PNG Tuna Tagging Project

Summary Report of Cruise 2
(19 Feb – 20 May 2007)

1 Introduction

The PNG Tagging Project is a joint research project being implemented by the Oceanic Fisheries Programme (OFP) of the Secretariat of the Pacific Community (SPC) and the PNG National Fisheries Authority (NFA). Its major objectives are:

1. **To obtain information on the large-scale movement of tuna in, and from, the PNG EEZ.** This information is important for understanding the relationship of PNG stocks with those of adjacent areas. Movement rates are particularly important for assessing the potential for interaction between fisheries operating in different areas. The comparison of tagged fish movements from the Bismarck Sea (an area of major anchored FAD deployment) that will result from this project with tagged fish movements from the same area in the early 1990s (before extensive anchored FAD deployment) will provide important new information on the meso- to large-scale effects on tuna movement of large anchored FAD arrays.
2. **To obtain information on current exploitation rates of tuna in the PNG EEZ.** Information on local exploitation rates is important for understanding the impact of fishing at the EEZ scale. In particular, it allows estimation of the extent to which current catch levels may reduce the standing stock of tuna and the catch-per-unit-effort of the fisheries, a phenomenon commonly known as “local depletion”.
3. **To obtain information on the dynamics of tuna associations with FADs, in particular species-specific information on residence times, vertical and horizontal movements and FAD interactions.** This information is required for a better understanding of the effects of FADs on tuna stocks and their vulnerability to fishing, and for the design of appropriate management measures.

4. **To obtain data that will contribute to regional tuna stock assessments.** Conventional tagging data are an important component of tuna stock assessments, providing quasi-fishery-independent information on exploitation rates, natural mortality, movements and other parameters.

5. **To obtain information on the trophic status of free-swimming schools of tuna, and tunas associated with FADs, other floating objects and seamounts**. This information is required for the general understanding of the ecosystem impacts of FADs compared to other types of tuna aggregations.

6. **To characterize the variability and extent of catches of by-catch species from purse seine catches in PNG.** NFA runs an observer programme with high coverage rates, which offers the opportunity to document by-catch levels and their variability in purse seine sets on anchored FADs and other set types.

These objectives are being pursued through a tagging programme, and associated data collection activities in PNG waters. Funding support for the project has been generously provided by the PNG National Fisheries Authority, New Zealand Agency for International Development, Australian Centre for International Agricultural Research, European Commission 8th European Development Fund (through the PROCFish Project) and the Global Environment Facility (through the Pacific Oceanic Fisheries Management Project).

This progress report presents the results of the second of two three-month cruises by the chartered pole-and-line tagging vessel *Soltai 6*, owned and operated by Soltai Fishing and Processing Ltd, a Solomon Islands-based company. The report of the first three-month cruise, undertaken during August-November 2006, is available at http://spc.int/oceanfish/Html/TAG/index.htm.

The operational objectives of this second and final cruise were:

- To tag and release 15,000 tuna (i.e. half the project target of 30,000 tuna) using conventional tuna tags, with an ideal species composition of skipjack 60%; yellowfin 30%, and bigeye 10%.
- To increase the spatial distribution of tag releases already achieved during Cruise 1 throughout PNG waters:
- To tag and release 200 plus tuna using electronic archival tags, with a priority on bigeye and yellowfin tuna;
- To undertake sonic tagging and deployment of FAD monitors using methodology developed during Cruise 1 in 2006;
- To train scientific staff, including two full-time PNG biological technicians, on tagging and sampling methods, including archival/sonic tagging procedures and data management;
- To undertake biological sampling (length, sex, stomach contents and tissue samples) according to an experimental design in order to obtain information on the trophic status of tunas in different school associations.

Additional activities related to tag recovery were undertaken separately to the activities of the tagging vessel and are reported in section 7 of this report.

2 Summary of results

The Cruise (and the second charter) began with the departure of the *Soltai 6* from Noro, Solomon Islands, on February 19th 2007. The vessel had been recommisioned during the previous week, after commercially fishing for the intervening three month period since the conclusion of Cruise 1, with tagging gear and the portable office relocated on the vessel, and routine maintenance undertaken. Tagging operations proper began in PNG on February 20th, with a productive fortnight in the Solomon Sea before spending six weeks fishing most parts of the Bismarck Sea and adjacent areas, then returning to Noro on May 20th via the Solomon Sea and waters east of Bougainville. Figure 1 provides details of the vessel track during Cruise 2.

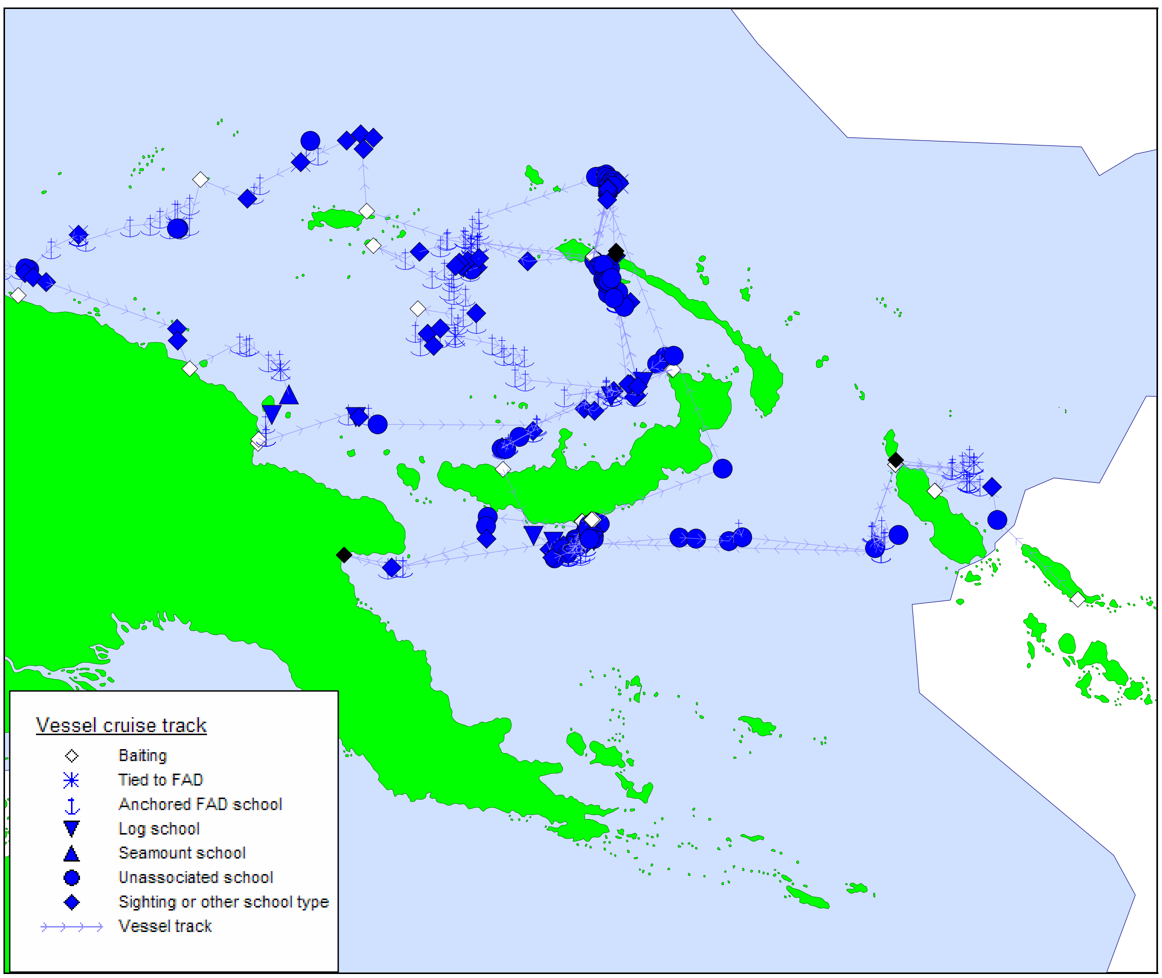


Figure 1. Cruise plot of Soltai 6, 19th February - 20th May 2007

During Cruise 2, a total of 39,064 tuna were tagged with conventional yellow tags of two sizes, 212 with archival tags and 160 with acoustic tags. Archival and acoustic-tagged tunas were also conventionally tagged. Further details of these releases are given in the following sections. 68% of releases were anchored FAD-associated fish during Cruise 2, compared with 80% during Cruise 1.

As at 30th June 2007, 603 tag recoveries had been received from the Cruise 2 releases for an overall recovery rate of 1.5%, consistent with the much higher proportion of releases away from the intensively fished Bismarck Sea. Over 20,000 releases (>50%) were made in the Solomon Sea and in waters east of Bougainville. Cruise 1 recoveries stood at 4,071 (18.2%), with 4,675 recoveries overall (7.6%) for the combined releases (61,7649) on the two cruises.

Tag recovery arrangements are working and survival of fish following tagging is assumed to be good.

3 Conventional tag releases during Cruise 2

3.1 Conventional tagging methods and equipment

Basic tagging methods and equipment remained essentially unchanged from Cruise, but some noteworthy additions to, and modifications of fishing gear were incorporated into Cruise 2 operations. Coordination, planning and provisioning were greatly enhanced by linking the IRIDIUM satellite telephone with a dedicated email account with PC interface. A petrol-driven generator was purchased to run an underwater bait attraction light from the aluminum dinghy which significantly increased the baiting power of operations and speeded the baitfish loading process. An anchored FAD was deployed for the project close to Dyaul Seamount which provided an exclusive tag release area in the center of the Morgado Square where purse seining is not currently permitted on anchored FADs. Two purpose-built cradles for electronic tagging, deployed at the bow and stern tagging stations, were incorporated into standard pole and line operations. The cradles greatly increased the number of archival and sonic tag released during the cruise.

3.2 Number of releases

During the 2007 Cruise 2, a total of 39,064 tuna were tagged with yellow conventional tags (skipjack 67.1%; yellowfin 32.6%; bigeye 0.3%). 211 tuna (89% yellowfin, 11% bigeye) were also tagged with archival tags and 175 (63% yellowfin, 35% skipjack, 2% bigeye) with acoustic tags. Of these, 13 tuna were implanted with some combination of archival and sonic tag
The number of conventional tag releases in 2007 (and recaptures as at 30th June 2007) by species and school association is given in Table 1. This brings the grand total of tag releases for the PNG Tagging Project to 61,748 (40,409 skipjack - 67.1%, 20,648 yellowfin - 32.6%, and 691 bigeye - 1.1%). In addition, one large yellowfin tuna was released with popup archival (satellite reporting) tag.

The species composition of releases (67:32:1) was close to the skipjack:yellowfin target (60:30), although the overall proportion of bigeye tagged was much less than desired. It proved difficult to catch and tag large numbers of bigeye in the Bismarck Sea by both pole-and-line and night line fishing (jigging) while tied up to anchored FADs, due to the general inefficiency of pole-and-line gear in capturing bigeye in equatorial waters and an apparent low local abundance. However, the incorporation of archival/sonic tagging cradles into daylight pole-and-line operations maximized the numbers of yellowfin and bigeye implanted with electronic tags during Cruise 2. Bigeye tuna also proved scarce in the vicinity of Dyaul Seamount and the adjacent FAD set for the project where significant numbers of bigeye tuna were tagged during the Regional Tuna Tagging Project (15 years previously)

The total numbers of conventional tag releases (and recaptures as at 30th June 2007) by species and school association is given in Table 1.

School association	Releases				Recaptures			
	SKJ	YFT	BET	Total	SKJ	YFT	BET	Total
Unassociated/free	6,774	2,447	23	9,244	123 (1.8%)	12 (0.5%)	0	135 (1.5%)
Log	719	475	0	1,194	11 (1.5%)	4 (0.8%)	0	15 (1.3%)
Anchored FAD	17,316	9,385	102	26,797	153 (0.9%)	279(3.0%)	1	433 (1.6%)
Drifting FAD	1,043	85	3	1,131	10 (1.0%)	2 (2.4%)	0	12 (1.1%)
Marine mammal	259	169	1	429	2 (0.8%)	1 (0.6%)	0	3 (0.7%)
Current line	255	2	0	257	1 (0.4%)	0	0	1 (0.4%)
Island or reef	102	282	0	384	1 (1.0%)	3 (1.1%)	0	4 (1.0%)
TOTALS	**26,462**	**12,845**	**129**	**39,436**	**301 (1.1%)**	**301 (2.4%)**	**1(0.8%)**	**603(1.5%)**

Table 1. Conventional tag release numbers by species and school association, for Cruise 2, and recaptures, as at 30th June 2007

Table 2 below provides an update of Cruise 1 recaptures, as at 30th June 2007

School association	Releases				Recaptures			
	SKJ	YFT	BET	Total	SKJ	YFT	BET	Total
Unassociated/free	1031	124	0	1155	34 (3.3%)	8 (6.5%)	0	42 (3.6%)
Log	1257	376	28	1661	121 (9.6%)	21 (5.6%)	2 (7.1%)	144 (8.7%)
Anchored FAD	10685	6636	480	17801	2190 (21.5%)	1479 (22.3%)	156 (32.3%)	3824 (21.5%)
Current line	6	11	0	17	0	0	0	0
Seamount	968	657	54	1679	42 (4.3%)	28 (4.3%)	7 (13.0)	77 (4.6%)
TOTALS	**13947**	**7804**	**562**	**22313**	**2387 (17.1)**	**1536 (19.7%)**	**164 (29.2%)**	**4087 (18.3%)**

Table 2. Conventional tag release numbers by species and school association, for Cruise 1, and recaptures, as at 30th June 2007

3.3 Spatial distribution of releases by school association

The spatial distribution of skipjack, yellowfin and bigeye releases, by species and school association, is shown in Figure 2. A large and useful tag release cohort of skipjack and yellowfin was made from free schools found in the Solomon Sea, close to the south coast of New Britain. Free (or island associated) releases of yellowfin and skipjack were also made close to Tench Island, north of New Ireland and on anchored FADs west and east of Bougainville. Cruise 2

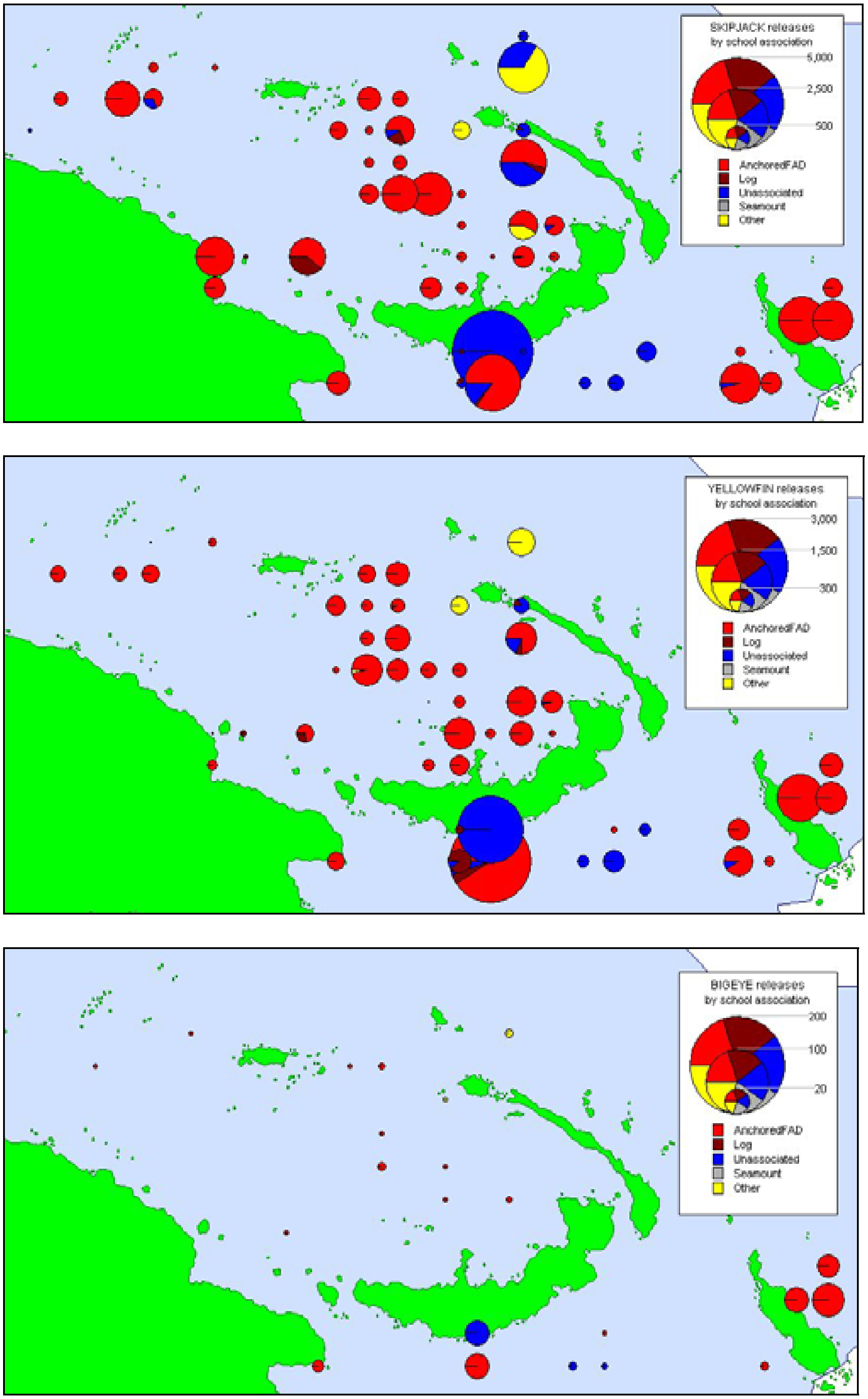


Figure 2. Spatial distribution of releases of skipjack (upper), yellowfin (middle) and bigeye (bottom) by school association.

succeeded in tagging significant numbers of skipjack and yellowfin in areas of the central Bismarck Sea where the project had not previously visited as well as in the northeast Bismarck Sea on the anchored FAD set for the project near Dyaul Seamount (New Ireland). Fishing and tagging success in the far western Bismarck Sea, an important fishing area visited for the first time, was limited, with difficult baiting and poor fishing conditions encountered during Cruise 2.

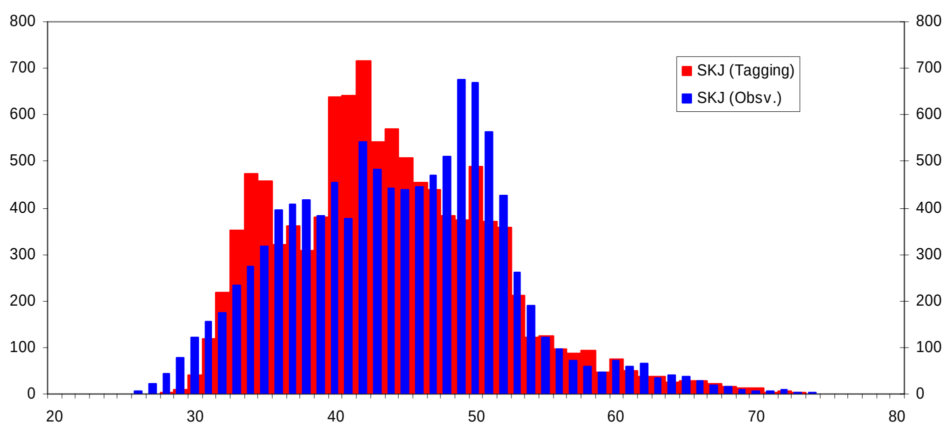
As noted earlier, bigeye releases were very low throughout Cruise 2 with the highest numbers of bigeye released in the Solomon Sea and near Bougainville. The majority of tag releases were made on schools associated with anchored FADs (Table 1; Figure 2), though less so than was the case for Cruise 1 (see earlier).

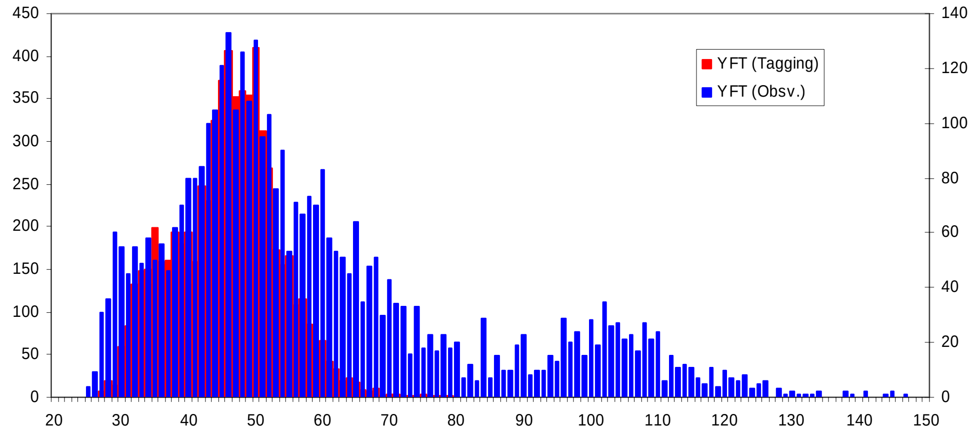
3.4 Size distribution of conventional tag releases

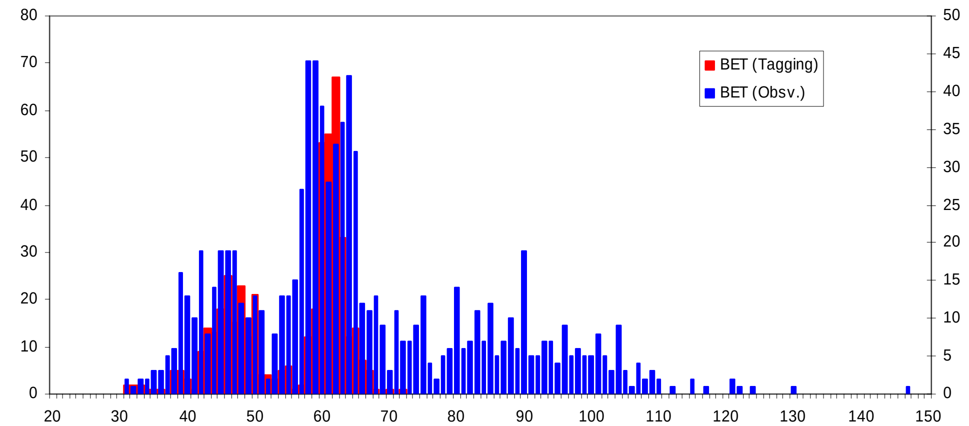
The size distributions of tag releases during Cruise 2 (red) by species and the corresponding size distributions for the locally-based purse seine fleet in PNG (blue) are shown in Figure 3. For skipjack, the size range tagged is similar to the size range of fish captured by purse seiners setting on anchored FADs in PNG. For yellowfin, the purse seine size distribution consists of multiple modes, with the tag releases corresponding in size to the smallest mode. The larger mode centred at around 100 cm in the purse seine distribution was not available to any substantial degree to the pole-and-line tagging vessel. For bigeye, the numbers tagged are concentrated into two modes within a wider overall range of sizes taken by the purse seine fleets. These differences in size distributions of tag releases and purse seine catch mean that size will need to be included in any models utilizing both the tagging and fishery data.

These size distributions include significant numbers of fish <40 cm fork length. These small fish are often not seen in landed purse seine catches in the broader western and central Pacific because they are avoided or discarded at sea. However, they are seen in the catches in PNG because the locally-based purse seine companies have a “retain all” policy centered on FAD associations.

Figure 3. Size distributions of FAD-associated conventional tag releases (in red) compared to the 2005 size distribution for the PNG locally-based purse-seiners (in blue), by species.







4 Archival tagging

4.1 Archival tagging methods and equipment

For the second Cruise, 2 additional tagging cradles designed for archival/sonic tagging were installed (see Figure 4). These cradles greatly increased the possibilities of deploying archival and sonic tags during standard pole-and-line fishing operations but also increased the numbers of conventional tag releases during fast biting schools.

Table 3 shows, for Cruise 1 and 2, the total archival tag release number by gear type.

Table 3. Total archival tag release by fishing gear

Fishing gear	Cruise 1	Cruise 2	Total
Pole-and-line	18 (25%)	171 (81%)	189 (67%)
Rod-handline	53 (74%)	29 (14%)	82 (29%)
Trolling	1	11(5%)	12 (4%)
Total	72	211	283

Figure 4. Additional tagging cradle designed for archival and sonic tagging

4.2 Archival tag releases

During Cruise 2, 211 archival tags were deployed, consisting of 187 yellowfin, 23 bigeye and 1 skipjack. Also one pop-up satellite tag has been deployed on a large yellowfin caught on a troll line.
The numbers of releases by species and school association are given below (Table 4).

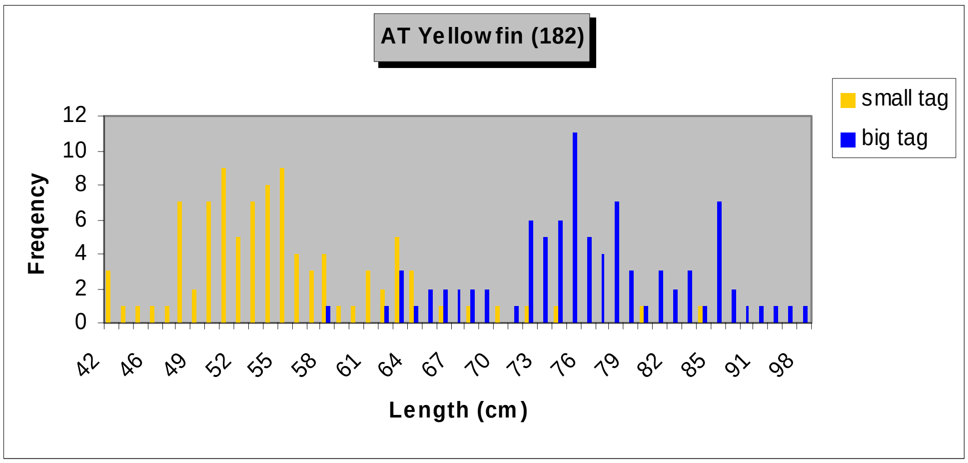
Table 4. Total archival tag release numbers by species and school association

Species	Free school	Fad	Drifting Fad	Log	Whale Shark	Current line	Total	%
BET	6	16	1				23	10.9
SKJ		1					1	0.5
YFT	58	117		8	2	2	187	88.6
Total	**64**	**134**	**1**	**8**	**2**	**2**	**211**	100
%	30.3	63.5	0.5	3.8	0.9	0.9	100	

4.2.1 Size distribution of archival tag releases

Archival tag releases were separated into two different size classes: The LTD-2310 (Lotek) and the Mk9 (WLC) are physically larger than the LTD-2410 and LTD-1110 (both Lotek). Initially, release sizes were set conservatively with the larger AT models used on tuna greater than 70 cm and the smaller ATs in fish greater than 50 cm. With increasing speed of archival tagging procedures and the observed positive fish condition, these size limits were reduced to 60 and 40 cm respectively.

Figure 5 shows the size distribution of archival tagged fish by tag size for bigeye and yellowfin tuna.



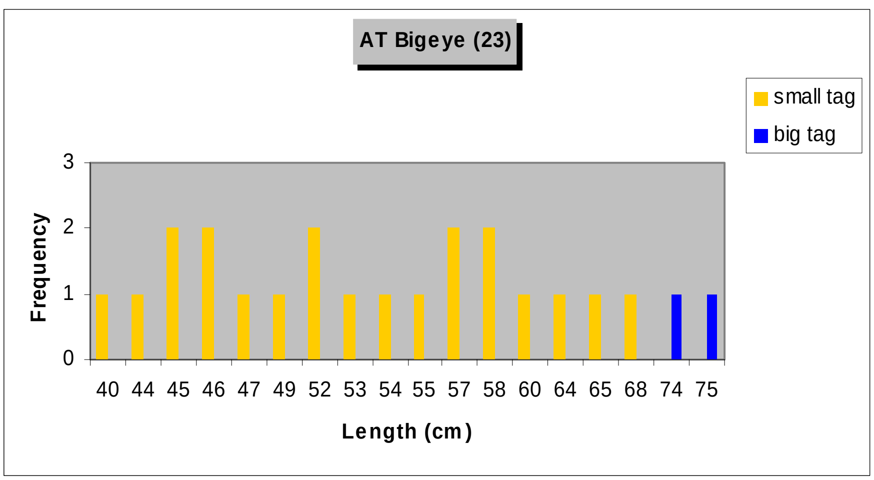


Figure 5. Size distribution, by tag type, of archival tagged yellowfin and bigeye

5 Sonic tags and FAD monitors

The use of coded sonic transmitter tags and compatible acoustic monitors allows the collection of fine-scale spatial behaviour of pelagic resources from specific environments. This technology is particularly suited to the examination of FAD-specific tuna behaviour, if receivers are mounted beneath FADs capable of detecting sonic tags within a spatial range that approximates FAD associated tuna schools. Sonic tagging was incorporated into the overall project goals through a collaboration with the Pelagic Fisheries Research Program (University of Hawaii) that has funded similar studies on anchored FADs in Hawaiian waters[1].

The strength of this approach focuses on the adoption of individually coded "pinger" tags in conjunction with pressure sensing sonic tags that provide accurate depth data at fine time scales. All data are transmitted to and stored by the FAD-mounted sonic receivers, thus providing size and species-specific "presence/absence" and vertical behaviour comparable to archivally tagged individuals. The real strength of this approach is that tagged fish provide data without the need to recapture and download a data archiving tag and all information is specific to a particular FAD association.

5.2 Sonic tagging methods and equipment

Cruise 2 continued deployment of underwater telemetry gear manufactured by VEMCO[2]. Coded V9 pinger tags and depth recording V9P tags were utilized by the PNG Project due to their adequate power range balanced with a small size capable of being used on a wide size range of tuna. This aspect of gear selection allowed the sonic tagging of all three tuna species throughout the size range of fish encountered by the Project from the same mixed-species aggregations on the same FAD. The approach allows direct comparisons of species and size-specific vertical behaviour, residence times and inter-FAD movements. The relatively small size of sonic tag also allowed double tagging of medium sized tuna with both a sonic and an archival tag which can provide a useful combination of fine and larger-scale movements, the characterization of on and off-FAD behaviour and help to refine geolocation estimates from recovered archival tags.

Sonic tag release numbers were significantly increased during Cruise 2 by the incorporation of two purpose-built sonic/archival tagging cradles into the general tagging strategy. These cradles were positioned on the bow (between two conventional tagging cradles) and on the stern where the cradle was used as a combination conventional/sonic/archival tagging station. This allowed the selection of desirable species and size ranges of fish to be implanted with sonic tags during normal pole-and-line operations.

---

[1] Dagorn, L., Holland, K.N., and D.G. Itano. (2006) Behavior of yellowfin (*Thunnus albacares*) and bigeye (*T. obesus*) tuna in a network of fish aggregating devices (FADs). Mar. Biol. 227(511). 12 pp.

[2] http://www.vemco.com/

5.3 Sonic tag releases and FAD monitor deployment

A total of 175 sonic tags were deployed during Cruise 2 (3 bigeye, 110 yellowfin and 62 skipjack tuna) as detailed in Table 5. Almost two thirds of sonic tags deployed in Cruise 2 were depth sensing V9P tags, with 13 yellowfin and one bigeye tuna implanted with some combination of a sonic plus an archival tag. Skipjack were not double tagged with electronic tags due to the limited space available in their peritoneal cavity. Yellowfin tuna made up two thirds of all sonic releases with skipjack making up most of the remaining 175 sonic releases. It is noteworthy that only three bigeye tuna were implanted with sonic tags during Cruise 2 due to the difficulty in locating bigeye on acoustically monitored FAD clusters and during the entire Cruise 2 in general.

Sonic tag type	Archival tag types	BET	YFT	SKJ	Total
V9 coded	Sonic tag only		36	20	56
V9 coded	LTD 1110		8		8
	V9 coded subtotal		***44***	***20***	***64***
V9P depth	Sonic tag only	2	61	42	105
V9P depth	LTD 2310	1	3		4
V9P depth	LTD 2410		1		1
V9P depth	Mk9		1		1
	V9P depth subtotal	***3***	***66***	***42***	***111***
	Sonic tag release total Cruise 2	**3**	**110**	**62**	**175**

Table 5. Summary of sonic tag releases for Cruise 2

5.3.1 Size distribution of sonic tag releases.

The size distribution of sonic tag releases attempted to span a wide size range to gain information on the aggregative dynamics of "small" versus larger tuna by species. Figures 6 – 8 indicate the size distribution of skipjack, yellowfin and bigeye tuna released with sonic tags during Cruise 2. Sonic tagging of skipjack spanned a useful range of 33 – 53 cm. Sonic tagging of yellowfin also spanned a wide size range of fish from 38 – 77 cm roughly grouped into three size groupings with the larger fish above 58 cm. As noted earlier, only three bigeye were released with sonic tags of 60 and 74 cm FL.

Thirteen anchored FADs were equipped with a VR2 sonic receivers in five groups in the eastern Bismarck Sea and one group in the Solomon Sea (Figure 9).

Figure 6. Length frequency of skipjack sonic tag releases during Cruise 2 (n = 62)

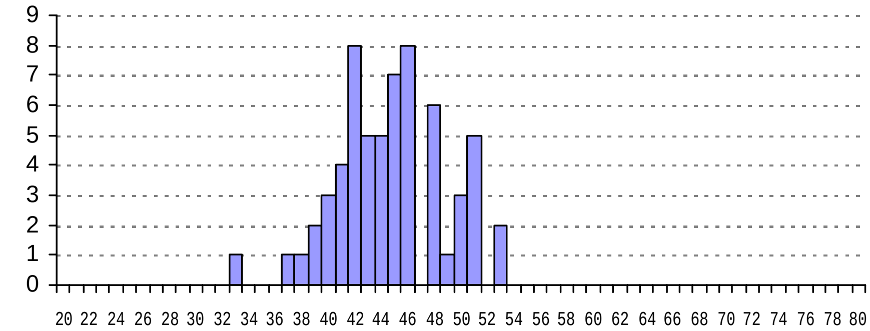


Figure 7. Length frequency of yellowfin sonic tag releases during Cruise 2 (n = 109)

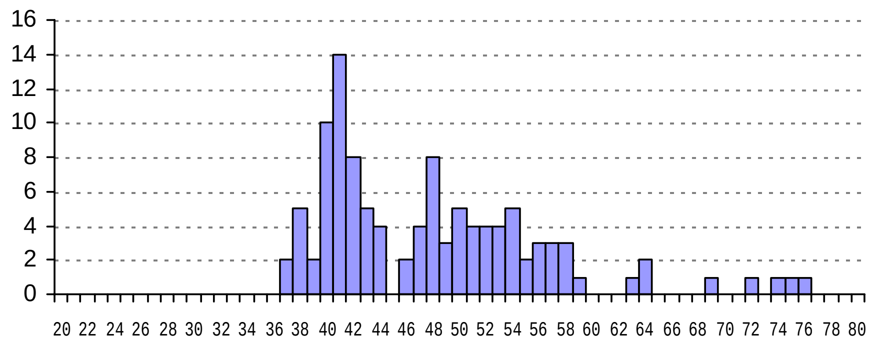
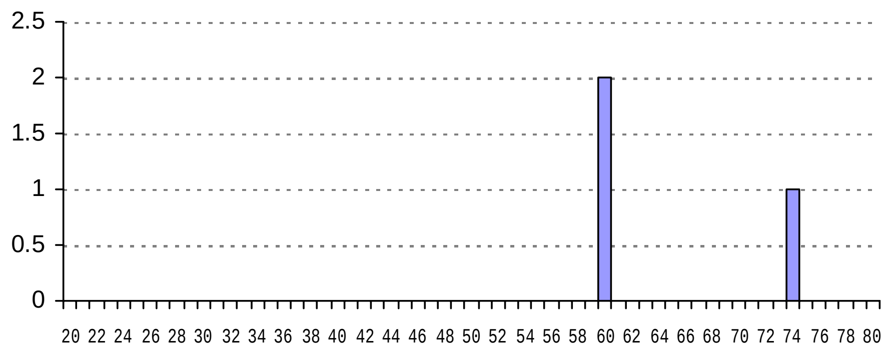


Figure 8. Length frequency of bigeye sonic tag releases during Cruise 2 (n = 3)



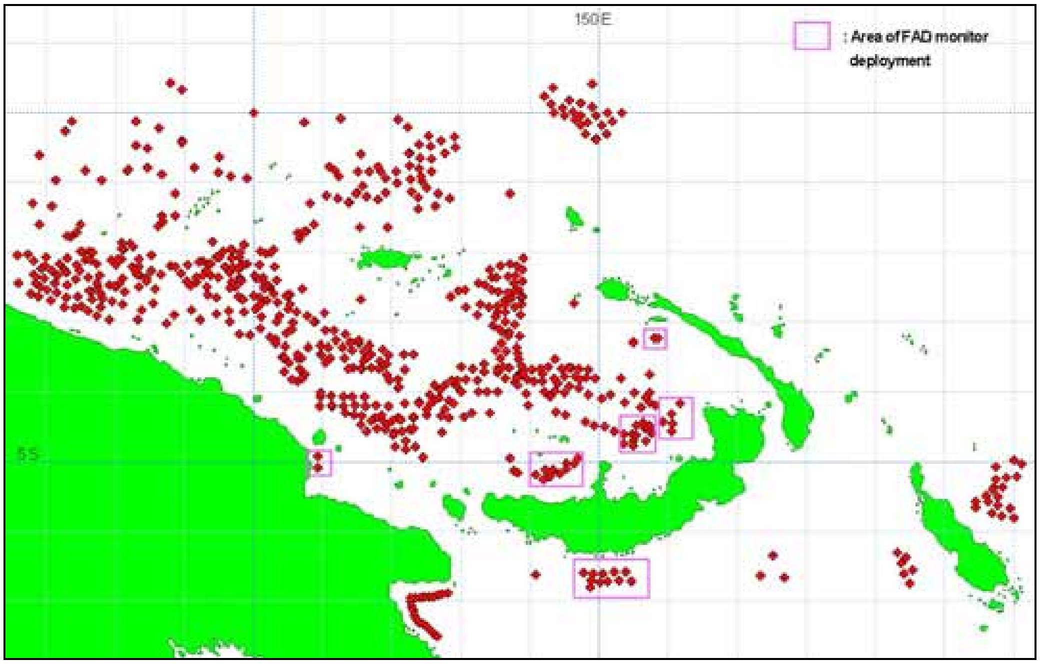


Figure 9. Location of FADs in the PNG area during Cruise 2 and FAD monitors.
The pink rectangles indicate the areas of FAD monitor deployment

5.3 Data acquisition and receiver status

All sonic receivers were collected from the three FAD groups along the north and south coasts of New Britain except for one unit that went missing due to an apparent loss of the FAD due to mooring line failure. Data was successfully downloaded from all retrieved receivers during the latter stages of Cruise 2 and sent to Hawaii for analysis. The receivers on two FADs near Madang and the single FAD deployed for the project near Dyaul Seamount (New Ireland) were left in place for later retrieval. Initial examination of retrieved data indicated high reporting rates of sonic tag releases. However, for the most part, all sonic tag releases appeared to maintain association with their FAD of release for short periods with most releases apparently departing *en masse* within a few days of release.

The successful training of NFA counterparts in surgical procedures necessary for archival and sonic tagging provided the possibility of continuation of sonic tagging experiments beyond the charter period. Materials necessary for archival and sonic tagging were left with NFA (surgical supplies, tagging mattress, conventional tags, recorders) including eight VR2 receivers. Initial plans were developed for NFA to conduct sonic tagging within a group of anchored FADs set in the Huon Gulf, near Lae, with NFA agreeing to fund the purchase of sonic tags and expenses related to personnel time and vessel use.

6 Biological sampling

The objective for Cruise 2 was to collect samples for all the strata of the stratified sampling design (per species, school association type, area and time of day) developed at the beginning of the project. After the first biological sampling undertaken during Cruise 1, it was decided to try to enhance the sampling of bigeye tuna, and of seamount and non-anchored-FAD samples.

The total number of samples collected during Cruise 2 was 1,406 (Table 6). Most of the samples were taken from anchored FAD schools, however more than 25% of the samples came from free schools, a much higher proportion than during Cruise 1 (8%). Only 10 samples of associated species were sampled around seamounts.
Skipjack comprised 48% of the samples and yellowfin 42%. The catch of bigeye was very low during this Cruise, resulting in only 3 samples of this species.

Table 6. Number of biological samples taken during Cruise 2

	School type					Grand Total
species	Free school	Drifting log	Anchored FAD	Whale	Seamount	
Skipjack	181	39	450	10		680
Yellowfin	161	1	422	8		592
Frigate tuna	13		43	2		58
Rainbow runner	5		27		10	42
Kawakawa	18				10	28
Bigeye	1		2			3
Silky shark			1			1
Dolphinfish			1			1
Blue marlin	1					1
Grand Total	380	40	946	20	20	1406

In addition to stomach/muscle/liver sampling, measurements using a Fatmeter were undertaken. The Fatmeter is a non-destructive, non-invasive method that can be used on live fish. This electronic device measures the lipid content of the fish. The lipid content of fish is related to the water content of the sample; by measuring the water content using a microstrip sensor the amount of lipids can be inferred by conversion with the appropriate calibration (required for each species). Calibration for yellowfin was built in to the device but muscle samples have been collected for checking the calibration in the lab. More muscle samples were collected for skipjack to establish a proper calibration for this species.

A total of 608 fish were examined with the Fatmeter including 348 skipjack and 260 yellowfin. Fillets for calibration were collected from 74 skipjack and 20 yellowfin.

7 Tag recoveries

7.1 Recovery procedures

Considerable efforts have been made to publicize the project and establish tag recovery procedures in the main locations where recoveries are likely to occur, both within PNG and beyond. Tagging posters, providing information to finders on what information to collect, where to send the tags and information, and the rewards that will be paid, have been produced in 13 languages. Posters have been sent to industry and Government contacts throughout the Pacific and east Asian regions. Arrangements have been made in key locations, including PNG ports, other Pacific Island landing sites, Philippines, Thailand, Japan and Korea, for tags to be collected, rewards to be paid, and the tags and recovery data sent to SPC.

The rewards being for the return of tags and recovery data are:

Conventional tags	USD10 or a project shirt or cap
Archival tags	USD 250
Sonic tags	USD 50

7.2 Interim tag recoveries (at 30th June 2007)

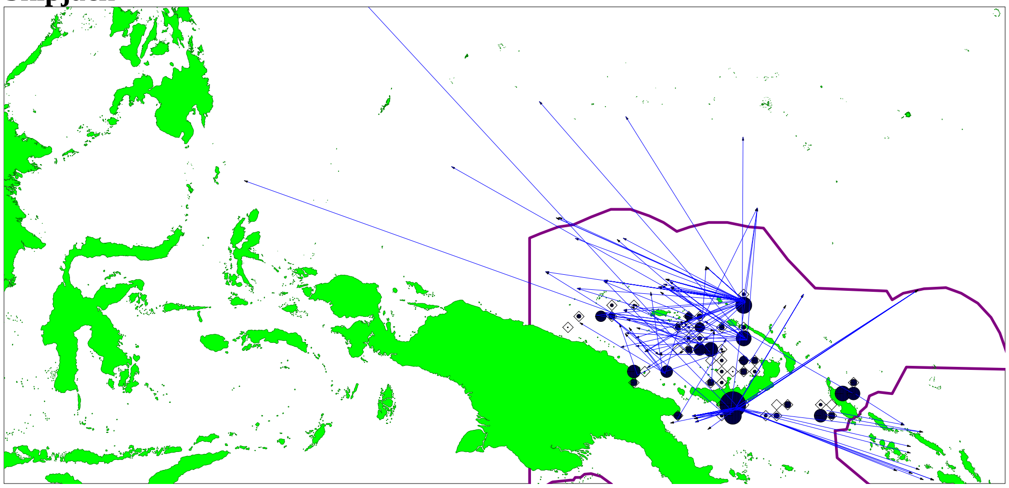
As at 30th June 2007, 603 tags (1.5%) had been received form the Cruise 2 releases – 601 yellow conventional tags (299 skipjack, 301 yellowfin and one bigeye) and two archival tags, both yellowfin. Figure 11 shows the displacement of Cruise 2 tagged tunas by species (movements > 100 nm) in the relatively short time since the release period (February - May 2006).

Recaptures from Cruise 1 releases continued to be received, with 4,071 (18.2%) tags retruned by 30th June 2007. This includes 23 archival tags (7 bigeye, one skipjack and 15 yellowfin, at a return rate of 31.5%. Figure 12 shows the displacement of the much larger number of Cruise 1 recaptures for movements > 100nm. Skipjack appear to show a greater degree of mobility on average than yellowfin or bigeye tuna.

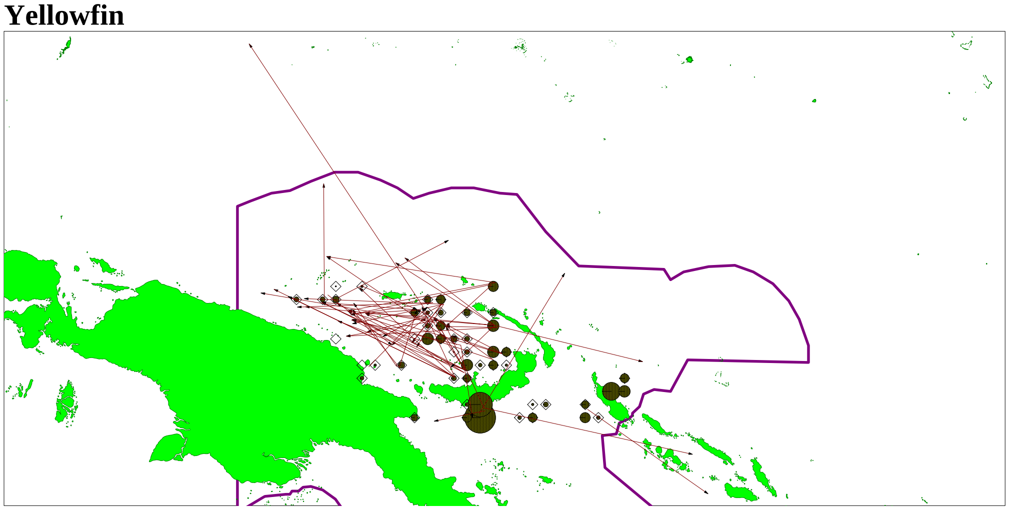
Figure 13 shows the displacement frequencies, by species, for all recaptures to date. The majority have been recaptured after 40 days at liberty, with relatively fewer recaptures in the 10-40 days at liberty period.

Figure 11. Displacements > 100 nm of recaptured tunas, Cruise 2.

Skipjack



Yellowfin



Bigeye

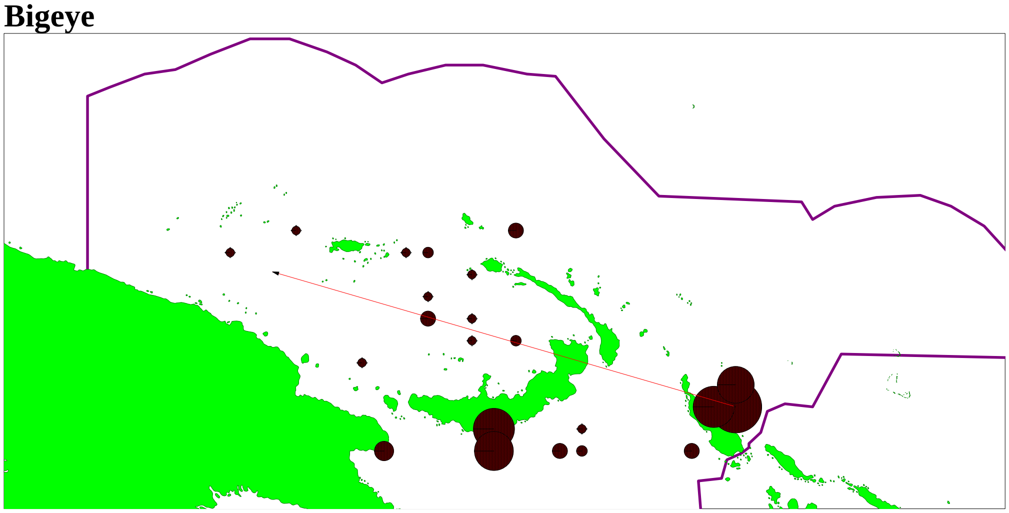
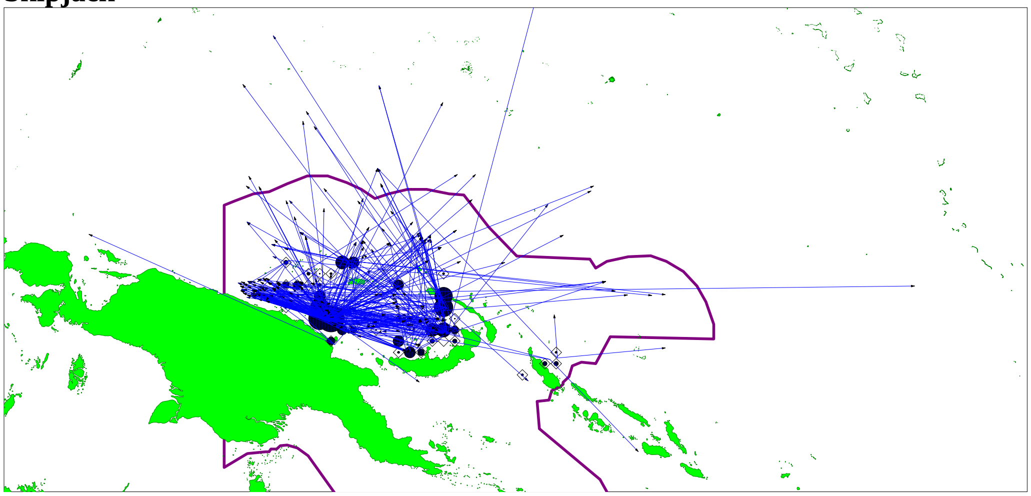
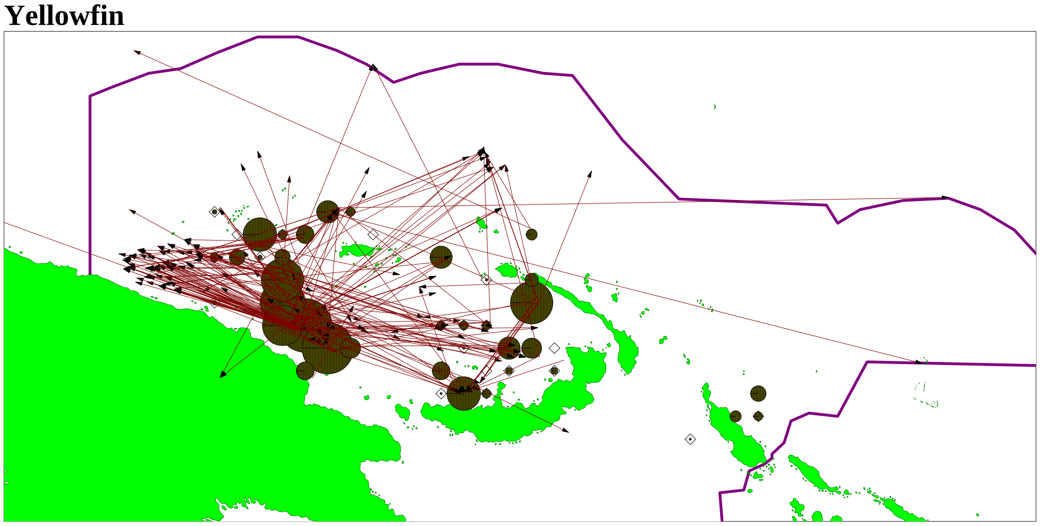


Figure 12. Displacements > 100 nm of recaptured tunas, Cruise 1.

Skipjack



Yellowfin



Bigeye

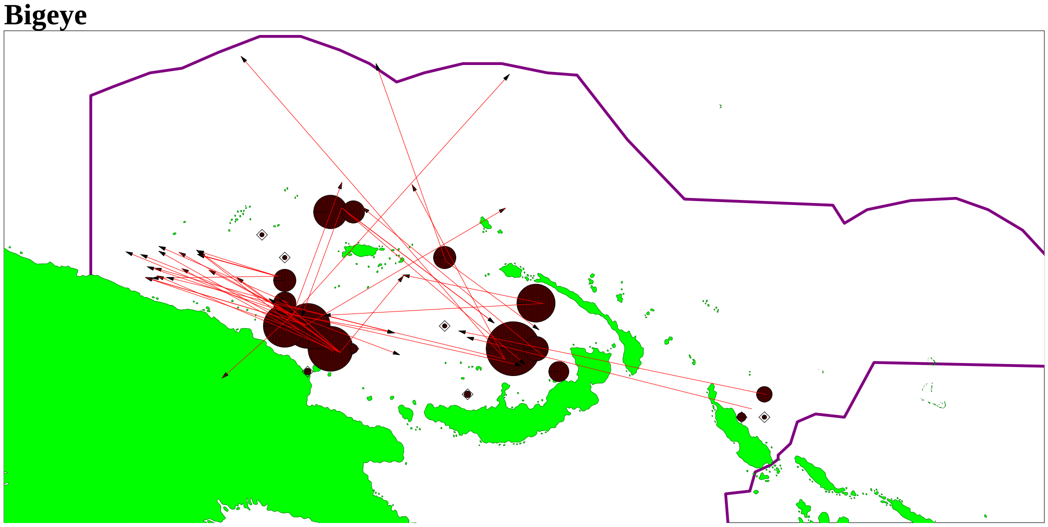
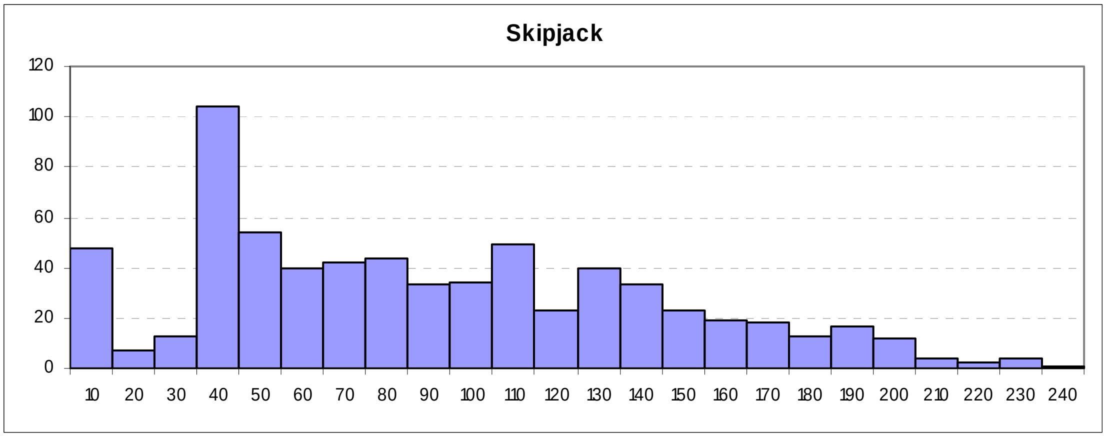
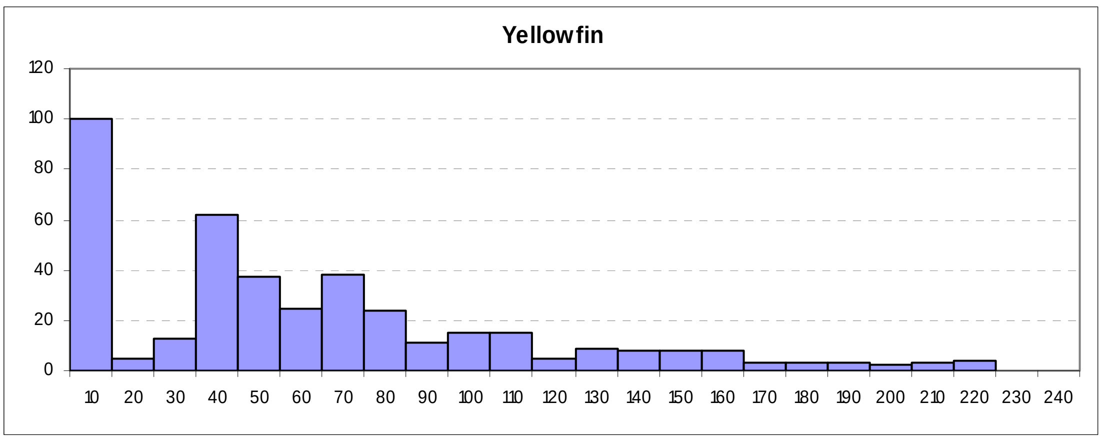
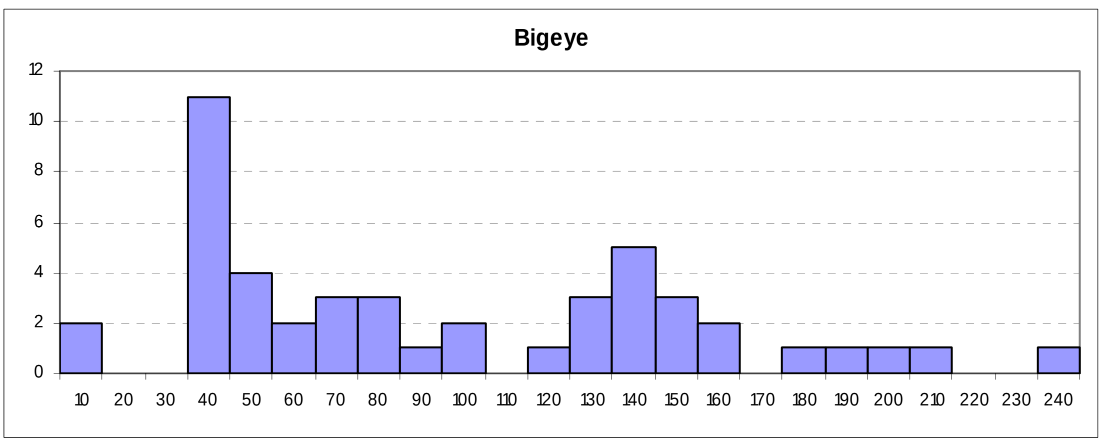


Figure 13. Frequency of days at liberty by ten day intervals, for all species.
A small number of recaptures at liberty for more than 250 days has not been included.







8. Future tagging

The PNG Tagging Project represents Phase 1 of what hopefully will be a larger regional tuna tagging project, involving activities throughout the WCPFC Convention Area, with emphasis on the tropical area where the majority of the catch is taken, and the majority of the biomass is assumed to occur. Funding for Phase 2 activities, likely to be coordinated by the Western and Central Pacific Fisheries Commission (WCPFC), is being sought. While there are no plans to carry out further tagging in PNG at this time (apart from some continuing sonic tagging activity by NFA), it is possible that residual funding may be applied to some tagging in contiguous areas, notably the Solomon Islands.

9. Conclusion

The PNG Tuna Tagging Project has been demonstrably successful, with most of not all of the operational objectives of the cruises achieved, with the exception of the conventional tag release numbers for bigeye. However the achievements of the two Cruises were nevertheless outstanding, with the overall target for conventional tag releases being exceeded by more than 100% for both skipjack and yellowfin. Efforts to increase the bigeye tag numbers were hampered by the apparently low abundance of the species of a size vulnerable to pole-and-line and FAD-associated night handline fishing during the first half of 2007 in most areas of PNG.

The excellent results obtained were possible in no small part due to the trouble-free operation of the *Soltai 6* during the two 3-month cruises, which is a tribute to the professionalism of the Solomon Islands officers and crew, and the logistical support provided Soltai Fishing and Processing Ltd. The teamwork and dedication of the officers, crew and scientific staff were instrumental in the success of the cruise. We thank also the fishing industry and our tag collection contacts in the various locations for their cooperation and assistance in the retrun of tags.

<u>For more information contact:</u>

John Hampton, Oceanic Fisheries Programme, SPC JohnH@spc.int
Bruno Leroy, Oceanic Fisheries Programme, SPC BrunoL@spc.int

Or visit the project website: http://www.spc.int/oceanfish/Html/TAG/index.htm