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SPC ACTIVITIES

DEEP SEA FISHERIES DEVELOPMENT PROJECT NOTES

Commonwealth of the Northern Marianas — Deep-bottom fishing project Phase III

After the disruption caused to Phase II of this project by very bad weather conditions (see *Fisheries Newsletter #52*), many local fishermen newly interested in learning deep-bottom fishing techniques were left waiting for training and, in addition, plans by the Northern Marianas Division of Fish and Wildlife (DFW) to survey bottom fish stocks around uninhabited atolls in the north of the group were unfulfilled.

In light of the importance given to this work by the DFW and in order to capitalise on the interest aroused among local fishermen in deep-bottom fishing during Phase II, the Government of the Northern Marianas asked that an SPC Masterfisherman return for four months during a period when calm weather generally prevails. Consultant Masterfisherman, Peter Watt, who supervised Phase II, was subsequently reassigned to the Northern Marianas, arriving in Saipan in mid-April.

This third visit involved an extensive training programme for fishermen on Saipan and Tinian as well as continued survey of deep-bottom fish stocks. A two-week trip was made to uninhabited Pagan Island to compare catch rates there with exploited stocks around Saipan and Tinian. Ten days fishing at Pagan produced 1,030 kg of catch for a catch rate of 5.7 kg per line hour. A five-day trip was also made to Esmeralda Reef, some 30 nautical miles west of Tinian, where 245 kg of bottomfish were taken. In addition, two seamounts were located offshore of Saipan and Tinian, each of which produced good catches.

As a result of the catch and stock data collected, the DFW is now in a better position to manage the country's deep-bottom resource for long-term benefit and many fishermen in Saipan and Tinian have a new means of diversifying their fishing effort away from fuel-expensive trolling.

Kiribati — Gear Development Sub-project

Masterfisherman Paxton Wellington recently completed the second of the Gear Development Sub-projects, based in Tarawa, Kiribati. His assignment was to adapt modern, small-scale commercial tuna longlining techniques and gears to Pacific Island fisheries, and to determine whether modified versions of these gears could be effectively scaled down to suit typical island fishing craft.

The craft used in these trials was an 8 m Yanmar GRP skiff, powered with a 40 HP diesel engine and an outdrive. Perhaps the major consideration in planning a longlining operation from a craft of this size is the utilisation of all available space. As approximately 5 miles of longline would have to be carried, consideration was given to using monofilament nylon, as many modern medium-scale longliners do. However, nylon must be wound onto a drum for handling and the great pressures exerted by it when wound under strain require that drums are precision-engineered in metal and hydraulically driven. A small commercially-made drum to handle the longline envisaged would cost around US\$ 4,000 to buy and install. The decision was made therefore to fish with *Kuralon* line — the type of longline generally used by large longline vessels. *Kuralon* can be faked down in a well and handled without mechanical gear; its disadvantages are that it is bulky and heavy to haul by hand. Branchlines were rigged from monofilament nylon and stored in a 'shooting box' with the hooks hung on wire mounted around the top edge.

For the most part, fishing operations with this gear went smoothly. Once an efficient baiting and setting system was established, the three-man crew was able to set around 150 hooks per

set. During 30 trips a total of 3,789 hooks was set for a catch totalling 3,035 kg. Of the 139 fish taken, 68 were yellowfin, the target species. The next highest component of the catch was sharks.

Catch rates overall were 1.8 tuna per 100 hooks, which compares well with large-scale commercial longlining catches. When the gear was modified to fish at more shallow depths, during the last seven trips the catch rate improved dramatically to 4.5 tuna per 100 hooks. The largest tuna taken was 38 kg and the smallest 7 kg; average weight was 20.3 kg.

Wellington's report of this project is presently in final preparation; it will include detailed description of the gear and techniques used and his assessment of the application of the method for small craft.

INSHORE FISHERIES RESEARCH PROJECT

Improvement of ciguatera case history reporting

Ciguatera fish poisoning is endemic in many parts of the South Pacific. This form of fish poisoning is caused by the ingestion of fish that have previously consumed toxic dinoflagellates or by eating predators of these fish. The symptoms of ciguatera fish poisoning are varied and the toxin(s) can cause gastro-intestinal illness such as diarrhoea and vomiting, as well as neurological afflictions such as paralysis and the reversal of the hot-cold sensation in the skin. Ciguatera poisoning is not usually fatal but the effects of the intoxication can be very debilitating and lead to a sensitisation of the victim to normally non-toxic substances in foodstuffs and drinks that are similar in chemical structure to ciguatera poisons. Outbreaks of ciguatera can have a deleterious effect on fisheries development, since fishing grounds may be closed and certain fish species prohibited for sale by fishermen. This is particularly critical in the small islands and atolls of the South Pacific where economic opportunities are limited and fresh fish comprises a substantial portion of the national diet.

The South Pacific Epidemiological & Health Information Service (SPEHIS), based at the SPC, records between 3,400 and 4,700 cases of fish poisoning each year, although not all of these are due to ciguatera intoxication. However, at present the number of ciguatera cases reported throughout the region is thought to comprise only between 10 and 20 per cent of actual poisoning incidence. That there is a need for some form of initiative on ciguatera in the South Pacific is evident. However, the effect that this fish poisoning has on island societies is largely unknown due to the poor reporting of case histories. A first step to improve the current underreporting is to encourage both health and fisheries workers in the region to record case histories on a standard ciguatera reporting form, and to send them to the SPC where they can be collated in a database. The SPC Health Programme has circulated the form on page 38 to regional health workers via the SPEHIS monthly news-sheet.

The form is reproduced here for fisheries workers in the region to record cases of ciguatera poisoning that they encounter. The copy on page 38 can be used as a template for making multiple copies, or, where copying facilities are unavailable, the SPC Inshore Fisheries Research Project will be happy to supply copies. As this form is still undergoing trials in the field, we would be glad to hear from persons who have criticisms or suggestions for improving the form. Finally, we would encourage fisheries workers in the region to work in co-operation with their colleagues in their health departments to record all incidents of ciguatera that they hear about. Only with your help can we gauge the true extent of this problem and plan and co-ordinate future work accordingly.

REGIONAL FISHERIES TRAINING PROJECT

1990 SPC/Nelson Polytechnic Pacific Island Fisheries Officers Course

The 11th SPC/Nelson course was held from Monday 5 February to Friday 13 July 1990. The course followed a similar syllabus and structure to those held in previous years, with an 18-week module at the School of Fishing, Nelson Polytechnic, New Zealand, followed by a 5-week practical module in Fiji. In line with SPC's practice of involving regional training institutes in all of its projects, the practical fishing module was held in conjunction with the Institute of Marine Resources (IMR) of the University of the South Pacific. The module was based at the IMR research station at Dravuni Island using two of the IMR vessels and staff from IMR and SPC.

The syllabus of this course was once again reviewed during the 22nd Regional Technical Meeting on Fisheries in August 1990 and some minor changes were made to keep it relevant to Pacific Island needs.

The course continues to be popular and receives support from Fisheries Departments within the region and from funding agencies. Funding for the 1990 course was supplied by the Government of New Zealand, FAO/UNDP, the Commonwealth Foundation and the South Pacific Commission.

TUNA AND BILLFISH ASSESSMENT PROGRAMME

Regional Tuna Tagging Project

The tagging vessel *Te Tautai* (photo on page 8) continued to work in Palau for the first week of July 1990 before moving on to the Philippines for a three-week visit.

During the first two weeks in Palau waters, fishing activities were carried out to the south of Babelthuap as far as Helen Reef and also along the east and west coasts. A total of 1,624 tunas was tagged and released (448 yellowfin, 1,173 skipjack and 3 bigeye). Baitfishing in Palau was also very successful, especially at Helen Reef and Urukthapel baiting ground. A further 864 tuna (266 yellowfin, 578 skipjack and 20 bigeye) were tagged in Palau waters en route to the Philippines.

Activities in the Philippines were restricted by poor bait catches and periods of bad weather. Nonetheless, 2,115 tunas (186 yellowfin, 1,913 skipjack, 8 bigeye and 8 longtail) were tagged and released, mostly in the vicinity of drum rafts in the western Sulu Sea. Smaller numbers of tunas were tagged off N.E. Mindanao and in the Moro Gulf.

Fishing activity in the Philippines was centred on the Moro Gulf and Celebes Sea to the south of Zamboanga. The vessel operated in an area of fish aggregation devices (FADs), but in four days of fishing only managed to tag and release six skipjack. The *Te Tautai* had various problems with repairs and had to stay in Cebu City. The boat departed Cebu on 14 August and steamed for Helen Reef in the extreme south of the Palau EEZ, encountering rough seas on the way.

During the week in Palau waters, the vessel fished from Helen Reef to the main islands of Babelthuap and Peleliu. A total of 2,082 tuna, consisting of 803 yellowfin, 1,238 skipjack and 41 bigeye, was tagged. The majority of these releases (83 per cent) were made off the west coast of Peleliu and Babelthuap.

The *Te Tautai* departed Palau waters on 25 August and spent the remaining days of the month fishing around the main islands of Yap. During this time, 584 tuna (62 yellowfin, 515 skipjack and 7 bigeye) were tagged and released.



Poling a skipjack tuna for tagging

The tagging vessel continued to operate in the Federated States of Micronesia (FSM) during most of September before moving to the Marshall Islands at the end of the month.

The first week was spent fishing in Yap and Truk States where a total of 1,195 tuna (557 yellowfin, 588 skipjack and 50 bigeye) was tagged and released. Most of the releases were made on a drifting payao found between the Woleai and Lamotrek Islands. Baiting was difficult in these areas but improved significantly in Pohnpei State. Baiting off Pohnpei Island was very successful and sufficient quantities of bait were taken at Kapingamarangi Atoll to allow fishing in the southern FSM zone. Another 2,304 tuna (633 yellowfin, 1,657 skipjack and 14 bigeye) were tagged in Pohnpei State before the boat moved to the Marshall Islands.

Baiting in the Marshall Island atolls of Majuro and Arno was excellent but no tuna were tagged during this time. Tagging activities were restricted by rough weather and the small quantity of tuna schools found in the vicinity of Majuro, Arno and Mili Atolls.



Measuring and tagging a skipjack tuna on board the Te Tautai

The following table (total as at 30/9/90) summarises the releases and the recoveries to date by species.

RELEASES							
Yellowfin	Skipjack	Bigeye	Other ·	Total			
16,001	21,821	834	8	38,664			
RECOVERIES							
Yellowfin	Skipjack	Bigeye	Other	Total			
350	1,469	41	_	1,860			

The Twenty-Second Regional Technical Meeting on Fisheries (RTMF), held in Noumea from 6 to 10 August, was attended by 70 delegates from 25 SPC member countries and 19 international or other organisations. The meeting was chaired by Mr Peter Sitan, the representative of the Federated States of Micronesia. The purpose of the meeting, as always, was to present the work of the SPC's fisheries programmes for regional review, to provide an update on the major issues facing fisheries development in the Pacific, and to facilitate the interchange of information and ideas among the region's fisheries managers.

The first item on the agenda was a general overview of SPC fisheries programmes, describing the activities of each of the programmes' component projects over the past year. The Inshore Fisheries Research Project, since the SPC Workshop on Pacific Inshore Fishery Resources, in March 1988, has continued to support specific national-level resource assessment projects such as a pearl oyster resource survey in Kiritimati Island (Kiribati), management of inshore fishery resources (Palau), and a survey of beche-de-mer resources in Tonga. The activities of the Fisheries Information Project were outlined, with description of the concept and the utility of Special Interest Groups for fisheries workers. An overview of the work of the Deep Sea Fisheries Development Project was given, presenting project activities undertaken in Tonga and Kiribati (Fishing Gear Development Sub-project), Northern Mariana Islands --- Phase II (exploratory fishing and training), Papua New Guinea (develop provincial deep-bottom fisheries and develop gear rigs and techniques suited to local canoes), Nauru (survey and chart FAD sites and investigate locally suitable FAD design and material availability), Northern Mariana Islands --- Phase III (extend exploratory fishing survey to atolls and banks to north of Saipan and train fishermen in deep-bottom droplining). The activities of the Fish Handling and **Processing Project** were outlined, with descriptions of country assignments undertaken in Papua New Guinea (Papua Region Women's Workshop on Fish Processing and Marketing), Vanuatu (Beche-de-mer Training Workshop) and the Cook Islands (workshop for fishermen).

The **Tuna and Billfish Research Project** was described. The meeting was reminded that tunas comprise 95 per cent of Pacific Island fish landings and that several Pacific Island nations' waters are among the richest tuna fishing grounds in the world. The establishment of the **Regional Tuna Tagging Project** was outlined and its aims and operations were presented. The **Albacore Research Project** was also detailed, with particular interest expressed by the meeting because of the activities of Asian drift net vessels.

The Fisheries Statistics Project was reviewed and its principal activities, such as maintaining the Regional Tuna Fisheries Databases, publication of the SPC Regional Tuna Bulletin, assistance to member governments with fishery statistics systems and statistical support for other SPC fisheries projects, were outlined.

An important agenda item was the report of the Third Standing Committee on Tuna and Billfish. The RTMF recommended strongly the continuation of the Tuna and Billfish Assessment Programme on a longer term basis and proposed a scientific workshop on yellowfin. The meeting then turned its attention to the report on the Second Consultation on Arrangements for South Pacific Albacore Management.

The Regional Fisheries Training Project was described and meeting participants went on to discuss in more detail the Workshop for Senior Fisheries Personnel, and extension training activities, including the Extension Development Workshop. Plans for future activities in these areas were outlined.



The pole-and-line chartered vessel Te Tautai used for the Regional Tuna Tagging Project

The meeting also dealt with the attachment of a Japanese Overseas Fishery Cooperation Foundation specialist who would supply technical support to the coastal fisheries programme; a proposal for the establishment of a Women-in-Fisheries Project was considered and supported; the restructuring of the Coastal Fisheries Programme was also discussed and the meeting expressed support for the establishment of a Coastal Fisheries Manager position.

The meeting then considered two SPC fisheries projects for Lomé IV funding: the Regional Small-Scale Purse Seine Test Fishing Project, which was strongly supported by delegates at RTMF 21, and the South Pacific Regional Tuna Research Project.

Other items discussed were the establishment of a Regional Post-Harvest Fisheries Facility for the Pacific, the co-ordination of SPC work on ciguatera, the enhancement of Pacific Island invertebrate fisheries by restocking, and issues relating to trochus and pearl shell research.

As is the practice each year, a one-day workshop was held on an issue of topical interest in Pacific Island fisheries development. The subject of this year's workshop was fish aggregation devices (FADs). The workshop reviewed FAD programmes of Pacific Island countries and compared recent information (January 1984 to May 1990) with the previous review (1979 -----1983). The review evaluated the success of the inverse catenary mooring system design which was introduced in 1984. It further addressed FAD raft and mooring system calculations. FAD programme planning and methods for FAD construction and deployment were discussed. Raft designs were technically reviewed and a new raft design was introduced. Four countries described their existing FAD programmes.

Existing information and current research on pelagic fish around FADs were presented. That information included studies of tuna movements around FADs in French Polynesia, FAD research in the Indian Ocean and FAD fishing practices by industrial and commercial fisheries.

The next item was the presentation of a report of the Pacific Island Marine Resources Information System (PIMRIS). The Fisheries Education and Training Adviser then presented a brief overview on the topic of educational resource materials and teaching assistance to schools.

The meeting also considered SPC initiatives in remote sensing and geographical information systems and a forthcoming feasibility study on the possibility of establishing a remote sensing and geographical information facility at SPC was outlined.

The meeting finished with presentations of the work done by other organisations involved in fisheries development in the region. The representatives of the International Centre for Ocean Development and Canadian International Development Agency, the Forum Fisheries Agency, the FAO/UNDP Regional Fishery Support Programme, the United States Agency for International Development, the Institut français de recherche scientifique pour le développement en coopération, the Japanese Overseas Fisheries Cooperation Foundation, the University of the South Pacific, the Commonwealth Secretariat, the Nelson Polytechnic School of Fishing, the Australian Maritime College, the International Center for Living Aquatic Resources Management, and the National Marine Fisheries Service all briefly described the recent activities of their organisations and answered questions from the floor.

Overall the meeting was an interesting and productive one, which covered a wide range of topics and provided important guidance for the future SPC fisheries-related work programmes' activities. As always, much business was conducted outside the meeting room, and many delegates benefited from the opportunity to establish personal contact with representatives of other countries and institutions.

NEWS FROM IN AND AROUND THE REGION

TURTLE SHELL BAN SOUGHT IN FIJI (Source: Fiji Times)

Fiji's Ministry of Primary Industries (MPI) has submitted a report to the government urging a ban on the export of turtle shells to Japan. A MPI spokesman said the ban was being proposed because of the possible extinction of the turtle species in Fiji.

In June 1990, the international environmental organisation, Greenpeace, urged the Fiji Government to ban the export of turtle shells to Japan. Greenpeace official and turtle specialist, Trevor Daly, warned the government that unless a ban was imposed the Hawksbill turtle would become extinct. The two main species of turtles in Fiji are the Green turtle (Vonu) and the Hawksbill (Taku).

The Hawksbill is recognised as an endangered species world-wide and is listed in the Convention on International Trade in Endangered Species (CITES).



The Hawksbill turtle (*Eretmochelys imbricata*)

MICRONESIANS IN JOINT FISHING VENTURE (Source: The South Sea Digest)

The *Micronesian Investment Quarterly* reports in its edition for the third quarter that the Federated States of Micronesia (FSM) has approved initial funding for a new joint venture project with the Kailis and France Group of West Australia to increase Australia's fish exports by expanding the FSM's fishing fleet.

The project will combine the financial resources of the FSM National Fisheries Corporation (NFC) and the Pohnpei Economic Development Authority (EDA) with the Australian group. Each of the three partners will contribute US\$ 2 million towards a total cost of US\$ 13.5 million, including the purchase of three existing fishing boats. The NFC and EDA are expected to make up the balance of US\$ 7.5 million. The joint venture will operate under the name of the Caroline Fishing Company.

HEAVIER PENALTIES WANTED FOR ILLEGAL FISHING (Source: The South Sea Digest)

Delegates to the 47th Asia-Pacific Parliamentary Union conference held in Tonga approved a resolution urging countries in the region to impose harsher penalties on illegal fishing operations. The delegates stressed that all fisheries and marine resources in the region must be properly exploited for the maximum benefit of the people. Despite existing penalties illegal fishing continues to be a major problem in the region, delegates said.

FIJI GOVERNMENT DEVELOPING FISH SMOKING AND DRYING (Source: *Fiji Times*)

The Department of Energy and the Ministry of Primary Industries in Fiji are collaborating in a fish smoking and drying project. The project has started with both high- and low-value commercial species, assessing various factors like temperature, time and salt content to give a marketable product.

The Director of Energy, Devendran Kumaran, said that the next stage of the project will look at smoked low-value species and drying techniques. He said the original smoking unit was of the Altona cabinet type, with expanded metal trays holding the fish and a sawdust tray, heated by a fire, at the bottom of the cabinet. The cost of such a unit is about F\$ 150.

The Department of Energy is closely monitoring the performance of the smoking unit both in wood/sawdust consumption and heat transfer. 'This entails ensuring sufficient temperature is achieved by the fish during smoking to satisfy storage regulations. The mechanics of brining and smoking are looked after by the MPI,' said Mr Kumaran. 'Once all the factors are assessed and the smoker design modified, units could be placed at MPI ice-making centres in the islands.'



Simple version of Altona-type oven

COOKS PEARL PROJECT FUNDED (Source: Samoa News)

Cook Islands is receiving US\$ 2.4 million from the United States Government over a five-year period for research and development of commercial black-lipped pearl culture in the northern Islands.

Cook Islands Prime Minister, Geoffrey Henry, and the United States Ambassador in Wellington, Della Newman, signed an agreement for the project. The agreement is part of the U.S. Agency for International Development's Pacific Islands Marine Resources Project, PIMAR, which provides aid assistance to several countries in the region for the development and conservation of their marine resources.

The American embassy in Wellington said that the development of commercial black-lipped pearl oyster culture was particularly important in the outer Cook Islands where there are few income-generating activities. The challenge is to introduce appropriate commercial mariculture technology successfully and to avoid the risk of disease as currently experienced in pearl culture operations in other countries. Plans are to develop a research and extension facility on Suwarrow Atoll in the northern Cook Islands to refine black-lipped pearl mariculture techniques.



LAGOONS INVITE SEAWEED CULTURE (Source: Pacific Daily News)

A United States-funded pilot project in Majuro has shown that a seaweed of high value on the world market can grow in the Marshall Islands lagoons, said Dr Richard Zingmark, a visiting Fulbright professor with the College of Micronesia, who has supervised the project.

He added that the key now was to train Marshallese people to grow the seaweed and to interest the private sector in buying and trans-shipping the seaweed for overseas export. 'The Marshalls has a lot of potential for aquaculture products but it is not like it will happen in the next six months or one year. It will require changes, training and "selling" to make it happen.'

With the aid of a U.S. Department of Agriculture grant through the College of Micronesia's Land Grant Program, Zingmark established a small 'farm' in Majuro's lagoon, a few hundred yards off shore. Zingmark said that, since it began in March, Marshall Islands Aquaculture has helped to establish experimental farms on Likiep and Mili Atolls.

The seaweed produces a chemical known as physico-colloid, from which carrageenan is extracted. This is in great demand by many industries, he said. In particular, carrageenan is

used as a stabiliser and thickening agent for ice cream, instant desserts, and processed cheeses, Zingmark said. The demand for carrageenan far out-distances the supply.

Zingmark said that the JENU Products Corporation in Denmark has indicated it would locate a processing plant in the area if the Marshalls, Federated States of Micronesia and Kiribati can combine to produce 600 tons of the seaweed annually. One two-and-a-half acre lagoon 'farm' can produce 12—15 dry tons of seaweed a year, he said. 'One family can do it.'

At current prices this would gross a family US\$ 6,000 to US\$ 10,000 a year. It could be an ideal industry for the outer islands, Zingmark said. While the seaweed farms need tending every day, there are jobs that children can do as well as adults, so that it wouldn't prevent outer islanders from fishing and other activities they need to do. But the marketing side is critical to the success of the project, he said. 'There has to be someone to pay the farmer cash for his product. It needs the support of government or quasi-government agencies to get people started.'

600-JOB TUNA PORT

(Source: Marshall Islands Journal)

In his last action before departing Majuro, United States Representative Sam Thomsen joined Education Minister Phillip Muller in signing an agreement committing the United States to provide US\$ 150,000 for a detailed study for the feasibility of developing Majuro into a tuna trans-shipment port.

The agreement paves way for the study, which Republic of Marshall Islands officials hope will be completed within the next two months. The Ministry of Resources and Development will soon be selecting a firm to conduct the study. The bid process for the study closed in July 1990.

The study is the latest step in the Marshalls' march toward the tuna trans-shipment facility, which would include tuna processing and offer jobs for 500 to 600 people, say officials. They added that interest in making Majuro a tuna hub for the central Pacific is strong in the American tuna industry; one official even predicted that the port would become a reality within 12 months.

The Marshalls have received repeated visits by officials from two of the three major canneries in the United States, including one which sent an engineer to assess the potential for building the shore-side maintenance and supply facilities needed to service a major tuna fleet fishing base in Majuro, said the official. According to him, the Americans are interested in Majuro because:

- The Marshalls are conveniently located between Micronesian and Kiribati fishing grounds now being plied by the American tuna boats. With the U.S. tuna companies' ban on use of tuna caught with dolphins, the American fleet is shifting away from the eastern Pacific to fish in the Western Pacific.
- Waiting time to off-load tuna in American Samoa can be up to 60 days. Every extra day in port means money lost. In recent weeks, the Marshalls' purse seiner *Koorale* discharged its 1,100 tons of fish in Tinian rather than fight the line-up of ships in Samoa.
- Labour is less costly in Majuro. In American Samoa, cannery workers must be paid at least the U.S. minimum wage. In the Marshalls the basic wage is US \$ 1.50 an hour, less than half that in Samoa.

- The Marshalls have basic water and electricity. Basic infrastructure is in place in Majuro.

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Republic of Marshall Islands officials see a four-step process to developing a tuna base there: build a fleet of tuna ships; establish trans-shipment and processing facilities; and, finally, build a cannery. 'We've already taken the first step by buying two purse seiners', an official said. 'Within the next 12 months we should have a processing operation here. Processing would involve gutting and skinning the tuna, then cooking it and shipping the fish to a cannery for final packaging.'

Officials estimate there will be 500 to 600 jobs in the processing and stevedoring operations alone. There will be other spin-offs', the official said, listing engine and net repairs, food and fuel supply, and other services needed by the tuna fleet.

500 POUND (227 KG) MILI CLAM GOES TO HAWAII (Source: Marshall Islands Journal)

A 500-pound (227 kg) giant clam from the Marshall Islands is now the centre of attraction in Sea Life Park, Hawaii. It was donated by the people of Mili Atoll and Iroij Driktak, to increase United States interest in the Marshalls. It was then packaged and freighted by Neil Skinner of Marshall Islands Aquaculture (MIA), helped by graduate students from the University of Hawaii. MIA is starting to produce young giant clams in its hatchery, so is now on the next stage of its programme, training the island's future farmers. It has two trainees each from six different atolls and has started a co-operative on Mili.

Skinner sees a great future for the farmers of giant clams, not only to feed the growing local population but also as an export business. But Skinner's recent challenge this week was the export of a live 500-pound giant clam to Hawaii. Not only was this the first giant clam to get to Hawaii for a holiday, but U.S. officials were fussy. So with little direct knowledge to guide him, and U.S. officials threatening huge fines if the clam arrived dead or diseased, Skinner had a giant clam which was a giant problem.

Fortunately for Neil he has friends like Paul Cross, who cultivates pearls and knows about moving molluscs, and John O'Bannon, who builds boxes for a business. They helped Skinner create a de luxe crate for his clam. The crate, at one thousand pounds, was twice as heavy as the clam. But that included a pump worked by a helicopter's radio batteries and two filters, plus of course, enough water to cover the clam, which was securely mounted on a tied-down platform.

MIA, which created another first when it flew the crated clam to Hawaii, provided valet service, with a special delivery of the pump's batteries and the regular attention of the jet's flight engineers, just in case the pump stopped. However, all went well and the giant clam from Mili Atoll arrived uneventfully and safely at Sea Life Park, where it is pampered and fussed over as a big publicity attraction. And there, with no more arduous work than posing for the tourists' cameras, it enjoys the ideal environment of Sea Life Park. Happy as a clam—all five hundred pounds of him.

PREVENTING AND COMBATING FIRES ON BOARD (Source: Australian Fisheries)

Every year, people are injured, lives are lost and boats are destroyed or damaged through explosions or fires on board. Prevention and knowing what to do in case of fire could save your life or your boat.

No-one would disregard the presence of high explosives in a boat, yet many people are indifferent to the presence of petrol. A rough guide to the destructive force dormant in petrol is

that the evaporation of a teacup of petrol will generate enough vapour to create an explosion equal to that made by the detonation of ten standard sticks of dynamite.

Prevention is always better than cure, so boat users should be aware of the following common fire hazards and elementary precautions.

Smoking

Ash-trays should be provided and their use insisted upon. Fires caused by smoking in bed are particularly dangerous. A sleeping person has no sense of smell and can easily be suffocated by smoke before becoming aware of the fire.

Rubbish

Newspapers, paper, plastic wrappers and cardboard cartons in the accommodation area constitute a fire hazard. So, too, do oily rags and cotton waste in the machinery compartment, and used paint tins, paint brushes, cleaning fluid and rags on deck. All rubbish should be disposed of ashore, but where this is not possible, it should be stowed away in a safe position, with oily rags, cotton waste and paint rags being placed in an airtight metal container.

Liquefied petroleum (LP) gas

LP gas, a mixture of hydrocarbons, is heavier than air, and like petrol vapour, can form an explosive mixture with the atmosphere. LP gas cylinders should always be located on the open deck or on the cabin top, be shielded from the sun, and be in a position where escaping gas is unlikely to reach the boat interior. The system should be regularly tested for leaks, and all crew and passengers should be aware of the characteristic smell of the gas.

Machinery

Petrol and diesel, the fuels in common use, by their very nature present a serious fire hazard, with petrol being the more dangerous. Petrol vapour is twice as heavy as air and tends to gravitate to the bilges, where it may form an explosive mixture. For this reason, the fire and explosion risk in a boat can be reduced by installing a diesel engine in preference to a petrol one. Before starting any engine, the engine should be inspected for fuel leaks and the space well ventilated.

Refuelling

The danger of fire or explosion increases when a boat is being refuelled. The following rules should be followed:

— No smoking;

— Engine off;

- All cooking appliances and naked lights extinguished;
- Portable tanks and loose cans to be taken out of the boat for filling; and
- After refuelling, remove spillage and then ventilate for at least five minutes before relighting any cooking appliance or restarting the engine.

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Electrical installation

Fires and explosions originating from electrical installations are usually caused by short circuits or overload. For peace of mind, it is essential that the electrical installation in a boat be designed, installed and maintained by a competent marine electrician.

Due care must be given to cable sizes, cable insulation and sheathing, and overload protection. Never use multiple adaptors for attaching additional appliances to a circuit that is not initially designed for the purpose. Never replace an existing fuse by one of a larger size.

When on charge, batteries evolve hydrogen, and very small concentrations of this gas present an explosion hazard. Overcharging causes excessive evolution of hydrogen and should be avoided. It is vital that the charging system be reliable and that charging instructions are observed. Battery spaces should always be well ventilated.

Fire extinguishers

Probably the easiest and quickest way to put out a fire is to use a portable fire extinguisher. However, not all types of extinguishers are suitable for use on all types of fires. The use of a water extinguisher on an oil fire or a foam extinguisher on a 'live' electrical fire might be positively dangerous.

The table below indicates the type of extinguisher to be used on a particular class of fire.

Type of extinguisher	Suitable for fires			
-	Fire A	Fire B	Fire C	
Water and soda acid (bucket of water)	Yes	No	No	
Foam	Yes	Yes	No	
Carbon dioxide	Yes	Yes	Yes	
Dry chemical powder	Yes	Yes	Yes	
Halogenated hydrocarbon	Yes	Yes (but not for cooking fires)	Yes	

- Fire A: ordinary combustibles such as wood, cloth or rubbish, where cooling action is required.

- Fire B: inflammable liquids such as petrol, diesel, oils, paints or cooking fats, where a smothering action is required.

- Fire C: fires in electrical equipment such as motors, switches and appliances, where a nonconductive extinguishing agent is required.

Fire drill

- Raise alarm.
- Have extinguisher ready.
- Shut off fuel supply and remove flammable items.
- Eliminate draught by closing hatches and vents. Drift or sail downwind to reduce apparent wind.
- --- Fight fire with extinguisher or use smothering techniques. Aim extinguisher at base of fire.
- --- Cool area with water to prevent the fire flaring up again.

MARINE RESOURCES OFFICE TALKS TO FISHERMEN ABOUT THEIR CATCH (Source: Samoa News)

The Office of Marine and Wildlife Resources (OMWR) in American Samoa is conducting a year-long survey on inshore fisheries. A questionnaire produced by staff of OMWR will ask local fishermen how often they fish, how long, what they catch, what their fishing mode is and whether they fish for themselves or sell their catches.

Bonnie Bonwith, who will be in charge of the survey, explained that it has been 10 years since the last survey of inshore fisheries on Tutuila was done; the results gathered from the 1990 survey will show what has happened since then. Fellow biologist Peter Craig stated that there has been a lot of development on the island and this has affected the reefs and most probably the inhabitants. The biologists hope to gather information about traditional fishing methods used once for reef fishing but no longer practised today.

The 1980 study showed that 67,000 kg of fish were caught and the amount of invertebrates (e.g. clams, sea urchins, sea cucumber, lobster, octopus) caught annually was 32,000 kg. The most popular fishing method was day gleaning, which accounted for 22,000 kg. Day diving landed 19,500 kg, and night diving reaped 11,900 kg. Most of the reef fishing was done for recreation or on a subsistence basis. A few fishermen sold their catches.

WESTERN SAMOA IMPORTS GIANT CLAMS

(Source: Samoa Times)

Giant clams, *Tridacna gigas*, recently existed in Samoa but, according to fossils found, became extinct, said Samoa Marine Director, Fosi Levi. Recently Samoa Marine imported 1,300 juvenile giant clams (*Tridacna gigas*) from Australia's Great Barrier Reef. These were initially kept under quarantine at the Fisheries Division, but were transferred to the company's marine farm at Aleipata after a month.

The clams are noted for their large size and fast growth. Samoa Marine also breeds the slower growing local clam, *Tridacna squamosa*, and *Tridacna derasa* imported from Palau. *Tridacna derasa* are found locally but are rare. Older fishermen call this species **manifi** (exhausted) which indicates that it has been overfished in the past.

PEARL SHELLS FROM ABAIANG (Source: *Marshall Islands Journal*)

Abaiang Island, 51 km north of Tarawa in Kiribati, could be like Manihiki in the Cook Islands, selling pearls plus giant clams, which are in abundance in its lagoon. A survey is being carried out in the Abaiang lagoon to determine the growth rate of these shells. While the Abaiang Island Council is doing the survey, fishermen who dive for such species have been told to stop collecting these precious shells.

If the survey proves that commercial farming could be undertaken, then an official request will be made to the Government for an expert to make further studies and recommendations on how to go about it. It is known in Kiribati that mother-of-pearl shell and giant clams are plentiful at Abaiang lagoon, but they never reach maturity because they are fished out when young for their delicious meat and making fishing lures to catch tuna. At a recent sitting of Parliament, Abaiang was endorsed as the best possible site for a commercial project.

UNITED STATES AIDS SOLOMONS' FISHING INDUSTRY (Source: The South Sea Digest)

The United States Government has made a grant of SI\$ 900,000 (about US\$ 360,000) to Solomon Islands for the establishment of fishing and fish marketing centres in the country's seven provinces.

Four fishing centres will be upgraded at Korovou, Shortland Islands (Western Province), Marau (Guadalcanal), Star Harbour (Makira) and Lavangu, Rennell Island (Central). Two new fish market centres will be built in Malaita and one in the Reef Islands in Temotu Province, and another at Kaolo will be transferred to Buala in Isabel Province. There will also be training courses for provincial and national fisheries officers.

FISHERIES PROJECT ESTABLISHES A BASIC DEVELOPMENT INFRASTRUCTURE IN ARNO ATOLL

(Source: Marshall Islands Journal)

Located some 10 miles off Majuro, Arno Atoll, like Majuro and Ebeye, has only taken the first step in basic fisheries infrastructure development. But a fisheries pilot project is well on the road to completion and is changing the face of Arno. Arno Atoll has been noted for its lead in copra production in the Marshalls over the years. Now, with Japanese assistance, the people are starting to market fish in Majuro.

Currently, there is a great deal of construction going on there in preparation for the fisheries pilot project. Landing jetties, causeways (which will connect Arno and Ine Island), docks, buildings that will house the staff and support the project are under way. The first landing jetty (on Arno) is completed, with just some finishing touches needed, while the first causeway is well under construction. As soon as the construction in Arno is completed, the team will move on to Ine Island (part of Arno but separated by a channel). There, the team will construct the same infrastructure as at Arno.

While construction is under way, the delivery of fish from Arno to Majuro has been happening since late 1989. So far more than 50,000 pounds of fish — including tuna and bottomfish — have been 'exported' to Majuro for marketing.

However, Resources and Development officials said the catch has declined in the last several months due to the change in season. The winter period around the new year tends to bring more

catches than summer, the officials noted. But, they said, this does not mean that there are no fish to be caught at this time of year.

The project is funded by the Government of Japan through the Government of the Marshalls. The Japanese contractors are stationed at the project site. The Overseas Fishery Cooperation Foundation is responsible for providing assistance in marketing the fish, and the Kajima Corporation is the main contractor for the construction work in support of the fisheries project (PII/McConnell Dowell Joint Venture is the sub-contractor). Both are working under the Marshall Islands Marine Resources Authority to make the project possible.

According to Hiroshi Furukawa, the project manager working on the construction, they are expected to have the fishing base ready by March 1991. This will allow the people of Arno Atoll the opportunity to exchange fish for money rather than relying entirely on the backbreaking job of copra-making.

In reality, Arno Atoll is setting the pace for the Marshalls in promoting fisheries development. This has great potential for improving the local economy of the Marshalls.

SEAWEED MANIA SPREADS IN KIRIBATI

(Source: Marshall Islands Journal)

The cultivation of seaweed is spreading across Kiribati fast. In the latest report, it is revealed that Aranuka in the Central District is the latest island to look seriously at seaweed farming.

Neighboring Abemama Island supplied six bags of seaweed for new farmers on Aranuka. The fisheries officer on Aranuka distributed it to interested farmers and the officer has now had to order more because apparently nearly everybody wanted to grow seaweed.

Progress on the first lots is encouraging and the officer is quite confident that it will grow very well at Aranuka lagoon, and that people will attend to it more than to copra-cutting.

A report from Aranuka suggested that people seemed be less interested in copra-cutting because of recent reductions in the copra price. Aranuka people have heard stories about people on Abaiang collecting more than 500 dollars from their production of seaweed.

However, there is a problem with overseas marketing. Most of the seaweed grown on Abaiang and other islands is presently accumulating at Betio Port.

TWO NEW SKIPJACK TUNA BOATS DELIVERED

(Source: Fishing Boat World)

The Government-run Fiji Marine Shipyard is rapidly gaining an excellent reputation as a reliable manufacturer of high quality fishing and cruise vessels for local and international buyers. At a time when many shipyards are cutting back, it is considering expanding to cope with increased demand.

The yard is in the final stages of building two 28.65 m vessels for Fiji's Government-owned fishing company, taking to six the number of skipjack tuna fishing vessels built at the yard in recent years. It has built four boats in 1990 and won seven major contracts worth F\$ 35 million from international tenders, with options worth another F\$ 27 million.

Shipyard General Manager, Apenisa Naigulevu, said although there was a chain of work until 1992, the yard was still under-utilised. He has launched an international marketing campaign,

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aiming to enter the lucrative Australian markets for cruise and fishing vessels and to capitalise on the yard's reputation as a reliable supplier to the smaller Pacific Island nations.

The yard broke into the Australian fishing market recently with an order, won on international tender, for a F\$ 700,000, 20 m prawn trawler for Sonar Ship Brokerage of Cairns. Naigulevu expects the job to generate a flood of orders from the Cairns and Gulf of Carpentaria fishing and prawning fleets. He claims the yard is so cost-competitive that a prawn fisherman would make a profit if he sold his old vessel in the Mediterranean and built his new one in Figi.

The yard's reputation and its central location in the South Pacific are also drawcards for small Island Governments developing their burgeoning, and lucrative, tourism and fishing industries. Naigulevu is confident of getting several orders for fishing boats along the lines of its skipjack tuna boats and hopes to tie up an order for two fishing vessels for Tonga which will be funded by the Asian Development Bank. He added that the Fiji Marine Shipyard's major advantage was that it could deliver quality vessels far below the cost of similar-sized yards in Australia, New Zealand and Singapore.

The yard has the most modern facilities in the South Pacific outside Australia and New Zealand, and uses the strict Japanese quality control IHI system. Quality has to be maintained because vessels funded by overseas aid, particularly European Community and Australian aid, must fulfil the strict quality standards of those countries. The yard uses the ILO safety and health policy for ship construction.

The yard has 250 employees, including a management team of 37 civil servants, 108 skilled workers, 65 indirect workers and 40 apprentices. It uses its own version of block construction and has a 35-tonne gantry straddling two slipways: one capable of building ships up to 1,500 tonnes, 76 m length and 11 m breadth; the other up to 1,000 tonnes, 61 m length and 9 m breadth.

The yard has a timber section, engineering section, engineering section, mould shop, steel section prefabrication shop, drawing office and outfitting jetty. Although it has a naval architecture section, customers usually bring their own designs. Naigulevu said he is willing to be flexible in adopting and modifying new ship construction techniques to suit the buyer. The yard is capable of building and fitting using its own resources, except for the refrigeration, electronic and electrical fittings, which are done on a sub-contract basis by companies in Suva. The aluminium and steel are imported from Europe to meet EC standards. The yard also has three repair slipways and a 120 m repair wharf taking ships up to 1,000 tonnes—and an excellent reputation as the repair centre of the South Pacific.

Naigulevu is trying to emulate the Japanese system of shipbuilding. The Japanese Government's aid organisation, Japanese International Cooperation Agency (JICA), has funded four Japanese experts to provide management, production, technical and financial advice over the next few years.

Naigulevu's approach to personnel management is to look at the best way of utilising each worker's talents and he emphasises the Pacific Way of **talanoa** — sitting down and talking out problems. He has implemented the Japanese practice of exercises before work and after lunch. Naigulevu has also introduced the Japanese quality circle concept where workers have the opportunity to discuss their workplace and work methods and suggest improvements.

Naigulevu bases the yard's fishing vessel expertise on the six skipjack tuna boats it has built for Fiji and Kiribati in the past seven years. He says similar boats are used in Australia, and other Pacific nations, because they suit the same lifestyle.

Ika 9 and *Ika 10*, the two F\$ 3.4 million skipjack tuna boats shortly to be handed over to the Ika Corporation, the Fiji Government's fishing corporation, are the latest in a line of small-scale economic pole and line boats that have been evolved in Fiji.

The idea was originally conceived by Graham Southwick (then General Manager of the Ika Corporation) and Robbie Stone to develop a smaller, lower-powered ship to replace the big fast Japanese vessels that were proving expensive to run and maintain. The first design was prepared by Chris Williams of Queenscliff, Victoria, Australia. The Chris Williams design built by Fiji Marine Shipyard as *Ika* 7, was altered and a second ship *Ika* 8 built. The Williams design was also modified by Carpenters Industrial of Fiji and built as *Independence*, which has been a very successful vessel.



View of the *Ika 9* and *Ika 10*

The experience gained from *Independence* and *Ika* 7 and *Ika* 8 was used by Colin Dunlop and Associates of Suva to modify the design yet again for the construction of two vessels for Kiribati, *Moaika* and *Baeau*, funded by the European Community and built at the Fiji Marine Shipyard.

Ika 9 and *Ika 10*, also designed by Colin Dunlop and Associates, are an original design based on the *Independence* concept of avoiding the expensive, fuel-inefficient Japanese boats. Dunlop said the design was probably the ultimate in the evolution of the Ika boats, and followed extensive discussions with all parties involved in the operating and running of the boats. They have features of the earlier Ika and Kiribati vessels, and also incorporate other improvements. He said they would be bigger, slightly faster (400 hp), able to tolerate more extreme weather conditions and carry more fish than their predecessors.

The Fiji Marine Shipyard launched its first boat in 1930, and built for the Government until the early 1980s when its ship building programme was completed. Rather than close down, it expanded to take commercial orders, and now pays for its own labour force. The other ships on the yard's book are a 38-metre catamaran cargo carrier for an Australian company, a 73-metre luxury cruise boat for an Australian operator with an option for two more, a 52-metre cruise vessel with the option for two more for Pacific Navigation Ltd. which is registered in Vanuatu, two 48-metre cruise boats for Fiji's Blue Lagoon Cruises and the 20-metre prawn trawler.

The Government is investigating changing the yard's status from a part of a Government department to a commercially oriented autonomous Government corporation.

Over its 60-year history, the yard has built fishing boats, motor launches, tugs, motorised landing craft, pilot vessels, tourist and passenger boats, motor vessels and barges, cutter suction craft, piling pontoons, push and submersible barges, and navigation vessels.



View of the deck of Ika 9

PNG FISHING COMPANY WANTS BIG CONCESSIONS (Source: South Sea Digest)

The Papua New Guinea Cabinet has approved, in principle, a proposal by a joint venture company partnered by the AM-Group of West Germany (20 per cent), the national and provincial governments, James Barnes Meat Cannery of Madang and private shareholders for a huge fish-catching, processing and marketing operation by their company, Sealog (PNG) Pty Ltd.

But the Government has rejected its application for concessions which would include unrestricted repatriation of all foreign investment, interest, royalties, management fees and dividends.

The concessions were estimated to be worth K 296 million (about US\$ 304 million). A fish cannery would be established at Madang, and a number of subsidiaries would be involved in ship-building, fishing and marketing. The catch would be processed in mobile, floating factories off Manus, Kavieng, Rabaul, Kimbe, Madang and Wewak. The company said the K 70 million (about US\$ 72 million) fishing project would create about 570 jobs for Papua New Guineans and about 20 for expatriates.

FISHERMAN CATCHES BLUE MARLIN TO WIN

(Source: Marianas Variety News and Views)

Eduardo Usia emerged as this year's Grand Prize winner of the sixth Annual Saipan International Fishing Tournament held from 8 to 9 July 1990 at the Smiling Cove Marina. Usia, whose prize catch was a 135 kg blue marlin, won a 17-foot Sunbird SPL 170, a 70 hp Yamaha outboard and an E-Z Loader Trailer worth US\$ 18,500.

Usia, a neophyte in the competition, caught the marlin in his 14 ft fibreglass boat Sonia I. His winning entry was caught east of Tinian on the second day of the tournament. The tournament, which is an annual sporting event, attracts sportsfishermen from several islands in the area. Categories for the competition include billfish, yellowfin tuna, mahi-mahi, wahoo and skipjack tuna. A prize is also given for the total weight category.

For this year's competition, 64 boats competed, with seven entries coming from Tinian. The competition was organised by the Saipan Sports Fishermen's Association and was sponsored by the Commonwealth Development Authority (CDA), Marianas Visitors Bureau, Saipan Mayor's Office and the Division of Fish and Wildlife Resources.

FISHERMEN SURVIVE SEA ORDEAL (Source: Samoa News)

Four fishermen from Tonga arrived in Pago Pago harbour in August 1990 after drifting at sea for three weeks, surviving on the blood and flesh of a five-foot shark they caught during the ordeal.

Captain Steven Manoa and crew members Steven Fukafuka, Kauvaka Fusitua and Toa Hafoka, from Haapai, were fishing aboard the sailboat *Halatoaogo* when it lost engine power about 200 miles from the Vava'u group, according to Captain Manoa. He said that they tried to sail to Vava'u, but encountered 30-knot winds coming from the islands, pushing them further away.

The Halatoaogo carried a compass, but no charts or other navigational gear. Manoa added that after days of bad weather, he decided that it would be impossible to make it back to Tonga and. using the compass, attempted the passage to Samoa.

After a few days, the men caught a 100-pound shark and, for the next three days, drank its blood and lived off the flesh. After that they had nothing more to sustain themselves until they arrived in Pago Pago. The Captain said that they were lucky to encounter good winds when they finally sighted Tutuila, and were able to sail into Pago Pago harbour. They tied to a buoy and were met by a pao pao boat which gave them water and took a message ashore.

Harbour master Silila Patane said that he received a message over the weekend that a yacht had entered the harbour and that the crew wanted to come ashore. The men appeared to be in remarkably good condition, considering their ordeal. They were weakened and still exhausted, but grateful for the help they received.

It is expected that the engine will take two weeks to be repaired, as it suffered extensive damage from salt water entering it, ruining the starter motor and other parts. Captain Manoa said that the crew was happy with the treatment they received from all officials involved, and did not expect any problems while waiting for repairs to be finished so that they can make their way back home.

SEVENTH INTERNATIONAL CORAL REEF SYMPOSIUM

The Seventh International Coral Reef Symposium (7ICRS) will take place in Guam from 22 to 26 June 1992, with field trips to other islands of Micronesia during the weeks before and after.

The symposium is sponsored by the International Society for Reef Studies (ISRS), the Pacific Science Association (PSA), Wildlife Conservation International (WCI), the University of Guam, several departments of the Government of Guam and a revolving fund initiated by the Organising Committee of the Sixth International Coral Reef Symposium.

For further information and other matters concerning the scientific programme and presentations, contact the 7ICRS at the Marine Laboratory, UOG Station, Mangilao, Guam 96923, USA. (Fax: (671) 734-6767; telephone: (671) 734-2421; telex: 721-6275).



'INTRODUCED AQUATIC ORGANISMS IN THE PACIFIC BASIN' TECHNICAL SESSION

The Hawaii Chapter of the American Fisheries Society has begun planning for a one-day technical session on *Introduced aquatic organisms in the Pacific Basin*, to be held during the XVIIth Pacific Science Congress, probably on Saturday 1 June 1991.

The session is co-sponsored by the University of Hawaii School of Ocean and Earth Science and Technology and the University of Hawaii Sea Grant, the U.S. Fish and Wildlife Service Pacific Islands Office, the National Marine Fisheries Service Pacific Area Office and the NMFS Honolulu Laboratory, and the Western Pacific Regional Fishery Management Council.

For further information about the technical session, please contact Dr James Parrish, FSW Hawaii Cooperative Research Unit, University of Hawaii, 2538 The Mall, Honolulu, HI 96822, USA (tel: 808-956-8350), or Ms Linda M. Paul, 815 Pahumele Place, Kailua, HI 96734, USA (tel: 808-262-6859).

FISHERIES SCIENCE AND TECHNOLOGY

ATHLETIC TUNA GRAB INTEREST OF SCIENTISTS (Source: Pacific Magazine)

Scientists from the United States, Canada and New Zealand gathered at the Honolulu Laboratory's Kewalo research facility recently to conduct co-operative studies on skipjack tuna. Among other things, tuna are considered to be the ocean's most impressive athletes because they can use energy and recover from the effects of exhaustive exercise about 10 times faster than any other fish species.

'Understanding this remarkable aspect of tuna biology was the focus of the co-operative research', said Richard W. Brill, co-ordinator of the project and a fishery research biologist with the laboratory.

Tunas form the basis of Hawaii's largest and most valuable fishery and are one of the most valuable fishery resources in the world. The world wide tuna catch is worth more than three billion U.S. dollars annually. The value of tuna caught by local fishermen is almost twice that of all Hawaii's other commercial fisheries (which include lobster, bottomfish and other pelagic species such as billfish) combined.

'The benefits of the research include a better understanding of the physiological processes that affect tuna movements, distribution and abundance, as well as developing solutions to practical problems such as "burnt" tuna', Brill said.

Burnt tuna occurs most often in fish caught by handline or rod and reel and rarely occurs in fish caught by longline. Therefore, burnt tuna is found most often in fish that struggle a great deal during capture. Recent studies by scientists from the Honolulu Laboratory and University of Hawaii's Department of Physiology imply that possible strategies to mitigate burnt tuna might involve allowing fish to recover before they are boated. How, and how quickly, tuna recover from severe exercise are important questions.

To find the answers, the scientists examined the physiology of tuna hearts, which are several times larger than those of other fish; the ability of tuna to recover from exhaustive exercise; and the biochemistry of their skeletal and heart muscles. The group performing the physiology studies was headed by Tony Farrell of the Department of Biology, Simon Fraser University, Vancouver, British Columbia. The biochemistry group was headed by Peter Hochachka of the Department of Zoology, University of British Columbia.

Farrell's group examined what tuna hearts can and can't do and how important blood circulation is in the heart muscle itself. Some studies used a perfusion machine in which tubes with solutions, such as saline, were inserted directly into a tuna heart. A perfusion machine allows scientists to control a fish's blood pressure, for example, and to monitor how its heart responds when blood pressure is increased or decreased.

Farrell's group also tried to determine the normal blood flow rate of tuna and what mechanisms control how the heart muscle contracts. On the basis of their preliminary results, it appears that tuna hearts are more similar to mammalian hearts than to those of other fish.

The scientists also examined how calcium promotes heart contractions by activating a protein. Conducting such studies on a biochemical level will help scientists understand why tuna heart rates are more similar to those of mammals than to those of other fish species. This conclusion was echoed by Hochachka's group, which looked at how tuna recover after heavy exercise.

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'I have looked at trout, which take 12 to 14 hours to recover from exercise, whereas tuna are about 10 times faster', said Peter Arthur of UBC's Zoology Department. 'Tuna recover so quickly. They may be as fast as human beings.'

In some studies, Hochachka's group measured glycogen, lactate and other biochemicals to gain insight into how tuna replenish their energy so quickly. Glycogen is stored in the muscles and during exercise is metabolised to lactate in white muscle. When glycogen is depleted and lactate builds up, fish must 'refuel' with more glycogen. Tuna apparently are able to 'refuel' very rapidly whereas other fish species are thought to be slow refuellers.

Besides studying the biochemistry of the skeletal and heart muscles, the scientists also examined the relative ability of skeletal muscle, cardiac muscle and liver in aiding tuna in recovery after severe exercise. In one study, scientists isolated groups of tuna liver cells. The liver is one of the major organs that may be involved in re-synthesising glycogen in tuna after exercise.

The facility is the only laboratory in the world where tuna are maintained in shoreside tanks for research. The laboratory has had an active tuna research programme for almost 30 years and regularly hosts visiting scientists from around the world. It also serves as an animal holding facility for local scientists and has been the site of important research on everything from endangered species (e.g. the Hawaiian monk seal and the green sea turtle) to lobster and bottomfish.

ICE-MAKING MACHINES FOR SMALLER FISHERIES STATIONS (Source: Nordon Pty. Ltd.)

A wide range of ice-making equipment for use in the fish and poultry industries is produced by Nordon Pty. Ltd. whose manufacturing base is in Adelaide, South Australia. The firm is engaged in producing ice-making machines for all applications involving food preservation and cooling. According to Nordon's Managing Director, Mr Donald Garvie, up to 90 per cent of its production is sent overseas.

In March 1984, the company embarked on a programme to develop a new range of block icemakers, which would provide durability, long life and reduced weight and outlast conventional ice-makers many times over. Earlier in 1990, the ice-makers were redesigned to use an environment-friendly refrigerant gas to help reduce ozone depletion. All Nordon ice-makers have a fibreglass brine tank, thus eliminating the corrosion problems which dramatically reduce the life of ice-makers with steel tanks.

The packaged, self-contained construction permits the ice-maker to be transported easily to remote, hard-to-get-at locations, and does not require the services of a highly skilled technician to start it. Nordon ice-makers are supplied with salt, ice moulds, dust cover, hydrometer and instruction manual. All that is required on site is the mixing of the salt with water to make the brine solution and connection to the power supply.

The ice-maker can operate using either calcium chloride or sodium chloride brine solution, but sodium chloride (common salt) is recommended because it is generally readily available and costs less than calcium chloride.

Three sizes of block ice-makers are available, '150', '400', and '800'. They produce 150 kg, 400 kg, and 800 kg of ice respectively in 24 hours using 21°C water in a 31°C ambient temperature. Ice is harvested every 11 hours, in which time the model '150' produces eight 9 kg blocks, the '400' twelve 16.5 kg blocks and the '800' twenty-four 16.5 kg blocks.

As standard, all ice-makers are pre-wired ready for connection to a 240 volt or 415 volt, 50 Hz AC electrical power supply. However, the 400 and 800 models can be supplied to suit other electrical requirements, and if necessary can be factory-adapted to operate by diesel engine.

The ice blocks are produced in durable galvanised steel moulds specially designed to allow easy release of the blocks when freezing is complete.

The largest market for Nordon's output of course is the processing sector. Mr Garvie believes that there is still a general under-use of ice for general cooling, but that will develop as more machines are put into service. He considers that the small-scale fisherman could improve the quality and economy of the catch with the use of ice at the rate of 1 kg of ice for 1 kg of fish. The model '150' block ice-maker shared by three or four fishermen would pay off.

For those processors that require crushed ice, Nordon produces a block-ice crusher which can crush up to sixty 16.5 kg blocks per hour. The crusher is powered by a 240-volt electric motor.

For further information, contact: Nordon Pty. Ltd., 15 Winding Bay, Belair, Adelaide, South Australia 5052 (tel: (61-8-278-1978; fax 61-8-278-5081)).



The 'Nordon 150' block ice machine

CAMPAIGN PROMOTES FISH AS HEALTHY (Source: Professional Fisherman)

The Fish Marketing Authority of New South Wales has launched its largest-ever advertising campaign to promote the health benefits of eating fresh fish to the public. The *Health fish fest* campaign, which was expected to stimulate sales at retail level, ran until 1 August 1990.

Traditionally sales are slower and supply of fish is high at that time of year. Television advertising on the Nine Network, Sydney, placed mainly during the daytime, was the main component of the campaign. Channel Nine's TVC Productions produced the television advertisement and the campaign was co-ordinated 'in-house' by the Authority. It was the first

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time that the Authority had utilised television for an intensive promotion. An endorsement by leading nutritionist, Rosemary Stanton, of the need to eat more fresh fish for good health, was featured in the advertisement, and consumers were directed to their local fish retailer for a free 'Health fish fest' recipe booklet.

The booklet contains results of the Authority's recent analysis of fish species, information on Omega 3 fatty acids found in fish, and a variety of low-fat recipes. This campaign was unique in that members of the Master Fish Merchants Association of New South Wales, mainly buyers from Sydney Fish Market, voted to contribute to the campaign by applying a A\$ 140 levy per member. This will generate funds of over A\$ 25,000, which will be allocated for a supporting advertising feature in the *Daily Mirror* and point-of-sale material.

Authority Promotions Manager, Annette Forrest, said that national seafood promotion was non-existent in Australia, but the Fish Marketing Authority in New South Wales was the most active of all the State authorities in promoting local fish and shellfish. Ms Forrest said that it shows great potential when seafood retailers, fishermen and government authorities can work together for the promotion of the wonderful seafood resources.



THE MYSTERY OF THE 'O' FISH

by

Robert Gillett FAO/UNDP Regional Fisheries Support Programme Suva, Fiji

In Tokelau much of the fishing lore revolves around a fish called 'O'. It is a small reddish fish, perhaps 3 to 5 cm in length. Occurring in vast quantities outside the reef on a predictable lunar schedule, it is important as a food source, an object of communal fishing, a factor in planning pelagic fishing strategy, and a determinant of tuna behaviour.

Information obtained from masterfishermen at Fakaofo Atoll indicate that 'O' are frequently present in vast quantities on the 23rd to the 25th days of the synodical lunar month in the areas seaward of the reef and in the open ocean. It is generally agreed that there is a remarkable increase in the amount of tuna schools in the area when aggregations of 'O' are present. Skipjack feed with vigour on the schools of 'O' and pearl shell fishing for skipjack is usually very successful near the 'O'. The 'O' can be scooped up by large nets. MacGregor (1937) describes the 'O' and aspects of its fishery. Sperling (1978) mentions the importance of 'O' in determining tuna behaviour in Tokelau. Hooper (1984) discusses the type of net used for 'O' at Fakaofo, Gillett (1985) discusses 'O' in relation to tuna fishing.

There are indications that 'O' are important in other island groups. Kennedy (1930) relates that in Tuvalu 'O' are important and that they affect tuna behaviour. M.Batty (pers. comm., 1985) confirms the importance in Tuvalu of the small red baitfish known as 'O'. Ledyard (1974) relates that a fish known locally in Vava'u, Tonga as 'O', occurs occasionally in vast quantities and is scooped up by the bucketful. Fishermen from Nukuoro Atoll south of Pohnpei in Micronesia tell of a small reddish fish called 'Malu O' which occurs in large numbers on a lunar cycle in the open ocean.

The peculiar feature of all the above information on 'O' is that the fish itself had **never** been taxonomically identified. Furthermore, it would seem that, if the fish was abundant enough to be so important, procuring a specimen would be a simple matter. This has proven not to be the case. Although well aware of the importance of 'O' in Tuvalu fishing lore, M.Batty (pers. comm., 1985) writes: 'I have now spent over 90 days at sea spread over seven months of the year catching more than 2,000 skipjack and tunas without ever seeing this 'O' creature'. Attempts were made during a two-month period in 1985 to obtain an 'O' sample from Tokelau without success. Finally, a reward for an 'O' fish was offered to the residents of Tokelau in early 1986. Four years later a sample of a dozen 'O' was received and forwarded to J.Randall at the Bishop Museum.

The specimens were identified as the damselfish (*Lepidozygus tapeinosoma*, Bleeker), a very common shallow-reef fish. G. Allen (pers. comm., 1990) indicates that this fish is the only representative of the genus *Lepidozygus* and that it is distributed from East Africa to the Tuamotu Islands in French Polynesia (Allen, 1975). Adults inhabit lagoons and outer reef slopes at a depth of 5 to 25 m while the larvae have a pelagic duration of about 25 days (Thresher et al., 1989). Randall (pers. comm., 1990) indicates that the samples from Tokelau are at a post-larval stage of development.

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Juvenile preserved samples of the elusive 'O'

by

Paul Dalzell, South Pacific Commission, Noumea, New Caledonia, Steve Lindsay, Zoology Department, James Cook University, Townsville, Australia and Helen Patiale, Fisheries Division, Tuvalu

Niue is a small solitary island, lying about 400 km due east of Tonga and is the result of two tectonic uplifts of what was originally a coral atoll. The island is self-governing whilst remaining in free association with New Zealand. Niue is surrounded by sheer coral cliffs that rise to between 20 and 30 m above the sea, whilst the highest point on the island is about 60 m above sea level. At sea level there is a narrow wave-cut platform around the island covered with coral that is analogous to a true fringing coral reef. Beyond this 'reef' the coastal shelf falls away rapidly to abyssal depths (≥ 1000 m) although there are a few ridges and seamounts approximately south-west of the capital, Alofi.

The rugged nature of the coast has limited fisheries development on Niue and despite several fisheries development projects in the past on the island, most fishing operations continue to be pursued from one-man canoes and outboard-powered dinghies. The SPC successfully demonstrated and introduced deep slope snapper fishing with the Samoan-style hand reels, although this is pursued by only a few individual professional fishermen. Most fishing activities on the open sea are directed towards catching large pelagic species by trolling or by midwater handlining. The main target species are wahoo (*Acanthocybium solandri*), yellowfin tuna (*Thunnus albacares*) and skipjack tuna (*Katsuwonus pelamis*). Fishing on the reef is targeted at a variety of reef-dwelling species including mullets, surgeonfish, wrasses and soldierfish. As in other Polynesian islands fishing with scoopnets is practiced at certain times of the year for flying fish and catches are also made of the small scads, *Selar crumenophthalmus* and *Decapterus* spp., by jigging with handhines.

This fisheries resources survey of the island of Niue was carried out jointly by the SPC Inshore Fisheries Research Project and the FAO South Pacific Aquaculture Development Programme. The survey was set three main objectives:

- 1. To review all the existing information, published and unpublished, on the fisheries of Niue and to incorporate observations on catches, catch rates, species composition and fishing methods into the final report.
- 2. To conduct a comprehensive fisheries resource utilisation questionnaire survey amongst the population of Niue, to assess the commonest fishing methods, to identify the proportion of the catch from the reef and the deep sea and to determine which were the commonest species caught by a particular gear.
- 3. To make an assessment of the stocks of giant clams and other commercially important invertebrates on the reefs of Niue, such as beche-de-mer and lobsters, assess the sociocultural importance of clams in the diet of Niueans and assess the potential of clam aquaculture in Niue.



A typical one-man outrigger canoe built on Niue. Note the thin shell of the hull and the carrying handle extending at a slight diagonal across the outrigger frame. This assists the fisherman to carry the canoe up and down the steep cliff paths which provide access to the sea.

Besides these main objectives, the survey was asked to look at the feasibility of introducing the top shell, *Trochus niloticus*, to the reefs of Niue. The shells of this and other large gastropods such as green snail (*Turbo marmoratus*) are currently in demand by the garment and furniture industries in Europe and Asia. Trochus was successfully introduced into the Cook Islands, Tokelau and Tuvalu, and is harvested commercially in Aitutaki (Southern Cook Islands).

The survey team consisted of Paul Dalzell of the Inshore Fisheries Research Project, Steve Lindsay of James Cook University (contracted by FAO for this survey), and Helen Patiale of the Fisheries Division, Tuvalu.

Estimation of the giant clam abundance was made from a small dinghy that towed two observers equiped with masks and snorkels. The observers counted all clams that fell in their transect as well as enumerating other invertebrates such as beche-de-mer, crown of thorns

starfish and the extent of total and live coral cover. Only two species of giant clam, Tridacna maxima and T. derasa, were found at Niue, the commonest of which was T. maxima. Fifty specimens of T. maxima were measured at three sites on the west coast of Niue to obtain the size frequency distribution of this species. Measurements were made underwater with calipers by divers equipped with scuba gear. No size measurements were made on the east coast due to the rough seas on the windward side of the island. The number of tow transects along the east coast was also limited due to the sea condition.

Estimates of total and live coral cover were assessed because Niue had been hit by Cyclone Ofa during January of that year (along the western coast of the island the waves were high enough to wash over the 30 m cliffs). Crown of thorns starfish, which have caused extensive damage on the Australian Great Barrier Reef, were present at Niue, but only nine adults were observed during dives. The commonest beche-de-mer species on the intertidal reef was *Holothuria atra*, which has little commercial value. On the sub-tidal reef, *H. atra* was co-dominant with *Thelenota ananas* which is a commercially targeted species but was present in only low densities at Niue.

Dives at night to catch reef crustaceans revealed that three species of spiny lobster or crayfish (*Panulirus penicillatus*, *P. longipes* and *P. versicolor*) were present on the reef. Other crustaceans taken included the reef crabs *Carpilius maculatus* and *Etisus splendidus*, and the slipper lobster, *Parribacus caledonicus*. From the diving surveys, and from information from a Niuean fisherman who specialised in catching lobsters, the commonest species taken on Niue are *P. penicillatus* and *P. longipes*.

Records of deep-bottom fishing, troll fishing, mid-water handline fishing and scoop netting for flying fish were available from commercial and subsistence fishermen on Niue. Another good source of fishing data was the records of fishing operations by the Fisheries Division's 8.5 m *Alia* catamaran. Many of these were destroyed when Cyclone Ofa ravaged the Fisheries building but a complete set of data was still available for 1986. The records of fishing operations by the SPC masterfishermen during their three visits to Niue were also incorporated into the data collected by Niuean fishermen. From these different data sources it was possible to estimate catch rates for different methods of fishing, and describe the catch composition and the seasonalities of the different fisheries.

The resource survey questionnaire study revealed that Niueans consume fish from the waters beyond the reef in about equal numbers to those from the shallow reef area. The commonest methods of fishing on Niue are hook-and-line fishing with handlines, reels for deep slope fishing, rod and lines and trolling. Net fishing, apart from the use of scoop nets to catch flying fish, is not commonly practised. The survey also showed that reef gleaning activities such as collecting shellfish and other invertebrates are commonly practised. Catch rates for different fishing activities on coral reefs are not known, nor were any records available for small pelagic catches other than for flying fish.

Total fisheries production on Niue was estimated empirically using data obtained by a 1987 SPC nutritional survey. Total fisheries production was estimated at about 115 tonnes per year, although this is acknowledged to be only a first estimate based on ancillary data. If correct, it suggests that Niue's reef fisheries resources are exploited reasonably heavily, with a total yield from the 6.2 km² of 9.3 t/km². Most of Niue's catch comes from subsistence fishermen for whom records of fishing activities are very limited at present. Further observations on the average size of catches are needed to verify the initial estimate of total production.

Examination of the reef shelf at Niue suggested that it might provide a suitable environment for trochus, if this species were introduced to the island. Based on trochus fisheries elsewhere, the potential yield was estimated empirically to be about 65 tonnes per year. It was concluded that the potential of culturing clams in Niue was limited due to the absence of a lagoon and hence of suitable protected environments for juvenile grow-out. It was suggested that at present the Fisheries Division in Niue do no more than obtain juvenile clams from either Tonga or the

Cook Islands and proceed with small scale experiments for the suitability of clam culture in sub-tidal protected areas.



Rendezvous at sea between a private fisherman in an aluminium dinghy and the 8.5 m *Alia* catamaran belonging to the Fisheries Division. Note the tail of a specimen of *Etelis coruscans*, caught by bottom fishing, to the left of the photograph.

The commercial beche-de-mer resource of Niue is practically non-existent, given that there is no demand for *H. atra*. Lobster fishing might offer some potential for limited expansion but only to satisfy local demand and the demand from Niueans living in New Zealand. This latter 'market' absorbed approximately five tonnes of fish, exported from Niue as passenger luggage, when direct flights existed between the island and New Zealand. Similarly it is estimated that two tonnes of coconut crabs were exported in the same manner to Niueans resident in New Zealand during the periods of direct flights. Direct flights between Niue and Auckland were discontinued during 1988 but commenced again during July 1990. A significant volume of fish and marine products can thus be expected to be exported from Niue as long as flights persist.

About 2,260 people live on Niue, 2,000 of whom are Niuean, whilst the remainder is made up of various Pacific Islanders and some expatriate New Zealanders. In the past, the population of Niue has been as high as 5,000 people, but nevertheless the present population generates a significant demand for fresh fish and shellfish. The rugged nature of the coastline of Niue and the lack of a protected small boat harbour led initially to the tradition of small light canoes that could be carried down the cliff tracks to be launched. Subsequently these have been joined by small 12 to 14 ft aluminium dinghies and 15 hp motors that can be easily manhandled for the same reasons. The restriction of fishing to these vessels naturally limits the fishing activities pursued on Niue, but at the same time subsistence and commercial fishing are able to satisfy a large part of the demand for fresh fish.



An example of the 12 ft (3.7 m) aluminium dinghy that is commonly used for fishing on Niue. This vessel has been equipped with two Samoan-style wooden handreels, used for both bottom fishing and trolling.

Finally, what management strategies, if any are required, for Niue's fisheries? The level of exploitation on the deep slope snapper stocks and the large pelagic stocks is unlikely to have any significant impact at present levels of exploitation. Fishing pressure on the reef stocks can only be inferred indirectly from an empirical estimate of total production. Given the uncertainty in this area it would be prudent to divert some attention to quantifying the reef production directly, although given the constraints of fishing it is unlikely that reef fish and shellfish stocks are overfished. With respect to giant clams, a separate questionnaire survey of Niueans revealed that clams are not regarded as a staple but as a condiment to be eaten infrequently. Although the densities of *T. maxima* are low compared with other places in the Pacific, the rate of consumption is not high enough to threaten resident stocks seriously. Stocks of *T. squamosa* are low enough, however, to warrant some some minor management intervention, in this instance collection and positioning of adult clams in circles to increase spawning and recruitment success. These recommendations and others were contained in a report to the Niuean Department of Agriculture, Forestry and Fisheries at the termination of the survey.

FISHERIES TRAINING CENTRE IN VANUATU

by

Simon Maeva, Training Officer, Fisheries Training Centre, Vanuatu

Background

Prior to Independence in 1980, fishing activities in Vanuatu were very limited and those that existed largely restricted to the reef areas. Little fishing, if any, was done outside reefs in deeper waters. After Independence, the Department of Fisheries was established to look into the possibility of further developing fishing in this country.

During this period, the Government of Vanuatu gave priority to the development of the previously non-existent coastal fishery. The village fisheries development programme (VFDP) was established in 1982—1987. This programme set out to develop the coastal fishing activities of the rural population.

As a follow-up to this, the Department considered it appropriate to consolidate the nowestablished coastal fishery and therefore decided to set up a Fisheries Training Centre.

Buildings

The Fisheries Training Centre is a purpose-built block of three buildings whose construction was funded by the European Community:

- --- Building 1: accommodation and self-catering facilities for up to 3 visiting tutors,
- Building 2: two large class-rooms and office,
- Building 3: accommodation and self-catering facilities for up to 16 trainees.

The Training Centre, at Melcoffee in Espiritu Santo, provides training courses for both Extension Service staff and fishermen in need of technical training. The Centre works closely with the Extension Service in the planning and implementation of the training.

Training programme

Training is directed at three target groups who attend the Training Centre for varying types of training:

- People with no fishing experience who request training in order to establish a fishing project. These are given a month of elementary training and fishing experience and later go on to use a Fishery Department boat under a leasing scheme. Those who prove to be good fishermen are then selected to receive further assistance from the Fisheries Department;
- Established fishermen who need further in-depth training in a particular subject. This training is particularly important for any fisherman wanting to upgrade his operation, for example by running a larger boat and making longer fishing trips;
- Fisheries Extension Officers, who receive either basic or more advanced training from the Centre, depending on their level of experience. A Training Manual for Extension Officers is being prepared by the Training Centre.

Training boats

The Training Centre operates a fleet of up to three boats to give trainees practical experience under the guidance of an experienced Instructor Fisherman. These boats are essentially self financing, with running costs being met by selling the fish caught on the training trips.

Benefits to Vanuatu

- Only the more successful of the new trainees will be selected to receive further assistance from the Fisheries Department, thereby reducing the waste of government time and money on the less committed.
- Part-time fishermen can be directed to the size and type of boat suitable to their needs, thus reducing the number of fishing projects that collapse because their boat is too expensive to run.
- Potential full-time fishermen can be directed to the size and type of boat most suitable to their needs and receive appropriate training in the use of these boats.
- A cadre of trained, committed Extension Officers will be built up to promote fisheries development throughout Vanuatu.

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TTEM

- 1. Engine continuous rating 20-30hp, 3:1 reduction.
- 2. Propeller maximum diameter 600mm (24ins). Propeller shaft. length 2500mm. Stern tube length 20000mm between flanges.
- 3. Fuel tank 150 litres. Extra fuel in jerry cans.
- 4. Hydraulic steering with emergency filler.
- Icebox aft, net volume 1.35m³. Insulatian 100mm. Fish capacity 620kg. Fish/ice 2:1.
- Icebox forward, removable far access to emergency handstart of engine. Net volume 0.44m³, insulation 100mm.
- Anchar rope storage, selfdraining. Main onchor, fisherman type or similar, 20kg. Additianal anchor 10kg. Fishing grapnel 8kg. Chain ¾in, length 8m. For each anchor, anchorline 14mm, length 40m. Mooring lines 12mm, length 16m.

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- 8. All-round light, white.
- 9. Side lantern, red and green.

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- 10. Manual bilge pump, 0.7 litre/ stroke, filted with loose suction pipe for draining of fish boxes or bilge in engine room.
- 11. Fishing reels, FAO-Samoa type.
- 12. Mast, wood, diameter 115mm topered to 80mm at ends. Length 5.90m.
- Forestay and shrouds 4mm stainless 1 × 19. Total length 25m. Stainless thimbles.
- 14. Halyards, 10mm, 3-stand. Length 30m.
- Sheets 12mm, plaited. Length 25m.
- 16. Topping lift, lacing rope, 6mm plaited. Length 16m.
- 17. Single block, 12mm rope.

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16

Main 11m²

30% reef

Foot 3.95m loose

5

16

12

Tatal sail area 22m²

Jib 1¹m²

<u>30%</u> reef

- Single block with becket, 12mm rope.
- 19. Trolling booms, optional.

Foot 4.2m

-0

ARTISANAL FISHING CRAFT OF THE PACIFIC ISLANDS

3

South Pacific Commission SEAFOOD POISONING REPORT FORM

Please fill in the answers to the questions completely. Tick the boxes where appropriate.							
Details of person filling in report form:							
Name Job/ Position	_						
Contact address							
Date: Signature							
Poisoned person's details:							
Name Sex (M/F) Age (yrs)	-						
Address	_						
Details of the seafood that caused the poisoning: (tick all the boxes that apply)	_						
Type of food Where caught How preserved What eaten How eaten							
Fish River Fresh, no ice Head Unprepared (raw)							
Crab Mangrove Fresh, iced Flesh Marinated							
Lobster Beach Frozen Skin Cooked	▫▮						
Other crustacean _ Reef patch Salted Liver							
Gastropod* Lagoon Dried Roe D							
Bivalve* Outer reef Smoked Other organs How many others							
Other mollusc Open sea Pickled (specify) ate this meal?							
Other (specify) Other (specify) U felt sick?							
UUUUUU were admitted	—						
Unknown U Unknown U Unknown U to hospital?	—						
What is the local name of the seafood?							
What is the English name of the seafood?							
Name of vendor or restaurant (if bought)	—						
Name of place it was caught (if known)	—						
When did you first feel sick? Date Time							
* Gastropods are one-shelled seafoods like snails, trochus, conches, etc.							
Bivalves are two-shelled seafoods like clams, mussels, cockles, oysters, etc.							
Sumatown (figh all the bases that apply)							
Symptoms: (lick all the boxes that apply)							
Burning or pain when touching cold water Pin pricking sensation on touching water							
Tingling or numbress sensations Strange taste in mouth							
Difficulty or pain in urinating							
Difficulty in breathing Excessive salivation Fever or chills							
Difficulty in walking Excessive sweating Headache							
Difficulty in talking U Diamhoea U Joint aches							
Eye irritation	, L						
Medical data:							
Pulse Blood pressure / Pupils							
The core of death:							
Date of death Autopsy findings							
Other information							

Please return this form to:

Y

n

South Pacific Commission, P. O. Box D5, Nouméa CEDEX, New Caledonia

THANK YOU