not yet even on the fantasy list.

The data that were being gathered from the joint-venture companies constituted the only real 'survey' information we had. As the fishery expanded in time and space, these data were becoming more useful for both scientific and economic assessment of the dynamics of the fishery. But their use for contributing to the biological parameters, such as growth and mortality rates, both fishing and natural, of the key tuna species was limited. Even the distribution of key species beyond the relatively small areas currently being fished was unknown. So, we needed a survey program to better describe the distribution of key species, coupled with an assessment program that used this distribution data together with growth, mortality, spawning, migration and stock structure information on the key species.

The distribution data needed could most efficiently be gathered by aerial survey using light planes. But it of itself would be of limited value without knowledge of the biological parameters to underpin the assessment of stock dynamics. Aerial surveys would be necessary, but they could wait until we were confident we would be able to get the necessary biological data, including assessment of the movement of individual fish and even populations.

I already held a strong opinion that tag and release of whatever tuna species were assessed to be of priority was going to be a fundamental plank in the platform of the tuna research effort. My searches of the scientific literature, meagre though they were, had already led me to be somewhat concerned that stock assessments of skipjack were notably absent. I was unable to find a single example of successful modelling of a skipjack population based on the progression of cohorts of fish through a fishery. If this were going to be possible in Papua New Guinea, we would have the catch and effort data

to do it, provided I managed to ensure that the size composition data we collected were truly representative of the population we were trying to assess. That was a big unknown. But even then, it would take years to get a large enough dataset to enable the observance of cohorts passing through the fishery – the most common technique used for fisheries stock assessment at the time. As my knowledge of the Papua New Guinea tuna fishery increased, my faith in size composition data from the commercial fleet being suitable as the backbone of adequate stock assessments diminished. The size composition data we had, meagre though it was, suggested it was most unlikely that such data would ever be able to be used to monitor the progression of age cohorts through the fishery. My commitment to establishing an adequate tagging program as the foundation of our research program intensified.

After only two or three months in Papua New Guinea, I had the outline of a research program that I was confident, if implemented, would provide a sound scientific basis for the development and management of the tuna fishery. There were, however, several major problems: the program had only one staff member, me, and no vessel, equipment or even an approved budget. I was told by the executive that if I could provide convincing details on how the program would work, staffing and budgeting issues would be considered. The support for an effective tuna research program among the executive appeared genuine, as it was proven to be. I felt confident that if I could provide a sound design and realistic costings of a workable program, success was possible. I found it an incredibly exciting opportunity. Perhaps I should have been concerned that this was my first full-time job and I did not have much research experience with tuna population dynamics, but I wasn't. I had more immediate concerns – like how to get an adequate research vessel.

Obtaining a successful outcome from the total program was dependent on getting reliable data on the biological and movement characteristics of the key species, particularly skipjack, on which the current fishery was based. Tagging was the logical way to fill this gap. How to get access to live tuna to tag was the immediate challenge. It had to be overcome. The whole of the program, as I was proposing it, depended on it.

Of course, the best platform for tagging tuna would be a purpose-built tuna research boat. It was immediately apparent that cost was going to prevent this from being an option. The key executives of the department were definitely supportive, but not that supportive. Alternatives included chartering one

or more commercial vessels for specified periods or putting scientists on commercial boats under some agreement to tag and release a percentage of the catch. Once I had ascertained what the budget for tuna research would be, I could investigate all options. High on the list of support requirements for either of these options was excellent cooperation with the joint-venture companies. This did not appear to be a problem. I was in their 'good books'.

I was already aware of the critical role of live bait in pole and line tuna fisheries. I was also increasingly aware that fishing for bait by the joint-venture companies, even at night, was still a source of conflict with local fishers. Surveys of the country's baitfish resources and descriptions of the characteristics of the key species would be essential components of the assessment of Papua New Guinea's tuna fishing potential.

Papua New Guinea is a big country with many islands, creating a huge total coastline with immensely variable habitats for potential baitfish species. I could not imagine a way in which sufficiently comprehensive baitfish surveys could be conducted without the service of a suitably large mobile marine research platform – that is, an appropriate boat.

DASF clearly did not have a boat that was purpose-built for tuna and baitfish research. I would have to work up a budget for chartering one. Or perhaps modifying a vessel that was built to work in another type of fishery was a possibility. The fisheries research division of DASF did have a 60-foot research vessel, the Fisheries Research Vessel (FRV) *Tagula*, but as soon as my enquiries led to this revelation, I was rather firmly informed by other staff members, including the chief scientist at Kanudi, that the *Tagula* was built and rigged as a prawn trawler, and even though it was currently in dock, its future was committed to prawn, and possibly lobster, research. Interesting!

Over the next month or so, I investigated the possibilities for chartering a vessel from the joint-venture companies and then discussed the likely costs with senior members of the DASF hierarchy, including the director. I was truly impressed with the enthusiasm within the department for having a quality tuna research program to support an expanding tuna industry. The fact that I had quickly got on and had the available data computerised had gone over well, as did the solution to the industry's baiting problems. They already had something to see from my efforts, and I was promising much more. It was envisaged that the tuna industry would eventually include

processing plants and canneries. But the cost of a charter for the time that would be necessary for both tuna and baitfish research of sufficient scale was well beyond the currently available budget.

Shortly after taking up my position at Kanudi, I developed a firm friendship with the captain of the *Tagula*, Reg Eginton. That we both came from the far north coast of NSW helped. Reg was from Ballina, and I came from Kingscliff – coastal towns only 80 kilometres apart – and we were both fishermen. Our numerous discussions included the feasibility of modifying the *Tagula* for tuna research. Reg was almost immediately attracted to the possibility of cruising around the many beautiful islands of Papua New Guinea, fishing for tuna and baitfish; it was much more appealing than being confined to the relatively turbid waters of the Gulf of Papua, the only known prawn-fishing area, on a prawn trawler. But the *Tagula* had not been built with tuna fishing being one of its planned uses.

The size and design of the vessel were such that it was going to be very difficult, if not impossible, for it to carry sufficient water to keep a viable quantity of bait alive to support effective pole and line fishing. Below-deck bait tanks were out of the question; there simply was not enough space. Reg thought it extremely unlikely that the *Tagula* would be able to safely carry on-deck bait tanks that were sufficiently large to make live bait and pole fishing rewarding. But he agreed to talk to the engineers at Steamships Shipyard, who had the contract for servicing the *Tagula*, about just how much water could be carried on deck and what additional pumps would be needed to circulate the water in the tanks. My few trips on the Okinawan boats operating in the Papua New Guinea fishery had already convinced me that water sprays would also be needed to help attract tuna to the fishing area at the stern of the *Tagula*.

Reg was extremely surprised by the engineers' assessment of the size of the tanks that could be safely carried. He remained sceptical. We were confident that the amount of bait that could be accommodated in tanks of the size the engineers proposed would be sufficient to enable the tagging of at least enough tuna to meet a modest research target of 5,000 to 10,000 fish. With this information and Reg's enthusiasm for the cruise plan we had discussed, a meeting with the director of DASF led to an agreement to make the necessary modifications to the *Tagula* and its commissioning to tuna research for three years in the first instance. This part had been rather painless, for me at least. My prawn research colleagues at Kanudi did not regard me as 'the flavour of the month'.

While arrangements for data processing and access to a research vessel were progressing rather smoothly, the staffing of the tuna research team developed slowly, but the small quantity of staff was more than compensated for by quality. Firstly, Barney Smith arrived to take up a scientist position in the tuna program. I did not have to intervene in this process, as the position Barney filled had been allocated to tuna research right from the time the three research positions had been advertised. But when Tony Lewis arrived at Kanudi a few months later, I did have some smooth talking to do. The prawn researchers had already surrendered their research vessel, and now they were being asked to forfeit a position that they had been told was earmarked for prawn research. The argument that without the *Tagula* to do the trawling, there was no real need for an extra prawn research scientist was not one on which it would be wise for me to go public.

To this day, I am not sure what won the debate about what job Tony would fill, but I have a feeling Tony's insistence that he had always been led to believe he would be working on tuna had something to do with it. Who gave him that assurance remained a mystery. Much as I would like to take the credit for the outcome, I am fairly confident that all I told him was that I would work very hard to have him on the team. This I had done.

Discussions with Reg Eginton confirmed that the Papua New Guinean crew of the *Tagula* were very competent seamen. Reg was extremely confident they would quickly adapt to skipjack pole and line fishing and to baitfish fishing both night and day (with small-mesh beach seine nets and not the 'drive-in' technique the Okinawans had been using), provided I knew enough to be able to train them. Fortunately, confidence was not something I was short of.

Perhaps I should have been worried that all three scientific staff members of the tuna research program were embarking on their first full-time jobs, but I wasn't. Regardless of what limitations the three of us had, the grouping was to hold for more than 40 years. Collectively, we were to play a significant role in Pacific skipjack fisheries research and management, not just in Papua New Guinea but in the broader Pacific, Australia and even Southeast Asia and beyond, for at least several decades. Included in our collective contributions was the involvement of each of us, for different periods, as director of the SPC's Offshore Fisheries Program (under its evolving titles, which included the Skipjack Survey and Assessment Programme and the Tuna and Billfish Programme) for a combined total in excess of two decades.

The commissioning of the FRV *Tagula* as a tuna and baitfish research vessel became effective on July 31, 1971, when the vessel departed Port Moresby Harbour heading east-southeast. The stated two primary objectives of the cruise were (1) 'to develop an effective method of tagging skipjack tuna from the *Tagula* and commence a long-term programme with the ultimate aim of releasing 5,000 to 10,000 tagged fish' and (2) 'to investigate over a wide area the extent and nature of baitfish stocks suitable for use in the live bait fishery for skipjack' (Kearney, Lewis and Smith 1972).

It had taken at least a month longer than anticipated to get the vessel ready to begin tuna research. The engineers assured us that we would be rewarded for taking the extra time to make sure everything was 'ship-shape'. Their definition of ship-shape would prove to be considerably distant from reality.

We, the scientists, had been busy accumulating the necessary tagging and biological research equipment, which included 10,000 yellow plastic dart tags manufactured by Arthur E King and Company in Newtown, Sydney. We also had the net-making team at Kanudi make a bouke-ami net to catch bait. Fitting the net to the research vessel turned out to be a bigger problem than we anticipated: the *Tagula* was by no means the ideal length and shape for such a net. But we persevered, and in the end we got there. Details of the methods used in the whole of the research program, including the evolution of the design and construction of tuna tagging cradles, are provided in Kearney, Lewis and Smith (1972).

As cruise leader, I had the additional task of being the providore for both scientists and crew. We had to anticipate that it could be up to three months before we could reprovision the vessel. I had no great difficulty with the food for the scientists – lots of frozen chickens, prawns, legs of lamb, whole beef rumps and appropriate vegetables, both fresh and frozen, to be supplemented with additives like rice, spaghetti, bread, butter and breakfast cereals would keep us out of trouble. I was assuming, of course, that there would be limitless supplies of fresh fish and occasional mud crabs and lobsters. But when it came to the crew's rations, my ideas were significantly different from those of the captain of the vessel, Reg Eginton. If we were going to take the likes of a dozen frozen chickens and half-a-dozen legs of lamb for the scientists, I maintained that we had to take at least the same number of such items for the Papua New Guinean crew. Reg advised that his extensive experience with Papua New Guinean seamen was that I should not worry about trying to match what they would eat with what we would, even though they had the services of the same cook and cooking facilities

as we did. We should instead supply copious quantities of canned mackerel and bully beef and lots of rice. Of course, all of us would have access to as much fish as we could eat. I found fundamental discrimination in food to be at least demeaning, perhaps to the point of having racist overtones. I was the boss, so we took a dozen frozen chickens and eight legs of lamb and quite a bit of other European staples for the crew, but acknowledging Reg's experience, we also took four cases of canned mackerel and three of bully beef, and loads of rice.

Right from the outset of this cruise, the vessel was plagued by serious mechanical and electrical problems. But the waters we covered and the small islands we visited on the way to Samari were so spectacularly beautiful that complaints were minimal. You could not buy a holiday cruise to take you to the places we went. Reg planned the cruise such that we anchored in the lee of a new island late almost every evening. We were such a novelty to the residents on these islands, many of whom had not seen a visitor for quite some months, that they paddled out to greet us, and hopefully trade, in large numbers. We would always top our list of items we wanted from them with mud crabs and lobsters, whereas their desirables were almost always dominated by plug tobacco. Ice cream was popular, though.

I well remember one small island where we were greeted by at least a dozen men in dugout canoes, including the island's one schoolteacher. He wanted to chat, in English, for as long as we would keep talking. When I questioned him about what we might be able to give him, his immediate reply was newspapers. I was most impressed yet disappointed that it had not occurred to us to offer a schoolteacher such. I quickly gathered up three or four of the most recent *Sydney Morning Herald* editions that we had and offered them to him. I could immediately see by the look on his face that he was not overjoyed. 'Haven't you got any Australians?' was his verbal response. Again, I was impressed; the standard of the journalism, or perhaps the national perspective of the journalism in *The Australian*, was driving his priorities! But when I asked him why he preferred *The Australian*, his response was, 'The *Herald* won't stay alight'. He didn't want newspapers to read but rather in which to roll his tobacco so he could smoke it. It was widely accepted across Papua New Guinea at the time that *The Australian* was the superior medium for this purpose.

So poor was the mechanical state of the *Tagula* that in the 138 days of this first cruise, on only 21 of them was even a small amount of tuna fishing possible. Even the calculations behind the engineering of the modifications

that had been made to the vessel were found seriously wanting: the bait tanks that had been designed and purpose built for the *Tagula* were found to hold almost twice as much water as the vessel could safely carry on deck; the first time the vessel ventured on to the open sea with them full, they had to be emptied as a matter of emergency; the 5-inch bungs in the bottom of the two tanks had to be immediately punched out to get rid of the water as quickly as possible while the vessel was maintained heading into the prevailing swell. A wonderful load of bait had to be sacrificed. But of more consequence was that all fishing had to be suspended until the tanks were removed and severely modified. The *Tagula* had to go back to port for this to be undertaken, and it took several weeks.

Unfortunately, this was not the end of our mechanical problems with the *Tagula*. It was only in the last week of the cruise that gear and techniques were serviceable to the extent that tagging could be commenced; only 74 skipjack were tagged and released on the entire cruise, which was concluded in Madang Harbour on December 15, 1971.

Considerable baitfish research was possible during the cruise, even though the areas able to be covered were greatly restricted by the mechanical problems with the vessel. More than 160 species of baitfish were identified from 37 locations. Eleven of these species had not previously been recorded from these waters (Kearney, Lewis and Smith 1972). Catches of bait taken at most sampled sites were at least adequate in both quantity and quality to support skipjack fishing.

The baitfish survey had already confirmed that there were numerous places not currently in use by the joint-venture fleets where tuna fishing boats could be based, at least in the short term. The utility of these sites would be greatly increased if vessels were able to be adaptable in where they baited and fished. We were already confident that bait supply would not be the limiting factor on the total size of the Papua New Guinea skipjack fishery. Of course, the importance of bait in the management of skipjack fisheries in Papua New Guinea and other Pacific countries and territories was to be greatly diminished in some countries, with the progressive displacement in later years of pole and line with purse seining, which did not need bait.

The frequent returns to port of the *Tagula* did afford the opportunity to assess the skill of the providore in catering for both scientists and crew. The first inspection of remaining supplies was possible after little more than two months. The remaining rations for the scientists were almost exactly

as predicted, but when I checked the crew's rations, it was immediately obvious that in the future I should leave this aspect of planning to Reg. The crew had disposed of two chickens (probably one meal), one leg of lamb, the whole of the four cases of canned mackerel and all but two of the many tins of bully beef. To this day, I struggle to understand why the crew didn't eat more chicken and lamb: they had the same cook as the scientists did, and the way they hung around the window to our mess area looking for leftovers when we were concluding our meals left no doubt that they really enjoyed such food. I accepted the Papua New Guinea axiom that nothing flavoured a kilo of rice more efficiently than a can of mackerel in oil, but our crew really did like chicken or lamb with baked potatoes! The saving aspect of my 'providoring' was that when, at the end of the cruise, I asked the crew how the food had been so far, they were extremely positive. They had had what they wanted. But they agreed with the scientists; more lobsters and mud crabs would be appreciated. The supply of these two cherished commodities was less than ideal because we did not normally spend more than one night at each location, and it commonly took the locals at least overnight to catch lobsters and mud crabs.

Despite the severe restrictions imposed by the poor mechanical state of our research vessel optimism among scientists and crew remained: the last week or so of the first cruise had confirmed that we could indeed catch and tag tuna from the *Tagula*, even if so far only in small numbers: the modifications we were making to the vessel and our fishing practices were working, and we were confident that we would continue to improve. The improvements we had developed for handling baitfish had already enabled us to double the amount of bait we could carry in our smaller-than-ideal tanks. The dawning of the new year would bring with it rekindled enthusiasm. The two local senior research assistants, James Aewai and John Tokias, deserved special recognition for their contributions to the maintenance of the positive attitudes of all crew.

The second phase of seagoing skipjack research began in March 1972 when the FRV *Tagula* departed Madang Harbour headed for the south coast of New Britain. An excellent bait haul was made in Gasmata Harbour, but the vessel was once again rendered unserviceable by a major mechanical failure on April 4; it had to remain at anchor until it could be towed to Rabaul for repair. Only 14 skipjack had been tagged on this cruise so far. By April 17, despite continuing mechanical problems, 101 skipjack were tagged, only to have a serious illness by one crew member necessitate the urgent return *to* Rabaul. Serious mechanical problems were to continue right through to the

end of June. By the middle of the year, I had become so disillusioned with the vessel that I concluded a greater priority needed to be given to the use of aerial surveys in the survey component of our goals. I approached the appropriate individual members of the executive of DASF seeking funding to commence an aerial survey program.

On July 2, circumstances finally began to improve on the *Tagula*: 240 skipjack were tagged in one week and 59 tagged in the next. However, the good times did not last; the *Tagula* had to again be towed back to Rabaul in the second week of August.

In September 1972, DASF approved AU$60,000 for the aerial survey of Papua New Guinea's tuna resources, with the two primary objectives being:

> 1. to investigate the distribution and abundance of surface-schools of skipjack and other tunas in waters adjacent to Papua New Guinea; and 2. to derive an estimate of the proportion of the resource lying within twelve miles of the recognised land mass, i.e. within territorial waters and the declared fishing zone.

The survey was approved to commence in mid-November 1972.

This time, I did accept that experience was necessary. A highly qualified professional tuna spotter was required. Largely on the advice of Kevin Williams of CSIRO, and my wife Hope, who had worked on the CSIRO aerial survey team the year before she moved to the University of Queensland, Ted O'Connell, from Eden, Australia, was recruited.

Further good news was to come in October when more than 2,000 skipjack were tagged on the *Tagula* and almost another thousand in November. The impact of this success is clearly evident in the statement in the log of the cruise relating to this period: 'Finally operating at something approaching full potential' (Lewis, Smith and Kearney 1974).

The cruise was completed on December 13 when the *Tagula* arrived back in Madang. A total of 3,469 skipjack and 115 yellowfin tuna had been tagged; extensive biological samples from all major pelagic specimens had been captured and analysed; and 150 species had been identified by baitfish research (14 of which were new records for the area surveyed). New baitfish handling techniques were developed that greatly improved the survival of baitfish loaded into the bait tanks. The two major goals of the research programme, to tag 5,000 to 10,000 fish and to describe the extent and nature of baitfish stocks, were no longer mere fantasies.

The year 1973 brought with it the first broad-scale analyses and publication of the results of the Papua New Guinea tuna program and the integration of these results into consideration of how the knowledge of Papua New Guinea's tuna resources had been advanced. There were four basic components to these results:

1. Fishing and tagging techniques onboard the FRV *Tagula* had progressed to the extent that the lower boundary of the program's original goal of releasing between 5,000 and 10,000 tagged skipjack seemed certain to be met within the year, and the more ambitious target was likely to be approached within the next two years. Perhaps even more importantly, the recapture of tagged fish and the provision of the necessary information on where and when they had been recaptured, and in sufficient cases, the size of the fish at the time of recapture, was continuing to improve. Our tagging techniques had been proven; the fish survived being caught and tagged, and the tags stayed in. In fact, by the end of 1974, 8,748 tagged skipjack had been released, and 593 of these had been reported as recaptured. The quantity of adequate data on where and when the fish had been recaptured and what size they were at that time continued to grow.
2. The collection and analysis of data on the performance of each and every boat in the Papua New Guinea fishery since its beginning in 1970 had progressed to the point that by the end of 1973, the database was sufficiently detailed to match that in the world's biggest tuna fisheries.
3. The aerial survey of surface schooling tuna confirmed the value of this type of exploratory research under the circumstances that prevailed in Papua New Guinea at the time. The relevant results were summarised in Kearney, Lewis and Smith (1973):

   > Over the survey period the best concentrations of skipjack indisputably centred on the Eastern Bismarck Sea. *It was estimated that the commercial skipjack catch taken from this area during the survey represented only a fraction of the tonnage seen. Furthermore, the joint venture fishing boats were rarely observed in areas of optimal school density, even though these areas usually lay withing their range*. Other good concentrations of skipjack were seen in areas not worked at present by the joint venture fleets for example around the D'Entrecasteaux and Trobriand islands.

   There was an overall conclusion that the efficiency of the total skipjack fishery could be considerably improved using one or more light planes and fish spotters to direct the fleet to the most productive areas,

perhaps on a weekly or, at times, a daily basis. The efficacy of doing so on a cooperative basis between all joint-venture companies was worth consideration.

4. The survey of new areas where adequate quantities of baitfish could be taken had been extremely successful. Furthermore, the taxonomic and biological data collected and analysed, predominantly by Barney Smith and Tony Lewis, on more than 160 potential baitfish species greatly increased the utility of the knowledge of Papua New Guinea's total baitfish resources. The changes that were developed for baitfish capture and handling techniques, particularly for the more delicate species, greatly increased the utility of Papua New Guinea's total baitfish resources to support pole and line fishing for tuna. *It was established that the supply of bait would not be a limiting factor in the ability of the skipjack fishery to be expanded.*

At the commencement of the Papua New Guinea tuna program in 1971, very little was known about the country's skipjack resource, its distribution around the country and its dynamics that may make it more or less vulnerable to fishing pressure inside or out of Papua New Guinea's territorial waters. We had quickly eliminated the first premonition I had brought from Australia, that *Katsuwonus pelamis* was a temperate species, but the second, that it was predominantly coastal in distribution, would require further investigation. The aerial survey found that there tended to be more schools of skipjack within territorial waters (within 12 miles of land), but the schools outside 12 miles were much larger (an average of 20.1 tonnes outside compared to 6.6 tonnes inside). Once more tags were returned, more light could be shed on the dynamics of schools and the movement of individual fish.

In the first few months of the Program, tag returns were restricted to fish that had been caught by the Papua New Guinea joint-venture vessels. Then one or two came back from the Solomon Islands. I remember well the excitement that was created by the first tag to come back from the expanding purse seine fishery to the east and north of Papua New Guinea. It had been recovered in a tuna cannery in American Samoa. It arrived at Kanudi in a letter from Dr William Bayliff, a senior scientist at the Inter-American Tropical Tuna Commission (IATTC) in La Jolla, California. This tag return had more impact on me than any other in my life, even though it came with very little information. The only information Dr Bayliff had for certain was that it had been recaptured by one of the large purse seine

vessels operating in the waters well to the east of Papua New Guinea. But its recovery was enough to confirm several of my assumptions that had underpinned the selection of tagging as our primary skipjack research tool. We now had confirmation that at least some of our tags were staying intact after having spent at least days in the refrigerated hold of a distant-water fishing vessel and the rigours of the unloading and processing that was associated with tuna canneries. Plus, of course, the major revelation that at least some skipjack from Papua New Guinea were moving well beyond the confines of Papua New Guinea's local fishery.

I immediately wrote to Dr Bayliff explaining the importance of this tag, as it represented our first confirmed venture into the wider world of tuna research, and asking him if there was anything we could do to get more information about its recapture. Thus, was started a professional friendship that was to intensify and last the best part of 40 years. As it turned out, this first tag was quickly followed by many more from tuna canneries and even from distant-water fishing vessels themselves. Bill Bayliff was to do a great deal more work for us in tracking down which vessels had unloaded at the time of each tag recovery and where they had been fishing. The excitement continued to mount.

A month or two after our tags started coming in from the broader Pacific, I received a letter from Dr James Joseph, the director of the IATTC, explaining that he knew very little about the Papua New Guinea tuna fishery except that it was an exciting development, both for skipjack fishing in the Pacific and the science of research on skipjack. He asked for any information I could send him. As an international, dedicated tuna research institution, the IATTC was, in my opinion, as close as any institution could be to nirvana. And as the director of this august institution, Dr Joseph must be very close to God. I was determined; one day, I was going to meet this guy. I sent him copies of all of our publications, which at that time numbered about three preliminary reports, and drafts of a couple more we had in preparation and summary tables of our catch and tag return data, to date.

As the tag returns mounted, it became increasingly apparent that Papua New Guinea skipjack were intimately connected to at least some of the fish to our east and possibly north and south. I started combing through the scientific literature to sniff out what I could about the possible stock structure of skipjack in the broader Pacific and how this might help the assessment of Papua New Guinea's tuna fishery. It was not easy to get a lot

of information in Papua New Guinea in the days well before the internet and personal computers, but within about a year, with considerable help from the DASF librarians, who were extremely helpful, I had compiled enough for a publication on exactly this subject: its title was 'The stock structure of skipjack resources and the possible implications on the development of skipjack fisheries in the central and western Pacific'. It was published by the Food and Agriculture Organization of the United Nations (Kearney 1975b). Researching for this paper in combination with the growing evidence from our tag recoveries convinced me that the sound management of Papua New Guinea's skipjack fishery was going to require much more information on the stock structure, growth, mortality and breeding behaviour of skipjack over a much bigger area than we were currently researching. But nobody else was doing research that would adequately fill these gaps. So began my quest to answer the question, where to from here?

But first, back to 1973, which continued as a pivotal year for my thinking on what the priorities should be for the research that was necessary to support the managed development of Papua New Guinea's tuna fisheries. If only all other Pacific Island countries were doing research like we were, the problem of where our skipjack were coming from and what cooperative management arrangements would be necessary to manage them would at least be a tractable issue. The success of our tagging to date firmly cemented, in my mind, that tagging was the way to go. It was, however, already apparent that by only releasing tags in Papua New Guinea's waters, we were never going to be able to assess the full population of fish that may come and go from those waters. To get a proper stock assessment from tagging, we would need releases across the whole area of the distribution of the stocks we fished, preferably evenly distributed across the total area of the distribution of the stock.

I made up a list of what island countries and territories might be able to support some form of a cooperative tagging program, but apart from two obvious candidates, Solomon Islands and Fiji, which had existing pole and line fisheries for skipjack, and perhaps one or two of the French or American territories, the chances of getting a good coverage of participants looked bleak. But the total skipjack fishery in the Pacific was growing rapidly, and the world's biggest fishing nations were expanding their involvement. Why not consider expanding our Papua New Guinea operation into an international venture? Would it be possible to distribute tagged fish sufficiently evenly across the whole area of the populations of skipjack that contributed to the total fishery? We would certainly need a great deal better research vessel

than the *Tagula*, but the distant-water fishing nations already operating in the area of interest, particularly Japan, certainly had such things. Worth thinking about! And thinking I did a lot of.

I discussed the concept of a broader tagging program with Barney and Tony. Barney thought that the concept had merit, but to do it properly would be too expensive, probably hundreds of thousands of dollars that would be impossible to raise. I thought it best not to tell Barney that my first estimate of the cost of what I was thinking was millions of dollars, not merely hundreds of thousands: $2 million over three years was my first estimate (guess!). Even $2 million was only half what the cost of the Skipjack Programme would turn out to be ($2 million in 1973 equates to $23,933,000 in 2026). Tony was even less supportive. He thought that there was still so much good work we could do in Papua New Guinea that I should not give serious thought to deserting the team by moving on to do something that he thought would not work anyway. He thought it would be impossible to get sufficient fish tagged across the whole area to enable an adequately precise estimate of population size. I did not often disagree with these two guys, so I went away to think some more.

Barney was, as usual, right; the big project I was suggesting would be extremely expensive, and I did not, as yet, have a plan of any sort for how I would raise the money. But my commitment to the concept was such that this did not put me off. I would simply have to work on it.

I had respect for Tony's concerns, but they did not worry me. I believed I had good reason not to agree with him. I was strongly of the opinion that the research program we had already implemented had been sufficiently successful to answer most of the questions it was designed to address:

1. We had solved a huge problem for the joint-venture companies by convincing them to change to night-time fishing for bait.
2. We had surveyed the baitfish resources of Papua New Guinea and developed new baitfish capture and handling methods and techniques, to the extent that we were confident that bait supply would not be a limiting factor for the development of Papua New Guinea's pole and line fishery.
3. The aerial survey had clearly demonstrated that there were more than enough skipjack present to sustain the fishery, even in the areas that were being fished, and there were many areas of good concentrations of skipjack that were not being fished.

4. We had overcome the limitations of our research vessel to at least release enough tagged fish in good condition to enable sufficient tag returns with adequate data to answer the primary question of the independence, or otherwise, of the skipjack stocks in Papua New Guinea waters. We had documented that Papua New Guinea skipjack travelled huge distances to at least many parts of the central and western Pacific Ocean, and that the skipjack being captured in the Papua New Guinea fishery were only one or two years old, and they grew fast.
5. We had identified the additional major aspects of skipjack stock dynamics that we needed to know, but for which further research in Papua New Guinea would not provide the answers, including: Where do the skipjack in Papua New Guinea come from? How will the development of other skipjack fisheries in the region, or outside it, impact Papua New Guinea's fisheries? How big is the total population of skipjack to which Papua New Guinea has access? What is the likely maximum, or optimum, catch from this population?

I believed I now knew enough about skipjack population dynamics to know the limitations of what I knew. But most importantly, I believed I knew what I needed to know to give the Papua New Guinea government adequate advice on what research was necessary to support the management of their skipjack fishery. What everybody with an interest in the skipjack of the central and western Pacific, including the Papua New Guinea government, needed to know was this: How would the fisheries developing in many different areas of the broader Pacific interact with each other? Did they all need to be managed as part of one big fishery?

I was convinced that the big research program I was considering was the only way we were going to get the necessary answers. Papua New Guinea needed answers to these questions as much as any Pacific Island country or territory did, perhaps more so, as it had the biggest domestic fishery in the region. Researching the Papua New Guinea skipjack fishery had been a fantastic experience, for which for the rest of my life I would remain extremely grateful. But it was in all parties' interests for me to move on. If I were to leave Papua New Guinea to pursue the broader perspective, I would not be deserting the team. In any case, at this time, I did not have a project to move on to. Where was I going to move to?

2

The concept of the Skipjack Program starts to materialise

There were more events in 1973 that impacted, or nearly did, my commitment to skipjack research in the broader Pacific. Throughout my PhD studies at the University of Queensland, I had regarded a job with CSIRO Division of Fisheries and Oceanography to be about as good as I could aspire to. So, when a job working on pelagic fisheries based in Cronulla was advertised, even though I now had a good job in Papua New Guinea, I felt I had to apply. I did so successfully. But before accepting, I spent two weeks at CSIRO in Cronulla trying to make up my mind.

My desire to establish the broad-scale skipjack project was strengthening. In the end, it won out. I returned to Port Moresby with even stronger commitment – but not before I had made a firm friendship with Kevin Williams, who was to have been my deputy on the CSIRO project in which I had been offered a leadership position. Kevin has a fabulous depth of knowledge of Australia's tuna fisheries and lots of experience with tagging tuna, particularly southern bluefin tuna (SBT). To this day, nobody has tagged more SBT than Kevin. He has been a great help to me and my exploits with tuna research ever since. I was particularly pleased when he advised me that CSIRO scientists thought so highly of the tagging methods we had developed in Papua New Guinea (Kearney 1974) that they adopted at least some of them themselves. About 20 years later, when my wife heard Kevin publicly repeat his praise of our tagging techniques, she turned to me and somewhat accusingly said, 'You never told me that CSIRO thought so highly of that aspect of your work'. All I could say was, 'You never asked'.

In mid-1973, I received an unheralded visit in my office at Kanudi from Roy (Dick) Baird. Dick was the fisheries officer at the SPC at that time. I knew so little of the SPC that I did not even know where it was based. As I had a busy schedule that day, which did not include a meeting with 'a Dick Baird' who had arrived unannounced, I may not have been as courteous to Dick as I should have been; we spoke for only about 30 minutes. I did have another meeting that day. However, as Dick was to later tell me, this short meeting was sufficient for him to be most impressed with the quality of Papua New Guinea's skipjack research program, including the data printouts on the joint-venture fisheries, the tag recoveries and the results of the baitfish surveys. He told me he had no idea that research of this standard was going on in the area of the SPC, and he was the fisheries officer for the whole area. His visit also provided the opportunity for a brief discussion of the much more ambitious tagging project I was contemplating.

At that stage, my thinking was centred around getting those countries that had significant skipjack fisheries, principally Solomon Islands and Fiji, and possibly French Polynesia and one or two of the US territories, to start their own skipjack tagging ventures. A chartered vessel under centralised direction would then be required to systematically tag in the waters of each of the other Pacific Island countries and territories.

All I had in writing at that time was one page of notes, which was dominated by a listing of the likely hurdles that would need to be jumped. The biggest problem was clearly how to pay for the charter of a suitable vessel for long enough to get enough tags in the water across enough of the total study area. Attached to that one page was a list of the few countries that might be able to do some tagging and a separate list of the countries or organisations that might be prepared to contribute to the funding of such a venture. I did not give Dick a copy of my notes, as I thought they were too preliminary.

Dick was obviously excited by this discussion. In fact, I was surprised that I had no difficulty ushering him out the door so I could go to my next meeting. I remember thinking that he left like he was in a hurry to go and tell somebody about the great news he had just received.

I thought little more of this encounter until I received a letter from Dick several months later. It included the promise of an air ticket for travel to Tahiti to attend a meeting to discuss skipjack assessment. The meeting was to be convened under the auspices of the Expert Committee on Tropical Skipjack, of which I was being invited to be a member. It was with much

enthusiasm and optimism that I accepted the invitation. This would be the perfect opportunity to begin a public campaign to promote the concept of the broader tagging and baitfish study, which had matured considerably in the past couple of months. I attended my first truly international meeting a few months later with my excitement clearly evident; I made no attempt to hide it.

The first meeting of the Expert Committee was convened by Dick Baird in Papeete, French Polynesia, from February 25 to March 1, 1974, under the chairmanship of Richard Shomura, the director of the Hawaii office of the US National Marine Fisheries Service. It was at breakfast with several of my new colleagues on the first morning of the meeting that my qualifications for membership in an 'expert' committee on skipjack were first put to the test. We were dining outside our hotel when a young man walked past with a very significant tuna, more than 20 kilograms, over his shoulder. The black back of the fish was facing me. I did not immediately recognise the species, but could tell it was not a yellowfin. I said, 'What the hell is that?' None of the others seemed to know, so I caught up with the man carrying the fish and had a good look at it. From another angle, the stripes gave it away. Of course, it was a skipjack. In more than three years of intensive research on skipjack in Papua New Guinea, I had never seen a skipjack over 6.5 kilograms. Not recognising one was not a great start to my career as an international expert on skipjack.

Once the meeting was underway, it was immediately apparent to the members of the committee that even though there was a lot of interest in skipjack fisheries in the area of the SPC, apart from what was going on in Papua New Guinea, there was very little skipjack research in the region. In fact, as the meeting broke on the second day, the chairman said to me:

> It is just as well you brought your data and tagging and baitfish survey ideas to the meeting. Otherwise, we would not have had much to talk about. We certainly would not have had a plan of what we should do next.

The members were easily convinced of the usefulness and appropriateness of the tagging and survey program I was now selling them. The results from our work in Papua New Guinea were a big factor.

The representatives from Solomon Islands, Fiji and the French territories I had on my list of countries or territories that might be able to run their own skipjack programs, similar to the one we had going in Papua New Guinea,

but they simply did not have the research resources to undertake such a task at that time. The members unanimously endorsed the concept of the broader program I was proposing as the highest priority. The introduction on page 1 of the report for the meeting states this:

> After considering all available alternatives for the study of skipjack in the area (of the SPC) 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.

Of particular note from the SPC perspective is the comment on page 11 of the proposal:

> 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.

This was to prove to be of considerable importance to several of the eventual donors to the programme, particularly the Japanese.

At Dick Baird's invitation, I stayed on in Papeete a few days after the meeting to expand my 'concept note' into a more formal proposal, including a very preliminary estimate of possible costs. Not surprisingly, this estimate was way under what the actual cost turned out to be.

Dick immediately agreed with my suggestion that even though I had conceived the idea of the project and written the proposal, it would be best, at least in the short term, to have it go out under the authorship of the Expert Committee. Dick was keen to demonstrate that his concept of the Expert Committee had been a success, while I was already concentrating on the task of attracting funding for the project. Getting the fisheries officers from all the countries and territories in the SPC on side with the concept of the project was the perfect place to start. We agreed that having all members of the committee feel some ownership would help catalyse support from at least the countries represented on the committee. The members, as owners, would likely be stronger lobbyists for the programme.

3

Increased travelling as fact-finding for the pursuit of funding

At the conclusion of the Expert Committee meeting in Tahiti, Richard Shomura invited me to a Baitfish Workshop he was convening in Honolulu in the next month or so. While I was keen to accept this invitation, I suggested to Richard that it would be more appropriate if he invited Barney Smith or Tony Lewis, as they had done the bulk of the baitfish work in Papua New Guinea. Richard made it clear that he wanted me to attend primarily as a member of the Expert Committee on Tropical Skipjack and not as a baitfish expert. He wanted me to promote the newly proposed skipjack tagging programme. He also hoped that after the workshop, I would accompany him to the Lake Arrowhead Tuna Conference in California, again to help promote the tagging and survey project. He hoped that I would then go on with him to La Jolla, where his bosses were housed in the same building as the Inter-American Tropical Tuna Commission (IATTC), the Scripps Institution of Oceanography. He thought it would be good for us to have a chat with them about South Pacific skipjack fisheries and the prospects for a major research initiative. Just to make sure I had no excuses, he stated that he would meet all of my expenses.

I presented papers at both the Baitfish Workshop and the Tuna Conference, and Barney and Tony each submitted a paper to the workshop.

The Baitfish Workshop in Honolulu was well attended, informative and extremely enjoyable. I found it particularly gratifying to learn that our baitfish work in Papua New Guinea was well ahead of most others in the

broader Pacific region. While most night-time baitfishers were aware of the considerable influence of the phase of the moon on bait catches, we were the first to quantify that impact (Kearney 1977a). The meeting left me in no doubt that the baitfish component of the broader programme I was proposing was both necessary and adequate.

The Lake Arrowhead conference was a pivotal one for me for a variety of reasons. Right from the moment we landed at the Los Angeles International Airport (LAX), my understanding of the United States began to accelerate. On looking beyond the stairway down from the plane, behind Paul Strushaker, a scientist in Richard Shomura's lab, I was amazed by the density of the smog that greeted us: visibility was a lot less than 100 yards at about 2 pm. As his feet touched the tarmac, Paul immediately fell to his knees with his arms raised, exclaiming loudly, 'God bless America'. He was clearly not impressed with the air quality that greeted him on his arrival home. The drive up the mountains to Lake Arrowhead, at the back of Los Angeles, exposed the thickness of the green-brown smog, and what a contrast was created when we burst through it going up the mountain to see blue sky again. Air quality in Los Angeles has, of course, improved greatly since the 1970s.

On arrival at the main Conference Centre, it did not take me long to find Bill Bayliff. Everybody seemed to know him. At the first opportunity, I introduced myself. We had a lot to talk about, and we quickly agreed to do so, perhaps beginning over dinner that night. Then Bill just casually informed me how much Dr Joseph was looking forward to meeting me. I thought it was a bit early for Christmas celebrations, but maybe not.

My presentation was scheduled early in the program for the next day and just before a coffee break. There were lots of questions (usually a good sign). The fishermen wanted more information about the tuna and baitfish catch rates from the commercial fleets, whereas the scientists wanted to know more about the almost 600 tag recoveries we had documented. One guy, who stood up each time he asked a question, and he did that a lot, wanted more information about everything.

As the session concluded, Bill approached me to thank me for the talk. I immediately asked him, 'Who is the little guy asking all the questions?' 'That's Jim Joseph', he replied. Not my most auspicious start to a quest to

meet somebody I thought was really important for me to impress. As fate would have it, I was to have lunch with Jim and Bill that first day, so no harm had been done.

The conference was a wonderful introduction, for someone like me, to the world of tuna fishing, research and management, at least from the American perspective. I got to meet many key people, including a surprising number of tuna fishermen, and lots of representatives of the big canning companies, such as Starkist, Ralston Purina and Bumble Bee.

My friendship with Jim Joseph was strengthening quickly, and when at lunch on that first day he invited me to visit him in his office on Monday and to accompany him and his wife Pat to a celebration of the launch of a new tuna boat the following evening, my trip to San Diego was already a success, and I hadn't got there yet.

At the conference, I also had great enjoyment talking to tuna fishermen, including Tony Nizitich and Manuel Cintas. Manuel was the skipper of the *Apollo*, a new boat and the first in the US fleet with the capacity for 2,000 tons of tuna. I received another Christmas present when Manuel offered to give me a lift to San Diego after the conference.

On the drive down from the mountains a day or two later, I was to be given my first lessons on the value of using fish aggregating devices in tuna purse seining. One story in particular I will never forget.

The *Apollo* was about a thousand miles out from San Diego, and the fishing was unusually poor when Manuel spotted a piece of thick white polystyrene rope, only about two yards long but four inches thick, floating high on the water. It was almost certainly a piece of mooring rope for a very large ship. Manuel said that he knew the potential value of floating objects for attracting tuna, but this one was so small that he wouldn't usually even look at it. But these were tough times, and the fishing had been extremely slow.

When he gently steamed up to the piece of rope, his echosounders immediately became rather excited. There was no doubt that a very large school of tuna was underneath it. He set his net on it and retrieved more than 300 tons of large yellowfin tuna. The rope came up with the net. He had a quick look at it and was about to throw it in the garbage bin, but as it was dark by the time they had loaded their catch, he thought why not just put the piece of rope back in the water and drift here overnight, as you never know what the morrow may bring! One school of 300 tons of tuna

had gathered around it; why not another one? He attached a small upright red flag to the piece of rope to make it easier to find when it was in the ocean. Then he put it back over the side.

It took some time to find the rope the next morning, but when they did, it had another school of tuna under it. They fished the same piece of rope for the next four days for a total haul of 1,000 tons of yellowfin.

San Diego did not disappoint. At the site of the Scripps Institution of Oceanography, I got to meet and chat with the senior staff of both the IATTC, including Cliff Petersen, the deputy director, Pat Tomlinson and Witek Klawe, and the National Marine Fisheries Service, including Bill Fox and Brian Rothschild, with whom I had a brief discussion that included Richard Shomura, about the Expert Committee on Tropical Skipjack. This was followed by several lengthier discussions with Jim Joseph and Bill Bayliff. I raised with them my thoughts on the much broader scale skipjack tagging project that had now been endorsed by the Expert Committee. They were immediately interested to the point that I thought, excited.

The cocktail party on the new tuna boat was another fascinating event. I got to meet more fishermen and celebrities in the tuna industry, including Augie Fellando, who, as the CEO of the American Tuna Boat Owners Association, I was to have a lot to do with over the next 10 years. I continued to hound Jim Joseph a little, to the extent that I felt I should apologise to him and his wife Pat (with whom my wife Hope and our whole family were soon to begin a lifelong and very close friendship) for taking up too much of his time. Pat immediately replied, 'As far as I am concerned, it would be great if you spoke to him all night. You are friendly to him. The fishermen just want to harass him, or even abuse him, for closing the tuna fishery at what they think is the wrong time'. Jim, as the director of the IATTC, was responsible for setting the dates of the opening and closing of the tuna fishery in the commission's area. I know of very few, if any, fisheries management decisions that pleased all the fishermen. (I have written a paper on the subject, entitled 'Resource Assessment: The Joy of Always Being Wrong' [Kearney 1991a].)

Before the evening was out, Jim invited me to come back to the wharves the next day with him so I could watch a tuna boat being built and to go over a few of the boats to help me get a better understanding of how they operated. Of course, I agreed.

The next morning turned out to be more of an introduction to the American work ethic than a fishing lesson. Shortly after Jim and I began walking around the dock, a bell rang, and all the workers on the various boats came walking briskly towards the coffee bars, of which there were several. Not much is unusual about that. Ten to 15 minutes later, the bell rang again. To my amazement, all the men walked very briskly, quite a few even jogged, back to their workstations. If you ran back to work on Australia's wharves, numerous union officials would let their displeasure be known.

As we inspected several tuna boats, the level of staff commitment to the industry impressed me greatly. While on one of these boats, Jim introduced me to Gordon Broadhead, who was working for Ralston Purina at that time but had previously been the senior scientist at the IATTC. He was, in fact, so senior that many people associated with the commission thought that he would succeed Dr Jack Kask as director of the IATTC – a responsibility that was given to Jim Joseph. I was immediately impressed with Gordon and was very pleased when he accepted Jim's invitation to join us for coffee.

As we were chatting, the subject of the broad-scale tagging project came up. Both Jim and Gordon thought this was very likely to be something the IATTC might be able to help with. Should it get going, it would certainly be something they would be greatly interested in. After all, the area of responsibility of the IATTC was in the same ocean, and at least some skipjack could be expected to mix between the east and west Pacific. While the structure of skipjack stocks was the subject of considerable debate, there was certainly no demarcation line that was a permanent barrier to movement. The subject inevitably shifted to how much I thought the project would cost and how I was proposing to have it funded.

I advised that I had only a very preliminary estimate of cost and that much would depend on where and how a suitable vessel would come from. Under cross-examination, I suggested maybe $600,000 a year for three years to do the tagging and then about half this amount per year for another two years to complete the analyses. Gordon made some wise observations that led him to several conclusions: he thought the project was a laudable idea, but he thought my estimate of cost was seriously low. But even $600,000 a year for multiple years was a huge amount of money to raise for a fisheries research project, particularly on a fishery that was still very much in its infancy. He stressed that to raise that amount of money, I would need to have considerably more than just a good idea. I would have to be able to convince donors that there really was something in it for them. I would have

to explain why they could not afford not to be in it. Over the next two years, I was to be given similar advice from several relevant sources, most notably the Rockefeller Foundation (see Chapter 5). Gordon wished me well, but really did not think I had much chance of raising the necessary money.

After Gordon left, Jim asked me if he could come visit our operation in Port Moresby and discuss our future cooperation further. I could see him quickly becoming my mentor and had difficulty restraining my enthusiasm for his visit.

Jim did not procrastinate. Within a month, we were sitting in my office at Kanudi discussing how we could best make such a big research program eventuate. Neither of us had serious doubts that having the project based largely on tagging was the right way to go. Yes, there were undeniably considerable risks, but we thought they were not sufficiently problematic to make us change direction. We could not see a viable alternative. We also had little doubt that 100,000 tagged fish should be enough to enable resource assessment within acceptable confidence intervals. We agreed that tagging this quantity over three years was technically achievable. Jim agreed with me that tagging the 100,000 fish over three years was much better than having the same number tagged in a shorter period. I felt that three years would be enough to enable at least first impressions of the variability in abundance over time.

Jim could not really help allay my concerns that problems with getting bait in the eastern part of the central Pacific may make it difficult to have tags sufficiently uniformly distributed across our total study area. He knew that I had more experience than he did with tropical baitfish species. And he was impressed with the baitfish survey and assessment program we had developed in Papua New Guinea. Of particular relevance to this specific problem was the improved baitfish handling processes we had developed primarily for the smaller and more delicate tropical baitfish species. These new techniques had greatly increased the amount of bait we could carry in a bait tank and the longevity of most species once carefully loaded, observing the specific protocols we had developed. Of particular value was our procedure for splitting the bait-fishing process into three stages: 1. With the assistance of bright underwater lights, trapping the bait in a 'bouke-ami' net at night; 2. Holding it uncrowded and undisturbed in the net for the rest of the night; and 3. Crowding and then loading it into the bait tanks after daybreak.

There was good reason for confidence that, provided the vessel we used was in sound working condition, and the crew were up to commercial pole and line fishing standards, we could overcome most technical problems that might arise. What we were planning was, after all, a research project, and we were well aware of the priority that must be given to baitfish supply. I was also anticipating that there would be some areas where there simply would not be enough skipjack to make tagging rewarding. Dealing with unequal sample sizes was an anticipated part of the process of analysis. We may have to revisit some areas several times.

I never did know for sure what was the cause of the coincidence, but while Jim was in Port Moresby, so also was Dr Akira Suda. Suda-San was at that time the director of the Far Seas Fisheries Research Laboratory in Shimizu, Japan. I had meetings with him in Shimizu a year or two earlier. He had come on a fact-finding mission, having heard of our success in researching the Papua New Guinea tuna fishery. I suspect that Jim may have orchestrated the 'coincidence' of them both being in Port Moresby at the same time. The three of us, plus Tony Lewis, spent considerable time talking generally about Papua New Guinea's tuna resources. Dr Suda had the opportunity to talk to Barney Smith one-on-one on board the *Tagula*, which was working out of Rabaul under Barney's direction for the week Dr Suda was in Papua New Guinea. He had actually managed to catch a few skipjack and see them tagged while he was on the boat.

Suda was particularly keen to talk to me about the imminent international discussions on the Law of the Sea and what might happen in the South Pacific – a subject of great interest to the Japanese. Dr Suda had not been able to find anybody other than myself who appeared to have a great interest in what changes the Law of the Sea might bring to tuna management in the South Pacific. I had started work on exactly this topic and, in the next two years, would publish several papers on it, so I was very keen to exchange opinions with such a senior member of the Japanese fisheries hierarchy. Dr Suda felt that my involvement with the issues around the Law of the Sea and what Pacific Island nations wished to achieve from it would have a big impact on Japan's attitude to funding the Skipjack Programme.

Having such distinguished visitors gave my wife, Hope, and I the opportunity for a rather special seafood dinner, to which the minister for Agriculture, Stock and Fisheries, Bruce Jephcott, with whom I had a firm friendship, also accepted our invitation. Port Moresby was a great place for fresh seafood at the time, and the meal included very large mud crabs, lobsters, several

species of prawns from the Gulf of Papua and a very large long-tail tuna I had caught in Port Moresby Harbour four or five days earlier; the tuna was presented at the dinner as sashimi.

The evening was great fun. I particularly remember the merriment that was created when, at the start of the smorgasbord, Tony unceremoniously plonked one of the biggest mud crab claws I have ever seen on the minister's plate. The claw was so big that the minister almost lost control of his plate. I also well remember Suda-san's amazed look as he studied the very large plate with more than two kilos of tuna sashimi on it. He looked a little puzzled as he came up to me and said, 'Kearney-san, that is a very big plate of sashimi'. I took him over to the fridge and showed him where there were at least 5 kilos more (Port Moresby was famous for very big *Thunnus tonggol*, and this one had been over 40 pounds at the time of capture). Suda's puzzled look was replaced with a beaming smile: 'This could not happen in Japan: to be invited to a dinner party where there is more tuna sashimi than you could possibly eat'. He then went silent for a while, apparently deep in thought. Then he stated, 'I appreciate the trouble you and your wife have gone to, to make sure that we have a variety of seafood, but would you be upset if I ate only tuna?' What an easy guest to please!

Before Jim left Port Moresby, we discussed the wisdom of getting the Food and Agriculture Organization of the United Nations (FAO) involved in engendering support for the Skipjack Programme. Jim knew FAO well, and he thought that John Gulland would be the right person to approach if we thought FAO should be involved in some way. We agreed that I would talk to Dick Baird and Richard Shomura about it and get back to him.

The concept of the Skipjack Programme continued to gain momentum as 1974 rolled on. The old-fashioned spelling of the word 'programme', Dick Baird informed me, was at the insistence of the SPC. While it rather annoyed many, particularly the Americans, I learnt to live and work with it.

The SPC's Seventh Technical Meeting on Fisheries, which I attended, was held in Nuku'alofa, Tonga, in July. I gave a short talk on how I felt the Skipjack Programme, if implemented, would help with gaining regional consensus on how to address the new Law of the Sea, which was on the horizon. The meeting endorsed the proposal of the Expert Committee as a 'project of the highest priority and urgency'; an endorsement that was subsequently seconded by the Indo-Pacific Fisheries Council Sixteenth

Session, meeting jointly with the Indian Ocean Fishery Commission in Jakarta, Indonesia, in November. By invitation, I attended both meetings to promote the programme.

Discussions with Dick Baird and Richard Shomura confirmed that getting FAO involved may help with fundraising, once that begun in earnest. I so advised Jim Joseph, who immediately confirmed that he would call John Gulland. I felt it would be much better if Jim rang Gulland, as I had met him only once when I attended a population dynamics course he ran in Cronulla a year or so earlier. In any case, Jim carried much more seniority than I. Jim rang me back a day or so later to tell me that Gulland was enthusiastic about getting involved. FAO had not had much success at all with fisheries projects in the Pacific, so why not get on board with the biggest one they had ever heard of? What Jim arranged was that I would give Gulland a week or so to get endorsement from Fred Popper, who was the director of FAO's Fisheries Division, and then give Gulland a call to discuss the possibilities.

Calling Gulland in Rome, Italy, turned out to be not a simple task. Jim had given me the number to ring, but in 1974 in Papua New Guinea, international phone calls were not simply a matter of dialling and speaking. I checked the time in Rome, and at about 10 am, their time, rang our international switch and booked a call. 'Please wait', said the local operator, who did not sound at all confident about the task I was giving him. So I waited … and waited … and waited … I finally hung up about an hour and a half later. I tried the next night for the same result, except as I was about to hang up, my wife, Hope, said, 'Give me the phone'. She wanted to be helpful, but I could not help but feel that she was a little annoyed I had given in so meekly the night before. I gladly gave her the phone. She hung on for ages. Eventually, an operator came on the line to see what was going on. As nothing was happening, Hope gave him a polite serve and kept waiting. I was about to go to bed when, in a very secretarial voice, she said loudly (to alert me to her success), 'Good morning, Dr Gulland. You have a call from Papua New Guinea. Could you please hold for a moment while I get Dr Kearney for you?'

The discussion with Gulland was much more productive than I dared hope. He led with a statement of how keen FAO was to be involved, confirming FAO's lack of success with fisheries projects in the Pacific. He then offered me a month-long consultancy, to come to Rome and work with him and Sidney Holt to refine the project proposal and investigate ways of getting it

supported. There was not a lot more for me to say than a rather enthusiastic 'yes'. He would send me the plane ticket. He suggested a date in November, and I would only need to contact him if I could not make that date. If I did make it, all I needed to do was tell him which flight, and I would be met at the airport.

To go from living in Port Moresby, or even Sydney, to living in Rome in 1974 was clearly going to result in some form of culture shock, but I wasn't quite ready for how much. One of FAO's very senior scientists, Jean-Paul Troadec, met me at the airport. As we drove into Rome, I was most impressed with the many beautiful older buildings. I commented to Jean-Paul about one. His response, that this one was only about 700 years old, said it all: no existing building in Australia is much more than 250 years old.

The consultancy resulted in the production of a revised proposal for the Skipjack Programme that contained considerably more detail on what activities would be undertaken and what analyses would be done. It even included a draft schedule by country or territory for the first year of tagging and baitfish research. Of significance to later obtaining financial support from the UK (discussed in Chapter 7) was the acknowledgement of the possible difficulty of getting sufficient bait in the eastern extremes of the SPC area. This concern was countered by the acknowledgement that skipjack were known to be seasonally abundant in this area.

This version of the proposal was published as a document for the joint meeting of the Indo-Pacific Fisheries Council and the Indian Ocean Fisheries Commission in Mombasa, Kenya, in July 1975 under my name as an FAO consultant (Kearney 1974). At the time, I thought FAO was keen to have me as one of its staff acknowledged as the author because of its history of difficulty in establishing successful projects in the Pacific. Immediately after funding for the programme was confirmed, I became aware of the full extent of FAO's interest (see Chapter 11).

While at FAO, I also took the opportunity to have several discussions with Fred Popper, the director of the FAO Fisheries Division, on the broader issues of the Law of the Sea and South Pacific fisheries management. I told Fred of the paper I had begun writing on this topic. He suggested that we might write a joint paper on this topic at some time. Less than two years later, we did so. Before leaving Rome, I was offered another three- or four-month consultancy with FAO to undertake a review of Indian Ocean tuna fisheries. I did not have to decide immediately.

I returned to Port Moresby in late December 1974 and immediately pestered Dick Baird for an update on the funding for my possible position at the SPC. He told me that he was extremely confident he could get enough money from the SPC to allow me to work for six months on the fundraising for this project. It would suit him if I took the FAO job in the interim, as this would give him time to get a signed commitment for me to be paid. He clearly implied, without unequivocally stating it, that the money for my salary would be coming from the SPC.

It was some time, more than a year, and well after I began working at the SPC, before I established that it was not SPC money that funded my appointment. I now believe that Dick had not wanted me to know that the SPC Executive was not supportive of the programme. I think he needed the extra time to make sure they would provide some support, such as housing and medical insurance, that was standard with SPC employment. I believe he thought I might not take on the task if I knew the full extent of the lack of support from the executive staff of the SPC.

Paul Judd's excellent report, 'A Short History of the Skipjack Survey and Assessment Programme' (2016), provides a sound summary of this critical period in the commencement of the programme, beginning in the middle of 1974:

> 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 was a directive from the SPC Executive. It clearly reflected considerable concern, particularly among the executive, that if SPC donor country funds were directed towards this project, the outcome would be a negative influence on the quantum of funds available for SPC core support.

I was to spend four months on the second FAO consultancy, culminating in the publication of a review of changes in the tuna fisheries of the Indian Ocean (Kearney 1975b). I then returned briefly to Port Moresby before accepting the challenge put to me by Dick Baird. I commenced work at the SPC in Noumea on September 13, 1975, believing that my salary was being paid by the SPC for at least the next six months.

As Paul Judd reports, in the interim, the Rockefeller Foundation had created the International Center for Living Aquatic Resources Management (ICLARM), but its operation was still very much in its infancy in mid-1975. The first meeting on the ICLARM Technical Advisory Committee occurred in Honolulu in February 1975, and just five days later, the ICLARM program coordinator (Steve Ritterbush) sent a memo to Dr Phil Helfrich, the director designate of ICLARM, concerning the 'Skipjack Resource Assessment Project':

> After working out the initial details with Dick Baird (DB) … this is where we stand at the moment. The Project Manager for this program 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* [emphasis added]. DB has assured me that no percentage of ICLARM funds will be deducted for administrative overhead.

The funds that were to be spent on the employment of the Skipjack Programme coordinator were ICLARM funds and not those of the parent Rockefeller Foundation. I was to ascertain in my meeting with the Rockefeller Foundation's Program Committee in November 1975 (see Chapter 5) that they were not aware that some of the funding they had provided to help create the Expert Committee on Tropical Skipjack had been used to pay my salary in the early stages of my pursuit of funding for the Skipjack Programme.

4

Life at the South Pacific Commission

On arrival in Noumea in September 1975, Hope and I were met by Dick Baird and his wife, Ina. We were immediately made to feel most welcome. We had visited Dick and Ina before and had developed a sound friendship. Hope and I were both very much looking forward to living in New Caledonia. The Bairds showed us to the house we had been allocated and made us generally feel comfortable. Dick and I had a brief discussion of what was in store. I felt very confident about developing an excellent working relationship with him.

I took up my appointment at the SPC with the title 'Pacific skipjack stock assessment project co-ordinator'.

It did not take long for the true feelings of at least some of the SPC Executives to surface. On the second or third day of my tenure in Noumea, I received a phone call from the secretary general's (SG's) secretary asking me to come to the SG's office to take my oath of allegiance to the commission. Something I had not heard about, but had no problem with.

At the SG's office, I was greeted by the director of the commission's Health Program, who introduced himself as the acting SG. I remember his words from then almost verbatim:

> Dr Kearney, the secretary general is away on duty travel, but he has instructed me, as acting secretary general, to take your oath of allegiance. I would rather not have to do so, but as I have been instructed to, I will. But first, I wish to advise you that the Commission does not need people like you. We already have too

> many fisheries projects, and all your big project will do is take vital money away from health and other social programmes that are of far more importance to South Pacific Island countries. But now that you know where we stand, I will take your oath.

My formal relationship with the SPC was off to an exciting start! Clearly, allegiance was not a two-way street. Fortunately, Dick Baird was there to provide encouragement. The fact that the skipjack fishery, which the Skipjack Programme was designed to nurture and protect, represented one of the best opportunities for small island states to generate foreign exchange to enable them to pay for health and other social services was not in the acting SG's thinking.

Of course, I quickly sought Dick's counsel on what I had found to be an amazing and perplexing official 'welcome' to the commission. Dick admitted he was aware that the attitude of the executive to fisheries projects was less than enthusiastic, but he had not expected it to go as far as the extremely unprofessional behaviour to which I had been subjected. He confirmed that he had had some difficulty convincing the executive to commit to providing housing and other support for me as Skipjack Programme coordinator. I assume that was why he had needed the extra time before he could offer me the job. I had been quickly made aware that the executive was not prepared to support me in my efforts to have the Skipjack Programme funded.

Dick and I agreed that I would have to approach the fundraising for the Skipjack Programme mindful that I could not expect official help. I realised that I would have to go a little further and try to minimise the damage that the executive might deliberately encourage.

Right from the moment of my arrival at the SPC, I was aware that the institution was in dire financial trouble. The SPC was the first major regional organisation of significance 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 whom had administrative and colonial responsibility over one or more island territories or states. 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'. It had met this mandate reasonably for almost 30 years. However, by 1975, the SPC had major budgetary problems, and donor support was waning, as evidenced by the General Review presented to the Fifteenth SPC Conference by the SG, 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.

Dick Baird and I were well aware that raising big sums of money was going to be extremely difficult. Given that the budget I would be seeking funding for was approximately a million dollars a year, equivalent to about 33 per cent of the total SPC budget, at a time when funding for international initiatives was extremely tight, my task could well be impossible. Many people, including most of my scientific colleagues, thought it would be. Not all because they thought it impossible to raise the amount of money that would be necessary to fund the experiment; some had grave doubts about whether tagging could be successfully used as the primary measure of the size of the skipjack population. Nobody had been able to do it for any population of skipjack before. Global finances were being impacted by uncertainty following 'the oil crisis', and closer to home, the SPC itself had admitted to budgetary difficulties 'to an alarming extent' and a lack of interest by the current donors in helping (as confirmed by the SG's presentation to the South Pacific Conference, quoted earlier).

The likely donors for the Skipjack Programme were largely the same ones as those who funded the SPC core budget, and as was evident from the SG's presentation, they were clearly reluctant to give the SPC any more money, let alone the 33 per cent increase I was seeking.

There was also open expression by emerging Pacific Island nations that the SPC was more 'colonial' in its operation than they now wished. More colonial territories were gaining independence almost every year in the 1970s. There was a groundswell of belief 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. It is also important to note that at that time, the SPC was stating that it still did not have a single extra-budgetary project on its books – all activities were paid for out of consolidated revenue, known as core funding. Extra-budgetary projects had been talked about, and apparently actively sought. However, in the 1970s, the SPC was publicly stating that it had not been able to obtain funding for a single one, not even for a few thousand dollars. If funding was to be obtained for a multimillion-dollar project, costing more than a third of the commission's total budget, a totally new approach was necessary. Optimism was essential.

Dick Baird and I quickly determined that the most appropriate division of labour would be for Dick to ensure that the fisheries departments of all commission countries and territories were kept up to date with developments with the Skipjack Programme and were supportive of it. This would best be done through the Expert Committee on Tropical Skipjack and the Regional Technical Meeting on Fisheries: Dick was, after all, the commission's fisheries officer; it was his job to run both activities. My job would be to develop a new approach to attracting extra-budgetary funding for a major new initiative and then, of course, to convince the targeted sources to provide the money. As the Rockefeller Foundation was to point out to me (see Chapter 5), the design of the Skipjack Programme could be accepted as the job of a fisheries scientist, but the job of raising the money to fund it was one for a high-powered salesman, not necessarily a scientist.

We already had expressions of the strongest possible support from the Expert Committee and the regional fisheries officers, plus endorsement from the Indian Ocean Fisheries Commission and the Indo-Pacific Fisheries Council. While they were not going to come up with any money, I was hopeful that the fisheries officers might be able to influence potential donors.

My enquiries of the commission's finance officer, Ivan Boyd, revealed that the commission had a list of 22 proposals for which it was presumably seeking extra-budgetary funding. These were ranked by the SPC Executive in order of their priority for funding, with number one being the highest.

I asked for the Skipjack Programme to be put on the list, thinking that, as it was the only one with high regional support and international support from outside the commission members, it would receive a high ranking. I was subsequently advised that the commission's secretariat gave it a ranking of number 21. They clearly did not want the programme to be funded. I immediately asked, successfully, for it to be withdrawn from this listing: I could not afford to have this Programme considered an extremely low priority project. The fisheries officers of the region certainly did not consider it as such.

I was surprised that I was repeatedly told that the SPC had never had a single extra-budgetary project. But the Expert Committee on Tropical Skipjack had been funded by the Rockefeller Foundation? Was the commission so strongly against fisheries projects that it did not wish to admit that its one success with extra-budgetary funding had been a fisheries project? Or did the commission simply not keep good records of what projects it had? I suspected that both were probably true, but decided that this was an issue I would simply let lie.

While I was less than impressed with the commission's attitude towards the Skipjack Programme, I never wavered in my pursuit of having the programme based at the SPC. The commission's broad membership was essential for the type of research on highly mobile tuna species I was proposing. The programme had to have a home. The SPC was the logical one.

The purpose of the programme was to tag sufficient skipjack to enable an accurate estimation of total skipjack population size and the dynamics of the population that would provide managers with the tools to sustainably manage the fisheries that would exploit these resources in the waters of each country and territory. That such management was going to be essential was being constantly reaffirmed by the rapid development of policies for extending the oceanic jurisdiction of all island states under a new Law of the Sea. Most of the area of the SPC was ocean (Figure 4), and this was about to be carved up (Figure 5). Scientific assessment of what this would mean and how the resources of the whole region could best be managed was both critical and urgent. For many of our island states, particularly some of the smaller ones, tuna fisheries represented their one chance for some economic independence and positive foreign exchange.

Dick Baird and I firmly believed that if the commission seized the moment and provided the research on what was quickly becoming one of the world's biggest tuna fisheries, the commission's vital importance to Pacific Island countries and territories would be ensured for at least several decades. We anticipated that the precedent it would create would make it easier to attract funding for other extra-budgetary projects, or even research experiments, based on similar principles to those proposed for the Skipjack Programme. The members of the current SPC Executive clearly did not share our vision for the commission's future.

5

The support of the Rockefeller Foundation

Dick Baird and I were both scientists, and we worked well together. He was particularly helpful to me in reviewing drafts of the papers I was using to foster the relationship between research and sound management of oceanic resources, including the sharing of highly migratory ones, and the impacts of the changing Law of the Sea. These documents were critical to my fundraising program. I became dependent on his friendship and increasingly appreciative of his advice. However, only a month or so after taking up my position in Noumea, it became obvious that the money Dick said he had obtained from the commission to pay my salary and travel for six months was in fact nowhere near enough for even six months. Plus, I also quickly confirmed what I had feared; six months was not going to be enough time to raise the money we needed. Eighteen months would be a better estimate. I had encountered my first serious crisis.

It was then that Dick suggested I approach the Rockefeller Foundation in New York to support me in continuing my efforts to have the programme funded. The Rockefeller Foundation was in the process of establishing the International Center for Living Aquatic Resources Management (ICLARM) in Honolulu, and they had approached Dick about being involved. Dick told me that in his response, he advised the foundation that he would only take on the job as director if they also appointed me to run the Skipjack Programme as an ICLARM project. My investigation, almost 50 years later, of the files held in the Rockefeller Foundation Archive Center in New York State did not confirm Dick's interpretation of events. To this day, there is still uncertainty in my understanding of the timing of the involvement

of the Rockefeller Foundation in the funding of the Skipjack Programme. I now believe that this was exacerbated at the time because Dick did not tell me, or the Rockefeller Foundation, that he and ICLARM had used some of the money the foundation had given him, through ICLARM, to create the Expert Committee on Tropical Skipjack, to fund the first few months of my employment in Noumea.

It was not until November 2024 that Paul Judd sent me copies of archived correspondence between the SPC, the Rockefeller Foundation and ICLARM that I first became aware of any communication between the SPC and the Rockefeller Foundation. I was particularly intrigued by the copy of a letter sent from the secretary general, G. F. D. Betham, on April 8, 1975, to Dr John Pinot, of the Rockefeller Foundation, approximately six months before I took up my position as 'skipjack stock assessment programme coordinator' in Noumea. Three paragraphs in that letter are particularly interesting, and I now find them informative.

The first states:

> Proposal for Skipjack Survey and Tagging Programme in the Central and Western Pacific Ocean' has been prepared by Dr R. E. Kearney at the request of FAO in collaboration with the South Pacific Commission.

I have no idea how the secretariat of the SPC developed the idea that I wrote the first version of the programme proposal at the request of the Food and Agriculture Organization of the United Nations (FAO). If they truly believed this, it is not so surprising that Dr Gulland of FAO should lay some claim to the programme after it was funded (as discussed in Chapter 11).

The second states:

> The function of the Project Co-ordinator would be to act as a catalyst in obtaining the necessary funding from supporting countries and organisations and, having done so, begin to set the project up as an operational unit. The cost of the Project Co-ordinator for one year would be approximately US$45,000.

This paragraph makes it clear that it was always envisaged that the programme coordinator would run the programme, at least initially (set it up as an operational unit) should the funding be obtained. It also leaves no doubt that the SPC requested seed funding for my salary for a full year, in the first instance.

The third states:

> I would mention that we have approached Dr. R. E. Kearney, Chief Biologist of the Papua New Guinea Fisheries Service and a leading world authority on skipjack tuna, with an offer of the post should funds become available.

This paragraph, in combination with the preceding second one, leaves little doubt that, should funding become available, the SPC Executive accepted that I would run the programme (see Chapter 11).

Attached to the secretary general's letter was correspondence from ICLARM stating that, '$25,000 [US] tentatively allotted for the program to acquire program coordinator'. This smaller amount was the only one Dick Baird mentioned to me, and there was never any mention that the money did not come from the commission. In all my time at the SPC, I never knew of the existence of this letter by the secretary general. This truly surprises me, for it is obvious, to me at least, from the wording of the letter that Dick Baird at least drafted it. To this day, I am not aware of any response to it. Paul Judd had not been able to find one in the SPC archives.

So, when I wrote to the Rockefeller Foundation in 1975 seeking seed money, I thought I was asking them to support a totally new concept. I was to form the strong impression that so did they. They replied to my letter incredibly quickly with a suggested date of November 14, 1975, for a meeting in New York with Dr John Pinot, the director of agricultural sciences for the foundation. The letter contained an air ticket for me to get to New York and back.

I took advantage of my trip to New York to meet with Bill Ripley of the United Nations Development Program (UNDP) on November 10 and 11, 1975. This meeting produced lots of platitudes from UNDP, but no commitment of support. In contrast, my meeting with Dr Pinot, together with the foundation's program committee on November 14, was one of the highlights of my professional life.

I was well aware of the importance of the meeting to converting my dream of getting the Skipjack Programme up and running into reality. The few months I had already spent chasing funding were enough to convince me of the difficulty of the task. But the research I had done during this time on the likely impact of the emerging Law of the Sea on Pacific Island countries and territories had made me more convinced than ever of the magnitude

of the benefits that would come from the programme, if it ever materialised. The meeting with UNDP just a couple of days earlier was a stark reminder of how difficult it could be to get even funding agencies, whose job it was to help developing countries, to provide seed funding.

I had done a lot of homework in preparation for this meeting with the Rockefeller Foundation, concentrating on five issues:

1. The importance of having the best possible science to underpin resource assessments – science that small Pacific Island countries currently had virtually no capability to provide.
2. The magnitude of the resource in question and its tremendous importance to the people of Pacific Island states, particularly some of the smaller ones.
3. The impending changes in the Law of the Sea and what they would mean to the future of the peoples of the Pacific.
4. How the programme would provide the perfect platform for the creation of the regional fisheries agency discussed in the papers I was to prepare for the South Pacific Forum (see Chapter 8).
5. A totally administrative matter; the need for a sizable travel budget to support fundraising.

I was particularly sensitive to this last point as, in Australia, travel by public servants in 1975 was regarded as a 'lurk' and not a responsibility. It was extremely difficult for scientists to get approval for overseas travel. It required the personal signature of the relevant minister of government. I was asking for $3,500 for travel, a huge amount by comparison with the travel budget of even a very senior Australian scientist. I spent a lot of time preparing my defence of this amount. I knew I would need to travel quite a bit.

I could not bear to think of what I would do if the Rockefeller Foundation said no. I anticipated problems in convincing people that I needed so much for travel. I could fly around the world three times for $3,500. But I knew if I was going to raise $4 million, I would have to travel – probably a lot.

It was with some trepidation that I walked through the doors of the Rockefeller Building, one of the tallest in the mighty city of New York, at 9.57 am on the assigned day. It was easy to be overawed.

The reception desk was obvious. As I approached the desk, an impeccably dressed woman walked up to me and said, 'Good morning, Sir. How may I be of assistance?' I replied, 'I have a 10 am meeting with Dr John Pinot'. Without a moment's hesitation or reference to notes (and there were no computer screens in those days), and before I had a chance to introduce myself, she stated, 'Welcome to the Rockefeller Foundation, Dr Kearney. May I take you to Dr Pinot's office?'

We then went at least five times higher in an elevator than I had ever been before; Dr Pinot's office was on the top floor. As the door to the elevator opened, Dr Pinot's secretary, a charming middle-aged lady, greeted us and guided me to a comfortable chair.

After giving me a cup of coffee and explaining that Dr Pinot would be with me in about five minutes, my newest friend then took me to the huge picture window to proudly show off the fantastic view of New York City. She took pride in pointing out the Twin Towers of the World Trade Center, which dominated the skyline in that direction.

Dr Pinot emerged from the committee room and, after introducing himself, explained how the process would unfold. He would introduce me to the committee, who have copies of the programme proposal and the covering letter I had sent him. I would then be asked to give a brief, 5–10-minute introduction to the key aspects of my request, to be followed by questions from the committee for perhaps half an hour. I would then be asked to leave the room while they considered their response. This could also take up to half an hour, after which I would be called back into the room and given the result of their deliberations. I would know that day if they were going to support me and, if so, how much money or other support they would be committing. I would be allowed to make a brief response to their decision(s). Clearly, I would have to be at my best.

There were eight members of the committee, and from their brief introductions by Dr Pinot, I gathered that at least several of them had significant scientific credentials. The others had more corporate or legal backgrounds. There was no doubt the committee collectively represented great experience with assessing applications for grants, as would be expected of the world's leading granting authority.

I made a point of keeping my introduction to the five-minute guideline. I stressed the importance of quality science to the programme, particularly with the big changes that were coming with the Law of the Sea and the almost

complete lack of appropriate fisheries science capability among the 23 countries and territories in question. The committee's questions were excellent. Many wondered what gave me confidence that I could raise the $4 million, which, they kept reminding me, was a huge amount of money for a research project that I acknowledged had considerable risk. As I left the room, I felt that I had done as well as I could. I did not feel caught out at any stage.

After I was called back in, Dr Pinot began. Almost verbatim, it was so important I remember it chapter and verse 50 years later: 'Dr Kearney, I think you will be pleased with what I am about to tell you'. This alone made me pleased and excited. He continued:

> Your presentation on the need for the Skipjack Programme was excellent. Before your talk, this Committee was divided on whether to support your proposal. But you have convinced us. This is a hugely exciting research proposal, and the project is exactly what the small South Pacific countries need. You have acknowledged that the project is research and possibly even relatively high risk; tagging has never been successfully used to determine the size of a tuna population anywhere in the world, let alone in the middle of the world's biggest ocean. You have acknowledged the high risk, but risk does not worry us. We are in the business of providing seed money to pursue concepts. Risk in research is a factor that must be identified and managed, not feared.

Then he said, 'But wonderful though your research project is, it is not what you have asked the Rockefeller Foundation to support'. My heart sank. 'What you have asked us to support is you, and your ability to persuade six or seven of the world's biggest democracies to give you $4 million'. I immediately realised that he was right; I had erred in the direction I had taken. But he continued:

> Fortunately for all of us, in convincing this Committee of the quality of the project and the need for it, you have given us the perfect opportunity to assess not just your abilities as a developer of a major science program but also as a salesman for the project you have designed.
>
> We have assessed your abilities as a fundraiser to be more than considerable. We are convinced that if you deliver the same message you have given us, in the same way, to appropriate donor governments and/or institutions, they will be similarly impressed. But we stress that this will require you doing it in person and not

> by phone or written correspondence. Accordingly, we have agreed to fund all of what you have requested for your salary and associated expenses. As far as travel is concerned, our response is not similarly straightforward.

I thought I had done adequate preparation for what was to follow, but I was wrong:

> You have asked us for $3,500 for travel. We are going to give you $15,000. With that extra funding comes our expectation that you take our advice and do at least the bulk of your fundraising in person. Your attempts to raise the money must not be constrained by a lack of finance to enable you to speak to the right people in person.

As for the travel advice, I was to spend eight of the next 12 months away from home, and no trip was longer than 10 days.

Dr Pinot's final comment was to state that they had not yet decided how they would make the money payable to me, but it would likely be through ICLARM. In any case, the Rockefeller Foundation wanted me to work closely with ICLARM in Hawaii. Little did either of us imagine that in 20 years, I would be the chairman of the ICLARM Board.

I could do little more than give a profound thank you to Dr Pinot and his committee. I was overwhelmed with gratitude. Not only had they given me a great deal more money than I had requested so that I was now not only in a position to get to donors in person anywhere in the world, as often as necessary, but I would also be able to tell them that my project proposal had been reviewed by no lesser authority than the Rockefeller Foundation and their response had been to give me much more money than I had asked for. My chances of raising the $4 million had just gone up enormously. I was on a high that would persist for at least a week and would greatly impact the next 10 years of my life. The experience remains one of the greatest of my professional career.

I was to celebrate that night by going to see *West Side Story* on Broadway. Hang the expense; I had to celebrate appropriately. My only regret was that my wife, Hope, was not with me.

6

Dick Baird's passing and ICLARM's emergence

With funding of my salary and travel confirmed for at least the immediate future, 1976 loomed bright. It was therefore a tremendous blow when, only a few weeks into the year, Dick Baird was diagnosed with lung cancer that was found to be aggressive, incurable and terminal. He had been a very heavy smoker for many years, smoking unfiltered Gauloises. His commitment to his work with the fisheries officers of the region was such that the week after his diagnosis, he undertook a 10-day field trip to the Cook Islands. His wife was not at all pleased with this arrangement. She pleaded with him to, for once, put himself first. But that was not Dick's nature.

After trips to Australia for surgery, he died from cancer in March. That day was a particularly poignant one for me, as when I went home to tell Hope of Dick's passing, she had just returned from her doctor's appointment. She confirmed that she was pregnant with our first child. She said, 'One life ends as another begins'. It was a day of highly confused emotions for both of us.

Dick's illness itself had a huge impact on me and on my working environment. His passing forced me to accept that continuing to work at the SPC with not a single close colleague or confidant was going to make fundraising just that much more problematic. I was at this time not aware of what a great professional colleague and friend Dick's replacement, Dr Rene Grandperrin, would become.

Immediately following my meeting at the Rockefeller Foundation, I had begun, as requested, to increase my communication with Dr Phil Helfrich, who had now taken up his appointment as director of the International Center for Living Aquatic Resources Management (ICLARM) in Honolulu. ICLARM and Phil himself were strong supporters of the Skipjack Programme. We became very good friends and were to remain so for many years. We discussed my predicament following Dick's death and agreed that it would be beneficial to both of us, and to Richard Shomura, as chairman of the Expert Committee on Tropical Skipjack, for me to base myself in Honolulu for at least a few months. I still had funding to get me through to at least August. ICLARM's offices were in the same building as Richard's, so this would be the logical place for me. Hope was happy to live in Honolulu for a while, even up to the time she intended to go back to Australia in September to have our first baby.

Richard Shomura thought it was a great idea for me to take up temporary residence in Honolulu; he happily provided the necessary office space.

My discussions with donors continued, effectively unchanged. If anything, it was marginally easier to travel from Honolulu than Noumea. While their assurances that they were on track to fund the Programme were becoming a little more strongly worded, nothing definite was happening. The money I had to fund my position was not going to last forever. It was not as though I was on a permanent appointment and could afford just to wait for things to happen. I found it difficult to determine what the problem was that all the donors appeared to share. It later became apparent that they simply would not provide any additional funding to the SPC (see Chapter 9).

My relationship with ICLARM continued to strengthen. At Phil's request, I used my contacts in Canberra to arrange a meeting for him and I with Sir John Crawford to promote the case for having ICLARM accepted into the Consultative Group on International Agricultural Research (CGIAR), of which Sir John was effectively the Patron. ICLARM's membership in the CGIAR eventually came to pass some years later. In addition, at Phil's request, we travelled to Japan for discussions with the government and with scientists of the Far Seas Fisheries Research Laboratory in Shimizu. The bullet-train trip, Tokyo to Shimizu, was a cultural experience in itself.

In 1976, there was hardly a word in English about Japanese trains. We congratulated ourselves for getting on the right train unaided, but then quickly realised that we had no way of knowing when to get off. The train

was racing through most stations at about 300 kilometres an hour and then stopping at one, but which one it was, we had no idea. We divided responsibility for identifying a station, any station, by one of us looking at the first Japanese character and the other the last character on the station name as we sped through each one and then trying to match these characters with those on the chart of the railway network on the wall of the train, which was all in Japanese. Had it not been for a Japanese gentleman who worked for *The New York Times* and obviously spoke very good English and saw the trouble we were having, we might still be on the train!

We made it back to Tokyo two days later without incident, thanks to some excellent instructions from our scientific colleagues in Shimizu. That evening, though, when we went for a walk around the Ginza, two policemen decided to make our stay in Tokyo a little more exciting. They approached us, and after about five minutes of questioning in moderately good English, they arrested us for not having our passports with us when out of our hotel. This was not something we had any idea we were required to do. Fortunately for us, after threatening to take us to the police station, they concluded that about half an hour's detention was sufficient for the crime, after which they let us go with a warning.

My meeting with the Japan Fisheries Agency was straightforward. In essence, Japan was ready to pay for at least the first two months of the vessel charter as soon as I had enough money to commit to the charter of a Japanese pole and line boat for at least five months.

7

The pursuit of individual donors

The obvious countries to approach in the search for donors for the Skipjack Programme were the ones that were ongoing supporters of Pacific Island countries and territories as members of the SPC. In alphabetical order, they were Australia, France, New Zealand, the United Kingdom and the United States of America. Japan, as the country with, at that time, the biggest fleet that fished for tuna in the central and western Pacific, was another likely candidate for support. Other possibilities included Canada and the European Union, but neither of these had had significant involvement at that time as aid donors in the South Pacific.

Once I accepted the position of 'skipjack stock assessment program coordinator' based at the SPC, I began a formal and structured evaluation of what I anticipated to be the reasons why each of these countries might support the programme. How could I convince them all of the benefits the programme would bring? I quickly concluded that they all shared an interest in having the marine resources of the whole region well managed and, where possible, exploited rationally at optimum levels. It had been established since about 1973 that skipjack likely represented the biggest living marine resource, one for which regional cooperation in the management of was most obvious. The Law of the Sea was just emerging as a topic for discussion between countries. Considerations of how it could be implemented were very preliminary, though they had already brought skipjack fisheries very much to the fore for many Pacific countries and territories. My strategy would be to ensure that all potential donors were fully aware of the benefits to Pacific Island states that would flow from the skipjack research I was

proposing. These benefits would include having sufficient knowledge of skipjack stocks to be able to manage the rapidly expanding fishery with confidence. If total catches were to be increased to optimum levels, cooperation from all countries involved, including coastal states and distant-water fishing nations, would be required. It would be impossible to get adequate cooperation if the status of the resource and its response to increased fishing pressure were not known with adequate precision. I was already aware that greatly increased catches were likely, and if these increases materialised and could be proven by science to be sustainable, the financial benefits to Pacific Island states would be unprecedented.

My initial approach was to contact the most senior government fisheries and/or aid representative that I knew in each country and try to persuade them to open a door for me to get an appointment with the most influential aid or foreign affairs person(s). This approach was largely successful. Australia and New Zealand were straightforward because of the presence of effective consuls general in Noumea. I also knew the senior fisheries people in both countries reasonably well. Being in a French territory made the France connection straightforward. Japan was less of a problem than I had feared. My contacts in the Japan Fisheries Agency and the Far Seas Fisheries Research Laboratory in Shimizu, which I had established while in Papua New Guinea, proved to be extremely valuable. I did not have such good contacts in the United Kingdom, and this did make it considerably more difficult to get to the right people, but with time, I got there. In the United States, I had a powerful contact in Jim Joseph. As the director of the IATTC, he was in the perfect position to help, and he was very willing and capable.

The numerous South Pacific Forum regional meetings on the Law of the Sea represented the perfect platform for me to interact with the right people from both the countries and territories of the region and the possible donors. My impact on donors was greatly aided by the fact that, at the invitation of the Forum Secretariat of the South Pacific Bureau for Economic Co-operation (SPEC), I wrote the foundation documents for discussions at these meetings on what the Law of the Sea could mean for fisheries development in the South Pacific (in particular, Kearney [1976, 1977]; see Chapter 8). There can be little doubt that these two papers and the prominence of my role at these meetings had a huge impact on the donors' perception of my understanding of the major issues impacting tuna research and management and my ability to run the proposed programme.

By the beginning of 1976, my list of possible/probable donors was restricted to those listed previously. I had received a definitive refusal from Canada and a 'not now, but come back in a few years' response from the European Union. The United Nations Development Program (UNDP) was vague in its response, but one key staff member indicated that support was most unlikely; he felt that they were already overcommitted. I felt that contributing to other agencies or commissions was not UNDP's preferred way of doing business. They appeared to favour direct dealings with individual countries.

Discussions I had had with each of the likely donor governments on how much money I was requesting began by pointing out that I anticipated a budget of around a million dollars a year for the first three years and then approximately half this amount for one or two more years. There was a lot of uncertainty in the dollar estimates because of rapid changes in the relative value of the Australian and American dollars, which were the two currencies most used or discussed in the region. At the time of the first estimate of the budget for the programme, the Australian dollar (the currency used in SPC budgets) was worth 1.3 US dollars; however, this ratio was changing quickly: it had been 1.5 a little more than a year earlier. To provide some perspective on the relative value of money in the 1970s and today, I recall that in my first visit to Tokyo in 1973, as part of a Papua New Guinea delegation to discuss cooperative skipjack research, I stayed in the Okura Hotel, one of Japan's finest, for AU$22 per night. In February 2025, the cost of a Simple Plan Room–only at the Okura for one night was quoted online as US$1,195.48 – more than 50 times the 1973 price.

As there were six likely donor countries, AU$1 million split evenly six ways would be AU$166,000 each or approximately US$200,000 per year at the exchange rate of 1.3 at the time I first made the request. I tried to maintain discussions around the figure of US$200,000 each per year with every potential donor, but several countries insisted on keeping negotiations in their own currency. This made allowances for exchange rates a little more problematic, for me at least. Further uncertainty resulted from the lack of a definite quote for the cost of chartering a suitable vessel – the major item of expenditure for the programme. There was always the possibility that if I were unable to secure the total of approximately $1 million (in either currency), I would have to reduce the number of months for which the vessel was chartered; nine months per year was the initial predicted minimum requirement, but I felt that 10 months would be much better.

I was uncertain if lesser amounts of time tagging skipjack would result in sufficient releases across the whole study area and enough subsequent recaptures to make the whole experiment viable.

My early discussions with potential donors revealed several generic problems:

A. I was considered by some donors to be too young and inexperienced to run a research program of this magnitude. The Japanese company with which I later negotiated the vessel charter arrangements had a particular problem with this issue (see Chapter 13). I felt that the United Kingdom also had a significant problem with this, but their representatives were too diplomatic to raise it directly with me (see discussion of the UK in the following).
B. I did not have an established research team behind me, and in addition to the immediate problem of not having a 'team approach' to the project, the SPC's lack of recognised scientific standing was thought likely to make it difficult to recruit scientists of sufficient calibre, particularly the ones necessary to do the analyses of the tag release and recapture results.
C. Nobody had ever used tagging to determine the size of a population of tuna; therefore, new analytical models and analytical techniques would need to be developed and then successfully proven and applied to the data we would collect. What proof was there that the analyses and models that were developed would work?
D. The scope of the experiment was enormous; the area of the SPC alone was 30 million square kilometres, and this did not include all the area of the resource: 50 million square kilometres was a more likely figure.
E. The assurances I gave to donors that the design of the whole programme was sound were largely dependent upon my opinion, which was itself derived from my four years of skipjack research in Papua New Guinea. Nobody had ever done anything at all like the big program I was now proposing.

The progress I made with the likely donors in the first 10 or so months is detailed in the following pages.

Australia

As an Australian with a background in fisheries and science, I believed that I was in a strong position to at least know which were the relevant Australian agencies and who the key individuals were for me to discuss possible funding with. Australian consuls general to New Caledonia, particularly Bill Fisher, proved to be excellent conduits to the relevant government agencies and people. Bill, in particular, was very supportive of the programme.

I was aware of strong support on the research side from CSIRO, particularly their tuna researchers, Kevin Williams and Dr Garth Murphy. They could be relied on to support the utility of research for fisheries management purposes and the use of tagging as the primary research tool for Pacific skipjack. On the negative side, Australia did not have a meaningful skipjack fishery, and even its long-line tuna fishery was a relatively small-scale domestic operation. More worrying for me was that Australia's representatives at regional fisheries and Law of the Sea meetings were not normally from CSIRO and often did not display a great deal of interest in, or knowledge of, the fisheries aspirations of Pacific Island states (see Chapter 16). They had shown little leadership in debates on the key subjects. In fact, several of the technical representatives on the Australian delegations to regional fisheries meetings had been notably unimpressive. Australia's diplomats were, as expected, much better informed.

The extremely positive side to Australia's attitude was that they stated publicly that they would support proposals with the strongest island-state backing. This they did, and in the case of the Skipjack Programme, they did so considerably more generously than the other donors. By the conclusion of the Skipjack Programme, Australia had contributed US$996,331. The second highest was Japan, with US$726,333.

Despite Australia's generous intent, it was not prepared to 'lead the charge' and be the first to sign their commitment. But I had little doubt that if other donors supported the programme, so would Australia. The Australian representatives also hinted, rather strongly, that they may be able to be talked into contributing more than the $200,000 per year that was currently on the table for discussion. They clearly thought that the programme was a really good idea. One of the AusAID (Australian Agency for International Development) officials actually told me that the strength of the unanimous

and strong support from the region's fisheries officers was impressive and had had a big impact on donors. Several of the fisheries officers actively lobbied Australian government officials in support of funding for the programme.

France

The French were well aware that the SPC was continuing to lose favour with Pacific Island nations. The South Pacific Forum was taking control of the debate on most key regional issues, even recently including fisheries. France was also very much aware that it continued to upset many Pacific Island nations with its nuclear testing in the region, particularly at Mururoa Atoll. France very much wanted the Skipjack Programme to go ahead, basically because it would be based in Noumea, which would help combat the weakening status of the commission in the region. But France did not wish to be seen as driving the programme. They were consistent in voicing their strong support to me, but not publicly. France would not be the first to contribute. They would much prefer to be seen as supporting what Pacific Islanders wanted, not telling them what they needed. Another major multinational program based in New Caledonia would likely help stop the decline in the popularity of the SPC.

Aotearoa New Zealand

New Zealand was the most upfront and vocal in support. They had done their homework and fully understood the key linkages between quality research, fisheries management, the Law of the Sea and the need for a broad-membership regional fisheries agency. Their fisheries people were on top of the issues, and their diplomats appeared particularly empathetic with the aspirations of Pacific Islanders. The New Zealand director of fisheries research, Duncan Waugh, was tremendously helpful to me professionally and as a friend. The New Zealand consuls general in Noumea were wonderfully supportive, particularly Dr Dick Grant.

New Zealand had one problem with contributing: the New Zealand dollar was not an international legal tender at the time. They would likely have to make their contribution in US dollars.

United Kingdom

British interest and influence in the region appeared to be waning – not the best time to be asking them to increase their financial contribution to regional projects. From their performances at meetings, I had formed the impression that they were interested in the concept of the Skipjack Programme, but they had reservations. They gave the impression of not wanting to become involved in fisheries management in the South Pacific. Perhaps they had had enough of their own international fisheries problems with the European Union in the North Atlantic?

My first visit to London to discuss the programme in person with their aid people was illuminating.

To my pleasant surprise, the two relatively young men assigned to talk to me had done their homework. But what was not so encouraging was that they had strong technical or scientific problems with the experimental design of several key components of the programme. The biggest immediate problem for me was that their concerns largely had at least some legitimate basis; they raised some of exact same doubts that I had had when I was first putting together the proposal for the programme.

They did not state it directly; they were too diplomatic for that, but they clearly had a problem with the fact that I was only 30 years old and had never been involved in a project anywhere near as big as this one, let alone run one. And I did not have a research team behind me. That there had never been an independently funded international fisheries research project as big as this one anywhere in the world did not help.

The fact that the Skipjack Programme funding was to be totally independent of the SPC regular budget meant that the Programme could be considered 'parentless'. They also felt that my arguments in support of the programme were inordinately dependent on my opinion that it would work. They were not aware that I had run a skipjack tagging program in Papua New Guinea based on the same principles, although on a smaller scale. When I gave them details of this, it definitely helped, but it did not make me any older. The strong support for the programme expressed by Pacific Island leaders at the South Pacific Forum meetings on the Law of the Sea had had a very positive impact, but the scientific and technical aspects of the programme had not been discussed in any detail.

They remained concerned about the magnitude of the proposal. The tagging program itself was enormous in both geographic distribution and in the number of fish it was proposed would be tagged. And, of course, the cost. Nothing on this scale had ever been done anywhere in the world. The area to be covered – 30 million square kilometres in the SPC area alone – was so great that they found it hard to believe it could all be adequately covered in three years. They were not convinced that tag releases and recoveries would be spread sufficiently uniformly to enable accurate determination of the skipjack population size and the biological parameters, such as growth and mortality, that would be necessary to guide the fisheries management decisions that were anticipated. They were particularly apprehensive that the programme design may not have been adequately reviewed, and no 'steering committee' was included to help compensate for their perception of my lack of experience.

I was able to allay many of their fears, but not their concern that there had been an inadequate review of the basic design of the tagging experiment. I believed that they particularly needed scholarly opinions from scientists they knew and respected, and that the number and distribution of tags over the huge study area were going to be adequate to achieve the results I was telling them they could anticipate.

I acknowledged that there were some unknowns, and, yes, the adequacy of the distribution of tags was an issue that needed to be managed. After all, the programme was research; it was an experiment. I could not counter their concerns over the scale of the programme. No fisheries research project had ever operated over such a huge area, and tagging had never been used to determine the size of a tuna population. It was true that nothing like this had ever been done. Addressing issues on which there is a great need for knowledge that is currently not available is what science is about. I stressed that reviewers of the science of the design had included staff of the IATTC, the world's premier tuna research institution, Australia's CSIRO and the US National Marine Fisheries Service. Local and regional fisheries expertise had been provided by the Expert Committee on Tropical Skipjack and numerous Regional Technical Meetings on Fisheries. But they were still not impressed. They were not convinced that the members of the Expert Committee on Tropical Skipjack had enough experience with skipjack research to inspire confidence. I was, as far as they could tell, the only member who had ever tagged a tuna of any sort. They felt that most of the members would struggle to demonstrate true international-level expertise in skipjack research.

I left the meeting with a deep sense of dread. It was one thing for one of the potential donors not to be supportive, but it was a totally different thing when the reason for that lack of support was an unacceptable experimental design of the backbone of the whole programme. If this concern were made public, other donors may well review their commitments. I had to convince these guys, and quickly.

I was on the way home on the plane when the lightbulb revelation occurred. It appeared that they were not accepting the reviews of the programme I had listed because none of the reviewers was known to them. They could not validate that adequate scientific excellence had been brought to bear on the programme's design. I had made a significant mistake in listing only the reviewers of the scientific design who had experience with skipjack fisheries, and they were predominantly Americans whom the British did not know. There were no skipjack fisheries in Britain. Why did I not think of the solution in the interview? I had this problem completely covered, but had missed my opportunity. Reviewers of the project proposal had, in addition to the Americans I had mentioned, included two of the world's most widely known and respected fisheries population dynamacists, Dr John Gulland and Dr Sidney Holt. Most importantly, they were both British.

At the end of 1974, I had gone to the Food and Agriculture Organization of the United Nations (FAO) in Rome on a consultancy basis to rewrite my original programme proposal with Dr Gulland's and Dr Holt's guidance. This revised proposal, with increased explanation of the analytical processes to be employed, was published by FAO under my name as an FAO consultant (Kearney 1975). It was presented to the joint meeting in Mombasa, Kenya, of the Indo-Pacific Fisheries Council (IPFC) and the Indian Ocean Fishery Commission, where it was strongly supported. Both Dr Gulland and I attended that meeting and spoke to my paper.

The more specific concern, over the spread of tags, was now much easier to counter than it had been at the time the original programme proposal was written. At that time, I had serious apprehension over this issue myself. The area for research was huge, and there was no way the fishing, and hence the tagging, could be equally successful in every part of this area. However, tag returns from the skipjack tagging project I had run in Papua New Guinea continued to be accumulated, and now that the fish had been at liberty for almost two years longer, it was increasingly obvious that they were moving much greater distances and were mixing much more than I had originally had any evidence to confirm. Most skipjack were not migrating in

predetermined patterns; they were, however, moving great distances and in practically every direction. The total population was mixing much more than the science available prior to the tagging we did in Papua New Guinea suggested. That research in Papua New Guinea was already changing the world's knowledge of skipjack. The need to release tagged fish in precisely the same numbers in all parts of the study area was no longer the issue it had been. But only scientists with access to the latest skipjack tagging results from Papua New Guinea would be aware of this.

I was back in London in, I think, not much more than two weeks with written responses to each of their concerns, except my age; I hadn't had a birthday in the time I was away. The information I gave them included a copy of the FAO version of my proposal that Gulland and I had spoken to in Mombasa. I also gave them a copy of the draft of my paper 'The Law of the Sea and Regional Fisheries Policy' (Kearney 1977b), which described the relationship between research and the possible creation of a regional fisheries agency.

I was also able to assure them that once sufficient funding for the programme was confirmed, a steering committee would be formed with representatives from all donors. The primary task of this committee would be financial oversight of the programme, but suggestions on the science and technical management of the programme would be welcome.

I had little doubt that the formal involvement of Drs Gulland and Holt in the latest version of the programme proposal carried the day. From then on, support from the United Kingdom was not questioned. They confirmed that they would contribute if other countries did, but they made it quite clear that they would not be the first to sign.

The United States of America

US interest in the Skipjack Programme differed from that shown by other 'colonial powers' in the SPC in several major ways, but primarily because the United States is a distant-water fishing nation in the South Pacific. It is a major player in the purse seine skipjack fishery. It is also a member of the IATTC and, as such, has had a long association with major tuna research and management programs. Dr Jim Joseph, an American and the director of the IATTC, was now a close friend of mine and had effectively been my mentor for the past year or more. He was a very strong supporter of the programme

and was actively lobbying the US government on my behalf. His contacts in the government were very good; as the director of the IATTC, they were required to be. He advised me that his lobbying for the programme had been greatly helped by Harold Carey, a particularly important supporter in government circles. I only met Harold on one brief occasion, but Jim was in regular contact with him: I believe he had been the US representative on the board of the IATTC for some time.

The US tuna industry was also strongly supporting the programme. From their experience with the IATTC, they knew the role that research would play in future resource allocation and the pricing of access to the resource for distant-water fishing nations. They definitely did not want the programme to go ahead without US participation. The strength of the interest of the United States in fisheries management in the SPC area was exemplified by the size of the US delegation at the relevant meetings: there were 39 US representatives at the second meeting on the Law of the Sea in Suva. I was extremely confident of US support, and I held hopes that I might be able to persuade them to catalyse the actions of others by being the first to confirm their contribution.

Japan

The only country on my list of likely contributors that was not a member of the SPC. Japan had also never made a significant financial contribution to an international organisation of which it was not a member. Getting Japan to commit, therefore, posed some interesting challenges. As the biggest catcher of skipjack in the study area, Japanese involvement in the programme was highly desirable; access to data on the catches by the Japanese fleet and their active contribution to the recovery of tags were going to be essential. I had an even stronger personal interest in Japan being involved; as far as I could see, a commercial Japanese skipjack pole and line boat appeared to be the best option for our chartered research vessel. Japanese government involvement in the charter process would facilitate cooperation with the company that owned that vessel and ensure that, should anything go wrong with that vessel or some aspect of the charter agreement, one of the members of the funding group, Japan, would take particular interest. My experiences with the poor mechanical condition of the FRV *Tagula*, in Papua New Guinea, were very much to the fore when considering a charter agreement and the management of the vessel and its crew.

I was confident that Japan wanted to be part of the programme; Japanese fisheries scientists were extremely strong supporters. But Japan was not going to be the first to sign up. The other five likely donors were all members of the SPC, so Japan did not believe it was appropriate that they should lead the move to fund the programme.

The concerns of several donors, most obviously the United Kingdom, that assurances of the success of the programme were almost totally dependent on my opinion did resonate with me. I felt strongly that I needed to do something serious to correct what was clearly an issue for some donors. I decided to seek Jim Joseph's help to convene a meeting of internationally recognised skipjack fisheries experts to ensure that the goals and design of the programme were clearly aligned with the best options for skipjack research – and were clearly seen to be so. Jim's help was, as usual, effective.

I was able to convene the 'Ad Hoc Meeting of Scientists to Discuss Skipjack Fisheries Developments and Research Requirements' in Noumea from December 5 to 10, 1976. The attendees at this meeting and their countries or organisations were (in alphabetical order) M. A Fonteneau, France; Dr R. C. Francis, New Zealand; Professor K. Fujino, Japan; Dr J. A. Gulland, FAO; Dr J. Joseph, IATTC; Dr R. E. Kearney, SPC; Dr J-C Le Guen, ORSTOM; Mr A. D. Lewis, Papua New Guinea; Dr G. D. Sharp, IATTC; Mr R. S. Shomura, NMFS USA; and Dr S. Ueyanagi, Japan.

There is little doubt that this group more than adequately represented the world's expertise in skipjack research at the time.

After reviewing the state of skipjack research worldwide and a detailed discussion of the Skipjack Survey and Assessment Programme, the summary recommendations from this meeting were:

A. High priority should be given to the proposed Skipjack Survey and Assessment (tagging) Programme being coordinated by the South Pacific Commission (see Recommendation No. 2).

B. Arrangements should be made for coordinating skipjack research encompassing all countries with an interest in fisheries in the region. For the immediate future, pending more permanent arrangements, this could be done through a working party sponsored jointly by SPC and IPFC.

> C. This working party should give early attention to the collection and compilation, on a regional basis, of catch and effort statistics, and of such environmental data as are likely to assist in the interpretation and analysis of the statistical data.

Recommendation No. 2 stated:

> In order to further investigate the stock structure of skipjack in the Pacific a large-scale tagging effort should be undertaken with substantial sampling effort being undertaken in areas where, at present, no skipjack fisheries exist. This Ad Hoc group of skipjack scientists therefore recommends that the tagging programme being coordinated by the South Pacific Commission be implemented as soon as possible.

The assertion that the programme, as I had designed it, was the best way to address the lack of knowledge on Pacific skipjack was no longer dependent disproportionately on my opinion. In fact, I doubt that any tuna research project has ever had a more powerful international review committee than this one. I thank the scientists from the United Kingdom for their insistence, discussed previously.

8

Increased emphasis on the Law of the Sea

While trying to raise funding for the programme had remained my primary focus over the previous six months, I had been spending an increasing amount of time on Law of the Sea issues and their implications for Pacific Island states. I began my research on this issue in the last two years of my involvement with the Papua New Guinea tuna program (see Chapter 1). It was inevitable that some big changes were coming. I had little doubt that these changes would result in greater emphasis on tuna fisheries assessment and, therefore, the requirement for better science.

It is very easy to forget just how different the Pacific was in the 1970s. Many people today have little or no knowledge of the major political changes that took place in the region between 1970 and 1980, and how quickly it was changing. During that short time span, no less than seven South Pacific states – 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, towards the end of the 1970s, most 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 the use of the region's fisheries and other oceanic resources. (The preceding two paragraphs were taken largely from Judd [2016].)

Most of these meetings were under the auspices of the South Pacific Forum at the headquarters of their secretariat (South Pacific Bureau for Economic Co-operation [SPEC]) in Suva, Fiji. I was to play a major role in most of them, particularly the early ones, which set the objectives for regional initiatives and established the guidelines for how regional cooperation could best be nurtured. These meetings, and the documents I wrote for them, were hugely important for my efforts to raise the money for the Skipjack Programme.

Even though the subject matter was of vital interest to all countries and territories, it was the South Pacific Forum, with membership of approximately half of the countries and territories, that took the running on organising these meetings. The SPC, as an institution, played no formal part in the influential discussions on the Law of the Sea or regional fisheries policy.

At the request of Mahe Tupouniua, the secretary of SPEC and a former senior minister in the Tongan government, I wrote the foundation policy discussion document for the first meetings of Pacific Island leaders on how to progress regional approaches to the Law of the Sea. I believe that Mahe's invitation was a result of him having heard the presentation I gave on this subject at the Regional Technical Meeting on Fisheries in Tonga in 1974. The title of this first paper was 'A Regional Approach to Fisheries Management in the South Pacific Commission Area' (Kearney 1976). It was published initially by the SPC and subsequently republished by invitation and unedited in the *San Diego International Law Journal*. The title alone highlighted the dichotomy between consideration of events over the whole of the area of the SPC and having the meeting convened by the South Pacific Forum, which had a lesser membership than the SPC and thus did not cover the whole area. Several non-Forum member countries had representatives at these meetings. A few non-Forum member countries, such as the United States and France, had very large delegations.

The paper I wrote for the first meeting in Suva was a rather brief introduction to the key issues that I believed Pacific leaders needed to address as they moved towards agreement on a Law of the Sea strategy. These items were identified as:

1. The need for cooperation.
2. The fisheries resources and the importance of each.
3. The impact of a regional management approach on the surveillance of foreign vessels.
4. Possible adverse effects of the failure to adequately manage the tuna resources.
5. *The possible structure and role of a regional fisheries management body* [emphasis added].

The first document may have been relatively short, but it had a considerable impact. One consequence was that I was invited to prepare a second major document, which was a far more detailed dissertation on these same issues, for a meeting approximately six months later. Its title, 'The Law of the Sea and Regional Fisheries Policy: The Impact of Extended Jurisdiction on Fisheries Management in the Central and Western Tropical Pacific Ocean and the Need for a Regional Fisheries Agency' (Kearney 1977b), confirmed the increase in the priority commanded by the Law of the Sea. It was also republished (unedited) by the *Ocean Development and International Law Journal*. The paper highlighted the progression of the debate from the possible role of a regional fisheries management body to the need for one. I wrote several smaller articles for these meetings, including one with Fred Popper, and several in response to questions raised at the meetings, including one rather brief one with Sidney Holt. The fact that both of my two major papers were republished, unedited, in international law journals had a big impact on the potential donor governments. The French acknowledged the importance of both papers by arranging for a particularly scholarly translator, Louis Devambez, to translate both for publication in French through the SPC. A few weeks later, Louis came to my office to tell me what a privilege and pleasure it had been for him to translate documents that were well researched and written and were having such an impact on the whole Pacific region. He advised that they were definitely having an impact on the French attitude to my work and were therefore likely to influence the French attitude to funding the Skipjack Programme. The content and intent of this second paper were prominent in the draft convention to establish a South Pacific regional fisheries organisation, which was debated at the Ninth South Pacific Forum meeting in Alofi, Niue, in September 1978.

Both meetings for which these papers were written were well attended by extremely high-level representatives of the many governments: approximately half the representatives of Pacific Island states were heads of government.

Many of the rest were the relevant ministers of foreign affairs. The former 'colonial powers' – Australia, France, New Zealand, the United Kingdom and the United States of America – were also well represented: Australia and New Zealand were Forum members. At the second meeting, the US delegation numbered 39, whereas the French had 17. Fiji was the only island state with a sizable delegation; they had seven, led by Winston Thompson, who, from memory, was either the minister or the secretary for foreign affairs at the time. Presumably, being the host nation made travel costs less restrictive for Fiji. Several island states had a delegation of a single person, but in most cases, it was the prime minister, or equivalent, such as the president of Nauru.

These meetings afforded me the opportunity, as the author of the primary discussion documents, to stress the importance of research on key resources, such as skipjack and other tunas, and the need to have the management of the waters of all countries and territories in the total area of concern (the area of the SPC) covered by common policies. It also allowed me to convince possible funders of the vital role of the proposed Skipjack Programme in future developments in the region as a whole. Of course, it also allowed potential donors to assess whether I, as the proponent and presumed leader of this programme, had the appropriate knowledge and skill to carry the day. In effect, each day of the meetings was, for me, an eight-hour job interview, with a very large selection panel. Then there were the opportunities afforded by after-hours meetings and discussions. There were lots of these. I remember two at the second meeting particularly well.

The first of these informal meetings occurred as the formal meeting was breaking at the end of the first day. The leader of the US delegation (I think it was Bill Bode, who was later to become the US ambassador to the Pacific and to play a very prominent role as the informal chairman of the committee of donors that was formed to oversee the Skipjack Programme) approached me and asked if we could have a confidential chat, and perhaps a quiet drink. The lounge at the Grand Pacific Hotel was the obvious place.

Mr Bode opened by stating that he thought the performance of his delegation, particularly the young State Department lawyer who was their spokesperson, had been excellent. But despite this, in his words, 'We were not getting traction'. He felt that many of the Pacific Island delegations actually 'switched off' when the US representative spoke. What did I think?

My response was to be in complete agreement. This response by Pacific Island leaders had been obvious. The US lawyer had given a virtually word-perfect dissertation on the legal aspects of each subject he addressed. He really had done his homework, and his presentation was noteworthy. Had he been addressing a United Nations budget committee meeting in New York, it would have been perfect. But the audience he was addressing here was not similarly experienced nor intentioned. Papua New Guinea had brought a very senior lawyer (Geoffrey Dab, the government's most senior lawyer) to the meeting, but as far as I could tell, the other island states had not. Plus, they were all dealing with what were huge issues for small island countries, and they had little, if any, experience with them. They wanted to have free and open discussions as equals, not be lectured to by the former colonial powers.

Many of the issues were completely new to most delegates. They had little information on the subject matter, except for what was in my papers. But perhaps most importantly, this was the first time for them to be in what was in effect a 'negotiation' with powerful countries, like the United States. They had come to these meetings with the impression that they were, perhaps for the first time ever, equals. For a change, they were not asking for aid or favours. They were not on bended knee. These were their waters, as were the resources that were being discussed. It would be nice if they were asked about issues and what they thought, not lectured about the legal implications of alternatives, that they could assume would be biased towards the outcomes preferred by the United States: not only a colonial power but also a distant-water fishing nation.

I suggested to Mr Bode that one thing they might try is for their spokesperson to be a little less definitive, and perhaps less obviously confident that he knew the way every issue should be resolved. Rather than espousing the only way forward, he might suggest, perhaps even with some trepidation, possible approaches that island states might like to consider. Even showing a little uncertainty, perhaps even an occasional grammatical error on his part, might make him appear more empathetic – or at least more human. Then there was the issue of the size of their delegation, particularly when compared to those of the island states. Americans dominated the space, even at coffee breaks.

We had a rather in-depth discussion around these issues. We were in agreement.

The second memorable meeting occurred after Winston Thompson approached me at the afternoon coffee break on day two, I think, and asked if he and some selected Pacific Island leaders could have a meeting with me at 6 pm that evening. Of course, I agreed. Winston did not need to tell me what it was going to be about: whatever it was, I would be there. Those present included four prime ministers (Kiribati and Tuvalu, almost for certain, and I think Tonga and Samoa), Winston and myself. Winston ran the meeting. As usual, he spoke with authority and conviction. I had always found him impressive.

I was not ready for what they wanted of me. I was almost immediately made somewhat uncomfortable. They requested me to take back to the secretary general of the SPC, Macu Salato, the message that they were very unhappy with his commission. In their opinion, it was continuing to primarily be a service institution for the colonial powers and not a forum for the development of the aspirations of Pacific Island countries and territories. This sentiment did not surprise me: I had heard that the prime minister of Fiji, Ratu Sir Kamisese Mara, the revered elder statesman of the region, had actually told the secretary general that the commission was quickly becoming 'a colonial anachronism'.

Winston and his colleagues then used these Law of the Sea meetings as examples of why they were concerned. The Law of the Sea and the future management of marine resources were extremely important to all Pacific Island states. As leaders of these states, they had found my supposition that the area under discussion needed to be the whole of the area of the SPC with all its members to be logical, perhaps even compelling. They found the information and data I presented on the need for quality scientific research easy to understand and convincing. They had no doubt where I was coming from and what I was proposing. They knew what I was trying to do with the Skipjack Programme, and their fisheries officers had already unanimously, strongly, supported it, as they did themselves. They all wanted to be part of it. Most importantly, they accepted my fundamental position that the research and management of fisheries resources would best be done with the involvement of all stakeholders. Therefore, there was likely a prominent role for the SPC in future negotiations.

But the SPC was not formally involved. Winston and his colleagues knew that I was an independently funded consultant to the SPC, not a regular staff member. I was not even funded from the SPC core budget (I was a little surprised they knew that). I had been invited to these meetings because of

my knowledge and expertise on technical and scientific issues, not to present the official position of the SPC. Where was the SPC Executive when it was needed? Who was going to explain what the SPC was going to do to help Pacific Island states further the agreements that would come from these and presumably future fisheries meetings? If they were not going to help at this critical stage of a major issue that was clearly of great interest to all Pacific Island countries and territories, what could island states expect them to help with? Why did they not take advantage of my superior understanding of the issues being discussed to explain how the commission could contribute?

I repeated my apprehension at presenting the feelings of this august group to another very senior Pacific statesman. I expressed my surprise that they felt I could do it better than they. I specifically asked Winston why he, as a Fijian, or the others present, as heads of Pacific Island states, felt that I was more likely to get the message across to another Fijian, Macu Salato, and one far more senior than I. Winston's answer was simple: 'He does not hear what we say. But we understand he listens to you'. I found Winston's skilful differentiation between the words 'hear' and 'listen' powerful. Flattering though Winston's statement was, I found it difficult to believe. I had enjoyed numerous chats with the secretary general, and I liked him and felt we had a good relationship. But our discussions were, indeed, chats. I had had very few in-depth discussions with him and none on major issues of policy.

But they were unmoved by my protestations. I concluded that even if they were wrong, and I would not have much influence with the secretary general, they were such senior Pacific leaders that I could not deny their request.

Upon my return to Noumea, I sought a meeting with the secretary general at his earliest convenience. The next afternoon, we spoke in his office. The subject was delicate: I tried to be. He was very gracious and thanked me for being the reluctant messenger. He understood my apprehension.

He was aware of the problem and would speak to each of the gentlemen at the earliest opportunity. We concluded with a brief discussion of my opinion of the outcomes of the Law of the Sea meetings. I stressed that the meetings had progressed to the point that the communique from this most recent meeting included agreement to work towards the creation of a new regional fisheries body. I suggested to him that if this did occur, it could have major implications for the SPC, certainly at least for its fisheries programs. He did not seem worried and was genuinely pleased that I was happy with the progress that had been made at the meetings and that I believed my

involvement had furthered the cause of funding the Skipjack Programme and the involvement of the SPC in Law of the Sea discussions, should the executive choose to be involved. I came away thinking that though the meeting had been difficult for me, it had strengthened my relationship with the secretary general. He gave me the impression he was impressed by the responsibility Pacific Island leaders had bestowed on me.

Another issue involving my interactions with the United States and the Law of the Sea arose on the final day of the second meeting, discussed previously. There had been considerable discussion of how surveillance of licensed and unlicensed vessels might be carried out and paid for. This was described in my background papers and confirmed in the meeting's communique to be one of the major issues that cooperative, regional management would have to address successfully.

A workable system of having transmitters (transponders) on licensed vessels with associated satellite-facilitated reporting on each had been established in the eastern Pacific tuna fishery; some detail was given in my background paper (Kearney 1977b). Discussion of the possibility of having satellite surveillance methodology for detecting unlicensed vessels, which obviously would not have transponders, in the total management area under consideration in the southwestern Pacific also occurred. It was quickly accepted that these were technical issues about which the island states knew extremely little. The United States was clearly the country with by far the greatest knowledge. The US delegation to this meeting had not anticipated this discussion and did not include people who could answer the relevant questions. After a brief break in the meeting, I was asked by a subcommittee that included one of the US State Department representatives if I, as one of the most appropriately experienced scientists in the region, would be prepared to go to the United States and discuss the issues, including likely costs, with the relevant authorities, which it was assumed would include the US military.

I advised that I was scheduled to go to the United States in the next few weeks to discuss possible funding for the Skipjack Programme, and provided the arrangements for the necessary meetings to discuss surveillance issues were made with the full support of the office of the US ambassador for the Pacific, I would be honoured to do so.

That I might be accepting responsibility that was way above my pay grade was to the fore in my thinking, but this was, after all, only a fact-finding mission. I had been dealing with governments, including that of

the United States, for some time on a one-on-one basis in my attempts to get commitments to fund the Skipjack Programme. This was effectively just more of the same. Furthermore, taking on such responsibility would increase my communication with US authorities who could well influence the decision on funding for the Skipjack Programme. It would also unquestionably demonstrate the confidence Pacific leaders had in my ability, and I would politely make sure all potential donors to the Skipjack Programme were aware of this. All but one of them, Japan, were represented at this meeting anyway.

These Forum-sponsored meetings in Suva were particularly effective in furthering the cause of the creation of the broadly based fisheries body I had been championing for at least a year or two and had detailed in my discussion documents. They led to the creation of a draft convention for such a body (see Chapter 16). The impact of my documents on that draft convention was obvious. I left the last meeting feeling very confident that a new, broadly based organisation was not far away.

So, it was at about 6 pm on one of the coldest evenings ever recorded in Washington, DC, in pursuit of meaningful discussion on the use of satellite surveillance of fishing vessels that I arrived at the hotel Jim Joseph had recommended. Jim had also highly recommended a restaurant that was only about 100 yards down the street. So, after checking in, I put on my heavy coat, gloves and scarf and set off to the restaurant. As I got to the double air-locked doors of the hotel, a very large man in the hotel's uniform stepped into my path. He very formally asked me why I was clearly intending to go outside. When I told him I was going to the restaurant, the lights of which could be clearly seen from where we stood, he responded: 'I am sorry, Sir, but I cannot let you go outside to do that'. 'Why not' was my somewhat surprised reply. I was not sure what gave him the authority to stop me, but I thought it best not to question it. His answer was 'It is so cold out there [that] you will not be safe. The footpath is covered in black ice, and you may well have a fall which could be nasty'. My immediate thought was that he was just trying to restrict my movements so I would have to stay and have dinner in the hotel's restaurant. Black ice surely cannot be that dangerous? But he was persistent, and eventually I gave in. I had a rather nice meal at the hotel, but I remained a bit annoyed that I had missed out on trying the restaurant Jim Joseph had recommended.

The next morning was possibly even colder than the evening before. I found myself in a taxi on my way to the State Department when, about 100 yards from my destination, the driver completely lost influence on his vehicle as it spun out of control. The black ice on the road was the cause of our discontent. The taxi did a full 360-degree spin before coming to rest facing exactly where we had been headed. The driver was in shock. How we missed the vehicles coming the other way was a mystery, or a miracle. He suggested that it might be better if I walked from where we were. I needed no talking into this suggestion. Black ice is not something we learn how to deal with in the South Pacific, but I did think I had a better chance of surviving it on foot than in a spinning taxi.

Once in the State Department, I was escorted to a large office where one gentleman in full, and obviously very senior, military uniform and three others in civilian suits were waiting. After introductions, I was given an agenda for our discussions planned for the next two days. The man in uniform, who my memory suggests was a general, was obviously the ruling authority. All of them seemed very knowledgeable, and they were forthcoming with information on satellite surveillance based on using transponders on boats. The detail they gave me on how the system works and what the costs were was excellent, but as soon as I asked for information on satellite detection of vessels without transponders – that is, illegal vessels – I was told in no uncertain terms that this could not be done. It was stated categorically that the technology to do such surveillance had not yet been developed to the point that it was usable. This was contrary to the advice, albeit much less authoritative, I had been given by senior people in the US tuna industry.

The second day of the meeting was in a different building, which my memory suggests was the Pentagon, but my American friends now tell me that it was unlikely. Then again, how unlikely would it have been that I would be, wherever I was, discussing the details of satellite surveillance with the US military on my own? Regardless, the morning's exchange was again very courteous, until I once again mentioned the issue of surveillance based solely on satellites. It was again instantly dismissed as being impossible. The preparation I had done for these meetings had given me enough information to make me sceptical of this conclusion: I had been told that several US tuna boats had been apprehended via satellite surveillance for fishing illegally in other countries' waters.

When, a short while later, the general moved to draw the meeting to a close, I thought I would give it one last shot. I said to him words to this effect:

> General, you and your colleagues have been very forthcoming on information on transponders and satellites, and I thank you sincerely for what you have given me. But, with respect Sir, I am having great difficulty accepting that even with what we know of the depth of US satellite technology and the impressive might of the US military, you cannot use satellites to find a boat as large as a modern super-seiner in predetermined parts of the south Pacific Ocean.

His expression changed considerably. He was silent for a good 10 seconds. He then looked across at his colleagues. Their faces were as close to expressionless as a human face could be. If anything, they may have suggested, 'Why look at us? It is up to you, General. You are the defender of our country and the manager of this meeting'. The general then turned to me and said:

> Listen buddy, if there were two bastards out there in a rowboat we could tell you their names. Of course, we have the technology and the skill to find tuna boats in the south Pacific. Your problem is you can't afford it.

I had great difficulty keeping the smile off my face, but it was important that I did, so I managed to. It was my turn. I responded:

> My sincere thanks for your candour, General. And please forgive me for attempting to take advantage of it, but if you could please tell me how much money it is that we cannot afford, I would be able to give a far more meaningful report to Pacific Island leaders.

His response was illuminating. They had obviously done quite a bit of research on our dilemma, including the possibility that we could, in some way, get involved with satellite surveillance of unregistered vessels. They had tried hard to be helpful. He went on to tell me some of what they had concluded.

They had looked at the size of the area in question and run several models of factors such as how many boats were likely to be in the area and what precision in detection was necessary; for example, was it only the presence of boats we were worried about, or was the nationality of each boat, or even its name, necessary? He said they had made assumptions about what detail we would likely need. They had estimated that with the technology they had at the time, we would require three satellite scans a day on three days

a week in areas of greatest interest. Each scan would cost about $90,000. These costs would vary with the level of detail we required, but they were unlikely to come down in the foreseeable future.

Not much arithmetic was required to confirm that, yes, the general was obviously right; we could not afford it. But that knowledge of itself was a great help in focusing future discussions on what type of vessel surveillance the Pacific Island countries would need and could afford. I felt that my mission had been very successful. I could report back with information that was extremely valuable.

9

The donors suggest a novel way to fund the programme

With the gathering of delegates for the 1976 South Pacific Conference, the potential donor governments took the opportunity to have a meeting to see if they could agree on governance procedures for the programme, in the event that agreement could be reached to fund it. I was invited to attend. High on the priority list was how best to deliver the financial support for the programme. They were adamant that they would not put any more money into the SPC. They were openly not happy with the way the SPC was handling its finances, and they took the SPC Executive's insistence that funding for the programme had to be totally independent of the SPC's core budget as confirmation that the SPC Executive did not want the programme to be a core part of the commission's work programme anyway.

I had no problem with this in principle, but I was not quite ready for how they proposed to keep the funding and decision-making for the programme independent of the SPC Executive. The donors had collectively concluded that the best solution was to give the money and the responsibility for its management to me personally.

I was not immediately at all happy with this arrangement. The science side of the programme was what I felt confident with, and I was not an accountant. I reminded them of this. They responded that they would ask the SPC to act as the non-executive accountant. The only authority that accountant would have would be to advise the donors if I was proposing to do something totally untoward with their money. I found this division of responsibility somewhat shallow. After all, the account was to be under my name and signature, so if I decided to move the money to some offshore

haven, the SPC accountant would not find out about it until after the event. Of much more interest to me was that the donors assured me that my responsibility would be to oversee the accounting and make all significant decisions on expenditure, not actually do it all myself.

After some discussion and admission that I did not have a better solution, I agreed to this arrangement. They then asked me to open a bank account in the name of the Skipjack Programme, with me as the sole signatory. They suggested that the Hong Kong and Shanghai Bank might be an appropriate medium.

They also reached an in-principle agreement that in the event of the Programme commencing, the donors would create the Skipjack Programme Administrative and Finance Committee. The membership of this committee would be solely the donors to the programme. Of course, I would be expected to attend and participate in all discussions. An accountant from the SPC would be invited to attend but would be expected not to speak unless specifically invited to do so by either a member of the committee or me as the programme coordinator.

Confirmation of this unique series of events is given by Paul Judd in his article on the history of the Skipjack Programme. He revisited the available historical documentation at the SPC and summarised the donors' arrangements for the management of the programme (Judd 2016):

> Dr Kearney personally conducted all of the negotiations with the potential donor governments, with no official help from the SPC hierarchy. This unusual situation coupled with the extremely strong support from the island nations for the project, and subsequently its obvious success, contributed significantly to the high degree of donor solidarity displayed once the project was up and running, towards both the project and Dr Kearney himself as Programme Co-ordinator.
>
> As the search for funding gained momentum the likely donors agreed that in order to meet the requirement of independence from the SPC core budget that it was not just the budget that needed to be independent from the SPC; the expenditure and accounting processes for the project would best be established as an entity that was totally separate to the rest of SPC's accounts. They committed to the principle that the project would be set up with Dr Kearney as the sole signatory and single authority to commit expenditure. As history shows, the donors maintained their commitment to this principle

> for the whole of first the Skipjack Programme and subsequently the Tuna and Billfish Programme. Both remained totally separate from SPC's accounts until the end of 1986.

I left the Programme in September 1984, up to which time I had enjoyed full authority for both programmes.

> The independence of this management arrangement also made it easier for Japan to contribute as an equal. In addition there was considerable support among both the potential donors and the island nations for maintaining independence for the project in the event that it would be beneficial to move it to a 'Regional Fisheries Organisation'; the creation of which was beginning to be formally discussed at the time under the umbrella of the Law of The Sea negotiations.
>
> (Judd 2016)

A few weeks after this seminal meeting, I was in Tokyo for some preliminary discussions with the Japan Fisheries Agency on the possibilities for a vessel that I could charter, when I had enough money. I was keen to get a reliable estimate of what a suitable vessel might cost. I took the opportunity of being in Tokyo to pay a visit to the Hong Kong and Shanghai Bank, as suggested by the donor governments, should the money be made available.

I simply walked into their bank headquarters off the street and asked the nearest teller, in English, if I could speak to one of their financial planners about opening an account with about a million dollars a year in perhaps as many as four different currencies. He quizzed me for several minutes and then said he would go and ask one of their senior people to come and talk to me. I waited, only about five minutes, and he came back with a very distinguished-looking gentleman, who introduced himself as the managing director of the bank. The more junior staff member had certainly delivered on his promise to get 'somebody senior'. The director asked me just a few simple questions and then invited me to accompany him to his office.

We began a rather formal discussion about what I wanted to do. He kept asking me for details about the Skipjack Programme. I soon realised that he was extremely interested in it – apparently more so than my banking requirements. He found the magnitude of the Programme almost incredible: 30 million square kilometres of ocean, 23 countries and territories involved, six donors from around the world with a variety of currencies, including some of the world's strongest, seed funding from the Rockefeller Foundation, changing rules under the new Law of the Sea, and really it was all about

science for small developing countries. Our discussion became increasingly less formal. I felt that he would have talked about the programme for much longer, but at my request, we finally began to discuss the banking issues.

I explained that I did not yet have the money, but I was very confident that signed commitments would be made within the next couple of months. I wanted to get an account opened so that deposits could be made. He then stated that the amount of money I was likely to have was important, but it was not a huge amount for a bank such as his. However, it was a highly unusual and fascinating opportunity for a banker. And the project behind it was captivating. He asked me if he could think about it overnight. I said, of course and asked if I should come back at this time tomorrow. His reply really did surprise me: 'Would you be available to come to my home tomorrow for lunch, and we can discuss it then?' He gave me a card with his home address, which he assured me was easy for taxi drivers to find.

His house was beautiful. It even had trees in the yard, which is not common for houses in Tokyo. The lunch was simple but wonderful. He confirmed my perception that he was captivated by the concept of the Skipjack Programme and the complexity of the effort to get it up and running. He would love to be the banker for it and see it progress. However, to his regret, he felt obliged to tell me that, for a suite of rather complex reasons that he did not wish to detail, his bank was not the best option for me. He then proceeded to give me some advice that history has proven to be most valuable.

He stressed that the volatility in exchange rates occurring at that time was a serious threat to a pool of money that was in several different currencies. He told me that I should ask all donors to make their contributions in the currency in which the money would be spent: 'If you must spend the money in a currency other than the one in which it was contributed, do the conversion as soon as possible after receipt of the money'. He strongly advised not to get caught up in the search for profits from changes in exchange rates. As he said, if you make money on exchange rates, the donors will say you were lucky, but if you lose money, that was likely your fault; you should not gamble away their money. You should have had your money in the currency you were going to spend it in. You could still make or lose money on changes in exchange rates, but this way you will be more likely to be able to meet commitments and defend the actions you had taken. You could not be expected to do more. He then told me that overnight, he had done some research on my options and concluded that the central branch of the Commonwealth Bank in Sydney was likely the best bet for me.

I found the whole of the discussions over two days not only enjoyable but hugely beneficial. I was not a banker, but banking was quickly becoming part of my duty statement. The donors had effectively made me a banker, whether I wanted to be one or not. I was now a salesman and a banker: perhaps one day soon, I would get to do some fisheries science?

On my way back to Noumea, I stopped in Sydney to go and see the Commonwealth Bank. My reception from the teller when I asked to speak to a senior currency exchange expert to discuss my possible deposit of a million dollars in three or four currencies was in stark contrast to the positive response I had had with the Hong Kong and Shanghai Bank in Tokyo. He immediately said that they did not have any experts free and would not for at least two hours. I walked out, found a public phone and rang my brother, John, who somewhat fortuitously worked in that branch of the Commonwealth Bank at that time. I told him of what I thought had been rather shabby treatment. He asked me to ring him back in about an hour. This I did, to be advised that I should come straight up to the floor the executive branch was on and that somebody would look after me.

Upon my arrival, and to my amazement, there was the managing director with two of his senior staff, one of whom was the head of the currency exchange division. After an apology for my treatment downstairs, and over a cup of tea from the silver service, we discussed my situation. I was told that $1 million a year in multiple currencies over three years at least was definitely of interest to the currency division. I made arrangements to open an account in the name of the Skipjack Programme with me as the account holder, but with one or perhaps two other signatories to be added by me. I said that the account would be active in about two months, when contributions would start to be deposited. My optimism was concealed; there is nothing like confidence when you are talking to bankers. The boss of the currency exchange section then gave me his card with a direct phone number and told me to call him as soon as the first deposit was to be made.

Despite the strong expressions of support for the programme, should it eventuate, and confidence in me to run all aspects of it, by the time Hope and I returned to Noumea at the end of November with our baby daughter, my skills at raising money for my own salary were being severely tested. Trying to raise $1 million a year for a programme that would be of great benefit to more than 20 small Pacific Island countries and territories was one thing; trying to convince donors to give me enough money to support myself and my family, while I waited for the donors to sign a commitment,

was another. The latter was not fun. There was no moral high ground to retire to when you are asking for money for yourself. Phil Helfrich and the International Center for Living Aquatic Resources Management (ICLARM) were fantastically helpful, but ICLARM itself was a new nongovernmental organisation that was trying to raise support for its own existence. Phil was not finding it that easy.

Back in New Caledonia towards the end of 1976, I had several periods of a week or more when I simply did not have money to pay myself. The SPC insisted on me having contracts, and some were as short as a week. I was fairly confident nobody in the SPC actually knew when I was on contract and when I wasn't. There were periods when I simply did not have a contract. The Australian and New Zealand consuls general in Noumea each had very small discretionary funds for emergencies, and each of them came to my aid on at least one occasion. The regional UNDP office also made a small, but extremely welcome, contribution in one of my emergencies. ICLARM continued to provide what could best be called occasional support. I was reasonably confident that some of my 'excess' travel money from the Rockefeller Foundation grant got 'transformed' into salary support, but it was not my business to worry about how ICLARM managed its accounts. I did not need to know. And by this stage in the fundraising, I was not doing a lot of travelling.

But definitive commitments from donors continued to be elusive. Each representative I talked to made most of the right noises, but I still did not have a single signature. And I was tired of begging for money to keep me going.

By the beginning of February 1977, I had reached the point where I thought it was not fair to my family for me to go on doing not much more than waiting: I had a wife and a three-month-old baby and a job that was not paying me. I did not have another job to go back to, and my optimism about getting the Skipjack Programme up and running was being seriously strained. Verbal assurances from different government representatives, such as 'Yes, we think the programme is a great idea, and we are very likely to fund it – please just be patient', were wearing a bit thin. They all said that if I could get the other donors to contribute, they would do likewise. But I was caught in what could perhaps best be described as a 'donor stand-off'.

I had always thought that the New Zealanders were the most enthusiastic in their support and therefore the most likely to 'take the plunge' and sign a commitment. So, in the middle of February, I decided to have one last try. After arranging a couple of meetings with the appropriate officials, I went to Wellington; this really did stretch the budget. I recall that I paid for one airfare out of my personal bank account, and I think this was the one. The airfare from Noumea to Wellington was about the cheapest of any travel I did.

I needed to start my discussions with somebody whom I was confident would lift my spirits, so my first meeting was with Duncan Waugh, the director of fisheries research. Just talking to somebody as supportive as Duncan did wonders for my outlook on life. And it was about to improve even more. When I told him of my concern over my complete lack of job security, his response was wonderfully reassuring. He said:

> [T]hat is one thing I can do something about, and immediately. I promise you that if you fail to get the funding for the Skipjack Programme, I will give you a job. I cannot promise it will be at the level you and I would both like it to be, but it will be a job as a scientist on my staff. I have a position vacant at the moment, and I will keep it open for you for the next six months. By then you should know if you will need it or not. But in the interim, I really want you to keep trying to get the Skipjack Programme funded. We, and the whole region, need you to succeed.

With a rejuvenated sense of optimism and something positive to tell my wife about my future, I had discussions with the relevant New Zealand Agency for International Development (NZAID) and foreign affairs people. The outcomes were not quite as definitive as those from Duncan, but they were still very positive. They were more important for the future of the Skipjack Programme than had been the issue of my job security. The NZAID people said that a tentative agreement to fund the programme had been reached between NZAID and the Department of Foreign Affairs, and the paperwork was now being finalised. It would then need the approval of the relevant minister, but they would be most surprised if that was a problem. However, the process would take a little time: about two months, most likely. If it were to be finalised within two months, I would be delighted. The New Zealanders had been extremely supportive so far, so I had every reason to be confident. I had waited 16 months up to this time, so what was the problem with two more?

The next two months were not very memorable. I kept 'chipping away' at each of my potential donors. My wife, Hope, continued to be unshakably supportive: 'It is now three years since you conceived the idea of this broad-scale tagging project and committed yourself to it. You have come so far; you cannot give in now'. She kept up her fantastic feats of entertaining the representatives of the five SPC member governments who came to Noumea for meetings, particularly the aid agency representatives. The lunches and dinners she put on for them at our house were special. She really did commit to 'mastering the art of French cooking' (Child, Bertholle and Beck 1966). Her Blanquette de Veau in particular was spectacular. She became famous for her desserts; not a huge range, but they were extremely good. As we had a rotating audience, the restricted range was not a problem.

An unusual but important event did occur in this otherwise rather slow time. One morning, about a week after my trip to New Zealand, I had a knock on my door. As usual, it was open, and I looked up to see two young men I had never seen before smiling at me. 'Yes gentlemen, what can I do for you?' One of them stepped forward and said, 'My name is Bob Gillett. I am here to ask you for a job. And this is my friend Wardy, who's travelling with me from California'. When I explained that I did not have any jobs, Bob replied instantly, 'But I understand from Dr James Joseph that you soon will have'. I replied with a request for him to thank Dr Joseph for his confidence, but I was simply not in a position to offer anybody a job. I did not, as yet, even have a secretary or an assistant of any sort. In fact, I did not even have a secure job myself.

I invited them to sit down, at which point Wardy took his leave to let Bob and me have a personal discussion. Gillett then proceeded to tell me what he knew of the Skipjack Programme that made it the most exciting job possibility he had ever heard of. When I asked him what had brought him to New Caledonia, he replied, 'I came to see you'. 'What if I was not here?' I said. Bob replied, 'Dr Joseph thought you would be, and I was prepared to take that chance'. I continued, 'What about your friend, Wardy?' Bob said, 'When I told him I was going to New Caledonia, he just said he had never been there, and that it sounds interesting – do you mind if I come?' (I found out later that 'Wardy' was a part of the Ward component of Montgomery Ward, the famous American department store chain, so cost would not have been a limiting issue for him.)

Bob then proceeded to tell me that he would take any job in the programme, doing anything just to get to be a part of the action. His goal was ultimately to tag skipjack and travel around the central and western Pacific, but in the interim, he would take on any task I prescribed – office work or out on the ocean; anything just to be part of this adventure. His enthusiasm was infectious. It lifted my spirits. Two weeks later, I received a letter from him, just making sure I had his contact details. His letterhead was a hand-painted skipjack. This guy's enthusiasm was infectious. I loved it.

10

Serious things begin to happen

I had been counting down the days to the two months the New Zealanders had said they would need to get the necessary approvals to give me some money. So, as soon as the calendar clicked over, I took the option that I thought would be the most polite way of saying to them, 'Well, fellas, what's happening?' by phoning their consul general in Noumea. He was well aware of my anxiety. He said he would call Wellington immediately and get back to me, hopefully in a day or two.

Later that afternoon, he called: 'Approval to contribute US$120,000 per year for the first three years has been signed. You will receive written confirmation in the next few days'. The impact of this contribution was monumental on me in the first instance, but I was certain it would also have an impact on the other donors. While the amount may have been less than ideal, its value was immense.

A year and a half of apprehension had been worth it, judging by how elated I felt. I quickly called Hope and asked her to put a bottle of Champagne in the fridge. I then called Duncan Waugh to thank him. He sounded almost as pleased as I was. It was too late to call Jim Joseph in his office, but not too late to call him at home, which I did. I also called Bill Fisher. I then sat back and planned my strategy for appraising the other 'donors'. The moment of truth for each of them was at hand. They had all stated that they would not be the first, and they had lived up to that promise, but their desire not to let it go ahead without them was definite, or at least I hoped it was. In reality, each of them had been worried that if they made a definite commitment and the others did not, things could get messy. The SPC

clearly did not want to be a participant in the programme, so there was no parent organisation to help broker a solution if one or more of the potential donors pulled out. I progressively got the impression that there had been discussions among at least some of the five SPC member donors, basically agreeing that it was a grand, but parentless, project. The only person to negotiate with was Dr Kearney, and he didn't have the sort of money we are talking about. That they would all like to see the Skipjack Programme go ahead was agreed, but the impasse had been 'We will follow you'. The great news was that 'you' had just put their hand up: New Zealand was showing the way – just follow us!

Now that at least one contribution was on the way, I needed to make sure the banking arrangements were in order. So, I paid the commission's finance officer, Ivan Boyd, a visit. I wanted to be certain he and I agreed on how the money that would be coming in was to be managed. I started to tell him about the donors' agreement to keep the money totally independent of the SPC and, in fact, to give it to me. Ivan interrupted me; he was already aware of this. He had been asked by the representative of one of the donors at the last SPC conference if such an arrangement would work. He advised that he thought this arrangement to be the logical way to proceed; the programme was, after all, an 'extra-budgetary' one. He assured me that this was the commission's first ever. So, there was a need to create the appropriate processes and to keep the budgets separate. I told him of the bank account I had opened in Sydney and that as soon as money started arriving, I would get him authorisation to access it for programme expenditure. He thought these arrangements were the right way to go and offered to help as soon as necessary. I then rang my contact at the Commonwealth Bank and informed him that the first of the money was on its way.

The next day, I began formally ringing the other donors; I had no money left to go see them, as the Rockefeller Foundation had espoused. Australia's aid people had given me the impression that if any other donor showed some initiative, they were likely to make a quick and favourable decision; so, I started with them.

I had had numerous face-to-face discussions with the senior AusAID officer with whom I spoke previously, and I was confident we had a good relationship. In any case, the enthusiasm that was evident as soon as I told him that New Zealand had signed left me in no doubt that he was happy I had rung. He then told me that approval to commit to the programme had been signed a few weeks before, but enactment of it was subject to two

conditions: the first being that there were contributions from other donors; the second was that the actual amount of Australia's contribution remains negotiable, to some degree. The amount of $200,000 had been discussed as indicative of a fair contribution. Australia accepted the quantum of this contribution, but noted that the original discussion occurred over a year ago and exchange rates were fluctuating considerably; some negotiation might be necessary. A possible increase in Australia's contribution was on the table. In the signed commitment, the relevant AusAID representative had been authorised to negotiate the final amount with the programme coordinator, taking account of exchange rates and the contributions from other donors. I could not have dreamed of more.

At the time of the original suggestion of $200,000, the Australian dollar was worth US$1.37. As the Australian dollar was continuing to depreciate against the US dollar, Australia was prepared to increase its contribution. Noting also that the only contribution confirmed to date was that of New Zealand of $120,000, the total of all contributions was likely to be less than an average of $200,000. Taking account of these two factors, Australia was prepared to increase its contribution to AU$250,000 per year for the first three years. At that time, AU$250,000 equated to US$275,000. 'I love a sunburnt country' ('My Country' by Dorothea Mackellar), where once it does rain, it often pours. I loved it an unbelievable amount more than usual on that day. I could now contact the other four donors with the news that New Zealand and Australia had both committed for a combined total of approximately $400,000 per year. Two of the six shares were paid up.

I then called Jim Joseph again. He had already been on the phone with his contacts in the State Department, and the fact that New Zealand had started the process of contributing was enough for them. They said I should receive something in writing, probably from the US ambassador in Suva, in a week or so.

The UK representative in London was very calm and positive: 'We said we would contribute when others were in, and we will, probably in about a week'.

The local French representative on the SPC said France was a definite starter. He then said, 'off the record', that with the other donors committed, it would be very unwise for France to pull out now. But getting a signed commitment would take about a month; getting agreement between Noumea and Paris had a reputation for not being instantaneous.

The Japanese had always been ready to go, if I had enough money to negotiate a charter agreement. I told my contact in the Japan Fisheries Agency that I now had enough money to guarantee at least the five-month charter they felt was the minimal requirement. I then reminded them of my earlier request for them to identify a suitable vessel for us to begin negotiations over. He agreed to take the necessary action.

Within about two weeks, all but the French contributions had been confirmed. Money was flowing in. I had not officially informed the SPC of the confirmation of good fortune, so now I thought it appropriate to tell the secretary general the good news. He was visibly pleased and congratulated me. He then said, 'Now that we have the money, we can start the programme'. I found his reference to 'we' having the money a little strange, particularly in view of the executive's insistence that the money being raised must be outside the core budget. The money was in a separate bank account under my name. Perhaps, by 'we', he was just being friendly towards me? After all, his finance officer, Ivan Boyd, had already been aware that the money was going to be coming to me. So, it was likely just a slip on his part.

That night, Hope and I went out to dinner to celebrate what was effectively the start of the Skipjack Programme. Or, more correctly, the successful completion of phase one: the fundraising. I had quite a bit of administration before me, but I couldn't wait to get out on the boat and tag some skipjack. Tomorrow I would begin drawing up duty statements and advertisements for staff. I could also put myself on the payroll. I now had a job with regular pay – or so I thought.

Figure 1: Author tagging skipjack on the bow of the *Hatsutori Maru*
Source: Bob Gillett.

Figure 2: Aotearoa New Zealand prime minister Robert Muldoon with SPC secretary general Young Vivian showing off the Skipjack Programme t-shirt
Source: SPC archives.

Figure 3: Tagging from the stern of the *Hatsutori Maru*
Note the feeding frenzy bars on the fish coming in (see Chapter 12).
Source: Bob Gillett.

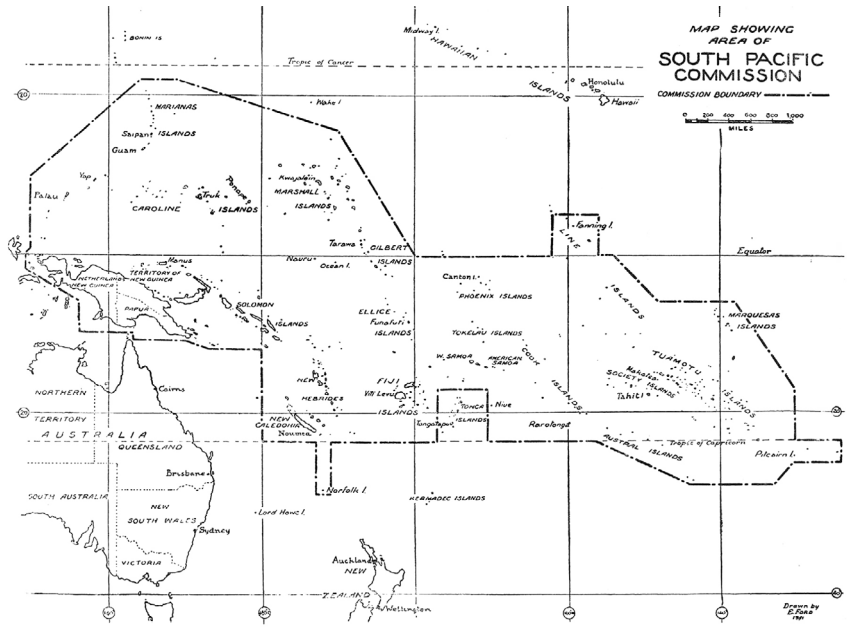

Figure 4: The area of the South Pacific Commission

Source: Peters F. E. (1954).

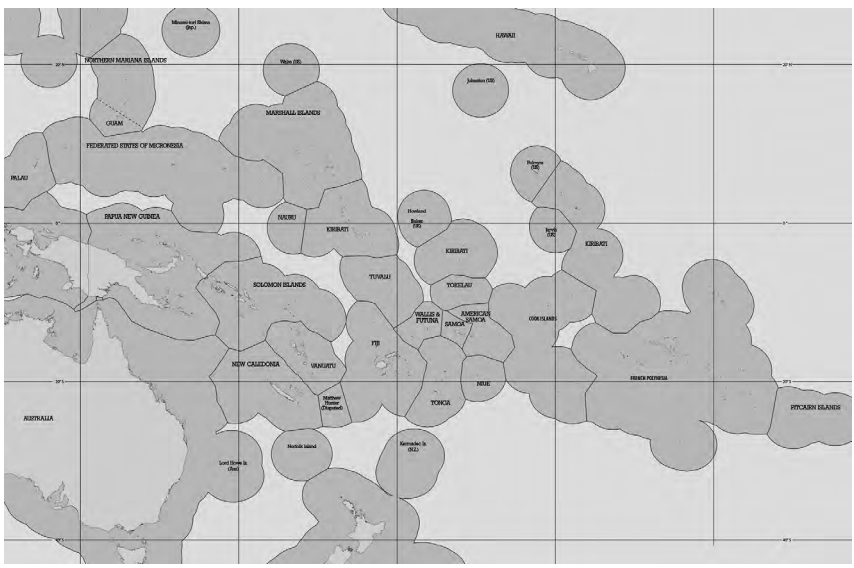

Figure 5: The South Pacific, highlighting the collective ownership of 200-mile EEZ's

Source: © Pacific Community, 2018.

Figure 6: *Hatsutori Maru No. 1* at anchor
Source: Bob Gillett.

Figure 7: Wallis & Futuna stamps acknowledging the contribution of the Skipjack Programme
Source: © JPP-Stamps Wiki, CC BY-SA.

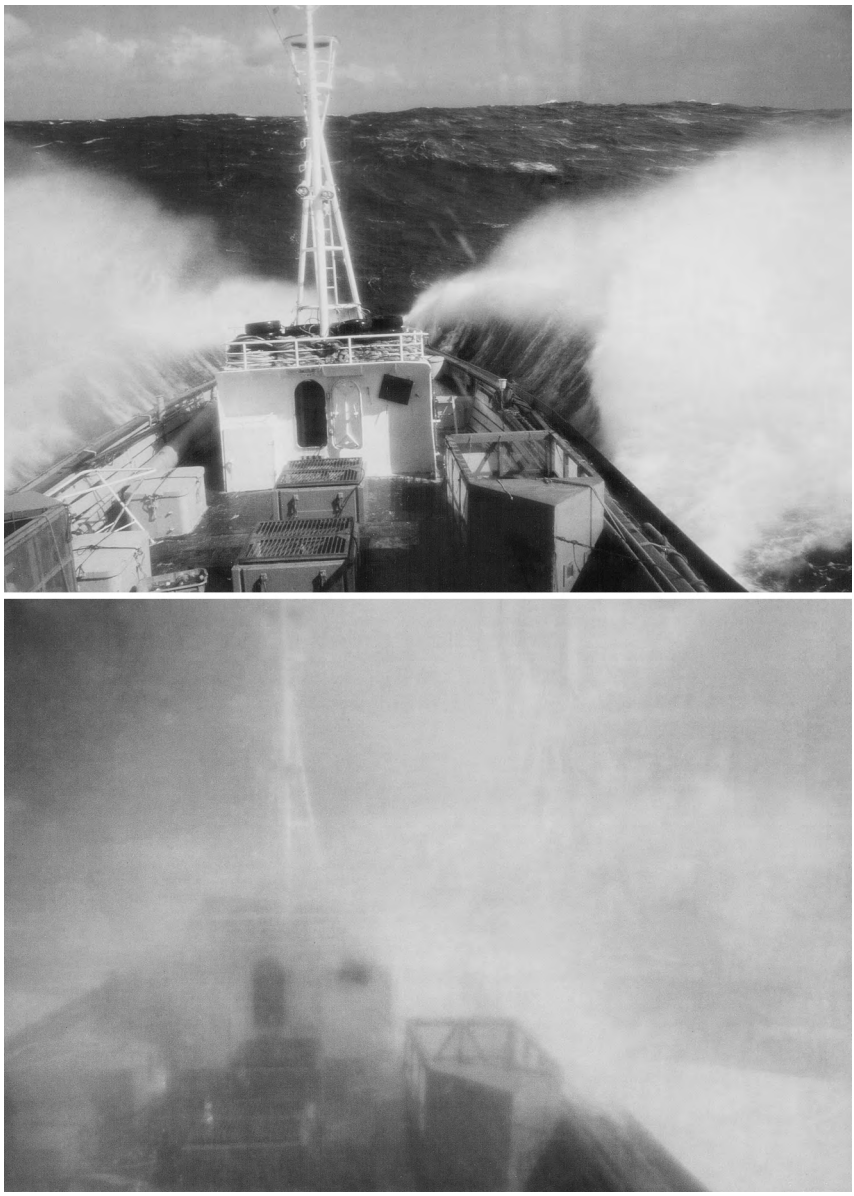

Figure 8: Rough weather in the Tasman Sea (top) and same position two seconds later (bottom)

Source: Charles Ellway.

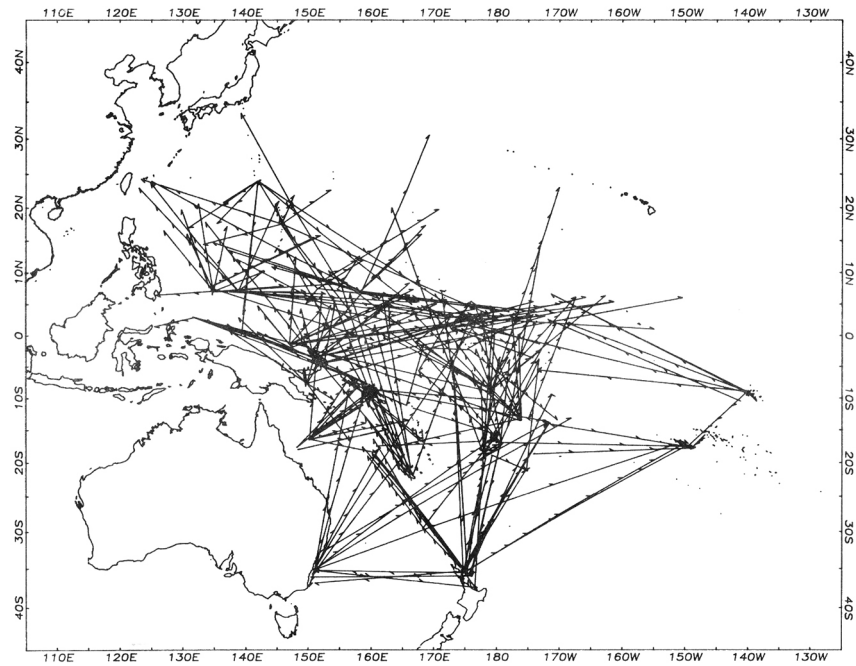

Figure 9: Samples of straight-line representations of the movements of skipjack tagged and subsequently recaptured

Note the distribution of recoveries across the whole area of the SPC.

Source: Kearney (1983).

11

An attempted coup, or two

A couple of days later, for some reason I remember it was mid-morning on a Thursday (my memory was probably strong because it turned out to be a rather momentous day), I had a visit to my office from the commission's director of programmes. This was completely unexpected and was, as far as I was aware, the first time he had ever been in Wing 7, which was where my office was located. He knocked on my door and then walked in. He sat down in the chair in front of my desk. I remember verbatim what he then said:

> Congratulations on raising the money for the Skipjack Programme. A million dollars a year is a lot of money. Now that we have that money, we are going to advertise the position of Programme Coordinator. With that amount of money, we believe we will be able to attract somebody really good to run the Programme. Of course, you can apply, if you want.

I was speechless. In shock. Then I decided I was not going to respond in haste. When I didn't, he waited about half a minute, then got up and left. My immediate thoughts were twofold: firstly, no wonder the commission is broke, and apparently broken, with this guy in charge of the work program; secondly, there would be no point in me applying to the SPC for the job because they had already determined that I was not 'somebody really good'. With all this money behind them, they thought they could easily find somebody better.

I then walked out of my office and over the road to the beautiful white sandy Anse Vata beach. A good stroll along the beach helped clear my head, or at least settle my nerves a little. After an hour or so, I decided that it would be best to let the donors deal with this. I was very confident they

would be on my side. They had not been prepared to give the money to the commission, so I thought they would not be happy to have them 'steal' it. I strongly suspected that when they heard what the commission was proposing, they would not be amused. So, I returned to my office and called the Australian consul general, Bill Fisher, intending to call the New Zealand consul general, Dick Grant, immediately after. I would then contact the other donors as necessary.

Bill was like me, speechless, but he is a diplomat, so he did not wish to give away too much. I told him that I was seeking support from the donors to the programme, starting with him as the representative of Australia. I was then going to contact the other donors as necessary. Bill thought it a good idea to get all donors involved, if necessary, and he would be happy to lead off. But before he did, he would like to know what I thought were the main issues he should take up with the SPC Executive. He wanted to make sure that his case was as good as he could make it. It was not an issue on which we could afford to lose. He said that once he had put together his case and confirmed the support of Dr Grant, he would visit the secretary general and the director of programmes.

I said that there were quite a few key issues, including these three: the first was whether removing me from the position of programme coordinator was a sound decision; the second was whether the director of programmes has the authority to take this action: he certainly does not have access to the programme's money to pay anybody else, and as I am the sole executor of the account, I think he will have a very difficult time getting access to the money; and the third is the director of programmes' assertion that they will be 'able to attract somebody really good' (that is, better than me) to fill the position. Yes, my pride in what I had achieved so far with the Skipjack Programme had been severely challenged. I tried to put this aside and concentrate on the facts of where we were with the programme and how we had got there. What does the duty statement for the position look like? How do my qualifications for the position stack up against somebody who is 'really good' for the job?

I explained to Bill that in all of my discussions with potential donors, a key assumption had been that I would run the programme – if I could get it funded. On the occasions of the Law of the Sea meetings (see Chapter 8), several donors actually raised the issue of whether I would be prepared to sign a commitment to stay for at least two years once the money had been secured. In other words, my remaining to run the programme was a key

factor in their commitment. I had assured the donors that this was irrelevant, as I was not trying to raise the money because I liked fundraising. I am a scientist, and I raised the money because I wanted to carry out this big project and see the benefits it would bring to the countries and territories of the region. I had assumed that I would stay for at least four years. Why would I want to leave now when this fantastically exciting science project that I conceived and promoted was about to become a reality? It simply had never occurred to me that I could be sacked from a job that I had created and had obtained the funding for. The only measures of my performance to date were my success with convincing the fisheries officers of the region that this programme was what they needed, and then convincing the donors to fund it.

I would be most surprised if the donor governments collectively were happy with my removal, to be replaced by an, as yet, unknown person who is 'really good'. What exactly is that person going to be not only good at, but better at than I am? What are the selection criteria for the position of program coordinator, and how do my qualifications against those criteria stack up?

1. *Fundraising*. The donors are in the process of awarding me an extra-budgetary grant of approximately $1 million a year for at least three years after only one and a half years of single-handed fundraising. In the 30 years of the commission, not one of its employees, or the commission collectively, has been able to attract a single extra-budgetary grant, even for $1,000.
2. *Experience with designing and running a Skipjack Survey and Assessment Program*. The program I designed from scratch and ran for four and a half years in Papua New Guinea was an appropriately scaled model of the current programme for the broader area of the South Pacific. It has been extremely successful and remains the only currently operational skipjack tagging programme of this kind in the world. Nobody else has run anything like it. I developed, described, directed and then published new methods for tagging skipjack and surveying skipjack and baitfish resources. The current Skipjack Programme was my idea, and I designed it: I wrote the original program proposal and all subsequent amendments.
3. *Extensive experience with managing surveys of baitfish resources of the South Pacific, in particular the selection and design of specialist gear to catch different species of bait in different habitats and environments*.

Again, my Papua New Guinea experience is unique. More than 150 species of tropical baitfish were identified, with 15 of them previously unidentified in the area in which they were captured. Several new techniques for bait capture and handling were developed. Again, these have been described and published.

4. *High-level experience with skipjack research results and the interpretation of the relevance of these to the management of tuna fisheries*. I have published numerous appraisals of skipjack populations and stock structure. It is what I do!
5. *Proven knowledge of the major ocean management issues in the South Pacific and the implications of the changes occurring in the Law of the Sea*. I have published numerous papers, including those specifically used as the primary discussion documents for regional meetings of heads of governments on the Law of the Sea and regional fisheries policies. Two of these papers have been republished by invitation, unedited, in international law journals, even though they were not originally written for a legal audience.

There is a huge and fundamental flaw in the director of programmes' stated assumption 'Now that *we* [emphasis added] have the money', this being exactly the same expression the secretary general had used just a few days earlier when I advised him that I now had confirmation that I had secured the necessary funding for the programme to begin. Both gentlemen need to be reminded that the money is not being given to them; it is being given specifically to Dr Kearney: I am the designated sole signatory on the accounts and the sole executive officer of the Skipjack Programme. It was the donors' idea to make me the recipient of the funds and the chief executive of the programme. The donors were keeping the programme's funding totally independent of the commission. They clearly have doubts about the SPC's ability to manage a project such as this. It is not an accident that these same donors have not awarded the SPC another extra-budgetary project in the history of the commission, even though the commission currently has 21 such projects on their 'wish list'.

If I were to leave the SPC, the money and the programme would likely go with me. I was certain that the University of the South Pacific in Suva would be overjoyed at being asked to host a $1 million a year project at no expense, as would most universities in Aotearoa New Zealand or Australia.

I would also suggest that not only the donors but also the fisheries officers of the region would not be pleased to see me removed as programme coordinator. Indeed, at least some of the leaders of the countries and territories of the region might also not agree that I should be replaced. My work with them on the Law of the Sea negotiations had made me quite a few friends in high places.

I left Bill in no doubt about how upset I was by what I considered an incredibly unfair turn of events. I felt, even then, that I may have gone over the top in my response to Bill's request for me to explain what was wrong, but I think I was still in shock. I have never had a professional experience affect me as this one had.

About 4 pm that afternoon, I was going to the main SPC building to pick up some files when I saw Bill Fisher and Dick Grant walking down the corridor towards the secretary general's office. I quietly turned around and went back to my office.

Bill called me that evening to tell me not to worry. He and the New Zealand consul general had had a good chat with the relevant officers of the commission. I could anticipate an apology early next week. He never did tell me exactly what he said to them, except for the fact that Australia would not be pleased if I were removed. New Zealand, and almost certainly the other donors, would also not be impressed.

On the following Tuesday, the director of programmes again came to my office. An apology was clearly beyond him. Instead, he stated that he and the secretary general had reconsidered the running of the Skipjack Programme, and they would not be advertising my position after all. I could continue with implementing the programme. How magnanimous of him! As with his first message, I did not say a word; the 'thank you' he was waiting for did not eventuate. He quickly and quietly left my office.

I must admit that the whole incident of being 'sacked' by somebody who did not have the authority to do so and having to seek external assistance to be reinstated shattered what enjoyment there had been in working at the SPC. I had to make every effort to prevent my annoyance with the current executive from diminishing the passion I had always had for getting the Skipjack Programme fully operational throughout the whole area of the SPC. The excellent results that continued to come in from the tagging in

Papua New Guinea had made me more confident than ever that the big experiment would work. I now had the money; all I had to do next was get 100,000 tags out across the whole area of the SPC in the backs of skipjack.

Another Takeover Attempt

Despite the good relations I had established with the commission's finance officer, my problems with getting between other people and a pool of money were not all over. About two weeks after the incident with the director of programmes, the secretary general's secretary asked me to come to the secretary general's office. The secretary general handed me a letter from the Food and Agriculture Organization of the United Nations (FAO). I do not remember the exact detail, but believe it began with:

> Congratulations to the Commission and Dr Kearney for raising the money for the Skipjack Programme. FAO would now like to appoint a senior scientist to take up the position of director of the programme.

No justification for such a strategy was given, but it appeared to be based on the assumption that, since one version of the programme proposal was written by Dr Kearney as an FAO consultant, FAO somehow owned the programme.

The secretary general seemed very much on side with my opinion that this was a valueless 'try-on'. He asked me to draft a reply for his signature. Thinking that he would likely water down what I wrote, I did not hold back. In essence, we told FAO that they had not at any stage indicated a desire to have their staff involved in finding donors for the programme, and they had provided no tangible assistance, of which we were aware, with having the programme funded. The SPC had therefore moved on and begun employing staff, including the continuation of Dr Kearney running the programme.

Fortunately, neither Macu Salato nor I had seen the letter the previous secretary general had sent to the Rockefeller Foundation claiming, falsely, that I had written the original programme proposal at the request of FAO (see Chapter 5). I did write an updated version of the programme proposal while working at FAO in Rome, but it was my idea to do so. And all we did was modify some bits of the original proposal I had written.

I think the secretary general had learnt from the earlier disagreement the director of programmes had dragged him into with donor governments. He signed and sent the letter I had drafted without changing a word.

A few weeks later, we received an apologetic response from FAO. No further discussions were entered. I did, however, re-establish my friendship with John Gulland. It flourished until John's death more than 10 years later.

12

Recruiting staff and procuring equipment

It had taken 18 months to get the donors to sign up for the programme, but once they signed, they were very prompt with their payments. They had clearly all been prepared to pay once one of them showed some initiative, as New Zealand had done. Being mindful of the administrative load of handling the finances, the recruitment of the necessary staff and the procurement of the variety of equipment that would be needed, including the research vessel, the most urgent need was to get myself a secretary (yes, people who took shorthand and performed all of the duties of a personal assistant, or office manager, were still called secretaries in 1977).

I had had plenty of time to develop a well-reviewed list of urgent issues. I now had to address them in priority order. Finding the right boat to charter was high on my list. Making sure I had 10,000 tags immediately and more to follow was also close to the top. Getting staff with excellent analytical capabilities was perhaps less urgent, but certainly no less important. But first, I needed a secretary to help me get the pursuit of all these components underway and then well managed. I had a lot of administrative work ahead of me; I certainly needed help.

In anticipation of this event, for the previous few months, I had been assessing the work of the numerous clerical workers in the commission's typing pool. I had been carefully noting the quality of the work each one did for me and taking the opportunity to have a friendly chat with each of them about their work at coffee breaks. I had made my choice. But I now needed to find a way to convince her to work for me, and for me to get the commission to allow this to happen. It was, after all, the commission's

typing pool I was about to selectively pilfer. I thought I needed to first make sure I could simply offer her a job. I was not going to the director of programmes to seek approval, so I went to have a chat with the finance officer, Ivan Boyd.

I was most pleased with my discussion with Ivan. In fact, I was amazed. The commission had not contributed one cent towards my salary over the last year and a half, even when I had been desperate, but Ivan's response when I told him that I wanted to appoint one of the typists from the pool as my secretary, on salary from Skipjack Programme funds, showed no lack of support. He simply said, 'No problem. Just ask her to come and see me, and I will change her duty statement and adjust her salary'. Then our discussion became even more surreal: he said that he thought it was not unreasonable that her salary should continue to be paid by the commission. And he would arrange for that to happen. I was speechless. He knew I had more than enough money to pay her salary out of Skipjack Programme funds.

I was never certain that I understood the full reason for this sudden attack of generosity, but I did have a strong feeling that it could only have been a personal decision by the secretary general. I assumed to make amends, once he realised how badly he had been misled by his director of programmes, over the move to advertise my position. He had been made abundantly aware that the donors to the Skipjack Programme were not at all amused by this proposed action. And they were the same donors providing the bulk of the funding for the commission's core budget. I believed that he felt an urgent need to mend some bridges. I had always liked Macu Salato and had previously thought we had a good relationship. I hoped that paying my secretary's salary might also have been his way of attempting to get that relationship back on track.

Beginning in the next couple of months, I experienced a progressive warming in the commission's attitude toward the Skipjack Programme. This attitude took a huge step forward when the incumbent director of programmes, who had clearly been at least a major part of the commission's problems, left. His replacement quickly improved the feeling throughout the organisation. Then, when Young Vivian took over as secretary general, the Skipjack Programme effectively became 'the flavour of the month'. Young was a very strong promoter of it, as depicted in the photograph of him presenting a Skipjack Programme t-shirt (normally reserved for individuals who returned recaptured tags) to the prime minister of Aotearoa New Zealand (Figure 2).

The change in attitude to me as programme coordinator progressed over the term of the programme and was perhaps most obviously confirmed, in the longer term, by the South Pacific Conference creating a special classification of my position above that of other SPC programme staff. Perhaps I had even become 'somebody really good'? (see Chapter 11).

Immediately after my seminal meeting with Ivan Boyd, I went straight to the typing pool and asked Carol Moulin if she would accompany me to my office to discuss the possibility that she might work for me on a full-time basis. She promptly agreed.

Back in my office, I told her that, subject to one condition, I would like to offer her a job as my secretary. In our brief discussions at coffee breaks, I had already confirmed that she took shorthand, but I never had the opportunity to assess it, and my offer was conditional on her shorthand being of an acceptable standard. She agreed to a quick test, which was all that was necessary to very comprehensively confirm that her shorthand was excellent. She had another attribute that was particularly important to me; her English and French were both excellent – she was English, and her husband was French. Her excellent French was particularly important to me, as mine was, for all intents and purposes, non-existent. Carol seemed very pleased to accept the offer. She left my office and went straight to see Ivan Boyd. She started work for me the next Monday. Carol was to give wonderful service for the whole of the Skipjack Programme and for at least as long as I stayed with the Tuna and Billfish Programme.

Once the programme became fully operational and data was accumulated at great speed, it became apparent that more office help was necessary. By May 1978, the need was such that I recruited a research/administrative assistant, Veronica van Kouwen, who not only was very efficient with manipulating piles of data and had excellent English and French but also took excellent shorthand and was thus of great help to Carol with secretarial duties. Veronica also stayed for the full length of the programme, and to this day, she, Carol and I remain close friends.

As soon as the charter arrangements were formally agreed, the next urgent personnel management issue was to recruit the person I needed to send to Japan to supervise the modifications to the research vessel I was about to charter alongside a potpourri of scientific equipment (see Chapter 13). I had already spoken to Tony Lewis about filling this role and him then staying on for at least the first month or so of fishing to help train the new

recruits in tagging, biological sampling of tuna, and baitfish identification and analysis. Tony and I had already worked together for four years in Papua New Guinea, and I had extreme confidence in his abilities and the relevance of his experience. The only other person I knew of anywhere who had similar appropriate tagging experience and tropical baitfish knowledge was my other Papua New Guinea partner, Barney Smith. If neither of my two Papua New Guinea colleagues were available, I would need to consider taking one of the 'yet to be recruited' staff to Japan and staying with him for a week or two to purchase the right equipment. This I did not want to do, as I did not have two weeks to spare at this critical stage of the programme. I admit that I was already somewhat overcommitted. My enthusiasm to finally get some skipjack tagged had clouded my judgement a little.

The good news was that Tony was most enthusiastic about the job, and he would be available by late August. He accepted a three-month contract in the first instance, but he made it clear that he would not be available for much longer than that; he had accepted a senior job in Fiji that he needed to get to.

Even though, after my very positive meeting with Ivan Boyd, I felt that my standing in the commission may be about to improve, my earlier episodes with the acting secretary general and the director of programmes, who were both still in power, had left me injured. I felt that I needed to have some people I could trust around me. People who truly believed in what the Skipjack Programme represented and wanted to help me get it done would have a big impact on my outlook on life. People with Bob Gillett's attitude would be a big help.

The next day, I rang Bob Gillett and offered him a job, I think initially as a fisheries experimental officer. He took less than five seconds to accept the offer, even before I told him what the salary would be. I asked him to take up the position as soon as possible. He was happy to pay his own airfare to Noumea and be reimbursed for it on arrival. He arrived in early August, as the first staff member, after me, to be employed on the programme's own budget.

Tony Lewis arrived in Noumea within a few days of Bob, and he departed for Japan a week later with a long shopping list and a generous budget. I was not going to skimp on essential equipment, and I trusted Tony's judgement

completely. He needed to have spare money and the authority to spend it on things that we had not thought of, but that he would see in Japan as he perused the stores that had the equipment we had anticipated.

I then recruited Jean Pierre Hallier, the fisheries officer, from New Hebrides (soon to become Vanuatu) in the middle of September. He was slated to be one of the scientists who spent a lot of time, approximately five months a year, at sea. He would also be a special assistant to me in arranging visits of the *Hatsutori Maru* to French territories. He and Bob Gillett were to evolve into being alternate cruise leaders for the whole of the sea-time when I was not on the vessel, which, after the first couple of months, was most of the time. They both did a wonderful job of it. They had different styles in dealing with people and issues, but both were very effective. We did not have a significant dispute on the research vessel during the whole three years of the programme.

The search for suitably qualified senior analysts, not surprisingly, took longer than finding more junior scientists who could be trained at sea. I spent several months making enquiries of people I knew in appropriate universities and fisheries institutions around the world. One very important such contact was Dr Peter Larkin, who was the dean of graduate studies at the University of British Columbia. He very strongly recommended Dr Pierre Kleiber. Jim Joseph made some follow-up enquiries on my behalf, such that I was able, with great confidence, to offer Pierre a position as senior fisheries analyst. He arrived in Noumea in late May 1978.

The standard of the staff we had in many quite varied jobs in the Skipjack Programme was wonderful, but Pierre's contribution was exceptional, even in a highly qualified field. The computing, data processing and analytical skills he demonstrated by turning a big pile of tag release and recapture data and catch returns from vessels of many types and nationalities into succinct assessments of the status of skipjack stocks underpinned the success of the whole programme. The pioneering analyses he and Sandy Argue developed and used completely erased the concerns I had held since I first conceived the idea of a huge-scale tagging experiment. Using techniques that they developed, it was possible to confirm that, yes, the tags were sufficiently widely and evenly spread at the time of release, and the recaptures were sufficiently numerous, well spread and well documented to use as the basis of assessment of the size of the skipjack population in the whole of the central and western Pacific. And yes, in combination with our growing

compendium of catch and effort data, they were adequate to assess the inter-relationships between fisheries in different parts of the total area (see Chapter 19).

By the middle of September, I had recruited enough scientific staff to make up a full complement to board the *Hatsutori Maru No. 1* on October 5 when it arrived in Kavieng, Papua New Guinea, to commence fishing the next day. Tony Lewis, Dr Masakazu Yao and the representative of the Japan Fisheries Agency would have boarded the vessel in Japan. The two Japanese scientists would prove most valuable in facilitating the early establishment of an excellent and enduring relationship between the scientific staff and the Japanese crew. The 13 Japanese crew were the responsibility of Hokuku Marine, as were the 15 Fijian crew, 12 of whom were always on board.

Once the frenzy of recruitment that occurred in the first few months had settled down, I was able to manage staff numbers and positions rather comfortably for the remainder of the programme. It took a little longer than anticipated to get the frenzy of procuring all of the necessary equipment under control.

I knew that I had set a very tight schedule for myself in getting the programme operational. I couldn't wait to get started on the real work – tagging skipjack – so I may have been a little optimistic. Finding a vessel and getting it chartered was essential, but so also was the procurement of the tags that were an absolute necessity for any tagging program. Without them, there was no point in having a research vessel.

The process of chartering the boat is discussed in Chapter 13, but even before a charter agreement had been signed, I had realised that the procurement of tags was not going to be as straightforward as it had been in Papua New Guinea. The supplier of the excellent tags we used in Papua New Guinea, Arthur King, had, unbeknownst to me, retired and closed his business in Newtown, Australia. I had been trying for several days to reach him by phone before I made contact; he only came into the office a day or so a week to tidy up paperwork. No, he did not have any capability to make tags for me or anybody else, for that matter. The only bit of good news was that he had given the mould for the nylon barbs, or sold it at an acorn price, to CSIRO. He also told me that Kevin Williams had bought a million barbs for CSIRO, so he might be prepared to part with 100,000 or so, at least as

a short-term contribution to solving my problem. What I now needed to do was to urgently find somebody who would make and print the streamers that were the substantive component of tuna tags.

From the time I realised the problem with the supply of tags and the commencement of the charter, I had little more than two months. It really was time for an emergency response. To say I was somewhat concerned is an understatement.

The first thing I did was call Bill Bayliff at the Inter-American Tropical Tuna Commission (IATTC).

The IATTC also had spare barb heads, but the only company of which either of us was aware that at that time made tuna tags was Floy Tag and Manufacturing. They were based in Seattle, Washington. I had had some dealings with Floy while I was in Papua New Guinea and had not been particularly impressed. But I had Arthur King as an alternative then. Things were different now. So, I called Floy.

I explained my predicament, and hence the urgency. The person to whom I spoke sounded very accommodating and said yes, they would be prepared to give priority to a run of 10,000 tags under the condition that if this first lot of tags were satisfactory, I would give Floy the business for the rest of our tag needs, which were anticipated to be at least 100,000. We then discussed the specifications that I stressed were essential. The list they accepted included that the streamer material was resistant to temperatures down to –40 degrees. This requirement was now necessary because Susume Kume, of the Japanese Far Seas Fisheries Research Laboratory, had discovered that numerous broken vinyl tags had been found in the holds of tuna boats with very cold refrigeration. The rest of the conditions I stressed were standard for all acceptable tuna tags, such as the internal and external diameter of the streamer and the quality of printing, including the numbering. Floy's condition of securing the rest of our business seemed fair to me, as it could only be invoked if the tags met my specifications and were therefore the product we wanted anyway. Surely not a lot could go wrong with the manufacture of a product that had only two parts, a vinyl streamer of 11 centimetres and a nylon barb head, neither of which was a 'movable' component.

How wrong could I be?

The first batch of tags from Floy met the timeline for delivery but failed to meet the agreed specifications on 13 separate issues, many of which were fatal:

1. The spelling of Noumea was incorrect (a critical factor, as a lot of skipjack fishermen did not know where Noumea was, even when spelled correctly).
2. The duplicate numbers were not at each end of the streamer but together near the middle.
3. The numbers and letters were not permanent; some rubbed off far too easily.
4. The outside diameter of the streamer was outside the specification to the extent that the tags would not fit the applicators.
5. The internal diameter of the streamer was outside the specifications to the extent that the barbs, already purchased, could not be made to fit.
6. The streamers were not resistant to –40 degrees.
7. The supplied barbs were too soft.
8. Bubbles of glue were common between the streamer and the barb, such that the tags could not fit into the applicators.
9. The streamer itself was too stiff and would not lie flat along the side of the fish.
10. The sealant used on the streamer did not set properly, with the result that the tags stuck together.
11. With time, the glue used to fix the barb to the streamer became brittle, making it easier for the barbs to become detached.
12. The sequential numbering was not perfect, with some numbers missing and, even worse, some numbers duplicated.
13. The alphabetic character that described each batch of tags was often so far removed from the numbers that it was difficult to tell if it was part of the number or not.

Floy immediately offered to replace this first batch of tags, but I cannot be sure that we tried again for some time. I do know that I immediately activated Emergency Plan B. I called Barney Smith, who by this time had been promoted to my earlier position of 'principal biologist' in the Papua New Guinea Department of Agriculture, Stock and Fisheries (DASF). He was now in charge of skipjack tagging. On bended knee, I asked if I could please borrow 10,000 tags, knowing that they would be Arthur

King's streamers and barb heads. Being the great friend that he was, his response was immediate: 'If we have that many, you certainly can have them'. It later transpired that the first 6,015 tagged skipjack released by the Skipjack Programme carried Papua New Guinea tags: 4,593 yellow ones and 1,422 blue ones. Regional cooperation at its best. Of course, using tags with DASF Port Moresby as the return address created some extra administrative issues, but these were nothing compared to the problem of not having any suitable tags. There may even have been a slight advantage in using Papua New Guinea tags in the early days of the programme; the tuna canneries and many tuna fishermen had experience with them from our Papua New Guinea tagging program, so they knew where to send returns. We could relatively easily retrieve them from Port Moresby.

After lengthy discussions with Bill Bayliff, we formed the opinion that the only way I was going to obtain more than 100,000 quality tags was to buy the basic ingredients and have programme staff put them together. But this would not be straightforward.

It turned out to be impossible to find extruded vinyl tubing that met the temperature specification of –40 degrees. We would have to buy bulk vinyl and have it extruded. Even this step turned out to be extremely difficult. Bill did the searching on my behalf, and he concluded that the only chemical company that manufactured yellow vinyl that met our requirements was Dow Chemicals. They were prepared to guarantee that their product in bulk form was temperature resistant to –65 degrees Celsius. But when extruded, this specification could be expected to drop to –40 tolerance. Resistance to a temperature of –40 degrees was adequate. But then there was the issue that the minimum purchase of the bulk vinyl was 1 ton.

Before we could go ahead with the purchase, we had to first find a company that was prepared to extrude this product into tubing that met our specifications for both internal and external dimensions. Bill did this in the form of Anjac Plastics Incorporated of El Monte, California. This still left the issue of having the tubing cut and printed, including the sequential numbering.

I am not sure how many miles of tubing a ton of vinyl made, but I do remember we had several spare rolls of more than a metre in diameter left over in the programme's storeroom after we finished our three years of tagging. I also know that we released 17,600 metres of plastic in the form of tags in the backs of skipjack and yellowfin tuna.

The records show that the process of purchasing bulk vinyl and having it extruded to our specifications added $19,000 to our expenses. We still had to have the tubing cut and printed. It turned out we had no choice but to get Floy Tag and Manufacturing to do both the cutting and printing.

Whether or not Floy was chastened by my revelations after their first attempt to make tags for us, I am not sure, but the first batch of printed individual numbered pieces of tubing was very good. And it continued to get even better as the batches progressed. The last 30,000 tags that were cut and numbered by Floy two years later from the Dow Chemical bulk vinyl extruded by Anjac, and with Arthur King's nylon barb heads fitted by our staff, were as good as any I had ever worked with.

The rest of the tagging equipment was relatively straightforward. Tony Lewis was getting on very well in Japan. He had the expected few problems with finding all the science bits and pieces, but in our frequent discussions, he demonstrated that he had mastered the art of working in Japan, when you do not speak the language, much faster than his boss had. He was confident that all would be ready by the time the *Hatsutori Maru* was scheduled to depart Japan for Kavieng. He was confident that the metal frames of the tagging cradles, a step up on the wooden ones we had in Papua New Guinea, would be ready to have the vinyl covers fitted and adjusted during the first days of the cruise. The metal frames were to be proven to give the tagger and the tagging assistants extra security and stability when tagging in rougher seas. The microscopes had cost more than we had anticipated, but were still within the total budget for the outfitting of the vessel.

The research Barney, Tony and I had done in Papua New Guinea had resulted in great improvements in the design of tagging cradles. Barney has advised me that much of the effort we put into developing special cradles for skipjack was a flow on from my PhD research on the comparative physiology of fish and how that related to their activity levels. Skipjack are not big tuna, but they have evolved for sustained high speed. In terms of body lengths per unit of time, they are as fast as any. Their blood and muscle chemistry reveals incredibly high levels of the respiratory pigments haemoglobin and myoglobin that give them the ability to maintain extremely high speeds for extended periods of time (see Chapter 20). But with these elevated abilities comes a vulnerability to bruise easily and to bleed at the slightest provocation. Because of their incredibly high levels of oxygen consumption, they also cannot withstand extended time out of the water. The result from a tagging perspective is that they must be handled much more gently yet

more quickly than other fish, even other tunas. We quickly learnt how much more delicate they were than even yellowfin tuna and how much more quickly they must be returned to the water. We concluded that during the tagging process, bumps and bruises must be avoided at all costs; fish with any visible damage should not be tagged, and if skipjack were out of the water for more than 10 seconds in the tagging process, they should not be returned to the water and regarded as a legitimate tagged fish.

The tagging cradles we designed and developed in Papua New Guinea were very good, but Tony Lewis and I were convinced that we could refine the design even further. One immediate change we were able to make on the *Hatsutori Maru* was to have the side of the cradles overhang the side of the boat so that tagged fish could be released by simply sliding them over the side of the cradle on the very slippery vinyl that lined all our cradles. Full details, photos and diagrams of the tagging cradles are given in Kearney and Gillett (1982).

Careful examination of the tape recordings by our scientists when tagging demonstrated that with training and practice, our scientists and the Fijian tagging assistants who handled the lines on which the fish were swung towards the cradles, individual Skipjack Programme taggers could tag and release up to 30 fish a minute when fishing was optimal.

Another astounding benefit of the tape recordings was that the exact time between the release of a tagged fish and its recapture, if it were recaptured in the same session of tagging and detected by the same tagger, could be measured to the nearest second. We had numerous skipjack recorded as recaptured six seconds after they had been released. The first time this happened, I really struggled to believe it. The explanation included that when skipjack are in a serious feeding frenzy, their behaviour becomes completely dominated by feeding. So much so that their physical attributes change. Individual fish develop temporary vertical bands that are as prominent as their horizontal stripes. Under good fishing and tagging conditions, it is very common to tag and release fish on which these bands have not begun to fade. We concluded that when such fish hit the water after being released, they are still in a frenzy and prone to grab the next food item, or lure, they see. At least one was reported to be recaptured three seconds after its timed release, but I was not certain that human error could be ruled out completely in such cases. As the lures are very close to where tagged fish re-enter the water, virtually instantaneous recaptures were common. Quite a few were recaptured within five seconds of release. This provided

further confirmation that our tagging methods, in the main, cause very little discomfort to skipjack. There is little doubt that the Skipjack Programme took the science of tuna tagging to a new level.

Speaking of the tape recorders that were a critical part of the tagging process, I digress to tell of an interesting episode. Tape recorders in the 1970s were not what they are today. The microphones on the only recorders we could get that were small enough to be worn around the neck of the taggers were about 10 centimetres long and 2 centimetres thick. I called a staff meeting to discuss how we could best make these waterproof. The best solution we could come up with was to put a condom on each one with a rubber band around the base. We knew that there would be considerable turnover in condoms, as they would frequently get damaged and punctured, including by the hooks on the jigs we used to catch the skipjack. We agreed that we would need to buy about 100 at a time to ensure that we did not run out. Sandy Argue had the responsibility of buying one batch. On his return from one of the tagging cruises, he had time to shop. He had been at sea for almost two months, so he bought presents for his three children plus 100 condoms, all of which he put in his suitcase.

On his arrival home, he gave his kids their presents and left his suitcase open on the lounge in the living room while he quickly went to his office to collect his mail. The outcome was probably inevitable. His daughter went to her mother and asked, 'Mummy, why does daddy have 100 condoms in his suitcase?' Of course, Margaret had no idea what her husband was doing with 100 condoms. A couple would be bad enough, but 100? What had been going on during these tagging cruises? Fortunately, the truth came to the rescue, and a good laugh was had by all. (I have Margaret Argue's approval to publicise this episode. In her enthusiastic response to my request, she said, 'I still find it hilarious'.)

13

Getting a research vessel (plus some lessons in Japanese culture)

As soon as I was reasonably certain that I would have enough confirmed commitments from the five donors who were members of the SPC, I went to Tokyo for discussions on the Japanese contribution and how it might be delivered. They had already suggested that they may make their contribution in the form of paying for several months of the costs of chartering the research vessel. I also had to make sure they were comfortable with what the other donors had agreed about payment of the money to me, and not the broader SPC. They appeared to have no problem at all with this arrangement. In reality, it made little difference to them, as in the first year at least their contribution would be in the form of payment of several months of the cost of chartering the Japanese research vessel.

The Japan Fisheries Agency had done what I had asked and searched for an appropriate vessel for me to charter. They proposed the *Hatsutori Maru No. 1*, a commercial skipjack fishing vessel of 192 Gross Register Tonnage owned by Hokoku Marine Products Co., Ltd of Japan. This vessel had proven its appropriateness for working in the survey area. It had spent two years in Papua New Guinea and was working in Fiji at the time. It was relatively old, but as a purpose-built pole and line boat, it was adequate for the task. It had a crew who had worked in the study area for several years. Plus, as it came with the expressed endorsement of the Japan Fisheries Agency, I had the comfort of knowing that if something serious went wrong with it, Japan would likely come to our assistance.

I went to Fiji in mid-June 1977 to inspect the *Hatsutori Maru No. 1*. At that time, it had been working for almost a year without a major service or overhaul. It certainly looked its age. Superficially, it looked rusty and dirty. The Hokoku Marine Products representative spent some time convincing me that it was mechanically very sound (the engine room looked crowded but spotless) and that if I agreed to a charter contract, it would be immediately returned to Japan and given a thorough overhaul, including repainting. I remained a little apprehensive, but when the representative assured me that the structural changes to what would become the scientists' cabin and laboratory would be no problem at all, I agreed to go to Tokyo and negotiate a charter agreement with Hokoku Marine Products.

Immediately after I arrived back in Noumea from Fiji, I called my contact in the Japan Fisheries Agency. (Unfortunately, for the life of me, I cannot remember his name, even though he continued to be immensely helpful over the next three years. The name Immamura keeps coming to me, but I am by no means confident that it is. Nevertheless, I will use Immamura from here on to overcome the problem of not having a better alternative.) I asked him to arrange a time and place for me to meet with Hokoku Marine Products. I also asked him if he could ask Hokoku to send me at least one business card in English and Japanese so that I could use it to get taxis to their offices in Tokyo; using taxis in Tokyo in the 1970s was not without its problems. I asked him to also please send me a business card for himself so that I could contact him if I needed to. Within a week or so, Mr Immamura had everything in order, including the fact that the business cards were on their way, and yes, he would be very happy to help while I am in Japan. I also had a phone call from Mr Furuie, who was the CEO of Hokoku Marine Products. He seemed to want little more than to introduce himself and say he was looking forward to meeting me. We did have a brief chat about the things we would need to discuss, like the price of the charter and how long it would be. I suggested nine months, but obviously, we needed to talk about this. Much would depend on the price.

I asked the commission's travel officer to book me flights to Tokyo via Sydney and return on the dates that I gave her. The return flight was to include a stopover in Sydney so that I could do some business in the city (visit the Commonwealth Bank to discuss the programme's bank account and the transactions that had now started). Two days later, the travel officer came to my office; she was clearly a little distressed. The director of programmes had told her to change my bookings so that I flew Air Nauru, which did not go to Tokyo; the only city in Japan at which it had landing

rights was Kagoshima, and I would have to change planes there to go to Tokyo. I would also have to overnight in Nauru on my way. I was not amused. I took it to be the director of programmes' attempt to indicate to me that he was still in charge. I was reluctant to make a fuss over it because I did not want to get the secretary general involved again so soon. But nor did I want to add being a travel agent to the list of my responsibilities, which already included being a salesman and a banker. I would leave it for now, but put the issue on the agenda for the next meeting with the donors.

The lighter side of my changed travel arrangements was that the flight had a couple of amusing components. I had to first stop over in Nauru for the night and then fly to Kagoshima the next morning. This second flight made two stops; the last one was in Pohnpei. There were only about 20 people on the plane when we left Nauru, and at Pohnpei, the other 19 got off, leaving just me. As I got back on the plane, two hostesses (as they were called then) in their striking bright yellow uniforms greeted me at the top of the stairs with a trolley with drinks, including Champagne, being very obvious:

> Good morning, Mr Kearney. As you are probably aware, you are the only passenger on this leg of the flight to Kagoshima. We are at your service. There is plenty of food whenever you would like it, and we have lots of different beverages. We can serve you if you like, or we could leave the trolley near you so you could just serve yourself whatever and whenever. But we would like to advise you that the action on this leg of this flight will be down the back of plane where we will be playing poker with our colleagues. You are most welcome to join us at any time.

The 'action' continued at Kagoshima. At this airport in 1977, there was not a word in English that I could find. I had to walk up to a few counters and show my ticket in the hope that I could be directed to where I would board my flight to Tokyo. Eventually, this worked, and I was able to board a flight that I was reasonably sure was the right one. At take-off, all announcements were in Japanese; there was not a word in English, but this did not seem to be a problem, as I was the only obviously non-Japanese person on the flight. I had been on plenty of planes and knew what most departure announcements were about. This should not be an issue. There were two announcements during the flight, after which people adjusted their seat belts, and so the intent of the announcement was obvious.

In Tokyo I easily made my way to the taxis and thus to the Imperial Hotel; unlike today, the Imperial was rather cheap in those days. After checking in, I prepared for my meeting the next morning at 10 am. Just to be sure of my actions the next day, I showed the concierge the business card for Hokoku Marine Products and asked how long it would take to get there. He gave me an estimate, which, from memory, was less than half an hour.

The next morning, a little before 9 am, I got into one of the taxis that were queued up on the driveway of the hotel. I gave the driver the Hokoku business card. After looking at the card, he quickly got quite agitated. He eventually shouted at me. I was clearly meant to get out of his cab, which I did. I got into the next taxi and got the same treatment, just a little less shouting. So, I got out and went up to the concierge, showed him the business card and told him of my predicament. He took the business card and went up to the first cab I had been in and talked to the driver, and then the second one. Then he came back to me: 'The problem is these two drivers do not know how to get to that address'. He proceeded to walk along the line of waiting taxis, with the Hokoku business card, until he found one that would take me.

My worries were not yet over, for when the driver got to where he wanted, he made it obvious I should get out, which I did after paying him. Then I quickly realised there were no signs in English that described the building I needed. After about five minutes of looking, I did find a small brass plaque with Hokoku Marine Products on it. Into that building I went.

But my saga had only just begun. I found a door that was clearly marked Hokoku Marine Products. So, I entered. There was a reception desk with a young man behind it, and it was still only 9.55 am. I gave the young man my card and said slowly, 'I have a meeting with Mr Furuie'. He took my card and walked through the doorway behind him. He was gone for four or five minutes, and when he returned, he pointed to chairs against the wall behind me. So, I went and sat down and waited. After half an hour with nothing happening, I went again to the young man. He disappeared again through the door behind him. He was only gone for a minute this time, and when he returned, he again pointed to the chairs. So I went and sat down again, and waited, and waited. After about another 40 minutes, I had had enough. I went up to the man again and did not attempt to hide my agitation. I said, 'Please find somebody who speaks English'. He went through the door again. This time he came back with another man, of middle age. He said to me in moderately good English, 'You can come in

when Dr Kearney arrives'. I said to him, 'I am Dr Kearney, as my business card says'. He said nothing but shook his head. He went back through the door. He returned a few minutes later and immediately stated, 'You can come in when Dr Kearney arrives'. By this time, my agitation was probably showing. But what more could I do than repeat that I am Dr Kearney? He went through the door again. This time, he came back with an older gentleman. He came up to me and said, 'Who are you?' I replied, 'I am Dr Kearney'. In a back-and-forth manner, we continued: 'No, you are not'. 'Yes, I am'. 'You are not. Dr Kearney is a man of experience and authority. I have spoken to him. You are not him'.

Apart from having an identity crisis, I was not sure what to do. This older gentleman, I assumed, correctly as I would find out, was Mr Furuie; he was the one I had spoken to on the phone, and he was the boss. I was at the end of the line. Fortunately, I had Mr Immamura's card with me. I showed it to Mr Furuie and asked him to ring Mr Immamura. 'Perhaps if you talk to him, he will be able to convince you that I am, indeed, Dr Kearney?'

Mr Furuie disappeared through the door with Mr Immamura's card. After about 10 minutes, he returned. He came up to me and stated, 'We discussed you, and I accept Mr Immamura's explanation of what Dr Kearney looks like, and I accept that you are him'. He was clearly not totally convinced, and even more clearly, not happy. He then said it was now almost lunch time, and one of his people would take me to lunch. We would begin our meeting at 1 pm.

The lunch was basic and uneventful. I was in their meeting room at 12.55 pm with my notes in front of me. The meeting began about 10 minutes later. Mr Furuie was present for some of the time, but he did not speak. Two other gentlemen spoke English that was plenty good enough for a robust discussion, but we did not have one. They opened by reading a statement of about two pages, which rather succinctly covered the issues we needed to address. I was pleased that they were virtually the same as the ones on my list. The key issue, the price of the charter per month that they quoted, was quite a bit higher than the Fisheries Agency had suggested, but it was not outrageous. In any case, that is the sort of thing I was here to discuss. I responded by thanking them for their outline of what we needed to agree on, and I added a couple of points to the list. I then asked a specific question about how many months the charter should be. When I did not get a definitive answer, I suggested nine months. Again silence. So, I raised the issue that I did not yet have all the donor contributions, and

until I did, I would like to suggest that we agree on the first five months of the charter and then extend the agreement immediately once the French contribution is received. No response. When I asked them if there was any arrangement I could make on the length of the charter that might make it possible for them to reduce the monthly cost, there was silence for a while, then a different man read out the same two-page statement. After a rather pregnant silence, it was read again by a different person.

By 3 pm, I realised that we were not going to get anything meaningful achieved in the rest of the day. I decided that the most productive thing I could do would be to go back to my hotel and call Mr Immamura and ask him if we could possibly meet at a place of his choosing, to discuss what I needed to do. I was seriously concerned. I simply had to be able to charter a suitable vessel, or else there could be no Skipjack Programme.

We called the meeting off at 3.30 pm, and they arranged a taxi to pick me up and take me back to the hotel.

When I got to my room, I immediately called Mr Immamura. I was delighted when he quickly agreed that we needed to meet. He suggested the bar in my hotel. He said that he needed to make a few phone calls, after which he would go to the Imperial Hotel and meet me at 7 pm. I had seldom looked forward to a business meeting so much. I certainly needed help.

Mr Immamura was punctual. I led him to what appeared to be an executive bar and immediately offered him a drink. When he suggested a whiskey, I asked the waiter for two very good whiskies. This was not a time to be frugal about the cost of a drink. When the bill accompanied the two drinks, my lack of knowledge of Japanese customs relating to the price of the best whiskey in a top-level bar was further exposed, but $37 (in 1977, this equates to more than $300 today) for two whiskeys was the least of my worries.

Mr Immamura had called Mr Furuie and discussed our predicament. The issue of my not being Dr Kearney was easily explained. But they simply could not believe that somebody my age (Mr Furuie thought that I could even be not much more than 40 years old, and it was best he didn't find out I was 32) could be in a position to negotiate a charter agreement for more than half a million dollars. And on his own. I wasn't old enough to have had sufficient experience with any of the key issues of running a fishing vessel the size of the *Hatsutori Maru*, let alone adequate experience with

the financial issues associated with reaching a binding agreement for this amount of money. He was not convinced that my signature would carry the necessary authority. Therefore, there was little point in negotiating.

Running out and getting my hair bleached was not going to do it; they had already met me in the flesh anyway.

The second major concern Mr Furuie and his team had was that they found it impossible to accept that one person, regardless of their age, could negotiate a contract such as we were planning. Surely, I should have a team to consult with! Mr Immamura had a plan. He felt that if I could turn up for the meeting with three or four other people, this would be considered a mark of respect for their concerns and the Japanese tradition of doing business. These extra people did not have to say anything in the meeting, except to appear attentive when I turned to them and said something – anything!

I had a suggestion, but I was worried it might be testing the resolve of the donor governments of the Skipjack Programme a bit too much at this early stage. However, I did not have a lot of alternatives. I would contact the embassies of each of the donors and ask them to lend me a staff member for at least a couple of days, to sit behind me at meetings. These staff members did not need to be diplomats: they could be drivers or cleaners or whatever, but older men would be the most highly qualified for the task. Mr Immamura thought it better if they were not Japanese. That way, it was more likely they were truly representatives of their respective embassies.

We discussed a plan, over a second whiskey, and agreed that first thing the next morning, Mr Immamura would ring Mr Furuie and ask him to put our meeting back to the afternoon, perhaps 2 pm. He would only then ring me if there was a problem, which there should not be because our meeting was currently scheduled to begin at 10 am. I would ring the embassies of Australia, New Zealand, the United Kingdom and the United States – those countries had already funded the Skipjack Programme – in search of staff. Overnight, I modified this a little by deciding to ring the Australian Embassy first and confirm that they thought my plan to have each embassy lend me one or two staff members for a couple of days was a good one.

The next morning, I was most impressed that when I rang the Australian Embassy, I quickly ascertained that they knew I was in Tokyo and why I was there. I assumed that Bill Fisher, the Australian consul general to New Caledonia, had been at work. I was almost immediately put through to the ambassador. He understood my problem and thought my plan was a good

one, and he would be pleased to help. He would send a senior driver to the Hokoku Marine Products building at 1 pm, and he would be very happy to contact the other embassies on my behalf and ask them to do at least the same. He was very confident that they would agree. A primary responsibility of the embassy staff was to encourage and facilitate business between Australia and Japan. And this was business the Australian Government was paying for.

Shortly after 1 pm, the Australian driver turned up, as did two New Zealanders, an American and two Brits. The two Kiwis, one male and one female, were actually diplomats, a bit younger than the ideal, but to my great surprise, they actually knew quite a lot about the Skipjack Programme and were interested in it. They were looking forward to sitting in on the negotiations. I cleared with them that if the opportunity arose, I might even ask them to comment on New Zealand's support for the programme and their hope that the chartered vessel would go to New Zealand at some stage. I asked them to make a point of talking to the Hokoku staff about the programme during coffee breaks. They were definitely not just 'rent a crowd'. They were very good.

At the start of the meeting, I introduced my new support team as members of the embassies of the countries that, like Japan, were supporting the Skipjack Programme and thus contributing financially to the charter of the *Hatsutori Maru*. Mr Furuie's face lit up, and so did the mood around the room. Just the fact that four embassies had immediately come to my support appeared to be a big factor.

One of Hokoku's senior staff opened the discussion by saying that they had been thinking of Dr Kearney's question of yesterday relating to the length and cost of the charter. They thought that this was an excellent place to begin negotiations, and they would start by stating that, obviously, the length and price of the charter were related. And yes, there was room for them to reduce the asking price if an agreement was reached on other aspects. I could not believe the depth of the transformation from the day before.

By the end of the afternoon, we had a tentative agreement on most of the major issues, including a commitment to a five-month charter until the French contribution was received. Then it would go to nine months with agreement on the possibility that 10 months could be an option, if I had enough money and, of course, the price was within my range. The asking

price had already come down to approximately $60,000 per month, with the acknowledged possibility that it may come down further, particularly if I agreed to the full 10-month charter.

We had agreed in principle that during the refurbishing of the *Hatsutori Maru*, I would send one of my staff to work with them on the modifications to the scientists' cabin, including the lengthening of at least two of the bunks and the construction of a wet laboratory where fish could be gutted and baitfish analysed. Hokoku also agreed to help my staff member purchase the necessary scientific equipment, including microscopes and glassware. I offered to transfer money to them in advance of these purchases. They were not worried about prepayment; they were happy to pay for this equipment and send us a bill.

The day ended with us having made what I thought was incredible progress. There were still lots of important details, like the demarcation of authority between the responsibilities of the captain of the vessel and the senior scientist on board at the time. But we had already agreed that this would be within the general parameters of the scientist deciding on where the vessel went, with the captain having absolute authority over how the vessel got there.

I was hugely relieved. I had little doubt our relationship was now on a sufficiently firm base that we could rationally deal with any likely issues. Mutual respect had been established.

I then spoke to my 'staff' and, after thanking them profusely, asked them about coming back tomorrow. Their embassies had all committed to two days at least, so this was not an issue.

Back at the hotel, I called Mr Immamura to thank him. He had already spoken to Mr Furuie, who he said was very pleased with the way things had gone.

The next day saw very cordial discussions on most aspects of what I expected of the vessel and its crew. We had little difficulty agreeing on all key subjects, such as the countries we would visit and the likely order in which we would visit them and the length of time we anticipated staying in each. I would be responsible for making sure each country was in agreement that the vessel was welcome and could fish for tuna and baitfish in most areas; I would ascertain if there were particular areas where we should not fish, and I would advise the captain before the vessel arrived in each country of where

restricted areas were. Hokoku agreed that they would be responsible for arranging technical issues, such as where the vessel could berth and purchase fuel and provisions. I was particularly pleased when they suggested only one or perhaps sometimes two days per month would be spent in port.

At the end of the third day, Mr Furuie asked me to keep the next evening free because he would like to take me to dinner. Our relationship was now definitely on a sound footing.

By the end of Thursday, we had reached an agreement on all substantive issues, including that the last day would be spent going over the draft agreement. They were happy that my 'staff' would be surplus to requirements for this purpose.

The dinner was memorable. It was at one of Tokyo's best French restaurants.

I was well pleased with the document that we had agreed to by the end of Friday, particularly the price of the charter at approximately $56,000 per month, with some additional costs for victualing and salaries for the Fijian crew. The best estimate I could make for the total monthly cost was $60,000. Most importantly, I felt confident that the relationship with Hokoku Marine Products was strong enough that if problems were to arise, we could agree on solutions. One interesting aside was that before we broke for lunch, Mr Furuie rather sheepishly asked me if I minded if 10 people took me to lunch. I had no problem at all, but I was curious. Only one of the 10 spoke English, and none of them had been at our meeting, so the need for this gathering was beyond me. The meal was at a very good restaurant, and it was excellent and expensive.

From memory, there were some small changes in minor items in the draft agreement, and the final version was signed at the SPC on August 23 and by Hokoku Marine Products in Tokyo on September 1. The fieldwork of the Skipjack Programme officially commenced when the *Hatsutori Maru No. 1* arrived in Kavieng, Papua New Guinea, on October 5, 1977. Skipjack fishing commenced the next day.

Successive Charter Agreements

Approximately a year later, I was back in Tokyo to negotiate the terms of the second year of the charter agreement. It was now accepted that I was indeed Dr Kearney. In fact, my stature had increased to the point that I was

now Kearney-san. As all payments had been received on time by Hokoku Marine Products, my authority to negotiate and to pay bills was no longer in question. My age had not changed a lot, but still, my 'staff' would no longer be required. I had been planning to bring at least one of my scientists with me if that had been necessary.

I had been delighted with the performance of the vessel and crew. After the very poor fishing in the first month (see Chapter 14), the rest of the fieldwork had gone better than I had expected. Equally relevant to the discussions on the costs and conditions of the next year of the charter was that international currency exchange rates had gone in my favour to a significant degree. But my windfall was largely at the expense of Hokoku Marine Products. I had come to Tokyo prepared to commit at least a bit more money relative to the previous year and was prepared for a significant increase in the asking price based on exchange rate issues. The previous year, the US dollar had been worth 270 Yen, and this year it was only 195 Yen.

Our meeting opened with both parties being in a very good mood; the atmosphere was wonderfully informal. I began by saying how pleased I was with the performance of the *Hatsutori Maru* and its crew. All the arrival and departure times had been met, and all the countries and territories in whose waters we had operated were both impressed and pleased. The fisheries officers from the various island states had greatly enjoyed their time on the *Hatsutori Maru*. Mr Furuie responded by saying how pleased they were with the year. In preparation for the day's meeting, he had contacted all the crew to seek their intentions on committing to another year of the same. He was delighted to report that every one of the crew wished to do it all again for the full 10 months. They had enjoyed the tagging and bait-fishing work, interacting with our scientists and seeing all the new countries and locations for fishing.

Once we had agreed that another 10-month charter was the objective, we quickly got to the key issue – the price. They tabled an estimate of their expenses that were anticipated to increase compared to the period of the charter that had just been completed. In summary, they represented an increase of about 3 per cent. Out of respect for the excellent relationship I had with Hokoku, I stated that we had done very well out of currency fluctuations over the last year, and as they had borne the brunt of this, I was prepared to offer them an increase of more than 3 per cent. To my amazement, Mr Furuie responded that Hokoku Marine Products was a well-established business and they were used to the pros and cons of

currency fluctuations. There was no need to compensate them for the year. He looked at me and smiled: 'Next year, the currency will go our way'. It was obvious that the critical issue was that we continued to negotiate and to pay in US dollars. I found the contrast with what I would expect of an Australian company if offered more money surprising.

We managed to fill in two days with discussion of relatively minor issues, like things that might be done to improve the quality of the food on board. I remember saying that this was not a huge issue, but a bit more quality steak would be appreciated. This was duly noted. I advised that we greatly appreciated the efforts of the Japanese cook, Wakasaki-san, to prepare meals that our scientists would enjoy. The food on the boat had been predominantly Japanese and very good.

One issue of some substance to me was to enquire about the possibility that the captain of the vessel could be changed. The other scientists and I had some difficulties working with the current captain. On too many occasions, he had taken it upon himself to move the vessel while we were actually fishing a school. He was not a good fishing master, and we had not been able to convince him of the benefit of keeping a school biting for a long time compared to trying to catch the maximum weight of fish very quickly. For our tagging operations, a steady stream of fish coming into the tagging cradles was a great deal better than having 'helter skelter' fishing, resulting in a big pile of dead fish on the deck. We were using the vessel for research, not commercial fishing. In addition, the captain did not like to take instructions from the senior scientists who were in charge when I was not on the boat, and this was more than half of the time. One of those scientists, Bob Gillett, was even younger than I was. Even when I was on the vessel, the captain could be difficult.

Mr Furuie said that changing the captain of the boat was a very big thing to ask. They did not have a lot of experienced skippers, and he doubted that he would be able to find one who would be prepared to be away from home for 10 months straight. Plus, the current captain would consider it an insult to be replaced against his wishes. Mr Furuie said that first he would talk to the incumbent. I said that I would appreciate anything he could do to help. I had found the current captain to be rather stubborn, so I was not optimistic. But in keeping with Hokoku's willingness to help, when the *Hatsutori Maru* arrived back from its annual service in Japan, to commence the second cruise, it had a new skipper, captain Mirsutoyo Kaneda. He was to turn out to be excellent.

During the year since our first round of negotiations, I had made enquiries of several Japanese diplomats and scientists about the issue of 10 people taking me to lunch and/or dinner. The answer was a bit convoluted, but it provided a plausible explanation of the events.

Since shortly after the end of the Second World War, Japan had a policy of rewarding companies who could bring foreign currencies into Japan, particularly US dollars. This reward was in the form of not only tax deductions on legitimate expenses in attracting foreign investment, but actual reimbursement of all or at least part of those expenses. Entertainment expenses were considered legitimate, provided at least one of the people doing business in US dollars was present. The rules were rather complicated, and none of the people I managed to speak to was up with the details, but there were apparently grades of reimbursement that were influenced by the amount of US dollars involved. I was told by one person that $100,000 was a key trigger. At around $600,000 a year, we were well above the minimum level.

In my private discussions with Mr Furuie, he stated that his company was particularly pleased with the relationship we had developed and how smoothly the first year of our agreement had progressed. He also thanked me for agreeing to have numerous staff members accompany me at restaurants and other events. To demonstrate his appreciation, he wanted to ensure that I had the opportunity to experience, at their expense, some of the benefits of Japanese culture, such as excellent restaurants, bars and the opera.

Back to the meeting on Thursday. We had quite a few minor issues for which the discussion was valuable. One was the possibility that we could give the captain as much lead time as possible for our detailed schedule. They had some concerns about the availability of fuel and stores in some of the places that were on our draft itinerary, particularly the smaller countries or territories. I agreed that we would work with the captain on the detailed plan and that we would schedule a meeting on board the *Hatsutori Maru* every week to ensure we were 'on the same page'.

Mr Furuie's two senior officers took me to dinner on Thursday night. It was more than just dinner. Following a wonderful meal at another excellent French restaurant, which had several Michelin hats, we went to the opera. After that, we went to a very small bar in which there were only three very small tables and four or five stools at the bar. At one of the tables sat an elderly, extremely well-dressed man who was obviously somewhat intoxicated but still drinking, serving himself from the bottle of whiskey on

his table. I was having a very pleasant chat with my colleagues, mainly about the day's discussions, when the elderly gentleman fell off his chair. He lay flat on the floor. Two men in black suits and white gloves immediately appeared and carried him out to a very large black car that was parked at the curb right in front of the bar. The promptness and precision of their response left no doubt that they had been observing their master for some time and were well trained. My colleagues advised me that the gentleman in question was a very influential businessman, and he came to this bar most evenings after working late and just drank until the inevitable occurred, again. I had noticed throughout 'downtown' Tokyo a surprising, to me, number of similarly small bars with racks of whiskey bottles with writing on them – the names of their owners. My colleagues advised me that the practice of senior Japanese businessmen drinking in seclusion was reasonably common. It was accepted practice for those who could afford it. The fact that they had their 'minders' looking out for them meant that they would not be a cause of inconvenience to other patrons of the bar.

The third year of negotiations included several more lessons in Japanese culture.

The meeting began in excellent spirits. My wellbeing was heightened when Mr Furuie advised that they were proposing to upgrade the vessel I would be chartering from the *Hatsutori Maru No. 1* to the *Hatsutori Maru No. 5* (which was the same type of vessel but 50 tonnes bigger). It would be roomier for the scientists and more stable, and it was faster. Hokoku Marine Products would make this better vessel available at a little extra cost. Then they handed out the profile of the charter agreement. It included a very significant increase in the monthly charter cost; from memory, the increase was close to 30 per cent. I was surprised. Whatever the actual cost was, it took the total cost of a 10-month charter well above my budget. Unlike last year, I had very little money to negotiate with this time: I had spent almost all of my noncommitted cash on the purchase of a computer for more than $100,000 (see Chapter 15). There was also some uncertainty at this time over the actual level of contributions from a couple of donors, and uncertainty about when some of the contributions might be received.

I told them that I found the size of this requested increase in price to be unreasonable, and based on what they had told me and what was in their proposal, it was not well justified. I was deeply disappointed that they had not given me any warning that such an increase was coming. One of their

officers then proceeded to read out their proposal. He finished by adding that they believed this was a perfectly reasonable request. As soon as I said that I did not agree and thought it unreasonable, he picked the paper up and read it out again. When a third person read out the same proposal, I realised that our relationship had suddenly reverted to where we started two years ago, when they would not accept who I was. They had gone back to referring to me again as Dr Kearney. I needed some time to think.

I told them that I would like to take their proposal back to my hotel and think about it overnight. We had sorted most of the issues related to the vessel charter out in the negotiations of the previous two years, so really, the only issue this year was the price. We had plenty of time. Mr Furuie adjourned the meeting until 10 am the next day.

On arriving back at the hotel, I immediately called Mr Immamura. Fortunately, he answered. He offered to call Mr Furuie and get back to me. He did not take long. The issue was straightforward. My direct challenge to their proposal was not the Japanese way of doing business. The fact that I said they were being unreasonable was insulting. I had to find a much gentler way of asking them to reconsider. Mr Immamura was confident that if I could do that, we could make progress. Mr Furuie was ready to negotiate, but only if such negotiations were done in a spirit that was in keeping with Japanese culture. How much progress we might make, he was not sure.

The next morning, to open our discussions, I delivered the short speech I had composed overnight:

> Mr Furuie and gentlemen, I wish to apologise for some of the things I said yesterday and the way I said them. I am truly sorry. The reason I reacted the way I did was that I suddenly realised that the problem I had with your proposed increase in the price for the *Hatsutori Maru No. 5* was all my fault. The real problem is simply that I do not have enough money. I will not be able to charter the vessel for the 10-month period that has worked so well for two years. Your proposal is perfectly reasonable. The fault is mine. I was disappointed, and I overreacted. However, I must tell you that at this time, I only have enough money to charter the vessel for eight months at the price you have quoted.

Mr Furuie took his time, then he responded:

> Kearney-san, thank you for your apology. It is much appreciated. Our company is a very honourable and reasonable one, and we work in good cooperation with our partners and clients. We have very much enjoyed working with you and your research team over the past two years. We would like to keep doing it. We appreciate that you do not have enough money, so in the spirit of good cooperation we will accept the eight-month charter, and we will reduce the price to $70,000 per month.

I thanked him sincerely and said that I would speak to the donor governments and hopefully be able to extend the charter to at least nine months.

Harmony had been restored. We had very productive discussions of details through to lunchtime. Mr Furuie came up to me with a big smile on his face. He shook my hand and repeated how much he had enjoyed our relationship. And he enjoyed it so much that the next day he would like to take me to lunch at Tokyo's best restaurant – one that is Japanese, and the very best of Japanese culture of dining would be on display.

The lunch was indeed memorable. There were three of us, and we had our own rather large room with two full-time ladies in unpretentious kimonos as attendants. Part of the floor was glass, and very large carp could be seen swimming around below us. The meal was truly wonderful. I lost count of the number of small courses, but the total was about 18. All were impressive, but some were spectacular, like the southern bluefin tuna toro sashimi. Many of the courses were very small, one being a simple quail egg. But, as I was informed, it was no ordinary quail egg! I have forgotten the story about the egg, but I will never forget the one about the Ayu, a very small (about 10 centimetres) freshwater fish. We had one each that had been fried and presented on a small plate with no trimmings whatsoever. Mr Furuie explained: 'The Ayu is very popular in Japan. But this is no ordinary Ayu. This one comes from the freshwater streams on Mt Fuji'. I knew enough about the reverence associated with Mt Fuji to be most impressed, and said so. Mr Furuie continued: 'But Mt Fuji is not the reason this one is extra special; the real reason is that this species is on top of the Japanese endangered species list'. I really did not know what to say, so I said nothing but nodded in agreement. I later found, by enquiring of my Japanese colleagues, that these Ayu were almost certainly fish that were cultured from broodstock that had their origins in the streams of Mt Fuji.

The demise of the ones we ate would have no impact on the wellbeing of the species. But yes, the wild population is indeed threatened. The occasion was indeed enjoyable and memorable.

We concluded our meeting early, with a full day to spare.

I was sorry my trips to Japan to negotiate the charter agreement had come to an end. Collectively, they had represented a fabulous set of experiences. They had enabled me to overcome one of the most significant challenges to the whole of the Skipjack Programme – the procurement of an appropriate research vessel.

That evening, I was most pleased when Mr Immamura accepted my invitation to come to the Imperial Hotel for a glass of whiskey, or two, so that I could express my great appreciation in person.

Shortly after returning to Noumea, I was advised by the Government of France that they would be making a substantial increase in their contribution for the next year. The Government of Japan and the Japanese Fisheries Agency also agreed to increase their contributions to help with the increased charter costs. I was able to advise Mr Furuie that we could now extend our charter agreement to the usual full 10 months. His response: 'Thank you, Kearney-san. I am very pleased'.

14

Some seriously exciting times: The beginning of fieldwork, 1977

By October 6, 1977, the Skipjack Survey and Assessment Programme had already afforded me many memorable moments, and the fieldwork of the programme, clearly the 'fun part', had not yet even started. Not all the memorable moments had been highs. But to that day, none of the highs had come close to the level of sheer joy and elation of standing on the bridge of the *Hatsutori Maru No. 1* and looking out across the enormity and magnificence of the western Pacific Ocean as we sailed out of Kavieng Harbour on New Ireland in the north of Papua New Guinea.

We were about to commence what I had, for the last three years, assumed would be a fabulous adventure. And it would turn out to be. My dream had blossomed into reality. I had designed this huge scientific experiment, raised the necessary millions of dollars, recruited the staff and chartered the vessel on which we were now entering my laboratory, all 50 million square kilometres of magnificent blue ocean: 30 million square kilometres inside the area of the SPC and about 20 million in international waters outside that area. And I was not alone or unprepared. I had the personnel, tools and equipment, all of my choosing, including a very large research vessel, to test my hypothesis that yes, we could release and recover enough tagged skipjack over the whole of the area of greatest interest to enable accurate assessment of the skipjack resources of the entirety of the central and western Pacific

Ocean. The survey of the baitfish resources was not a hypothesis. I did not doubt that it would work. It was merely a matter of accurately compiling and analysing the data that inevitably would be collected.

We were embarking on a fisheries research experiment for which there had been no equal. It was to be conducted under my direction in an environment that was, for all intents and purposes, limitless. How privileged was I? For what more could a relatively young fisheries scientist ask?

Standing two metres to my right, and clearly absorbing the highs of the occasion on this fine sunny day, was my friend and colleague from Papua New Guinea skipjack tagging days, Tony Lewis. As we passed out of the harbour, Tony looked my way. We both just smiled, absorbing what was a truly spell-binding occasion, for both of us. Nothing was said. Tony came up to me, and we shook hands. The moment was of itself so big, for both of us, that talking could only be a distraction. Another noise was far more reassuring: the sound of the heavy-duty, diesel main engine of the *Hatsutori Maru No. 1*. *Ker chunk a chunk, ker chunk a chunk, ker chunk a chunk* … a loud, heavy-base noise that was constant. Boring, even challenging, if you were not a seafarer. You could not get away from it anywhere on the boat. But if you were a mariner, it was calming. Its consistency and reliability were reassuring. It was the heartbeat of our adventure. Without it, we were not going anywhere; we were nothing.

It was indeed a grand occasion. But also, it was a time to concentrate on the uncertainties that lay ahead. It was a bit late to address any major deficiencies in my planning, but not too late to review our preparedness for the inevitable variability of nature.

During the fundraising period, several of the donor governments had expressed concern that assurances that the Skipjack Programme would work were disproportionately dependent on my opinion. At least some of them were mindful that tagging had not been used anywhere in the world to obtain an estimate of the size of a tuna population. This was not just any tuna population we were setting out to measure, but what I suspected was the biggest in the world. The area of the distribution of the population we were going to measure was enormous. Even the number of fish that would need to be tagged – 100,000 – was an estimate of mine that could rightly be challenged. Was it enough? Could we catch that many and get them back in the water in sufficiently good health for their behaviour to be truly representative of the broader population? Would the analytical scientists

I had yet to recruit be capable of developing the models that were going to be necessary to accurately interpret the mass of data we would, hopefully, accumulate? On my own, I had convinced the donor governments that this experiment was worth investing in. Now I had to deliver. And now I had what I believed was the necessary equipment and help to do so.

I never had serious doubts that the survey components or the programme, both for skipjack and baitfish, could be more than adequately covered in three years. The 18-month fundraising period had afforded me more than ample time to describe how analyses of the skipjack growth and migration data that would inevitably result from whatever number of tag recaptures we were able to achieve could be used to make a significant contribution to global knowledge of skipjack biology and resource dynamics. There had been no structured baitfish surveys in most of the island countries and territories of the region, so it would not be hard to demonstrate that the baitfish data we were certain to gather would, on their own, likely justify the expenditure on the programme. But I had gone to great lengths to hide my concerns that the skipjack stock assessment component of the objectives of the programme was by no means 'a given'. The reality was that at this stage of the programme, the concept that the size and dynamics of the greater western Pacific skipjack population could be determined by tagging was still little more than my hypothesis. In early 1977, I had given a talk to the regions' fisheries officers entitled 'Some Hypotheses on Skipjack (*Katsuwonus pelamis*) in the Pacific Ocean' which was published a year later (Kearney 1978). It describes the uncertainty surrounding skipjack population dynamics that I had openly acknowledged leading up to the start of the Skipjack Programme.

Even the pillars of the work program, such as the programme's stated target of 100,000 tagged fish in three years, were hardly precise. The first public exposure of this figure was at the opening meeting of the Expert Committee on Tropical Skipjack. I justified 100,000 based, primarily, on my three years of tagging skipjack in Papua New Guinea, the tagging results from the National Marine Fisheries Service work in Hawaii, and detailed scrutiny of the distribution and catches of the Japanese distant-water pole and line fishery in the Pacific. It was a balance between the minimum number I thought would be necessary to support the analyses that I hoped we would be able to do, and my best estimate of the number we could realistically expect to tag in three years. The chairman of the Expert Committee, Richard Shomura, canvassed suggestions for alternative numbers. As there were none, 100,000 became doctrine. When questioned by potential

donors to the programme about its adequacy, I displayed no hesitation in confirming that the data that underpinned it were as good as were available at the time. But were they adequate? Did they really amount to more than just my opinion? At this early stage in the programme, this issue still left me with some apprehension.

I never held serious concerns that, provided our research vessel performed as expected, we could tag 100,000 skipjack in three years. But concerns that we may not be able to have the tagged fish sufficiently uniformly distributed, both at the time of release and at recapture, were to remain at the front of my mind right through until about the middle of the second year of the programme. Up to that time, I kept a very anxious watch on the tag recovery data. I had always believed that, provided our tagged fish moved the great distances in virtually all directions, as the ones we had tagged in Papua New Guinea did, the problem of uniform distribution of releases would diminish with every tag release.

My long-standing concern that we may have difficulty catching enough fish to tag in all areas would only go away by demonstrating that we had done it. I had always anticipated that we would encounter areas where either skipjack or bait would be disproportionately difficult to catch. I was optimistic that by detailed monitoring of the distribution of tag releases and recaptures and maintaining flexibility in scheduling where we fished, it would all come together. The programme was, after all, research. We were about to find out. The experiment had just begun.

Kavieng had always been my first choice as the place to start the fieldwork of the programme. The reasons were many. To begin, the biggest pole and line skipjack fishery in the SPC area was based there. It was well documented to be among the best skipjack fishing areas in Papua New Guinea, and Papua New Guinea was, at the time, the most productive area in the whole of the area of the SPC. But perhaps most importantly, Barney Smith, Tony Lewis and I had tagged several thousand skipjack in the vicinity of Kavieng and conducted very successful aerial surveys of the greater area during our Papua New Guinea skipjack project. Plus, we knew the best bait-fishing grounds, and they were good. Should skipjack be hard to find, we had the full cooperation of the Australian–Japanese joint-venture skipjack fishing company, Gollin Kyokuyo, that was based in Kavieng. They had agreed to keep in touch with the *Hatsutori Maru* and to give us their daily fishing reports if we needed them.

I had done a lot of homework on the scheduling of our cruises and had gone to great lengths to make sure that the first month, in particular, was spent in areas where there were proven stocks of skipjack and bait was relatively easy to catch. I had gone over the detailed catch records of all four Papua New Guinea joint-venture companies for the six years since they started operating, and around Kavieng was clearly a premium location. These same catch records confirmed that October was a good month to be fishing in this area. I believed that I had done all that was possible to ensure that our first month of fishing would be successful, that it would impress our new staff and would set the tone for the next three years.

I was particularly mindful that most of the scientific staff on board were new to skipjack fishing. Only Tony and I had handled a skipjack, let alone tagged one. Pole and line fishing for skipjack is tremendously exciting: fish flying through the air on and off lines, live baitfish being thrown over the side in scoops-full, tuna splashing at the live feed, fishermen revelling in the excitement of hooking large fish and swinging them around to the tagging assistants, fish being tagged and returned to the water, scientists calling the numbers on the tags and the corresponding length of each fish to tape recorders, the chummers anxiously yelling instructions to other crew to transfer more bait to their 'pilot' tanks from which it could be thrown into the beautiful clear-blue Pacific Ocean – and these were only the short-term attractions. I needed the new scientists and crew to feel that excitement as soon as possible, as part of the inspiration and proactive reward for the hard work that was ahead of them.

Let the adventure begin.

The fishing on the first day did not live up to expectations. We saw only one school of skipjack and tagged only seven. The high I had experienced as we left the port of Kavieng had been challenged. I was seriously disappointed, but I knew the vagaries of fishing.

But worse was to come. In the next 10 days, only four fish were tagged.

We expanded our search area by progressively moving north. The joint-venture vessels based in Kavieng were not catching any more than we were, so we needed to try somewhere else. Around New Hanover, Mussau and Manus Islands were our new targets. Going there achieved little more than to confirm that the extremely low abundance of skipjack was common to

at least a much bigger area than just the immediate vicinity of Kavieng. In 10 days of searching in this area, we did not sight a single school of skipjack.

In the first 20 days of the cruise, only 28 skipjack were tagged. No end to our dilemma was apparent. The word we got from the joint-venture vessels based in Rabaul was that the fishing there was just as bad.

To say I was disappointed by these results grossly diminishes the impact they had on me. Papua New Guinea was the one area about which I had held no fear of really poor fishing. My expectation for the first month of the cruise had been 5,000 fish tagged. I was worried about some other places we would need to fish, but not this one.

The only positive I could find in the extremely low abundance of skipjack in the whole area was that it was abnormal. It represented new information. It was an experience I had not had before. Perhaps even more remarkable was that the few skipjack we did catch were the smallest I had ever seen in Papua New Guinea – less than half the average size. And we found them by strikes on troll lines we had out behind the boat while we were steaming. This itself was extremely unusual. We were witnessing a major aberration in skipjack behaviour that we had to assume was due to a significant oceanographic event, about which we knew nothing except that we could not fix it. It was hard to maintain enthusiasm for collecting data on events that we wished were not occurring.

What to do? By day 10, morale on the boat had fallen to a worrying level. With normal skipjack fishing, the ship's bridge would be a hive of activity, fuelled predominantly by scientists and crew intensely scanning the horizon with binoculars for signs of splashing schools of fish, or birds circling and diving. On the first three days after leaving Kavieng, it had been hard to get a spot in the wheelhouse to search from. Plus, there was always at least one person scanning the ship's radar screen for the slightest blip that might indicate bird activity a long way off. By the end of the second week, there was nobody on the bridge except the captain and me. The record of school sightings showed that of the first eight schools we sighted, I had been the first to detect six of them. My eyesight was no better than average, and there were more than 20 scientists and crew on board; nobody else was looking with enthusiasm.

I could have drawn up a schedule for all crew to take a turn looking for schools, but you cannot roster enthusiasm. Having more people asleep in the wheelhouse with binoculars propped up in front of them, as many had been, was not going to solve our problem. The Japanese and Fijian crew had all fished this general area for at least a year or two, and none of them had ever seen fishing so bad. They found it very hard to maintain interest.

I was greatly concerned for the morale of our newly recruited scientists, particularly Jean Pierre Hallier and Bob Gillet, whom I had marked as potential leaders of future cruises. This was not what I had promised them. They had every right to be concerned about what the future held for them. My repeated assurances that the fishing would soon improve were being delivered with less and less conviction. My authority on this topic, and by inference other topics, was quickly being diminished.

I had never worked so hard on trying to find a solution to a problem in my entire life. If we could not catch skipjack there was no real point in continuing the programme. Yes, we were collecting impressive data on baitfish, which we caught at night, but there were more efficient ways to do this than spending all day, every day looking for skipjack that weren't there. After three weeks, the idea of admitting defeat from time to time darkened my mind. It would clearly be unwise, if not stupid, to continue with our current catch rates of skipjack for the whole 10 months of our charter. When is enough, enough?

I was the one who had to make the decision on what to do. And I was very much on my own. I had Tony Lewis to confide in, but our discussions on the delicate issue of what to do seldom went past reassuring each other that the fishing simply cannot continue to be this bad forever. We both knew how fickle fishing could be. But neither of us had ever seen it this bad.

I was the one who had to decide what to do about the current dilemma. The whole programme was my idea. All the implementations had been either done by me personally or at least under my direction. I had nobody else to blame, or even to share the blame with. The responsibility weighed very heavily on me. As it should have.

What were the options? Carry on as we were? For how long? What would make me admit defeat? What did defeat look like? Should I terminate the whole programme now and give the money back to the donors? My dark thoughts even went so far as to consider giving the money to the SPC so they could employ 'somebody really good to run the programme' (see the SPC's

director of programmes' statement in Chapter 11). It was the realisation that I had reached such a low point as this that jolted me into reminding myself that giving in was not in my nature. I remained convinced that the design of the programme was sound, but was 'as good as it could be' good enough? There were ample data to confirm that skipjack were usually abundant in most parts of the western Pacific, even if not uniformly spread in time and space. What we were experiencing was an aberration. Unfortunately, there was another side to this 'aberration'; we had no idea how widespread this low abundance of skipjack might be and how long it would last. What if the same lack of skipjack was occurring over the whole of the central and western Pacific Ocean? I remained confident that with normal levels of skipjack abundance, the programme would work. But what if 'normal levels' never returned? This was too frightening to dwell on. The only thing we could do was just try harder to find some skipjack. My anxiety would remain until we did.

Even though my faith was being tested, I had not yet lost confidence that the programme would work and that I was the right person to run it. The scientist in me kept revisiting the data. Sparse though they were, the available statistics strongly indicated that there should be lots of skipjack where we were, even if not all the time.

We did not know then, but subsequent examination of the catch returns from the whole Papua New Guinea commercial tuna fleet revealed that October 1977 was the worst month in the seven-year history of the fishery. Statistically, it could not stay like it was. Our luck would change!

On October 19, I decided to abandon our search north of Kavieng and go south, perhaps as far as the Solomon Islands, which was the next country we were scheduled to visit.

On October 25, approaching the Shortland Islands and Bougainville, we finally found a school of skipjack that wanted to bite, even if only for a short while: we tagged 113. The next day, we tagged 455. There was a crowd in the wheelhouse again, looking for schools of skipjack.

The fishing did not suddenly become great, but at least there were signs that our luck was changing. The four-week cruise in Papua New Guinea resulted in 1,167 skipjack and 24 yellowfin tuna being tagged, mostly in the last week. Some excellent bait-fishing results were obtained and analysed. Our new scientific crew had at least some training in the processes that underpinned the programme.

History would show that we had survived the worst skipjack fishing that we would encounter in the whole three years of the programme. I still had a job – and my sanity. History would also confirm how abnormal our first month in Papua New Guinea really was. When the *Hatsutori Maru* returned to Papua New Guinea in May 1979, a total of 7,683 skipjack and 784 yellowfin tuna were tagged.

Fortunately, the fishing improved very quickly from the end of October 1977. The Solomon Islands and our short visit to Vanuatu were kind to us. Little more than a month later, in December and early January, in New Caledonia, 10,272 skipjack were tagged.

The programme's first annual report, for calendar year 1977, detailed that in a little less than three months, to December 31, a total of 10,045 skipjack and 187 yellowfin tuna had been tagged and released (Kearney 1978). At this rate, in the three years of the programme, we should release 100,450 skipjack, very slightly in excess of our stated target for the whole of the programme of 100,000. After a disastrous start, we were back on track. We were confident we could catch and tag enough fish. The basic principles underpinning the programme were indeed sound.

15

Reporting of the programme's work

The Skipjack Programme, right from its commencement, maintained the same rigorous reporting schedule that had been a feature of the Papua New Guinea Tuna Program: all components of the programme's work were covered in great detail and published as quickly as possible. The schedule included a preliminary country report for every country and territory that the *Hatsutori Maru* visited. These reports were completed and distributed as soon as possible after the conclusion of the fieldwork in the respective country. As a consequence, 12 preliminary country reports were produced in 1978.

A final country report for every country and territory was produced after the conclusion of the three years of fieldwork and analyses of the relevant tag return data, and related catch data from commercial fleets operating in or near the survey area. These final reports took much longer to materialise because they could not be completed until the relevant tag returns were documented and analysed. As tags could still be returned more than two years after they were released, extension of the time taken for final reports to be completed was inevitable. An annual report for each calendar year summarised the programme's operational and field activities in the prescribed year.

The detail covered not only tuna tagging but also the biological sampling of tuna that were caught but not tagged. This extra information provided data that were used to estimate growth, feeding behaviour and reproduction. Blood genetics and parasite occurrence were also catalogued and used for the description of stock structure. In addition, there was a huge amount

of data and analyses on the hundreds of baitfish species that were captured in most countries and territories by a variety of gears in both night and daytime sampling.

The first 'annual' report was for the calendar year 1977 (Kearney 1978). The programme's fieldwork commenced on October 5, 1977, so this report had fewer results than the following three. This was balanced by having more description of methods adopted for use throughout the programme, including data capture and processing methodologies.

Sampling techniques for all aspects of each of the programme's activities are described in the numerous technical reports that were produced for specific activities or datasets – for example, SPC (1980) on genetic analyses; Kearney and Gillett (1982) on methods used for tagging; Argue (1982) on biological data sampling; Hallier, Kearney and Gillett (1982) on bait-fishing methods; Argue, Conand and Whyman (1983) on juvenile tuna from tuna stomachs; Kearney (1983), which provides a programme final summary report; and Sibert, Kearney and Lawson (1983) on skipjack growth estimates. In addition is a suite of papers that describes the data processing and analytical techniques used in fisheries assessments – for example, Kleiber and Maynard (1982) and Kleiber, Argue and Kearney (1987).

The annual report of the programme for 1978 (Kearney 1979) was the first to cover a full calendar year. The period covered begins on January 1, when the *Hatsutori Maru* was in New Caledonia, halfway through a very successful period of tagging. Extensive details of the programme's activities for the whole of that year are provided in that annual report. Of relevance to activities in subsequent years was that in 1978, two of the donors increased their contribution to the programme for the next year: Australia's increase was from AU$250,000 to AU$283,000, whereas Japan, which had previously funded three months of vessel charter, at an approximate cost of $168,000, changed to a cash contribution of $180,000. These increases I took to be expressions of the donors' growing confidence in the programme.

Also of considerable significance for the future activities of the programme was that, for a variety of reasons, including exchange rate changes that were largely in our favour in that year, sales of fish and bank interest, total income for the year exceeded expenditure by $89,605. It was also noteworthy that during the year, the auditor general of Australia approved the way the programme's accounts had been maintained. This was of seminal importance, as the Skipjack Programme was outside the SPC's budget and

was the first to have its own independent executive processes. As I was personally responsible for all expenditure, the favourable auditor's report was hugely important to me.

In 1978, a significant addition to the staff of the programme was made with the recruitment of Dr Pierre Kleiber as the first senior scientist. He took up this position in May. A second senior scientist, Sandy Argue, was appointed to take up the position in March 1979.

Pierre had only been in the job a few months when he concluded that the arrangements we had for using the New Caledonian government computer for the compilation and analysis of our data were inadequate to achieve the level of excellence in science to which we were committed. It did not take him long to convince me that we had to do something serious to solve the problem. Two consultants were employed to advise on how best to address the issues. Both concluded that the only realistic solution was that we buy our own computer, one with enough power to accommodate the amount of data we envisaged handling and the intricate analyses of the tagging data that would be the foundation of our assessments of the size and dynamics of the skipjack population.

Buying a computer in 1978 was a hugely different task from what it is in 2026. Cost was a major problem, but not the only one. Firstly, I had to get the donors to agree that this was the way to go. Bearing in mind that there was only one computer in New Caledonia and this was owned by the government, this was not an insignificant issue. There was some concern by one or two donors that if every other enterprise in New Caledonia, including the SPC, could get by without a computer, why couldn't we? My answer that we needed to do much higher quality assessments of much more complicated datasets than did other enterprises, including the SPC, did not immediately allay their concerns totally. However, my discussions with representatives of individual donor governments led me to believe that the task of convincing them was not going to be impossible, but some work did need to be done.

The fact that we had significant savings, approximately $90,000, from the previous year facilitated the progress of my discussions with donor governments. We had demonstrated that I was a responsible financial manager, and the purchase would not cost the donors more money – at least

not much more. When I sought the approval of the donors to buy the computer, two of them simply said, 'We have given you the money. If you believe it is a priority and you have the money, just go ahead'.

The second annual meeting of the Programme's Intergovernmental Administrative/Finance Committee was held on October 10, 1978, while the delegates had gathered for the Eighteenth South Pacific Conference. At this meeting, the budget and accounting procedures for the programme were approved, and the auditor's report was accepted. It was most significant that it was agreed that if additional funding for the programme was required for whatever reason, then I, as the programme coordinator, should first attempt to obtain such funding from the existing donor governments. I took this to be an expression of pride in the 'ownership' of the programme, which the existing donors did not wish to see shared with 'interlopers' who had not taken the initial risk of funding an unproven enterprise. I advised the donors that I had already had a visit from South Korean representatives asking to be allowed to become a donor to the programme at a level of US$200,000 per year. The existing donors then agreed that if more funding was required than the current donors chose to fund, the programme coordinator could approach outside sources. Again, I took this to be a strong show of confidence in the management of the programme and support for it.

While at the South Pacific Conference, the donors had been getting very positive feedback from the Pacific Island delegates, the fisheries officers had been doing their bit.

Eventually, it was agreed at that meeting that the programme's savings could be used to purchase the proposed computer in pursuit of the standard of excellence in analysis to which the programme was committed. I had little doubt that if we needed a 'bit' more money to get the right computer, one or more of the donors would help. Australia and Japan had already demonstrated their willingness to take unilateral action in increasing their contributions to the programme. My confidence that all would be well with the level of funding for the computer was reinforced by their agreement that if extra funding was necessary, the existing donors had just authorised me to go to other donors if necessary. South Korea would almost certainly welcome the opportunity to help.

Price was obviously a major factor. Preliminary quotes from the few companies that made and sold computers in those days began at around $100,000. But it got worse. Most of the few companies that marketed suitable

computers would not sell to clients in countries that were considered not to have adequate capabilities to maintain and service their machines. Hewlett-Packard (HP) and Texas Instruments were the only two that offered us a computer that Pierre and our two consultants considered would do what we needed. After several rather brief discussions by phone, Texas Instruments withdrew their offer. They considered New Caledonia too 'remote' and not computer 'friendly'. Even though I now had the agreement of the donors to buy a computer, we were still going to be at the mercy of HP.

My job now was to convince HP to sell us an adequate computer at a reasonable price. After numerous phone calls to HP's regional office in Melbourne, it was obvious a face-to-face discussion was going to be necessary. They clearly had some serious reservations. So, Pierre Kleiber and I went to Melbourne.

Negotiations were far from straightforward: an outcome I had anticipated. HP finally agreed to sell us an HP Series 1000 mainframe with a 40-megabyte hard drive for about $100,000. The hard drive alone cost US$60,000. (I have never met anybody else who has paid $60,000 for 40 megabytes, and in 2026 currency conversion, this was approximately half a million US dollars.) I felt that this qualified me to be considered as either mad or a pioneer in computing! But this was not all. I had to agree that the computer would have its own air-conditioned, dust-free room with an appropriately buffered and isolated power supply, plus an appropriately qualified technician/scientist to run it full-time. To get the contract across the line, I also had to agree that one of our staff would undertake a training course at the HP head office in California. Dr Kleiber had a trip in front of him, which, in hindsight, he agrees he enjoyed.

From December 4 to 8, 1978, an 'Ad Hoc Meeting of the Expert Committee on Tropical Skipjack' was convened in Noumea to design fisheries catch statistics forms for use by all countries and territories of the region. That the Skipjack Programme should adopt responsibility for a regional data collection and analysis system had been confirmed by the 'Ad Hoc Meeting of Scientists to Discuss Skipjack Fisheries Developments and Research Requirements' that I had convened in Noumea from December 5 to 10, 1976. The members of the Expert Committee, of whom I was one, were, on my advice, pre-empting the arrival of a suitable computer.

Acceptance of standard forms by the regional fisheries officers would, in effect, commit the Skipjack Programme to the processing of them and production of computerised summaries and analyses. If we did not do it, nobody else would. The donors had somewhat of a problem with this action. Some of them felt that becoming the regional repository for tuna catch and effort data was beyond what they had committed to. I justified this commitment on the grounds that the tuna fisheries data were required to be used in combination with our tagging data for our analyses of the total skipjack resources of the region.

The move to commit to catch and effort data processing was in effect the beginning of the adoption by the programme of one of the primary responsibilities intended for the broad membership of the Regional Fisheries Agency. Such an agency was first proposed and then described in my two Law of the Sea papers delivered to the meetings convened by the South Pacific Forum in Suva in 1976 and 1977 (see Chapter 8). These meetings had resulted in the production of a draft convention to establish a South Pacific regional fisheries agency. I had for some time been championing the need for a regional agency that had the membership of all the countries and territories of the region. There appeared to be little chance the SPC executive would provide leadership on this issue, even though the SPC was the only organisation with the broad membership to do so. It had to be done, and we in the Skipjack Programme were the only ones who had the capability to do it.

The year 1978 was a very successful one for the programme from more perspectives than just buying a computer and entering regional fisheries data collection: it was an excellent year for activities on the *Hatsutori Maru*. A total of 13 countries and territories were surveyed: New Caledonia, New Hebrides, Fiji, Tonga, Wallis and Futuna, Western Samoa, American Samoa, Tuvalu, the Gilbert Islands, the Trust Territory of the Pacific Islands, Tokelau, the Cook Islands and French Polynesia. A total of 47,031 skipjack and other tuna were tagged; 7,901 biological samples were taken from tuna that were captured but not tagged, and 17,254 buckets of bait were captured, and samples were systematically analysed. The tagging results were outstanding, with an average of 244 fish tagged per fishing day. This included a world record of 2,910 tagged on one day, on May 20, near Wallis Island. The people of Wallis and Futuna were so impressed by the work on the *Hatsutori Maru* that they struck a series of beautiful stamps to commemorate it (Figure 7). The total number of tagged fish released exceeded the target number for the year by more than 40 per cent.

It is noteworthy that of the 276 days the *Hatsutori Maru* was in the survey area, 194 were spent fishing, 41 days travelling and only 41 days or part thereof in port. Many of the number of days recorded as being 'in port' were, in reality, often only parts of days. In other words, one day, or only part of one day, per week, was spent in port over the whole of the charter period. Considering that refuelling and obtaining supplies took longer than anticipated, particularly in some of the more remote areas visited, and that on top of daytime activities, 146 nights were spent fishing for bait, this constitutes a remarkable performance by all crew and scientists. Equally impressive was that not a single hour was lost due to mechanical problems with the vessel: a great reason to be extremely happy with the charter arrangements. I constantly reflected on the comparison with the Fisheries Research Vessel *Tagula* in the days of the Papua New Guinea Skipjack Tagging Program, when half of the possible fishing time was lost due to mechanical failure of the research vessel.

16

The relationship with the Forum Fisheries Agency

A one-off event that was to have long-term implications for the Skipjack Programme and subsequent fisheries activities at the SPC was the South Pacific Forum meeting in Niue, from September 16 to 20, 1978. The Leaders' Communiques from that meeting states:

> The Forum had before it a draft Convention to establish a South Pacific Regional Fisheries organisation. The draft Convention had been negotiated at meetings in 1977 and 1978. Participants at those meetings included in addition to the Forum countries; Chile, France, United Kingdom and United States. After a full consideration of Forum countries reasons for wanting a fisheries organisation, *the Forum decided that the organisation envisaged in the draft Convention was not the organisation which Forum countries wanted in the immediate future. The Forum accordingly decided to set up forthwith a South Pacific Forum Fisheries Agency comprising Forum countries and to examine further the more broadly based organisation proposed in the draft Convention*.
>
> (From Forum Leaders' Communiques, Ninth South Pacific Forum, September 1978; emphasis added)

This clearly worded communique leaves little doubt that the Forum members would like to get to a more broadly based organisation, but not at this time. As had been apparent at the second Law of the Sea meeting, in 1978, described in Chapter 8, at least some of the Forum members felt that they needed more information and debate with like-minded countries before committing to permanent agreements that included at least one distant-water fishing nation – the United States. The fact that the United

States had 39 people in their delegation at that meeting and tended to dominate the discussion with lawyers' details was a major contributor to their apprehension (see discussion of the meetings that led to the draft convention in Chapter 8). Clearly, at least some Forum members believed that they were not ready for negotiations, or perhaps even discussions, on the bigger political issues with non-'like-minded', much bigger countries, such as the United States.

At the time, I was disappointed, even in the short term annoyed, by the creation of the Forum Fisheries Agency (FFA). I had been championing the broadly based body for more than three years, and the fact that the meetings in Fiji, convened by the Forum Secretariat, had led to a draft convention for such a body based on the principles outlined in my two papers that were the primary discussion documents for those meetings meant that the island countries and territories agreed that good progress was being made. The desire to have such a body was clearly acknowledged in the Forum Communiques, quoted previously. I had been hoping that those at the Niue meeting of the Forum would decide to progress the convention of a broadly based body. I strongly believed that if more debate was required between Forum members before consensus could be reached, this would best be facilitated through the existing Forum Secretariat (the South Pacific Bureau for Economic Co-operation [SPEC]). I thought that the creation of an alternative fisheries body, with less than full membership, would set the plan for a broader-based body back considerably. I was also concerned that if the Forum formed its own fisheries body because they felt they needed more advice on political issues that they did not want to share with non-Forum members, this would diminish the priority that would be given to the importance of science in the cooperative management of the region's resources. I also felt that the creation of a Forum-only body would provoke at least some of the non-Forum countries or territories to form their own group to further their particular interests. Both of these major concerns were proven to be correct: the Parties to the Nauru Agreement (PNA), with participation from some non-Forum and Forum members, was created in 1982. The activation of the convention for the creation of the Western Pacific Fisheries Commission, the broadly based body, was set back considerably. It did not come into force until 2004.

At no stage did I believe that the work proposed for the FFA did not need to be done. Or that the work done by the PNA has not been extremely valuable. But I believed that the work for Forum members that was envisaged in the creation of the FFA was predominantly political, supplemented by legal

and economic concerns, and could have been more efficiently performed by extra staff within the Forum Secretariat (SPEC) in Suva. That body was set up specifically to help Forum members with policy development on issues of political and economic significance. Addressing that function in the name of a fisheries agency that was not a science, research, or fish resource management body certainly took the wind out of the sails of those of us who believed that the region needed a coordinated fisheries research and management capability. The results from the Skipjack Programme had already proven this.

I also strongly believed that the creation of the FFA inadvertently diminished the standing of fisheries issues on the Forum agenda. The 1978 Niue meeting itself was proof that fisheries issues had finally been acknowledged to warrant debate at the highest levels (by heads of government) of Forum members. This was a critical time for fisheries development and Law of the Sea negotiations. The creation of the FFA delegated responsibility for, at least the debate of, these critical issues to a lower level of government than would have been the case if they had remained the responsibility of the Forum Secretariat (SPEC).

I do not question that the FFA has done some particularly valuable work for Forum members. I would contend that this has been most apparent since the creation of the broadly based Western and Central Pacific Fisheries Commission in 2004. The way in which Forum members have adhered to regional solidarity in negotiations with distant-water fishing nations has been impressive and has brought considerable benefits to members. I would contend that had the draft convention for the more broadly based body been enacted at the Niue meeting in 1978, and staffing levels in SPEC been increased by similar levels to those provided to the FFA, these benefits would have been achieved much earlier, and the more broadly based body would have been created much sooner.

I was not present at the Niue meeting, but my colleagues who were there told me that the suggestion for the creation of the FFA came personally from the Australian prime minister, Malcolm Fraser. At the time, Australia was keen to demonstrate support for the recently created Forum. At least some of the Australian delegation that the prime minister had to advise him at the Niue meeting were not on top of international fisheries issues. The prime minister himself correctly formed the opinion from the discussion in Niue that several Forum members were reluctant to immediately push ahead with the creation of the broad-based fisheries organisation because

of their fear that the outputs from the organisation would be dominated by the bigger, non–Pacific Island countries. Several of the Forum members had aired their displeasure with the domination of discussions on non-fisheries issues within the SPC by the 'colonial powers' (see Chapter 8). The dominant presence at the Law of the Sea meetings in Fiji by the United States, in particular, but also France, had unfortunately transferred these same concerns to the debate on marine issues, which were at that time dominated by fisheries.

It appears that the composition of the Australian delegation to the Niue meeting was such that the prime minister would not have had the benefit of a quality briefing on the current feelings of Pacific Island people on fisheries issues. It also appears that the prime minister's advisers at that meeting did not adequately understand the differences between a body that would do the research, including the stock assessments that were essential for management of oceanic fisheries, and a body that provided political and economic advice to members on issues such as regional cooperation and the licensing of distant-water fishing vessels. In the absence of this understanding, Fraser's suggestion was logical for an Australian prime minister who wished to be seen as actively supporting the Forum. In my view, however, it was poorly informed and, as a result, unfortunate.

I did not doubt that Australia intended to support the pursuit of the aspirations of Pacific Island countries and territories. The generous contribution by Australia to the funding of the Skipjack Programme was the most recent demonstration of this intent. Australia contributed $996,331; the second highest contribution, $726,533, came from Japan. However, the frequent lack of understanding of Pacific Island fisheries issues by Australia's delegations to regional fisheries meetings created a severe handicap for the efficient achievement of Australia's intentions.

As an Australian fisheries scientist, I took great interest in my country's performance at fisheries meetings. I was frequently embarrassed by the performance of Australian delegations at regional meetings in the South Pacific. At one such meeting, the Australian spokesperson provoked Pacific Island delegates, led by the Solomon Islands, to move a motion that the delegate from Australia no longer be heard. I shared the concerns of the island delegates. This was the only time I witnessed such a motion at a South Pacific meeting, where consensus and collegiality are so respected. The substance of the particular complaint at the meeting in question was that the delegate in question continued to ask an inordinate number of

inadequately informed questions, to which most people in the room knew the answers. His interventions seriously disrupted the flow of the meeting. When I confronted him with this, he stated, 'But I am enjoying this. I am learning so much'. When I pointed out to him that he was supposed to have learnt about the issues before he represented Australia at such meetings, he seemed genuinely surprised.

Also of immediate importance at the time, to me personally, was that following the Niue meeting, I was offered the job as the first director of the FFA. What to do?

Of relevance to my decision on this issue was that a day or so after I was offered the job, I was approached by a senior member of the New Zealand delegation to the Niue meeting. He wanted to advise me firsthand that in the Forum's debate on the subject of the position of director of the FFA, New Zealand had not supported my nomination that had been proposed by Papua New Guinea; in fact, they had opposed it. They wanted me to hear this, and the reasons for it, from them directly before I got a distorted version that might come through the 'rumour mill'.

I was told that New Zealand believed that the new FFA, as had just been created, was more a political, legal and economic advisory institution than a fisheries research and management body. Its primary task would be to foster understanding of the political and legal issues impacting regional cooperation and to maintain cohesion on agreements that were to be reached, particularly in relation to the Law of the Sea. Therefore, it would be better if the director were a diplomat, or perhaps a lawyer, or even an economist, rather than a fisheries scientist. Although he certainly did not state it (he was a diplomat, after all), I formed the definite opinion that New Zealand did not support the Australian prime minister's suggestion to create the FFA in the form in which it had been constituted.

He stated that New Zealand's decision not to support me for the position of director was not against me personally. He reminded me, not that I needed reminding, that New Zealand had strongly supported me in my quest for funding for the Skipjack Programme (they had actually been my strongest supporter; see Chapter 7), and they continued to do so. They accepted that a fisheries scientist would likely be appropriate to be the director of the broadly based fisheries management institution, once it was created, and in their opinion, I would be a strong contender for that position.

Again, the Kiwis understood the issues better than most. I completely agreed with their logic and could not fault the decision they had come to. But the position of being the director of the FFA did have some appeal to me, and I had been offered it. It would be rude not to at least think about it. Furthermore, lately I had been more of a salesman and a banker than a fisheries scientist anyway: why not try being an economist? I asked SPEC for a week to consider the offer: they agreed.

A week later, I declined the offer. My reasons were multiple. Firstly, I agreed with the New Zealanders that the job was really for a diplomat. The second was that I did not want to desert the Skipjack Programme halfway through; the third was that as the director of the FFA, it may not be good if I continued to support the creation of the broader-based body that I truly believed in; and finally, and I would like to think most importantly, my wife was very happy in Noumea, and we now had two very young children – moving our family to another country was not a great idea, at this time.

But I accepted a compromise. I agreed to undertake a three-month consultancy to outline the fisheries issues that I thought would be of immediate concern to the FFA. To ensure that my time was free of Skipjack Programme commitments during this task, I carried it out at the CSIRO Fisheries and Oceanography laboratories in Cronulla. The report of that consultancy was subsequently published by SPEC (Kearney 1979).

Looking back on the broad issue of the creation of the FFA, 46 years later, I have come to the conclusion that had Malcolm Fraser not made what I believed to be a poorly informed decision, the SPC would not be enjoying the prominence in fisheries research that it currently does. Had the FFA not been created, the countries and territories of the central and western Pacific, including the members of the South Pacific Forum, would likely have carried on with the progress towards the creation of the broadly based fisheries commission for which a draft convention had already been developed by the Forum Secretariat (discussed previously). Had that happened while the Skipjack Programme, or possibly even the Tuna and Billfish Assessment Programme, was still in operation as an externally funded add-on to the SPC, the whole of the skipjack and other tuna research would likely have been moved to the new commission. This move had been anticipated, even considered a goal, by the donors to the Skipjack Programme and numerous Pacific Island countries (see Chapter 9 and Judd [2016]). It would have

provided the perfect platform for ensuring broad membership of the new commission. It would have given the new body a fully functional work program and a broad-based regional fisheries database to build on.

Had the SPC lost the biggest and most famous component of its work program in the late 1970s, when it was in great financial trouble and not popular with most of its island members and its major donors, the SPC would likely be a totally different organisation than what it is today. I believe that the loss of its most successful program while the Forum was in the ascendency, including taking the running of marine issues such as fisheries, may even have been fatal for the SPC.

I was to maintain a good working relationship with the FFA throughout the remainder of my tenure at the SPC, even though this was a little difficult during the short tenure of the first director, whose time in the position was, fortunately for at least most interested parties, rather short. The agreement that the Skipjack Programme would stick to the scientific aspects of fisheries research and management while the FFA concentrated on the political, legal and economic components was logical, and generally adhered to.

I particularly enjoyed working with the deputy director, Les Clark, and after Phillip Muller took up the position of director, he and I formed a firm friendship that was to last for years after I left the SPC. One area where there was some contention, and even dispute, that was to continue for quite some time, was that of the collection and control of the catch and effort data from the distant-water and domestic fishing fleets. The analyses of these data were of vital interest to both organisations.

As discussed in Chapter 15, once it was obvious that the Skipjack Programme would have the computing capability to compile and process the very large amounts of data on the western Pacific tuna fisheries that would be forthcoming, I was determined to have the primary control of that data rest with the body that was responsible for the scientific assessment of the status of the resources. If the primary use of the data was to be for science and the wise conservation of the resources, then the moral imperative to have the data provided by fishing vessels correct and accurate would be more defensible by the agency responsible for collecting it. This has been proven to be the case (discussed further later in this chapter).

Even though the creation of the broad-based fisheries organisation may have been set back by the creation of the FFA, I took some comfort in the final statement on this subject in the Forum communique of September 20, 1978, which stated the intention 'to examine further the more broadly based organisation proposed in the draft Convention'. As the director of, effectively, the only international tuna research program/organisation in the South Pacific at the time, I believed that I had a heavy responsibility to foster and maintain continuity in that data and ongoing research until a more permanent, broadly based research capability was established.

I do not have an accurate recall of the time, but it was shortly after the departure of the first director of the FFA that I received a request from the acting director, Dick James (formerly the Solomon Islands' director of fisheries), for a meeting to discuss responsibility for collecting and processing tuna fisheries data. A time was agreed for a two-day meeting in Noumea.

Dick brought with him to the meeting Dr Mike Sheppard, a well-respected Canadian international fisheries expert. I had briefly worked with Mike before in dealings with the Food and Agriculture Organization of the United Nations. I had been impressed with his ability and was pleased that he would be participating in this meeting, even though I knew he was a strong supporter of the FFA.

The first half day was spent with Dick James explaining that he had authorisation from the Forum to make whatever arrangements were necessary to ensure the FFA had all the data needed to fulfil its mandated responsibilities to its members. In discussions, I was subjected to repeated reminders that the Forum was the new regional body, and it had been created specifically because many of its members believed that the SPC no longer met their needs on major regional issues, which now included the Law of the Sea. He made it clear that, in his opinion, if he and Mike advised the Forum members that the FFA should take over responsibility for the tuna database, at least for its member countries, it would happen. Unfortunately, for the reasons outlined in Chapter 8, I felt that there was a high degree of probability that this assumption was correct. I had a day and a half to convince him and Mike not to advise the Forum to that effect. Dick's view was obvious, and he appeared intransigent on the subject. Mike was the technical expert, so what chances I had rested with me convincing him and then him convincing Dick.

We then had a lengthy discussion around my assertion that it would be much easier to convince fishing companies to provide accurate and complete data if such data were demonstrably used for science and research on issues such as resource abundance and sustainability, rather than how much the licence fee could be increased. I also stressed that the FFA did not need all the data that we did – for example, it did not need, but may like, the data for non-Forum countries. Whether these non-Forum countries would agree to provide the raw data to the FFA was unknown.

The fact that the FFA was deliberately created to serve the members of the Forum, and there were quite a few Pacific Island entities that were not, currently at least, members of the Forum, was prominent in my comments. I stressed that if the Skipjack Programme continued to collect and process all the data for the region, it would be a relatively simple process for us to create a subset of that data for Forum members and provide that to the FFA. Obviously, the avoidance of duplication in data collection and processing was a major issue. If the researchers and the FFA were working with even marginally different datasets, this would spell enormous problems for all concerned. Researchers and managers had to be looking at the same data, and disputes over its authenticity and accuracy had to be avoided.

We spent the last two hours of the afternoon with Skipjack Programme staff demonstrating the use of our facilities for data handling and analysis. Mike was particularly impressed with our team of people, which included Dr Meryl Williams as the overall data manager, senior scientists Dr Pierre Kleiber and Sandy Argue, and other members of staff, including the growing local contingent led by Helene Ixeko (Helene was to spend the next 42 years in uninterrupted service to the SPC and the people of the Pacific). Mike spent considerable time inspecting our computer facilities, including the data processing programs that had been developed by Meryl, Pierre and others to handle our data and analysis needs.

The next morning's discussion began with Mike asking a hypothetical question of me: 'If the FFA was to accept that the Skipjack Programme was to continue to be the repository of all the basic data, would you be prepared to create subsets of individual Forum members' data, and collective data for all Forum members, according to specifications determined by FFA?' He added that a suitable schedule for the timeliness of the FFA receiving that data would also have to be agreed.

In principle, this was what I had always thought was the logical solution. The only reason I could not be more definite than in principle agreement at this time is that we would like to have the agreement include inputs from Skipjack Programme staff into the specifications that were to be determined by the FFA. It was logical to assume that there would be a benefit to both parties in having the people doing the data compilations and extractions involved in determining the format of such presentations.

It was agreed that the FFA would, as soon as practical, draw up a draft schedule of specifications for the data summaries that they would require. After that, the appropriate technical people from our two institutions would meet to agree on final specifications and a timetable for their delivery.

In a private discussion with Mike, he told me that the two issues that he used to convince Dick to accept this arrangement were, firstly, that the FFA did not have the facilities or staff in Honiara to do what we were doing in Noumea, and it would almost certainly take them at least several years to get up to the same standard. The second major issue was that if they did the compilation of the Forum members' data and the Skipjack Programme continued to do the analyses for the non-Forum members, the FFA's data analysis would inevitably be compared to ours. In all likelihood, it would be quite some time before they achieved our standard, assuming that they eventually did so. We were not going to slow down our development so they could catch up. Mike said he pointed out to Dick that our staff were highly qualified, experienced and actually very good at their jobs. It may well be difficult to recruit staff of that quality in Honiara. It would be wise to avoid comparison when it is not necessary. It would, of course, be cheaper for the FFA to have us do the work anyway. Why not give the agreed arrangements a year or two as a trial? Mike completely agreed with my assertion that having the researchers and political advisers working from different datasets would be a disaster.

In essence, Mike and I agreed that there had to be only one master dataset, and for the next few years at least, the Skipjack Programme, and the Tuna and Billfish Programme that was to follow, represented the only functioning option.

This temporary solution was to stand for the remainder of my time in Noumea. However, I understand that the debate between the two institutions on data processing issues was to continue for at least several years after I left the commission. Timely access to a comprehensive set of data on

the tuna fisheries in the broader central and western Pacific was to grow in importance to the work program of fisheries research and management carried out at the SPC. Rather strangely, I thought, it was to continue even after the creation of the broader-based body, the Western and Central Pacific Fisheries Commission. I was advised by several of my colleagues who remained at the SPC that this was primarily because of the excellent reputation for high-quality fisheries science, including data collection and processing, that had been developed at the SPC since the beginning of the Skipjack Programme.

17

The Skipjack Programme in 1979

The year 1979 was the second full year of the Skipjack Programme. It followed on from the successes of the first 15 months and was therefore an important period of consolidation.

There were two significant changes to the funding of the programme that year. First was the contribution of $90,000 from the IATTC as joint sponsorship of the longer-than-usual (eight weeks) time spent in French Polynesia. The second major change was the generous increase from $122,474 to $215,180 in the annual contribution from the Government of France.

The same vessel, the *Hatsutori Maru No. 1*, that had been used in 1977 and 1978, was used for the first seven months of 1979. As described in Chapter 13, a charter agreement for a larger (46.75 metres overall length) and faster vessel, the *Hatsutori Maru No. 5*, was negotiated with Hokoku Marine Products Co., Ltd in Tokyo. At the time of these negotiations, the budget was so tight that only an eight-month charter could be agreed upon in the first instance. However, the increased contribution from France and substantial extra assistance from the Government of Japan and the Japan Fisheries Agency made it possible to extend the charter for the full 10-month period at $70,000 per month.

Budgeting had been made particularly tight with the expenditure of $112,878 on the computer and associated electronics, which was not in the original budget. Actual expenditure in 1979 was $1,165,131, which was only $3,108 (less than one-quarter of 1 per cent) below total income.

It was comforting that the accounts up to the end of 1978 were audited by the Australian auditor general, and his approval of the way the accounts had been maintained was contained in his report.

A major event in 1979 was the installation of the programme's computer in April (see Chapter 15). Much of the remainder of the year was spent entering the huge amount of data that had been accumulated in 1977, 1978, and 1979. In the later part of 1979, we experienced a major breakdown of the computer.

We were already so dependent on the computer that every day without it was, in my opinion at least, a catastrophe. Paul Judd described the incident well in his brief history of the Skipjack Programme (Judd 2016):

> The computer eventually arrived in March 1979 and was installed at SPC. It generated a lot of interest in Noumea. The first person hired to run the computer, (in keeping with the Hewlett-Packard agreement of purchase), was Sam Bledsoe, who came from the University of Washington in Seattle. During the six months that Sam worked for the Programme the computer had one major breakdown; Sam was able to diagnose the cause as a specific failure in the main circuit board. Sam was sent off to Sydney to bring back the necessary replacement board. This was only possible because of a wonderful demonstration of donor solidarity for the Programme: Sam's US passport had expired the week before and he had not yet obtained a replacement. With support from the highest levels of both the French and the Australian authorities Sam was able to fly to Sydney that day, pick up a board that had been couriered up from Melbourne, and hand-carry it back to Noumea the next day; all without a valid passport.

Two meetings of significance for the programme were held in 1979. The first was the third formal annual meeting of the Programme's Intergovernmental Administrative/Finance Committee, which was held on October 10 in Papeete, Tahiti, in conjunction with the Nineteenth South Pacific Conference. At this meeting, the donors expressed their pleasure with the progress of the programme. There were several good-natured questions about how our expensive new computer was going and if we were looking after it well enough. The second meeting of significance was the SPC Eleventh Technical Meeting on Fisheries, which incorporated the meeting of the Expert Committee on Tropical Skipjack. The substantive issues for both groups were the activities and results from the *Hatsutori Maru* throughout the region. The individual country reports were the subject of rather

intense analyses: not only were individual fisheries officers greatly interested in the report for their country or territory, but there was great collective interest in the comparison of results from different countries. Individual fisheries officers expressed their pleasure in being able to be involved in the programme's work during their time on the *Hatsutori Maru*. They obviously enjoyed catching skipjack, but they also found great benefit in being able to participate in the bait-fishing activities, both by day and by night.

The 1980 meetings were eagerly awaited, as by then the programme's fieldwork would have been concluded and final assessment results would be emerging.

On January 1, 1979, the *Hatsutori Maru No. 1* was working in French Polynesia, which it continued to do until February 3. It then departed for, in order, the Cook Islands, New Zealand, Australia and Papua New Guinea. By July 2, a total of 32,102 skipjack and other tunas had been tagged on this cruise. The annual target of 33,000 was well within range. With this achievement in mind, the *Hatsutori Maru* was dispatched from Papua New Guinea to take up the invitation of the government of Indonesia to do a relatively short (three-week) tagging expedition in Indonesian waters. I had a particular interest in this event, as I felt that it would add significantly to the coverage of the whole region, including the interaction with bits beyond the area of the SPC. It would hopefully indicate skipjack movement into the SPC from outside this area.

Even though we had been assured by Indonesian national officials that all necessary arrangements had been made for our visit, on arrival in Jayapura, the *Hatsutori Maru* was met by a significant party of heavily armed military personnel. The vessel was effectively seized. It was not allowed to fish or to leave Indonesia. Jean Pierre Hallier, the cruise leader on that voyage, was seriously distressed when he called me. In essence, when he accepted the cruise leader position, he did not anticipate the duty statement included dealing with guns being pointed at him. We maintained phone contact each day. I considered immediately flying to join him and the crew, but decided that the best chance we had of getting a rapid resolution of our predicament would be for me to get the donor governments to come to our aid. I could do this more efficiently from my office than on the research vessel.

We subsequently were to learn that the government in Jakarta had not informed the regional authorities of the pending arrival of the *Hatsutori Maru*. My repeated appeals to the Indonesian officials who had arranged the visit did not result in sufficient action to solve the problem. I raised the issue

with our donor governments. I then asked two of them to raise the issue at the United Nations. To my surprise and delight, they agreed to do so. Whether they did this at the Indonesian ambassadorial level or in some form of more formal meeting, I do not know. But the *Hatsutori Maru* was finally cleared to leave Indonesia on July 16, two weeks after arriving. By then, there was no time to reschedule a visit to another country. The *Hatsutori Maru* returned to Japan to conclude the cruise four days early.

By the end of the second year of the programme, the *Hatsutori Maru No. 1* had been used to survey most of the countries and territories of the SPC; the exceptions were Nauru, Niue and Pitcairn. All of these, and lots of repeat visits to other countries, were included in the schedule for the last cruise in 1980.

As for 1978, the results from skipjack tagging and baitfish surveys in 1979 were extremely pleasing. In 160 fishing days, a total of 43,438 fish were tagged – an average of 271 per day, which was even better than our 1978 average of 244 per day. Our 1978 world record of 2,910 releases in a day was substantially bettered on March 2, 1979, when 3,692 skipjack were tagged and released off the east coast of Aotearoa New Zealand. I remember the event well, even though I was not on the vessel at the time.

That evening, Bob Gillett, the cruise leader, called me to say that the scientists and crew were exhausted and he had given them the next day off. Certainly, well deserved. To add some perspective, they had tagged more than 10 tonnes of skipjack in one day. In addition, the scientists had to transcribe all the tagging results from tape recorders and catalogue the rest of the day's activities, such as the record of all school sightings and analyses of skipjack stomach contents, before bedtime. Then, of course, if they were going to fish the next day, they would have to catch bait that night! Even though the crew (particularly Bob Gillett, who had always displayed this wonderful 'all systems go' attitude) found it hard not to take advantage of record-breaking fishing conditions, sanity prevailed. Even Bob was exhausted. He was a bit worried I might insist they fish the next day. If I did give him that impression, I apologise. On the grand scale of the programme's total tag releases, the record-breaking day had pushed the total number of releases in New Zealand up to more than an adequate level. More is better, but we were well in front of the essential requirements of the programme. By this stage in the programme, we were confident that the number of tag recoveries was going to be more than sufficient to enable an estimate to be made of the total population of skipjack in the study area.

Crossing the Tasman Sea

Life on the *Hatsutori Maru No. 1* was not always about breaking world records for tagging tuna and smooth sailing around beautiful tropical Pacific Islands in calm, clear-blue seas. Charlie Ellway, one of the programme's scientists on board for the crossing of the Tasman Sea, recorded that event:

> During the skipjack survey down the west coast of New Zealand's North Island, we had sighted only a few schools, and on the evening of the Sunday, 25th March 1979, anchored off Nelson at the top of the South Island to set the bouke-ami net for bait. Next morning, the crew loaded ~100 buckets of small pilchards into the bait wells of the *Hatsutori Maru #1* and the vessel proceeded into Nelson to resupply for the brief survey down the west coast of the South Island, and then passage across the Tasman Sea to Australia.
>
> The *Hatsutori Maru No. 1* departed Nelson at 1800hrs heading down the west coast of New Zealand's South Island. We spent most of the next day searching for tuna schools before heading across the Tasman to Eden. On Wednesday morning the boat encountered growing seas, with a large swell from the southwest. By the next morning, the weather had deteriorated, and the alarm- buzzer got everyone out on a deck to tie down any loose deck gear. The wind built during the day, and the captain was forced to 'slow ahead', or 'hold station' as sea-farers call the defence strategy of staying-put facing into the sea. Seas were breaking over the bow and occasionally the sides and even very occasionally the stern.
>
> As evening approached, the sea became very, very rough; an estimated Force 7–8. The deck was constantly awash. The beach seine net broke loose and one of the forward tagging cradles was all but destroyed. The captain called a halt about 1900 hrs so we could strengthen the tie-down of the deck gear including the bouke-ami. A further halt was called at 2300hrs when the captain turned the boat so we could safely work on a floodlit deck with a following sea. The #5 bait well was pumped dry and the seine net piled into it. The bait transporter had been wrecked and was put over the side. We held our breath as the captain turned the boat back into a wild and forceful sea.
>
> The night was restless for the entire crew. Just after midnight, a huge wave set the boat corkscrewing wildly, throwing those of us in their bunks, around. It was particularly uncomfortable for the Fijian crew in the forward quarters, who had to endure the vessel rapidly

> lifting over steep waves and lurching down the other side to meet the next sea. Next morning, we were still slow ahead, however the wind dropped a little and swung to the south. At midday the captain changed course to northwest, and to our relief, set off at full speed for Eden in a confused, but not dangerous, sea.
>
> The seas remained pretty sloppy for the remainder of the day. On Saturday, the wind and waves dropped away and we cleaned up, getting the deck ship-shape once more. Although the sea picked up the following day with a heavy swell, it did not delay us from reaching Eden the next morning to clear customs and meet up with the Skipjack Programme leader, Bob Kearney.

I discussed this rather 'exciting' event with the captain of the *Hatsutori Maru*, Mitsutoyo Kaneda, upon the vessel's arrival in Eden. He said that the whole crossing of the Tasman had been perilous, to the extent that for about four hours one night, he feared that there was close to a 50 per cent chance the vessel would not survive the storm. He said that he did not tell everybody on board just how bad it was, for there was nothing any of them could do anyway. Figure 8 gives visual documentation of what the ship was up against.

Once again, in 1979, not a day was lost due to the malfunction or mismanagement of the chartered vessel. But more than one was lost due to bad weather, as described previously. One other issue of some interest did occur, and it did so while I was on the boat. We were at anchor one evening with the bait lights blazing, and I had just finished dinner when the engineer approached me. He looked seriously agitated. I did not know that he spoke English and so was surprised when he addressed me: 'Kearney-san, we have very big problem'. I steeled myself for the worst. 'Come with me', he said. Then it got worse: 'I will get captain', which he hurriedly went up to the wheelhouse to do. When he came back with the captain, he told us both to follow him. Down into the engine room we went. My first reaction was that it was very crowded with machinery, but it was spotless. There was no obvious sign of a catastrophe. 'Listen! You can hear problem'. All I could hear was the repetitive thumping of the main auxiliary engine, a noise I quite like when at sea, but I would not like to have it in my bedroom at home. I felt better when the captain asked the engineer what we were supposed to be listening to, or for. It wasn't just me who could not hear a malfunction. The engineer continued: 'Engine making very bad noise. If getting worse engine will stop. Then, no electricity, no fishing. Very big problem'. I immediately agreed with him: that would be a very big problem. So, I asked him what

we needed to do. His response: 'Get spare part urgently. I can fix if I have spare part'. I assumed he was telling me that the *Hatsutori Maru* would need to leave immediately for the closest port that would have the necessary spare part. So, I asked him how long we had to get the spare part before the engine would stop. He said, 'Not long. Maybe only six weeks'. As I had been warned of the urgency, six weeks sounded like an eternity to me. Surely we could get a spare part in that time?

I asked the captain and the engineer why they did not just get Hokoku Marine Products to send the necessary part to the harbour master at the next port the *Hatsutori Maru* would be visiting. But they were adamant that they wanted me to arrange the spare part for them. The only conclusion I could take from this was that they had made a mistake by not having a spare of this particular part on board and did not want the parent company to know this. I cannot remember exactly what the part was, but it was not huge – something like a gasket.

I got them to give me the full details of the part and the make, model and serial number of the engine. The next morning, I messaged Noumea and gave instructions to whichever of the two cruise leaders was there at the time, for the part to be tracked down. I explained that if the shipping companies were reluctant to help, they should contact Jean-Louis Boglio, who was the harbour master in Noumea and a close friend of mine. I explained that the cost was not an issue, and if the part had to be couriered from wherever, then just do it. Whoever was due to join the boat at the next port of call should hand-carry the part with them and not put it in their checked baggage.

I was advised within a few days that all was under control. I cannot remember which was the next port of call, but I do remember that as we approached the dock, the engineer was on the front deck and looking rather anxious. Ten minutes later, after inspecting his package, he was all smiles.

My take-home impression of the whole affair was how good the engineer was at picking up the issue six weeks before it became a real problem. I had nothing but gratitude for Hokoku Marine Products from the first negotiation of the charter agreement to the conclusion of the fieldwork. Again, the comparison with the performance of the *Tagula* during the Papua New Guinea Skipjack Program (see Chapter 1) underlined how good the parent company's handling of the two *Hatsutori Maru* vessels had been.

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The conclusion of fieldwork, 1980

The year 1980 was to see the last eight months of fieldwork for the Skipjack Programme. It was an important period for numerous reasons. One was that the remaining countries and territories that had not previously been visited were included in a rather tight schedule. This final cruise also allowed repeat visits to at least some countries. Having some repeat data from the same locations was important for evaluating the variability of skipjack abundance, growth rates and/or behaviour, in time.

We were already aware of the variability across the region of the El Niño–Southern Oscillation (ENSO) – oceanographic events on variability in the distribution of skipjack, but we needed much finer-scale data to help our investigations of variation in skipjack distribution and behaviour within individual countries.

On January 1, the *Hatsutori Maru No. 5* was already in French Polynesia, halfway through a lengthy visit that was jointly funded by the Skipjack Programme and the IATTC. During the total time committed to French Polynesia, the *Hatsutori Maru* took a two-day visit to the Pitcairn Islands. In those two days, 59 skipjack and 290 yellowfin tuna were tagged. The *Hatsutori Maru* then, in turn, visited 17 other countries and territories, namely the Cook Islands, American Samoa, Western Samoa, Niue, Tonga, New Zealand, Norfolk Island (Australia), New Caledonia, Fiji, the Wallis and Futuna Islands, the Solomon Islands, Tuvalu, Kiribati, Nauru, the Federated States of Micronesia and Palau. (The names used for countries and territories are as they were in 1980.)

Completing this ambitious schedule meant that in the last eight months of this final cruise, 65 days were spent travelling between countries and territories. This exceeded, considerably, the amount spent travelling in the full 10 months of cruises in each of the earlier two years: 41 days in 1978 and 47 days in 1979. In the whole of the eight months of the cruise in 1980, only 34 days were spent in port or were lost due to bad weather. On average, less than one day, or part thereof, per week, was spent in port. As in the previous two years, no time at all was lost due to mechanical failure or mismanagement of the vessel's schedule. Both statistics represent confirmation of exceptionally dedicated effort by the vessel's crew and the scientific team.

The only deliberate changes in 1980 to the programme's routine procedures described in earlier reports were in the processing and analysis of data. As the amount of tagging and commercial fishing data inevitably increased, data entry, processing and analysis took up progressively more time than in previous years. Ever since the arrival of the programme's computer, the staff, led by Pierre Kleiber, Sam Bledsoe, Sandy Argue and Clive Maynard, had devised intricate security systems for preventing the accidental or deliberate corruption of data files held on the computer. These systems included the daily creation of magnetic tape copies of the contents of all computer files. A system of storage of these tapes at a secure location outside the SPC, in the safe-storage room at the Australian Consulate in Noumea, prevented the potential loss of data in the event of fire or other serious damage to the computer system.

A total of 49,120 skipjack and other tunas were tagged in the 136 days fishing in 1980. The average of 361 fish tagged per day substantially exceeded the numbers tagged per day in 1978 and 1979 of 244 and 271, respectively. Of considerable interest was that the average number of tuna schools sighted per hour, 0.82, was remarkably similar to that sighted in largely different locations in 1978 (0.83) and 1979 (0.72). This supports the conclusion of a surprisingly uniform distribution of skipjack across the total area of the SPC and over the three years of the Skipjack Programme's fieldwork. This has major implications for the level of confidence that could be placed in the use of tagging data to estimate abundance in the whole area (as discussed in Chapter 19) and for the future management of the distribution of total fishing effort in the region.

Total expenditure of the programme in 1980 was $1,164,547, which was considerably more than in each of the two previous calendar years. The increase was almost entirely due to the higher costs of chartering the bigger research vessel, the *Hatsutori Maru No. 5*, and the timing of when the charter costs were paid. The amount was within the budget. In 1980, the programme's accounts were audited by the New Zealand auditor general, and his approval of the manner in which the accounts were maintained was contained in his report, which was accepted by the Skipjack Programme's Intergovernmental Administrative/Finance Committee at its meeting in Papua New Guinea in October.

One event that occurred in 1980 related to the considerable amount of the programme's work was the evaluation of the stock structure of skipjack. More information on the structuring of schools of skipjack was to come from observation from light aircraft of the behaviour of individual skipjack in large schools. The following six paragraphs are modified slightly from a previously published (Kearney 2022) description of some illuminating observations.

In the summer of 1980, I was tuna spotting from a light plane off the northern tip of the North Island of Aotearoa New Zealand with the country's best fish spotter, Graham Bell. There were five American tuna purse seine boats working the area. Graham was contracted by them to find skipjack schools and direct the boats to the best of them. I was there at the invitation of the New Zealand Ministry of Fisheries as the coordinator of the Skipjack Programme, in which New Zealand had keen interests: firstly, as a supporter and funder of the region-wide programme, and secondly, as a country with its own rapidly expanding skipjack fishery.

The sea was glassy calm; there were lots of skipjack about, and the visibility from our high-wing Cessna was excellent. We had found nine or 10 schools of between 35 and 45 tonnes each. Following Graham's direction, all the boats were at the same time 'in set', about to set their net, or approaching a school that had been agreed by the captain of the boat, on Graham's recommendation, to be a priority target. As all boats were occupied, we had time to have a look around while listening on the radio to the progress of each set, the completion of which would take several hours.

As we circled a school of about 40 tonnes, I saw six or seven skipjack swim out one side of the school heading almost due north. I was most surprised that a small number of fish would just leave a school like this out in the middle of nowhere. Didn't the axiom of safety in numbers for schooling

fish apply to skipjack? Graham and I discussed what we had just seen. He hadn't noted it before. We began a search for similar pods of skipjack. It was only when we looked closely that we realised there were lots of them. We hadn't noticed these small groups before because we had been looking for big schools, not individual fish. We quickly realised that the pods were headed to all points of the compass. We could not detect any pattern or obvious preference in direction. If it had not been such a fabulous day for fish spotting and had there not been more than enough schools to keep all the boats busy, we probably would never have noticed this phenomenon. From different perspectives, we both had a great interest in finding out more about the behaviour of skipjack schools.

We watched one group of eight skipjack swim up to our school from the west. These eight fish swam right into the middle of the school. Seconds later, five swam out the other side on the same trajectory as those that had entered the school. We observed about 10 interactions in the next half hour or so. We kept looking for this phenomenon when we had spare time throughout the afternoon. Sometimes more came out of the schools than had gone in. Sometimes less. Occasionally, none came out. The fact that we could not detect a pattern in the directions they were going or coming intrigued me. As far as we could see, the directions of their movements appeared completely random. But for reasons we did not really understand, we suspected that it was not. To us, it was unexpected behaviour. But it was so common it was clearly not occurring accidentally: there had to be some predetermined purpose to it!

We flew around the general area, and now that we were looking for them, we found small groups of skipjack everywhere. Never individual fish; not even two, but three was not uncommon. Twelve was the maximum we saw in a group. We felt that we could be forgiven for thinking that they must be able to count! The moving pods tended to go in 'gun-barrel' straight lines. They did not even seem to change direction much when a big school of skipjack was nearby. If a school was in their path, they would collide with it and apparently 'test it out'. They did occasionally deviate a little to do so. If, when they were out in the open, their paths crossed with another small pod, they may or may not link up with it.

The big schools remained relatively stationary, with fish moving about within them. Individual schools remained about the same size as the day went on. None was bigger than 45 tonnes or smaller than 35 tonnes at any stage. The degree of movement within schools was difficult to assess, as the

density of similar-sized individuals was high and they were stacked on top of each other to a depth of several fathoms. There were 10,000 to 15,000 fish in a school. The range in the size of the schools, which Graham was proven by purse seine catches to be able to estimate with an accuracy of better than approximately 10 per cent, was such that no two schools could coalesce without exceeding the maximum school size in the area on that day.

What was the reason behind this behaviour by small pods of fish? The obvious suggestion was that individual fish of a different size than the average in the school felt out of place. The need to be with others of their same size compelled them to leave the school. But leaving it on your own was likely too dangerous; pursuit of 'safety in numbers' was assumed to be why fish schooled in the first place! If you felt compelled to leave a school, best to find a few mates of about your size to go with you?

What was the significance of the 45-tonne maximum and 35-tonne minimum school size?

Some quantification of the school restructuring we had observed in New Zealand was provided a few years later. From the results of the recoveries of Skipjack Programme tags, we were able to prove that skipjack schools did indeed restructure throughout the day. One of the programme's scientists, Dr Ray Hilborn, published an estimate of the half-life of a school as almost exactly one day. In layperson's terms, a 40-tonne school of skipjack at the beginning of the day could well be the same size at the end of the day, but only half of the individual fish in it at the end of the day would be the same ones that were there at the beginning of the day.

Preliminary results of much of the work of the Skipjack Programme were presented to the fisheries officers of the region and other interested parties at the Twelfth Regional Technical Meeting on Fisheries in Noumea in November 1980. Presentations on the updated methods and activities were given, and individual documents on the results of the analyses of baitfish catches and effectiveness of that bait, skipjack migrations, growth, blood genetics, parasites, cannibalism and length frequency distributions throughout the region were distributed and discussed. Background documents available at this meeting included the series of preliminary country reports, which by the end of 1980 had been completed for every country and territory in the SPC, plus New Zealand and Australia. These country reports were very popular with the fisheries officers of all countries and territories (see Chapter 15).

The final analyses of the skipjack population assessments could not be completed until at least the great majority of anticipated tag recoveries had been documented and included in the analyses. The meeting was advised that the almost final results of the programme would be presented at the Thirteenth Regional Technical Meeting on Fisheries in Noumea in August 1981. We had set ourselves a very tight deadline, as some tag returns would still be outstanding at that time; however, by the end of 1980, we had seen enough of the incoming tag returns and fishing effort data to be confident that another year would be adequate for the total skipjack population size to be determined within acceptable confidence limits. The last of the final country reports would likely still be outstanding at that time and would be concluded under the Tuna and Billfish Assessment Programme.

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Final results: Had the programme achieved its objectives?

The fieldwork for the Skipjack Programme had begun on October 6, 1977, when the *Hatsutori Maru No. 1* departed Kavieng Harbour in New Ireland, Papua New Guinea. It concluded on August 22, 1980, when the *Hatsutori Maru No. 5* departed the Federated States of Micronesia bound for its home port in Japan. In the intervening three years, Skipjack Programme staff tagged 140,443 skipjack and 9,596 yellowfin tuna and captured 71,986 kilograms of baitfish in 26 countries and territories throughout the central and western Pacific. Full details of all baitfish and skipjack sampling and analyses are given in the many Skipjack Programme publications and reports, including a preliminary and a final country report for every country and territory and one for the region as a whole.

The fisheries officers of the island countries and territories reported that they found the individual country reports, both preliminary and final, of great value. The fact that these reports were produced quickly after the visit of the research vessel to each country or territory was greatly appreciated, thus playing an important role in the popularity of the programme and the excellent cooperation we received from all the region's fisheries officers. This cooperation was pivotal to the encouragement for the return of tags with the necessary information on the time and location of recapture of tagged fish. Return of tags with accurate information was the foundation of the scientific data that underpinned the analyses that fulfilled one of the

programme's primary purposes, which was to provide the first assessment of the total skipjack and baitfish resources for all countries and territories in the 30 million square kilometres of the area of the SPC.

One of the many reports, 'Assessment of the Skipjack and Baitfish Resources in the Central and Western Tropical Pacific Ocean' (Kearney 1983), provides a succinct precis of the performance of the programme against the three primary objectives set for it in the original program proposal (SPC 1975) and modified and expanded later that same year (Kearney 1975c).

The following comments on the achievements of the Skipjack Programme against its three specified objectives are modified from those provided in the official concluding summary of the programme.

The three defined objectives of the programme are considered in turn throughout this chapter.

A. To provide a better understanding of the migrations and stock structure of skipjack, thus determining the degree to which fisheries in different areas exploit the same stock, and hence interact with each other.

Tag recapture results provided the only comprehensive assessment of skipjack movements, including migrations, within the whole of the study area up to the time of completion of the Programme in September 1981.

There was clearly a great deal of movement of skipjack that were tagged in all parts of the study area (Figure 9). An outstanding feature of this movement was that it was obviously far more random in direction than would be consistent with the species being truly migratory. In tropical regions, there was little evidence of predetermined routes that all, or even the majority of, individuals in an area observed. At the southern extreme of the study area, around Aotearoa New Zealand, skipjack were seasonally clearly migratory: they arrived in late spring, and at the onset of winter, they moved north to warmer water rather quickly. Clearly true migration.

Blood genetics and parasite analyses confirmed the existence of structuring within the total population of skipjack. As recommended in 1976 by the 'Ad Hoc Meeting of Scientists to Discuss Skipjack Fisheries Developments and Research Requirements', during the Skipjack Programme, large numbers of blood samples were taken from skipjack from the same schools from which large numbers (more than 100) of skipjack were tagged

and released. This enabled investigation of the suggestion by Dr Barry Richardson (The Australian National University scientist contracted to do the genetic analyses of the samples collected by the programme) that esterase gene frequencies in an area and time may make it possible to predict the direction in which skipjack tagged in those areas and times would move after release. Dr Richardson's suggestion was exciting; it seemed a most likely hypothesis, at least before the Skipjack Programme's tag recapture information became available.

As had been found by Fujino (1976) and Sharp (1978), there was a definite gradient in serum esterase gene frequency of Pacific skipjack, with much higher frequencies in the west of our survey area and lower in the east. The lower frequencies at around 140 degrees west were very similar to those much further to the east. However, the movements of tagged skipjack recorded by the Skipjack Programme did not support Dr Richardson's hypothesis. Nor did they support the existence of discreet subpopulations of skipjack that were sufficiently different to warrant consideration for separate management, as had originally been suggested independently by both Fujino and Sharp.

The observations of the behaviour of skipjack within schools (see Chapter 18) and the estimate of school integrity have, for years, impacted my thinking on the very first objective of the Skipjack Programme: 'To provide a better understanding of the migrations and stock structure of skipjack'. The patterns of movements of individual tagged skipjack described a great deal of long-distance movement and a huge amount of variability in the directions of that movement. The lack of significant and consistent deviation from random directions, except for the obvious seasonal migration to and from New Zealand, was largely responsible for the conclusion that the skipjack resources of the central and western Pacific could best be managed as a single stock. The implications for management of constant change in the integrity of individual schools, other than attempting to be with other individuals of the same size, and the apparent approximation of 'Brownian' (random direction) movement in the actions that support that change, remain a mystery, at least to me. And I have thought about it a lot in the past 44 years.

That skipjack would constantly restructure school integrity so that individual fish could be with others of the same size has obvious advantages. The hydrodynamic advantages for fast swimmers, runners or cyclists to be with individuals of the same size and headed in the same direction (what bike

riders call the 'Peloton effect') are well accepted and documented. But why do so by relatively random movement in and out of schools while ensuring at the same time the school remains, at least approximately, the same size? Is it possible that the small pods of skipjack observed leaving much bigger schools were adopting the role of scouts looking for patches of prey?

It would be reasonable to expect that there would be different areas that would be more attractive to skipjack of certain sizes and that individual fish would head for these, or at least not leave them so readily once they encountered them. If being with individuals of the same size in schools of predetermined size (for example, from 45 to 35 tonnes) is so important, why don't individual schools of approximately 40 tonnes coalesce and then, allowing for time to 'socialise', split into two 40-tonne schools of more precise median sizes? Such a strategy would appear to have advantages over small pods of fish for the 'safety in numbers' component of school structuring.

The enormity of, and lack of structure in, their environment, coupled with the extensive, apparently unstructured, movement of individual skipjack throughout the study area, are obvious factors that tend to support the probability that the total skipjack population is structureless, at least from the perspective of its management. The existence of significant and consistent variation in esterase gene frequency across the whole study area, however, confirms some structuring – the goal, outcome or cause of which has not yet been explained.

Considerable variation in growth rates of skipjack was confirmed in different parts of the study area and in the same parts of the area at different times. Such variation had been regarded by earlier researchers as another possible indicator of stock structure. The large numbers of tag releases and recoveries over the whole study area made it possible to investigate this hypothesis in considerable detail. It was concluded that the observed variability in growth was more likely to be due to environmental variability than stock differences. Sibert, Kearney and Lawson (1983) provide a succinct summary of Skipjack Programme results relevant to this variability as follows:

> Results presented here show that there are significant geographical differences in both growth increment and von Bertalanffy parameter estimates. These differences are not stable, however. Repeated visits to the same region yielded significantly different estimates of growth increments. These results provided further confidence in the conclusion that from a fisheries management perspective the skipjack within the area of the SPC could best be managed as a single stock.

Skipjack growth is considered in more detail under point C (presented later in this chapter).

The degree of interaction between coastal fisheries that existed at the time of the programme's fieldwork (from 1977 to 1980) was able to be evaluated in more detail and with more certainty than was thought possible at the commencement of the programme. The results are detailed in the final country reports. This superior outcome was facilitated by several unanticipated outputs and outcomes from the research:

1. The larger-than-anticipated number of tagged fish released and recaptured with usable information on each
2. The tremendous dispersal and mixing of tagged skipjack throughout the study area and beyond
3. The approximation of Brownian movement from all releases except those in the higher latitudes, which displayed seasonal migration to warmer waters (discussed briefly earlier).

The continuing accumulation of more detailed catch and effort data on all fisheries in the region since the conclusion of the fieldwork has enabled increasing confidence to be placed in assessments of interactions between fisheries.

B. To provide valuable survey information on the distribution and availability of skipjack and baitfish as a basis for further development and management of these resources within the region. Detailed survey data on skipjack were gathered in a variety of complementary forms. Clearly, the tag release and recapture data provided the most definitive descriptor of numerous measures of skipjack abundance and distribution, which are the most common goals for, and outputs from, quality fishery surveys (see point C). In addition, of the 21,583 skipjack that were caught from the same schools from which skipjack were tagged but were not tagged and released and instead were subjected to at least some biological sampling, 10,926 had their sex determined and 9,574 were examined for the presence of juvenile skipjack in their stomachs.

Other indicators of skipjack distribution and availability, such as school sightings by area and time, provided valuable confirmation of the remarkable uniformity in the degree of variability in the distribution, abundance and relative homogeneity of the total population of skipjack throughout the study area (see point C).

Survey and assessment of the baitfish resources suitable for pole and line fishing for skipjack and other tunas in the waters of all countries and territories in the SPC were one of the primary objectives of the Skipjack Survey and Assessment Programme. At the time of conception of the programme, pole and line fishing was the technique that offered the greatest potential for island states to participate in and benefit from. An adequate supply of suitable bait fish, usually as live bait, is a prerequisite for the operation of a viable pole and line fishery.

The size, origin and topography of islands were, as expected, excellent indicators of baitfish resources. Islands with large water catchment areas and high freshwater run-off bringing nutrients and sediments into extensive lagoons and/or sheltered inshore environments provide habitats suitable for many bait species. In general, countries with large land masses, such as Papua New Guinea, the Solomon Islands, New Caledonia and Fiji, have the greatest baitfish resources.

The great diversity in the topography of the many countries and territories is reflected in the capture of 286 bait species during the three years of the programme. Most of the sizable catches of good-quality baitfish were from four families: Engraulidae (anchovies), Dussumieriidae (sprats), Clupeidae (sardines and herrings) and Atherinidae (hardyheads).

A comparison of the cost-effectiveness of natural bait species and those available from aquaculture was carried out and published by the programme (Kearney and Rivkin 1981). Due to the great variation in fishing conditions, by area and time, little confidence could be placed in many of the comparisons. However, even the least effective bait species could at times support reasonable catches of skipjack. At other times, such bait could be ineffective. Much depends on what other food is present at the time. Whether aqua-cultured species can provoke viable catches over time was considered doubtful. It was concluded that within the commission area, the prospects for the cost-effective replacement, or even meaningful supplementation of natural bait by aquaculture, were limited.

C. To provide better knowledge of the population parameters (growth, mortality, etc.) of each skipjack stock, thus enabling better assessment of the current status of these stocks and of the effects of fishing on them.

This objective covers the components that necessitated the most in-depth analyses and interpretation of the bulk of the data generated by the programme and/or available in the scientific literature. Most staff were involved in the data collection, compilation and presentation in tabular or graphical formats, and as the programme progressed, most were increasingly involved in the writing and production of the many reports, such as the individual preliminary and final country reports, as well as the technical reports. These reports were the main medium for the delivery of information to the region's fisheries officers, donor governments and the public. Two of the technical reports, numbers 10 and 11 in the Tuna and Billfish Programme series, deal specifically with the first item in point C of the Skipjack Programme objectives – skipjack growth.

Information on skipjack length at time of tagging and length at subsequent recovery, together with the time at liberty for individual fish, was used to compute skipjack growth in the waters of all countries and territories for which adequate data were available.

Detailed analyses of the data from each country, or for each visit to a country for which there was more than one visit, clearly showed that the data for each visit warranted unique analyses, as did whether or not the data came from recaptures inside or outside the waters of the country in which the tagged fish were released. Differences in the size of the growth increments were found to occur as a result of variations in growth between countries, or areas of release, time of release and location of recapture (Sibert, Kearney and Lawson 1983). The variations in growth between countries and between different times in the same country (Table 19.1) were much greater than expected. They strongly suggest that skipjack growth is greatly influenced by changes in oceanographic conditions that are not obvious and are certainly not well understood.

Skipjack are known to grow a great deal bigger in the eastern Pacific than in the west. Joseph and Calkins (1969) reviewed skipjack growth data for the eastern Pacific and found growth estimates ranging from 11.16 centimetres per year to 21.84 centimetres per year, and maximum lengths (L infinity) from 729 to 881 millimetres (some fish were well over 20 kilograms). Skipjack in the Papua New Guinea fishery have a growth increment of 7 centimetres per annum and an L infinity of 65 centimetres (with a maximum weight of 6 to 7 kilograms, with fish of more than 6 kilograms being uncommon).

Table 19.1: Growth increments standardised to an average length at release of 50 centimetres and average time at liberty of 90 days

Country	Year of tagging	Increment (cm)
Fiji	1978	3.7 (± 6.9)
	1980	5.6 (± 1.3)
Kiribati	1978	1.4 (± 1.2)
Palau	1980	8.5 (± 6.4)
Papua New Guinea	1972–74	2.6 (± 1.5)
	1979	3.2 (± 1.5)
Ponape	1980	4.1 (± 4.1)
Solomon Islands	1977	2.5 (± 1.4)
New Zealand	1979	1.5 (± 5.2)

Source: Kearney (1983)

From the distribution of juvenile skipjack throughout the Pacific, Klawe (1963) concluded that there is very little spawning activity in the eastern Pacific. This lack of spawning is thought to allow eastern Pacific skipjack to invest more metabolic resources into growth, thus enabling them to grow much faster and bigger. Skipjack that do spawn produce phenomenal numbers of propagules and expend tremendous amounts of energy in the process.

There was concern among Skipjack Programme staff that bias in the measurement of tagged skipjack at the time of release and recapture may be a cause of the significant variation in growth apparent from the tag release and recapture data in the same areas at different times. However, bias in the length measurement at the time of release of tagged fish was found (from detailed analyses of recorded measurements at the time of release) to not be significant. Recapture length measurement bias was, however, found to be significant for all recapture categories other than those from skipjack recaptured on the Skipjack Programme research vessel. In all cases of significant bias, the effect was to reduce the apparent increase in length. This was somewhat surprising considering that a popular assumption is that fishermen tend to exaggerate the size of the fish they catch, which, if recorded, would increase the estimate of the growth increment, not reduce it.

Responsibility for the creative and scholarly development of the analytical models that delivered 'better assessment of the current status of these [skipjack] stocks and of the effects of fishing on them' (from point C), the

core of what the Skipjack Programme was about, very much rested with Pierre Kleiber and Sandy Argue. Throughout the programme, occasional appointments of experts, such as Sam Bledsoe and Dave Fournier, for a few months for analytical tasks proved very valuable. Towards the end of the programme, in 1982, John Sibert was recruited as a senior analyst. He made a significant contribution to several components of the overall assessment. After the conclusion of the Skipjack Programme, staff of the Tuna and Billfish Assessment Program (TBAP), and subsequent staff appointments to the SPC's ongoing Oceanic Fisheries Programme, continued the collection and analysis of skipjack data, including the reanalysis of the original Skipjack Programme data. It is most significant that when the tagging experiment of the Skipjack Programme was repeated a decade later, it produced the same estimate of population size: 3 million tonnes. That an experiment can be repeated to yield the same result is the fundamental criterion for confirmation of the quality of the science that underpinned the experiment.

Skipjack Programme staff, under the scientific direction of Pierre Kleiber and Sandy Argue, had to first develop the data capture and processing methods that ensured that the information generated by the programme, including the catch and effort data from all skipjack fisheries in the study area, was both precise and in formats that would adequately facilitate all the necessary analyses. This was a monumental task involving a great deal of originality: tagging had not previously been used to estimate the population size and dynamics of any skipjack stock anywhere in the world, let alone one as large and widespread as the one the Skipjack Programme was created to assess.

The necessary analytical models had to first be developed before being skilfully applied to the massive collection of data that was progressively becoming available.

Following the conclusion of the fieldwork and one extra year of analysis of results, at the Thirteenth Regional Technical Meeting on Fisheries in Noumea in August 1981, the concluding results of the programme were publicly presented. Pierre Kleiber gave an excellent presentation of the results of the complex analyses (see Kleiber, Argue and Kearney [1987] for full details) in language that could be understood by the general audience. This audience was the largest that had attended any SPC conference other than the annual South Pacific conferences. It included the fisheries officers of almost all countries and territories of the SPC, numerous international tuna fishermen and cannery representatives, a reasonable number of interested

scientists, and quite a few representatives of 'Conservation' nongovernmental organisations (NGOs) – plus, of course, representatives of the governments that had funded the programme. It was a seminal event in the history of fisheries research and development in the South Pacific. The results of the Skipjack Programme were to have a huge influence on the future direction of broadly based tuna research and management throughout at least the central and western Pacific.

The essence of Pierre's conclusions was that there were good reasons to be confident that the data collected by the programme were truly representative of the stocks of skipjack and baitfish in the tropical central and western Pacific. The standing stock of skipjack (the quantity of fish in the total population at a single point in time) was estimated to be 3.0 million tonnes, with the 95 per cent confidence range being 2.5 to 3.7 million tonnes. Perhaps even more importantly from the fisheries management perspective, the turnover of fish in the total population, due to natural mortality, fishing mortality and emigration out of the huge study area, was 17 per cent per month. The natural mortality alone was approximately 87 per cent per annum. This outstanding revelation in practical terms meant that 87 per cent of the population of skipjack of the size that had been sampled throughout the three years of the programme's fieldwork (that is, the total population in the SPC) died of natural causes every year.

By combining the figures on the standing stock and turnover, the annual throughput (the total flux of exploitable skipjack through the study area over 12 months) was estimated to exceed 6 million tonnes. This figure is approximately 27 times the annual catch of skipjack from the study area during the time of the Skipjack Programme.

Pierre did an excellent job of handling the many questions that followed his presentation. As he always did, he stuck to the detail of the data, and his and other programme staff's analyses of that data. He left the conjecture to others.

When Pierre was asked what all these analyses meant to fishermen who wanted to know how much skipjack could be sustainably harvested each year from the area of the SPC, he gave his usual analytically perfect answer:

> My job is to provide the scientific estimate of how much is there and what the dynamics of the population are, and I have done that. I will leave the discussion of how much could be safely caught to the managers. Effectively, over to you, Bob!

While the answer to this question may not require the mathematical abilities of Pierre, Sandy and other programme staff, it was by no means straightforward. But I must be honest and admit that for the previous five years or so, I had been dreaming of being in a position where I would be asked this question. I anticipated that I would be the first person in the world to have the necessary information to answer it with accepted accuracy.

The first statement in my response was the safe answer: 'Even with minimal management, the total catch could be a great deal more than what is currently being taken'. This statement was undoubtedly correct, but it did not do justice to the three years of groundbreaking fieldwork and the excellent analytical techniques that Pierre, Sandy, John Sibert and other staff members had developed and then applied to this data, together with the detailed catch and effort data that had been compiled and analysed by Meryl Williams, and later Tom Polacheck and their team, to make a more informative answer possible. At the time of the meeting, I was still a little overwhelmed by the enormity of the 3 and 6 million tonne figures that Pierre had given me only a few days before. I would attempt to make up for this in the discussions I had with the various interest groups outside the meeting itself.

What I did say at the meeting was words to the effect that while the resource is indeed huge, it is not infinite. Much more skipjack could clearly be sustainably taken than was currently being harvested. However, I would not be promoting attempts to take the 27 times more that the throughput estimates superficially, and out of context, might suggest. The overwhelming message to be taken from the composite data we accumulated and analysed was that the skipjack, *Katsuwonus pelamis*, is an extraordinary creature:

1. It is the dominant tuna species in the huge area of its distribution.
2. Individuals display an extraordinary amount of movement throughout this area.
3. They grow extremely quickly and are recruited to the fishery at little more than one year of age.
4. Natural mortality is exceptionally high, with 87 per cent of the population dying of natural causes each year.
5. They grow fast, but at tremendously variable rates impacted by both area and time.
6. In the huge area in which they spawn, they do so almost every night (every 1.18 nights to be precise).

7. Individual females lay approximately 300,000 eggs each time they spawn.
8. Skipjack are extremely cannibalistic, to the extent that no other species eats more juvenile skipjack than adult skipjack do.
9. It is probable that there is heavy consumption of skipjack eggs and larvae by skipjack juveniles.
10. Variations in localised abundance can be extreme; catch rates in normally highly productive areas can fall to close to zero for weeks at a time (as was experienced in the very first month of the Skipjack Programme's fieldwork in a normally extremely productive area to the north of Papua New Guinea; see Chapter 14).
11. Conventional models used for stock assessment developed for other fish species in other fisheries, such as age- and length-structured models, are of little, if any, value for skipjack. I caution against their use for such purposes.

In summary, there are many reasons why skipjack should not be considered as a 'normal fish'. Their management should not be bound by conventional thinking (see Chapter 20). While the total skipjack population may be huge, extremely dynamic and cover a huge area, if fisheries are concentrated in small areas, then excessive localised depletion could occur, and local fisheries that are close together could have a detectable, negative impact on each other.

Various combinations of the points listed previously dominated my comments at the Thirteenth Regional Technical Meeting on Fisheries in Noumea in 1981. I then publicly offered to discuss the issues in more detail with the various interest groups at breaks during the meeting and following its conclusion.

The essence of what I said to the various groups in response to questions during the meeting was largely as follows.

To attempt to maximise the sustainable yield, fishing would need to be distributed across the whole area of the resource roughly in proportion to the relative abundances in each individual part of this area. This was not going to be possible in the foreseeable future, if ever. However, as discussed further in the following, with the extremely high turnover and great mobility of most skipjack, it would be safe to say that fishing at any likely level would not be a threat to the survival of the species. At an earlier fisheries technical

meeting, I had offered the opinion that if skipjack were a million dollars each, you could not threaten the survival of the species with known fishing technology. I stood by that statement. As I still do, almost 50 years later.

In summary, with an annual turnover figure of 6 million tonnes, it is difficult to find fault with a harvest target of 3 million tonnes per annum, if fishing could be spread over at least most of the area of the SPC. With an annual throughput of 6 million tonnes, if it took a year to catch the 3 million tonnes of allowable harvest, then by the end of that year, the other 3 million tonnes of the throughput would be, at least, becoming available. Gulland's classical basic equation for 'a back of the envelope' estimate of sustainable catch being half MB0 (where M is natural mortality, that has in this case been estimated by the Skipjack Programme at 2.0, and B0 is the size of the unfished population of more than 3 million tonnes) adds considerably to the confidence that can be placed in the estimate of the sustainable catch being at least 3 million tonnes. The 3 million tonne estimate was of the lightly fished population, as it was at the time of the Skipjack Programme's fieldwork, not the virgin population, which would be higher.

The resource is huge, but it is not infinite. Furthermore, the distribution of the resource is not completely uniform, and it varies considerably in time. The memory will linger with me forever of the almost complete absence of skipjack in the first month of the Skipjack Programme's fishing in the well-established fishing area of northern Papua New Guinea. We averaged little more than one skipjack per day, and what few skipjack were there were smaller than the Papua New Guinea Skipjack Program had ever caught anywhere in Papua New Guinea (see Chapter 14).

Oceanic and environmental variability, particularly that which is not predictable, may cause major problems for attempts to maximise catches. Optimum sustainable catches will almost certainly be a more appropriate goal. Such catches will be very large but, almost certainly, below the theoretical maximum. Furthermore, if heavy fishing pressure is concentrated in small areas, there will be detectable depletion of those areas, for at least short periods of time. There will be negative interactions between areas that are heavily fished and are close together.

In consideration of the wellbeing of the skipjack species, fishing will become uneconomical long before the survival of the species is threatened. The species has a short life span, grows very quickly and spawns almost every night, with individual females laying approximately 300,000 eggs each time

they spawn. There is an enormous amount of room for poor management before long-term damage to the total population could be anticipated. However, careful and well-informed management of fishing by area will be necessary if total yields and economic returns to individual countries and territories are to be optimised.

After the session of the meeting in which the discussion of the results was the focus, the meeting adjourned for coffee. The fisheries officers I spoke to at the break were very happy with what we had told them. In fact, they were excited by what the options were for further developing their own fisheries and/or licensing foreign boats. Certainly, there was plenty of food for thought and optimism.

I then spotted most of the American fisheries representatives in a tight huddle. I thought they would be delighted by the news they had just been given; they had been pestering me for weeks. So, I walked up to the group rather boldly. Before I could say anything, Tony Nizitich, a purse seine boat owner and representative of Starkist and, I thought, good friend of mine, immediately looked at me and said, 'Do you realise you just took $200 off the world price of a ton of skipjack?' – clearly implying that if there are that many out there, he and his colleagues will find it difficult to get a decent price for their catch: and that was our fault!

The next group I had a discussion with was a selection of the representatives of the environmental NGOs. The main message many of them were going to take home was that we had just given the purse seiners open slather. They were not particularly receptive to my assertion that the primary thing we had done was to give Pacific Island countries and territories the scientific information to enable them to manage their own fisheries sustainably, including allowing significant numbers of purse seiners to operate in their waters. Even though I was confident I knew the answer, I asked why NGOs had a particular problem with purse seiners. The answer was simple: 'They catch too many fish!' For a total resource as lightly exploited as this one had just been assessed to be, this was a supposition that I felt would be extremely difficult to defend. But it was very much to the fore in the arguments put forward by conservation NGOs at the time. Purse seiners and trawlers were never likely to be the flavour of the month for conservation NGOs. Efficient harvest of renewable resources at levels approaching the maximum, or even the optimum, is not sought by all! But the results of the Skipjack Programme

had clearly given the Pacific Island countries and territories confidence in the sustainability of the resources, of which they were gaining increasing managerial responsibility.

Over the rest of my career in fisheries management, I was to slowly come to live with the conundrum of trying to get the various sections of the fishing industries and conservationists to agree that any resource assessment was truly correct. It did not matter how good the science was: one or more groups would always have some reason why an assessment should not be accepted. I finally wrote a paper entitled 'Resource Assessment: The Joy of Always Being Wrong' (Kearney 1991; see Chapter 3) for a conference on managing trawl fisheries. The Skipjack Programme was the closest I ever got to research outputs and outcomes that should be acceptable to all parties; the species is simply not like others. Conventional assessment methods, management practices and concerns for the survival of the species are not appropriate for skipjack. A few of the protagonists for particular points of view acknowledge this.

I continued to be required to debate what the programme's assessments really meant for the management of the skipjack fishery for the rest of my time in Noumea as head of the TBAP, which the Skipjack Programme morphed into. My summary conclusions changed little. I did, however, modify the words I used to describe them. Most of the people who asked me what the stock size and throughput numbers really meant for fisheries management wanted simple answers to two key questions: What is the maximum sustainable yield (MSY; the most common management goal in vogue at the time)? What are the priority sustainability issues for Pacific skipjack fisheries that management needs to give priority to?

1. Mention of the issue of MSY opens the debate on whether density-dependent factors will have a major impact on the management of Pacific skipjack. At the heart of this issue is whether, when a population is heavily fished, the remaining fish take advantage of the extra space and food to be more productive (grow faster and/or produce more offspring). If these attributes make a significant difference, then the total sustainable yield per unit of time can become higher than was anticipated before fishing started. Noting the relatively high levels of cannibalism by adult skipjack of juvenile skipjack, density-dependent increases in productivity should be able to be anticipated. Then, if the

levels of cannibalism of skipjack eggs by skipjack larvae and juveniles are high, as suspected, then secondary impacts of density dependence can be expected.

- I strongly believe that it will not be possible to get sufficient total fishing effort appropriately distributed over the total area of the Pacific skipjack resource to achieve MSY from the total resource. In other words, I do not believe that the future management of the fishery will be constrained by concerns for the sustainability of the species. The long-term goal will be to manage the distribution of fishing effort to optimise the catches in the waters of the many individual island states – that is, OSY (optimum sustainable yield), which I believe, for skipjack, will likely remain considerably less than MSY. Attempts to take the MSY will almost certainly provoke more variability in annual yields with associated negative impacts on the realised value of these yields for individual countries and even for the region as a whole.

2. The sustainability of the skipjack species is a significantly different issue from the sustainability of the fisheries on the species. The major skipjack sustainability issues for Pacific Island states will be associated with maintaining local fisheries at optimum levels. The resource is huge but not infinite. And it does vary in total and in local abundance and distribution. The annual migration of skipjack to and from New Zealand is the most prominent example of a major predictable change within the total region. The period of extremely poor fishing experienced by the Skipjack Programme's vessel in its first visit to Papua New Guinea (see Chapter 14), together with detailed examination of the catch returns by the joint-venture pole and line vessels in Papua New Guinea, confirms how variable the abundance of the resource can be in both time and space.

   - Localised depletion occurs wherever fishing occurs; if you take one fish out of the water, the resource is depleted, even if only by one fish and only for a matter of seconds. In the total Pacific skipjack fishery, depletion occurs wherever there are fisheries; a common characteristic of all capture fisheries is that fish are removed from the water, with the result that, at least temporarily, an area is depleted. The use of the word 'depleted' to imply overfished, as the Australian Government's official stock assessments do, is, in my opinion, a serious bastardisation of the English language. At best, it is imprecise and lazy. It is therefore unscientific.

- Wherever multiple vessels exploit the same section of the total stock, competition will have an impact on the catches of individual vessels. The greatest early concern in the Pacific has been over small local fisheries being negatively impacted by purse seiners – for example, in Japan, where the coastal pole and line fisheries have been diminished by the increasing purse seine fishery. Managing all forms of competition to protect the sustainability of individual components of the total fishery will undoubtedly be the major sustainability issue. Trying to optimise and stabilise the returns to each country and territory, and for the whole region, from the licensing of foreign vessels, will be a much more immediate concern than the conservation of the species itself.

An independent assessment of the performance of the Skipjack Programme against its objectives was provided by Paul Judd in 2016:

> The concluding summary of the Skipjack Programme (Kearney 1983) was able to confirm that all of the rather grand objectives for the Programme had been met. Furthermore, collectively the results enabled an assessment of the total skipjack stocks of the whole SPC region and greatly facilitated an estimation of resources beyond these boundaries: objectives that were considered aspirational at the time the Programme commenced. From an administrative perspective it is significant that all research schedules, including the production of preliminary and final reports for each of the countries and territories of the SPC, were met and total expenditure, including for the originally unbudgeted computer, was safely within the budget approved at the commencement of the Programme. The subsequent creation and funding of the Tuna and Billfish Assessment Programme, coupled with the ongoing success of SPC's Oceanic Fisheries Programme, provide testimony to the quality of the scientific and administrative foundations established by the Skipjack Programme.

Another external review of at least the early stages of the programme was provided by the Rockefeller Foundation in their evaluation statement of their Grant GA AS 7509, The Skipjack Programme (see Chapter 5). The review, quoted in the following, was provided by Gary H. Toenniessen, assistant director of the Rockefeller Foundation, on September 29, 1980:

> This grant can serve as the epitome of how a seed grant should work. It provided one year's support in 1975 which enabled the South Pacific Commission, in collaboration with ICLARM, to hire Dr. Robert Kearney, to design and initiate an assessment program for

> improved management of skipjack tuna, as one of the South Pacific's largest food resources. By 1979, the Skipjack Survey and Assessment Programme had grown under Robert Kearney as Coordinator, to have an annual budget of over $1,100,000 with six developed countries providing a majority of the support. It is expected to continue operations at approximately this same level.
>
> The Program is allowing the island countries of the South Pacific to move towards maximum economic yield from skipjack tuna, while simultaneously ensuring that the resource is not depleted. In short, a small RF [Rockefeller Foundation] grant provided the startup funding for a highly successful and much larger research program which in turn is making a significant contribution to the more effective management of an important component of the South Pacific's food resources.

Having a funding body as prestigious and respected as the Rockefeller Foundation assess the programme as the epitome of how seed funding should work does give most people associated with the Skipjack Programme a rather deep sense of satisfaction: dare I say pride?

From my personal perspective, I could not have been happier with the scientific, management, administrative and technical outputs from the programme. The Pacific Island countries and territories, our primary clients, were clearly happy, and 50 years later, they remain so. The science of the big experiment was proven correct. The extraordinary funding arrangements worked seamlessly. The ease with which I was able to convince four of the six donor governments to support the transformation of the Skipjack Programme into the TBAP provided compelling evidence of the donors' satisfaction. The donors continued to not only fund the programme but also maintained the funding arrangements with me as the recipient of the money and the sole executive of the programme, including the accounts.

I remain extremely grateful to all six of the donor governments to the Skipjack Programme. There is no doubt that they all took a risk in funding it. It was definitely an experiment, even though I may have talked this component down during the fundraising period. Nothing like it had ever been done before; tagging had never been used to provide a detailed stock assessment of a species of tuna. I admit that for at least the first 12 of the 18 months of the intensive fundraising effort, assurances that it would work were disproportionately dependent on my opinion, which itself was heavily dependent on the pioneering work Barney Smith, Tony Lewis and I did in Papua New Guinea (see Chapter 1).

The two governments that did not continue funding of the TBAP were Japan and the United Kingdom. While neither government formally offered a reason for not continuing, I had no trouble in thinking of reasons why they might not. I had myself publicly outlined, at the Twelfth Regional Technical Meeting on Fisheries in 1980, reasons why it might be better for the Skipjack Programme to be suspended once the analyses of results from it had been finalised. If a compelling program of fieldwork were developed, a new proposal could be put forward that more precisely justified and then addressed what needed to be done. It should not be anywhere near as difficult to fund as the first programme had been. Based on the assessment by the Rockefeller Foundation that the seed money they had given to fund the salary and travel expenses for me as the Skipjack programme coordinator (quoted previously) represented the epitome of a successful grant, I was confident that they could be convinced to help kickstart another scientific experiment with similar benefits for so many small Pacific Island nations. Perhaps they would even be prepared to be a significant donor to the program itself?

The Skipjack Programme was a scientific approach to meeting a real need for information that was required by many island states and distant-water fishing nations. It had a very definite design and research program to meet three clearly defined objectives within a definite time frame. At the time of creation of the TBAP, the defined parts of the work program did not yet, at least, include a detailed program of fieldwork. It was assumed that the programme would develop a schedule of in-field research on billfish and other tunas, in addition to skipjack, but details on what this might look like were not immediately available. It was not budgeted in the initial proposed expenditure under the TBAP. The Regional Tuna Tagging Project was approved in 1985, but fieldwork did not commence until December 1989.

Although the results from the 9,596 yellowfin tuna that had been tagged during the Skipjack Programme were indeed informative, it was too early to be confident that a yellowfin tagging program would provide sufficient information to make a definitive contribution to stock assessment. In my opinion, the goal was definitely laudable and worth pursuing, but would the risk be greater than it had been for skipjack? On the positive side, the Skipjack Programme had proven that tagging could be used to measure the abundance of tuna, and 9,596 yellowfin (a significant number) had been tagged while actively seeking skipjack.

The strength of the support for the Skipjack Programme from Japanese scientists had been a major factor in Japan's decision to fund the Programme. Senior scientists, such as Drs Akira Suda, Shoji Ueyanagi, Sigeti Hayashi and their colleagues, in the various Japanese fishery research institutions and the Japan Fisheries Agency, had been immensely supportive. A major reason for this help was their excitement over the magnitude and design of the tagging experiment. I felt that the lack of a clearly defined research experiment was a major factor in the diminished enthusiasm of Japanese scientists for the TBAP. In the absence of that enthusiasm, the Ministry of Fisheries found it much harder to convince the government to support a less well-defined work program of an organisation of which Japan was still not a member. The Skipjack and the Tuna and Billfish Programmes did not formally constitute international organisations in their own right; the money was still being given to me!

The United Kingdom had, from the start of our discussions on the possible funding of the Skipjack Programme six years before, given me the impression that they did not wish to be drawn into negotiations on the Law of the Sea and regional fisheries management in the South Pacific, even from a distance. I had the feeling that their problems at home with international fishing issues in the northern Atlantic, including even between the United Kingdom and others in the European Union, were more than enough to make them wary. Management of living resources that cross national boundaries can be inordinately difficult. The South Pacific has been proven to be an international exception (see Chapter 21).

I had the impression that the British would be much happier to leave funding of international fisheries management issues in the South Pacific to Australia and New Zealand, who were, after all, members of the South Pacific Forum, which had ordained itself to be the focus of international discussion on the issues. I believed the United Kingdom thought that the major issues with fisheries management in the future would be more political than scientific. The Skipjack Programme had demonstrated that the science could be productive. The doubtful bit was now political, and that was what the FFA had been created for, potentially leaving the SPC out of the main game. I was strongly of the view that the lack of a clearly defined work program for the TBAP and the absence of an experimental design that had been adequately peer reviewed were making the United Kingdom's scientific experts at least somewhat uneasy. They had been up front about similar issues in the early stages of our discussions over the funding of the Skipjack Programme (see Chapter 7).

Also relevant to the fundraising for the Tuna and Billfish Programme was the approach I received from Canada.

Right at the beginning of my attempts to raise funding for the Skipjack Programme, I had approached Canada for support, only to receive a very definitive statement of no interest (see Chapter 7). I heard no more from the Canadians until about a month before my planned departure from the TBAP, almost six years later. I received a phone call from a very senior representative of the Canadian International Development Agency (CIDA) asking if he could come and talk to me about the possibility of Canada contributing to the TBAP. We agreed on a date and time a week or two later. The Programme could certainly use some extra support if it was to undertake significant fieldwork. I looked forward to the meeting.

On the day, after an hour or so of rather 'peripheral' discussions in my office about what the Skipjack Programme had achieved and what was being proposed for the Tuna and Billfish Programme, we adjourned to my house, where Hope had done her thing and a lovely lunch awaited. The discussions got more to the point over lunch. The reason Canada had declined to join the donors to the Skipjack Programme, approximately six years earlier, was, at least in part, because of the poor financial state of the commission, as detailed in the secretary general's statement to the South Pacific Conference (see Chapter 4).

The indication this gave of poor financial management would not be missed by any in-depth review. Canada apparently felt that this was not the time to be contributing to the commission's first extra-budgetary project, which was equal to approximately a third of the commission's total budget.

Canada had watched, with some interest, the development of a new financial system for funding the Skipjack Program, specifically giving the money to me personally. CIDA, initially at least, had had serious doubts about the wisdom of such an arrangement. But they had more recently accepted the explanation from the donor governments that they were very pleased with the financial and management arrangements that had been made and the subsequent success of the programme.

Canada was considering an offer of $200,000 a year for three years under the same arrangements. In Canada's opinion, these 'same arrangements' included me staying on to run the programme for at least two years. When I told him that I was leaving in a few weeks and would be taking up a position of Chief Scientist at the IATTC, his only comment was this:

'I wish you had told me that before I left Canada. I could have saved myself a trip'. He confirmed that the condition of my staying with the TBAP was definitive – for the time being, at least. They were not prepared to commit to a project where the director had almost total say in how it was run, when they did not even know for sure who that director would be.

At the conclusion of the Skipjack Programme, I was confident we had more than adequately met the programme's objectives. We had also laid an excellent foundation for the creation of the broadly based fisheries research and management body, which had been one of my goals since 1975. I did, however, think it unfortunate that the creation of that body had been delayed (until 2004 as it turned out), for largely poorly informed reasons, including those discussed in Chapter 16.

20

Do I now know enough about skipjack to know how little I know?

Shortly after I arrived in Papua New Guinea in January 1971 to take up the position of principal fisheries scientist, with the more specific responsibility to establish a tuna research program, I became aware that I did not know enough about skipjack to know how little I knew (see Chapter 1). But my job afforded me the unique opportunity to design a research program with the primary goal of me – and the team I would be supervising – learning as much as possible about skipjack, as quickly as possible. If we were going to provide the Papua New Guinea government with the information needed to manage its rapidly growing tuna fishery, the level of our knowledge about this species and the fishery based on it needed to improve quickly. For an apprentice fisheries scientist, the opportunity to 'do it my way' was so compelling that even spare time was gladly spent contemplating how best to learn more about skipjack.

One thing I quickly learnt was that the scientific literature on skipjack was dominated by uncertainty. Even fundamental characteristics of the species, such as its age and growth rate in different parts of the world's oceans, had not been described with confidence. Even decades later, many of the estimates of the age of skipjack in the waters of different countries were still simply wrong. Many scientists started with a bias resulting from their difficulty in accepting that in tropical waters, skipjack were recruited to the fished, spawning population at approximately one year of age. For example, the New Zealanders, who enjoy a justified reputation for excellence in

fisheries science and management, in their Consultation Document on the management of their skipjack fishery and its possible inclusion in their Quota Management System, in 2004, included the statement, 'Estimates of longevity (of New Zealand skipjack) vary between eight and 12 years'.

The Skipjack Programme had determined two decades earlier that the skipjack in the New Zealand fishery were predominantly one year old, but some were two years old. Approximately 87 per cent of them die each year from natural causes, and the maximum longevity, only achieved by a very small percentage of the total population, is likely four years. The fisheries management requirements for a species with an average life expectancy of two years or less are entirely different than one with an expectancy of 10 years. Fortunately for New Zealand, Sir Peter Talley, the head of Talley's Fisheries, used the Skipjack Programme's data and analysis summary I gave him to persuade the New Zealand government to change its intended approach to the management of the New Zealand skipjack fishery. On Sir Peter's advice and insistence, they correctly refrained from trying to bring skipjack into the Quota Management System. As demonstrated by the results of the Skipjack Programme, the number of skipjack caught in one season in the New Zealand fishery is extremely unlikely to have a measurable impact on the catch taken in New Zealand in subsequent years. At least at that stage of the development of the New Zealand skipjack fishery, it was not a fishery for which annual quotas on the total catch were an appropriate management strategy.

What scientific papers there were on the more sophisticated characteristics of the species, such as stock structure and reproduction, were acknowledged in the 1970s and 1980s (even commonly by the authors themselves) to be little more than hypotheses. As far as I was able to ascertain in the mid-1970s, there had not yet been an accepted estimate of the size of a skipjack stock or population anywhere in the world. There was general acceptance that the species was underexploited, and as far as I could ascertain, it was not listed as 'overfished' anywhere. But I could not find estimates of how underexploited it was or what the optimum levels of exploitation might be. Furthermore, the physiological characteristics of skipjack had hardly been described at all, except for general acknowledgement that it was a species that could swim very fast, and presumably, over considerable distances.

From the time I left Papua New Guinea in 1975 to the confirmation in 1977 that the procurement of funding for the Skipjack Programme was secure, I had ample time to edit and update my knowledge of what information

on skipjack was available in the international literature. I also had time to add the results of our skipjack research in Papua New Guinea from 1971 to 1975 to the list of publications. I had gained some insight into what of this information contributed to the knowledge that was necessary to assess the stock(s) of skipjack in the broader central and western Pacific, and how these stocks might be managed. Always at the back of my mind was the need for an understanding of how this species could thrive in an oligotrophic (nutrient-poor) ocean to the extent that skipjack catches from the Pacific now dominated world landings of tuna. Surely the attributes that enabled such outstanding success needed to be better understood and considered when determining how fisheries on the species should be managed?

A paper summarising my findings just before the commencement of the Skipjack Programme, entitled 'Some Hypotheses on Skipjack (*Katsuwonus pelamis*) in the Pacific Ocean', was presented to the 'Ad Hoc Meeting of Scientists to Discuss Skipjack Fisheries Developments and Research Requirements' that I convened in Noumea from December 5 to 10, 1976 (see Chapter 7). It was subsequently published in August 1978 (Kearney 1978). It provides a summary of the status of knowledge of Pacific skipjack before the completion of the Skipjack Programme. Notable is the paper's lack of information on the physiology of the species. This knowledge gap was not because I was not interested in the physiology of the species; my research for my PhD at the University of Queensland had been on the comparative physiology of numerous fish species, including tunas. Apart from some extremely interesting work at the National Marine Fisheries Service laboratory in Hawaii on how skipjack used the unique oceanography of parts of the central and eastern Pacific to grow particularly big in those areas (Barkley, Neill and Gooding 1978), I was able to find very little on the physiology of the species that would be relevant to the management of fisheries on skipjack.

Also lacking were definitive stock assessments for the species, beyond acceptance that the total population of skipjack was very large. Little was known about just how large. Traditional methods of stock assessment, such as length and age-structured models, had simply not been able to be used successfully for skipjack. The primary reasons were that skipjack were so short-lived and so mobile that length, or even age-based cohorts, could not be adequately followed through the years in any area. For the few skipjack fisheries for which there were reasonable data on catch per unit of effort, such data did not appear to reflect a measurable, consistent change in abundance

due to fishing. Fluctuations in abundance did occur, and at times they were considerable, but fundamentally they appeared to be due to oceanic events rather than the impacts of fishing.

So, what was it about skipjack that led to the belief that there were plenty of them in the Pacific Ocean and that even considerable increases in fishing pressure were unlikely to represent a threat to future populations?

Skipjack are hugely different from other fish, even other tunas.

For most fish species, mobility by some means is critical to their lifestyle and usually their continued existence. Even for 'flat fish', such as flounder and sole, that have a body shape evolved to spend most of their time lying on the bottom, there is occasionally a need to move quickly when threatened or when pursuing prey. These feats are made possible in flat fish by relatively large, flexible fins and a body that can bend considerably throughout most of the fish's length.

Flat fish have very white flesh with virtually no myoglobin (the red respiratory pigment that helps mobilise and deliver oxygen in a manner that supports constant or repeated movement in red muscles, such as heart muscle). White muscle, such as hamstrings in humans, is efficient for short, rapid acceleration from a standing start. Flat fish also have low levels of haemoglobin (in red blood cells) in their comparatively small blood volume. The complete domination of white muscles ensures the species is capable of very quick, short-term movement, not sustained speed. Evolution has acknowledged the merit in spending most of their time lying on the bottom of the ocean with sand-coloured skin as camouflage on their exposed dorsal surface, and locomotion dominated by short, sharp movements to surprise prey or avoid predators. The latter is aided by the total body movement stirring up sand to restrict visibility by predators.

In contrast, skipjack have a body that has evolved to support extreme levels of sustained high-speed movement. In fact, they must keep swimming with their mouth partially open to keep oxygenated water flowing constantly across gills that are the most highly vascularised of all fish. They have no effective swim bladders or other attributes to accommodate being stationary. If they are made to stop swimming, such as by a fishing net, for not much more than a matter of seconds, they drown – or suffocate, if that is your perspective. Their body shape is one of hydrodynamic excellence. Overall, the body is torpedo-shaped, with a groove into which every fin, except their tail, fits; their scales are so small that their skin is slippery. Their tails have an

extremely high 'aspect ratio' (the ratio of the span of the tail to its breadth; the aspect ratio is an accepted measure of the relative capability of a fish species for sustained speed). The amplitude of the tail beat of skipjack is extremely small, and the frequency of beating is thought to be the fastest and most persistent of all common fish. In terms of the ability to swim fast continuously, they are the evolutionary extreme. Their swimming capability compared to their body length even dwarfs other species of tuna. There is nowhere to hide in the surface layers of the central Pacific Ocean. Their flesh is dark red, due to high concentrations of both myoglobin and haemoglobin; sustained speed is their only defence.

Although the available data are limited, it suggests that the difference between the metabolism (the set of life-sustaining chemical reactions in an organism) of skipjack and yellowfin tuna of 0.9 milligrams of oxygen per kilogram per hour is approximately equal to the difference between yellowfin tuna and the lowest of all other teleosts, 1.0 milligrams of oxygen per kilogram per hour. Thus, skipjack have much greater metabolic capacity than other tunas and many times more than that of other fish, particularly the white-fleshed flat fishes.

The evolution of such extreme capability to swim constantly and extremely fast (in body lengths per unit of extended time) leaves little doubt they are the fastest and most mobile teleosts. This capability is assumed to be an adaptation to the vastness of their available environment, approaching 100 million square kilometres of the Pacific Ocean alone, and the oligotrophic (low productivity) nature of the water in which they live. When there is a low abundance of food per unit area of habitat, there is a great selective advantage in covering large areas efficiently when foraging. For skipjack, moving a few thousand kilometres when oceanic conditions become unfavourable where they are is not a problem. Species that evolve such mobility can survive, or even thrive, in greater numbers than other predators.

In terms of total food consumption, there is little doubt that the extreme feeding capability of individual skipjack, aided by their propensity to hunt in packs (schools) and the enormous numbers of them (at least 3 million tonnes in the central and western Pacific alone), demonstrates that skipjack are the dominant predator species in this region. Their high metabolic rate also helps support an elevated internal body temperature, which facilitates their very rapid digestive and reproductive systems.

When considering predation by, and of, skipjack, it is informative to begin by looking at the consumption of skipjack by skipjack. Results from the Skipjack Programme confirm earlier findings, such that there is now no doubt the species is highly cannibalistic. The degree of this cannibalism was quantified by the Skipjack Programme. Consumption of juvenile skipjack by adult skipjack occurs over the whole area where juveniles occur. Larvae and juveniles appear to attempt to minimise cannibalism by restricting their vertical distribution in the water column to below where adults are concentrated. Larvae and juveniles appear to favour proximity to the 20-degree isotherm, whereas adults prefer water above 24 degrees. This usually means that larvae and juveniles are at least 100 metres below the adults in the water column in the areas where both stages of the life cycle occur. This is thought to reduce cannibalism, but it is well proven that it does not eliminate it.

Before the fieldwork of the Skipjack Programme had even commenced, I had hypothesised that skipjack are numerically, at least, their own greatest predator (Kearney 1978). In other words, adult skipjack eat more skipjack (as juveniles) than any other species does. It has also been suggested that the level of this predation may be so high that juveniles could be considered an important food item for adults. This makes ecological sense if one regards juvenile skipjack essentially as food-gathering organs of the adults. From an evolutionary perspective, providing the probability that feeding on one's own progeny is low, taking advantage of this abundant food resource makes perfect sense. From a demographic perspective, the impact that would otherwise occur from rampant cannibalism on overall population size is mitigated by the fact that the juvenile skipjack have been working hard to gather food resources that are subsequently of benefit to the adults. So, the adult–juvenile–larval interactions need not be interpreted as an unfortunate self-destructive phenomenon, but rather a mechanism that has evolved in time to enable the species to make more efficient use of its huge oligotrophic environment and to successfully occupy more of it.

My interest in the segregation of skipjack of different sizes was first piqued in the early years of my skipjack fieldwork in Papua New Guinea. While at sea looking for schools of skipjack from which to tag individuals, it became progressively obvious that the skipjack on which the fishery was based were individuals between a little less than 3 kilograms and a little more than 6 kilograms. The abundance of fish in this exclusive size range was confirmed by the catch data from the commercial fishing fleets, which covered the first five years of this fishery in considerable detail (daily catch

and size records from every boat: see Chapter 1). There were clearly many thousands of tonnes of these larger skipjack visible as surface schools, but during the whole of our Papua New Guinea skipjack research program, we never observed a single school of very small skipjack, even though there must be many millions, even billions, of small individuals somewhere in the total area we fished. As the schools of adult skipjack were abundant in the area in which they were spawning almost every night, it was difficult to create a scenario that did not include the larvae and juveniles being present in the same topographical locations as the adults. Only two scenarios seemed likely to explain what was happening. The first was obvious segregation within the water column, discussed previously. The second was some form of behavioural difference that prevented the juveniles from appearing as highly desirable food in the areas in which the adults were feeding.

I found it particularly noteworthy that the only time I ever observed schools of skipjack smaller than the normal size of first recruitment to the Papua New Guinea fishery was in the first month of fieldwork of the Skipjack Programme in the waters to the north of New Ireland. This was particularly noteworthy because, at that time, schools of adult skipjack were completely absent from the area that displayed a high abundance of adults at other times (see Chapter 14).

A clue to the possible avoidance of juvenile skipjack forming surface schools can perhaps be found in the feeding behaviour of adult skipjack when in schools. All experienced skipjack pole and line fishermen would have observed the common difficulty of getting some schools of skipjack to stop feeding on whatever it was that made them visible as feeding surface schools and start feeding on the live bait (chum) that was being thrown to them. If the school begins feeding on the chum, it can be held in proximity to the boat and captured in good numbers on lures similar in size to individual components of the chum, which may well be a totally different size from what they had been feeding on before the chumming began. This phenomenon is like what trout fishers call 'matching the hatch', which in practice means having the fly as similar as necessary to what the trout were feeding on before you came along. Trout will frequently display a feeding frenzy on one particular type of organism, such as a swarm of a single species of hatching insects, and reject all others. I observed a most spectacular example of this in New Zealand trout streams when cicadas were in abundance and frequently fell into the water. At such times, it became almost unbelievably easy to catch trout on a cicada-pattern fly and close to impossible to catch them on anything else.

I witnessed another piece of evidence when chumming skipjack one afternoon off the north coast of New Britain, Papua New Guinea, on the research vessel the *Tagula* (see Chapter 1). One morning, we had a good school of skipjack on the bite on small *Stolephorus* anchovies. I noticed in the chumming tank a reasonable number of large blue pilchards (*Amblygaster sirm*) that are excellent bait for most tuna and other oceanic pelagic species but are bigger than the *Stolephorus* anchovies that are the preferred skipjack bait. I scooped one of the larger species from the tank and threw it into the boil of feeding skipjack at the back of our boat. It immediately came to the surface and took off at speed away from the centre of the school of feeding fish. To my amazement, the skipjack ignored it. So, I threw out another one; it, too, was ignored. I wonder? I scooped up eight or 10 of the bigger pilchards and threw them out together. About three seconds later, one of the pilchards was attacked and disappeared in a large surface splash. Within another few seconds, all of them had been eaten. The skipjack had clearly quickly modified the target of their feeding frenzy.

The lack of surface schools of juvenile skipjack, together with the lack of a feeding response by adult skipjack to individual bait items, prompted me to ponder the possibility that juvenile skipjack do not form surface schools because to do so would create a concentration of food and a consequent feeding frenzy on small skipjack by the adults. One juvenile skipjack might be able to swim through a school of adults feeding on prey of a different size, but 1,000 or more juveniles would not be able to do this. This hypothesis is strongly supported by the lack of large numbers of juvenile skipjack in any of the stomachs of individual skipjack sampled in the fieldwork of the Skipjack Programme.

Argue, Conand and Whyman (1983) provide a thorough and detailed description of the data collected on juvenile skipjack in the 12,135 stomachs of skipjack and other tuna analysed in the whole of the Skipjack Programme. They provide considered analyses of these data in the context of a thorough review of the relevant literature and the implications of the Skipjack Programme data for the assessment of cannibalism of juveniles by adult skipjack. They provide a succinct summary of the vertical migration of juvenile skipjack:

> By staying below the daytime feeding range of surface tunas, skipjack juveniles may avoid considerable daytime predation (Kearney 1978), particularly in the early morning period that Magnuson (1969, cited by Argue et al. 1983) observed to be the time of most intense feeding

> by adult skipjack. Movement of juvenile skipjack to the surface (in the late afternoon and early evening) could mark the beginning of their period of intense feeding as they follow upward movement of zooplankton in the deep scattering layer.

It is reasonable to assume that skipjack eggs and larvae would be included in that zooplankton.

Argue, Conand and Whyman (1983) go further to state:

> Although skipjack may be 'their own greatest predators' … as Kearney (1978) suggested, skipjack juveniles were not a dominant item in skipjack stomachs over the total western and central Pacific area from which Skipjack Programme samples were obtained.

They support this statement, thus 'Over 100 diet items were identified from skipjack adults, and skipjack juveniles were only the ninth most common item in terms of percentage occurrence'. If juveniles did form schools that the adults preyed upon, then at least the occasional adult we sampled would have had many juveniles in its stomach. But not even one did. Nor did we find unusually high numbers of skipjack in the same school with above-average numbers of juveniles in their stomachs.

Argue, Conand and Whyman (1983) then go on to state: 'On the other hand, it is tempting to speculate on the amount of mortality due to cannibalism'. They base their speculation on the size of the standing stock of skipjack in the Skipjack Programme study area of 3 million tonnes (Kleiber, Argue and Kearney 1987), at an average size of 2.5 kilograms (Tuna Programme unpublished data), and estimate that the number of adult skipjack (predators), at any time, is 1.2 billion. The average number of juvenile skipjack in skipjack stomachs was 10.81 per 100 stomachs. An instantaneous gastric evacuation rate of 0.105 was derived from Magnuson (1969, cited in Argue, Conand and Whyman [1983]) to support an estimate of daily consumption of skipjack juveniles by skipjack predators of 0.282 juveniles per adult. At this rate, skipjack predators of a size vulnerable to surface fishing gear would consume a number of juveniles equal to their own number in just over three days (that is, 1.2 billion in three days, or well over 100 billion per year). If a fishery caught that number of individual juveniles, the anti-fishing lobby would be getting somewhat excited.

Argue, Conand and Whyman (1983) also conclude:

> Evidence was presented that skipjack juveniles formed size-specific schools or aggregations. These temporal and spatial distributions of skipjack juveniles were postulated to represent adaptations on the part of skipjack to minimise predation by surface-dwelling predators.

Adult skipjack were found throughout the Skipjack Programme and from observations from the air to be extreme in their pursuit of consistency of size of individuals within schools (see Chapter 18). That juveniles should do the same is not surprising. What is surprising is that no evidence was found of large numbers of juveniles being present in the stomachs of large numbers of adult skipjack from the same school. There was no evidence that one school of adults had encountered a large school of juveniles and preyed upon them. My hypothesis that juvenile skipjack reduce predation by adults by not provoking a feeding frenzy in adults by forming surface schools in areas where schools of adults are present, remains.

When contemplating the magnitude of the differences between skipjack and other fish, spawning behaviour must be to the fore. Skipjack spawning occurs year-round over vast areas of the central and western Pacific, being concentrated in equatorial areas and becoming more seasonal in higher latitudes. In equatorial regions, spawning occurs almost every night (on average, every 1.18 nights), with each female laying an average of 300,000 eggs each spawning (see Chapter 19). This astonishing egg production by individuals means that total fecundity is not likely to be a problem for the species' conservation. It is interesting to speculate on why it is so high. Superficially at least, it appears to be much higher than would be necessary to ensure the survival of the species.

Perhaps we need to expand the preceding dynamic between adults and juveniles, through cannibalism, to include the interaction between the juveniles and skipjack eggs and/or larvae? The vertical segregation of adults, juveniles and larvae in the water column is suggested to be, at least in part, to reduce predation of larvae and juveniles by adults. Assuming this segregation is not 100 per cent effective, would it not be plausible that skipjack eggs, and possibly even sperm, are an important source of food for larvae and/or juveniles? There are, after all, over 100 billion eggs, and presumably a similar volume of sperm being released into the open ocean every night, and the density of other food is low in the waters of the tropical Pacific.

While the concept of a species with a self-sustaining life cycle might horrify most ecologists and provide perplexing challenges for evolutionary biologists, perhaps skipjack might be the species for which we do need to think outside the box. Maybe they are so different from other fish that the traditional principles of population dynamics are not the ones that describe their behaviour?

It would be logical to conclude that the system of multiple layers of predation would still need at least some external nutrients to be brought into the system at some stage(s) of the cycle. Studies of the stomach contents of adult skipjack confirm that they are opportunistic predators with consumption of whatever vertebrates and invertebrates of suitable size are prevalent at the time (Skipjack Programme data from Argue, Conand and Whyman [1983] discussed earlier). However, when the attributes of skipjack are so extraordinary, perhaps we should not restrict our thinking to what is normal. Some detailed modelling of possible evolutionary and ecological scenarios taking account of the extraordinary characteristics of the species, including cannibalism at several levels, is warranted. Fishery assessment techniques that are used for most fish species are not appropriate for skipjack! Perhaps cannibalism at multiple levels has a significant part to play in the individualism of the species?

When considering the productivity of the total skipjack population, the life span of individuals must be included. Skipjack have a short life span (four years as a normal maximum). Natural mortality of skipjack on the logarithmic scale that is used in most fisheries assessments was found from Skipjack Programme research to be 2.0 (see Chapter 19). What this translates to is that 87 per cent of the population dies of natural causes (including predation by marlin, sharks or very large tuna, or diseases such as heart attacks) every year. The limited available information suggests that scar tissue resulting from heart attacks is very common in tunas. Not surprising considering their extreme activity.

The great majority of skipjack (87 per cent) do not live more than a year after being recruited to the fishery at approximately one year of age. When skipjack stock assessments are attempted, it must be noted that they are totally different from other fish, even other tuna, such as southern bluefin tuna (SBT). A comparison of the most used stock assessment indices of skipjack with those of SBT and a common species of lobster (Table 20.1) is illuminating. The purpose of this comparison was to demonstrate to an audience of fisheries scientists and managers (who were discussing the

question 'what is a tuna?') that, from a population dynamics perspective, SBT are hugely more similar to lobsters than they are to skipjack. I also concluded that if skipjack were a million dollars each, it would not be possible to seriously threaten the survival of the species with currently known fishing technology (see Chapter 19).

Table 20.1: Comparison of commonly used stock assessment indices between skipjack, southern bluefin tuna and western rock lobsters (*Panulirus cygnus*)

Characteristic	Skipjack	Southern bluefin	Lobster
Average max. age (years)	4	20	17
Age at first spawning (years)	1	8	7
Frequency of spawning	Every 1.18 days	Once or twice per year	Twice per year
Natural mortality (logarithmic per year)	2.0	0.2	0.2
Exploitation rate (%)	4	>40	60
K (von Bertalanffy, per year)	2.0	0.13	0.56

Source: Kearney 1991.

When designing the Skipjack Programme, I anticipated that the fieldwork and the analyses that followed would uncover considerable new findings about skipjack. It certainly did that. I contend that the programme revolutionised the global knowledge base on this remarkable species, at least in the central and western Pacific. But there is still much we do not know. For me personally, it certainly increased my knowledge base, at least to the extent that I now know that there is much more to learn. However, unlike when I started working on skipjack, at least I now have some idea about what it is that I cannot explain.

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The South Pacific Commission's tuna programmes post the Skipjack Programme

The Skipjack Programme evolved into the Tuna and Billfish Assessment Programme (TBAP) in September 1981. This significant change acknowledged the need to extend the fundamental data collection and research work, started through the Skipjack Programme, to other important stocks of tropical and subtropical oceanic tuna and billfish species. In the mid-late 1990s, the programme further evolved with the inclusion of tuna fishery bycatch and ecosystem research, including data collection. This evolution was accompanied by a further name change to the SPC Oceanic Fisheries Programme (OFP). The OFP co-exists with the SPC Coastal Fisheries and Aquaculture Programme within what is now called the Fisheries, Aquaculture and Marine Ecosystems Division.

Data collection for skipjack research continued to be enhanced after the completion of the Skipjack Programme. This enhancement acknowledged that the fishery data collected by SPC throughout the region underpins not only the scientific work conducted by the SPC but also the work of other agencies involved in the management, including compliance, of the region's tuna fisheries.

The complex nature of the stocks of skipjack and other tuna species, coupled with increasing catches and the value of these catches to Pacific Island nations, created an ever-expanding need for data to ensure stocks could continue to be sustainably harvested at optimum levels.

Logbook data established in Pacific Island countries during the Skipjack Programme continued to be collected and improved, particularly for the growing purse seine fishery.

There were several new tagging programmes in the decades following the Skipjack Programme. These included the Regional Tuna Tagging Programme (RTTP: 1989–1992) and the Pacific Tuna Tagging Project in more recent decades. Data on skipjack size, stomach content, otolith and tissue samples were increasingly collected through the establishment of observer data collection in the mid-1990s. Port sampling data collection was also established in numerous Pacific Island and Asian ports where tuna were unloaded during this time. These data continue to be an important aid to the management of the total fishery.

Another notable addition since 2010 has been the critical advisory role of the SPC in the enhancement by the Western and Central Pacific Fisheries Commission (WCPFC) of data collection systems for monitoring the diverse, complex domestic tuna fisheries of Indonesia, the Philippines and Vietnam. These labour-intensive fisheries account for 25–30 per cent of the total western and central Pacific tuna catch.

Steadily increasing skipjack catches from the area of the SPC (from 230,000 tonnes in 1975, when efforts commenced to have the Skipjack Programme funded, to around 1,200,000 tonnes in 2023, the most recent year for which complete data are available), with a value at the point of first sale of $2.2 billion, confirm that it is clearly the largest tuna fishery in the world. As such, and with various detailed sources of data collected from the fishery, the SPC data holdings increased substantially over time. It has been acknowledged for several years as the most comprehensive set of tuna fishery data in the world.

The need for enhanced access to the various fisheries data and significant advances in information technology have greatly increased the complexity of the SPC's data management systems. These developments have required all parties' agreement on the standardisation of data submitted and collected, data dissemination rules, and the development of many data query tools that facilitate access to certain datasets by authorised, bona fide users. The SPC

also compiles and manages a suite of public domain datasets on behalf of the WCPFC. These include annual catch estimates, aggregated catch and effort data, and observer data. These public domain datasets are regularly accessed by various external researchers from throughout the world.

Assessment of the skipjack stock had been progressively implemented since the initial estimate of 3 million tonnes by the Skipjack Programme in August 1981. From this time on, the SPC continued these assessments for skipjack and introduced assessments for other tuna stocks. The methodologies within the assessment model software (MULTIFAN-CL) were also expanded with the integration of both fisheries-dependent data (for example, logbook, port sampling and observer data) and fisheries-independent data (for example, tagging) from various sources. An assessment for each species has been typically conducted over a three- to four-year cycle and, since 2005, reviewed by WCPFC members at the annual Scientific Committee Meeting. This review includes reaching an agreement on the scientific advice on the status and management of the stocks of skipjack and other tuna and billfish species. The SEAPODYM model has also been developed to further assess the population dynamics of western and central Pacific tuna, particularly skipjack, using high-resolution environmental and fisheries data.

The development and application of these modern stock assessment approaches were made possible by the extensive fishery data collection system that the SPC had established. However, just as important for stock assessment and related models was the accumulation of information on key aspects of the biology of those species. This work began with the Skipjack Programme and has been continued by subsequent SPC tuna programs.

In the past 20 years, OFP, with the support of WCPFC and individual members, has expanded a range of biological research studies on subjects such as age and growth (through analysing growth rings on otoliths [ear bones]), reproductive biology, movements and population genetics. The biological sampling required for these studies was facilitated by the large-scale tagging, fisheries observer and port sampling programmes operating throughout the Asia-Pacific region. A key recent tool to support biological research has been the establishment of the Pacific Marine Specimen Bank, hosted at the SPC headquarters in Noumea, and which currently consists of more than 300,000 curated tissue samples from tuna and other pelagic species collected from fishing and research vessels operating in the region. These samples are made available to researchers on request.

In the past decade, the SPC has had the primary role in developing harvest strategies for the four main tuna stocks in the WCPFC region; a harvest strategy is a recognised, formal process for facilitating pre-emptive decisions on current and future management actions and outcomes to increase the achievement of agreed management objectives through actions in the fishery.

Rigorous formal reviews of the assessments conducted by the SPC through the WCPFC Scientific Committee have resulted in agreement that the skipjack stock, and the stocks of the other three main tuna species (yellowfin tuna, big-eye tuna and albacore) in the western and central Pacific Ocean (WCPO), are not 'overfished' and that overfishing is not occurring. This status has been confirmed by repeated assessments since the first by the Skipjack Programme in 1981 (see Chapter 19). Over this time, the WCPO has been the only ocean region in the world where all tuna stocks have this 'healthy' status. It is therefore acknowledged to be the best-managed tuna fishery in the world (acknowledging that the four tuna stocks in the Indian Ocean have only very recently attained similar status).

Since the establishment of the WCPFC in 2004, having the SPC as the region's independent science service provider (distinct from the WCPFC, the Pacific Islands FFA and Parties to the Nauru Agreement [PNA]) has had recognised benefits. The SPC is apolitical, and it is therefore able to produce the scientific outputs, deal with the facts and largely avoid damage from conflicting political influences. The SPC continues to deal directly with its Pacific Island membership on technical assistance (in addition to being contracted to the WCPFC for its scientific work). Most distant-water fishing nations, some begrudgingly, acknowledge the benefits of the independence of the SPC in providing the science and data management.

Another benefit of an independent SPC, which is not commonly known, is that it has benefited from receiving valuable, confidential historical datasets from some countries, purely for research work. These datasets have not been provided to the WCPFC or other agencies, but they have contributed to the assessments carried out by the SPC, from which all countries benefit.

When the WCPFC was established, the Pacific Island countries stated that their consolidated historical logbook data (held and managed on their behalf by SPC) for foreign fleets should not be provided to the WCPFC, since it was the responsibility of the flag distant-water fishing nation states to submit these data (which they only started to do from 2017 onwards).

The SPC therefore holds a much more complete, consolidated historical database of various sources of data, which are used for scientific purposes, than the WCPFC or any other organisation.

In 2026, more than 80 staff are employed in the SPC's OFP with an annual budget for its core programs of approximately AU$25 million. It is important to note that, in addition, the SPC OFP also has a key role in the co-administration, technical oversight and assistance in several major regional projects and processes where it does not receive funding directly (that is, the operational budget is not controlled by SPC administration). The total of this funding can, in some years, exceed the annual budget of the SPC's OFP. One such project is the recently approved (February 2025) Green Climate Fund Project 'Adapting Tuna-Dependent Pacific Island Communities and Economies to Climate Change', which has a total budget of US$107.4 million over seven years. The SPC will receive US$102.3 million of this funding. There is little doubt the SPC will continue to dominate research on the sustainability of Pacific tuna species and the environmental factors, such as El Niño and La Niña, that influence them for at least the next decade.

The Skipjack Programme not only laid the foundation for the sustainable development of the world's largest tuna fishery but also provided confidence that skipjack will remain a critical contributor to the food security and livelihoods of many Pacific Island people, and the development of numerous Pacific Island economies.

The significance of these contributions is demonstrated by the extraordinary socioeconomic benefits now derived from tuna, the most important renewable natural resource in the Pacific Island region. These benefits have been quantified in multiple peer-reviewed journal articles during the past decade and documented by the FFA in its report series on Economic and Development Indicators and Statistics.

Although more than 1,000 species of fish are consumed across the region, tuna – approximately 80 per cent of which will be skipjack – will need to supply 25 per cent of the fish required for good nutrition of all Pacific Island populations combined by 2035.

The contribution of industrial tuna fishing and processing operations to Pacific Islanders' industrial way of life is equally commanding. They now employ ~25,000 Pacific Island people. Ten Pacific Island countries and

territories have been assessed to have tuna-dependent economies. This is because these states derive an average of 37 per cent of all their (nongrant) government revenue from access fees paid by distant-water fishing nations to catch tuna within their Exclusive Economic Zones. To add perspective: Australia's hugely important mining industry represents 10 per cent of the Australian economy. The research described in this book underpins the confidence placed in the sustainability of the region's incredibly important tuna resources, particularly skipjack.

References

Argue, A. W. (1982). 'Methods Used by the Skipjack Survey and Assessment Programme for Collecting Biological, Tuna School and Ancillary Data from a Pole-and-Line Fishing Vessel'. In R. E. Kearney (ed), *Methods Used by the South Pacific Commission for the Survey and Assessment of Skipjack and Baitfish Resources*, 45–69. Tuna and Billfish Assessment Programme Technical Report No. 7. Noumea, New Caledonia: South Pacific Commission.

Argue, A. W., F. Conand, and D. Whyman. (1983). 'Juvenile Tunas from the Stomachs of Skipjack and Other Surface Tunas Caught by Pole-and-Line Gear in the Pacific Ocean'. Tuna and Billfish Assessment Programme Technical Report No. 9. Noumea, New Caledonia: South Pacific Commission.

Barkley, R. A., W. H. Neill, and R. M. Gooding. (1978). 'Skipjack Tuna, *Katsuwonus pelamis*, Habitat Based on Temperature and Oxygen Requirements'. *Fishery Bulletin* 76 (3): 653–662.

Child, J., L. Bertholle, and S. Beck. (1966). *Mastering the Art of French Cooking*. New York: Penguin Books.

Fujino, K. (1976). 'Subpopulation Identification of Skipjack Tuna Specimens from the Southwestern Pacific Ocean'. *Bulletin of the Japanese Society of Scientific Fisheries* 42 (11): 1229–1235.

Hallier, J. P., R. E. Kearney, and R. D. Gillett. (1982). 'Baitfishing Methods Used by the Skipjack Survey and Assessment Programme and Recommendations on Baitfishing Techniques for the Tropical Pacific'. In R. E. Kearney (ed), *Methods Used by the South Pacific Commission for the Survey and Assessment of Skipjack and Baitfish Resources*, 71–107. Tuna and Billfish Assessment Programme Technical Report No. 7. Noumea, New Caledonia: South Pacific Commission.

Joseph, J., and T. P. Calkins. (1969). 'Population Dynamics of the Skipjack Tuna (*Katsuwonus pelamis*) of the Eastern Pacific Ocean'. *Inter-American Tropical Tuna Commission Bulletin* 13 (1): 1–273.

Judd, P. (2016). 'A Short History of the Skipjack Survey and Assessment Programme (SSAP) [Part 1]'. *SPC Fisheries Newsletter* 150: 61–68.

Kearney, B. (2022). *Fishing in the Good Old Days: Was It Really Better?* Melbourne, Australia: Melbourne University Press.

Kearney, R. E. (1974). 'The Research Methods Employed in the Study of the Papua New Guinea Skipjack Fishery'. *Papua New Guinea Agricultural Journal* 25 (3–4): 31–37.

—— (1975a). 'The Stock Structure of Skipjack Resources and the Possible Implications on the Development of Skipjack Fisheries in the Central and Western Pacific', 59–69. FAO Fisheries Technical Paper No. 144. Rome, Italy: FAO.

—— (1975b). 'Some Developments in the Tuna Fisheries in the Indian Ocean'. Technical Report. Rome, Italy: FAO.

—— (1975c). 'A Proposal for a Skipjack Survey and Tagging Programme in the Central and Western Equatorial Pacific Ocean'. IOFFC:TM/75/Inf.4:13. Mombasa, Kenya: FAO.

—— (1976). 'A Regional Approach to Fisheries Management in the South Pacific Commission Area'. Paper presented to South Pacific Forum Meeting on the Law of the Seas, Suva, October. Noumea, New Caledonia: South Pacific Commission.

—— (1977a). 'Relationships amongst skipjack tuna (*Katsuwonus pelamis*), catch, bait catch, and the lunar cycle in Papua New Guinea skipjack tuna fishery'. In R. S. Shomura (ed), *Collection of Tuna Baitfish Papers*, 104–113. NOAA Technical Report No. 408. National Marine Fisheries Service.

—— (1977b). 'The Law of the Sea and Regional Fisheries Policy'. Occasional Paper No. 2. Noumea, New Caledonia: South Pacific Commission. Republished in 1978 in *Ocean Development & International Law Journal* 5 (2-3): 249–286.

—— (1978). 'Skipjack Survey and Assessment Programme Annual Report for the Year Ending 31 December, 1977'. Noumea, New Caledonia: South Pacific Commission.

—— (1979). 'Skipjack Survey and Assessment Programme Annual Report for the Year Ending 31 December, 1978'. Noumea, New Caledonia: South Pacific Commission.

—— (1983). 'Assessment of the Skipjack and Baitfish Resources in the Central and Western Tropical Pacific Ocean'. Noumea, New Caledonia: South Pacific Commission.

—— (1991). 'Resource Assessment: The Joy of Always Being Wrong'. *Bureau of Rural Resources Proceedings* 10: 15–22.

Kearney, R. E., and R. D. Gillett. (1979). 'Interim Report of the Activities of the Skipjack Survey and Assessment Programme in the Waters of Australia (1 April – 13 May, 1979)'. Skipjack Survey and Assessment Programme Preliminary Country Report No. 17. Noumea, New Caledonia: South Pacific Commission.

—— (1982). Methods Used by the Skipjack Survey and Assessment Programme for Tagging Skipjack and Other Tuna'. In R. E. Kearney (ed), *Methods Used by the South Pacific Commission for the Survey and Assessment of Skipjack and Baitfish Resources*, 19–43. Tuna and Billfish Assessment Programme Technical Report No. 7. Noumea, New Caledonia: South Pacific Commission.

Kearney, R. E., A. D. Lewis, and B. R. Smith. (1972). 'Survey of Skipjack Tuna and Baitfish Resources in Papua New Guinea Waters'. Research Bulletin No. 8. Port Moresby, Papua New Guinea: Department of Agriculture, Stock and Fisheries.

—— (1973). 'Interim Report on an Aerial Survey of Surface Schooling Tunas in Waters Adjacent to Papua New Guinea'. Research Bulletin No. 10. Port Moresby, Papua New Guinea: Department of Agriculture, Stock and Fisheries.

Kearney, R. E., and M. L. Rivkin. (1981). 'An Examination of the Feasibility of Baitfish Culture for Skipjack Pole-and-Line Fishing in the South Pacific Commission Area'. Skipjack Survey and Assessment Programme Technical Report No. 4. Noumea, New Caledonia: South Pacific Commission.

Klawe, W. L. (1963). *Observations on the Spawning of Four Species of Tuna*. Washington, DC: NMFS Scientific Publications Office.

Kleiber P., A. W. Argue, and R. E. Kearney. (1987). 'Assessment of Pacific Skipjack Tuna (*Katsuwonus pelamis*) Resources by Estimating Standing Stock and Components of Populations Turnover from Tagging Data. *Canadian Journal of Fisheries and Aquatic Sciences* 44 (6): 1122–1134.

Kleiber, P., and C. A. Maynard. (1982). 'Data Processing Procedures of the Skipjack Survey and Assessment Programme'. In R. E. Kearney (ed), *Methods Used by the South Pacific Commission for the Survey and Assessment of Skipjack and Baitfish Resources*, 109–122. Tuna and Billfish Assessment Programme Technical Report No. 7. Noumea, New Caledonia: South Pacific Commission.

Lewis, A. D., B. R. Smith, and R. E. Kearney. (1974). 'Studies on Tuna and Baitfish in Papua New Guinea Waters'. Research Bulletin No. 11. Port Moresby, Papua New Guinea: Department of Agriculture, Stock and Fisheries.

Sharp, G. D. (1978). 'Behavioural and Physiological Properties of Tunas and Their Effects on Vulnerability to Fishing Gear'. In G. D. Sharp and A.E. Dizon (eds), *The Physiological Ecology of Tunas*, 397–449. New York: Academic Press.

Sibert, J. R., R. E. Kearney, and T. A. Lawson. (1983). 'Variations in Growth Increments of Tagged Skipjack (*Katsuwonus pelamis*)'. Tuna and Billfish Assessment Programme Technical Report No. 10. Noumea, New Caledonia: South Pacific Commission.

South Pacific Commission. (1975). 'A Proposal for a Skipjack Survey and Assessment Programme in the Central and Western Equatorial Pacific Ocean: Expert Committee on Tropical Skipjack (16–18 October 1975)'. Noumea, New Caledonia: South Pacific Commission.

—— (1980). 'Review of Preliminary Results from Genetic Analysis of Skipjack Blood Samples Collected by the Skipjack Survey and Assessment Programme'. Skipjack Survey and Assessment Programme Technical Report No. 1. Noumea, New Caledonia: South Pacific Commission.