

# Biological Sampling Newsletter

for Observers and Port Samplers

## SPC-OFP Ecosystem Monitoring and Analysis Section\*

Issue #6 – 22 April 2008

Welcome to the sixth issue of the newsletter of the Ecosystem Monitoring and Analysis Section of the Oceanic Fisheries Programme (OFP), Secretariat of the Pacific Community (SPC). In this issue, we present details of our work on the Pacific Tuna Tagging Programme.

### END OF PHASE 1 OF THE PACIFIC TUNA TAGGING PROGRAMME – LET’S GET READY FOR PHASE 2

Large tuna tagging experiments are still the best tool to provide the information needed to assess the status of these highly migratory species. The last western Pacific Regional Tuna Tagging Programme (RTTP) operated from 1989 to 1991 and the situation has considerably evolved since then. An update was needed to take into account the 100% increase in tuna catch since RTTP and the generalised use of fish aggregation devices (FADs), which accounts for about 50% of catches by purse-seine fleets.

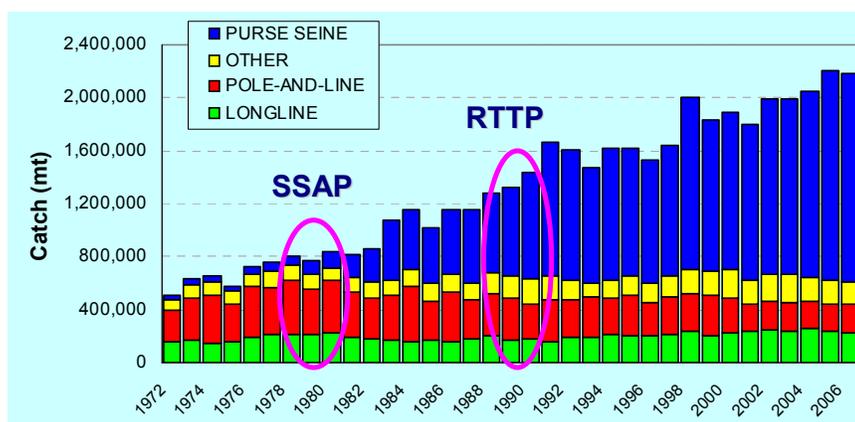


Figure 1. Evolution of the tuna catch in the western and central Pacific Ocean since the last tuna tagging programmes (Skipjack Survey and Assessment Programme [SSAP] and RTTP).

The **Pacific Tuna Tagging Programme (PTTP)** is the current large-scale tagging experiment in the western Pacific. It was launched in August 2006 and aims to collect updated information on tuna migration, catch rates and fishing mortality to improve the accuracy of stock assessment models.

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PTTP is divided into two phases. **Phase 1** covered the Papua New Guinea and Solomon Islands exclusive economic zones (EEZs), including the highly productive Bismarck and Solomon seas. About 25% of the tuna in the western and central Pacific Ocean (WCPO) is fished in these waters, where large-scale tuna harvest by domestic and domestically based foreign purse-seine fleets is occurring, primarily through the use of anchored FADs. Obviously, the impact of FADs and FAD fisheries is of critical concern to the region and to the Western and Central Pacific Fisheries Commission (WCPFC).

Phase 1 lasted eight months: six months in the PNG EEZ and two months in the Solomon EEZ. To conduct the tagging operations, SPC chartered a pole-and-line vessel, *Soltai 6*, which is owned and operated by Soltai Fishing and Processing Ltd, a Solomon Islands-based company.



*F/V Soltai 6 in PNG waters near an anchored FAD.*

Phase 1 was a great success, with more than 100,000 tuna tagged with conventional tags and about 500 tagged with electronic tags. It ended on 7 April 2008 with a two-week trial trip onboard a recently built pole-and-line vessel, *Soltai 105*. It was an intensive trip that involved fishing, tagging and collecting samples over a wide area, from south of Guadalcanal up to Ontong Java and from Noro to east of Malaita, to test the vessel in preparation for the next phase.

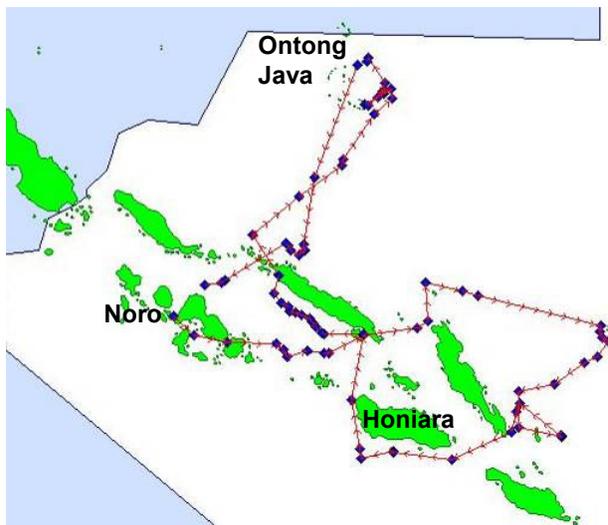


Figure 2. Cruise track of the trial tagging trip onboard *Soltai 105*, 26 March–7 April 2008.



*F/V Soltai 105 at Noro Base, Solomon Islands.*

**Phase 2** is planned to start at the end of June 2008. Initially there will be five months of chartering, and more have already been planned. The first part of Phase 2 will cover the EEZs of the Federated States of Micronesia (FSM), Palau, the Philippines and Indonesia.

### TAGGING FISH DURING PTTP PHASE 1

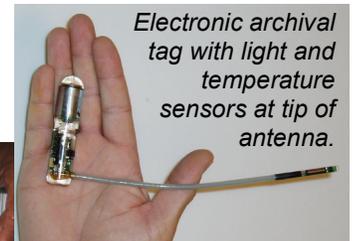
Most of the fish captured were tagged with conventional tags and released in less than 20 seconds after the species and length of the fish had been recorded. At recovery of the tags, date, length and position at recapture will be compared to the same information at the time of release. We can thus obtain information on growth, migration, fishing mortality and catch rate.

A new type of tag has been used during PTTP: the electronic archival tag. Equipped with sensors, it measures and records information such as date and time, depth, external and internal temperature and light intensity, from which geographic positions can be inferred. Electronic tags are surgically implanted in the belly of the fish; this can be done in less than two minutes by a well-trained tagger. Once recovered, data in the tag's memory are downloaded and analysed to obtain critical information about tuna behaviour (particularly in relation to FAD aggregations), habitat preferences and migration.



Conventional tag is inserted in back of fish.

Incision is made in belly of fish; tag inserted, antenna sticking out; 1 or 2 stitches are made before releasing fish.



Electronic archival tag with light and temperature sensors at tip of antenna.

Table 1. Number of fish tagged during PTTP Phase 1, by area, school type and species.

Species	PNG				SOLOMON			Total
	Free school	Drifting FAD/Log	Anchored FAD	Seamount	Free school	Drifting FAD/Log	Anchored FAD	
Conventional SKJ	7,907	3,539	27,995	968	3,046	3,153	16,447	63,055
Conventional YFT	2,853	1,118	16,023	657	463	1,070	16,430	38,614
Conventional BET	23	32	582	54	124	4	425	1,244
Electronic SKJ		1	70					71
Electronic YFT	64	14	289	6	5		22	400
Electronic BET	13	1	59		7		1	81
Total	10,860	4,705	45,018	1,685	3,645	4,227	33,325	103,465

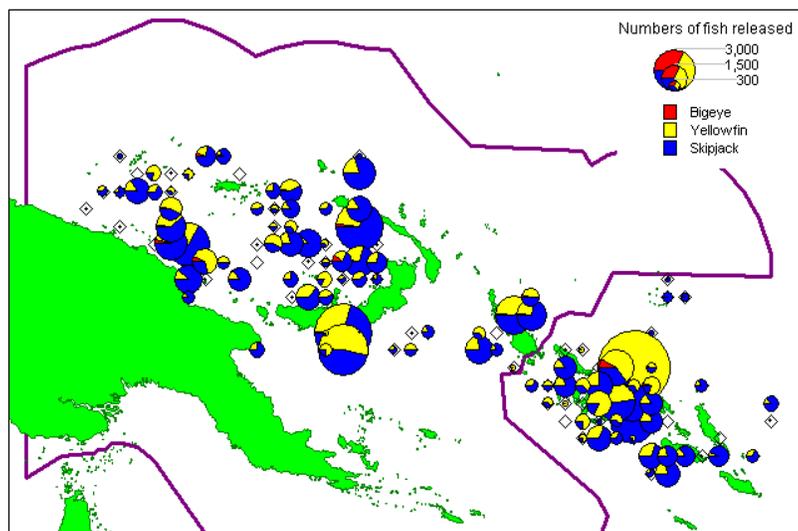


Figure 3. Spatial distribution of tags released during PTTP Phase 1, by species.

## STOMACH SAMPLING DURING PTTTP PHASE 1

Scientists collected stomach samples while onboard the tagging vessel. This sampling phase complemented the collection made during observers' programmes in the region, which allowed the collection of small fish that are usually not available during longline sampling.

The stomach sampling also allowed us to focus on an important objective we had in PNG and Solomon Islands waters: to study the impact of the numerous anchored FADs on tuna diet.

Since August 2006, the beginning of PTTTP, we have collected 2,562 stomach samples. Stomach-content examination work is conducted in the SPC laboratory in Noumea, New Caledonia concurrently with the stomach collection. A total of 605 stomachs have been examined and the data have been entered into the STOMACH database.

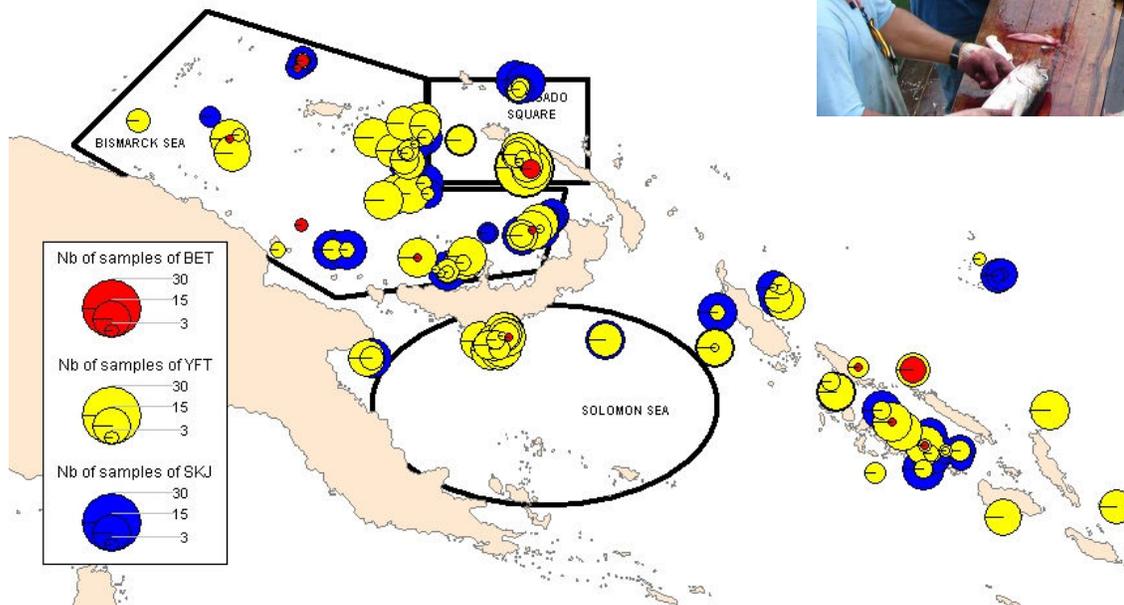
Table 2. Number of stomachs collected during PTTTP Phase 1, by area, school type and species.

Species	PNG				SOLOMON			Total
	Free school	Drifting FAD/Log	Anchored FAD	Seamount	Free school	Drifting Log	Anchored FAD	
SKJ	258	121	732	44	33	59	61	1308
YFT	164	36	667	44	13	52	60	1036
BET	1		25	5	7		2	40
BUM	1							1
KAW	22			10				32
RRU	10	5	48	10				73
FRI	15	2	43					60
DOL			8					8
FAL		2	2					4
Total	471	166	1525	113	53	111	123	2562

*The SPC team (Siosifa Fukofuka and Don Bromhead) and NFA team (Brian Kumasi and Thomas Usu) collect stomach samples during a tagging trip.*



Figure 4. Geographical distribution of stomachs collected during PTTTP, August 2006 to April 2008, by tuna species.



**FATMETER: AN ELECTRONIC DEVICE TO MEASURE THE AMOUNT OF FAT IN FISH**

To complement the stomach content analysis and in order to investigate the impact of anchored FADs on tuna diet, SPC has acquired a ‘Fish Fatmeter’, an electronic device that allows determination of fat percentages in fish muscle. This is done by placing the device in contact with the fish’s skin and pressing a button; the fat content is instantly displayed on the instrument’s digital readout and then saved in the memory downloadable on the computer.

Because a fish’s lipid content is related to its water content, if we measure the amount of water in the fish (using microwave technology), we can obtain the fat content by converting the water content into fat content using calibration data.

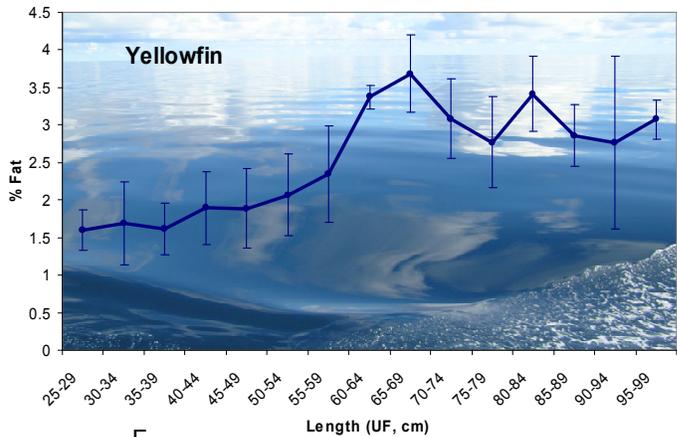
Acquired in 2007, the Fatmeter has been used to determine the fat content of 950 fish, mainly skipjack and yellowfin tuna.

Table 3. Number of fish analysed with the Fatmeter during PTPP Phase 1, by area, school type and species.

Species	PNG			Solomon			Total
	Anchored FAD	Drifting FAD/Log	Free school	Anchored FAD	Drifting FAD/Log	Free school	
BET				3	7		10
SKJ	248	35	33	123	65	2	506
YFT	159	14	55	141	51	14	434
Total	407	49	88	267	116	23	950

Analyses are currently being undertaken to compare the fat content of fish caught in areas with a high density of anchored FADs, such as the Bismarck Sea in PNG, and areas with lower densities of FADs. This will help us to detect any potential impact of FADs on fish diet.

An interesting result has already been observed for yellowfin tuna: an increase of 1.5% of fat in fish larger than 55cm. This increase is linked to a diet shift due to the capabilities of larger fish to dive deeper and therefore catch different types of prey.



F Figure 5 (above). Average percentage of fat (and standard deviation) in yellowfin tuna, according to size.



Valerie Allain using the Fatmeter on a yellowfin tuna during a tagging trip.

## ADDITIONAL INFORMATION

You might have seen the tagging **video** called ‘Taking Stock of Our Tuna’, shown on TV in early April 2008. Produced by SPC’s Regional Media Centre, it was part of an episode of *The Pacific Way* TV programme, which is distributed throughout the Pacific. The video explains issues facing tuna fisheries in the Pacific and describes different aspects of the work done by the SPC team and their colleagues onboard the tagging vessel *Soltai 6*.



*The Pacific Way programme introducing the tagging video.*

If you want to follow the progress of the Pacific Tuna Tagging Project, please check our **website** regularly (<http://www.spc.int/oceanfish/>). Numbers of tags released and recovered are updated frequently and small animations show you the movements of the recovered fish on a map. You will also find monthly tagging summaries, posters to download and a link to the ‘Tag Recovery Registration Form’ (<http://www.spc.int/oceanfish/html/tag/rtp2/>); if you find a tag, you should complete the form and return the tag so you can receive a reward.

## **YOUR HELP IS VITAL**

The success of this project is dependent upon the efforts of observers. If you are experiencing difficulties with collecting, storing or transporting samples, or delays in payment, please contact Caroline Sanchez ([carolines@spc.int](mailto:carolines@spc.int)), Aude Chenet ([audec@spc.int](mailto:audec@spc.int)), Valérie Allain ([valeriea@spc.int](mailto:valeriea@spc.int)), Peter Sharples ([peterbs@spc.int](mailto:peterbs@spc.int)) or Siosifa Fukofuka ([siosifaf@spc.int](mailto:siosifaf@spc.int)); they will attempt to resolve any logistical and/or training issues.

### **NEXT NEWSLETTER: END OF JUNE – BEGINNING OF JULY 2008**

Your comments on this newsletter are welcome – please send them to Valérie Allain ([valeriea@spc.int](mailto:valeriea@spc.int)), Caroline Sanchez ([carolines@spc.int](mailto:carolines@spc.int)) or Aude Chenet ([audec@spc.int](mailto:audec@spc.int)).