



Fisheries

Newsletter

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Editorial

In this issue of the Fisheries Newsletter, our readers will find a report on the activities carried out by the various sections of the Marine Resources Division. William Sokimi, Fisheries Development Officer, began another round of duty travel to Samoa. The fisheries service of that country had asked SPC to provide technical assistance in evaluating the performance of new super alia-type longliners.

In May, the Training Section organised a workshop on seaweed farming in Vanuatu. There is currently growing interest in the region for this type of farming, mainly with regards to the species *Eucheuma cottonii*. The existence of a profitable market, the rapid maturation of this species (6 weeks) and the shelf life of the dried seaweed makes farming this plant very worthwhile for island countries in the region.

As for our friends in Oceanic Fisheries, the four on-board observers of the SPRTRAMP Programme have finally put away their slide callipers and forms after five and a half years of faithful service. All objectives were reached after 2,570 days at sea.

Finally, to close, Paul Dalzell of the Western Pacific Regional Fishery Management Council explains recent developments in longlining in Hawaii. The expansion of this fishery over the last few years, especially that targeting swordfish, has led to incidental catches of certain species protected by the Endangered Species Act.

I hope all this whets your appetite and that you are going to dive straight into this Fisheries Newsletter. As always, your comments on its contents are more than welcome.

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Gaffing albacore in Samoan waters, on board F/V Ulimasao

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SECRETARIAT OF THE PACIFIC COMMUNITY

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SPC ACTIVITIES

■ FISHERIES DEVELOPMENT SECTION

The second quarter of 2000 commenced with Fisheries Development Officer, William Sokimi, assisting the Fisheries Training Section with the running of the second regional course for fishing vessel skippers in Nelson, New Zealand. Twelve fishing vessel skippers from throughout the region attended this course, which focused on electronics for fishing operations and fishing vessel management.

Fisheries Development Adviser, Lindsay Chapman, travelled to Hawaii in early April for a series of meetings, which included the annual SPC/FFA colloquium, the Forum Fisheries Committee (FFC) 43 and some sessions of Multilateral High Level Consultation (MHLHC 6). Lindsay took this opportunity to meet many Pacific Island representatives, to look at work programmes for upcoming projects and have discussions on other areas where possible technical assistance is needed. Lindsay also met with some local fish processors and gear suppliers in Hawaii.

FAD work in FSM

Fisheries Development Officer, Steve Beverly, spent two months in the Federated States of Micronesia conducting FAD site surveys and FAD deployments. Three FAD site surveys were conducted in Yap State, using Yap Fresh Tuna's newly acquired second-hand Japanese longliner, F/V *Merwel* (Figure 1).

FAD site surveys and FAD site selections were done on the eastern side of Yap proper, near Peelack Pass, Goofnu Pass, and south of Tamil Harbour. Contour drawings were left with coun-

terpart fisheries officers at Yap Fishing Authority, who should now be able to conduct FAD deployments in the three positions.

The majority of Steve's time was spent in Kosrae, where two FAD site surveys and two FAD deployments were carried out. Close to ideal FAD sites were found west of Okat Harbour and south of Utwe Harbour. Areas of flat bottom were discovered that had previously been unknown to Kosrae's Fisheries Development Division.

FAD site surveys and FAD deployments were done using the division's vessel, F/V *Mutunte* (Figure 2), which was equipped with SPC's echo sounder and GPS plotter.

Indian Ocean type FADs, following guidelines in SPC's *FAD Manual volume II*, were deployed in both locations (Figure 3). The echo sounder and plotter were left on board F/V *Mutunte* so that Fisheries Division counterparts, trained in FAD site survey techniques, could complete survey work for all of Kosrae. Steve



Steve Beverly

Figure 1: F/V *Merwel*, recently acquired by Yap Fresh Tuna, Inc.



Steve Beverly

Figure 2: F/V Mutunte, the Kosrae Fisheries Development Division's vessel



Steve Beverly

Figure 3: Indian Ocean type FADs were deployed

will return to Kosrae later in the year to conduct a FAD fishing technique workshop, using the Okat and Utwe FADs.

Steve also spent a brief time in Pohnpei conducting an on-board fish handling workshop

for the Indonesian crew of Micronesian Longline Fishing Company's longline vessels. The workshop was held on board one of the boats after it returned from a successful fishing trip. The captain of the vessel translated from English into

Indonesian. Most crew members on Micronesian Longline Fishing Company Inc's (MLFC) twelve longliners, operating out of Pohnpei, are Indonesian.



Technical assistance to Samoa

William commenced a new assignment in Samoa in late April, following a request for assistance in assessing the performance of a new super alia tuna longline vessel, and familiarising the crew with the vessel and its equipment. The concept of the super alia was developed by the Samoa Fisheries Division, to try to overcome some of the problems encountered by fishermen using the small 9 m class outboard-powered *alias* (Figure 1).

The 9 m *alias* are the backbone of the tuna longline fishery in Samoa. However, with the development of the industry comes associated problems of sea safety, fish quality control, and crew comfort. Because of the increased number of 9 m *alias*, these vessels must now travel farther offshore to avoid congesting the immediate waters surrounding the islands, and achieve catches that will make their trip worthwhile.

Several mishaps have taken place in the past years prompting the Fisheries Division to play a leading role in guiding and assisting the industry.

To overcome these problems, the Fisheries Division hired a consultant to design and build locally a cost-effective vessel suitable for Samoan waters. The result was the *super alia*, a 12.2 m aluminium catamaran with twin diesel inboard engines, insulated fish holds, and the latest amenities for safely fishing and navigating. The *super alia* was designed by Arild Overa of Overa Maritime Trading Ltd and built by Mr. Roy Peters at the Hillbuilt boatyard at Vaitele, Apia. Table 1 summarises the specifications of the newly designed and built *super alia*, F/V *Ulimasao* (Figure 2).

William's initial work included setting up the hydraulic reel and line shooter for fishing operations, positioning setting and hauling blocks, installing the Radio Direction Finder and antenna, installing the marine radio, preparing fishing gear, and general preparing of storage space for fishing gears.



Lindsay Chapman

Figure 1: The 9 m class outboard-powered *alias*

Table 1: Specifications of the new *super alia*, F/V *Ulimasao*

Item	Specification
Length overall	12.2 m
Beam (each hull)	1.90 m
Beam overall	5.05 m
Tonnage	11.13 t
Fish Hold Volume	8 m ³
Ice Capacity	4 t
Engine Power	2 x 48 HP Yanmar 4LM
Speed Range	7–11 knots
Fuel Capacity	1,500 l (diesel)
Range	Up to 7 days steaming

Mainline reel and hydraulic system on F/V *Ulimasao*

The hydraulic system on F/V *Ulimasao* is run off the port engine. The hydraulic pump (Vickers VTM 42 06) is mounted on a bracket connected to the sleeve rails that are an extension of the engine bed. The hydraulic hoses run from the pump through a brand control valve, through a flow control valve

onto the reel and shooter. There are drain back hoses to the tank from the brand control valve, the reel and the shooter. A cable control is set up in the wheel-house to control and operate the lever on the brand control valve from there.

The reel has a capacity of 20 nautical miles of 3.5 mm monofilament line, capable of supporting up to 750 hooks per set. During the second set of the first trip the hub on the starboard side of the reel split the welds and pushed outwards.

Repairing the reel took over a week, as it had to be strengthened as well. The Fisheries Division decided to order a new reel from SeaMech Limited in Fiji, as there was no guarantee that the original reel would hold up given the problems encountered after only two sets. The new reel needed to be built in Fiji and was expected towards the end of July, so the repaired reel was used to continue the sea and fishing trials on F/V *Ulimasao*.

Catch and initial assessment

On the first trip, William and the crew of F/V *Ulimasao* landed 196 saleable fish weighing around three tonnes, with only two sets and a total effort of 1,250 hooks per set. The catch consisted of 118 yellowfin tuna, 64 albacore tuna, 4 bigeye tuna, 1 wahoo, 2 blue marlin, and 7 skipjack tuna. This catch represented a successful start to sea and fishing trials of the new vessel, especially as the weather was marginal with 15–20 knot winds and moderate to rough seas.

Up until mid-July, six full fishing trips were carried out resulting in a total catch of 670 fish, the majority of which were albacore and yellowfin tuna. (Figure 3)



William Sokimi

Figure 2: The newly designed and built super alia, F/V Ulimasao



William Sokimi

Figure 3: Albacore and yellowfin tuna were the majority of the catch

William concluded that the vessel was an improvement on the original 9 m class *alia* catamaran design. F/V *Ulimasao* has a clear working deck area, proper accommodation for crew, stability, insulated fish holds, proper navigation and fishing equipment, and twin engines that are economic to run.

The new super *alia* looks to be meeting the objectives set by the Fisheries Division. William will do a full assessment of the vessel and its fishing capabilities at the conclusion of this project at the end of August.



Fisheries Development Section acquires safety grab bags for Fisheries Development Officers

The Fisheries Development Section recently received a grant from New Zealand's Pacific Regional Head of Mission Fund to purchase three sea safety kits.

The kits were supplied by Navstation Ltd, New Zealand. Each kit contains a personal 406 kHz emergency position indicating radio beacon (EPIRB), a hand-held water-proof VHF radio, a water-proof torch, an inflatable life jacket, and an all-purpose tool (Figure 1). The items are stored in a water-proof "grab bag" (Figure 2).

The idea of a safety grab bag was developed independently by fishermen and tugboat crews who spend a lot of time at sea. In an emergency situation it is often essential to have safety

gear in one easily accessible spot that each crew member knows about.

Convenient locations are the wheelhouse or in a cabin. The most important piece of equipment in the grab bag is the EPIRB, which gives out a signal that is received by a satellite and then transmitted to Rescue Co-ordinating Centres such as the one in Nadi, Fiji. Rescuers know exactly where to search and know the identity of the person in trouble when a 406 EPIRB is activated.

The VHF radio can be used to contact search and rescue air-planes or other vessels in the area. The other items in the grab bag serve as a supplement to the equipment and provisions

usually found packed with life rafts. Aside from the basic contents listed above, grab bags can be personalised by the addition of a first aid kit, a fishing kit, and spare food and water.

SPC's Fisheries Development Officers will carry a safety grab bag on all future sea duty travel. The section has one spare kit available to other SPC staff who may venture out in boats in the course of their work.

Sea safety grab bags are available from the following sources:

Navstation
 Bill Boon
 PO Box Box 90-141
 Westhaven, Auckland,
 New Zealand
 Tel: +64 9 3099942
 Fax: +64 9 3661734
 E-mail: navstat@ihug.co.nz



Steve Beverly

Figure 1: The safety kit



Steve Beverly

Figure 2: The "grab bag"

RFD New Zealand Ltd
Wayne Viall
PO Box 2386
Auckland,
New Zealand
Tel: +64 9 3732019
Fax: +64 9 3071012

Pains Wessex (Australia) Pty Ltd
PO Box 25 Glen Iris,
Victoria 3146,
Australia
Tel: +61 3 98850444
Fax: +61 3 98855530
E-mail:
genenq@painwessex.com.au

Ocean Producers International
Tony Costa
965 B North Nimitz Hwy
Honolulu, Hawaii 96817, USA
Tel: 1-808-5372905
Fax: 1-808-5363225
E-mail: tony@pop-hawaii.com



Other project activities

Lindsay went to Tonga in May to provide input to the National Tuna Management Plan being developed in conjunction with FFA. His role was to look at development options for domestic involvement in the tuna fishery, especially small-scale options. Lindsay visited Ha'apai and Vava'u to meet with local fishermen to canvas their ideas, find out their problems, and to see what was currently in place.

Securing affordable finance is one of the main obstacles for small-scale operators. Having an active FAD programme would greatly assist small-scale operators, and the charter fishing operations out of Vava'u are heavily reliant on the three FADs there. Small-scale longlining is another development option, and the Fisheries Department in Tonga is looking at ways to fund such a project.

For medium-scale tuna longlining operations, the training of skippers and engineers to attain their qualifications is important. There is also a need for training within the Fisheries Department, especially for the implementation of the National Tuna Management Plan. One large

constraint to fishery development in Tonga – high fuel prices – has been removed by the Fisheries Department. Duty-free fuel is now available to commercial tuna fishermen who apply and meet the data provision and other requirements set.

During June and the first part of July, Steve spent four weeks working with trainees from the SPC/Nelson Polytechnic Pacific Islands Fisheries Officers Course in the Practical Fishing Module. The first part of the module was held in Goro in Province Sud. The trainees and tutors stayed in a local hotel in Goro run by the chief, M Charles Attiti. They used a variety of methods on three boats, F/V *Dar Mad*, F/V *Pop*, and a charter vessel, F/V *Danse avec les Maquereaux*.

The three boats also fished off the west coast. The highlights of the training sessions included deploying a FAD at Passe St Vincent and catching eight moonfish (totalling approximately 300 kg) while longlining off Passe de Dumbea. The Practical Module will be reported separately in more detail in the next issue of the SPC *Fisheries Newsletter*.

Lindsay gave comment on Vanuatu's National Tuna Management Plan, which is being developed in conjunction with FFA. Input was required on infrastructure and training needs, and development options for the involvement of ni-Vanuatu in the tuna fishery. Currently, participation in tuna fishing by ni-Vanuatu is crewing on foreign tuna fishing vessels, charter fishing operations and some small-scale trolling activity around the one FAD off Port Vila.

There is potential for domestic participation in tuna fishing, especially if there is an ongoing FAD programme for local fishermen. This would need to be coupled with a marketing campaign to promote more consumption of tunas such as skipjack and small yellowfin, along with a campaign to improve fish quality. There is also potential for development in tuna longlining, with several fishermen looking to convert their vessels in the next 12 to 18 months. Training for fishermen, trades people and fisheries staff will also be needed as development occurs.



■ COMMUNITY FISHERIES SECTION

Pohnpei Workshop

In 1999, FSM requested the assistance of the Community Fisheries Section in assessing, documenting and subsequently training women involved in small-scale fisheries. Due to differences in traditional and modern fishing practices between the four states, the FSM National Fisheries Section requested that the situation in each state be examined independently.

In July and August 1999 the Community Fisheries Officer (CFO) travelled to Pohnpei to

participate in the Fifth FSM Women's Conference and to undertake the first part of the SPC Community Fisheries Section work in FSM – an assessment and report of the situation in Pohnpei. One of the recommendations resulting from this visit was that the SPC Community Fisheries Section assist in a training workshop for women involved in small-scale fisheries activities.

This workshop was held from 1 to 5 May 2000 and was attended

by eleven women involved in small-scale fisheries activities in Pohnpei State. Around half the participants were involved in running small seafood markets while the remainder were involved mainly in subsistence fisheries activities.

The workshop covered a number of topics: processing, quality, and control of fish spoilage; fish smoking, drying and salting; small business skills; conservation and management; and nutrition and healthy lifestyles. During the workshop the participants built a simple drum smoker and tried different methods of brining and smoking fish.

The session on conservation and management included an introduction to coral reefs and the importance of marine resources; sustainable harvesting and the management of renewable resources; destructive fishing methods; community management of marine resources; marine protected areas; community conservation measures; and the reasons behind present and potential regulations.

At the beginning of the workshop the women were asked to list the workshop topics in order of priority. Conservation and management of marine resources were listed last by the majority of the women – but by the end of the workshop, each participant listed conservation and management as the topic's of most use to them!



Lyn Lambeth

Brining the fish before smoking



Kosrae, Chuuk and Yap fieldwork

Following the Pohnpei workshop, the CFO travelled to Kosrae, Chuuk and Yap to undertake the fieldwork and produce reports for the remaining states of FSM. First stop, for one week, was Kosrae where the CFO, with the assistance of Roosten Abraham of the Fisheries Division, met with people of Tafunsak, Walung, Lelu, Malem and Utwe municipalities. The work also benefited from the assistance of Ropina D. Aloka, the Coordinator of the Women's Affairs Program.

Preliminary findings for Kosrae indicate a high interest in training for subsistence and artisanal fishermen and women, specifically in the areas of seafood handling, quality control, small business management and marine conservation. Most people are keen on exploring fisheries management and conservation issues and there is a high level of awareness and concern at the grassroots level, especially in Walung. Some work is underway in the area of com-

munity resource management but most of that work is not directly tackling fisheries issues. There is also strong support for community fisheries management from within the Fisheries Division.

There is good potential for a pilot aquaculture project (for an alternative food fish), particularly for Malem municipality – the area of greatest need for an alternative fish source due to the lack of reef resources and difficult access to outer reef fishing areas.

Next stop was Chuuk, where the CFO worked with the Conservation and Management Officer of the National Fisheries Section, Estephan Santiago, and Kichy Joseph, Research Assistant for Chuuk Marine Resources. Most of the meetings were concentrated on Weno (Moen) the main island of Chuuk lagoon, but visits were also made to Tonoas, Fefan and Parem to talk with people involved in small-scale fisheries activities.

Preliminary findings for Chuuk indicate a high level of interest in including women in fisheries training, especially for those who are currently involved in small-scale marketing activities on Weno.

Both Kosrae and Chuuk have requested workshops for both men and women who are involved in fisheries activities – to be run concurrently but separately, with perhaps a joint discussion at the end. In other words, two workshops run at the same time, one attended by women and the other attended by men, with the two groups coming together for a joint discussion at the end.

This is in recognition of the fact that, although men and women are both involved in various, and nowadays sometimes similar, fisheries activities, they would feel more comfortable in separate training sessions. Due to the traditional, separate roles of men and women in many parts of the Pacific, women are usually quiet and unassertive when in a mixed group. A group of women on their own however can be a different story. . .

The final stop on the FSM journey was Yap, known in Micronesia for the strength of its traditions and culture. Traditionally, fishing and the use of marine resources in Yap was subject to a complex structure of authority that determined ownership of geographical areas, habitat sites, gears, species, and fishing methods.



Lyn Lambeth

A new fish market run by a fisherman in Utwe, Kosrae

In addition, Yapese social organisation regulated the distribution of the catch according to the rank or prestige of the fishing method, species of fish, people or villages involved. Strong taboos against women going fishing or having anything to do with men's fishing gear or boats were in place.

Women and children were, on the whole, restricted to the collection of invertebrates from nearshore areas and handling inside the reef. In general, fish-

ing done farther from land was more prestigious. Men involved in certain fishing methods were subject to social restrictions and spiritual rituals associated with that fishing method. Some methods required fishermen to isolate themselves at the men's house for periods of time before and after fishing.

Reef ownership, fishing rights, catch distribution, dispute resolution and punishment are still well-defined in Yap but there are very few elements that are

actually observed in practice. What remains is a strong reluctance to consider that women are active in fisheries in any way – despite their involvement in reef gleaning, inshore fishing, processing, customary distribution and, more recently, small-scale marketing. At a meeting with the Yap Women's Association it was decided that training was needed to ensure that those women who are involved in fisheries activities are recognised and assisted in their activities.



Lyn Lambeth

Many people from the islands in Chuuk lagoon travel to Weno daily by boat to sell fish and other produce

Future work

Finalising the reports for Kosrae, Chuuk and Yap will be high on the work agenda of the section in the second half of 2000. The second fisheries module for the SPC Community Education and Training Centre programme was due to run in July in Fiji. This unfortunately was postponed as students were sent home following the coup.

Hopefully the module, developed by the University of the South Pacific's Post Harvest

Fisheries Development Project and the SPC Community Fisheries Section, will be run in August or September.

A French version of the CFS manual, Fisheries Management by Communities, should be ready for distribution by the end of the year. The South Pacific Forum Secretariat is publishing the three background reports on gender issues for the tuna industry management plans of Solomon Islands, Palau and Vanuatu.

These reports were completed by the Gender Issues Adviser of the Forum Secretariat and the SPC Community Fisheries Section.

Two reports, An Assessment of the Role of Women in Fisheries in Niue and An Assessment of the Role of Women within Fishing Communities in Tuvalu, will be distributed in the second half of 2000.



■ TRAINING SECTION

Instructor from Vanuatu updates his skills in New Caledonia

In November 1999, the Vanuatu Maritime College (VMC) and New Caledonia's *Ecole des Mé-tiers de la Mer* (EMM) agreed to work together to improve the variety and quality of training available to seafarers and fishers in both countries.

As a result of this agreement, VMC Engineering Instructor, August Fred, was attached to EMM in May and June this year to gain new experience and update his skills.

In May, August joined trainees from the Northern Province at

Touho on a community fishing course, concentrating on basic seamanship (ropework), and outboard engine maintenance and repair. The knots, splices and whippings he learnt at Touho stood him in good stead when, in July, he went to Vanuatu's northernmost province of Torba to teach ropework.

August has considerable engineering experience, but recently concentrated on larger, diesel-powered engines. The training in maintenance and repair of outboards revived his interest in smaller motors. He was interest-

ed to find that like VMC, EMM is concentrating on Yamaha engines, and he particularly liked the EMM POP sheet (Protection, Organisation, Prevention), which he used as an additional teaching resource in Torba.

August also took a course in personal survival and fire-fighting. He found the personal survival training almost identical to VMC's own training.

However, the fire-fighting was a totally new experience, as it was done using the fire-fighting simulator at Chaleix Naval Base. Wearing protective suits and helmets, trainees crawled into a smoke-filled room, holding on to each other so as not to get lost.

They learnt how to approach a room with a fire inside – cautiously, cooling the door down first – and then put out the fire by spraying foam inside. Outside the simulator they practised using high-pressure spray nozzles and foam-making branch pipes.

VMC is in the process of building its own fire-fighting simulator and, once completed, August will be able to teach others.

August's visit to EMM was funded by the SPC Fisheries Training Section. VMC is grateful to both SPC and EMM for their kind assistance.



Outboard engine training at Touho

Sefti materiel blong Vanuatu mo Solomon

In the early 1990s, the Training Section launched a safety-at-sea campaign aimed at reducing the number of small-boat distress incidents in the region, through

the distribution of resource materials to fisheries administrations, training institutions, NGOs and private operators. Starting in 1995, Section staff

have developed a campaign logo, four posters, two training videos, a safety equipment check-list (available as a sticker and as a laminated card), a

teaching manual for trainers, an audio-tape programme for radio stations and eight video clips for TV stations. More recently, the English version of a third video (Rambo Goes Deep Sea) was produced and a new course (Basic Sea Safety certificate) was developed for maritime training institutions.

Following a request from the Vanuatu Maritime College (VMC) and the maritime authority in the Solomon Islands, the Section undertook the translation of some of the above materials in pidgin English.

The safety equipment and five-minute checklists were translated

by Caroline Nalo (VMC Office Manager) and, after a quick formatting job by SPC Graphic Artist, Jipé LeBars, hundreds of copies were printed as posters, stickers and laminated cards.

The materials were shipped to Santo and Honiara, where local administrations will distribute them to the numerous and scattered islands in both countries. In Vanuatu, staff of the VMC will use and distribute the SPC materials during fisheries workshops (see article page 28), while in Solomon Islands, the Fisheries Division will take care of distribution using its extension network.

At a recent regional workshop, Solomon Islands Director of Marine, Michael Ahikau, gave the training section a boost of optimism when, commenting on SPC safety materials, he said: “. . . the number of accidents in the Solomons has dropped significantly following a series of workshops on safety-at-sea.” Let’s hope that with the pidgin materials, future workshops will have an even greater impact!

The Fisheries Training Section is now awaiting a translation of its materials in PNG pidgin.



Fisheries training on the web

August 2000 is an important date for staff of the SPC Fisheries Training Section. After several weeks of fine-tuning, the Section’s website is finally available on the Internet. If you

want to find out what we look like and, more importantly, what the Training Section does, www.spc.int/coastfish/sections/training is the website to visit!

Although still in the development stage, the Section’s website is a good source of information and resource materials. In addition to a short presentation of the Section and its staff, the

site provides three links of potential interest to fisheries personnel in the Pacific. Under Meeting Announcement, you will find the latest course advertisements and corresponding nomination forms. For instance, the link contains documents in relation to the forthcoming regional course for women managers of seafood enterprises.

The link to Training Material is probably the most interesting because it offers the possibility of downloading the Section's

most recent resource materials. Have you lost the recently distributed SPC Vessel Economics software and need to assess the profitability of a longliner you are about to purchase? Do you want additional copies of the On-Board Handling of Sashimi Grade Tuna manual for new crew on your fishing vessel? Will you soon run a safety-at-sea workshop and are desperately looking for resource materials? Easy! Just click on Training Material and download what you need!

Lastly, the section News will be regularly filled with training matters of interest to fisheries personnel, companies and training institutions. In there, you will find brief progress reports on the Section's activities as well as interesting news from other training providers in the region. Yes, our website is open to other institutions wishing to advertise their training activities but do not yet have the ability to develop their own website!



First SPC seaweed training workshop in Vanuatu

Between 16 May and 6 June 2000, seven fisheries officers from the Vanuatu Fisheries Department attended a training course on seaweed farming. The course was funded by the Government of Taiwan/ROC through its annual small-grant scheme to the region.

This particular training was organised by the SPC Fisheries Training Section. As mentioned in our previous article, the course was a train-the-trainer course and was designed for persons (mainly fisheries and extension officers) who will introduce and promote seaweed farming among coastal villagers. For Vanuatu, the seven participants consisted of three research officers and four fisheries extension officers. These officers will become trainers at the end of the workshop. The training was held in Port Vila on Efate Island.



Esaromea Ledua was contracted by SPC Fisheries Training Section to design and deliver the course programme.

The course covered areas such as seaweed farm maintenance and monitoring; proper post harvest handling and processing; packing and storage; marketing; establishing the procedures of selecting possible farming sites; and developing procedures of farm management. The training arrangement was dis-

cussed with the Director of Fisheries, Moses Amos and SPC Fisheries Training Specialist, Mr Terihauroa Luciani.

Overall, this first SPC course on seaweed farming was a success. The seven participants gained knowledge of and skills on seaweed farming. Their challenge will be to assist in the development of seaweed farming in Vanuatu. Additional funding is available.



Seaweed status in the region

Currently there is a growing interest within the South Pacific island states towards the farming of the seaweed *Kappaphycus alvarezii* or known by many as *Eucheuma cottonii*. The availability of the export market, coupled by the short-term nature of the crop (six weeks) and the life-span (two years) of the dried product, makes this particular commodity attractive to many small island states.

Like neighbouring island states, the Vanuatu Government is intending to venture into seaweed farming as a means of creating employment in rural coastal areas. Furthermore seaweed farming is envisaged to attract fishers as a means of reducing fishing pressure exerted on the already over-fished inshore resources. These were some of the reasons why the Vanuatu Government sought the assistance of the Secretariat of the Pacific Community for training the trainers in seaweed farming.

(Source: Esaroma Ledua, Fisheries Principal Officer, Fisheries Division of the Ministry of Agriculture, Forestry and Fisheries, Fiji Islands)

Skipjack handling workshop on hold

Following a request for assistance from the seafood company Ocean Trader, Training Section staff made arrangements for a workshop to be held in June, at Pacific Harbour, Fiji Islands but because of the coup, the workshop was postponed.

The workshop will be conducted by consultant/tutor, Mr Ken Harada from the Sydney Fish Market, the same person who assisted SPC with several sashimi-tuna handling and grading workshops in the mid-1990s. The purpose will be to safely

increase the efficiency and speed of Ocean Trader's filleting staff. Using a slide show, a manual specifically developed by the Section for that workshop, and practical demonstrations, the tutor will teach the trainees how to quarter-loin



Ken Harada

Small skipjack sale at secondary wholesaler at around 400 yen/kg



Ken Harada



Ken Harada

Preparing tataki in a supermarket



Ken Harada



Ken Harada

Tataki is displayed on the shelf for immediate consumption (center of the photo)

Quarter fillets for tataki

skipjack tunas to be processed as tataki for the very demanding Japanese consumers. Tataki, a traditional Japanese dish also known as “sashimi of the poor”, consists of fresh quarter-loin of skipjack that is lightly seared on the outside and raw in the middle. Because of the Asian economic recession, the consumption of tataki in Japan is rising to the detriment of the highest-value sashimi tuna species.

As part of its efforts to support the revival of the Fiji skipjack fishery, the innovative managers of Ocean Trader have entered a joint venture with a Japanese company to export frozen tataki to Japan. After just a few weeks of experience in this new process, Ocean Trader was processing two to three tonnes of raw product daily, for approximately one ton of finished product. But the Japanese want more and Ocean Trader is

attempting to double its production to 50 tonnes of tataki exported each month! This will mean buying more fish from the local FAD fishers and employing more filleting staff in the processing plant. A substantial boost for the local fishing sector! The Fiji Fisheries Division plays an important role in this success story as the coordinator of an ongoing FAD programme that helps Ocean Trader to obtain a regular fish supply.



In brief

- The second regional course on seafood enterprise operations and management for Pacific Island women will be held in Nelson, New Zealand from 6 to 24 November. The deadline for nominations is September 15 and applica-

tion forms can be obtained from the Section’s website (www.spc.int/coastfish/sections/training)

- The 1999 Fisheries Training Directory is now available on the same website. Training

providers are invited to forward their updates on courses for the new version of the Directory, scheduled for distribution by the end of 2000.

- In June, the SPC Fisheries Training Adviser visited Tonga to assist with the development of a pre-sea fishing course aimed at building a pool trained crew in support of the local tuna industry. A short safety course, followed by an exposure to real fishing conditions was recommended. The course, if implemented, will involve the Ministry of Fisheries and Tonga Maritime Polytechnic Institute. A survey of the local fishing companies indicate that by mid-2001, 11 new longliners would be operating, creating an additional crew requirement of 80 to 90 fishing deckhands.
- A draft Safe Operational Plan for small fishing vessels was developed by Section staff in June. Operators are advised to obtain a copy of this document.
- A pilot SPC/Australian Fisheries Academy Traineeship Programme for Pacific Island Fishers will be implemented from October to December. Six carefully selected deckhands will attend this programme that will combine four weeks of shore-based training with two months of sea training onboard commercial fishing vessels.
- An awareness poster on the dangers of alcohol at sea is being produced for Niue. French and English versions of the poster will be printed and samples distributed to other SPC member countries and territories.

Consultancy funds available

The AusAID financial assistance to SPC's Coastal Fisheries Programme includes a component for consultancy work in the area of seafood technology. This fund, although limited, would enable SPC to contract experts to assist seafood companies through short-term assignments. Four or five one-week consultancies can be funded in 2000.

If you own a seafood company and require assistance in the following areas, contact SPC:

- ☞ Quality Management System development or review;
- ☞ HACCP plan development or review;
- ☞ HACCP training;
- ☞ Staff training in seafood handling (including sashimi tuna handling and grading);
- ☞ Product costing and marketing;
- ☞ Product development and alternative value-adding processes;
- ☞ Seafood safety.

If you have expertise and experience in one or more of the following areas, and are available to undertake short-term consultancies in SPC member countries and territories, send your CV to the SPC Fisheries Training Adviser at michelbl@spc.int

- August Fred, engineering instructor at the Vanuatu Maritime College attended two, one-week training attachments at the New Caledonia School of Maritime and Fisheries Studies. Both attachments were organised and funded by the Section.
- Josese Rakuita, lecturer at the Fiji School of Maritime and Fisheries Studies attended a three-week training attachment at Nelson Polytechnic in July. Josese will play a major role in the introduction of the Pacific Islands Qualified Fishing Deckhand course in Fiji Islands.
- French versions of the "SPC Vessel Economics" software and "Rambo Goes Deep Sea" video are being produced. Completion and distribution are expected for the second half of 2000.
- A boat building training programme for staff of the Santo boatyard in Vanuatu is scheduled for October. A trainer from the New Caledonia School of Maritime and Fisheries Studies will introduce a new boat design using the West System building technique.



■ REEF FISHERIES ASSESSMENT AND MANAGEMENT SECTION

In Indonesia

The Reef Fisheries Management Advisor, Pierre Labrosse, took part in the regional working meeting on the sustainable development of marine aquaculture and grouper farming organised by the Indonesian Government with the Bay of Bengal Programme, the Asia-Pacific Economic Cooperation Council (APEC) and the Network of Aquaculture Centres in Asia and Pacific Region (NACA) in Medan, North Sumatra.

This meeting was a follow-up to two other workshops in Thailand, which were mainly concerned with establishing a regional research co-ordination network on grouper aquaculture at the Asia-Pacific level.

This new workshop was divided into three sessions*:

1. A technical session on grouper farming techniques and production alternatives in terms of species and farming systems;

2. A special session on the social and economic aspects of aquaculture for grouper or other marine fish in connection with coastal communities' sources of income;
3. A discussion session with three working groups that dealt with the following topics:

Group 1: Social and economic problems;

Group 2: Marketing and certification;

Group 3: Technology and management.

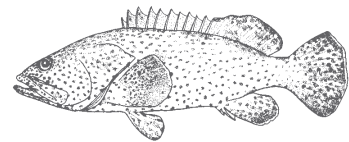
Three of the presentations involved subjects of concern to Pacific island countries:

Cathy Hair (ICLARM) presented the initial results of her experiments in Solomon Islands on collecting juveniles in a natural setting for aquaculture purposes by means of light traps or

reef crest nets. This work was mainly based on species of interest to the live fish market (human food and the aquarium trade).

Michelle Lam reviewed management options for live reef fish fisheries in Solomon Islands.

Finally, Sudari Pawiro's (INFOFISH) paper highlighted certain important issues linked to the sea food market in Southeast Asia, in particular the unlikely possibility for expanding the live or fresh reef food fish market, which probably cannot absorb any significant increase in production.



In the Philippines

Pierre Labrosse and Being Yeeting attended ICLARM's FishBase Co-ordinators meeting and participated in a Train the Trainers workshop at the FishBase office in Los Baños, Laguna, Philippines.

The main goals of the meeting were to allow regional node (i.e. focal point) co-ordinators to:

- Provide standardised updates and briefings on regional node activities during 2000.
- Discuss the 2000 Work Programme and develop specific regional Action Plans for each node with a focus on networking.
- Learn how to develop national information species profiles related to biodiversity and fisheries management using structured remote data entry features in FishBase.
- Learn new rapid assessment techniques for conservation-

oriented fishery analysis using FishBase ("Key Facts" and Length Frequency Analysis).

- Learn how to develop practical websites using MSWORD and FrontPage Express for each FishBase participating country.
- Identify areas of development in FishBase 2000 (Beta version) for future ACP training.

* Documents related to various presentations for all sessions are available in the Reef Fisheries Assessment and Management Section (e-mail contact: PierreL@spc.int)

- Interact technically with project staff and exchange information.

Pierre Labrosse gave a presentation of the Pacific node progress report as well as proposed activities from June 2000 and beyond. ACP countries involved in the project will be visited by the end of this year.

The main purposes of these visits will be to:

- identify permanent and valid contact points;
- give an update of FishBase and more generally of the project of “strengthening of fisheries and biodiversity management in ACP countries”;

- discuss the outline of a second phase beyond 2000; and

- research and recover data from “grey literature” and collect information on vernacular names.



■ OCEANIC FISHERIES PROGRAMME

Recreational Fishing Symposium

Recently Wade Whitelaw (SPC billfish biologist) attended the Recreational Fishing Symposium in San Diego where he made a presentation on ‘Gamefishing in the Southwestern Pacific – A Developing Industry’.

The symposium, which was jointly organised by the National Marine Fisheries Service and the National Sea Grant College Program, focussed on several themes: management, resource conservation and allocation (between commercial and recreational fisheries), catch and release, and education. Held over four days, there were

interesting discussions, especially on the issue of resource allocation with major pushes occurring in the US by recreational fishing and boat owner associations (mainly tackle groups) and environmental groups. This issue is slowly spreading westward from the US and eastward from Australia.

Wade is also implementing a game-fish data collection programme for SPC member countries to be used by scientists, managers and the industry to sustainably manage the fishery. Without accurate catch and

effort data it is impossible to understand or manage the development of game fisheries. Gamefish catch and effort data provides information on seasonal/inter-annual variations of gamefish species; fisheries interactions; and stocks. The data also helps to make decisions regarding allocation of resources and the development of the gamefish industry.

For further information please contact Wade at wadew@spc.int or the OFP web site:

<http://www.spc.int/oceanfish>



SPRTRAMP Observers

It’s over! Five and a half years later, the four SPRTRAMP observers have finally hung up their callipers, washed the last of the fish scales off and are gently returning to life on dry land — life without copious quantities of raw fish and plain rice.

A motley crew with nothing more than their EU/ACP passports and previous observer/tuna experience to bind them, they embarked on a mammoth task: providing the baseline data on catch and by-catch for all fishing fleets, gear types and nationalities that sail the Pacific.

Cultural and culinary challenges aside, they had their work to do. And once settled into their bunk (or floor-space!), flicking the cockroaches aside, they prepared themselves for the daily challenges. Knowing what the day would bring was like pulling straws.

A short straw day was one on a Japanese longliner, or any other longliner that was brazen enough to set over 3,000 hooks in Pacific waters. Those days were long—20 consecutive hours were often insufficient to monitor all hooks. On a Chinese

vessel, where less than 1,000 hooks are set, the challenge was to keep oneself stimulated and healthy on a fleet that interfered with more observer immune systems than any other. But long straws came about too. How about a day’s steam across a calm sea, onboard an American purse seiner, with nothing more to do except prepare for a late afternoon high ball? These were the days everybody wished for.

All objectives were met. It took 2,570 sea days and 151 trips to complete. During that time they

monitored over 1.3 million long-line hooks and 26,000 metric tonnes of purse seine tuna landings. With this work they have provided valuable insight into both the type and the amount of by-catch species landed by these vessels, their discarding practices and their fishing techniques. Additional agendas, the other bits and bobs, meant just as much; interpreting how vessels filled in their log sheets, providing feedback for the development of the new observer data forms and even just adding to the photograph album of SPC. Who knew that they would find soapfish in New Caledonia, frostfish in Tonga and gemfish everywhere? But now we do.

The all star line up was Siosifa Fukofuka (Tonga), Filipe Viala (Fiji), Juan Jose Areso (Spain), Deirdre Brogan (Ireland) and Manasseh Avicks (Solomon Islands). Siosifa thundered ahead, with day after day spent at sea, on one vessel after another. His consistent, easy-going style paid off in the end, when he topped the number of days spent at sea. The rest struggled to keep up but despite all the moans, completed sea days mounted, initially into the hun-

dreds and finally into the thousands.

The world is a better place with all of Filipe's efforts. Never losing his mischievous Fijian smile, he brought good cheer and God's word to many a vessel. Loaded down with giveaway bibles his excess baggage receipts were legendary. And now as the project winds down, rumour has it that Filipe is giving up neither his love of God nor the sea. We wish him luck with that. While Filipe was loaded down with bibles, his Spanish colleague, Juanjo preferred dictionaries. He had them all, Spanish-English, French-Spanish, English-Japanese, English-Chinese. In the beginning he thought the Aussies, Kiwis and Yanks were all speaking different languages, but he finally got the hang of the English language—even if he does speak with a quaint Asian twang “you me go disco now”. In October 1999, Spain decided they wanted Juanjo back, re-installing him on another idyllic tropical island—Mahe, in the middle of the Indian Ocean, to work with the Spanish purse fleet.

Some eyebrows were raised and disbelief expressed when the

only female observer, Deirdre, came onboard. The vessel captains often flapped their arms and were heard to say “Where sleep” or even “No lucky”. Despite all the noise, however, all her trips were successful ones and three vessels actually broke personal catch records with Deirdre onboard. It does seem polite though, to forget that one vessel actually went aground on a reef! In January 2000, a fifth observer Manasseh Avicks from the Solomon Islands joined the team, replacing Juanjo. As we write, Manasseh is still unpacking from his first adventures at sea under the SPC flag. His computer smells like a fish, his luggage is still somewhere between Vanuatu and New Caledonia, but he is content to have completed the work.

Although their work is done, there continues to be a need for experienced observers in the region. SPC and FFA are now looking at ways to increase the pool of experienced observers in the region. No funding for further training has been located yet, but one thing's for sure – the title of ‘experienced observer’ is a well-earned honour.



*The “dream team”:
from left to right,
Filipe Viala (Fiji),
Juan Jose Areso
(Spain),
Deirdre Brogan
(Ireland), and Siosifa
Fukofuka (Tonga)*

■ CTSA PROJECT TACKLES MARINE ORNAMENTALS

A new CTSA project will use a multi-institutional approach in an attempt to resolve the barriers to cultivating several popular marine ornamental species.

Approved by the USDA as part of the CTSA Year 13 Plan of Work, the project titled Aquaculture of Marine Ornamental Species - Year One will tap into the talents of researchers from The Oceanic Institute (OI), the Guam Aquaculture Development and Training Center (GADTC), the University of Hawaii (UH) and the University of Hawaii Sea Grant Extension Service (UHSGES).

The growing popularity of marine aquariums creates exciting potential for expanding this segment of the aquaculture industry. Although advances in marine hatchery technologies have helped increase the number of species commercially produced, attempts to culture higher-value species have been more difficult. The first challenge is to spawn these desirable species. Once larvae are produced, the next problem stems from the small mouths of these marine creatures, which creates challenges in identifying and mass culturing appropriate live feeds for larval rearing.

Using several approaches, the project participants will work to identify appropriate first feeds and refine culture techniques for the following species: the clown coris (*Coris gaimard*), yellow tang (*Zebrasoma flavescens*), flame angelfish (*Centropyge loriculus*), and feather-duster worm (*Sabellastarte sancti-josephi*).

Dr Anthony Ostrowski of The Oceanic Institute will serve as the project director and coordinator for the various activities of the project. "Currently, only

five percent of tropical marine organisms traded are produced through aquaculture," he said. "The CTSA project will help identify and resolve bottlenecks in rearing marine ornamentals, helping to pave the way to expanding aquaculture's stake in the marine ornamentals industry."

The Oceanic Institute's portion of the project will focus on maturation and spawning techniques for the yellow tang and the flame angelfish and examine a variety of novel feed items and approaches to rearing the larvae. Stocking yellow tangs began in November 1999 for future spawning and larval rearing research.

The first challenge is to establish reproductively active broodstock. A few of the tangs are quite large and tests have shown at least one of them is mature and ready to spawn. Once larvae are obtained, the project will focus on resolving the elusive question of what to feed them. The Oceanic Institute's work with the flame angelfish is moving closer to that stage. Flame angels at OI have been spawning daily since December 1999, producing an average 120,000 larvae each month.

The research conducted by the University of Hawaii and UHSGES will focus on invertebrates as well as finfish. Efforts include

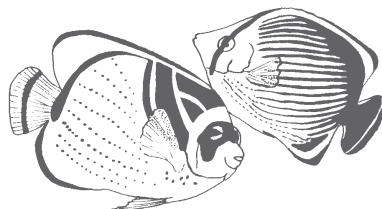
establishing colonies of feather-duster worms at chosen farm facilities. Studies will be conducted on these colonies and detailed descriptions will be developed to include husbandry and egg collection methods, the worm's larval stages, preliminary growth estimates, and comparisons of various substrates for settlement.

The UHSGES project activities will focus on the use of standard rotifer/algae production systems in an effort to identify species that can be cultured using currently available methods. By using this complementary approach, more species can be identified to initiate the transfer of technology to the commercial sector.

The project extends across the CTSA region to include researchers at GADTC. The GADTC is a multi-species tropical hatchery and research facility operated by the Guam Department of Commerce since 1986. GADTC already has several other research efforts underway involving the culture of marine ornamental fish, including the lyretail blenny (*Meiacanthus atrodorsalis*) being cultured for the first time by GADTC staff.

Research conducted at the GADTC will focus on establishing broodstock populations of the clown coris, a highly prized ornamental wrasse. The GADTC approach will also collect wild zooplankton from nearshore areas, which will be used to conduct short-term feeding trials of spawned clown coris larvae and help identify the food these species eat in the wild.

With the combined talents and experience of the researchers at OI, GADTC, UH, and UHSGES, the chances are very good that the objectives of this project will



be met. The successful cultivation of these popular marine species will not only create exciting growth opportunities for the aquaculture industry, it will also reduce pressures on

wild populations by providing a more sustainable alternative to collection practices. This will help ensure that these beautiful ocean creatures will be enjoyed in their native habitat—as well

as aquariums—for generations to come.

(Source: *CTSA Regional Notes*, Vol. 11, No. 3, Spring 2000)



■ DUTCH COMPANY TO PURCHASE STARKIST SAMOA'S CAN PLANT

Starkist Samoa's can-making plant is to be sold off by H J Heinz, the cannery's mother company, to Europe's second-largest metal can producer, the Dutch firm of Impress Metal Packaging Holdings B V. The sale of the plant will not affect cannery operations as the two are separate entities, according to Starkist official Meki Solomona.

However, it is not clear whether the sale will have an immediate or future impact on COS Samoa Packing, the other cannery, which is a steady customer of Starkist's Satala-based can plant. Taeaofua also revealed that can plant manager Mike Shelhamer will become Impress' local representative.

Though terms have not been disclosed, the agreement with Heinz allows Impress to buy

and operate all five of Heinz's North American can-making operations located within Heinz's food processing plants in Bloomsburg, Pennsylvania, Terminal Island California, American Samoa and Puerto Rico. The fifth plant is in Weirton, West Virginia and does not process food products.

Under the agreement, Impress will have an initial 10-year supply agreement for all Heinz metal food can requirements at its StarKist Seafood and Heinz Pet Products facilities throughout North America.

"The supply agreement would allow us to provide innovative packaging solutions, total supply chain management and economies of scale to address Heinz goals and strategies for its tuna brands and pet foods," Impress chief executive officer

Dominique Damon said in a press statement.

"The two companies will work together to ensure a smooth transition process from both an employee and operational basis," he added.

Impress expects to complete its purchase in early August 2000. The agreement remains subject to various conditions, including receipt of necessary consents, final negotiation of related agreements and financing.

When finalised, the agreement will allow the two manufacturers to form "a global strategic relationship," according to a press statement from Impress, the privately-held Dutch company.

(Source: *Samoa News*, Tuesday, 20 June 2000)



■ MAJOR CHANGES IN THE US TUNA MARKET

Twenty years from today, children may never know what a tuna cannery is. On 15 June 2000, Star Kist, the No. 1 brand in the United States, unveiled "tuna in a pouch" scheduled to appear in retail stores sometime in September 2000.

The 7-ounce (≈200 g) pouch of "Light Tuna in Sunflower Oil—Rich in Vitamin E and Low in Saturated Fat" opens a whole new world of possibilities to the industry.

In the 21st century, the traditional tuna cannery might become a thing of the past.

The Managing Director of Star Kist Seafood said "selling "tuna in a pouch" is the biggest innovation in the industry since canned tuna was introduced in the 1920s.

Based on the strong consumer preference for our pouch, Starkist Seafood expects the pouch to expand the US tuna

category by 4 to 6 points over the next two years with this exciting product launch.

The 7-ounce packages will be sold in three varieties: premium albacore in water; chunk light tuna in water, and chunk light tuna in sunflower oil, which is low in saturated fat and high in vitamin E.

The suggested retail price is US\$ 1.99 for the chunk light varieties and US\$ 2.79 for the

albacore. The pouch is designed for families and provides enough tuna for four sandwiches. Star Kist said its "tuna in a pouch" is firmer and fresher-taster than the canned variety because it requires less cooking and processing. Starkist is the first to sell retail 7-ounces packages. As early as last year "tuna in a pouch" was introduced in pouches by Chicken of the Sea and Forman Industries. Chicken of the Sea pouch is an institutional 1 kilo pouch. It is packed by Thai Union in Bangkok for Chicken of the Sea.

Star Kist also plans to invest more than US\$ 20 million in a national (US) advertising and marketing campaign to pro-

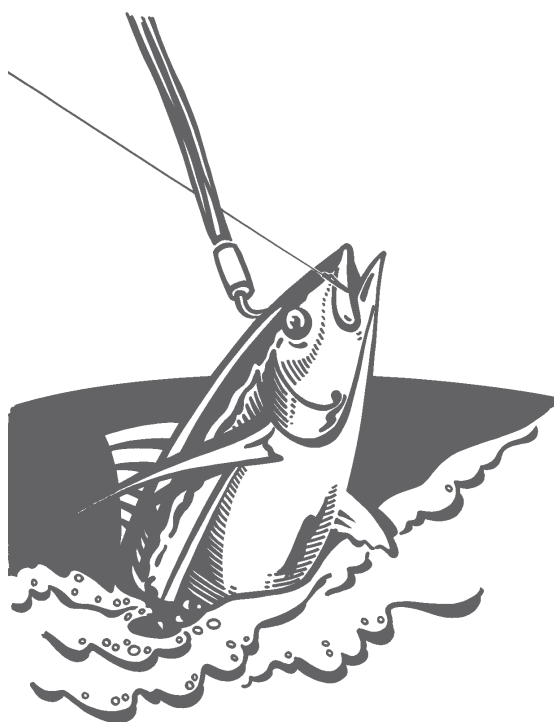
mote "tuna in a pouch" to include television and print advertising featuring "Charlie the Tuna". This is a radical transformation that the industry needed quite badly.

Mr Christopher Leschewski in his INFOFISH presentation in May 2000 reported that "since 1990, the three major tuna brands have spent a total of US\$ 14 million on television, radio, print and outdoor media. This is an average of less than US\$ 1.5 million per year."

Mr Leschewski compared this to the US chicken industry spending US\$ 86.5 million and the US beef industry advertising which is US\$ 25 million.

Mr Paul Krampe, United Tuna Cooperative Executive Director warned that: "If actions are not taken to improve the appearance of a can of chunk light tuna and if more creative marketing of the product does not take place soon, we will never see improvements in the business. We will continue the same current game of beating up each other trying to squeeze more profits out of a mature and relatively stagnant market."

(Source: *Crow's Nest*, July 2000)



FISHING, TURTLES AND THE LAW: RECENT EVENTS IN THE HAWAII-BASED LONGLINE FISHERY

On Thursday 3 August 2000, a federal judge imposed severe constraints on US longline vessels based in Hawaii. The judge's order, effective 4 August 2000:

1. closes a large area of ocean to longline fishing, apart from a limited number of sets (370 per year) that may be conducted for scientific purposes with 100% observer coverage;
2. establishes a larger area of ocean where unlimited fishing can be conducted between 1 June and 14 March;
3. requires observer coverage to rise from at present <5% to 20% within three months of the order date;
4. requires that any "profits" from swordfish sales be donated to charity; and
5. will remain in effect until the completion of an Environmental Impact Statement (EIS), scheduled for 1 April 2001.

The judge's order was the culmination of nearly 12 months of litigation brought against the National Marine Fisheries Service by an environmental law firm, Earthjustice, on behalf of plaintiffs, the Center for Marine Conservation and Turtle Island Restoration Network.

This action will have serious consequences for what is the USA's most valuable domestic

by Paul Dalzell,
Western Pacific Regional Fishery
Management Council,
Honolulu, Hawaii

fishery in the Pacific Ocean. A well managed fishery, moreover, without any serious stock problems. How and why did this happen?

Longlining in Hawaii

Longline fishing in Hawaii had been conducted for many decades prior to the expansion of the fishery in the late 1980s. Hawaii longline vessels evolved from wooden pole-and-line tuna sampans, employing longlines made from rope and fishing mainly within 2–20 nm of the coast.

By the 1930s the longline fishery was second only to the pole-and-line fishery in landed volume of fish, and accounted for most of the yellowfin (*Thunnus albacares*), bigeye (*Thunnus obesus*) and albacore (*Thunnus alalunga*) landed in Hawaii. The fishery peaked in the mid 1950s, with landings exceeding 2000 t, and then declined steadily through lack of investment in boats and gear until the late 1980s.

The revitalization of the Hawaii longline fishery was due to the development of local and export markets for fresh tuna to the US mainland and Japan, and

the discovery of swordfish stocks around Hawaii. Participation in the Hawaii longline fishery increased from 37 vessels in 1987, to 156 vessels in 1991. Further entry to the fishery was halted by a moratorium in 1991, later formalized as a limited entry program with a cap of 164 vessels.

These management measures were imposed by the Western Pacific Fishery Management Council, which has the authority to manage fisheries in federal (3–200 nm) waters around the US islands in the Central and Western Pacific*.

The Council, has a number of management plans for different fishery resources and manages fisheries for tunas and tuna-like species under the Pelagics Fishery Management Plan (PFMP) that was implemented in 1986.

Landings increased rapidly and by 1991, had reached 8,165 t, of which 3,992 t was swordfish. The newer vessels in the fishery were characterized by a greater reliance on sophisticated electronic gear for navigation and finding fish. These newer vessels also tended to be larger in size.

The majority of vessels operating in the Hawaii longline fishery are between 56 and 74 ft (17–22 m) in length, with the larger vessels fishing to the northeast of the Hawaiian Islands and targeting a mixture of swordfish (*Xiphias gladius*) and bigeye tuna (*Thunnus obesus*). The revitalized fleet also adopted more modern longline gear, using continuous nylon mono-filament main lines stored on spools, with snap on monofilament gear.

Monofilament longline gear is more flexible in configuration

* Eight Regional Management Councils were established by the promulgation of the Magnuson Act in 1976, five off the east coast and three off the west coast, to manage fisheries in US federal waters

and can be used to target various depths more easily than traditional tar-coated rope longlines.

Both daytime and nighttime fishing are practiced using the same monofilament system. Depth of a longline set irrespective of mainline material is principally a function of the length of mainline between adjacent floats and the number of hooks between floats (HBF). In targeting deep dwelling bigeye tuna, 12–25 HBF are deployed with enough sag to reach depths of 400 m. Only three to six HBF are deployed when targeting swordfish and the line is kept relatively taut so that it stays within the first 30–90 m of the water column.

Night-time fishing employs luminescent light sticks to attract swordfish and their prey to the baited hooks. Longlines deployed for swordfish are baited with large squid (*Illex* spp). Tuna-targeting longlines tend to be set during the day and use saury (*Cololabis saira*) as bait. Saury bait tends to sink faster than squid, which often has

pockets of air trapped within the mantle. Currently, the Hawaii fishery represents about 2.7% of the longline hooks deployed in the entire Pacific each year.

Protected species interactions

Early on in the re-expansion of the Hawaii longline fishery it became apparent that the vessels fishing close to the Northwestern Hawaiian Islands (NWHI) would on occasion catch animals protected under the Endangered Species Act, namely the Hawaiian monk seal and the green sea turtle.

Longline vessels were also known to be catching and killing substantial numbers of albatross that nest in the NWHI. This led the Council to implement the mandatory deployment of federal observers on the longline vessels and the imposition of a closed areas or cordon sanitaire extending for 50 nm around the NWHI.

A similar area closed to longline fishing was also imposed by the

Council around the main Hawaiian Islands in response to complaints from small vessel commercial and recreational pelagic fishermen that longliners were fishing too close to shore and competing with them.

They argued that the longline boats could range over wide areas of the ocean to find fish, while they, the small vessels fishermen were at the mercy of prevailing weather and sea conditions and did not want the additional competition from longliners. The development of closed areas around the entire Hawaiian archipelago also led the Council to implement a vessel monitoring system, where a radio beacon reports vessel position at regular intervals to a monitoring post.

The displacement of the longline fishery from shore solved the problem of interactions between monk seals, green turtles and small boat fishermen.

However, longline vessels continued to interact with other marine turtles (Loggerheads,



Steve Beverly

The F/V Kaimi is one of the longliners operating from Hawaii

Leatherbacks, Olive Ridleys) and to catch and kill albatrosses. In the USA, all marine turtles are protected under the Endangered Species Act (ESA) and the provisions of the ESA require the agency responsible for turtles, in this instance the National Marine Fisheries Service (NMFS), to produce a biological opinion (BO) where there is interaction and mortality from an enterprise such as fishing.

Under the BO, the agency must determine the level of interactions and mortalities and compare these with population dynamics of the affected populations. The BO can then set limits on the volume of interactions and mortalities, which, if exceeded, require a fresh BO.

NMFS has produced estimates of the turtle takes and kills from the Hawaii fishery over a number of years and on occasion the threshold values were exceeded requiring fresh consultations to generate a new BO.

All migratory seabirds are protected under the Migratory Bird

Treaty Act, including the Laysan and Black-footed albatrosses, which have the largest nesting populations in the NWHI. Also present in the NWHI are two to three species of Short-tailed albatross that are part of a global population of 1,000, and are protected under the ESA.

For these reasons the Council implemented further measures in late 1999 to minimize seabird interactions through additional regulations. These include the mandatory use of at least two of a range of measures to reduce seabird interactions, and makes attendance at a annual protected species training workshop compulsory for longline vessel owners and skippers.

The research addressing these interactions with turtles and albatrosses also revealed that the majority of incidents were associated with vessels fishing primarily for swordfish.

Interactions between turtles and albatrosses, and vessels targeting primarily bigeye tuna, were

one or more orders of magnitude less than those with swordfish. Further, vessels targeting swordfish tend to fish to the north of Hawaii, along the convergence zone of warm tropical water and cooler water from the northern Pacific, while vessels fishing for tuna are predominantly in the warmer waters to the south of Hawaii.

Litigation

In February 1999, Earthjustice filed a law suit on behalf of the the Center for Marine Conservation and Turtle Island Restoration Network against the National Marine Fisheries Service, accusing NMFS of negligence in its duty to protect endangered sea turtles. The plaintiffs were concerned about all marine turtles but focused on the Leatherback turtle, as populations in the Pacific have declined considerably over the past two decades.

During the hearing in November 1999, federal court judge David Ezra, found in favor of the defendants (NMFS)



Steve Beverly

Setting the longline on board F/V Mary M, longliner operating in Hawaiian waters

with respect to their ESA biological opinion on the marine-turtle and Hawaii-based longline fishery interactions. This meant that while interactions and some mortalities occurred, the judge agreed with the defendants that this had little influence on turtle populations.

However, the judge agreed with the plaintiffs that NMFS was delinquent under another government statute, the National Environmental Policy Act (NEPA). Under NEPA, federal policies, laws and regulations must be assessed with respect to their impact on the environment.

This includes an analysis of the impacts of a proposed action and of alternatives to a proposed action. The basic purpose of NEPA is to ensure that federal officials give appropriate consideration to environmental values in policy formulation, decision-making and administrative actions, and that the public is provided adequate opportunity to review and comment on major federal actions.

The document generated through the NEPA process is the environmental impact statement (EIS). The draft document is published and made available for public comment and notices are posted in the US Government's Federal Register announcing availability.

Following the draft EIS publication, meetings are convened to take comment from the public. Where a measure was not deemed to have a major envi-

ronmental impact, an environmental assessment is produced and reviewed for a finding of no significant impact.

At the time that litigation commenced, the most recent EIS for the pelagics produced by NMFS and Western Pacific Council was part of the document containing amendment 7 to the PFMP. This was published in 1994, and the judge agreed with the plaintiffs that this was out of date. Further, he agreed that there was no evidence that either NMFS or the Hawaii-based longline fishery had made any attempt to reduce interactions with and mortalities of turtles caught by longliners.

As such he was inclined to provide a temporary measure of relief until an up-to-date EIS had been produced. Based on data provided by NMFS it was apparent that the majority of turtle interactions, particularly with Loggerheads and Leatherbacks, occurred to the north of Hawaii, and were possibly associated with the oceanic convergence zone.

The judge therefore closed off an area of ocean north of 28° N and between 150° and 168° W. The judge also ordered all vessels to carry clippers and dip nets to untangle any hooked turtles.

The judge's order also requested NMFS to conduct an analysis of the best combination of time-area closures and for the parties in the case to review the results and make their own recommenda-

tions. Three scientists representing the plaintiffs, the defendants and the defendant intervener, the Hawaii Longline Association (HLA) reviewed NMFS's analysis in April this year.

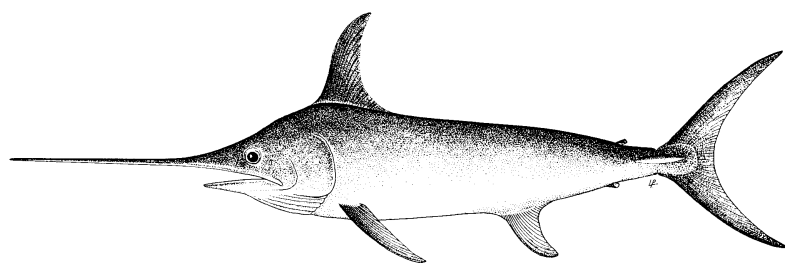
Each then filed a report with the judge. As might be expected the various options presented by the three parties ranged from widespread closures both to the south and north of Hawaii, to no closures and increased observer coverage.

On June 23, Judge Ezra announced his order for the fishery. This included a closure of all waters between 30° to 44 °N and bounded by 137°W and 173°E latitude, with fishing south of 30°N to 6°N reduced by 95 % of average annual effort and with 100% observer coverage, and closure of this area in April and May. The judge's ruling included waters to the south of Hawaii as a few Leatherback interactions were recorded south of the Hawaiian chain.

The judge's order would effectively have meant the end of all longline fishing in Hawaii. Following an intense period of protests and TV and press campaigns launched by the HLA a stay was placed on the execution of the order and Judge Ezra agreed to work with the parties to seek a reasonable compromise.

The compromise solution acknowledges that the Hawaii longline fishery is not homogeneous and that vessels targeting swordfish are responsible for the majority of interactions with turtles and other protected species.

It maintains more or less the same area coordinates, but the southern boundary is now at the equator. Fishing north of 30° N is banned except for a limited number of sets for scientific observations which must all be



accompanied by observers. The two-month closure from mid-March to May will also have a serious effect on the fishery, but the completion of the EIS by 1 April 2001 may negate this part of the judgement.

Consequences

About one third of the Hawaii longline fleet targets swordfish or a mix of swordfish and tuna, and accounts for about half of the annual US domestic swordfish production. Given the terms of the judge's order, swordfish fishing is effectively stopped in Hawaii until the EIS is published.

However, there is no guarantee that there may be any relaxation of these measures once an EIS has been published. Indeed, even stricter measures could be implemented by the court if it sees fit. Swordfish prices in the US will likely rise as a consequence of the shortfall in the market and more swordfish will likely be imported; ironically caught by fleets not as well regulated as US longliners.

Longline fishermen will be faced with a choice, either to move to another US port and continue to fish for swordfish, or to convert to fishing for tuna. This requires re-rigging the longline and fitting a line thrower to set line in deeper catenary curves in the ocean. The cost of a line thrower is about US\$ 6,000.

Many swordfish vessels in the fleet re-locate for part of the year to California to fish closer to the US mainland, leaving

Hawaii usually around October and returning early the following year.

In 2000, there may be an earlier migration to California with more vessels electing to home-port there rather than in Hawaii, at least until the issue is finally resolved with the publication of the EIS in April 2001. As much as one third of the 115 vessel longline fleet may eventually home-port elsewhere, which will clearly have a negative effect on the businesses which supply these vessels.

Hawaiian fish dealers will also feel the loss of fish if a large fraction of the fleet moves elsewhere and no swordfish production. Further, the knock-on effects will be felt through the Hawaiian economy, including businesses such as the airlines that used to ship most of the swordfish catch to the US mainland. Even if swordfish fishing recommences in the future, Hawaii fish dealers may not be able to win back old markets.

Even the eventual production of an EIS is no guarantee to an end to litigation. It is possible that the plaintiffs will continue to litigate, arguing that the EIS is inadequate and that Leatherback populations are in so perilous a state that the loss of even one animal to the Hawaii longline fishery is unacceptable.

Further, a notice of intent to sue under the ESA litigation was brought against NMFS by Earthjustice in May this year for not taking sufficient action with respect to putative interactions between the Hawaii longline

fishery and Short-tailed albatrosses. Some in the United States are concerned that fishery management is increasingly being conducted by the courts as a result of litigation, rather than through the Council process as mandated by the Magnuson Act.

The actual impacts on turtle populations brought about through the restrictions on the Hawaii longline fishery will be negligible. Major threats to marine turtles such as the Leatherback include the loss of nesting habitat through shoreline development for tourism and harvesting of eggs.

Further some fisheries such as the Peru and Chilean gillnet fisheries are thought to represent the major threats to Leatherback populations, which have declined in proportion to the expansion of these fisheries through the 1980s and 90s. Only concerted international action will save turtles, through establishing the level of danger to turtles by various coastal and high seas fisheries and by developing mitigation measures and strategies to reduce interactions and mortalities.

Not surprisingly, the 20th Annual Symposium on Sea Turtle Biology and Conservation held in February and March this year recommended an international plan of action (IPOA) for turtles taken by longline fisheries, comparable to the United Nations IPOA for seabirds and for sharks. The Symposium also adopted a broader resolution covering reduction of turtle interactions with all fisheries.



NEW SKILLS FOR FISHERS IN THE BANKS ISLANDS

How do I keep my outboard motor running well? What's the best way to catch freshwater prawns? How do I look after my boat? What do I do if I catch so many fish that we can't eat them all now? How do I find my way back to a good fishing ground?

Thirty-one people from the Banks Islands spent ten days at Sola on Vanualava Island in July, learning the answers to these and many other questions while they attended two courses run by instructors from the Vanuatu Maritime College.

The College's Engineering Instructor, August Fred, concentrated on engine and boat maintenance and repair, safety at sea, ropework used by seafarers and construction of a fishing reel. Thirteen people from all islands in the Banks Group attended. Some were fishermen, others were taxi-boat operators.

Nare Wolu, the Fishing Instructor, taught 16 fishers (12 men and 4 women) about fishing techniques, fish handling and preservation, fish poisoning, net-making and repair, and care of resources. All islands in the Banks except Mota were represented in this group.

The courses were officially opened on 5 July by the Vice-President of Torba Province, Edmond Hillary.

Training

Engine maintenance

Fishers and taxi-boat operators in the Banks all use outboard-powered boats, with engines of 25 HP (sometimes two on one boat) and over. Teaching was

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based on a Bislama version of SPC's Outboard Motors for Pacific Island Mariners – Learner's Guide. Trainees spent three days learning how to maintain and repair the engines, with classroom sessions in the mornings and early afternoons and the rest of the day focused on practical work. As part of their training, they overhauled engines belonging to the Province, Arep Junior Secondary School, the Education Department, the Island Court and a private operator. All were badly in need of servicing and maintenance.

Many of the trainees already knew some maintenance procedures, but hadn't put their knowledge into practice because they did not understand the reasons underlying the procedures. For example, the trainees discovered that washing their engines and tanks regularly, would make them last longer. They were also interested to learn practical aspects of outboard engine use, such as avoiding major damage to their engine by keeping the shift lock unlocked when running, and avoiding damage to their boat by not over-powering it.

Boat maintenance and repair

Many of the boats in the Banks Islands are made from plywood and built by the Santo Boatbuilding yard. Others are fibreglass. Some are used for fishing. The taxi-boats carry passengers,

food supplies and other cargo. After a short session in the classroom, trainees pulled four boats ashore, using coconut logs as rollers, and shored them up. They cleaned them thoroughly, using coconut husks as brushes, to remove all traces of algae, fish debris and soil from food.

Once they were brushed, the timbers of the wooden boats were checked; all were sound. In the classroom, the trainees learnt how to prepare boats for re-painting, but they could not put this knowledge into practice as no paint was available.

They also checked a 7 m fibreglass boat built in Port Vila. This was in poor condition. It had been holed in several places, had a broken transom caused by use of a too-powerful engine, and (after being moored in a swamp) was full of algae. The damage was so extensive that the trainees had neither the time nor the materials to repair it. After cleaning this boat thoroughly, they turned it upside down so that it could dry properly while awaiting transport to the Santo Boatbuilding Yard for repair.

Safety at sea

Torba Province is striving to ensure that all taxi-boats follow safety principles, but this is not always an easy task, as it can be hard to obtain even basic safety equipment. Many boats do not have flares, fire extinguishers, fire blankets or radios. Not all have life-jackets. And the boats are often over-loaded. Some of the boats make long trips (for example the journey from Vanualava to Merelava takes a full day), and some of these are made at night without lights.

Safety at sea was therefore an essential part of the training. August discussed precautions that should be taken before

going to sea and safety equipment and engine checks, using the SPC safety-at-sea materials as a basis for his teaching. (The Maritime College has translated these materials into Bislama and SPC has arranged their printing)

Some trainees had never used life-jackets. Using those owned by the Province, they learnt how to put them on and the proper way to jump into the sea wearing them. They also learnt how to make an emergency sail that can be hoisted if the engine fails. And they pondered the question: "Who pays the price when you get lost at sea and expensive air and sea searches are made?" – realising that it is better to be well prepared before you go.

Nare also emphasised safety at sea, as well as basic First Aid, during the fishing trips that he made with his group.

Knots, splices and whipping

Practical ropework was a useful part of both courses. Some trainees already knew about knots, splices and whipping and just needed to refresh their memories. For others, this was a new topic, and they were especially interested in the different ways of whipping rope.

Fishing reel construction

The "Samoan" fishing reel is very popular among Vanuatu fishermen for both bottom fishing and trolling. Using templates provided by the Santo Boatbuilding Yard, August showed trainees how to make their own reels and fit them to their fishing craft.

Unfortunately this was one of the few lessons where the training was "classroom-only" – no suitable wood was available at Sola at the time of the course. A

copy of the template was left at Torba Province Headquarters and the same type of reel was used in practical fishing exercises.

Introduction to rural fishing

Nare asked his trainees, "Why do we fish? What is fishing? What skills do we need?" They learnt that fish is a valuable source of protein for their families, as well as providing work and, maybe, the chance to earn some money. Most trainees thought "fishing" meant "taking a boat to go trolling or bottom fishing".

But the Maritime College's definition is much wider and includes: "any kind of activity that involves catching food from the sea or in fresh water". Trainees were also surprised at the multitude of skills a really good fisher needs: management of resources; money and business; maintenance and repair of boats and engines; fishing gear and techniques; fish handling and preservation; and use of safety equipment. This session had them really thinking about fishing.

Fishing techniques

The two main techniques taught were bottom fishing and trolling. Trainees learnt what materials they need to put their own fishing gear together, and the different kinds of knots and splices they can use for different purposes. At the end of the course each one had a trolling rig with lures and a wire rig with tuna circle hooks. They also learnt what other tools and gear they need to successfully bottom fish and troll.

Bottom fishing and trolling were new to the four women on the course – traditionally Vanuatu women practise shore

fishing, but do not go out fishing in boats. These four did go out, because Nare made three short night-fishing trips with his trainees, during which they practised both trolling and bottom fishing.

Before going fishing, Nare emphasised the importance of preparing the boat properly – checking that boat and engine are in good order, that safety and fishing gear are all there, that preparations are made for keeping fish properly, and that there is enough food and water on board.

Trainees learnt how to cut bait and bait their hooks correctly, how to use the reels and how to control a big fish without problems. Sola has no facilities for making large quantities of ice, but the trainees learnt the importance of keeping fish in top condition. This they did by covering the fish with copra bags and keeping the bags constantly soaked in cool seawater. The fish returned to Sola in prime condition, well before rigor mortis set in, and were kept for the rest of the night in ice in a freezer whose power supply had been turned off.

The first group were out from 6.30 to 11 pm. They caught 6 white poulet (*Pristipomoides flavipinnis*), 10 sea perch (*Lutjanus malabaricus*), 4 loches (groupers, *Epinephelus* sp.), 2 dogtooth tuna (*Gymnosarda unicolor*) and 15 pink fish (humpback snappers, *Lutjanus gibbus*).

The next day, the trainees used these fish in the fish preservation session. The second group made a shorter trip, from 6 to 8.30 pm, and only caught two snappers (*Etelis* sp.). The third group were out from 5 to 9.30 pm and caught 10 pink fish, a karong (trevally, *Caranx melampygus*), a red mouth (*Lethrinus* sp.) and 7 snappers.

In the classroom, trainees learnt to use transits of two or three landmarks to find their way back to productive fishing grounds. This was a completely new idea for them. They also learnt to use their bottom lines to discover the depths at which they are fishing, the kinds of fish found at different depths, and the importance of tides and currents.

Other fishing techniques briefly covered during the course were fishing (with traps) for lobsters and freshwater prawns. Banks Islanders traditionally make very beautiful lobster and prawn traps, but they learnt some new ideas about how to use them and how to maintain the quality of the lobsters and prawns they catch.

Fish handling and fish preservation

“Treat your fish like a baby” is Nare’s watchword. Trainees discovered how poor handling can increase the risk of damage caused by bacteria and enzymes. They discussed fish quality, and the proper way to gut and gill the fish, clean them with the least possible damage to their skin and flesh, and fillet them.

Then it was time for fish preservation. This was a popular session. In the classroom, four techniques were discussed: bottling, smoking, salting and sun-drying. It was only possible to do practical work on the first two, mainly because the sun (needed for the others) refused to show its face.



The trainees made bottled fish, flavoured with tomato sauce, soy sauce, oil, onion, salt and (for those who liked it) chili. The results were pronounced a “number one” substitute for imported tinned fish, and there were many demands for more.

Before smoking fish, trainees made a smoke-dryer, using a 200-litre drum, reinforced with rod and copra mesh wire. They used sawdust to make smoke during the lesson, but will normally use copra husks. The fish were sliced and flavoured with honey before smoking and should have been dried in the sun for a week afterwards.

This was not possible, but the rapid growth of mould on the fish after smoking was a valuable lesson in the need for drying. People who tasted the smoked fish said they liked it, but it is not a normal part of Vanuatu diet and it remains to be seen whether it will “catch on”.

Another topic covered was ciguatera fish poisoning. Nare’s students were interested to discover what causes ciguatera and why people should avoid damaging reefs – an activity that causes the organism responsible for fish poisoning to increase very fast. They also discussed the plants that can be used to treat fish poisoning, one of which, known as false tobacco, was not known to them, although they traditionally use many others.

Net making and repair

Under Nare’s guidance, the trainees made a gillnet 10 m long and 1m deep, complete with floats and sinker, which was left at Sola for use in the future. They also had hands-on training in mending and patching nets and learnt to make their own netting needles from bamboo. Further practical activities

included each trainee making a hammock to take home, and making a volleyball net for Arep Junior Secondary School, whose classroom they were using.

The original timetable for the course had programmed a practical session on gillnetting. However, it was not possible to do this, because in the interests of good resource management, Torba Province has very wisely placed a tabu on gillnetting, spear-fishing and shell collection in the area near Sola.

Resource management and fisheries laws

The tabu placed by Torba Province is a good example of the need to manage resources wisely. Among other topics, Nare emphasised the need to conserve mangroves as a nursery for fish, and to avoid taking turtle eggs and female turtles so that turtles can once again become plentiful. He also explained Vanuatu fisheries law as it applies to such resources as lobsters, coconut crabs, conch shells, turtles, dugong and whales. A copy of this portion of the law in Bislama was given to each trainee.

Resource materials

Each trainee was given notes in Bislama on all the topics covered by the course.

Copies of SPC’s safety-at-sea posters were put in the Torba Provincial Council Chambers at Sola, and the template for the fishing reel, fish quality posters and copies of the fisheries law and spare copies of the trainees’ notes, were also left at Province Headquarters for reference.

Closing ceremony

The course ended on 14 July with a closing ceremony, opened with a prayer by Father

Luke Dini. Speeches were given by Provincial Secretary-General Father Baldwin Lonsdale and by August Fred on behalf of the Vanuatu Maritime College. Mr Abraham Eldads, Principal of Arep Junior Secondary School, officially closed the courses. All participants were presented with certificates by their instructors. The final touch was the closing feast, for which Nare's trainees caught lots of good, fresh fish.

Conclusion

The students' eagerness to learn is an indication of how valuable this kind of course can be. Torba Province is one of the most remote areas of Vanuatu, consisting of scattered islands of which only some have air strips. Flights are not frequent, and visits by inter-island cargo ves-

sels are rare. The people therefore need to be self reliant, and fishing is a valuable activity for them.

The idea of running two courses simultaneously, with people from each island in attendance, is that trainees from one course can pass their skills to trainees from the other, as well as to other people. All trainees indicated that they would do this, and one particularly valuable trainee was Mrs Shirley Dick, who is in charge of Women's Affairs for Torba Province and whose job is training other women.

August and Nare's next courses will be held in September, again in Torba province, but this time at Loh for people from the Torres Islands – the northernmost islands in Vanuatu.

Thanks

The Vanuatu Maritime College is very grateful to the following for their assistance:

The Torba Provincial Government Council, especially Secretary-General Baldwin Lonsdale and Assistant Secretary-General Christopher Mackenzie, for their help with arrangements,

The Principal of Arep Junior Secondary School, Abraham Eldads, for making a classroom available,

George Couscous, for providing food for the two instructors,

Marcel Rosflender of the Santo Boatbuilding Yard, for the fishing reel template.



Practical work on a Yamaha outboard engine.

A lot of concentration was needed to learn how to whip rope.



Four boats were pulled ashore on coconut-log rollers...
...and thoroughly cleaned inside and out.





It's good to find that the techniques learnt in the classroom produce real results.

That bottled fish is really tasty – better than tinned fish.



Our families will enjoy resting in these home-made hammocks.

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