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PACIFIC TUNA TAGGING AND PNG TAGGING PROJECT PROGRESS REPORT AND WORKPLAN FOR 2011-2012

WCPFC-SC7-2011/ST IP-05

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Introduction

The steering committee report for the Pacific Tuna Tagging Programme (PTTP) for 2011 reports upon the tagging activities undertaken in 2010 under the banner of the PTTP, tag recoveries, and tag seeding activities. The objectives of the PTTP are specified in SC6-GN-IP-04. Funding support for the PTTP has been provided by the PNG National Fisheries Authority, New Zealand Agency for International Development, the Government of the Republic of Korea, Australian Centre for International Agricultural Research, European Community 8th European Development Fund, European Community 9th European Development Fund, European Community 10th European Development Fund, the French Pacific Fund, the Government of Taiwan and the Global Environment Facility.

In 2011, SPC and the PNG National Fisheries Authority (NFA) began a three-year tag release programme in the PNG EEZ, funded by NFA. This new project, referred to here as the PNG Tagging Project (PNGTP) is considered under the umbrella of the PTTP and is thus reported in this annual report. The PNGTP will extend the time series of tagging in PNG since the beginning of the PTTP in mid-2006 to 7+ years. The objectives of this work are consistent with those of the PTTP; however the work will be primarily focused on providing the data resources to assess the status of tuna resources in PNG for national tuna fisheries management. The data will also contribute to the wider WCPO assessment of tuna stocks.

The overall operational structure of the PTTP is as follows (with planned work for 2011-12 shown in red):

	Time period	**Operational area**	**Tagging vessel**
Phase 1	Aug – Nov 2006	PNG	*Soltai 6*
	Feb – May 2007	PNG	*Soltai 6*
	Oct – Nov 2007	Solomon Islands	*Soltai 6*
	Feb – Mar 2008	Solomon Islands	*Soltai 6*
	Apr 2008	Solomon Islands	*Soltai 105*
Phase 2	May – Jun 2008	Central Pacific (CP1)	*Double D*
(to date)	Jun – Nov 2008	Western Pacific (WP1)	*Soltai 105*
	Mar – Jun 2009	Western Pacific (WP2)	*Soltai 105*
	May – Jun 2009	Central Pacific (CP2)	*Double D*
	Jul – Oct 2009	Western Pacific (WP3)	*Soltai 105*
	Oct – Nov 2009	Central Pacific (CP3)	*Aoshibi Go*
	May – Jun 2010	Central Pacific (CP4)	*Aoshibi Go*
	Oct – Nov 2010	Central Pacific (CP5)	*Pacific Sunrise*
	Oct 2011	Central Pacific (CP6)	*Pacific Sunrise*
	Nov – Dec 2011	Central Pacific (CP7)	*Aoshibi Go*
PNGTP	Apr – Jul 2011	PNG (PNGTP1)	*Soltai 105*
	Jan – Feb, May – Jun 2012	PNG (PNGTP2)	*Soltai 105*

The report provides a review of work undertaken in 2010-11, an update of the overall programme results to date and the proposed workplan for the PTTP (including the PNGTP) for 2011-2012.

Summary of PTTP Activities in 2010-2011

Since SC6, PTTP activities comprised a handline cruise, CP5, in the tropical central Pacific, the first pole-and-line cruise of the PNGTP, continued implementation and refinement of tag recovery processes and tag seeding, and data preparation for use in the 2011 WCPO skipjack, yellowfin and bigeye tuna stock assessments.

CP5 was a cruise of 4 weeks duration conducted in Nov-December 2010 targeting bigeye tuna aggregations associated with the TAO oceanographic moorings (Figure 1) straddling the Equator at 170ºW and 180º. The Tonga-based multipurpose vessel *Pacific Sunrise* was chartered for the cruise. A total of 6,359 tuna (6,091 bigeye, 228 yellowfin and 40 skipjack) were tagged (Table 1). All releases were made at the 170°W (2°N, Equator and 2°S moorings) and 180°W (2°N). Within these releases, 58 archival tags were deployed on bigeye tuna.

Figure 2 shows the overall size distribution per species respectively tagged during all combined CP cruises and tagged during the other combined (pole & line) cruises. These figures show the selectivity differences between the 2 fishing methods (pole-and- line versus handline) and the much higher bigeye percentage that occurs around FADs in the central equatorial Pacific Ocean.

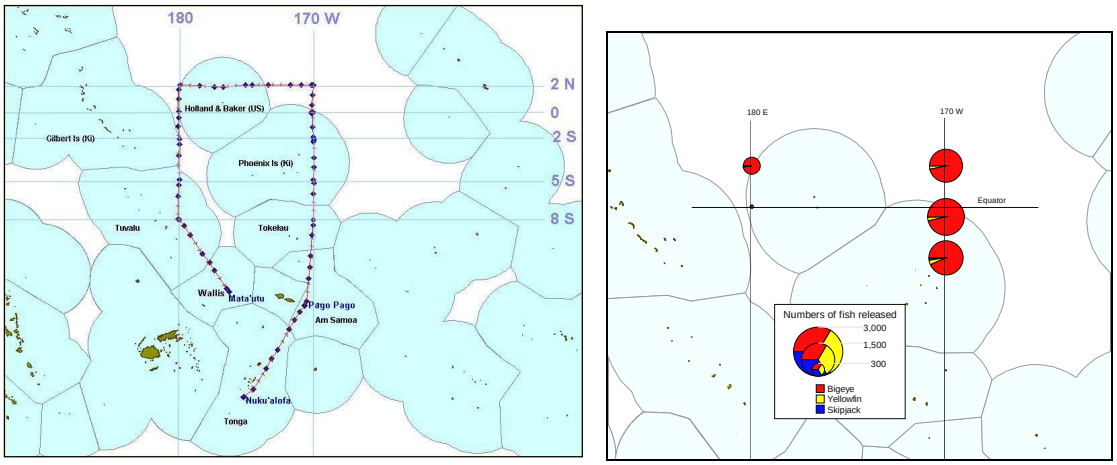


Figure 1. Cruise track and distribution of tag releases during CP5.

The first cruise of the **PNGTP** (PNGTP1) was conducted over three months from April to July 2011, using the chartered pole-and-line vessel, *Soltai 105*. The cruise was designed to release mainly conventional tags across 4 areas within the PNG EEZ (Figure 2). A total of 40,628 tuna (28,707 skipjack, 11,568 yellowfin, 353 bigeye) were tagged during PNGTP1 (Table 1). The distribution of releases is shown in Figure 3. Within these releases, 22 fish (19 yellowfin and 3 bigeye) received an archival tag. Archival tagging in Solomon Sea region for yellowfin was undertaken in collaboration with CSIRO.

Table 1. CP5, PNGTP1 and total PTTP releases to date of conventional and archival tags.

Project	Tag type	Skipjack	Yellowfin	Bigeye	Total
CP5	**Conventional**	40 (0.6%)	228 (3.6%)	6,091 (95.8%)	**6,359**
	Archival			58	**58**
PNGTP1	**Conventional**	28,707 (71%)	11,568 (28%)	353 (1%)	**40,628**
	Archival		19	3	**22**
Total PTTP	**Conventional**	194,964 (63%)	90,005 (29%)	24,164 (8%)	**309,133**
	Archival	97	423	505	**1,025**

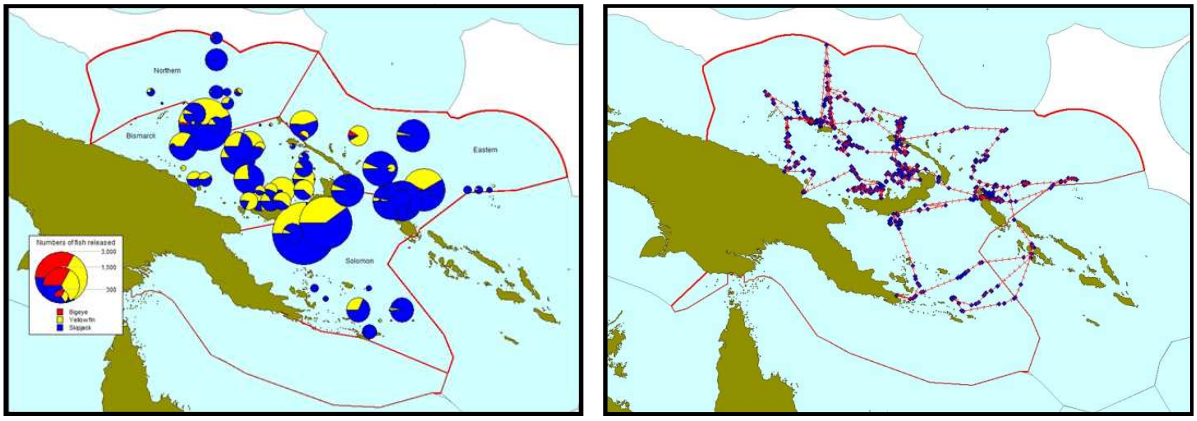


Figure 2. Left Panel. Distribution of tag releases during PNGTP1. The red lines show the delineation of the EEZ and sub regions. Right Panel. Cruise track during PNGTP1.

PNGTP1 also provided an opportunity to collect an additional 474 stomach samples (Table 2) as part of a long-term project to characterize the trophic status of the western and central Pacific pelagic ecosystem. Since the beginning of the PTTP in 2006, 4,782 stomach samples have been collected, mainly from skipjack, yellowfin, bigeye and albacore tuna (Table 3). The examination of the stomachs is an ongoing process and is conducted in the laboratory at SPC headquarters. A total of 3,191 stomach, representing 67% of the samples collected, have been examined and corresponding data entered in a dedicated database (see Table2).

Table 2. Number of stomach samples collected during PNGTP1.

PREDATOR SPECIES		COLLECTED
SKJ	SKIPJACK	214
YFT	YELLOWFIN	194
KAW	KAWAKAWA	38
RRU	RAINBOW RUNNER	23
BET	BIGEYE	4
WAH	WAHOO	1
	TOTAL	474

Table 3. Total number of stomach samples collected and analysed to date.

PREDATOR SPECIES		COLLECTED	ANALYSED	% ANALYSED
SKJ	SKIPJACK	2202	1458	66%
YFT	YELLOWFIN	1787	1182	66%
BET	BIGEYE	243	236	97%
ALB	ALBACORE	242	109	45%
RRU	RAINBOW RUNNER	98	45	46%
KAW	KAWAKAWA	88	50	57%
FRI	FRIGATE TUNA	63	60	95%
DOL	MAHI MAHI	40	35	88%
SWO	SWORDFISH	6	6	100%
WAH	WAHOO	5	3	60%
FAL	SILKY SHARK	4	4	100%
BUM	BLUE MARLIN	1	1	100%
NXI	GIANT TREVALLY	1	1	100%
PLS	PELAGIC STING-RAY	1	0	0%
YTL	AMBERJACK	1	1	100%
	TOTAL	4782	3191	67%

Conventional and archival tag recoveries for the PTTP

As at 27 July 2011, a total of 43,218 tagged tuna had been recaptured and the data reported to SPC. The numbers of conventional tag recoveries by species and by main tagging cruise are given in Table 4. Tag recoveries have occurred over the duration of the project, and are expected to continue for several years. Tag attrition follows the expected declining pattern (Figure 3) with the rate of decline in skipjack tag returns indicating their shorter expected lifespan and higher natural mortality when compared to yellowfin and bigeye tuna. The degree of similarity in recovery rates of yellowfin and bigeye tagged with archival tags and conventional tags vary depending on cruise (Table 5). Initial observations of this data suggest increased tag rejection/fish mortality with archival tagging on some cruises.

Table 4. Tag releases and recaptures for the PTTP to date.

Cruises	Releases				Recoveries (numbers and %)			
	SKJ	YFT	BET	Total	SKJ	YFT	BET	Total
PNG 1 Aug-Nov 2006	13,948	7,806	562	22,316	2,637 (18.9%)	1,801 (23.1%)	229 (40.7%)	4,667 (20.9%)
PNG 2 Feb-May 2007	26,493	12,845	129	39,467	2,481 (9.4%)	1,689 (13.1%)	6 (4.7%)	4,176 (10.6%)
SOL 1 Oct-Nov 2007	7,479	3,565	139	11,183	1,973 (26.4%)	783 (22%)	18 (12.9%)	2,774 (24.8%)
SOL 2 Feb-Apr 2008	15,327	14,404	414	30,145	1,753 (11.4%)	2,401 (16.7%)	62 (15%)	4,216 (14%)
WP1 Jun-Nov 2008	37,693	17,650	1,467	56,810	6,311 (16.7%)	2,014 (11.4%)	358 (24.4%)	8,683 (15.3%)
WP2 Mar-Jun 2009	34,207	13,919	3,145	51,271	4,534 (13.3%)	2,208 (15.9%)	460 (14.6%)	7,202 (14%)
WP3 Jul-Oct 2009	30,771	7,342	735	38,848	6,355 (20.7%)	1,283 (17.5%)	173 (23.5%)	7,811 (20.1%)
CP1 May-Jun 2008	57	116	1,736	1,909	4 (7%)	25 (21.6%)	566 (32.6%)	595 (31.2%)
CP2 May-Jun 2009	169	205	2,307	2,681	5 (3%)	24 (11.7%)	547 (23.7%)	576 (21.5%)
CP3 Oct-Nov 2009	66	237	4,802	5,105	2 (3%)	61 (25.7%)	1,648 (34.3%)	1,711 (33.5%)
CP4 May-Jun 2010	7	120	2284	2411	-	9 (7.5%)	357 (15.6%)	366 (15.2%)
CP5 Nov-Dec 2010	40	228	6,091	6,359	3 (7.5%)	4 (1.8%)	251 (4.1%)	258 (4.1%)
PNGTP1 Apr-Jul 2011	28,707	11,568	353	40,628	86 (0.3%)	95 (0.8%)	2 (0.6%)	183 (0.5%)
TOTAL	**194,964**	**90,005**	**24,164**	**309,133**	**26,144 (13.4%)**	**12,397 (13.8%)**	**4,677 (19.4%)**	**43,218 (14%)**

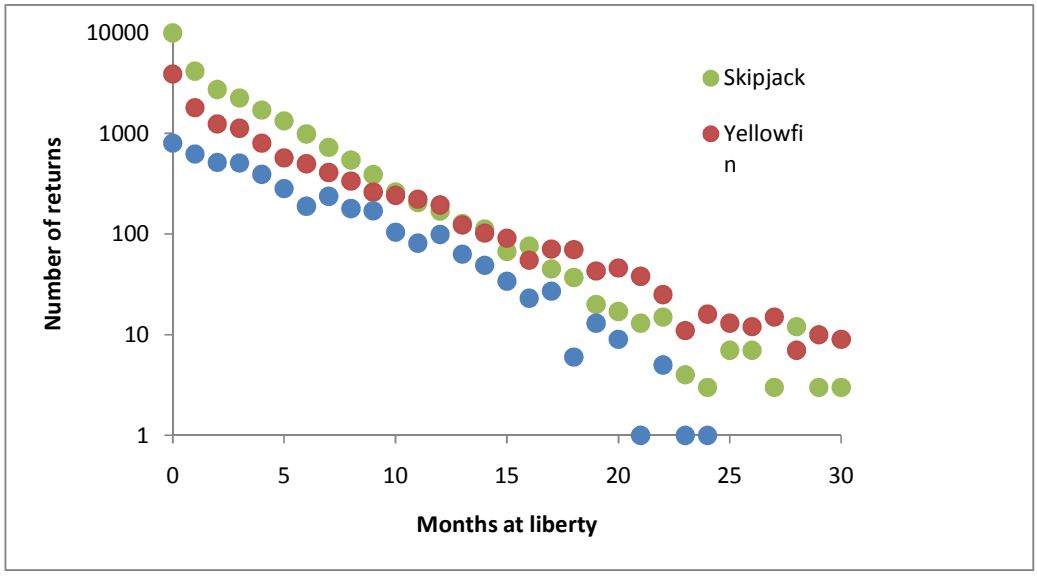


Figure 3. Tag recoveries by time at liberty for skipjack, yellowfin and bigeye tuna.

Table 5. Comparison of archival and conventional tag recoveries by species and cruise.

Cruises	ARCHIVAL Recoveries % (number tagged)				CONVENTIONAL Recoveries%			
	SKJ	YFT	BET	Total	SKJ	YFT	BET	Total
PNG 1 Aug-Nov 2006	100% (1)	37% (46)	44% (25)	40% (72)	18.9%	23.1%	40.7%	20.9%
PNG 2 Feb-May 2007	0% (1)	9% (18)7	0% (23)	8% (211)	9.4%	13.1%	4.7%	10.6%
SOL 1 Oct-Nov 2007		0% (5)	0% (7)	0% (12)	26.4%	22.0%	12.9%	24.8%
SOL 2 Feb-Apr 2008		22.7% (22)	0% (1)	21.7% (23)	11.4%	16.7%	15.0%	14.0%
WP1 Jun-Nov 2008		0% (13)	28.9% (36)	28.6% (49)	16.7%	11.4%	24.4%	15.3%
WP2 Mar-Jun 2009	0% (39	3.6% (56)	3.7% (81)	2.8% (176)	13.3%	15.9%	14.6%	14.0%
WP3 Jul-Oct 2009	5.4% (56)	7.7% (13)	0% (1)	5.7% (70)	20.7%	17.5%	23.5%	20.1%
CP1 May-Jun 2008		40% (5)	22% (45)	24% (50)	7.0%	21.6%	32.6%	31.2%
CP2 May-Jun 2009		11.1% (9)	17.7% (79)	17% (88)	3.0%	11.7%	23.7%	21.5%
CP3 Oct-Nov 2009		14.3% (28)	22.4% (107)	20.7% (135)	3.0%	25.7%	34.3%	33.5%
CP4 May-Jun 2010		0% (20)	5.1% (39)	3.4% (59)		7.5%	15.6%	15.2%
CP5 Nov-Dec 2010			3.4% (58)	3.4% (58)	7.5%	1.8%	4.1%	4.1%
TOTAL	4.1% (97)	12.3% (404)	15.9% (502)	13.3% (1003)	15.7%	15.7%	19.6%	16.0%

Tag recoveries have been received from all vessel nationalities involved in the purse seine fishery. In Table 6, we present the number of tags returned and reported as recaptured by different purse seine vessel nationalities, in relation to the catch of those vessels during the period of the PTTP (August 2006 – present). To aid interpretation we also present the distribution of catch by vessel nationality in the WCPO and the distribution of tagged tuna at release (Figure 4). The pattern of recoveries is very similar to that reported to the steering committee at SC6 in 2010:

- The numbers of tags reported by Indonesia, Philippines, PNG and Solomon Islands vessels has been very high in relation to their catches.
- In the case of Indonesia, this is thought to be a combination of a large number of tag releases in Indonesian waters, the proximity of intensive fishing effort to the tag releases and good tag recovery procedures in Bitung, Sorong, Kendari, Ambon and Ternate.
- In the case of Philippines, this has been due to the proximity of tag releases in PNG to Philippines purse seiners fishing in PNG, considerable fishing effort by Philippines vessels adjacent to the large number of tag releases in Indonesia, and good tag recovery procedures in the main Philippines tuna unloading port of General Santos City.
- For PNG, large numbers of tags were recovered by the domestic purse seine fleet fishing in the Bismarck Sea, particularly in 2006 and 2007, and also by PNG seiners fishing more widely in the region but unloading their catch in Wewak – see PNG panel in Figure 4. High returns have been facilitated by excellent cooperation of the PNG-based fishing companies – Frabelle, RD Tuna and South Seas Tuna Corporation.

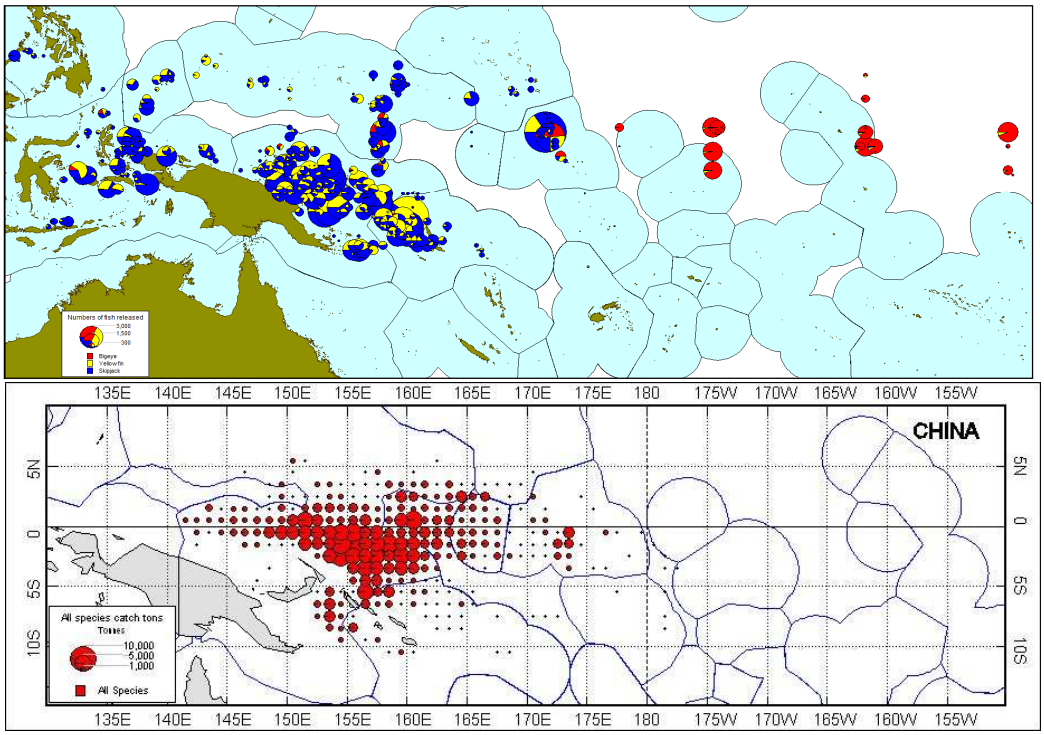
- Similarly in Solomon Islands, the large number of returns from Solomon Islands vessels reflects the large number of releases in Solomon Islands archipelagic waters, highly concentrated fishing effort in that area by Solomon Islands purse seiners – see Solomon Islands panel in Figure 4 – and very good cooperation in tag recovery by the two locally-based companies Soltai and NFD.
- Japanese seiners fished relatively close to the main centers of tag release, which, in combination with good tag recovery procedures in the main unloading port of Yaizu and excellent assistance by the Japan National Research Institute of Far Seas Fisheries, results in a moderately high number of tags/catch.
- In the case of Vanuatu, a large number of tags have been recovered by several vessels fishing in Solomon Islands archipelagic waters, which largely accounts for their very high tags/catch.
- Chinese Taipei seiners had moderate tags/catch fishing in an area similar to the Japanese fleet. The lower tags/catch of this fleet compared to the Japanese probably reflects the lower tag detection/reporting rates in transshipment operations compared to direct unloading at home port.
- United States seiners had moderate tags/catch despite the fact that its main area of activity was somewhat displaced to the east of the main tag release centers in PNG and Solomon islands. Most US recoveries came from fish that had been transshipped to Thailand, probably recaptured by vessels fishing closer to the main tag release sites. Very few tags have been recovered from vessels unloading in American Samoa (see following section).
- Korean vessels had a relatively low number of tags recovered, despite their fleet recording the highest overall catch since the start of the tagging programme. While the fishing activity of this fleet is largely to the east of the main tag release areas, it is similar to the areas fished by the United States and Vanuatu fleets.
- Some of the smaller fleets, such as Marshall Islands and New Zealand, had very low numbers of tags/catch, possibly due to their more easterly distribution of fishing effort.

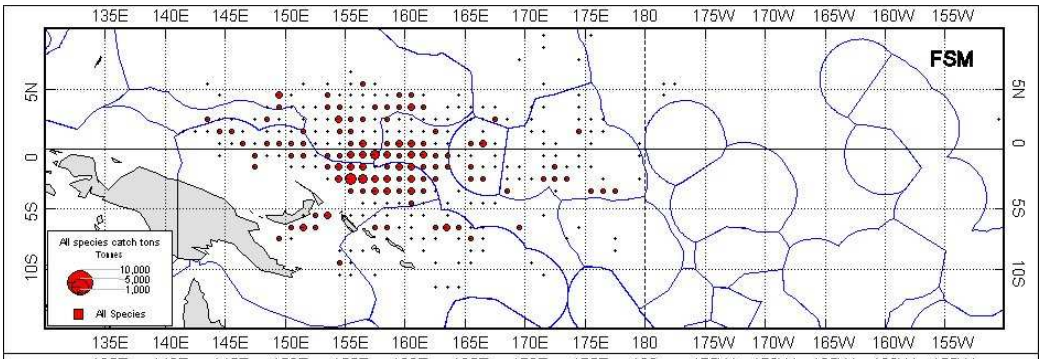
Overall, most of the variability in numbers of tags returned in relation to the catch of the various fleets are potentially explainable due to the operational characteristics of these fleets.

The accuracy of information returned from tags recovered on fishing vessels remains higher than that received from canneries or via transshipment (Figure 5). The information from transshipment on date and location of recovery is typically reported as unknown.

Table 6. Tag returns by purse-seine vessel nationality per 1,000 mt of total purse-seine catch of that nationality for the period 1 August 2006 to 31 December 2009 within the boundary of 130°E to 180°E longitude and 10°N to 15°S latitude.

Vessel Nationality	Number of tags returned	Tags returned/1,000 mt of catch
China	384	1.4
Spain	593	26.9
FSM	392	4.8
Indonesia	5949	7.2
Japan	2270	2.7
Kiribati	303	6.9
Korea	1221	1.2
Marshall Islands	271	1.4
New Zealand	14	0.2
Papua New Guinea	8868	9.5
Philippines	5243	8.1
Solomon Islands	6155	83.6
Chinese Taipei	2049	2.3
USA	1917	2.9
Vanuatu	1890	10.6

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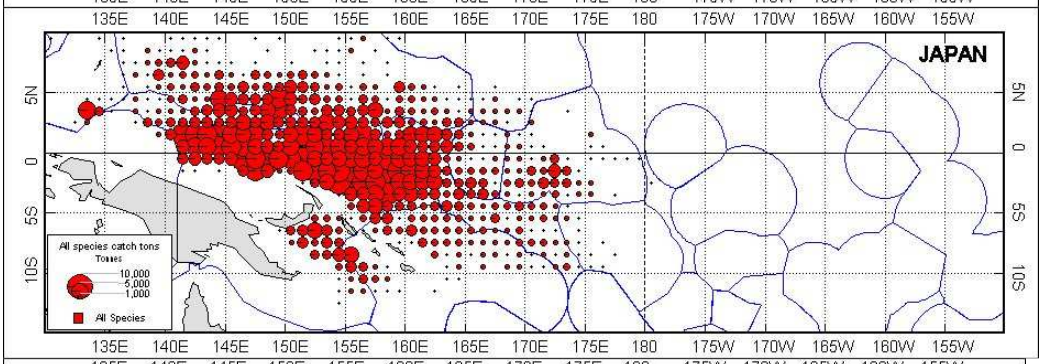
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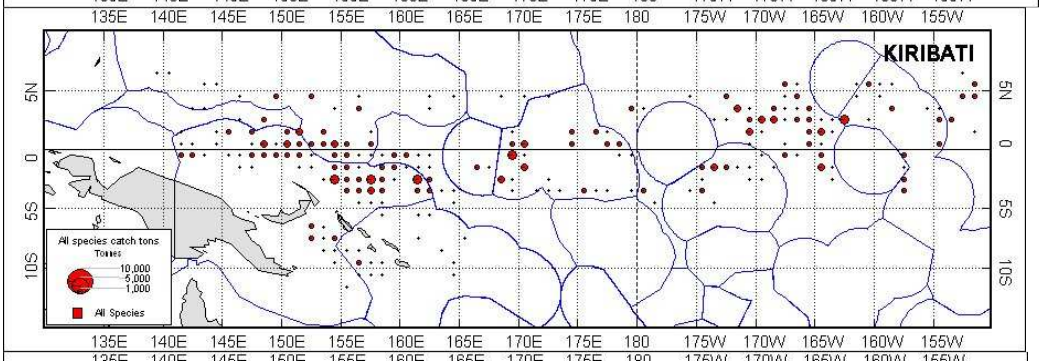
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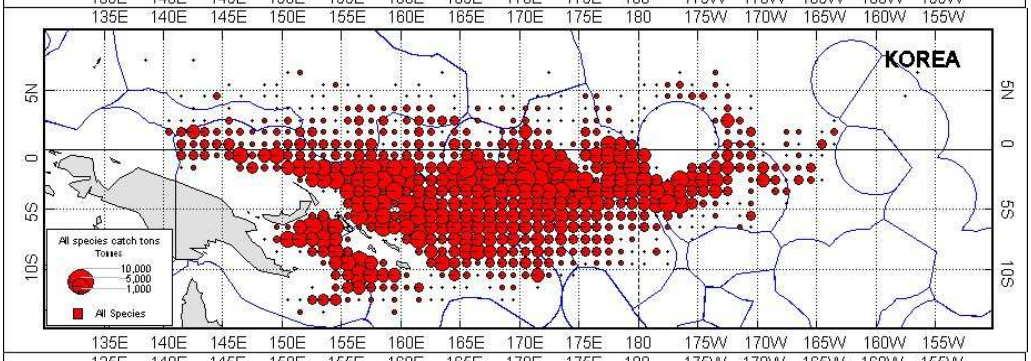
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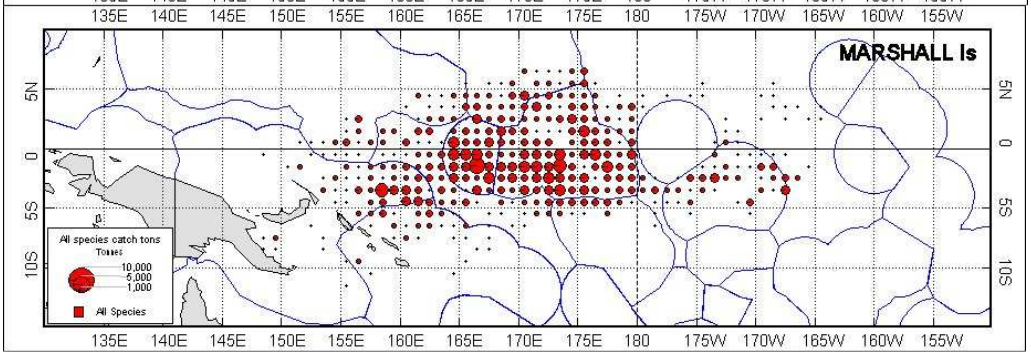
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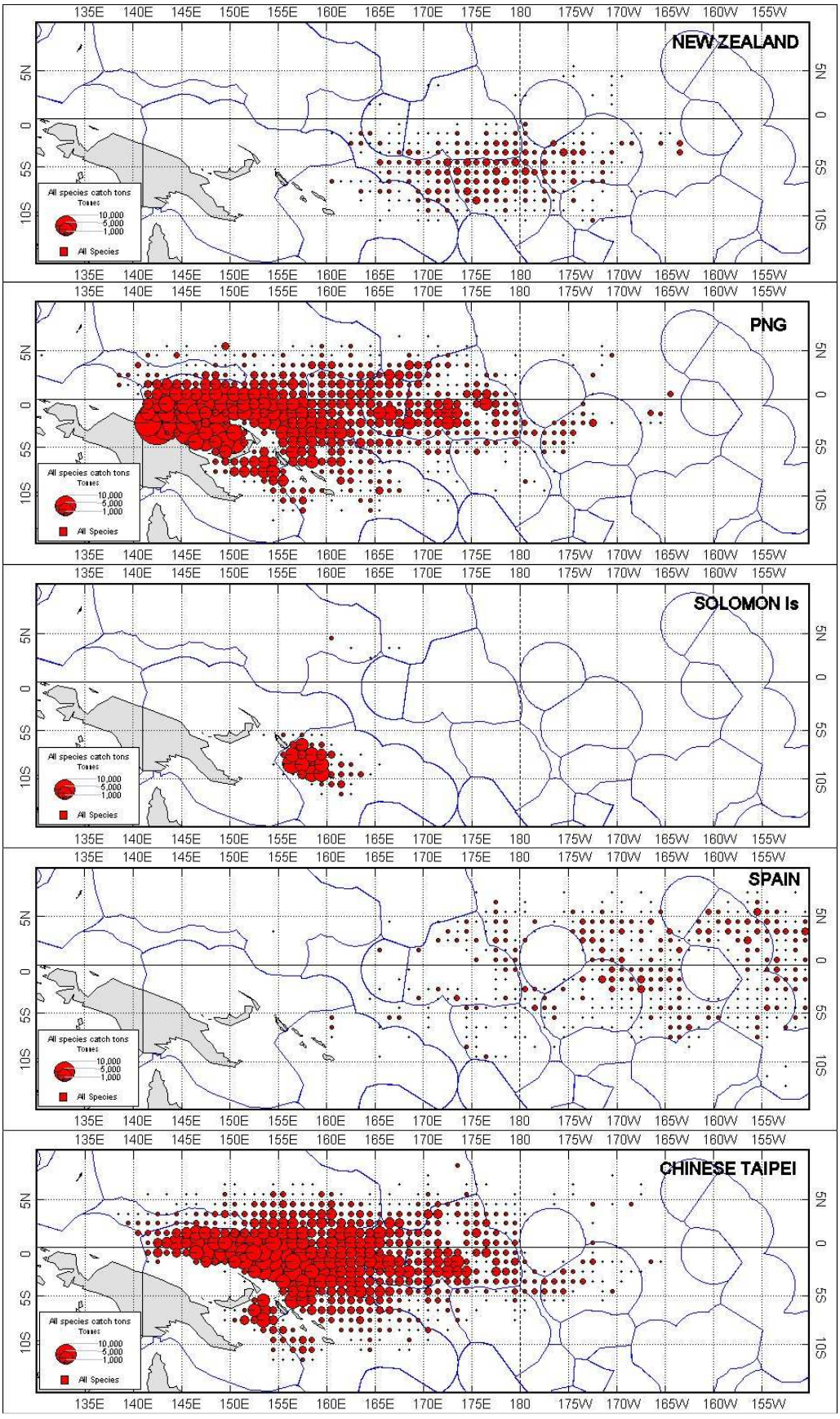
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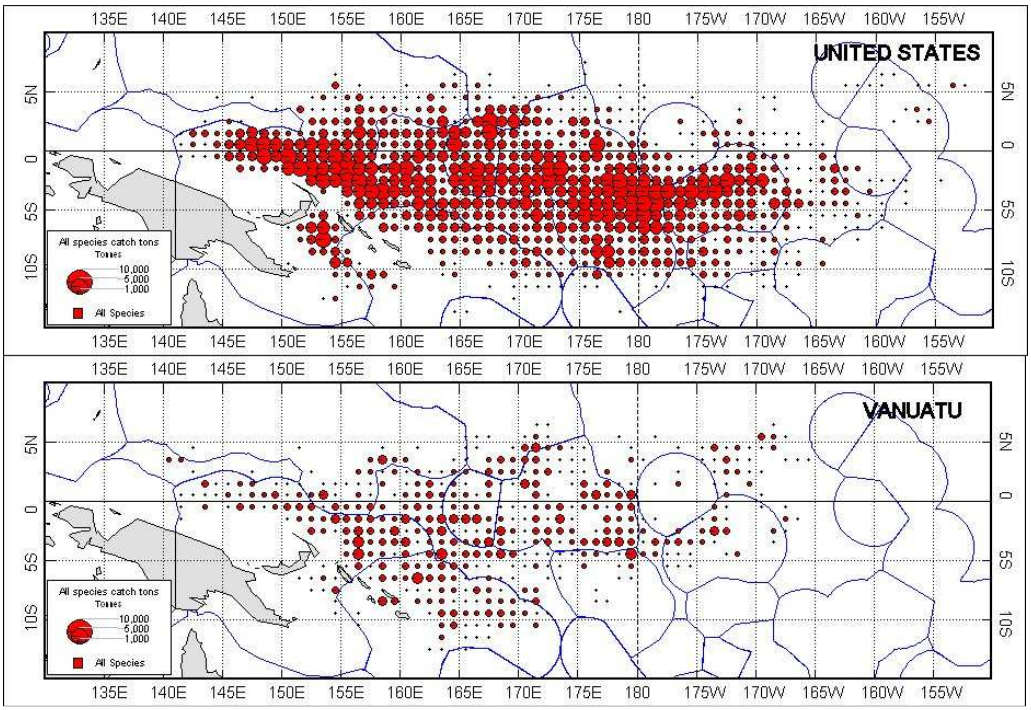

Figure 4. Top Panel. Distribution map of tag releases from 2006-2010. Lower panels. Maps showing the distribution of total catch between 1 August 2006 and 31 December 2009 for the major purse-seine fleets operating in the WCPO.

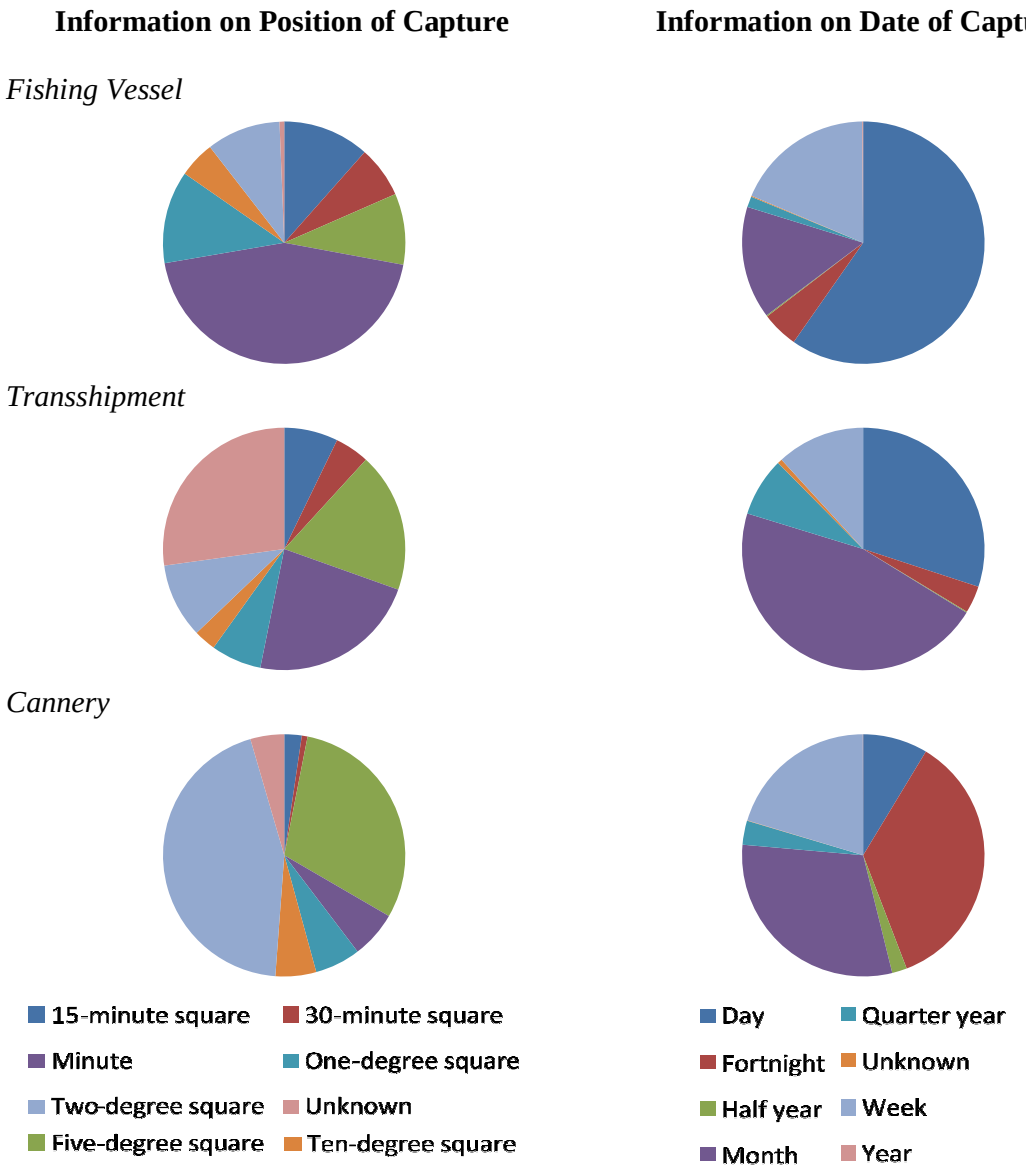

Figure 5. Location and date of tag recovery accuracy information for recoveries on fishing vessels, during transshipment and at canneries.

Tag Recovery

Full-time Tag Recovery Officers have been appointed in Wewak, Madang, Lae, Rabaul, Honiara, Pohnpei and Majuro and a part-time officer in Kiritimati Island (Kiribati). These officers are coordinated by the central TRO at SPC. The establishment of these positions should provide greater opportunity for collection of tags during unloading, transhipments and processing in canneries with more complete and reliable capture information. Tag recovery materials have been revised and a new manual provided to all TROs in addition to new reward posters and advertisement materials that promote tag recovery. Major unloading and processes facilities have been visited by TROs over the last 12 months with increased advertisement in the last 6 months to notify the fishing industry of the commencement of the PNGTP.

PIRFO standards for tag recovery and seeding have been developed and approved and a competency based module established for PIRFO Observer training courses. In addition nine PIRFO trainers have been certified to teach and assess this module.

Tag Seeding

From February 2007 to July 2011, 257 tag seeding kits (consisting of 25 seeding tags, applicators, guide books and data forms) have been given to observer coordinators in PNG, Solomon Islands, Fiji, FSM, Marshall Islands, Kiribati, New Zealand and American Samoa for deployment aboard purse seine vessels by senior observers.

To aid in the implementation of tag seeding experiments training is provided as part of the PIRFO Observer training courses. Tag Recovery Officers in the ports of Majuro, Pohnpei, Honaira, Rabaul, Lae, Madang and Wewak also liaise closely with Observer coordinators, Observer debriefers and observers to implement tag seeding experiments and to recover the tag seeding logs for deployed kits.

Of the 257 kits distributed to observer coordinators, 105 have been given to observers for deployment, of which 64 tag seeding datasheets have been received for these observer trips. Currently, SPC is holding returned seeded tags from an additional 15 kits for which the datasheets have not yet been provided. It is worth noting that it can take 6 months or more for datasheets to be returned.

Information of tag reporting rates derived from tag seeding is provided in SA-IP-10.

As at 27 July there have been 1,332 reported tags that have been seeded and 732 of these have been returned to SPC. The tag seeding data also allow the error rate in tag return information to be determined. Vessel name was reported incorrectly for 288 tags, was absent from the recovery information for 30 tags and was correct for 414 tags. The data was not correctly reported (within 2 days) for 601 tags. For the position, there were only 291 releases with position information for release and recovery. Of these, 145 were correct to within 100nm of the position recorded by the observer.

Preliminary Analyses of Movement and Growth

Movement trends observed from both conventional and archival tags are consistent with expectations for highly migratory species with larger movements positively related to time at liberty (Figure 6). Vertical movements are reported in SC3-BI-W)-04.

Preliminary analyses have been completed on the growth observed from the tag recoveries. Analyses have focused on temporal and/or spatial differences in growth rates for each of skipjack, bigeye and yellowfin tuna. Preliminary results suggest that growth rates have increased over time for skipjack (Figure 7) and that for skipjack and yellowfin that there are significant differences in growth rates in different areas (e.g. Figure 8).

Stock Assessment Data Preparation

Verification of the large number of recoveries received (~ 43,000), mostly with good data, but all in need of corroboration from logsheet and VMS matching is an ongoing task. Approximately 21,000 recovery records have been verified with VMS. Verification of the remaining tags is expected to be completed in 2011. Table 8 documents the number verified and data quality associated with the tags by source.

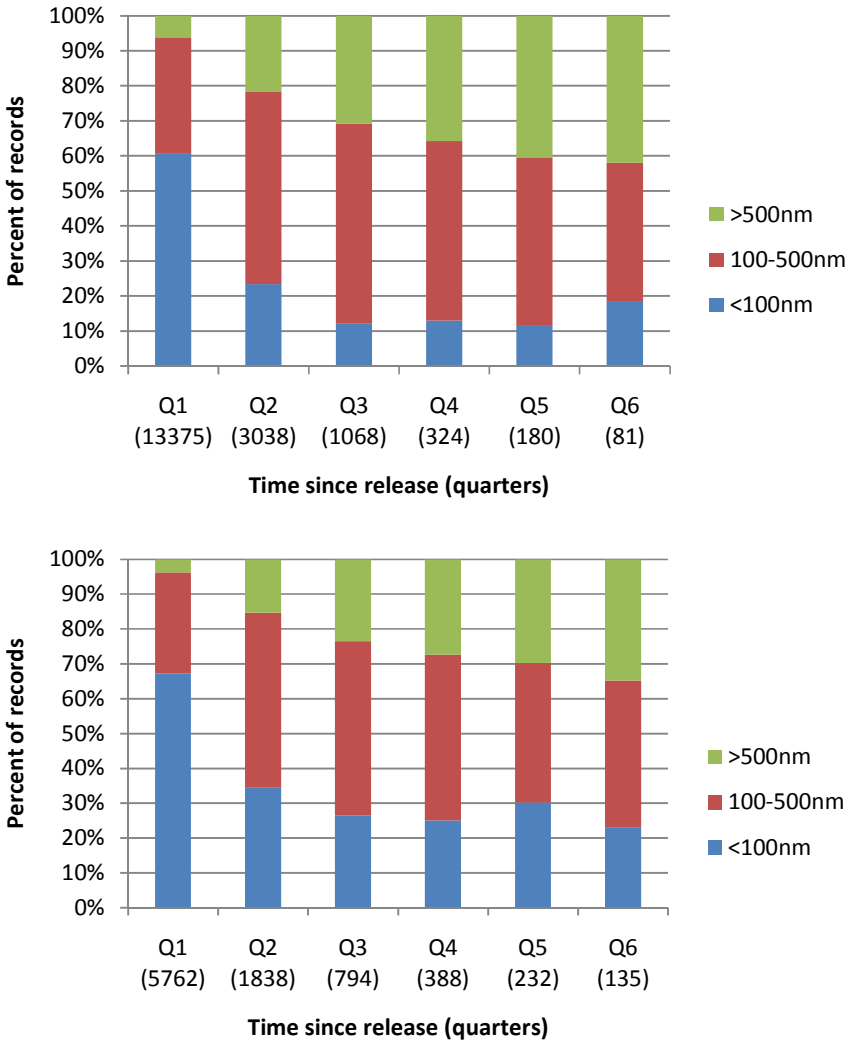

Figure 6. Reported recoveries within 100 nm, 100-500 nm and >500 nm in the first 6 quarters (18 months) since release for skipjack (upper graph) and yellowfin (lower graph). The sample size for each quarter is provided in the parentheses below the quarter label on the x-axis.

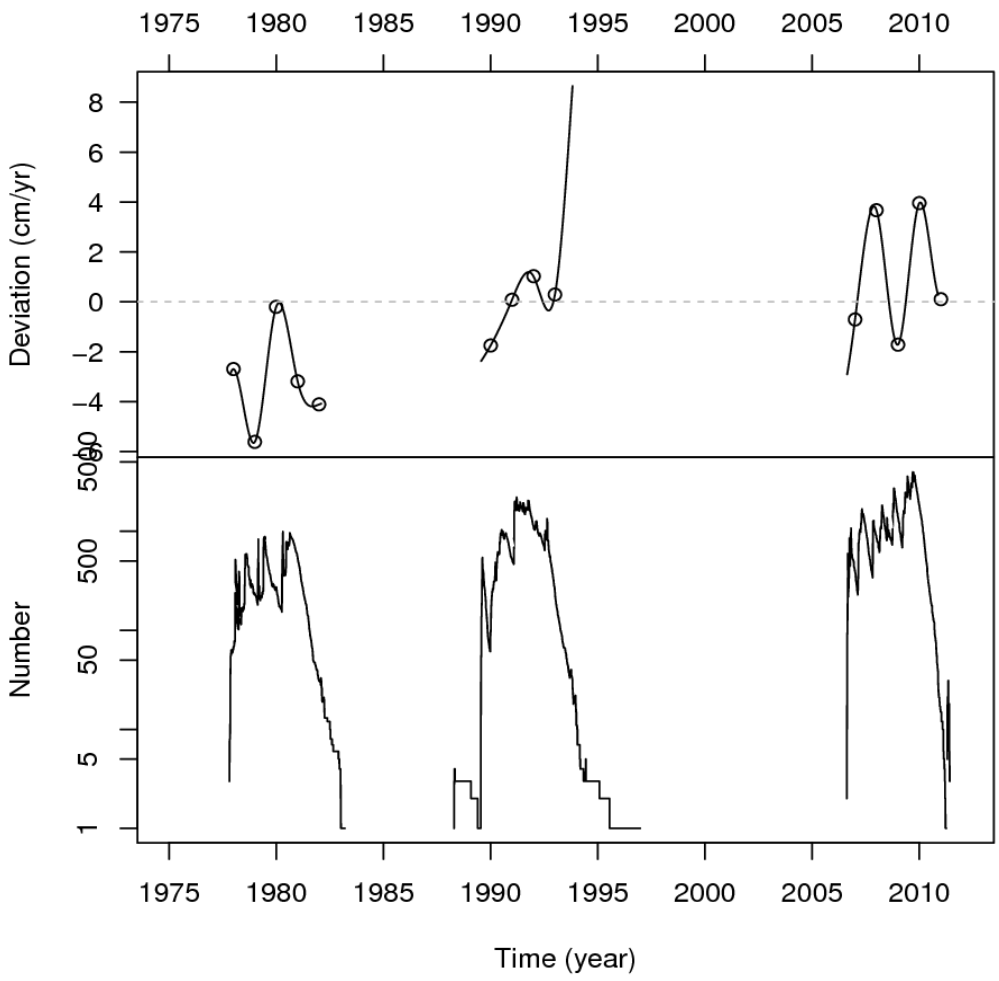

Figure 7. Estimated growth deviations (from average growth at length) by year for skipjack tuna. Top panel shows the estimated growth deviation spline with knots. Lower panel shows the number of tagged fish at liberty.

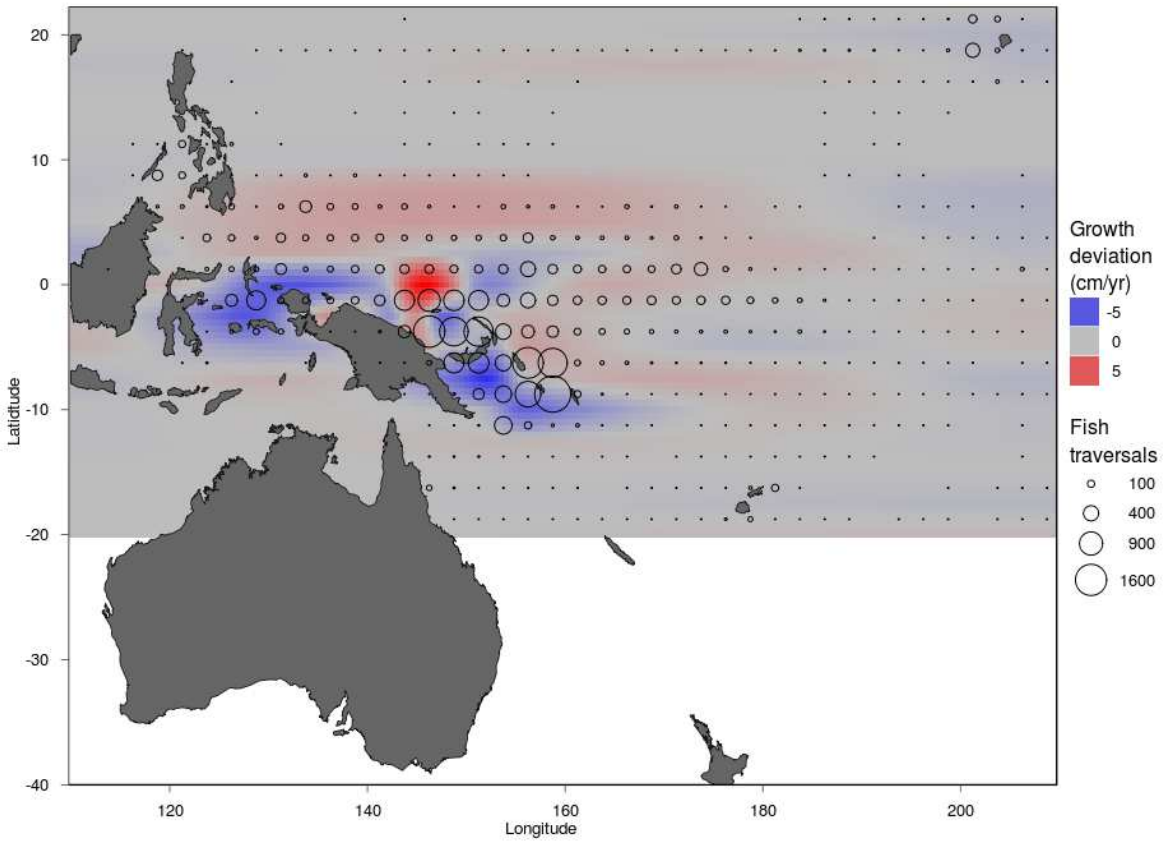

Figure 8. Estimates growth deviations (from average growth at length) by area for yellowfin tuna. The size of the circles is proportional to the number of fish that are calculated to have traversed through each grid cell.

Table 7. Tag recoveries by source and validation.

Tag source	Total recoveries	% Validated	% VMS	% Logsheet	% Archival	% Other	% None	% No vessel name	% Vessel but no date	% Vessel but no position	% No length	Validated	No vessel	Vessel but no date	Vessel but no position	No length
AS	357	79.55	84.86	1.41	0	0	13.73	11.76	0.84	33.33	54.06	284	42	3	119	193
CN	12	83.33	0	0	0	0	100	100	0	0	91.67	10	12	0	0	11
Fish. Ves	403	90.82	96.99	1.09	0	1.91	0	1.99	0	1.74	2.98	366	8	0	7	12
FSM	63	58.73	94.59	5.41	0	0	0	20.63	0	19.05	65.08	37	13	0	12	41
FSM (SPC)	89	80.9	93.06	2.78	0	1.39	2.78	1.12	0	11.24	2.25	72	1	0	10	2
IATTC	4214	25.27	29.2	9.39	1.78	16.62	43	7.38	10.11	31.78	88.89	1065	311	426	1339	3746
ID	5897	3.7	2.75	0.46	0	90.37	6.42	2	0	5.09	5.6	218	118	0	300	330
IOTC	8	12.5	100	0	0	0	0	62.5	0	37.5	0	1	5	0	3	0
JP	2168	88.24	92.89	4.76	0	1.1	1.25	3.51	0.05	5.17	3.87	1913	76	1	112	84
KI (Kiritimati)	31	100	83.87	0	3.23	0	12.9	12.9	0	3.23	35.48	31	4	0	1	11
KI (Tarawa)	245	42.86	25.71	0	0.95	4.76	68.57	80.41	0	6.53	7.76	105	197	0	16	19
KR	587	35.26	33.33	2.9	0	0.97	62.8	67.29	0	19.59	9.88	207	395	0	115	58
MH	573	93.37	82.24	15.51	0.37	0.75	1.12	1.22	0	10.82	25.31	535	7	0	62	145
NR	1	0	0	0	0	0	0	0	0	100	0	0	0	0	1	0
Other	74	39.19	48.28	3.45	3.45	17.24	27.59	25.68	0	17.57	33.78	29	19	0	13	25
PH (direct)	4398	34.83	47.91	15.27	0.13	20.89	15.8	6.09	0.05	43.16	80.15	1532	268	2	1898	3525
PH (Frabelle)	165	84.85	97.86	0.71	1.43	0	0	0	0	0	6.06	140	0	0	0	10
PH (NFRDI)	127	24.41	12.9	12.9	0	64.52	9.68	14.17	0	14.17	18.9	31	18	0	18	24
PNG (Frabelle)	1939	86.54	68.89	30.21	0.18	0.12	0.6	0.36	0.05	1.13	13.05	1678	7	1	22	253
PNG (NFA)	274	63.5	80.46	4.6	0.57	0	14.37	26.28	0	15.33	36.13	174	72	0	42	99
PNG (other)	63	55.56	82.86	17.14	0	0	0	20.63	0	9.52	6.35	35	13	0	6	4
PNG (RD)	6705	97.73	78.15	19.53	0.05	0.11	2.17	0.46	0	1.42	2.51	6553	31	0	95	168
PNG (SST)	1141	45.49	70.71	22.35	0	3.66	3.28	4.21	0	67.48	38.21	519	48	0	770	436
SB (Global)	1044	89.37	85.53	14.47	0	0	0	8.72	0	0.96	56.32	933	91	0	10	588
SB (MFMR)	186	60.75	89.38	8.85	0.88	0	0.88	4.84	0	24.19	12.37	113	9	0	45	23
SB (NFD)	3702	89.03	59.28	40.69	0.03	0	0	0.22	0.08	3.38	2.27	3296	8	3	125	84
SB (other)	47	59.57	89.29	7.14	0	3.57	0	38.3	2.13	25.53	38.3	28	18	1	12	18
SB (Soltai)	2696	83.9	85.68	13.57	0	0	0.75	7.86	0.19	1.52	1.34	2262	212	5	41	36
Tag Ves	278	30.94	0	0	0	98.84	1.16	0.36	0	7.91	1.8	86	1	0	22	5
TW	14	85.71	100	0	0	0	0	0	0	0	0	12	0	0	0	0
TH	6457	80.98	94.22	3.46	0.08	0.08	2.16	0.93	0	93.77	1.6	5229	60	0	6055	103

ALBACORE TAGGING

A description of albacore tagging activities was outlined previously in SC6 GN IP-06 and SC5 GN IP-16. As of the 27th July 2011, there have been 3 conventional tag returns, all of which were recaptured within the New Zealand EEZ. One of these recaptures was at liberty for 2 years, with the other 2 recaptures at liberty for approximately 12 months. The latter two recaptures were OTC-marked albacore, so the whole fish were recovered and the otoliths and spines removed to be analysed as part of an age validation experiment.

A further 19 albacore were tagged with miniPATs in New Caledonia, New Zealand and Tonga in 2010. All but one of these tags (from New Caledonia) has since reported, with time attached to fish varying from 1 day to 12 months, but most reported within the first 3 weeks (Figure 9).

In addition to albacore, 2 oceanic whitetip sharks were tagged with PSATs in the Tonga EEZ. One of these sharks was recaptured by a longliner in Fiji three months after release. The PSAT was recovered and the full data set downloaded.

Analyses and write-up of the reported tagging data for albacore is scheduled to be completed later in 2011.

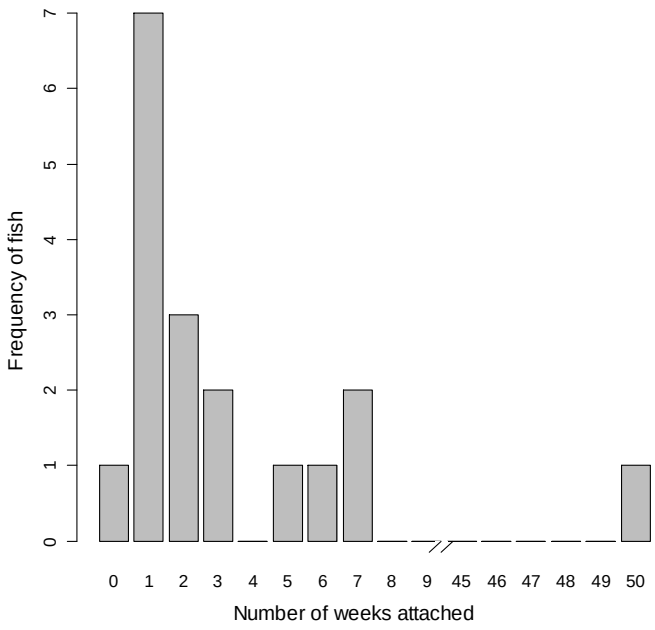

Figure 9 Attachment time for miniPATs on albacore (note break in x-axis)

PTTP 2011-2012 work plan

	Task	2011	2012
TAGGING			
1.	**CP6** *Background*: 4 week cruise focusing upon the NOAA TAO Oceanographic Buoys along the 170°W meridian (waters of Kiribati, Phoenix Islands and High Seas) and along the 180°W meridian (High Seas, waters of Kiribati, Gilbert Islands and Tuvalu). This is the sixth Central Pacific cruise designed to improve overall spatial coverage of PTTP tag releases in areas difficult to access between the Date line and French Polynesia and investigate movement parameters and vertical habitat utilization of tuna in the central Pacific region. The cruise will charter the *FV Pacific Sunrise*, a multi-purpose pelagic handline/longline vessel which is based in Nuku'alofa, Kingdom of Tonga. *Target*: BET 1,000 conventional tags; BET & YFT 50 Archival Tags		
2.	**CP7** *Background*: 6 week cruise focusing upon the NOAA TAO Oceanographic Buoys along the 155°W meridian (waters of Kiribati, Line Islands and High Seas) and along the 140°W meridian (High Seas, waters of French polynesia). This is the seventh Central Pacific cruise designed to improve overall spatial coverage of PTTP tag releases in areas difficult to access between the Date line and French Polynesia and investigate movement parameters and vertical habitat utilization of tuna in the central Pacific region. The cruise will charter the *FV Aoshibi Go*, a multi-purpose pelagic handline/longline vessel which is based in Honolulu, Hawaii. *Target*: BET 1,000 conventional tags; BET & YFT 50 Archival Tags		
3.	**PNGTP cruise 2** *Background*: 3 month cruise focused upon tagging within the EEZ of PNG and managed by NFA in collaboration with SPC using a pole and line vessel. *Target*: 30,000 tuna conventionally tagged with an ideal species composition of skipjack: 60%; yellowfin 35%; and bigeye 5%.		
TAG RECOVERY			
1.	Establishment and support of TROs in PNG, Philippines, Thailand, Indonesia, key Pacific Island locations and in Ecuador		
TAG SEEDING			
1.	Prioritise seeding of Japanese PS to confirm suspected high reporting rate		
2.	Prioritize continued tag seeding in order to improve understanding of the processes involved in tag reporting		
3.	Support locally based tag seeding co-ordinators		
4.	Undertake Observer training in tag seeding		
DATA MANAGEMENT			
1.	PTTP data verification with VMS and Logbook		
2.	Revision of PTTP web access		
3.	Migration of all WCPO tagging data into single database		
4.	Development of country specific PTTP web pages		
DATA ANALYSES			
1.	**Tag reporting and seeding** *Purpose*: Critical for any estimation of fishing mortality as it is a direct scalar for fishing mortality. *Tasks:* (1) Determine detection rate of double tags (test for impact on tag seeding returns); (2) Undertake an external analysis of seeding data to identify what influences recovery rate (vessel, flag/fleet, unloading locations);		
2.	**Movement (horizontal)** *Purpose*: Define regional structure of stock assessment models and provide estimation of mixing rates. *Tasks*: (1) Estimate movement from conventional tags and test for spatial variability in movement (use multiple models & compare ADR estimates); (2.) Estimate horizontal movement from archival tags; (3) Compare movement rate estimates among species & fish size from both archival and conventional tags, using AD models and simple approaches such as maximum displacement; (4) Add time structure to MFCL movements so that movements can be introduced from analyses outside the model and environmental covariates can be estimated; (5) Integration of archival tagging data into stock assessments		
3.	**Fishing and natural mortality** *Purpose*: Provide external validation to estimates from within MFCL and identify		

	fishing mortality changes in response to expansion of the WCPO fisheries. *Tasks*: (1) Repeat RTTP analysis, including an overlay of PTTP tags on RTTP parameter estimates.	[redacted]
4.	**Growth** *Purpose*: Key stock assessment model outputs are sensitive to both the mean and variation in growth curves and external analyses of growth will assist with documenting spatial and temporal variance in growth. *Tasks*: (1) Apply Grotag type analyses (Eg CSIRO) and IATTC revised methods; (2) Investigate the application of state-space methods to incorporate observation error in release and recapture lengths and time at liberty; (3) Investigate the application of integrated analysis to account for selectivity issues particularly for bet and yft	[redacted]