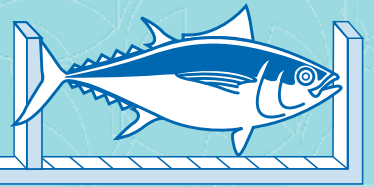


Fork length



N e w s l e t t e r

THE OBSERVER AND PORT SAMPLER NEWSLETTER
for the tuna fisheries of the Western and Central Pacific Ocean – Issue #8 – May 2009

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It's been a while since we last wrote, but a lot of work has been done in the meantime. Last year (2008) was a record year for observer training; additionally there were a number of workshops which focused on tuna data collection (the 6th and 7th Observer Coordinators' Workshops, the 2nd Tuna Data Workshop), and several regional and subregional management meetings delivered outcomes that will significantly affect tuna sampling programmes. The most significant outcome was the decision taken at the 3rd Implementing Arrangement of the Parties to the Nauru Agreement (PNA) group to require 100% observer coverage on purse-seine vessels. Recent changes in basic training put extra pressure on the regional coordinators (i.e the introduction of new national observer trainers for Papua New Guinea [PNG] and Solomon Islands and competency-based training standards), while new sampling initiatives like spill sampling on purse-seiners also required time and effort on their behalf.

2009 is also shaping up to be a busy year. The 3rd Tuna Data Workshop will take place in June. If you want to catch up with the outputs of the last workshop you can visit our website at <http://www.spc.int/oceanfish/Html/Meetings/TDW2/index.htm>. The Tuna Fisheries Data Management System (TUFMAN), which facilitates immediate access to national tuna data, has now been installed in most countries that don't already have their own national database. To further increase countries' autonomy in tuna data management, video training for TUFMAN is being prepared. It is hoped that the video training, along with TUBS—the observer component of TUFMAN—will be made available in 2009.



Hugues Gossuin
*the recently recruited
New Caledonia
Observer Coordinator*

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Of course, there is no point spending time entering your national data if you are going to lose it all in one quick moment of misfortune. With sensible precautions, you can reduce this risk considerably. Read Colin Millar's article on backing up data.

The Secretariat of the Pacific Community (SPC) and the Forum Fisheries Agency (FFA) hope to hold another Observer Coordinators' Workshop. *Fork length* will be there and we hope to issue our next newsletter soon after that workshop. We will also get a chance to report on the 3rd Intersessional Working Group—Regional Observer Programme (IWG-ROP3) that will take place in March. The Western and Central Pacific Fisheries Commission's (WCPFC's) Ad Hoc Task Group—Data (September) and the 8th Data Collection Committee (provisionally scheduled for December) are another two workshops which may affect the work we do.

Workshops and meetings allow us to move forward and share ideas, but the real tuna data work is done on a day-to-day basis in the fisheries departments around the Pacific. Leading by example is a great way to encourage your peers. Palau is one country that has done a great job collecting and managing tuna data over the years. If you want to get an idea of how they do it turn to page 5. Finally, keep your eyes wide open while you read this edition of *Fork length*. You may find it financially advantageous.

And as they say in Palau, *Kasmesumech* (farewell).

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Data collection

Collecting 'snapshot' data from the tuna tagging campaign

Generally, for tuna data to be effective it needs to be gathered continuously and collected over long time periods. One type of tuna data—tagging data—does not adhere to these normal rules; it is collected as a once-off endeavour. Tuna tagging cruises are intense, but limited periods of data collection, which aim to capture a detailed snapshot picture of the fishery. SPC is currently in the middle of its third regional tagging campaign. Previous tagging cruises were carried out by the Skipjack Survey and Assessment Programme (SSAP 1977–1981) and the Regional Tuna Tagging Project (RTTP 1989–1992). These campaigns concentrated on capturing information about skipjack and yellowfin and the data obtained has been fundamental to improving the accuracy and precision of stock assessments. In addition they provided information on fish growth and movement which is used not only for stock assessment purposes but also in forecasting tuna distribution and in the analyses used in National Tuna Status Reports.

The current tagging campaign kicked off in PNG in late 2006 with the specific intention of increasing our knowledge on bigeye, while continuing to collect data on yellowfin and

skipjack. Previous tagging campaigns looked at the Pacific-wide movements of tuna, but this project's focus is more limited, concentrating on the movements of tuna in the equatorial area and their behaviour around fish aggregating devices (FADs). The number of FADs has increased significantly since the last tagging campaign and information is required to understand the effects they are having on tuna movements, both horizontally and vertically. Archival and sonic tags, which like most modern technology have improved significantly since the last tagging campaign, will help to capture more detailed information on movements of tuna. Finally, the latest tagging campaign is being expanded to cover tuna fisheries in the equatorial Pacific (10° N to 10° S) between 140° W and 130° E longitude,



A tagged skipjack is returned to the sea in PNG

with the intention of gathering more information on how current fishing practices are affecting local stocks. It is true that tuna are a highly migratory species, but some tuna choose to stay around the same area for a significant proportion of their life. Some of these local populations may be under more fishing pressure than the regional stock, so it will be helpful to learn more about them and how they interact with the regional stock. The current tagging campaign aims to do this.

Data collection for the tuna tagging campaign begins on the tagging vessel. Unlike observer data collection no data forms are used, initially at least. An MP3 voice recorder is used to quickly and accurately record information on the tuna, which must be returned to the sea as quickly as possible. The species code, fork length, and the condition and quality of the fish are recorded by the tagger. This information is transcribed onto data forms, which are very similar to the pole-and-line and longline observer catch monitoring forms (PL-3 and

LL-4), immediately after the tagging has ceased. At the end of the day all of the data is entered into the tagging database. Another form which would be familiar to any observer taking part in the tagging campaign is the tagging vessel's daily log form. It strongly resembles the PL-3 but is modified to record the total number of fish that have been tagged, and not the total amount of fish that have been landed.



Tagging and data collection

CONVENTIONAL TAG RELEASE FORM																			
REVISED: JUL 2006																			
PROJECT CODE:					CRUISE:					VESSEL:					PAGE: OF				
SCHOOL INFORMATION																			
DATE :					TAGGED SCHOOL No.				START TIME :			END TIME :			AREA:				
COMMENTS :																			
TAGGER INFORMATION																			
TAGGER :				ASSISTANT :					CRADLE :			FIRST TAG NO. :				LAST TAG NO. :			
RELEASE INFORMATION																			
No	SPECIES	FL	COND	QUAL	No	SPECIES	FL	COND	QUAL	No	SPECIES	FL	COND	QUAL	No	SPECIES	FL	COND	QUAL
01					26					51					76				
02					27					52					77				
03					28					53					78				
04					29					54					79				
05					30					55					80				
06					31					56					81				
07					32					57					82				
					33					58					83				
					34					59									

The tag release form is similar to the observer catch monitoring forms (i.e. PL-3 and LL-4 observer form.)

Caution! Observers are trained to record their information directly onto data forms. **They should not use voice recorders to record their data.** Staff on the tagging vessel have excellent back-up support to ensure their equipment is working properly, as well as dedicated office space and enough time to transcribe their data. Observers do not have the same level of data collection support. To avoid unnecessary loss of data all observer data must be recorded directly onto data forms.

Recording information on the tagged fish is of course vital, but all the hard work pays off when tags are recovered and the basic details about the recovered tuna recorded. The main method of documenting these essential details is with the **tag recovery form**. This form helps tuna monitoring staff, and identified industry personnel, to capture the required information. A copy of this form has been placed into all of the observer workbooks (2007 edition), and an electronic version is available on the SPC website:

http://www.spc.int/oceanfish/html/tag/rttp2/RegisterTag_new.asp

Providing the information requested on the form will not raise too many challenges for tuna monitoring staff, but the data fields asking for the ‘reliability’ of the data require some explanation. The tag recovery form is unique in requesting this information. All other tuna data forms presume that the data are reliable and dependable, as they are generally collected by trained personnel or experienced industry workers, and there are routine data quality checks in place. The transitory and fleeting nature of the tagging campaign means that many of the people who recover tags and supply information will be doing so as a one-time activity. They may lack the skills or even the memory to properly report the data. To combat these reporting difficulties the tag recovery form provides space to note how reliable the data is. As an example let’s look at length measurements. If the tag was recovered onboard a vessel, with an observer, and the observer measured the fish with his or her caliper, the length measurements could be marked down as reliable. Alternatively, if a small canoe fisherman recovered the tag and then took more than two months to report it, and the length measurement was reported at ‘around

two feet’, then the length measurement should be recorded as unreliable. The reasons that the information is considered unreliable (time delay, lack of measuring instrument etc.) should also be recorded.

Another tuna data collection strategy unique to tuna tagging is known as data espionage. SPC staff members Siosifa Fukofuka and Brian Kumasi have trained a number of senior observers, mostly in PNG but also in the Federated States of Micronesia (FSM) and the Republic of the Marshall Islands (RMI), in this delicate task since late 2006. The observers are trained to ‘secretly’ tag landed fish, without being spotted by the fishers, during their normal trips. Known as ‘tag seeding’, the information resulting from this practice allows scientists to predict the number of tuna with tags that are captured by fishing vessels but are not subsequently reported. In 2009, SPC is aiming to do tag seeding on 100 observer trips. This information is essential to the tagging campaign, so a large monetary reward is being offered to senior observers (who have completed special tag seeding training) to carry out this task. Up to USD 100 is being offered for second and subsequent trips during which senior observers manage to seed 25 tuna (20 with normal tags and 5 with double tags). To highlight this important work, we have secretly slipped our own tagging competition into this edition of *Fork length*. The competition is easy. There are three tags secretly hidden somewhere in this newsletter. Gather all of the tag numbers and send them to observer@spc.int or by letter to the SPC address on the front of this newsletter. Mark the letter ‘observer competition’. The first three entries will receive a USD 50 cash prize. The competition is only open to SPC/FFA trained observers and will remain open until the next edition of *Fork length* is published.

Results of the tagging campaign so far

The current tagging campaign started in late 2006 and has visited the exclusive economic zones (EEZs) of PNG, Indonesia, Philippines, Palau and FSM.

	Releases	Recoveries	Percentage
Skipjack	100,894	10,813	10.71%
Yellowfin	56,335	6,055	10.74%
Bigeye	4,446	559	12.57%
Total	161,675	17,427	10.77%

The next phase of the tagging campaign will start in March 2009 and visit FSM (Pohnpei and Kosrae), RMI, Kiribati, Nauru (if sufficient bait can be found), Tuvalu and the south-eastern islands of Solomon Islands before the tagging vessel returns to its home port in Noro, Solomon Islands. Keep an eye out for the *Soltai 105* vessel and give it a wave if it sails past your boat. If you want to keep up to date with the new tagging campaign bi-monthly summaries are available on the SPC website:

<http://www.spc.int/oceanfish/html/tag/rttp2/>

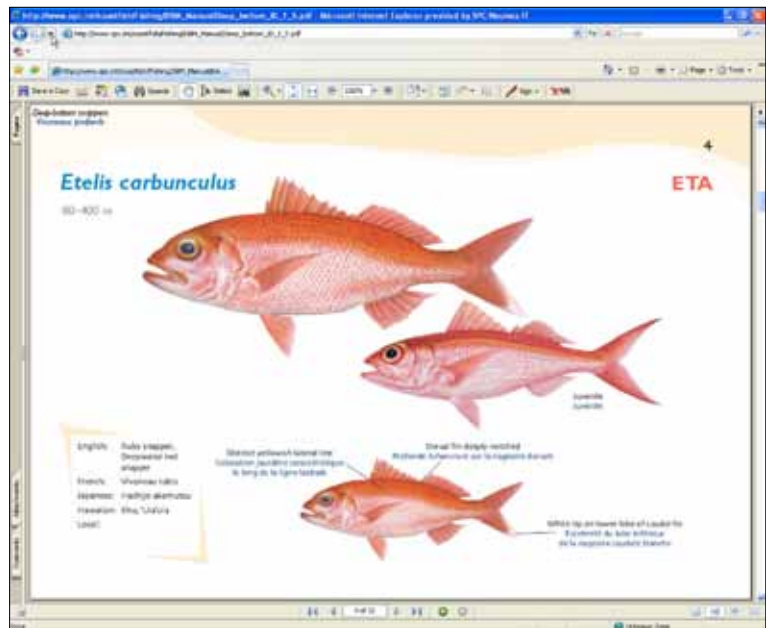
A new deep-bottom fish identification guide

A new fish identification guide for deep-bottom snapper fishermen has been produced by SPC's Fisheries Information Section. Normally tuna fishery observers will not come across bottom fish, but it does happen occasionally, when for example a longline vessel is fishing close to a sea-mount (a mountain rising from the sea floor). This new identification guide will help observers identify the exact species of bottom fish they have encountered. We won't be issuing one of these identification guides to every observer, but we will send some to each of the national observer programme offices, so most observers should have access to a copy.

The layout of the guide will be familiar to observers who already have a copy of the longline species identification guide. The same clear style and United Nations Food and Agriculture Organization (FAO) three-letter species codes are used. Many members of the team were involved in producing both publications. We acknowledge the significant contributions made to this production by SPC staff members Lindsay Chapman, Aymeric Desurmont, Youngmi Choi, Pierre Boblin, William Sokimi and Steve Beverly, as well

as Hawaii artist Les Hata. Electronic copies of the guide are available from SPC's website:

http://www.spc.int/coastfish/Fishing/DBM_Manual/DBM_E.htm



A ruby snapper outlined in the deep-bottom fish identification guide

Data management

Palau

In a small, recently renovated office, staff tasked with coastal and oceanic fisheries duties share office space. In the oceanic division, a strong female presence, a rare commodity in Pacific Islands fisheries offices, glows strongly. Nanette, Kathy, Latti, with administrative support from Stacey and Helena, all under the supervision of the bureau's Director—Theofanes Isamu, tackle the large task of monitoring the 10,000 mt of tuna that are caught in their 630,000 km² EEZ. Sampling is an area with more male involvement and a solid group of four long-

Entrance into Bureau of Marine Resources offices



term port samplers collect length frequency data from all port unloadings (Rimirsch Katoang [Supervisor], Clay Saridel, Luciono Aderiono, Lucinio Isidoro and Henry Ngirarois). Compliance support is given by Palau Division of Marine Law Enforcement in the Ministry of Justice and the growing observer programme is attached to that section.

Regionally, Palau’s tuna fishery is comparable to other medium-sized fisheries in FFA member countries, but in Palau the tuna fishery is economically overshadowed by the successful tourist industry. There have even been recent national calls to close the tuna fishery as there is only minor domestic involvement, but for now the fishery remains open and the Bureau of Marine Resources (BMR) does its best to implement the new rules and regulations required by the Western and Central Pacific Fisheries Commission (WCPFC), while trying to gain support from political leaders.



Longline vessels dominate the Palauan tuna fishery. Typically around 120 locally-based longline vessels



Unloading in Palau

from China, Taiwan and Korea) are licensed to fish in the oceanic waters of Palau. As they bait their hooks and set their lines into these equatorial waters they offer prayers and burn incense with the hope that some of the approximately 10 million hooks they set annually will capture their target species—yellowfin and bigeye. To improve their chances the fishing captains closely follow the oscillations of the moon. The recent fluctuations in fuel prices have increased their devotion to the moon phase, with many vessels tying up and keeping their port berths until they are very sure that the moon is once again favourable for fishing. As the moon starts to rise the vessels head out to sea, often to the same general area—the central east part of Palau’s EEZ, in the waters next to the FSM border. Sharks are no longer part of their catch. National legislation requires all vessels to discard any sharks that do get hooked. When the fishing is over, the vessels return to port and unload their fish under the watchful eye of both Palauan customs officials and port samplers. Palau’s close proximity to Japan and flourishing tourism industry allow plenty of opportunities to get the product to the market. However, the crash of a tuna freight plane in 2008 did seriously hamper tuna exports for a number of weeks. It is also true that the capacity of a shipping carton transporting tuna from Palau might be seriously tested at times as length frequency data shows that Palau has some of the largest bigeye tuna in the region.

With a small monitoring unit and a large tuna fishery how has Palau managed to obtain high logsheet coverage levels over the years? Palau’s approach is one that many countries could find useful. The government does not actively collect industry data but instead has firmly placed the responsibility on industry to submit the data. Government staff then use their time and energy to follow up. Less and less effort is required for the follow-up. The groundwork has been well laid and most companies gracefully comply, submitting their data on the tenth day after the end of each month.



Using whatever is available, tuna data filing in Palau



The companies typically deliver a large manila envelope containing the logsheets, unloading information, exportation documentation and vessel activity and port visit log (Palau was one of the first countries in the region to implement the activity log) directly to the BMR office. If, by chance, a company is late, the licensing officer (Kathy) calls with a gentle reminder that regular submission of data is important for future licence renewals. In general, a company representative will then quickly come by the office to hand the data in.

Colin Millar and Kathy Sisor use TUFMAN in Palau

Tuna data monitoring in Palau is efficient, and there are signs that the country is moving toward the 'perfect' monitoring situation. In a utopian world every tuna would announce its birth to the tuna monitoring office, gain an identification number and then regularly submit itself for measurement until announcing the date of its final day. We are still a long way from that, but Palau has made a start. Target tuna are bar-coded minutes after being unloaded from the vessels. This unique number

One of the first SPC/FFA basic observer training courses took place in Palau in early 1996. Both participants and trainers were faced with a steep learning curve, but the benefits continue today; many of the current port samplers first learned how to take a fork length measurement during that training course. Additional training sessions took place in 2003, 2006 and 2008. With trained observers available the nominated Observer Coordinators (Donald Ringlap, Kathy Sisor and Ian Tervet have all been Coordinators) were challenged with getting people out to sea. The low level of Palauan observer activity before 2007 is more a reflection of the political support for observer work at the time than a reflection on the efforts of the Coordinators. It has taken time for the 'powers above' to appreciate the benefits of having observers onboard licensed vessels and to defy the loud and immediate calls of industry for unencumbered access to the country's EEZ.



Bar-coded tuna

stays with the tuna until it is finally sold—normally on the Tsukiji market in Tokyo. Its distinct characteristics are captured and added to as it moves across the globe from the point of capture to the point of sale (i.e. weight, sashimi grade, export route and sale price). This information is easily transferred electronically. An excel file can easily be produced which theoretically can be imported directly into TUFMAN. The process could not be easier!

Although in the beginning there was a certain reluctance to put one observer onboard vessels, in one case in 1998 a vessel was boarded by two observers. Hoping to share some of his skills Siosifa Fukofuka (SPC) boarded a vessel with local observer Jersey Ngirachitei. This trip created a situation that has been highlighted in observer training ever since. When the captain realised that he had been fishing in the wrong zone he asked one of the observers to hand over his data. Luckily with two observers onboard a second copy of the data was kept and there was no loss

of data. If you are onboard alone and asked to hand over your data you are advised to always consider your personal safety first. If necessary, hand over the data, but continue to document the trip in your diary, paying special attention to recording the details relating to the request to hand over the data.

A Palauan observer will spend many of his or her sea days on the locally based Taiwanese fishing fleet. The living conditions onboard are far from ideal, with bare boards and a restricted menu. Their trips are often short, with a maximum length of around 10 days but typically much less than that. Palauan observers benefit from a high at-sea dollar rate, but a low number of total sea days means nobody is getting rich. With local legislation banning shark takes a Palauan observer will rarely get the opportunity to measure a shark—most are cut off from the line before landing—but

they still have the pleasure of measuring some of the biggest bigeye tunas in the region. So far the Palauan observer programme has made a slow but effective start. The programme has built on its foundations and since 2008 has increased its output significantly. There is every reason to believe that with the dedication and support of the current Coordinator, Ian Trevet, it will continue to move in the right direction.



Jeffrey Tarkong (Palauan observer) receiving his training certificate

Backing up data—why you need to do it and how to do it

You have heard the phrase before, but what exactly does it mean to back up data? Backing up data is the process of making a copy of a file or files. The copy might be a single document, a folder containing thousands of files, or an entire database. The reason for making a copy is to prevent ‘data loss’, which is when you lose a file or files that contain important information. Backing up data is one of the most important—yet one of the most neglected—areas of computing. It should be at the top of everyone’s computer maintenance list, along with virus protection.



How can data be lost?

Unfortunately there are many ways in which you can lose data:

- Accidentally deleting a file or even a folder.
- Losing the ‘media’ (e.g. disk, USB drive, portable hard drive, laptop, etc) that the files are on. Loss also includes theft.
- Virus attack.
- Software problems, such as corruption of the file while editing it.
- Electrical problems or power cuts.
- Physical failure of the media storing the data.

These are common events and they can happen to anyone, at any time. Media failure, the last problem on the list, is one of the hardest to overcome. This happens when the actual physical media, such as a hard disk, CD or USB drive fails and can no longer be read. Hard disk drives can be categorised into two groups: **disk drives that have failed, and disk drives that will fail**. It may take a number of years, but a computer's hard drive will eventually fail and you may lose all of the data on the drive. It can happen gradually, or suddenly and without warning. Don't think that a new hard drive is safe; it is not. New drives as well as old drives can fail.

If you back up well then losing data will not have a devastating effect. Imagine if you enter data for several years into TUFMAN, and then one day you lose all of the data because the hard disk storing TUFMAN fails. With no back-up you will have to enter all of the data again, which could take years, whereas if you have backed it up you may only lose one day or one week's worth of data, depending on when the last back-up was made.

How to back up

Backing up data means keeping a copy of important files in a separate location. This is done by saving a copy of the file that you want to back up in a different location. Saving a copy of a file onto the same hard disk as the original is not a good idea because the whole hard drive might fail. The place you save the copy of the file should be physically separate for the back-up to be effective. Some good places to back up your files are as follows:

- To a server back-up—Most network servers are set up with a regular back-up system, e.g. tapes, and will back up certain folders on the network at least once a week. If your office does this, then storing your important files in an area of the network that is backed up is a great way to secure your data. Don't leave your important files on the C: drive of your computer or laptop. If your office has a server with a back-up system, make sure that it is functioning and regular back-ups are being performed.
- To another hard drive—e.g. to an external hard disk, or another computer on the network.

- Onto CD or DVD—copying files onto a CD or DVD is not a bad way to backup data. The only thing to be aware of is that CDs and DVDs do not last forever. Some brands may last for 100 years, but some of the cheaper CDs and DVDs will not last such a long time, and they can also be damaged or scratched, making them unreadable. If the same back-ups are made about once per week then CD/DVD failure is less of a problem. But don't expect your DVD to last 50 years, or you may be disappointed.
- Others—there are other ways to back up data, such as zip drives, memory sticks, and online back-up services. For TUFMAN, SPC holds a copy of your database, so if you regularly (we suggest quarterly) send a copy of the data files to SPC, it is another form of backing up your data.

The best way to back up data is to store the copies as far away as possible, e.g. in another building. That way, if your office building burns down or is flooded, the back-ups will not be destroyed.

If you don't back up your data, now is the time to start. You should back up any file that you don't want to lose, because unfortunately every file is at risk of being lost and no storage media is risk free. It may take some time to do and seem boring and pointless, but one day your back-ups will save you many days, even years, of your work. If you want the back-up process to happen automatically, you can get a back-up programme that does the back-up on a regular basis and lets you schedule the back-ups with several different options. Last, remember to back up regularly. You don't want to have something happen to your data, then restore your back-up just to realise it is six months old. Depending how much work you do, back up weekly or at least monthly.

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Data dissemination

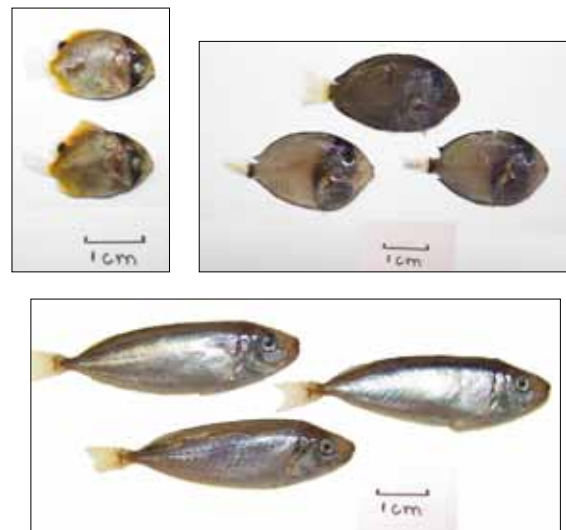
Observer sampling results: Pelagic ecosystem trophic structure in the equatorial Pacific

The stomach sampling project has started to produce some very interesting results. Research organisations from across the Pacific are involved in this project and their links to various national observer programmes have made it possible to collect tuna stomach samples from across the equatorial Pacific. The organisations involved in the study are: SPC, the University of Hawai'i, the Inter-American Tropical Tuna Commission (IATTC), and the Centro Interdisciplinario de Ciencias Marinas (CICIMAR)—Mexico. To date a large number of stomach samples have been collected and scientists now have a good understanding of the differences between the western and eastern Pacific equatorial food chains (trophic structures).

The aim of the project is to explain why there are large amounts of tuna in the western Pacific (84% of all Pacific tuna) when there are only very small amounts of plankton (the first step in the food chain) there. This contrasts with the eastern Pacific where there are much lower amounts of tuna (16% of all Pacific tuna), but double the amount of plankton. Before this stomach sampling project started scientists thought that tuna from the western Pacific might be travelling toward the central Pacific to feed in the plankton-rich waters that run all the way to the eastern Pacific. In addition to the stomach samples muscle samples were taken. It could be said that these muscle samples act as natural fish tags, since analysing certain chemicals (isotopes) in the muscles can allow scientists to map the movements of tuna. When the movements of the sampled tuna were mapped some surprising results were found. It seems the tuna do not move around as much as we had previously thought.

The stomach sampling also produced some other unexpected results. Stomach contents showed that yellowfin, bigeye and skipjack caught by purse-seiners across the equatorial Pacific have a similar percentage of empty stomachs. However, when they looked at stomachs that were not empty, the tuna from the western Pacific had two to four times more food in their stomachs than the tuna in the eastern Pacific. The stomachs of western Pacific tuna contained mostly fish, while stomachs of tuna in the eastern Pacific

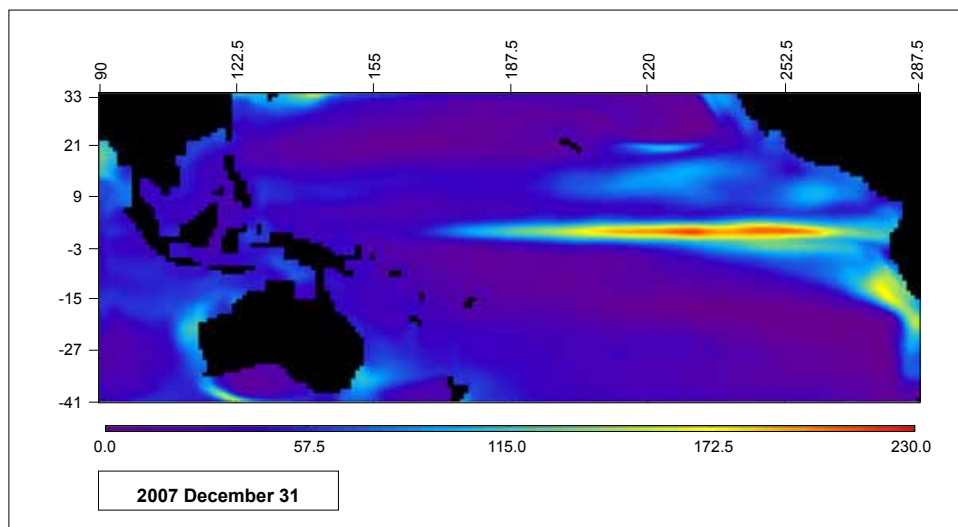
contained more squid. Different food species were found in the different equatorial areas. Mantis shrimps (Stomatopoda), anchovies, and juveniles of reef-associated fish (surgeonfish, butterflyfish) were often found in the stomachs sampled in the west, while the swimming crab *Callinectes* sp. and 14 squid species, particularly the jumbo squid *Dosidicus gigas* were often found in the east. Some food species were found both in the western and eastern Pacific, but the proportions varied. Many different species of flying fish were eaten in large amounts in the east, along with juvenile Scombridae (tuna- and mackerel-like fish), while in the west only juvenile skipjack (no other Scombridae) were eaten.



Juvenile reef fish (Top left: butterflyfish;
Top right: surgeonfish; Bottom: rabbitfish)

Using the information gained from stomach samples new food-chain models were developed. The new Ecopath ecosystem model demonstrated that there are clear differences between the western and eastern ecosystems. In the eastern Pacific there is a large influence of squids and juvenile bullet/frigate tuna (*Auxis* spp.); while in the western Pacific Scombridae juveniles are one of the main food sources. Another unexpected result was that this new Ecopath model showed that there is a disagreement between two other models developed at SPC. The

amount of prey species predicted by the Spatial Ecosystem and Population Dynamics Model (SEAPODYM) ecosystem model is too low to sustain the amount of tuna predicted by the MULTIFAN stock assessment model.



Primary production prediction by Earth System Science Interdisciplinary Center (ESSIC) for 2001–2004, used by the SEAPODYM ecosystem model.

One explanation could be an underestimation of the amount of food that is available to tuna in the western Pacific. It is possible that the importance of reef- and island-associated preys (i.e. juvenile fish) has been underestimated for the western Pacific, which is scattered with islands and atolls. Researchers also think that there is a possibility that food is replenished from the eastern Pacific through oceanic currents. Scientists hope to be able to look into these two new theories in the future. For more information on this work contact valeriea@spc.int.

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Factors affecting the use of purse-seine species composition data collected by observers and port samplers

Does the sampling data you collect ever get used? Yes, it does. Here we highlight some of the results of the ongoing analysis into the species composition data (species ID and length measurements) that have been collected by port samplers and observers.

Last year, Tim Lawson, SPC's Principal Fisheries Scientist (Statistics) continued on the work he started in 2001 in purse-seine species composition. Tim has now presented four papers on the subject, initially to the Standing Committee on Tuna and Billfish (SCTB),

an annual meeting which evolved into WCPFC's Scientific Committee (SC). His earlier papers were focused on analysing the species composition of purse-seine catch data. However, when carrying out that work he found some problems with the sampling data. In this new paper, Tim looked further into the reasons some of those problems have occurred.

Here are some of the possible sources of sampling errors that he looked at.

1) Grab sampling: Can samples selected by number of fish be confidently used to estimate the species composition in terms of weight of fish?



On purse-seiners, samplers are currently asked to randomly sample a specific **number** of fish (generally five fish per brail). This type of sampling is called ‘grab sampling’. When collected and processed, the data from these grab samples must be converted into a sample weight, as scientists final estimates of the species composition are always in terms of the total **weight** of the catch. As it turns out, there is a purely statistical problem such that the species composition (in terms of weight of fish) determined from grab samples is biased. (For those interested in statistics, the problem has to do with the expected value of a function of a random variable.) The bias results in overestimation of the proportion of smaller, more numerous fish (i.e. skipjack and small bigeye) and underestimation of the proportion of

larger, less numerous fish (i.e., yellowfin and large bigeye). The extent of this bias is relatively small and diminishes with an increase in the number of fish sampled.

Caution! Observers and port samplers are still required to carry out the advised and current sampling protocol—grab sampling (or random sampling by number) as previously advised. **Samplers should not change their sampling protocols until advised to do so.**

2) Spill samples: Are they better?

One possible solution to the problem associated with grab samples is for samplers to create a sample without having to grab individual fish. Tim explained the problem to Peter Sharples and Siosifa Fukofuka and asked them to come up with a solution. They did so in March 2008. With their energy levels waning after enthusiastically delivering a basic observer training course in PNG, they hopped onboard the *Dolores 828* at 0230 hrs and boldly launched themselves into the first set of the day at 0530 hrs. A PNG observer, Lawrence Pero, was already onboard, and he continued doing his normal grab sampling at the same time Peter and Sifa did the new ‘spill sampling’. The term spill sampling refers to how the fish are spilt into a container so that the sampler does not select the individual fish to be sampled. For the spill sampling they made use of a large plastic bin found on the dockside before their departure. They asked the vessel to fill up this plastic bin once during every tenth brail. Then they got to work recording length measurements of all the fish in the bin. They measured every single fish. Spill

samples tend to include three times as many fish per set as grab samples, so it was a lot of work! Data have now been analysed from four trips during which both grab samples and spill samples were conducted, and the results are clear—spill samples are much more accurate than grab samples.



Lawrence Pero doing grab sampling

3) Do the samples come from all the typical set sizes?

It is important that a wide range of set sizes be sampled (i.e. large, medium and small sets). Previous research has shown that there are generally more skipjack in large sets, so if we only sample large sets we will overestimate the amount of skipjack and underestimate the amount of yellowfin and bigeye that are in the total annual catch. Observers sample every set caught by the vessel, so normally their data will capture tuna from all the set

sizes. However, port samplers are inclined to sample larger sets. This is because the port sampling protocol requires that only wells with catch that have similar catch parameters (i.e. the same fishing location, time and school association) can be sampled. To achieve this port samplers often select wells that have tuna from one large set only, as tuna from one set will always have the same catch parameters.

4) Do the samples come from all the typical fishing areas?

The species composition of purse-seine catch changes across the Pacific. We know that there are more yellowfin in the catch taken from the western Pacific and more bigeye in the central and eastern Pacific. To get good species composition results we need to get samples from

across the Pacific. The analysed data show that observer data do include samples from catches across the Pacific. However, the port sampling data do not capture all of the fishing areas due to the lower sampling coverage.

5) Size selection bias: Do samplers choose larger fish?

The analysed data suggest that observers miss the very small and very large fish. A lot of training time has been devoted to teaching samplers the correct random sampling techniques, but some problems still exist. It is possible that samplers are unconsciously choosing larger fish and this is something they need to guard against.

It helps if a sampling protocol is chosen and strictly adhered to. For instance, you can decide to pull out the first five tails that are the closest to a full arm's reach away. Port samplers may be subject to the same size selectivity bias, but this has not been examined.

6) Size layering: Are larger fish brailed first?

One question that often arises is whether tuna tend to get 'layered' by their size or species inside a closed net or in a well. One way to examine this is to look at the species composition and average size of fish from different periods of the brailing process. By comparing data from the first 10 per cent of fish sampled in a set to the second 10 per cent, the third 10 per cent, etc., up to the tenth 10 per cent, it was found that while there is no layering in terms of the species composition, on average, there is a tendency for smaller fish to be

sampled at the end of the brailing process. It should be stressed that these results are 'on average'. There may be obvious layering in terms of the species composition in a particular set, but when considering the tendency over all sets, layering in terms of species composition averages out and so it is not an issue. On the other hand, layering in terms of size does not average out and so it is indeed an issue; this means that it is important to always sample throughout the brailing process.

7) Size and species sorting by vessels: How often does it happen?

We know that some vessels sort their catch after it has been chilled, often storing tuna of the same size in dry lockers or wells. Some reports have even suggested that vessels sort their catch by both size and species. If a port sampler samples a well that contains tuna that have been already sorted by size and perhaps species, we will get a false idea of what the original size and species composition was. Port reports seem to suggest that well mixing is happening more frequently, and

unfortunately the practice is often poorly documented by the vessels. The new 2007 SPC/FFA regional purse-seine logsheets do ask vessels to record all well movements. Hopefully, this will help us to capture how often this practice is occurring.

At the end of his study Tim summarised the problems with observer and port sampling species composition data.

- Port samples under-represent very small fish and are subject to set weight bias, grab sample bias and bias related to well mixing, but apparently not size selection bias.
- Observer samples are subject to grab sample bias and possibly size selection bias, but not set weight bias and well mixing.
- Spill samples are not subject to grab sample bias or size selection bias.
- Conclusion: The only sampling protocol with the potential for providing unbiased species composition data is spill sampling conducted by observers at sea.

We can therefore expect that spill sampling will progressively be introduced into the observer programmes in the region.



Seventh Observer Coordinators' Workshop

Palau generously hosted the 7th Observer Coordinators' Workshop (OCW) from 15 to 18 July. Coming less than a year after the 6th OCW, the workshop was convened to inform national observer coordinators of the outcomes of recent regional and subregional management meetings, which will necessitate changes to the administration of observer programmes. The workshop featured a varied and packed agenda and was facilitated by Tim Park (FFA) and Peter Sharples (SPC), who arrived directly from the 2nd Intersessional Working Group—Regional Observer Programme (IWG-ROP2). Karl Staisch (WCPFC) and John Kelly and Joe Arceneaux (US National Marine Fisheries Service [NMFS]) also shared their expertise at the workshop.

Here, for those who could not attend the meeting, are some of the main themes that were explored:

Funding—How much is required and where can the funds be found? This was not the first issue to be raised, but it was a recurring theme and one that affected many of the agenda items. It is important that funding for observer programmes be clarified before national programmes are set up. With that in mind SPC and FFA can offer advice to programmes on budgets and costs. A spreadsheet to calculate future observer programme costs was presented at the workshop. Many national programmes claimed lack of funds was one of main reasons for the current low coverage levels, but regional managers pointed out that target coverage levels should be considered during bilateral fishery negotiations. Very few Pacific Island countries and territories (PICTs) have managed to properly fund their observer programmes through bilateral negotiations. PNG was commended for negotiating a licensing fee level that allows them to carry out their observer work. The fees they receive

are somewhat similar to the observer levies set by the United States Multilateral Treaty (USMLT) and FSM Arrangement (FSMA) observer programmes run by FFA. This, regional managers advised, shows that vessels are prepared to pay such fees, and other countries should keep this in mind when negotiating future costs. Some of the smaller countries alleged that the aspiration to develop their national fishery was a hindrance to asking vessels to fund the observer costs. On this matter regional managers reminded coordinators that all countries had signed on to a number of regional and subregional agreements that require them to meet certain observer coverage rates.

Training—Once funding has been identified training can be offered. Taking a basic observer training course is the normal entry path for individuals who wish to pursue this unique line of work. During 2008 there was pressure on the two regional secretariats (FFA and SPC) to provide more training courses than before. Seven basic observer training courses were offered in 2008—a new record. This, coupled with new training initiatives (competency-based training and the use of new national observer trainers), put extra pressure on SPC and FFA staff. The demand for 100 per cent observer coverage by PNA countries will obviously increase demands for training.

Sampling—Observers and port samplers who have already been trained may come across new sampling challenges in 2009. SPC hopes to initiate a new longline albacore sampling and tagging project. This project aims to improve the biological information that is available on the albacore stock, which is very important to a number of PICTs (read more about albacore sampling on page 16).

New purse-seine sampling projects have also commenced, initially in PNG; there are plans to expand this work to other national programmes in 2009. A report by Tim Lawson, SPC's fisheries statistician, supports a change in the way purse-seine sampling is done. The current purse-seine sampling protocol is to sample five randomly selected fish. The report suggests that there may be some limitations to this type of sampling strategy and a new sampling strategy (called spill sampling) should be carried out to overcome some of the perceived biases. Participants at OCW were positive about this new sampling initiative, but they noted that cooperation from vessels is required, it might be difficult to carry out at times, and it may clash with other duties (like counting brails for instance). You can read more about spill sampling on page 11. Additionally, Sifa Fukofuka and Brian Kumasi from SPC began briefing a number of senior observers in the art of 'tuna espionage' in 2008! Observers were shown how to secretly tag tuna that had already been landed onboard the vessel. More

information on the new tag seeding work can be found on page 4.

Debriefing—Who is debriefing, and how can the number of debriefings be increased? Coordinators discussed many of the practical challenges they currently have with debriefing, and a summary of the issues showed that the best way forward was for observer programmes to gain better financial and management support for their work.

Emergency funds—Previous workshops agreed on the need to set up bank accounts in FFA member states to help traveling observers, who may quickly need funds when disembarking in a foreign port. Although those accounts were set up, not all countries have kept up their contributions. The Observer Coordinators voiced the need for greater managerial support to overcome these challenges.

Regional and subregional agreements affecting national observer programmes

At their third implementing meeting the eight parties to the PNA agreement (FSM, Kiribati, RMI, Nauru, Palau, PNG, Solomon Islands and Tuvalu) agreed to make unilateral changes to their licensing terms and conditions (LTCs). These changes have the potential to have a large impact on how national observer programmes in these countries will operate in the future. The fourth LTC clause (monitoring) calls for 100 per cent observer coverage to ensure that all vessels are adhering to these new conditions. The workshop participants were concerned that this may place a heavy burden on observers who are at sea alone, and who have been trained to record and report on what they see, but not to make compliance judgments.

Several of the new LTCs are likely to impact observer programmes. The 'catch retention' clause requires vessels to keep all the fish that they have taken onboard their vessel. There are two exceptions: 1) when the fish is 'clearly and demonstrably unfit for human consumption' and 2) for the 'final set of a trip when there may be insufficient well space to accommodate all fish in that set'. The 'fad closure' clause forbids vessels to fish on FADs between July and September every year. The 'closure of high seas area' clause forbids vessels from fishing in two high seas areas.

The other regional workshop that will affect national observer programmes was IWG-ROP2. Karl Staisch

(Regional Programme Manager) led that discussion.

The WCPFC Secretariat explained that a Regional Observer Programme (ROP) observer trip would occur any time an observer is onboard a vessel that fishes on the high seas, fishes in its own EEZ and one other flag state, or fishes in the EEZ waters of two or more flag states.

National observer programmes, and not individual observers will be recognised by the ROP. Recognition will be gained through an ROP auditing process, which will determine if the national observer programme is meeting the standards set by the commission. The audit will look at a number of different areas, i.e. training, debriefing, codes of conduct etc. Many of these ROP standards have not been finalised, and it will take more time before the process of review, discussion and agreement is finalised by WCPFC. In the meantime the current SPC/FFA observer standards are acceptable to ROP.

Some of the discussions regarding the ROP standards are summarised below:

Vessel size—Foreign nations signaled a preference for limiting ROP to vessels over 24 meters in size. This was rejected by FFA member states, who have placed numerous observers on vessels less than 24 meters over the years. It was also shown that excluding vessels less than 24

meters would eliminate up to 80 per cent of the longline fleet from ROP.

Cadre of specialised observers—This is not a separate observer programme, and normally these observers will be selected from the same pool of national observers, but they may be assigned different duties, i.e. transshipment monitoring.

Safety—An interim standard for safety is for all observers to undergo training in sea safety and

emergency procedures. The safety of individual boats and the right of the observer not to board will be a national programme issue.

At the conclusion of the meeting, the regional and national coordinators expressed their thanks to Palau for offering such agreeable workshop facilities. The national coordinators then turned their attention to returning home, but staff from the regional secretariats stayed on to conduct a subregional basic observer training course, which started in Palau two days later.

Training

New project brief—South Pacific albacore biological research

Background

Since the early 1990s, South Pacific albacore have become an increasingly important species for the domestic longline fleets of many PICTs, in particular New Caledonia, French Polynesia, Samoa, American Samoa, Fiji Islands, Tonga and Cook Islands. These PICTs now account for nearly half the total annual harvest of around 70,000 t. In addition, a significant longline fishery for albacore has been operated since the 1950s by foreign fishing fleets from countries such as Taiwan, Japan and Korea.

Given the importance of albacore to the longline fisheries of PICTs, there have been increasing demands for research on the species. In response, the SPC's Oceanic Fisheries Programme (OFP) has developed a research project for South Pacific albacore in consultation with the FFA Secretariat and member countries and funded by the European Union. The project has a three-year time frame and is designed around the need to reduce uncertainty in stock assessments and to provide better management advice both at the regional and national levels.

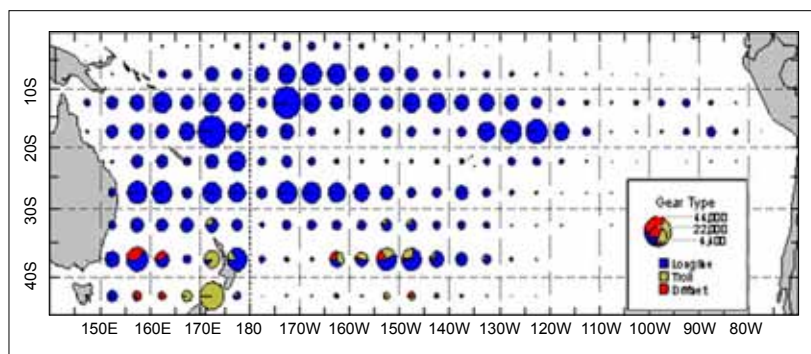
Project objectives

Recent assessments indicate that the South Pacific albacore stock is most likely not overfished and that current levels of harvest are sustainable. However, there remains considerable uncertainty in these assessments

due to our incomplete knowledge on the species' ecology. The objective of this research is to obtain better estimates of age, growth, maturity and fecundity (number of eggs) of albacore in the western and central Pacific Ocean (WCPO). This information will be incorporated into models used to assess the status of albacore stocks and will provide greater certainty in assessment predictions.

Project activities

This project will establish a large-scale biological sampling programme for the collection of albacore otoliths (ear bones) and gonads (reproductive tissue) across WCPO. The project aims to collect otoliths and gonads from around 3000 albacore over a two-year period starting in late 2008.



Distribution of South Pacific albacore catch (t) from 1960 to 2003 by five-degree squares of latitude and longitude for each of three gear types: longline, troll and driftnet. The area of the pie chart is proportional to the total catch.

Like trees, otoliths have distinct growth rings that are counted to estimate the age of the fish. Growth rates can then be determined by relating fish age to fish size.



Gonads are used by scientists to determine the sex of fish and their stage of reproductive development (e.g. immature, mature, spawning), and to estimate fecundity for females. This information is important for fisheries management as it makes it possible to determine the proportion of the population that is reproductively active, which is required to estimate the ecological sustainability of the fishery.



As most PICTs now have well-established observer programmes for their tuna fisheries, observers from the major albacore fishing PICTs of New Caledonia, French Polynesia, Vanuatu, Fiji Islands, Tonga, Samoa and Cook Islands are being asked to collect otoliths and gonads from albacore during observer surveys onboard commercial longline vessels. The assistance and cooperation of these observers will be fundamental to the success of the project.

To ensure that observers have the relevant skills, ongoing SPC observer training workshops have been extended to include an additional component to teach observers the techniques for extracting otoliths and gonads. To date, observers from New Caledonia, Vanuatu, Samoa, Fiji Islands and Tonga have been trained in otolith and gonad extraction. Importantly, the skills that the observers and fisheries managers obtain through this training and through their collaboration with this project should provide countries with the capacity to undertake this type of biological research independently in the future.

For further information please contact Ashley Williams (*Fisheries Scientist*, ashleyw@spc.int) or visit our website:

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



*Sairusi Madigi, Apenisa Sauturaga, Sailosi Naiteqe
and Mitieli Bosevakatubou in Fiji*



SPC/FFA observer courses conducted in 2008

Country	Start date	Number of participants	Number of certified observers	Notes
PNG	February 2008	16	11	National/all gear
Solomon Islands	April 2008	16	12	National/all gear
PNG	June 2008	16	6	National/all gear
Palau	July/August 2008	9	6	Subregional all gear
French Polynesia	August	3	2	National/longline
Vanuatu	October 2008	14	14	Subregional/all gear
PNG	November 2008	16	9	National/all gear



Back row: Peter Sharples (SPC), Fabian Yarafaitiu (Yap), Glen English (PNG), Manasseh Avicks (RMI), Sifa Fukofuka (SPC), Zachary Smith (Palau), Jeffry Tarkong (Palau), Albert Yangowemau (Palau), Joe Arcenaux (Hawaii)

Front row: Elizar Edward, Ian Tarvet (Palau), Latii Shmull–Palacios(Palau), Timothy Park (FFA), Juliet Ueda (Palau), Ali Ezekiah (Pohnpei), Jana-Lynn Ramarui (Palau), Donald Ringang (Palau)



Back row: Pelenato Manu (Tonga), Daniel Kalmet (Vanuatu), Tanuvasa Toetu Pesaleli (Samoa), Glen English (PNG Trainer), Michel Kalopoi (Vanuatu), Rooti Marewenteraoi (Kiribati)

Standing: Iuliano Matagofie (Tuvalu), Semisi Taulaki (Tonga), Jimmy Mailtorok (Vanuatu), Solomone Vakatale (Fiji Islands), Netani Tavaga (Fiji Islands), Sifa Fukofuka (SPC)

Front row: Manoi Kutan (PNG Trainer), Ambica Tasso (Vanuatu), Jiby Siba (Vanuatu), Tim Park (FFA), John Valia (Vanuatu), Timon Etualre (Kiribati)



Back row: Sammy Rapson, Noel Pidil Jr, Pwangi Kawetan, Aquila Lazarus, Gorge Moso, James Kamola, Rudolph Ihua, Peter Sharples (SPC)

Front row: Ambrose Orianihaa (FFA), Michael Albert, Baro Morofa, Mecham Salimibi, Mathew Sakat, Baeta Okena, Sailas Kenatsi, Gima A Gima, Japhet Kiagamba



Enuarurutini Geoff Tama, from Cook Islands, who recently up-dated his database programming skills during an attachment to SPC



Vanuatu port sampling training

SPC trained two new port samplers in Port Vila, Vanuatu during the longline transshipment in the month of December 2008. Auldrine Lowonbu and Smith Wuwut received practical training, measuring and recording 883 albacore tuna (97 per cent of all albacore caught and unloaded) while the *Yuh Chang #3* unloaded its frozen fish to a carrier. Other by-catch such as yellowfin and bigeye tuna, wahoo, moonfish, barracuda, marlin, escolar, mahimahi, skipjack tuna and sailfish were also measured and accounted for during the transshipment.

It is expected that Auldrine and Smith will monitor Port Vila's next transshipment on their own. Vanuatu Fisheries expects more transshipments and unloading will occur during 2009 when the tuna processing plant is completed.



Above: Siosifa Fukofuka, Smith (trainees) and Auldrine onboard *Yuh Chang #3* during the port sampling training

Top right: Auldrine measuring tuna during unloading

Bottom right: Smith measuring albacore tuna during port sampling training

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