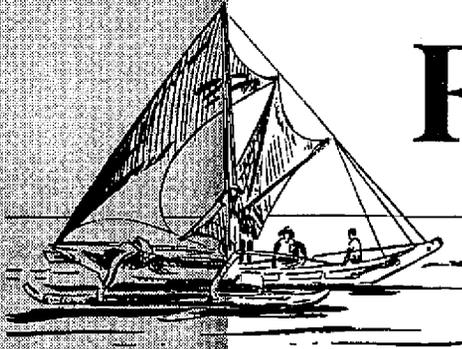


FISHERIES

Newsletter



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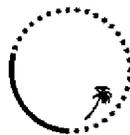
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Photo: Kevin Bailey

After ten years working on tagging programmes behind a desk...



South Pacific Commission

Prepared by Jean-Paul Gaudechoux, Fisheries Information Officer

SPC ACTIVITIES

■ BIBLIOGRAPHIC SURVEY FOR GUAM

A request was received from the Government of Guam (Department of Commerce) in August 1992 for assistance in compiling a bibliography of material relating to Guam's fisheries and marine resources. This will be the fourth marine resources bibliography in Micronesia, after Palau's bibliography in 1988, the Federated States of Micronesia's in 1992 and the Marshall Islands' in 1992 - all compiled by Masanami Izumi, SPC's Fisheries Development Associate.

For the Guam bibliography, Izumi undertook a survey trip from 12 to 30 September. During that time he examined 23 fisheries-related offices, libraries and collections in Guam and Honolulu for both published and unpublished materials appropriate for the bibliography. Special efforts were made to search at the University of Guam's Micronesia Area Re-

search Center (MARC) and Marine Laboratory, the University of Hawaii Hamilton Library and Dr. L. Eldredge's (Professor emeritus of the University of Guam and presently Executive Secretary of the Pacific Science Association in Honolulu) personal collection, among others.

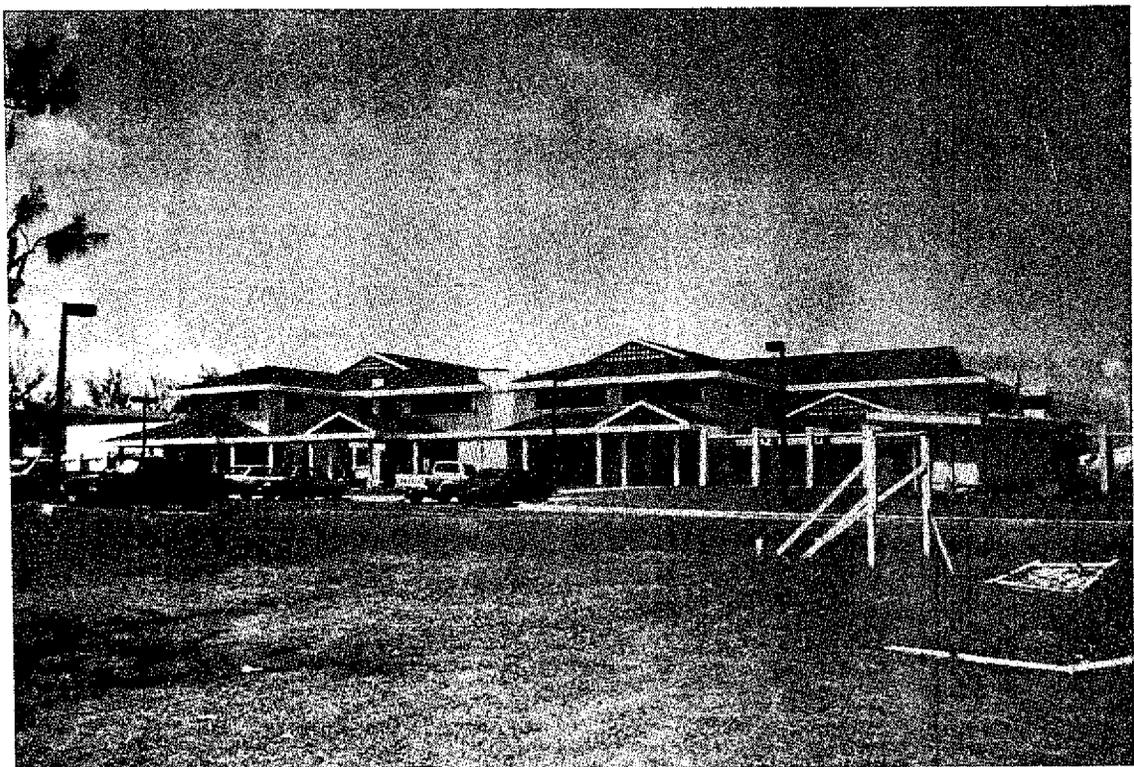
The following information obtained during the survey may be useful for fisheries officers and people involved in fisheries development and marine resource management:

— A number of environmental studies in Guam's coastal areas have been carried out by the University of Guam Marine Laboratory, the University of Guam Water and Energy Research Institute in the Western Pacific, the U.S. Fish and Wildlife Service and the U.S. Army Corps of Engineers.

— At the University of Guam's MARC, established in 1967 for developing a major collection of Guam, Micronesia and Pacific area materials (see photograph below), the Micronesia Area Bibliographic Database (MABDB) on agriculture and aquaculture in Micronesia is available; the newly installed reference database, the Online Public Access Catalog (OPAC), is also available for reference searches.

— Studies on aquaculture development in Guam have been carried out by the Department of Commerce, and the University of Guam's College of Agriculture and Life Sciences and Marine Laboratory.

— Studies on pelagic and bottom fish resources in Guam, the Northern Mariana Islands and the Pacific have



New building of the Micronesia Area Research Center (MARC) of the University of Guam

Photo: Masanami Izumi

been carried out by the National Marine Fisheries Service, the East-West Center Pacific Islands Development Program, and the Western Pacific Regional Fishery Management Council in Honolulu.

— The University of Hawaii Library Database (UHCARL) includes the following databases related to the Pacific:

- UH Moana Library database;
- Trust Territory of the Pacific Islands (TTPI) Archives Database;

- Hawaii/Pacific Uncover database;
- Uncover database;
- Other Library Catalog (MELVYL: University of California Library Database).

UHCARL is accessible from the PEACESAT satellite stations in the region. Further information can be obtained from the PEACESAT operators at each station. The Bernice P. Bishop Museum Library catalogs are expected to be linked with the UHCARL system by the end of 1992.

— There are very few Japanese research reports on Guam during the Japanese-mandated era in Micronesia before World War II and in the TTPI Archives after the war.

As a result of this survey, the Guam marine resources bibliography is expected to be published in early 1993.

(Contributor: Masanami Izumi)



■ REGIONAL FISHERIES TRAINING PROJECT

Study tour for fisheries personnel

A study tour group of Pacific Island participants, representing South Pacific regional organisations, universities, technical institutions and national governments, recently visited their ASEAN counterparts to consider the question of closer co-operation in fisheries education and training. The tour covered the Philippines, Indonesia, Singapore, Malaysia and Thailand.

Participants in the study tour included Hugh Walton from SPC (group leader), Noel Omeri from FFA, Professor Robin South from USP, Peniasi Kunatuba from Fiji Fisheries, Noah Idechong from Palau Marine Resources, John Kasu from UPNG, Starling Daefa from Solomon Islands College of Higher Education and Asher Edwards from the Community College of Micronesia. The group was accompanied by Western Pacific Fisheries Consultative Committee (WPFCC) Advisor, Dr Gordon Munro.

All arrangements for the tour were made by the hard-working staff of the WPFCC Secretariat in Manila. Their excellent organisation played an important role in ensuring that the tour was a very valuable and informative exercise for the participants. All felt that it more

than achieved its objectives of providing an overview of ASEAN fisheries institutions, and allowing Pacific Islands Nations (PINs) to identify a number of possible opportunities for inter-regional collaboration.



Photo: Gordon Munro

Participants in the study tour (from left to right: Noah Idechong, Hugh Walton, Robin South, John Kasu, Starling Daefa, Peniasi Kunatuba, Asher Edwards and Noel Omeri).



Photo: Hugh Walton

Peniasi Kunatuba examines the unique propulsion system of a traditional Thai fishing boat

Apart from the educational value of the exercise, the tour also proved to be an excellent opportunity to strengthen understanding and links between South Pacific institutions, regional agencies and national governments, through the many hours of discussions and meetings between the group members during the trip.

The study team found that the ASEAN region has very well developed programmes in marine and fisheries training, education and research, and was impressed by the close collaboration between universities, government and industry. The team also admired the overall regional co-ordination, such as through the Southeast Asian Fisheries Development Center (SEAFDEC), through the activities of the Asian Fisheries Society (AFS) and through various regionally focused funding programmes. The large population base of the ASEAN countries and the traditional role of fisheries in food

production has enhanced the development of specialised aspects of marine and fisheries training, education and research within the ASEAN region. The very small population base of the Pacific region, despite its commitment to devel-

opment of fisheries and marine resources, is unsuitable to the introduction of specialised training and education, and can logically look to the ASEAN region as being an appropriate venue for such.

The team was also impressed by the degree of infrastructure that is in place to support fisheries training and research, by the highly qualified staff in all institutions, and by the major commitment of the ASEAN governments to funding fisheries research. ASEAN has enormous strength in areas such as aquaculture and post-harvest that could be of significant benefit to PINs.

It is difficult to single out individual institutions as being of specific potential interest to PINs. The study team has produced a substantial report detailing the activities in all the institutions visited and noting specific areas of interest and suggestions for potential future actions. Annexes to the Report include a bibliography of ma-

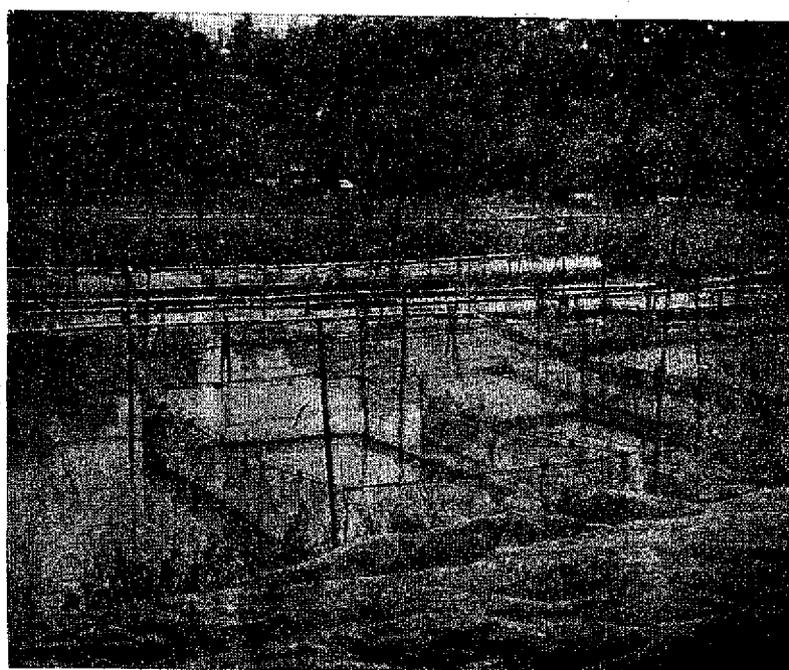


Photo: Hugh Walton

Tilapia growout experiments at the Asian Institute of Technology

terials received by the study tour, and a list of contact persons in each institution visited.

The report also contains a series of recommendations which focus on information exchange, opportunities for institutional building, human resource development, post-graduate training, and consultation between PINs and ASEAN, as well as mechanisms that can

facilitate such opportunities through regional organisations and donors. The question of co-ordination between similar regional funding programmes in the two regions is also raised.

The report is being published by WPFCC and will be circulated widely throughout the region in the early part of the new year. Additional copies will be available through

WPFCC, FFA, USP, and SPC. Any persons wanting further information or details of the tour should also contact these institutions.

The study tour was funded by the Canadian International Development Agency and the Government of France.

(Contributor: Hugh Walton)



Maritime trainers consider fisheries perspective

The Fisheries Education and Training Advisor (FETA) recently joined heads of the region's Maritime Training Institutions to present a fisheries training perspective to the 3rd Forum for Maritime Education and Training Institutions in the Asia-Pacific Region. The forum was held in December in Suva and was jointly hosted by representatives from the International Maritime Organisation (IMO), the Australian Maritime College, and the Fiji Institute of Technology's School of Maritime Studies.

Under a general theme of 'Developing an Asia-Pacific regional network co-operation through communications', the meeting proved very useful for the exchange of ideas and information, with some interesting discussion on the South Pacific Maritime Code and the future direction of maritime training in the Asia-Pacific region.

Each delegate was given the opportunity to present an overview of their respective institutions to the meeting. In presenting the Regional Fisheries Training Project, FETA called the attention of the meeting to the potential for developing fishing vessel crew

certification programmes for the Pacific region, particularly as a means of encouraging employment of Pacific Island nationals on foreign fishing vessels.

The presentation provoked considerable interest from delegates as fisheries had not previously been discussed in relation to maritime training at previous Forum meetings. Although not all Pacific national maritime training institutions were represented, the idea of standardised levels of certification for fishing vessel crews was generally accepted; participants agreed that introduction of a rating level deckhand qualification, offered through a number of institutions, would be a useful beginning. It was noted that the Fisheries Training Centre in Santo, Vanuatu, had already prepared a draft syllabus for such a course and was preparing to offer a pilot programme during 1993. The School of Marine and Fisheries Studies of the Solomon Islands College of Higher Education also agreed to consider the establishment of a similar programme in 1993.

The fisheries perspective on maritime training was also discussed informally with mem-

bers of a Forum Secretariat Consultancy Team currently considering development options for a five-year plan for Pacific maritime training. Captain Tom Kearsley and Samuela Tukuafu will spend several months touring the region and will present their findings to a meeting to be held at the Forum in May 1993. As a result of the deliberations of the Forum, the consultants are now familiar with the potential for the development of fisheries certification programmes and will certainly include discussion of this issue in their report.

There are now three institutions considering the option of a Pacific Island Fishing Deckhand Certificate course and the RFTP is assisting in the coordination and development of the programme. During 1993 the development of the programme will be discussed with additional institutions and reported regularly through this newsletter. Any persons interested in further information should contact the Regional Fisheries Training Project.

(Contributor: Hugh Walton)



■ INSHORE FISHERIES RESEARCH PROJECT

Review of statistical reporting from the deep slope handline fishery in Vanuatu

Inshore Fisheries Scientist Paul Dalzell visited Vanuatu in October and November to review the current status of statistical reporting from the deep slope handline fishery. Catches and landings from the fishery are reported in various forms and then entered into databases at the fisheries headquarters in Port Vila.

The fishery was initially monitored by ORSTOM, which has been responsible for fisheries research in Vanuatu. Its research data were concerned primarily with stock assessment of the snapper resources and did not provide readily available estimates of production for the various fisheries extension centres and fish markets in Vanuatu.

During 1989 and 1990, the fisheries extension centres began to use a new receipt system designed to provide information on catch, effort and catch composition. This receipt, or goods received note (GRN), has meant that a separate source of data on the deep slope fishery has been collected over the past few years.

During the assignment most attention was focused on the fisheries extension centre data which extended between 1990 and 1991. Some simple summaries were produced from the data which showed in ranked order the volume and value of landings at the six extension centres, the catch per unit of effort (CPUE) in kg/trip and kg/trip-hr, mean weight of fish landed at each centre and the seasonal changes in CPUE from the entire data set.

This type of information is very important for extension officers and development planners since it allows them to assess the impact of their work, and where to allocate resources. At present such summaries are not readily extractable from the databases due to incomplete and faulty reporting programmes.

The Natai fish market in Port Vila also keeps records of the volume of different species and species groups that are bought and sold each month.

The monthly summaries from January to September 1991 were made available for assessment of the recording of catch composition.

The species and species groups that are specified are either bottomfish (pouletfish, amberjacks, bream, loche, emperors, jobfish) or large pelagics (mahi mahi and yellowfin). Pouletfish, the common name for eteline snappers (*Pristopomoides* spp. and *Etelis* spp.), form about half the catch, while the remaining species groupings account for only 13 per cent of the remainder. About 36 per cent of the catch is 'other species' which are not broken down into their component species or species groups.

These other species are shallow reef fish which the fishermen have been encouraged to target in recent years, to relieve fishing pressure on the deep slope stocks. In the future it is recommended that more effort be devoted to recording volume of the major groups of shallow reef fish in the landings to Natai.

The Natai market in Luganville (Santofish) also keeps accurate ledgers of all its fish purchases, recorded by fisherman/fishing group and species on a monthly basis. About half of the fish landed at Santofish come from the Fisherman's Training Centre (FTC).

The FTC fishing trips are all properly documented and have been archived but not entered into a database. Nonetheless, this represents a unique collection of catch-effort and species composition data for bottom fishing in south Santo.

A series of recommendations was drafted dealing with the different sources of data on commercial fish landings in Vanuatu. These will be contained in a report to the Vanuatu Government that presents a guide to the databases and some examples of the types of product that can be derived from the data that are currently being collected on commercial fishing.

Other activities during the same assignment were the preliminary analysis of mark and recapture data originating from the Trochus Resource Assessment and Management Workshop in 1991 and discussions on the progress of the coastal FAD project in south Santo.

The trochus mark and recapture experiment was designed to look at the survival of cultured juvenile trochus released in the wild. The results will give important information on the possible success of re-seeding reefs that have been depleted from over-harvesting.

The coastal FAD project was established by the UK-based Marine Resources Assessment Group, with the assistance of the SPC Fisheries Programme,

to investigate the utility of nearshore coastal FADs for trolling and for bait supply. The results will help assess the effectiveness of nearshore FADs

by quantifying fishermen's catches before and after deployment.

(Contributor: Paul Dalzell)



Bottomfish and baitfish workshops (17–25 November), Honolulu, Hawaii

Bottomfish workshop: 17–20 November

These workshops were organised by RDA International which is the executing agency for two of the USAID Pacific Islands Marine Resources (PIMR) projects in Tonga and Tuvalu. The Tonga project is concerned principally with examining the feasibility of small-scale longlining and using locally caught bait for longline fishing.

However, RDA is also responsible for producing a management plan for the Tongan deep slope snapper fishery, which supplies both domestic and foreign markets. This fishery has been operating since the early 1980s and has been continuously monitored by the Fisheries Department since 1986.

The stock assessment and monitoring project was established by the Fisheries Department, but later obtained some funds from USAID for technical input from the fisheries scientists from the United States National Marine Fisheries Service (NMFS) laboratory in Honolulu. The project began at the end of 1986 and finished at the end of 1991. Initial analyses were carried out on the data during 1988 by Viliami and Sarah Langi, from Tonga, and Dr Jeff Polovina, Chief of Insular Resources at the Honolulu laboratory.

Further analyses and reporting of the snapper fishery were

made in 1989 at the USAID-NMFS stock assessment workshop by Tevita Latu and Sosaia Tulua from Tonga, once again assisted by Dr Polovina. The same Tongan fisheries officers came to the SPC in 1990 and completed an interim report on the fishery under the supervision of SPC Inshore Fisheries Scientist Paul Dalzell. During 1992, Dr Mike King of the Australian Maritime College was contracted by RDA to look at the snapper fishery and produce a report containing recommendations for the future of the fishery and the monitoring project.

RDA brought together all the key persons involved in the analysis of data from the Tongan snapper fishery to Hawaii for the drafting of a final report on the fishery. Dr King will be contracted again by RDA to produce a management plan for the fishery in co-operation with officers from the Tongan Fisheries Ministry.

RDA is also the executing agency for the Tuvaluan component of the PIMR project which is a survey of the deep slope fishery resources of the banks and seamounts in the southern part of Tuvalu's EEZ. Two Tuvaluan fisheries officers (Nikolasi Apinelu and Falasese Tupau) also attended the workshop to work on their data with a biologist from the Honolulu laboratory, Mr Wayne Haight, who has been involved

in the design and collection of the fishing and bathometric data from the Tuvaluan surveys.

From 17 to 20 November the workshop considered the data sets from the Tongan commercial fishery and the survey fishing data from Tuvalu. Previous investigations on the Tongan fishery had concentrated on stock depletion on some of the seamounts. This data set had not been extended since those initial analyses and so was not repeated here. Instead the workshop examined the five complete sampling years between 1987 and 1991 and partitioned the catch and effort data between the offshore seamounts and shallower coastal banks.

The seamount data could be reasonably well fit by a simple equilibrium surplus production model for the catches of the five principal species and for catches of the two main export species, *Pristipomoides filamentosus* and *Etelis coruscans*. The MSY for the catch of the five principal species was between 360 and 412 t/yr and for the export snappers about 210 t/yr. Using economic data from the fishery it was found that under present conditions the fishery will generate very little profit.

Although the Tuvaluans were not working with commercial fisheries data, the workshop looked at the catch rates expe-

rienced in this fishery and the costs of fishing with a relatively large vessel. The workshop concluded that the fish would have to be sold for between US\$ 20 and US\$ 30/kg to make fishing on the Tuvaluan seamounts economical.

Management options were explored for the Tongan fishery. The Government want the snapper fishery stock assessment project scaled down and staff re-assigned to other projects such as beche-de-mer fishery monitoring. The workshop suggested that obtaining records from the fish buyers might be the most useful and cost-effective method of monitoring the performance of the fishery now that catch sampling has stopped. The same information as used here could be extracted from the buyers' records. Length frequency data were collected under the sampling programme but they have

not been particularly useful for management purposes.

Other options were explored by the workshop for improving the economic performance of the fishery, such as a change over to hydraulic or electric reels and removal of excise duty on fuel and bait to lower costs. Concerns were expressed about the lack of maintenance for vessels and gear, which have the effect of eroding profit margins.

There were some reservations about using an equilibrium surplus production model on the Tongan data, however, nothing else appeared to explain the data. Dr Polovina tried fitting a dynamic production model to the catch and effort data but the fit was not very good. The highest level of fishing effort was in 1987 and this has been falling each year as the fleet size has diminished.

There has been a concomitant rise in the annual catch per unit of effort (CPUE), although whether the inverse relationship between CPUE and fishing effort is indeed due to the decline in effort is questionable, given the non-equilibrium state of the fishery.

The workshop summarised all fishing data from 1986 to 1992 for the final report. The 1986 and 1992 data sets were based on only a few monthly samples raised to the annual catch and effort and were not included in the production model analyses. It is interesting to note however, that the 1992 data suggest that the catch rate of *E. coruscans* has declined markedly. This may be due to incomplete coverage for this year but does appear to back up anecdotal reports from fishermen who have noted the low catches of this species.



Baitfish workshop: 23–25 November

The following week, beginning 23 November, the workshop considered the baitfish data collected by the RDA project in Vava'u. The project commenced in April 1992 under supervision of the RDA Project Leader, Mr Stan Swerdloff, and has been run by Viliami Langi and Siola'a Malimali. The bait fishing and sampling project was designed by Dr King of the AMC and data for April to October were available for analysis. After the session was opened Inshore Fisheries Scientist Paul Dalzell presented a paper that reviewed information on the biology of scad mackerel and sardine resources in the South Pacific. The workshop was then given a presentation by Viliami Langi on the background to the Vava'u project, the fishing

methods used to catch baitfish and sample data collection routines.

Baitfish are caught at night after they have been aggregated around an underwater light suspended from a skiff. The fish are caught in a purse seine (1.2 km in length, 20 mm mesh) deployed from a 15 m fibreglass vessel (the *Albacore*). Initially the purse seine was hauled by a hydraulic winch but this has been broken and the net is currently hauled by hand.

Fishing is conducted at two sites within the islands of the Vava'u group. All catches are sampled and information is collected on lengths, species composition, and more recently on gonad maturation stages and gonad indices. Catches

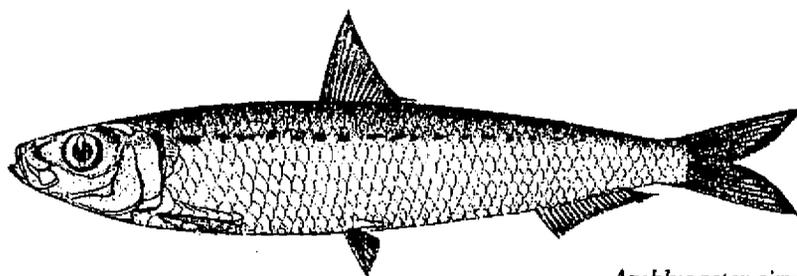
were very variable but averaged more than 500 kg/trip. The catches are dominated by sardines and round scads with the balance comprising other small pelagic fishes such as gold spot herrings and other species.

The workshop examined the length frequency and catch data collected to date. The catch data were very variable and did not show any clear evidence of depletion effects that could be used to compute biomass. The length frequency data for *Amblygaster sirm* and *Decapterus macrosoma* showed good modal progression that could be analysed by simple pencil and paper methods or with the ELEFAN suite of computer programs. The data were interesting: there appeared to be a strong seasonal influence on

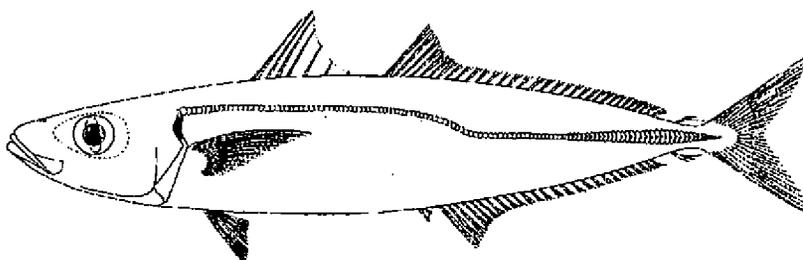
the growth rate that may be more visible when the data set is extended through further sampling.

The workshop also looked at length-weight and gonad data and computed length-weight equations, sex ratios and first maturity lengths for *A. sirm* and *D. macrosoma*. The conclusion of the workshop was that the data were of a very high quality and that they will add significantly to our knowledge of small pelagic fish biology in the South Pacific.

(Contributor: Paul Dalzell)



Amblygaster sirm



Decapterus macrosoma

Other activities

After spending a considerable time in the field following his appointment in late April, Senior Inshore Fisheries Scientist (SIFS) Dr Tim Adams had to concentrate on office duties for the last quarter of the year. Activities included:

- Analysis of data and writing up reports on the trochus stock assessment case-study performed at Aitutaki in August/September. A formal report will be published in early 1993 when comments on the draft have been received.
- Implementing the directive of the 24th Regional Tech-

nical Meeting on Fisheries that funding be secured to continue Inshore Fisheries Research Project activities without interruption when the present funding cycle expires at the end of March 1993. The British Government has now pledged to extend the project for a further nine months to the end of December 1993, but the consolidation of a full second cycle will depend on factors currently outside the control of the Fisheries Programme;

- Developing various computer database programs in support of IFRP activities,

including a fisheries catch-effort recording database for Nauru and a "catch-all" database for general statistics of relevance to national and regional fisheries stock assessment;

- Exploring the possibility of using satellite imagery in a practical way in planned future stock assessment exercises. Enough case studies have been done to suggest that such tools are cost-effective, but instances of practical application to fisheries are still rare.

(Contributor: Tim Adams)



Errata noted:

In the SPC Fisheries Newsletter #62 (July-September 1992), we published an article on coastal fisheries statistics (contributor: Paul Dalzell). In the table on page 10, some mistakes have been noticed:

Kiribati: land area (sq. km) should read 849 instead of 4,849;

Marshall Islands: population number should read 36,090 instead of 73,160;

Niue: land area (sq. km) should read 259 instead of 2,459.

■ TUNA AND BILLFISH ASSESSMENT PROGRAMME

Regional Tuna Tagging Project (RTTP)

RTTP field activities restarted in Tuvalu on 15 June, after a one month break for the *Te Tautai* and her crew. And the SPC field staff. Baiting was carried out in the lagoons of Nukufetau and Funafuti over two days. The trip to Nukufetau was undertaken by the crew; SPC staff Filipe Viala, Veronica Logez and Kevin Bailey arrived the next day. The vessel departed Funafuti on 17 June and searched towards Nukulaelae Atoll, en route for tagging operations in the Wallis and Futuna Exclusive Economic Zone. After learning by radio that afternoon that baiting access at Uvea Island had been denied at the last moment by the traditional leaders of Wallis, the *Te Tautai* steamed to Vanua Levu, Fiji. Forty-five skipjack were tagged and released in the southern part of the Tuvalu zone during this transit.

The vessel loaded bait (mostly large sardine) near Labasa (Sau Sau Passage) and Kia Island over two nights, after clearing into Fiji at Labasa, and began a long-range trip into the Wallis and Futuna zone on 21 June. A total of 209 skipjack was tagged in the northern Fiji zone, and 601 off the northern tip of Futuna during the trip. Rough seas resulted in high bait mortality and forced the vessel to return to Fiji 2-3 days earlier than planned.

After a second load of bait was obtained over the nights of 23 and 24 June (Qele Levu lagoon and Sau Sau Passage), the *Te Tautai* returned to Wallis and Futuna waters, fishing over a group of three seamounts to the northeast of Futuna. Once again, rough seas hampered

operations, but 372 skipjack were tagged before the bait supply was exhausted.

The *Te Tautai* then spent two days steaming to Suva, arriving on the afternoon of 28 June for refuelling and provisioning. The vessel departed at 1400 the following day, after a weary Veronica disembarked and two SPC staff members were shown over a hard-working fishing boat, not the cruise liner of repute. Bound once again for Wallis and Futuna.

The first of July found the *Te Tautai* fishing to the north of Cikobia, in northern Fiji. Five schools were encountered that day and 664 tuna (20 yellowfin, 644 skipjack) were tagged and released. The following day was poor — two schools were fished but no tuna were tagged. As the bait supply was largely finished by this stage, we decided to steam directly for Funafuti. This proved fortuitous as two of the crew fell sick along the way and required urgent medical treatment.

The vessel reached Funafuti on the morning of 3 July and stood down for two days so that the crew could spend some time with their families and friends before the start of six months away from home. Beach seining was carried out at Amatuku on the afternoon of 4 July for a well-load of atherinids. Unfortunately, this bait was all dead by the following morning, presumably because the well used for their storage was contaminated by fuel oil leaking from an adjacent tank. One of the sick crewmembers, the bosun Pauna Pauna, rejoined the vessel, but the fishing master,

Kepasi Tefau, stayed ashore. This was a sad occasion because Kepasi had been with the RTTP from the start in 1989 and it felt like losing a member of a family. A slightly querulous family but a family nevertheless. The spymaster, Teokila Usia, was duly promoted to fishing master, a change that everyone found entertaining, especially in the early days when he often steered the boat in one direction while the tuna school went in the other!

Te Tautai departed on 5 July for baiting at Nukufetau, and then spent the next three days steaming for Tarawa. Sightings were poor and only 10 yellowfin and 11 skipjack were tagged, all in the northern part of the Tuvalu zone. A drifting Philippine-style drum-payao and a 7 m tree trunk were also fished but only yielded large numbers of rainbow runner and ocean triggerfish.

A load of pond-reared milkfish was taken on board on 9 July in Tarawa. *Te Tautai* departed that evening and began a three-week trip across the equatorial Pacific, bound ultimately for the Philippines. The first day of this trip was unproductive, two schools of skipjack were fished but without luck. As the vessel crossed the Equator and neared Nauru, sightings of floating debris (coconuts, polystyrene, purse seine corks) increased. One log was fished and one yellowfin tagged. A number of schools were encountered close to Nauru and fished on the afternoon of 11 July. These schools were all fast-moving and erratic in behaviour, and only grudgingly yielded 57 skipjack releases.



Photo: Kevin Bailey

Putting the 'B' back into the TBAP; the boys on the *Te Tautai* land a small blue marlin caught with trolling gear.

As we approached Nauru, the Captain was laid low by a high fever. We obtained medical advice in Nauru and he was hospitalised for two days. This unscheduled stop enabled us to spend more time in Nauruan waters than originally planned and resulted in a busy day on 12 July, when 835 releases were made from two large schools of skipjack found 7–11 miles to the west of the island. Only two cradles were being used and there was considerable wastage — over 500 fish or about 1.5 tonnes ended on deck. Fortunately, these fish were taken off our hands by a grateful Tuvalu navy in runabouts, canoes and dinghys.

We also caught up with SPC Inshore Fisheries Scientist Paul Dalzell, first seen in a small speed boat whizzing along by our stern, sun hat, sunglasses and 2000 sun block, Mr Field himself, actually out at sea and

making a pretence of fishing (see *SPC Fisheries Newsletter* 62 for the other version). His and companion Alan Debao's assistance was solicited in locating a doctor and immigration officials. We also met up with Peter Jacob, Special Projects Officer (Fisheries) of the Department of Island Development and Industry, with whom we had liaised during the *Te Tautai's* last and unsuccessful visit to Nauru in September 1991.

The Captain rejoined on the morning of 13 July, exhausted by medication but with his temperature down and feeling the best he had in the last week. The vessel departed Nauru that day and searched to the southwest, towards the Nuguria Islands in Papua New Guinea. A total of 563 tuna was tagged from mid-morning, one school close to the island for 218 skipjack, and the remaining 16

yellowfin and 329 skipjack coming from a group of unassociated schools 30–50 miles further to the southwest. An area of logs and drifting Philippine-style steel drum payaos was encountered in the international waters between the Nauru and PNG EEZs on 14 July and yielded 99 releases (81 yellowfin, 17 skipjack, and 1 bigeye). We also came across two lengths of purse seine corks, which were duly salvaged and later put to use in the Philippines. Both lengths consisted of 'Casamar' floats, with selvage webbing and lacing consistent with U.S.-style seine nets.

A further 20 yellowfin and 56 skipjack were tagged from a school in northeast PNG waters before the vessel reached Nuguria on the afternoon of 16 July. With some relief, too, as the weather had deteriorated in the preceding two days, mak-

ing life on deck and below somewhat uncomfortable. On anchoring in the Nuguria lagoon, Ambassador Viala delivered a few baskets of skipjack to the local inhabitants and requested permission for the vessel to bait in the lagoon. This was duly obtained, although Filipe had to explain that our baiting probably hadn't affected the schools of sardines that usually congregated under the village wharf but were suspiciously absent after our one night visit in 1991. Two hauls were made that night for 140 buckets of sprats and atherinids, despite its being the night of the full moon. A similar catch was obtained the following night after a rest day was spent at anchor lounging about cleaning and repairing fishing gear and the ship's bicycle.

Numerous schools of small (< 40 cm) tuna were encountered between Nuguria and

Tench Island, northwest New Ireland, but responded poorly to the bait, and only 23 yellowfin, 99 skipjack and 2 bigeye were tagged. On 20 July, large schools of yellowfin and skipjack were fished immediately south of the Equator to the north of Manus Island, but again were unresponsive, largely because of the abundance of ocean anchovy on which the tuna were feeding. Nineteen yellowfin, 28 skipjack and 21 bigeye were eventually tagged after five schools were chummed.

The 21st and early morning of 22nd July were spent in the 0°-5°N, 140°-145°E five degree square that had remained steadfastly unproductive in May 1991 and a glaring blank on maps of releases. For much of the morning of the 21st, it seemed that it would remain so; however, by late morning the vessel entered an area of logs and schools. A total of 692 tuna

was tagged that day, consisting of 81 yellowfin, 570 skipjack and 41 bigeye. The majority of skipjack releases came from a large breezer associated with a small tree trunk. A log school the following morning yielded a further four yellowfin. With that success, we moved on to the infamous Viala five degree square (0°-5°N, 135°-140°E), so named because Filipe had been overwhelmed by two skipjack in the area last year while the rest of us had stood by and twiddled our thumbs. Once again logs came to the rescue; two were fished and 66 tuna tagged. Not a great score but a gap in our coverage was plugged.

It was interesting to note the relative 'youth' of the logs encountered near the Equator, none of which were covered with goose barnacles or bird guano, or showed signs of having been fished by purse seiners (e.g. presence of metal

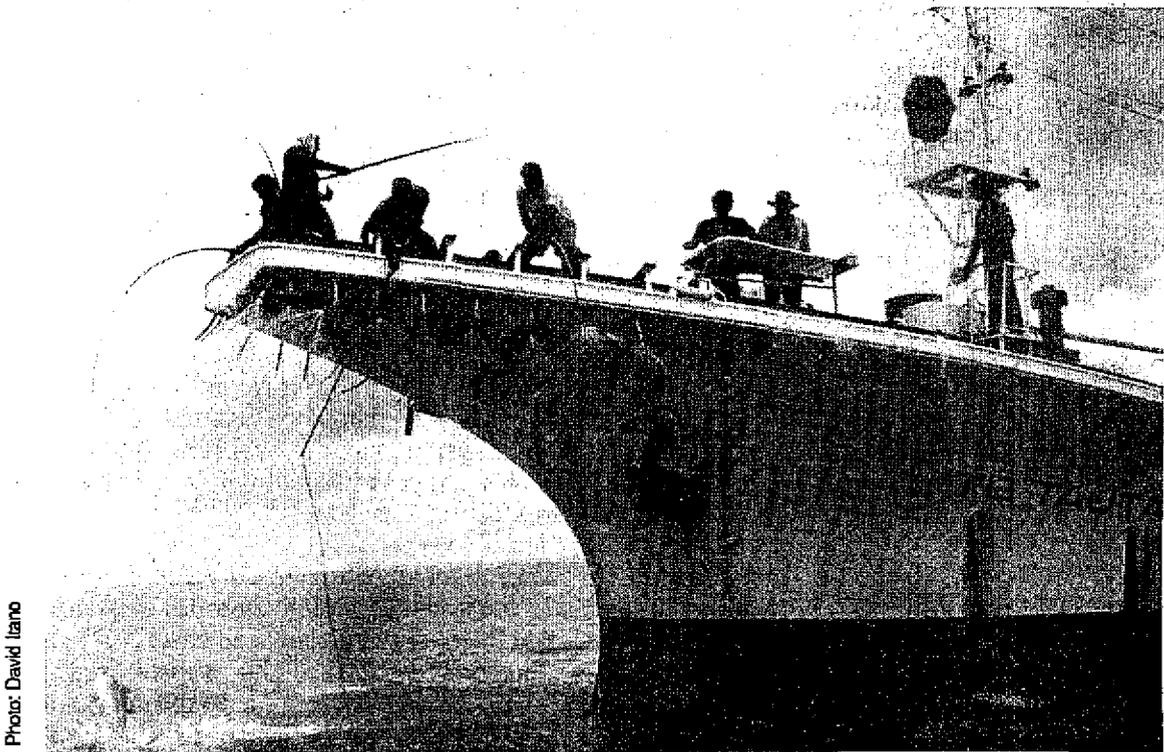


Photo: David Itano

Poling bigeye from the bow of the *Te Tautai*, with tagger and catcher (to right) waiting to receive the fish.

spikes and rope). Most of the logs harboured relatively small communities of baitfish, dominated by juvenile mahi mahi and ocean triggerfish. All of which suggested that these logs had only recently drifted out to sea, perhaps within the last month or two, possibly transported from PNG or Solomon Islands in the Southeast Monsoon Current and South Equatorial Current. A large milled log caught the Captain's eye and an hour one hot afternoon was occupied in attempting to winch it on board with brute strength, chain pulls and a certain degree of ignorance. As the boat began to list dangerously to port, the Captain had a reality attack, and shortly after we went on our way, miraculously light and care free. And it was such a beautiful day, too.

As the vessel searched further to the north, schools and floating logs and other debris became rare, and from 22 to 24 July releases were limited to 50 yellowfin, 22 skipjack and 5 bigeye before the bait supply was exhausted. Searching stopped on 24 July and the

vessel steamed directly for Helen Reef, in the southern part of Palau waters. On reaching the reef the following morning, RTTP activities ceased (until an anticipated early November recommencement in Cairns, Australia) and the Philippines Tuna Research Project began. Results of the latter project will be reported in a future edition of the *SPC Fisheries Newsletter*.

For a little over one month, we were able to tag and release 4,504 tuna, close to the monthly average of 5,000 releases achieved by the RTTP over its three years of field work. The number of releases in Wallis and Futuna and adjacent waters (1,891) was disappointing but largely due to the species of bait and the rough seas encountered throughout the visit. The real successes of the trip were the good numbers of releases in the Nauru EEZ (1,460), of which close to 10 per cent have already been recaptured and returned by U.S. purse seiners, and along the Equator to the northwest of PNG (1,037). Both these areas had managed to elude the RTTP juggernaut during previous passes. As the map of

releases shows, the coverage of the main tuna fishing grounds in the western tropical Pacific is essentially complete.

The RTTP release total currently stands at 128,137, of which 25 per cent are yellowfin (32,433), 70 per cent skipjack (89,391) and 5 per cent bigeye (6,231). A small number (82) of longtail tuna have also been tagged during visits of the *Te Tautai* to Indonesia and the Philippines. The total number of recoveries now exceeds 12,600, giving interim recovery rates of 9 per cent yellowfin, 10 per cent skipjack and 5 per cent bigeye. Three of the longtail tuna have also been recovered. Most of the recoveries (74%) have come from purse seine vessels, principally of U.S., Japanese, Philippines, Korean, Solomon Islands and Taiwanese flags. Twenty-three per cent have been made by pole-and-line vessels, mainly from countries such as Fiji, Solomon Islands and Indonesia that have local pole fisheries. A substantial part of the pole recoveries (8%) have come from the *Te Tautai*, usually after the vessel had returned to FADs or drifting logs that it had fished previously. Longline recaptures are still a cause for concern, but are slowly increasing; at present, 35 recoveries have been returned.

Two final pieces of RTTP field work are required of the *Te Tautai*, now at 11 years of age an elderly work horse that has seen a hard life and better days. In early November, the vessel will spend two weeks in the Coral Sea chasing and tagging yellowfin and bigeye schools that regularly aggregate around seamounts near Cairns over the full moons of October and November. This is a reprise of an extremely successful cruise last



Photo: Kevin Bailey

Ahhh, life at sea, blue sky, blue water, good companions, fish to chase and torment, and all at 10 miles an hour. Can't this boat go any faster!!!

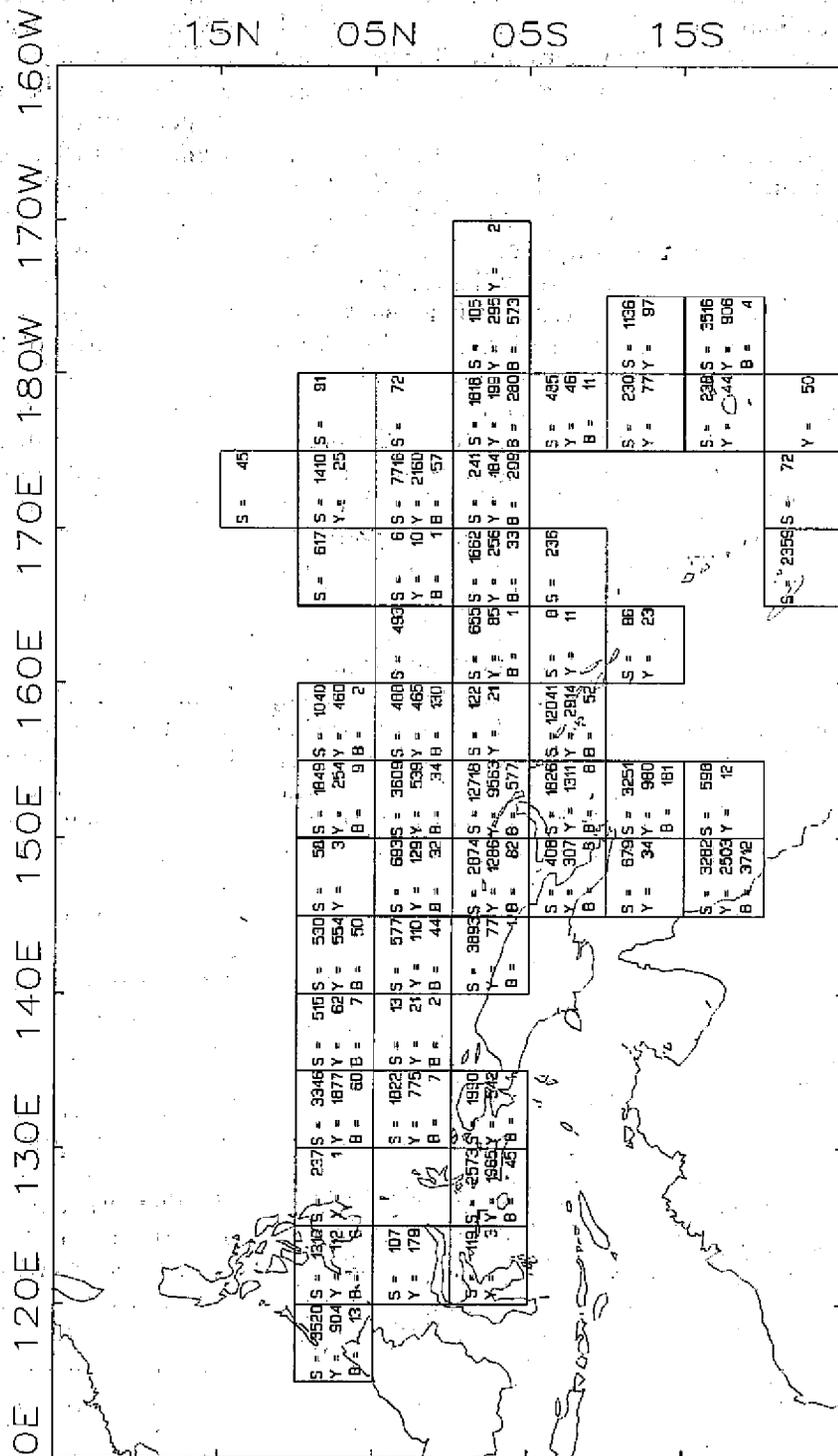
year, in which 6,227 large yellowfin and bigeye were tagged.

Following that work, the vessel will steam to Noumea and spend four weeks working around the islands of New

Caledonia. Shortly before Christmas, final, long farewells will be said, the *Te Tautai* will head for home, and this amazing experience called the RTTP will just be a memory, a lot of photographs to mull over and

a mountain of paper to shuffle. None of us will forget it, though, and the tall tales will just get taller...

(Contributor: Kevin Bailey)



Releases of the Regional Tuna Tagging Project as at 30 September 1992
(S=skipjack; Y=yellowfin; B=bigeye)

Fifth Southeast Asia Tuna Conference

The Fifth Southeast Asia Tuna Conference was held in General Santos City, Philippines, from 1 to 4 September 1992. Participants attended from Indonesia, Japan, Malaysia, Philippines, Thailand and the United States. International organisations represented included the Food and Agriculture Organization of the United Nations (FAO), the Indo-Pacific Tuna Programme (IPTP), the Southeast Asian Fisheries Development Center (SEAFDEC), the South Pacific Commission (SPC) and the Western Pacific Fisheries Consultative Committee (WPFCC).

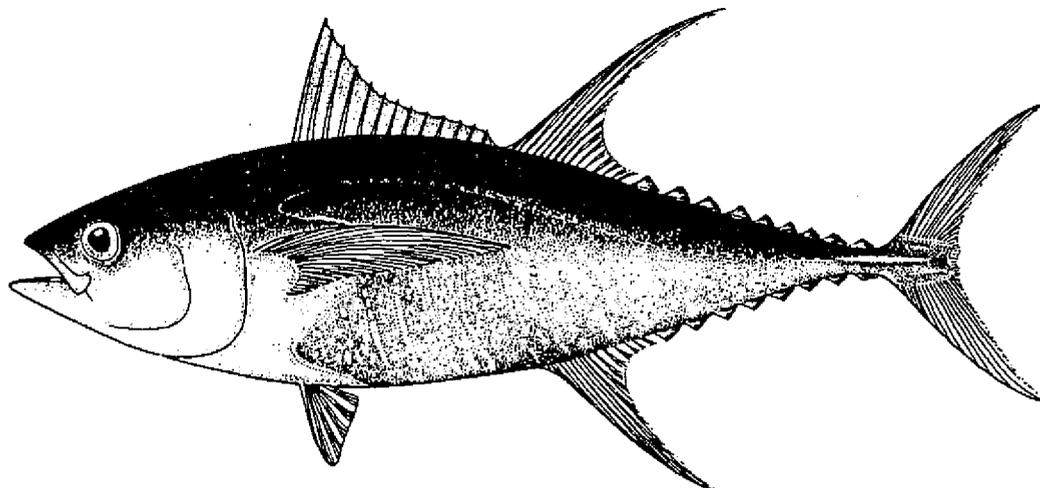
After a review of national fisheries and research programmes, various experience and research papers were presented, including the results of the second meeting of the Western Pacific Yellowfin Tuna Research group, the preliminary results of the SPC Regional Tuna Tagging Programme, the skipjack fishery of the southern Philippines, exploratory fishing trials conducted by Thailand in the Andaman Sea and the identification of juvenile tuna using mitochondrial DNA. A series of papers was then presented on juvenile stages of tuna, seerfish and billfish.

Institutional arrangements for data collection covering tuna fisheries in the Southeast Asian region following the establishment of the Indian Ocean Tuna Commission (IOTC) were discussed. The text establishing the IOTC will be submitted to the FAO Council in November 1992 for approval and to the FAO Conference in November 1993 for ratification. Then, following a diplomatic conference for the adoption of the IOTC by potential members, the organisation will enter into force after ratification by ten states. With the establishment of the IOTC, the technical functions for the collection and analysis of data that are presently undertaken by IPTP will be taken over by the new organisation. The area of competence of the IOTC will be limited to the Indian Ocean, thus excluding the Pacific Ocean seaboard of present IPTP member countries. Therefore, within two to three years, there may be no mechanism to maintain the tuna fishery database for the Southeast Asian region unless alternative arrangements are made.

A suggestion was made in the past that a possible mechanism

might be for SEAFDEC to undertake the IPTP functions relative to the Gulf of Thailand and the South China Sea, which mainly concern stocks of neritic tunas, and that the activities concerning the oceanic species of the Pacific coast of Indonesia and the Philippines be undertaken through some arrangement with the South Pacific Commission, which already exchanges data with Indonesia and the Philippines covering stocks shared with the SPC region. The participants concluded that the best approach would be for IPTP to officially alert national fisheries administrations of the region, as well as international organisations such as SEAFDEC, SPC and WPFCC. IPTP will also prepare a background document on the possible options, outlining functions, required level of support and current costs. Representatives of SEAFDEC, SPC and WPFCC expressed an interest in assuming the responsibilities, provided their members agreed and funding could be secured.

(Contributor: TBAP staff)



■ EIGHTEENTH REGIONAL FROZEN SURIMI AND FISH JELLY PRODUCTS TRAINING COURSE HELD IN SINGAPORE

This training course was conducted at the Marine Fisheries Research Department of the Southeast Asian Fisheries Development Centre (SEAFDEC) in Singapore from 15 to 26 June 1992. Nineteen participants representing Indonesia, Malaysia, Mauritius, Papua New Guinea, Philippines, Singapore and Thailand attended this training programme.

The SEAFDEC was established in December 1967, as an autonomous inter-government body, to promote fisheries development in the region. The SEAFDEC member countries are Japan, Malaysia, the Philippines, Thailand and Singapore. The Centre consists of the following departments:

- the Training Department on marine capture fisheries, located in Thailand;
- the Aquaculture Department; located in the Philippines; and
- the Marine Fisheries Research Department, located in Singapore (this department is responsible for post-harvest technology issues affecting the region).

The Marine Fisheries Research Department was established in 1969. Its main objective is to maximise the use and reduce wastage of resources in the region by improving the preservation and quality control of fish and fisheries products.

At the moment the emphasis is on the use of small demersal fish with lower value for human consumption (i.e. most of the fish caught by the shrimp

trawlers in Papua New Guinea are discarded at sea). This low market value fish is mainly used for the production of frozen surimi and fish jelly products. The Marine Fisheries Research Department conducts short-term training courses on processing of frozen surimi and fish jelly products.

The training course's main objective was to transfer technology of processing of frozen surimi and fish jelly products to fish processing technologists and processors through demonstration courses and lectures.

It aimed to demonstrate:

- the latest methodologies involved in frozen surimi processing;
- the use of this surimi for various fish jelly products processing;
- various packaging materials;
- Mirin-boshi, Kawatempura and fish ham processing techniques; and
- the use of various processing equipments used in the process of surimi-based products.

Daily lectures followed by practical demonstration were given by Japanese experts and staff attached to the Marine Fisheries Research Department. These included surimi processing, suitability of fish species for surimi production, principles of retort sterilisation, principles of gel formation, quality assessment of fish jelly products, use of pelagic fish for surimi production, processing

of fish balls, fish cakes, chikuwa, otakotak, kawatempura, fish sausage, fish ham, hand-made fish jelly products, mirin-boshi and packaging of jelly products.

Processing practices not found in books were also discussed during the course. The two Japanese experts had a long experience with Tokai Regional Fisheries Research Laboratory and Taiyo Fisheries Company in Japan.

In addition to lectures and demonstration, participants were given a list of fish processing equipment for surimi production and jelly products processing in the Southeast Asian region and their cost. This information was found very interesting by the participants attending from the private sector.

Participants generally felt that the contacts made during this training workshop will lead to a better use of their respective region's resources.

(Source: N. Rajeswaran)



■ NEW SERIES RELEASED BY FAO AND INFOFISH

The Need for Fish Inspection and Quality Assurance is the title of a new series, to be published jointly by INFOFISH and the UNDP/FAO Training Programme.

The Food and Agriculture Organization of the United Nations recognised the need for training in fish inspection and quality assurance at four levels:

- fishermen;
- fish processing plant workers;
- regulatory inspectors and fishing officers; and
- supervisory personnel and quality control managers.

This 33-page manual is meant to be used for training fish inspectors and quality controllers. It is designed to introduce readers and train participants at a course or workshop on the need for a systematic approach to fish inspection and quality assurance.

Potential users of this manual are:

- experienced trainers who already have a basic background in fish/food technology and/or quality assurance; and
- those who are not necessarily experienced trainers but have the necessary background in the subject to teach the topic.

This manual will target the following areas:

- the environment where fish is caught;
- harvesting and handling methods in different fisheries;
- processing, product types, marketing;
- how all the above relate to fish quality and the safety of fish as food;

— the need for fish inspection and quality assurance; and

— the objectives and benefits of a programme of inspection and quality assurance of fishery products and how to plan for an effective programme.

The Need for Fish Inspection and Quality Assurance is available from INFOFISH, P.O. Box 10899, 50728 Kuala Lumpur, Malaysia. US\$ 8 (incl. postage).



THE NEED FOR FISH INSPECTION AND QUALITY ASSURANCE

FAO INFOFISH
Technical Training Manual 1

■ FISH HOOK INJURIES — WOUNDED ANGLERS AND STRING THEORY

Injuries caused by impaled fish hooks are common, especially in countries such as New Zealand which have significant coastal populations and many people who fish. Some 600,000 recreational fishers operate on a fairly regular basis in New Zealand. Statistics about fish hook injuries are sparse, but data from Dunedin hospital suggest that at least 600 people are treated for them each year in emergency departments throughout New Zealand.

Standard texts of emergency medicine advocate removing fish hooks by grasping the hook with a plier or needle holder and advancing until the barb end protrudes through the skin at a point separate from that of the entrance wound. The barb is cut off with a wire cutter and the remainder of the hook is backed out of the wound.

An alternative but less well-known method was first published by a South Australian general practitioner in 1961 under the intriguing title, 'How to remove fish hooks with a bit of string' (see drawing below).

A 40 cm piece of string is made into a loop and attached firmly to one end of a 30 cm wooden ruler. The loop is placed over the shank of the hook. The injured finger is rested on a firm surface. The operator depresses the eye of the hook towards the skin with the left hand so as to disengage the barb. The ruler is held in the right hand so that the centre of the loop rests gently against the curve of the hook and the string points in a direction parallel to that of the shank.

The operator then imparts a decisive flick to the string using the angular momentum of the ruler, and the hook exits through the entrance wound.

Fishermen have long used the string flick technique because it allows them to remove the hook, dip the finger in the sea and carry on fishing within a minute. Some emergency units have also adopted the string approach in favour of the conventional method. The string method also has the advantage of causing no trauma to tissues already injured because the

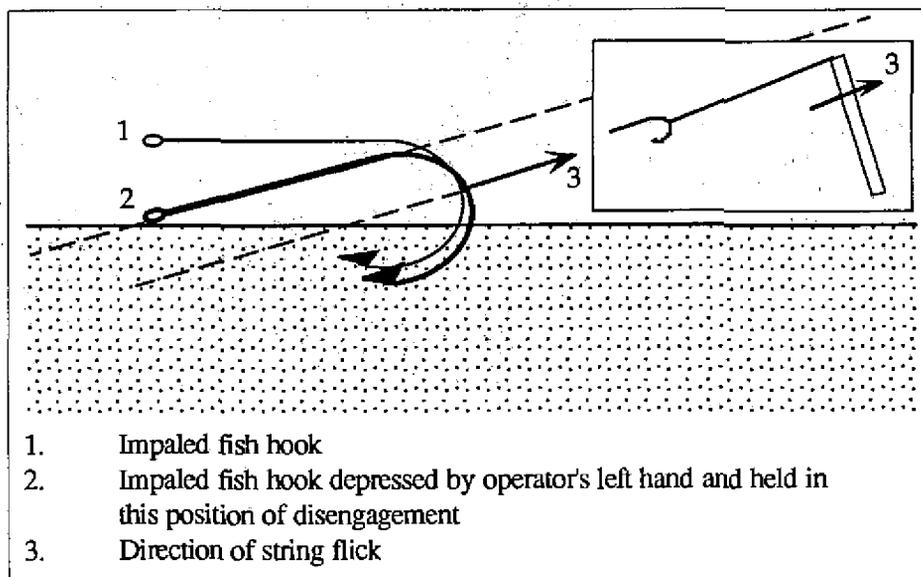
hook is removed by the same route it penetrated. The field contaminated by the hook is minimised.

Another potential advantage is that the string technique is usually painless and does not require local anaesthesia.

Both the conventional and string flick techniques are inappropriate if the hook is deeply embedded in an area near to vital structures, such as a neurovascular bundle. In this case surgical excision of the hook may be necessary. A site where the string flick method should never be used is the globe of the eye.

Injury prevention must be raised. Three simple measures would probably prevent most fish hook injuries: wearing gloves, hats, and protective eyewear (especially while fly fishing).

(Source: *New Zealand Medical Journal*)



DEVELOPMENT OF SHRIMP AQUACULTURE IN NEW CALEDONIA

World demand for sea shrimps, from both natural fisheries and farms, is very high (2,600 mt in 1990) and is constantly growing, while shrimp fisheries can no longer increase catches. The additional quantities needed can only come from controlled shrimp farming, which accounted for 5 per cent and 28 per cent of the shrimp market in 1982 and 1991 respectively.

New Caledonia is suitable for shrimp farming, because of a number of favourable features:

- suitable seawater temperature range, enabling year-round production;
- availability of land areas behind the mangrove belt,

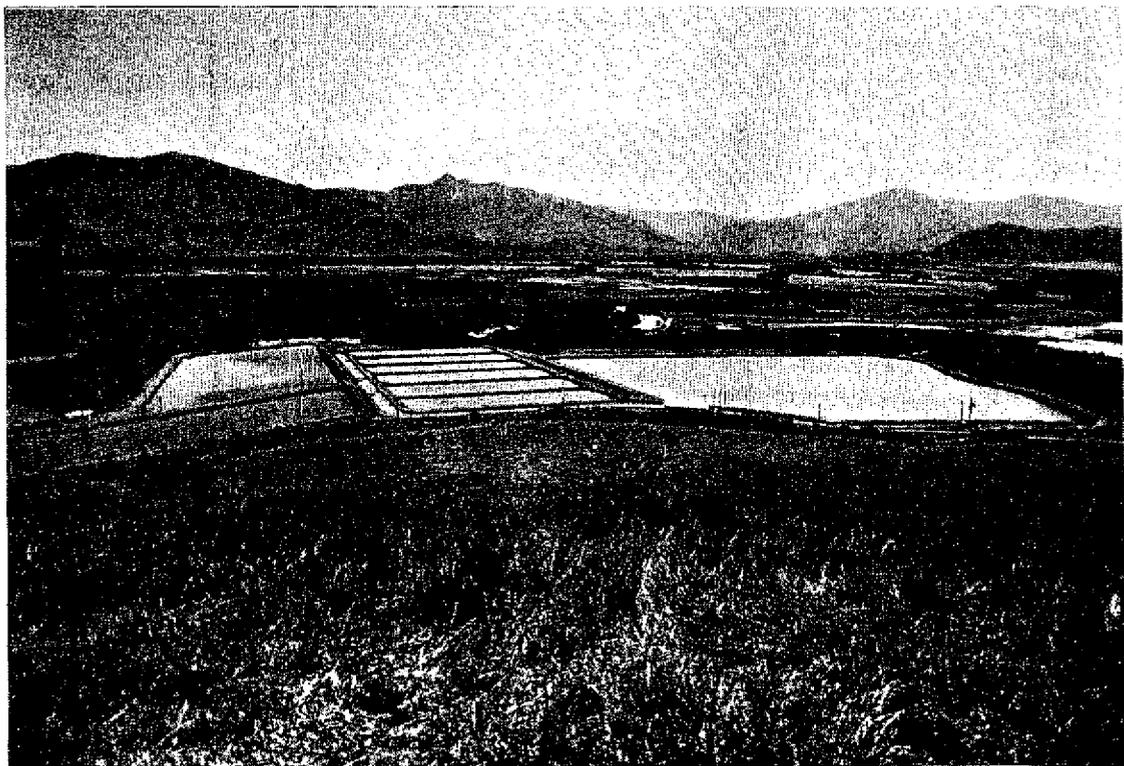
by C. Galinié
IFREMER
Noumea, New Caledonia

which, being flooded at high tide, cannot be used for agriculture and which are, for the most part, Territory-owned. A comprehensive survey of sites suitable for aquaculture, about 6000 ha in all, and a detailed study of the 18 sites earmarked for early development, were completed in 1989 under the ALIAS (IFREMER) programme using SPOT satellite imagery;

- a technology base built up by IFREMER and the Territory

in 20 years of joint research. This technology was developed with a selected and imported shrimp species which has now been reproduced locally in captivity for nearly 20 generations, and is being supplied free of charge to private shrimp farms;

- the Station d'Aquaculture de Saint-Vincent (SASV), run jointly by the Northern Province, the Southern Province and IFREMER, which, besides its technology transfer, training and technical assistance activities, maintains a strong research component for improvement of productivity and achievement of balanced development;
- the professed determination of the New Caledonian government to encourage the development of new rural-based activities in which



View of the Station d'Aquaculture de Saint-Vincent

all the Territory's population groups can be involved;

— the positive response of the population as a whole to this type of activity;

— good availability of supplies, services and basic infrastructure;

— feasibility of producing shrimp food locally.

SODACAL, a private shrimp farm set up in 1981 to demonstrate the viability of an integrated aquaculture farm geared to export, and which has since been the driving force behind this activity, can be regarded as a demonstrated success.

Over the past nine years, New Caledonian aquaculture has produced over 2,000 metric tonnes of shrimps:

1983	19 tonnes
1984	54 tonnes
1985	95 tonnes
1986	65 tonnes
1987	87 tonnes
1988	217 tonnes
1989	296 tonnes
1990	539 tonnes
1991	649 tonnes

Of the 1991 total output, 267 tonnes were marketed locally and 373 tonnes exported, making shrimps the Territory's second export commodity (after nickel ore). Ninety-two people were employed at the end of 1991 in shrimp aquaculture and processing for sale (not including research and indirect employment).



Hatcheries

There are three hatcheries in New Caledonia: the SASV hatchery, which is no longer involved in the production process, and two private hatcheries, namely:

— the SODACAL hatchery, which was set up in 1986 and produced over 66 million post-larvae in 1991 (or 47 million juveniles after nursery rearing). With 120 m³ of rearing tanks, its theoretical capability is 70 million juveniles after the nursery stage.

— the Montagnès hatchery, which has 80 m³ of rearing tanks and an annual theoretical output of 47 million juveniles. It was set up in 1991 by two private shrimp farms (AQUAMON and SEAFARM) and already produced nearly 14 million post-larvae in 1991 (i.e. 11.3 million juveniles after the nursery stage).

Grow-out

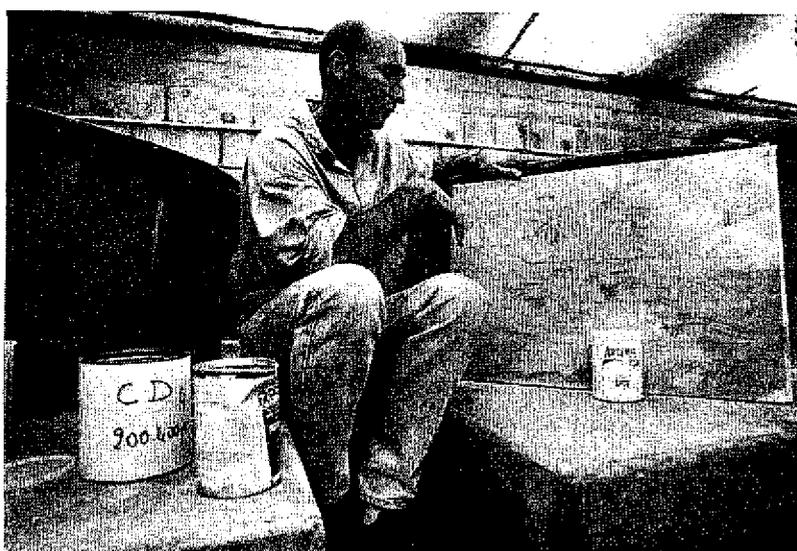
Six shrimp farms in New Caledonia practise grow-out to the marketable stage:

— AQUAFARM: has a grow-out pond 7.5 ha in area and 3 small juvenile rearing ponds, constructed in 1981 at Ouenghi by the SASV and handed over in 1991 to a private entrepreneur for harvesting and marketing (13,700 kg harvested in 1991), under the terms of the original agreement.

— AQUAMON: has 6 ponds totalling 45 ha in area, constructed in 3 stages from 1983 to 1990 at Tontouta (156,619 kg harvested in 1991).

— BASSINS DE DUMBEA: has 3 ponds totalling 15 ha in area, constructed from 1988 to 1990 (38,209 kg harvested in 1991).

— SASV: the research station at Ouenghi, has about 20 ponds totalling 8.5 ha in area



A Station d'Aquaculture de Saint-Vincent-based researcher is showing a diagram representing the different post-larvae stages.

* IFREMER 35.97 per cent, France Aquaculture 16.4 per cent, SPAC 15.65 per cent, BCI 12.32 per cent, PROPARGO 10.59 per cent, ICAP 4.34 per cent, Southern Province 4.34 per cent, other 0.39 per cent



A technician showing a marketable-stage shrimp

(41,453 kg harvested in 1991).

- SEAFARM: has 10 ponds totalling 35 ha in area at Bouraké. Construction was completed only in 1991 and the first harvest will take place in 1992.
- SODACAL: has 12 grow-out ponds and 12 juvenile rearing ponds totalling 129 ha in area, constructed in two stages, in 1984 and in 1987 (398,535 kg were harvested in 1991).

Because of the serious problems that occurred with locally produced shrimp food pellets in 1988 and 1989, the private farms will still be using a high proportion of shrimp food imported from Asia in 1992. However, this year, two locally produced seeds using different ingredients will come on the market for the first time and should prove more reliable.

Several feasibility studies have been conducted over the last few years but only one new grow-out farm will be opened in 1992, at Voh. With its 40 ha of ponds, the Voh farm will be

the first aquaculture venture of the Northern Province.

Processing for export

SODACAL has been operating a modern, export-standard processing plant since 1986. The plant is equipped with an automatic grader, cooking pots and a brine freezer and has an output of 5 tonnes of IQF (individual quick frozen) shrimps (raw or cooked) per 24 hours. It is located at the Noumea Port next to the General Cold Store and can therefore use these storage facilities pending shipment.

These cold storage facilities are to be overhauled and improved in 1992. The post-harvest automatic anti-oxidant treatment chain set up in 1991 on the SODACAL farm should be integrated into the processing plant in the city in 1992.

The average CIF price for export-grade shrimps has been rising steadily despite a not very favourable exchange rate for the Australian dollar (80.60 CFP francs). It was 1,121 CFP francs/kg in 1991. The very marked increase in the average

size of shrimps produced largely accounts for the good price they now fetch. Shrimps are being exported to France (193 tonnes), Australia (148.7 tonnes), Japan (11 tonnes), Tahiti (9.704 tonnes), New Zealand (8.4 tonnes) and Wallis (2.13 tonnes).

Production cost ex-pond was about 800 CFP francs/kg in 1991 at SODACAL and is expected to be reduced through improvement of yields (intensification) and better food-conversion rates, as food costs still currently represent between 40 and 50 per cent of the total production cost.

The 'export cost' (i.e. from arrival at the processing plant to CIF delivery) was 278 CFP francs in 1991 as against 342 CFP francs in 1990 and should be further reduced in 1992 (to about 235 CFP francs per kg) with the expected increase in quantities processed.

The export premium introduced by the Price Stabilization Board for three years, from 1989 to 1991 (120 CFP francs/kg for the first 350 tonnes of shrimps exported in 1991) is to be replaced in 1992 by another type of incentive guaranteeing a minimum exchange rate for the Australian dollar in respect of exports to Australia.

In 1991 SODACAL processed and exported part of the output from the other four shrimp farms:

- 65.7 tonnes for AQUAMON;
- 26.6 tonnes for SASV; and
- 2.4 tonnes for AQUAFARM.

A shrimp producers' association is to be established in 1992, with a view to joint utilisation

of the existing processing plant and marketing of all New Caledonian shrimps under a single tradename. Quality control will be set up concurrently to protect this tradename.

Prospects

Despite all its assets, New Caledonian shrimp aquaculture will never quite be able to compete with the large Asian producers, because energy, raw materials (imported) and labour costs are too high.

To stand a chance on the world market, the New Caledonian product must be 'different' (*P. Stylirostris* species which is uncommon and extra-large) and of excellent quality (stringent quality control and a single tradename). By increasing the quantities available for export (an estimated 600 tonnes in 1992) while decreasing production and processing costs, it will be possible to supply markets more regularly and more reliably.

The future for New Caledonian shrimp aquaculture looks bright and the initial results obtained by SEAFARM, the more intensive 'new generation' farm, could attract new investors and make banks more willing to grant loans. Just putting 1,000 ha of ponds into operation would yield between 4000 and 5000 tonnes of shrimps, result in a turnover of more than 5 billion CFP francs and directly generate 500 jobs.



Technician using a hand cast net to collect some shrimp specimens for analysis

FISHERIES IN THE NORTHERN PROVINCE OF NEW CALEDONIA

Background

The responsibilities transferred from the Territory to the Provinces under the Referendum Act of 9 November 1988 included, in the fisheries sector, management of vessels, stock management, marine training and economic development. In 1990, the Fisheries and Maritime Affairs Service operated with two staff based in Noumea. The Provinces' wish to develop this sector led to an expansion in staff numbers. Today, there are six staff members, including four field workers, two of whom (one in 1991 and one in 1992) attended the training course for Pacific Islands fisheries officers jointly run by the South Pacific Commission and Nelson Polytechnic.

Geography

The lagoon area of the Northern Province amounts to approximately 15,000 km², comprising a variety of biotopes. The west coast features large mangrove areas and a reef close to the shore, while the east coast is fringed by a lagoon exposed to the tradewinds and bordered by a reef quite distant from the shore.

Fishing activity and constraints

Since little monitoring was carried out before the Provinces were set up, actual fishing activity was not accurately

by H. Bru*
Fisheries Service
Northern Province
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known, especially as some pleasure-boat owners landed as much fish as the professional fishermen and sold their catch on the commercial market.

The beginning of 1992 saw professional fishing licences reintroduced as a compulsory measure; issuance is not yet complete, but so far almost 130 professional fishermen have been registered (as against only 70 in 1990).

The constraints encountered by fishermen are essentially connected with the lack of infrastructure on land: fuel depots, storage facilities, ice, repair shops etc., and a lack of training in the practical aspects of their job. In fact, at the present time, less than 10 per cent of active fishermen can be regarded as fishing commercially; the others fish for subsistence to supplement agriculture.

The various types of fishing activity

The range of fishing methods used is not very wide: crabs and shellfish are gathered on foot at low tide, while trochus and sea cucumbers are collected by divers. Fishing as such consists of handlining at night or net-fishing in the lagoon from 5—6 m long boats. Virtually no

fishing takes place outside the lagoon even though there are resources to exploit.

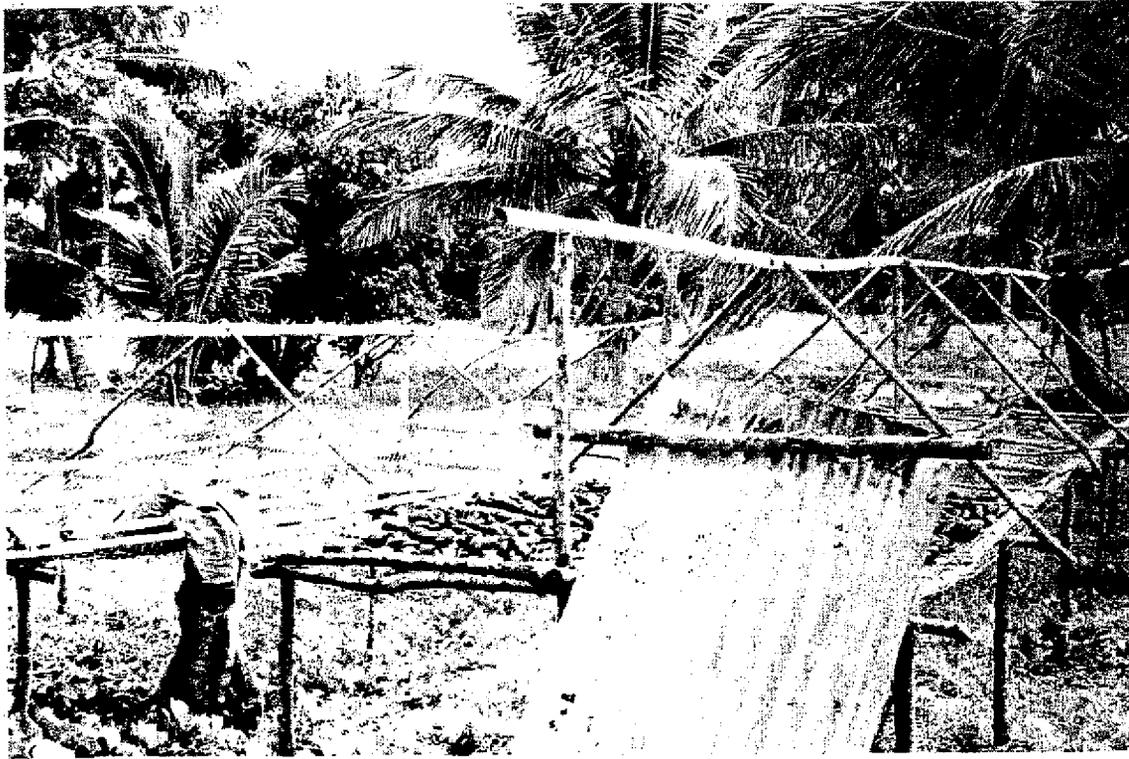
— *Crab*: about 30 metric tonnes of mud crab are caught annually, representing 80 per cent of the Territory's output. This activity is carried out on foot, mainly by women, during the six months the season is open.

— *Trochus*: was originally harvested only for its shell, but trochus flesh is now also finding a market. This is the main activity on the east coast. In 1991, the output of the Northern Province was approximately 100 tonnes or 85 per cent of the Territory's total production, in decline last year because the trochus exporters stopped buying from June to November.

— *Beche-de-mer*: harvesting is virtually continued to the Northern Province (almost 1500 metric tonnes in 1991) especially the northern section of that Province. Beche-de-mer is usually dried at the landing site and then sold to three main exporters who ship it to Hong Kong. Many fishermen are asking questions about how this resource should be managed.

— *Fish*: The main species caught are mullet, emperor, sea bream and groupers. Total catch is over 300 tonnes a year, 85 per cent of which is sold on the Noumea fresh fish market. Most of this catch comes from the north and west coasts.

Other authors, from the Northern Province Fisheries service, include: D. Darbon, M. Neaoutyine, C. Poithili and T. Smali.



Beche-de-mer is usually dried at the landing site and then sold to three main exporters who ship it to Hong Kong



Provincial involvement

This sector is under the responsibility of the Fisheries and Maritime Affairs Service. A better understanding of it was gained in 1991 with staff increases. Action is taken on two levels: Province-supported projects are set up and contact

is maintained with active fishermen through a follow-up service. The former was the Service's main activity in 1991 but the latter aspect is now considered the priority area. Sixty or so projects have received Provincial assistance since 1990, ranging from motor boat purchases to fish

transport facilities; the Province's contribution is on average 40 per cent of the capital cost. A Province-wide project was carried out to complement the individual support: this was the boatbuilding and repair yard set up under a State Province development contract at Oundjo on the west coast.

Support to the fishermen of the Northern Province has also taken the form of training in conjunction with the "Ecole des Métiers de la Mer" (Marine Training School) which has organised 12 outboard motor, diesel engine and hull maintenance and repair workshops since July 1991.

In 1992, each professional fisherman was given a logbook providing information on the current regulations, including tide tables and income and expenditure calculators which

should make it possible to monitor activities more easily.

Lastly, at the end of 1991, the Northern Province Fisheries Consultative Committee was set up to improve liaison between the administration and the professionals.

The Service also had an involvement in aquaculture by monitoring the feasibility study and funding proposals for the Gatope shrimp farm (west coast).

Prospects

Resource management: Little research in this sector has been carried out in the Northern Province, but a study on the mud crab is in progress.

ORSTOM has been approached to conduct a lagoon fish stock appraisal which could be funded under the development contracts, with the Fisheries Service collecting the fishermen's catch statistics. A study on traditional management of fisheries is under way; some kind of control now needs to be exercised over the lagoon.

Development of lagoon fishing: This work began this year. The aim is to improve infrastructure on land, facilities available, fishing gear, fishing techniques and harvest quality as well as restructuring the profession to enhance profitability.

Development of coastal fishing: The purpose here is to introduce some larger vessels (9—12

metres) which could fish outside the lagoon using trolling and deep-bottom methods. This will also require local and export market research to be carried out. The fishermen will need training for this type of activity.

Development of aquaculture: The Northern Province possesses enormous areas with potential for aquaculture. The realisation and the success of the Gatope shrimp farm should lead to other such ventures in years to come and construction of a hatchery in the Northern Province. Oyster farming trials will also be undertaken.



Part of the Belep fishing boats fleet (photo taken during a training course organised by the Marine Training School on outboard motor, diesel engine and hull maintenance)

THE PALAO TROPICAL BIOLOGICAL STATION AND MARINE RESOURCE STUDIES IN MICRONESIA IN THE 1930s

Introduction

During the Japanese-mandated era in Micronesia (1922-1945), Palau was called Palao. The Palao Tropical Biological Station (PTBS) was established in 1934 and research work was conducted there by Japanese scientists until 1943, when its administration was taken over by the Japanese Imperial Navy Institute. In this article, the achievements of those scientists and of the Fisheries Experiment Station of Japan's South Seas Government (Nan'yo-Cho) in Palau are introduced.

Palao Tropical Biological Station (PTBS)

At the Fourth Pacific Science Congress held in Java in May 1929, the International Committee on Coral Reefs of the Pacific was established for the purpose of joint research on coral reefs and related aspects. On the basis of this recommendation, the Japanese Society for the Promotion of Science set up the PTBS in Koror in June 1934 (Hiro 1936a; Motoda 1990). In March 1935, construction of the PTBS research laboratory was completed near Ngerbeched (see figure on p 27; Peattie 1988).

Over ten years, a total of twenty-nine Japanese research scientists, including university postgraduate students, conducted various studies in Palau and Micronesia for the PTBS. It is worth special mention that those scientists who spent their

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young and energetic days at PTBS went on to become leading scientists in the field of marine biology, in Japan and throughout the world, after World War II. Their research work conducted in the 1930s still provides good reference material. Research topics include the following (Hiro 1936b; PTBS 1940 & 1968; and Motoda 1990):

- Surveying and mapping of the bay area surrounded by Koror and Aluptagel (Iwayama Bay in Japanese);
- Coral taxonomy, embryology, physiology, ecology, etc.;
- Oceanographic studies (physics, chemistry and planktology) in Iwayama Bay;
- Marine life on coral reefs (*Polychaeta*, *Anthozoa*, *Astroidea*, *Crustacea*, etc.);
- Study on edible molluscs (silver-lip pearl oyster, etc.);
- Ecology of marine animals and algae;
- Fresh water fish culture;
- Luminous animals and plants;

— Stock assessment, physiology and ecology of edible sea cucumbers and other echinoderms;

— Spawning survey, physiology, systematics of tuna and skipjack.

The results of their work were compiled in the following research journals published by PTBS (PTBS 1968; Motoda 1990):

— *Palao Tropical Biological Station Studies* (in English): vol. 1, no. 1 (March 1937) to vol. 2, no. 4 (May 1944); and

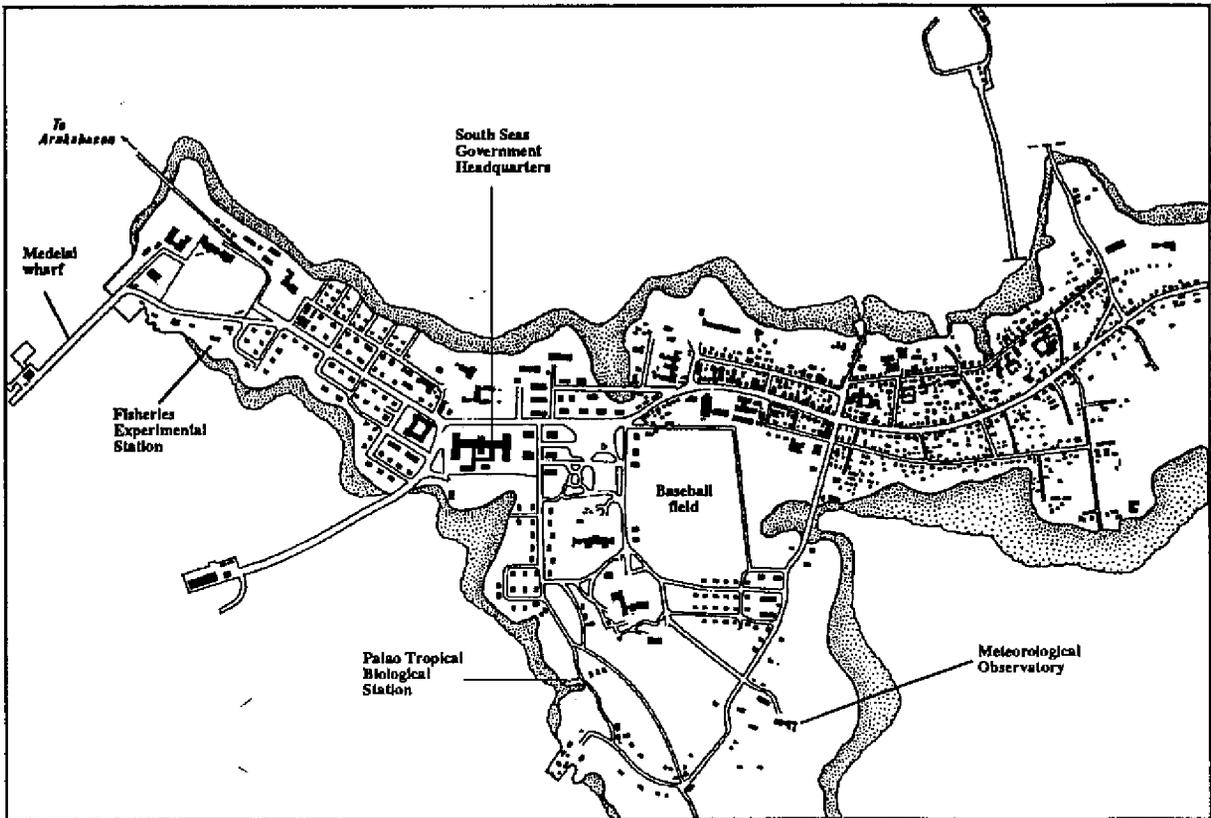
— *Science of the South Seas* (in Japanese): vol. 1, no. 1 (June 1938) to vol. 5, no. 2 (March 1944), and Supplement no. 15 (June 1944).

There is only one complete set of these journals in the region — at the University of Guam's Micronesian Area Research Center Pacific Collection (see 'Bibliographic survey for Guam' in this issue). The set is available for public perusal. Besides these two journals, some of the articles were published through other scientific bulletins, Japanese university research journals and other publications. The scientists' achievements were highly acknowledged in Japan as well as internationally (PTBS 1955).

Fisheries Experiment Station of the Japan's South Seas Government

The South Seas Government's Fisheries Experiment Station located near Medalai Wharf in Koror, Palau carried out various research and experimental surveys in Micronesian areas, for example:

— Tuna and skipjack fishing survey;



Koror, Palau, in the 1930s (redrawn from map cited in Peattie, 1988)

- Trochus resource survey and transplantation (Izumi 1987);
- Pearl oyster resource survey;
- Edible sea cucumber resource survey;
- Experimental hawksbill turtle farming (Izumi 1992a);
- Fisheries statistics (Izumi 1991);
- Seafood processing.

The results provide us with useful information for current development surveys and research in the region.

The survey and research reports from both these institutions are listed in the *Bibliography of Micronesia* (Bushnell 1950), the *Bibliography of Micronesia compiled from Japanese publications 1915-1945* (Hatanaka

1979), the *Palau Marine Resources Bibliography* (Izumi 1988), the *Marine Resources Bibliography of the Federated States of Micronesia* (Izumi 1992b), and the *Marine Resources Bibliography of the Marshall Islands* (Izumi 1992c) for further reference.

The work of these institutions was discontinued because of World War II, and there are few people remaining, either in Japan or Micronesia, who are aware of their research activities and findings. Unfortunately material that is not easily accessible is often overlooked. Hopefully an existing or new institution will establish a Japan Collection similar to the University of Guam's Micronesian Area Research Center Pacific Collection or the Spanish Collection in Micronesia. This would enable current researchers throughout the region to benefit from the experience of another era.

References

- Bushnell, O.A. and others (trans. & rev.) (1950). *Bibliography of Micronesia*, compiled by Huzio Utinomi. University of Hawaii Press. 157 pp.
- Hatanaka, Sachiko (1979). *A bibliography of Micronesia compiled from Japanese publications 1915-1945*. Gakushuin University Research Institute for Oriental Cultures, Occasional Paper (8). 217 pp.
- Hiro, Huzio (1936a). A general view of the Palao Tropical Biological Station and its work (in Japanese). *Botany and Zoology, Theoretical and Applied*, 4 (2): 411-420.
- Hiro, Huzio (1936b). A general view of the Palao Tropical Biological Station, II (in Japanese). *Botany and Zoo-*

logy, *Theoretical and Applied*, 4 (3): 561-567.

Izumi, Masanami (1987). *Summary translations of trochus research from South Seas Fisheries News, 1937-1939*. FAO/UNDP Regional Fishery Support Programme, Document (87/2). 28 pp.

Izumi, Masanami (1988). *Palau marine resources bibliography*. FAO/UNDP Regional Fishery Support Programme, Document (88/2). 245 pp.

Izumi, Masanami (trans.) (1991). *Fisheries statistics in Micronesia from 1922 to 1938*. 2 pp.

Izumi, Masanami (1992a). *Experimental turtle farming in Micronesia in the 1930s*. South Pacific Commission, *Fisheries Newsletter* (62): 33-36.

Izumi, Masanami (1992b). *Marine resources bibliography of the Federated States of Micronesia*. South Pacific Commission. 167 pp.

Izumi, Masanami (1992c). *Marine resources bibliography of the Marshall Islands*. South Pacific Commission. 119 pp.

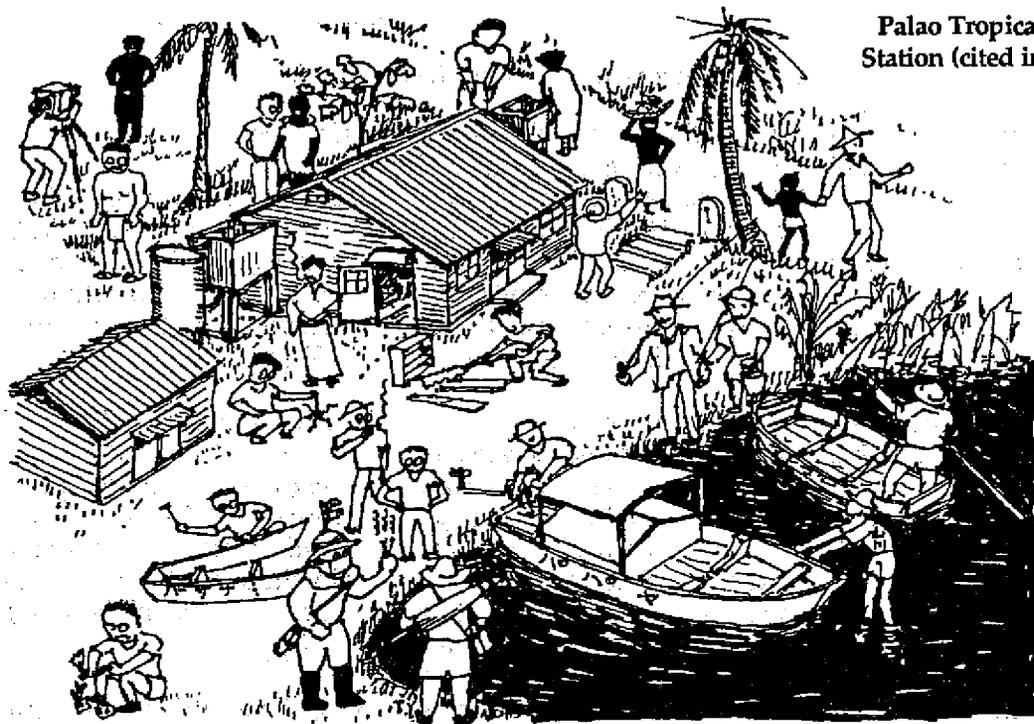
Motoda, Shigeru (1989). *Palau Tropical Biological Station* (in Japanese). In: *The Pacific Society* (1989). *Encyclopedia of the Pacific Islands*.

Palau Tropical Biological Station (1940). *Bulletin of the Iwayama-kai* (in Japanese). October (4): 21-26. [reprinted in January, 1989].

Palau Tropical Biological Station (1955). *Bulletin of the Iwayama-kai* (in Japanese). October (8): 30 pp. [reprinted in March, 1989].

Palau Tropical Biological Station (1968). *Bulletin of the Iwayama-kai* (in Japanese). December (9): 36 pp. [reprinted in April, 1989].

Peattie, Mark R. (1988). *Nan'yo: the rise and fall of the Japanese in Micronesia, 1885-1945*. Pacific Islands Monograph Series (4). 382 pp.



(Illustrated by S. Motoda)

Palau Tropical Biological Station (cited in PTBS 1968)

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