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PROJECT 42: PACIFIC TUNA TAGGING PROJECT REPORT AND WORK-PLAN FOR 2022-2025

WCPFC-SC18-2022/RP-PTTP-01

SPC-OFP[1]

[1] Oceanic Fisheries Programme (OFP), Pacific Community (SPC), Noumea, New Caledonia

Contents

1. INTRODUCTION

This Pacific Tuna Tagging Programme (PTTP) report provides information on the PTTP to date with a focus on the tagging activities undertaken in 2021-22 including research voyages, tag recoveries, and tag recovery and seeding activities. Issues arising in 2022 for consideration by the PTTP Steering Committee are highlighted and the PTTP work planned for 2022-2025 is outlined.

1.1. Programme objectives

The PTTP is a joint research project, implemented by the Oceanic Fisheries Programme (OFP) of the Pacific Community (SPC). The goal of the Pacific Tuna Tagging Programme is to provide data and knowledge for stock assessment and management of skipjack, yellowfin and bigeye tuna in the Pacific Ocean. The objectives of the PTTP, originally specified in WCPFC-SC6-2010/GN-IP-04 and revised in 2016 (PTTP Steering Committee, 2016), are:

1. To obtain data that will contribute to, and reduce uncertainty in, WCPO tuna stock assessments including estimation of overall and local exploitation rates, extent of mixing and appropriate spatial strata for use in assessments.
2. To obtain information to better understand the interactions between tropical tuna species and major fishing gears to support development of mitigation measures (where appropriate) and better interpret fisheries data (e.g., CPUE).

Under these objectives, information collected includes age-specific rates of movement and mixing, movement between this region and other adjacent regions of the Pacific basin, species-specific vertical habitat utilisation by tunas, and the impacts of FADs on behaviour.

1.2. Programme funding

Since its commencement in 2006, funding support for the PTTP has been provided by the:

- PNG National Fisheries Authority;
- New Zealand Aid Agency;
- 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;
- French Pacific Fund;
- Government of Taiwan;
- Heinz Australia;
- Global Environment Facility;
- International Seafood Sustainability Foundation;
- European Union (through voluntary contributions to WCPFC);
- and the WCPFC itself.

In 2011, SPC and the PNG National Fisheries Authority (NFA) also began a three-year tag release programme in the PNG EEZ, funded by NFA. This project, referred to here as the PNG Tagging Project (PNGTP) is considered under the umbrella of the PTTP and where relevant is reported on in this report.

In 2016 the PTTP steering committee recommended that SC normalise the tagging programme as part of the ongoing work of the SC (WCPFC-SC 2016). Ideally this would include research voyages every year alternating

between skipjack-focused voyages via pole and line in one year and bigeye-focused voyages via handline and dangler fishing in the next, starting with skipjack in 2017 (noting that yellowfin would be adequately covered by both surveys).

1.3. Operational structure

The overall operational structure of the PTTP to date is given in Table 1, with the work completed since the last PTTP reported highlighted and the scheduled work for 2022 also shown. The spatial distribution of these research voyages in the Western and Central Pacific Ocean is shown in Figure 1.

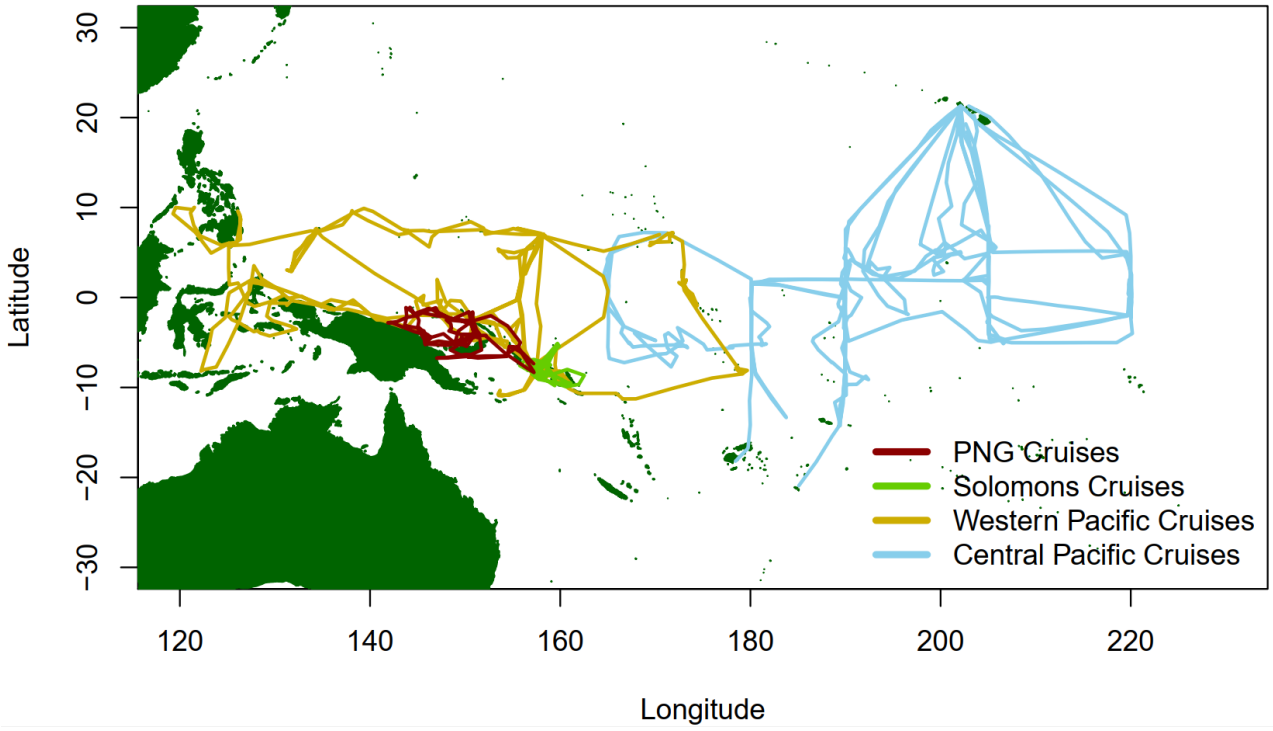


Figure 1: Tagging vessel tracks for all voyages for all PTTP research voyages. Legend relates to the groups of operational areas described in Table 1.

Table 1: Period, area and vessel used in PTTP tagging research voyages since the inception of the programme. Scheduled work for 2022 shown in italics.

Phase	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
	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
	Sep – Oct 2012	Central Pacific (CP8)	Pacific Sunrise
	Nov – Dec 2013	Central Pacific (CP9)	Pacific Sunrise
	Aug 2014	Central Pacific (CP10)	Pacific Sunrise
	Sep – Nov 2015	Central Pacific (CP11)	Gutsy Lady4
	Sep – Oct 2016	Central Pacific (CP12)	Gutsy Lady4
	Sep – Oct 2017	Western Pacific (WP4)	Soltai 105
	Jul – Aug 2018	Central Pacific (CP13)	Gutsy Lady4
	Jul – Sep 2019	Western Pacific (WP5)	Soltai 105
	Aug – Sep 2020	Central Pacific (CP14)	Gutsy Lady4
	Jul – Aug 2021	Central Pacific (CP15)	Gutsy Lady4
	Sep-Oct 2022	*Western Pacific (WP6)*	*Soltai 105*
PNGTP	Apr – Jul 2011	PNG (PNGTP1)	Soltai 105
	Jan – Mar 2012	PNG (PNGTP2)	Soltai 105
	Aug 2012	PNG (TAO trial)	FTV Pokajam
	Apr – Jun 2013	PNG (PNGTP3)	Soltai 101
	Jul 2016	PNG (TAO trial)	FTV Pokajam

2. SUMMARY OF PTTP ACTIVITIES IN 2021-2022

Since SC17, PTTP activities have included one Central Pacific voyage, CP15, focussed on bigeye tuna in the waters of Kiribati, Line Islands, and the nearby International Waters, and the continued implementation of tag recovery processes.

2.1. CP15 tagging voyage

The 2021 tagging experiment was initially planned to focus on skipjack tuna onboard one of the National Fisheries Developments (NFD) company's pole and line vessels based in Solomon Islands. Due to the travel restrictions imposed by the ongoing Covid-19 pandemic, a second central Pacific in a row, named the CP15 cruise, was implemented with only Hawaiian citizens comprising the scientific team onboard the SPC-chartered FV Gutsy Lady 4. The research voyage started from Honolulu on the 15th August for a total duration of 40 days (see voyage track in Figure 2).

The WCPFC and Korea jointly funded the cruise. Two fishing entities (Cape Fisheries and the US Tuna Group fisheries improvement program) voluntarily supported the cruise by providing positions of drifting FADs in the working area of the cruise.

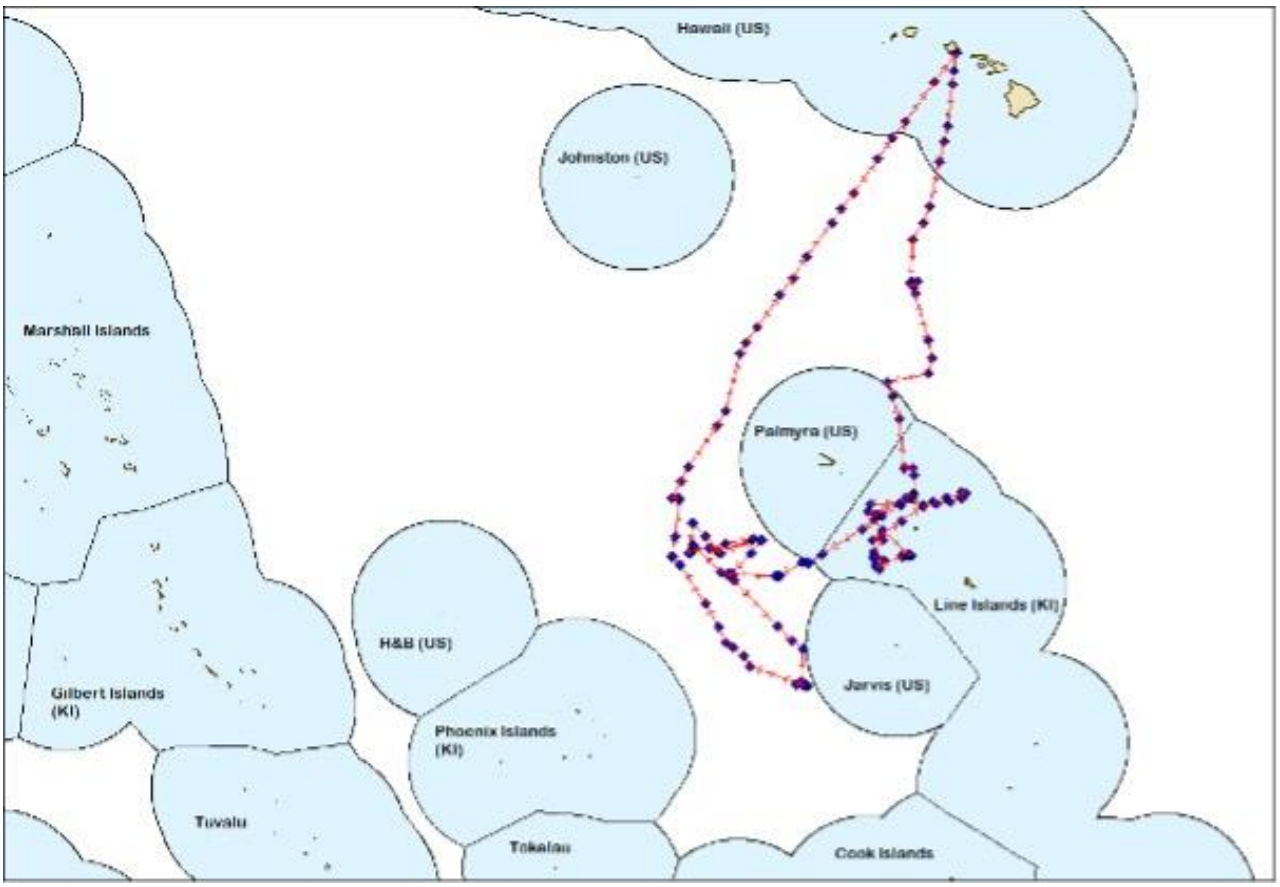


Figure 2: Voyage track during CP15 with daily positions for the vessel.

2.1.1. CP15 tag releases

Of the 40 days of charter during CP15, 11 days were spent fishing in Kiribati waters and 21 fishing days were spent in the surrounding international waters; remaining days were spent steaming to and from the fishing grounds. A total of 7,890 fish were tagged and released during the cruise (Figure 3), comprising 6445 bigeye (82%), 1344 yellowfin (17%), 98 skipjack (1%) and 3 sharks tagged with satellite tags. From those fish, 140 bigeye tuna, and 26 yellowfin were also tagged with an archival tag. Table 2 summarizes the number of fish tagged per species and tag type. The length frequency of tagged tuna is shown in Figure 4.

The average smaller size of bigeye tuna (compared to the CP14 cruise), the good participation of the industry (location of about 400 FADs shared) and the high percentage of bigeye in the encountered schools meant the cruise was remarkably successful (achieving the largest tag release number in CP cruise history).

Table 2: Numbers of fish tagged during CP15, by tag type and species.

Tag type	BET	YFT	SKJ	Others	Total
Archival tags	140	26			166
Satellite (miniPAT)				3	3
Conventional Y13	6,305	1,318	98		7,721
Total fish tagged	**6,445**	**1,344**	**98**	**3**	**7,890**

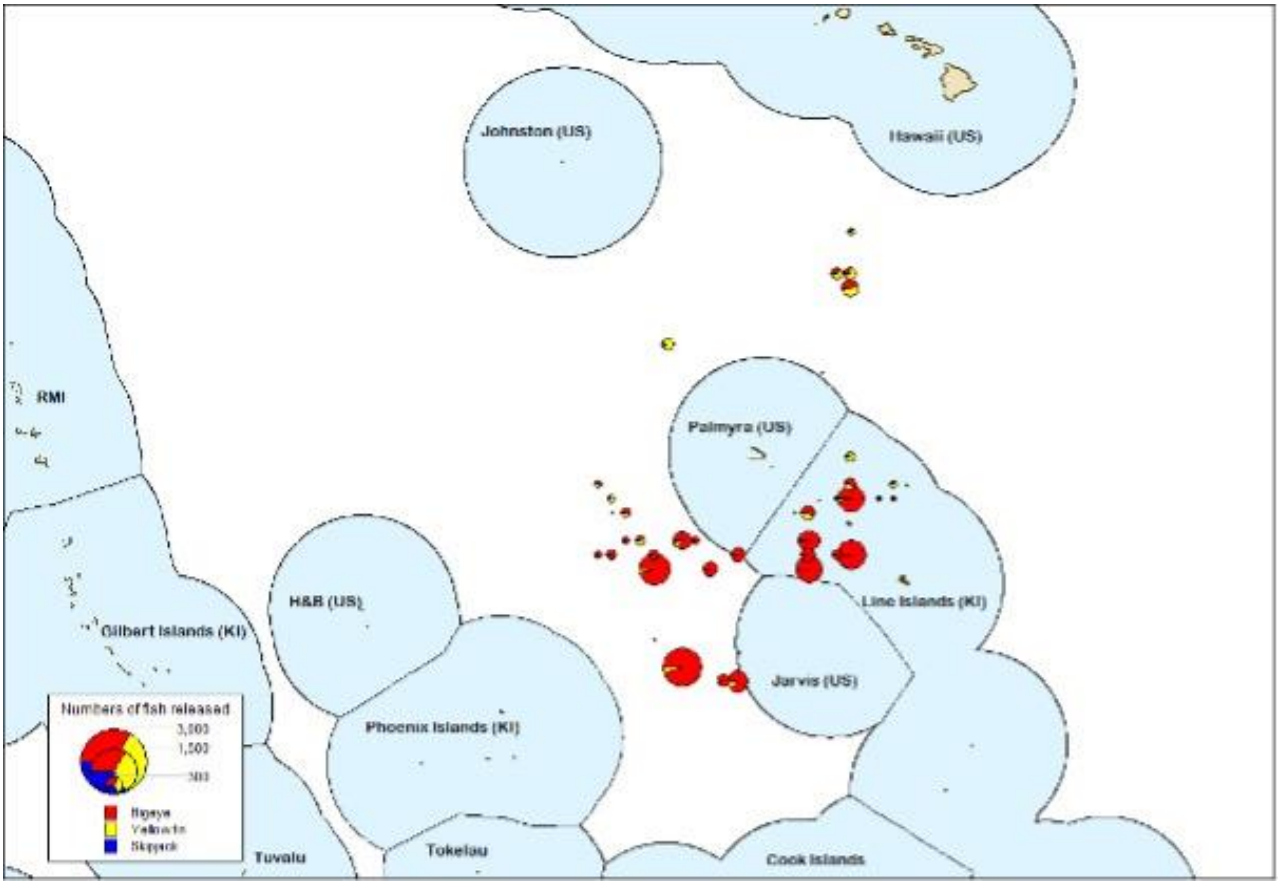


Figure 3: Distribution of tag releases during CP15.

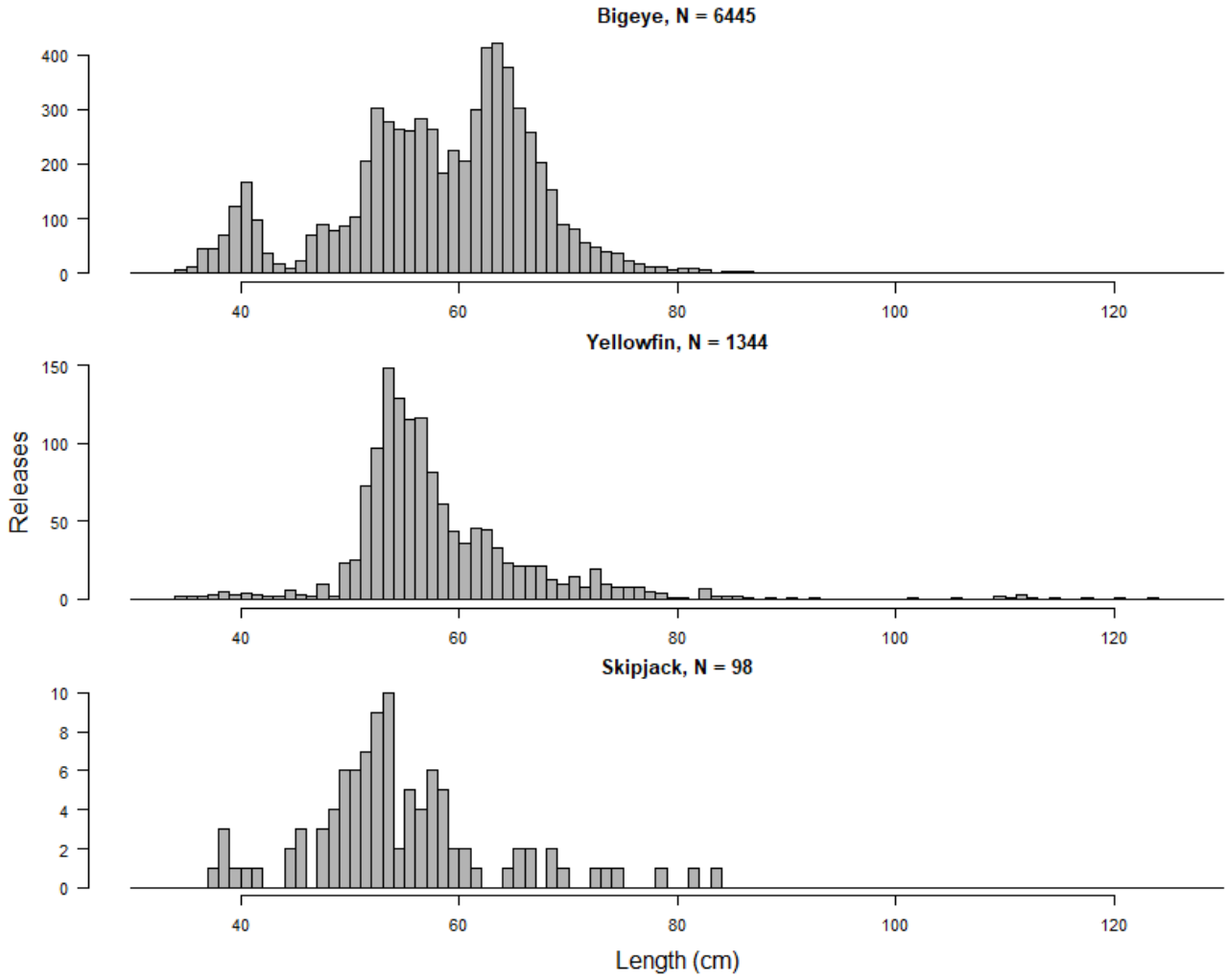


Figure 4: Size distribution (cm) of conventionally tagged tuna during CP15.

2.1.2. Biological sampling

As part of its planned activities, the CP15 voyage provided a significant number of biological samples and data as identified in Table 3. Biological sampling performed during tagging cruises complements the work conducted by fisheries observers on board tuna fishing vessels, increasing the number of samples collected in the region during the year. This sampling effort contributes significantly to the WCPFC Tuna Tissue Bank by providing biological information and samples that are available to the scientific community to conduct biological and ecological studies of interest to the region (see SC18-RP-P35b-01).

Table 3: Number of samples taken during CP15, per species and sample type.

Species	Muscle	Liver	Otolith	Stomach	Fin	Spine	Fatmeter
DOL	22	9	2	11	0	0	0
RRU	12	6	4	6	0	0	0
WAH	6	3	3	3	0	0	0
BET	712	189	186	190	0	190	184
BUM	8	4	0	4	0	4	0
YFT	154	77	77	77	0	77	58
FAL	0	0	0	0	20	0	0
SKJ	26	13	13	13	0	13	12
OCS	0	0	0	0	9	0	0
Total	940	301	285	304	29	284	254

During CP15, fish already slated for biological sampling were also utilised for three genetic projects to support upcoming research efforts. First, forty bigeye tuna were sampled repeatedly across hours and days in a controlled experiment to determine the rate of degradation of DNA in fish left on deck or stored in ice. The intention was to establish guidelines for when it is no longer effective to sample a fish for genetic research based on storage time and conditions. Second, forty bigeye tuna (with some overlap) were sampled to help calibrate different tissue types in upcoming epigenetic aging experiments. Third, ninety-four bigeye were triple-sampled with a variety of tools in an exploration of ways to take muscle samples quickly but also without cross-contamination, so that they could still be used for genetic purposes. Sampling for all three projects was completed onboard and samples have since been submitted for sequencing and initial analyses.

2.2. WP6 tagging voyage planned for September-October 2022

The Solomon Islands border opening scheduled on the 1st of July 2022 allows the possibility of implementing a Western Pacific cruise (named hereafter WP6) targeting skipjack and yellowfin onboard a chartered pole and line tuna vessel. The release of tagged skipjack this year is crucial for inclusion in the 2025 skipjack tuna stock assessment.

The planned WP6 will consist of a 25 to 30-day cruise operating from Noro, Western Province. The research area will be restricted by the number of accessible bait grounds and the average operational range of the vessel with full bait tanks (see Figure 5).

The tagging voyage will be crewed by 5 SPC staff and 2 Solomon Islands counterparts in collaboration with Solomon Island National University and the Ministry of Fisheries and Marine Resources.

This research voyage is scheduled to depart on the 14 September and be completed on the 10 October using the pole and line chartered vessel, *F.V. Soltai 105* owned by the National Fisheries Developments company.

The objectives for WP6 are listed below, and will be prioritized based upon operational events:

1. Conventional tag releases of skipjack and yellowfin tuna in free schools or in association with the commercial fishing anchored FAD array (target of 10,000 conventional tags)
2. Routine biological sampling of tuna species and bycatch to supplement the WCPFC Pacific Marine Specimen Bank.
3. Genetic biopsies, in association with SrCl injections (for growth study validation) is intended for skipjack tagged and released from a dedicated tagging cradle. The goal is to contribute to the ongoing

SKJ otolith ageing work underway in the Indian Ocean and, with the support of our tag recovery network to ensure a muscle sample is collected at the time of tag recovery, to provide samples for validation of the epigenetic ageing model for SKJ. This will be particularly useful if at least some of our tagged fish remain at liberty for more than six months.

4. To gauge the effects of time post-capture and storage effects on the SKJ stomach microbiome, there is a plan to run an experiment using 50 SKJ captured from the same school.

5. To obtain accurate Fatmeter measurements on as many SKJ, YFT and BET as possible as they come aboard during a fishing event, to get an indication of tuna fat content that represents potentially a valuable ecosystem indicator.

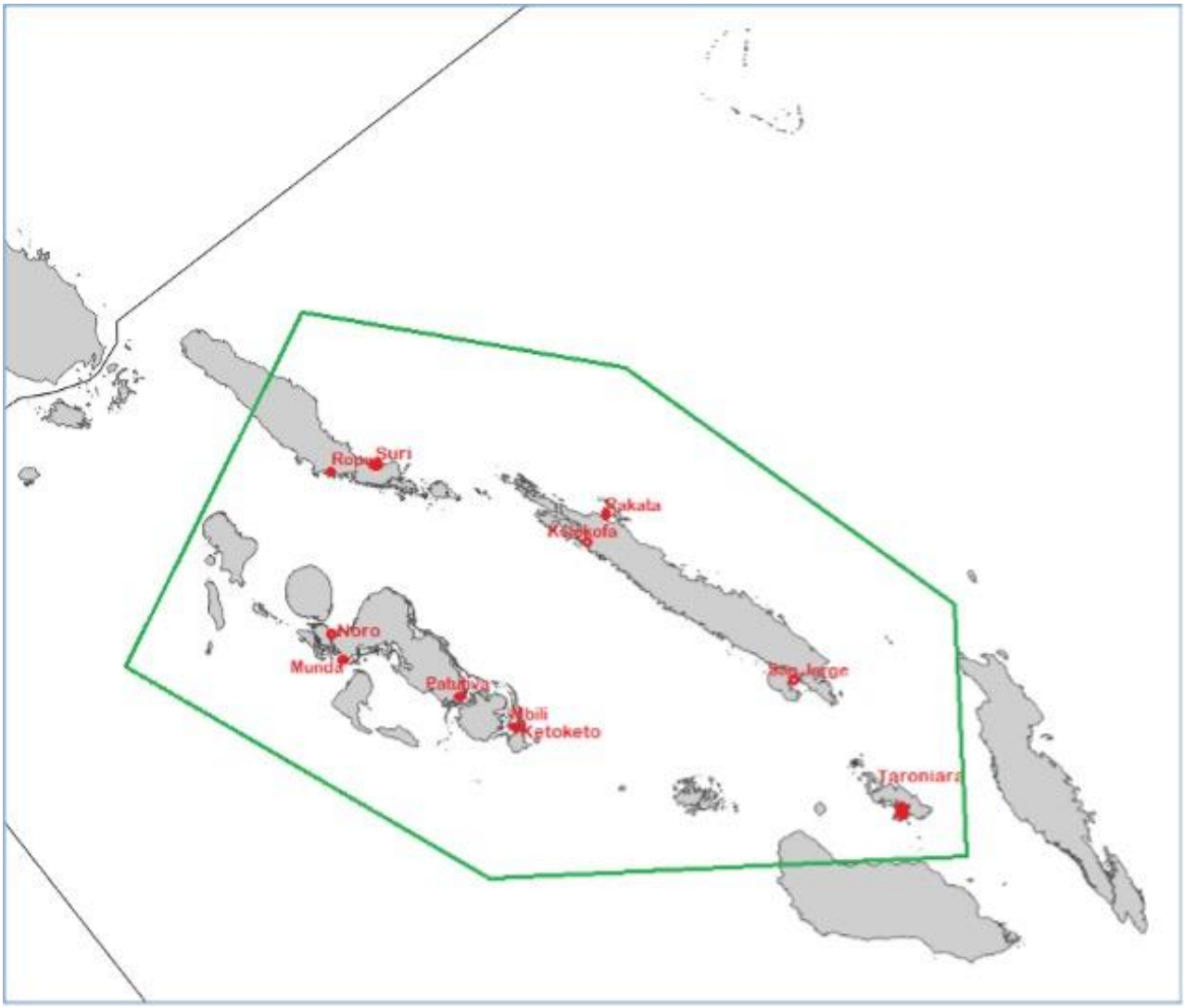


Figure 5: operational tagging area with accessible bait grounds (in agreement with NFD arrangements).

3. PTTP RESULTS

The Pacific areas covered by the different tagging voyages implemented since 2006 are shown in Figure 1. While there are noticeable gaps in coverage in the extreme east, west and southern latitudes, these are a direct result of the PTTP focus on the tropical tunas and of the need to undertake research voyages in areas and with methods that provide maximal catch rates for tagging.

The release numbers and recovery percentages to date of conventional and archival tags made during the 15 Central Pacific (CP) voyages, the PNGTP and PTTP Phase 1 voyages, and the ongoing PTTP Phase 2 voyages, are detailed in Table 4.

Table 4: Central Pacific, PTTP Phase 1 (PNG and Solomon Islands-based), Phase 2 Western Pacific, and total PTTP (including all other cruises) tag release numbers, and % of recoveries to date (June 2022) of conventional and archival tags.

Project	Tag Type	Release numbers				Recapture rate (%)			
		SKJ	YFT	BET	Total	SKJ	YFT	BET	Total
CP	Archival	32	369	992	1,393	0.0	8.7	18.2	15.3
	Conventional	1,257	5,962	49,665	56,884	3.4	9.2	25.2	23
PTTP Phase 1	Archival	2	328	68	398	50.0	18.0	26.5	19.6
	Conventional	143,689	65,443	4,105	213,237	17.6	18.0	22.7	17.8
WP Phase 2	Archival	174	91	123	388	2.9	3.3	13.8	6.4
	Conventional	142,816	41,812	5,379	190,007	16.7	14.7	19.4	16.4
Total PTTP	Archival	208	794	1,209	**2,211**	2.9	11.8	17.9	**14.3**
	Conventional	287,762	113,217	59,149	**460,128**	17.1	16.3	24.5	**17.8**

3.1. Tag recoveries for the PTTP

As at the 13 July 2022, a total of 84059 tagged tuna had been recaptured and the data reported to SPC. The numbers of conventional tag recoveries by species and by main tagging voyage are given in Table 5 and Table 6.

A reduced BET conventional tag recovery rate from CP9 onwards continues. Total recovery rate across all tuna changed from ~30+% up to voyage CP8, fell to 14% for CP9, and varied between 3 to 17% for CP10 to CP14, when releases began to be focused on drifting FADs. The rate for the CP15 cruise carried out last year is currently at 13% (Table 5), showing a much higher recovery than the prior years' CP cruise.

Recapture rate from WP5 remains lower than previous western Pacific cruises, though continue to improve since last year (7.2% vs 8.5%). It should be noted that WP5 differed considerably from the previous 3 western Pacific cruises, with the majority of releases in oceanic regions of Micronesia, on larger, free-schooling skipjack.

No new albacore tags were recovered during the period 2021-2022.

Table 5: Tag releases and recaptures for PTTP Central Pacific cruises to date (as at 18/07/2022).

	Release numbers				Recapture numbers and rate (%)			
Cruises	SKJ	YFT	BET	Total	SKJ	YFT	BET	Total
CP1 May-Jun 2008	57	116	1,736	1,909	4 (7%)	25 (21.6%)	579 (33.4%)	608 (31.8%)
CP2 May-Jun 2009	169	205	2,309	2,683	5 (3%)	27 (13.2%)	578 (25%)	610 (22.7%)
CP3 Oct-Nov 2009	66	237	4,802	5,105	2 (3%)	64 (27%)	1,790 (37.3%)	1,856 (36.4%)
CP4 May-Jun 2010	7	120	2,284	2,411	1 (14.3%)	13 (10.8%)	519 (22.7%)	533 (22.1%)
CP5 Nov-Dec 2010	40	228	6,090	6,358	7 (17.5%)	46 (20.2%)	1,966 (32.3%)	2,020 (31.8%)
CP6 Oct-Oct 2011	2	123	3,804	3,929	0 (0%)	29 (23.6%)	1,044 (27.4%)	1,073 (27.3%)
CP7 Nov-Dec 2011	52	245	4,212	4,509	1 (1.9%)	21 (8.6%)	1,468 (34.9%)	1,490 (33%)
CP8 Sep-Oct 2012	20	140	6,014	6,174	2 (10%)	32 (22.9%)	2,326 (38.7%)	2,360 (38.2%)
CP9 Nov-Dec 2013	29	135	4,296	4,460	2 (6.9%)	11 (8.1%)	635 (14.8%)	648 (14.5%)
CP10 Aug-Aug 2014	12	98	195	305	0 (0%)	6 (6.1%)	4 (2.1%)	10 (3.3%)
CP11 Sep-Nov 2015	231	775	1,966	2,972	6 (2.6%)	33 (4.3%)	217 (11%)	256 (8.6%)
CP12 Sep-Oct 2016	109	371	1,575	2,055	3 (2.8%)	85 (22.9%)	272 (17.3%)	360 (17.5%)
CP13 Jul-Aug 2018	79	443	611	1,133	4 (5.1%)	31 (7%)	43 (7%)	78 (6.9%)
CP14 Aug-Oct 2020	318	1,751	4,318	6,387	8 (2.5%)	83 (4.7%)	447 (10.4%)	538 (8.4%)
CP15 Jul-Aug 2021	98	1,344	6,445	7,866	0 (0%)	90 (6.7%)	910 (14.1%)	1000 (12.7%)
Totals	**1,289**	**6,331**	**50,657**	**58,277**	**45 (3.5%)**	**596 (9.4%)**	**12,799 (25.3%)**	**13,440 (23.1%)**

Table 6: Tag releases and recaptures for PTTP Pole & Line cruises to date (as at 18/07/2022).

	Release numbers				Recapture numbers and rate (%)			
Cruises	SKJ	YFT	BET	Total	SKJ	YFT	BET	Total
PG1 Aug-Nov 2006	13,948	7,806	562	22,316	2,646 (19%)	1,805 (23.1%)	230 (40.9%)	4,681 (21%)
PG2 Feb-May 2007	26,493	12,845	129	39,467	2,512 (9.5%)	1,725 (13.4%)	8 (6.2%)	4,245 (10.8%)
SB1 Oct-Nov 2007	7,479	3,565	139	11,183	1,980 (26.5%)	785 (22%)	18 (12.9%)	2,783 (24.9%)
SB2 Feb-Apr 2008	15,327	14,405	414	30,146	1,779 (11.6%)	2,430 (16.9%)	62 (15%)	4,271 (14.2%)
WP1 Jun-Nov 2008	37,691	17,647	1,467	56,805	6,628 (17.6%)	2,145 (12.2%)	372 (25.4%)	9,144 (16.1%)
WP2 Mar-Jun 2009	34,207	13,919	3,145	51,271	4,618 (13.5%)	2,359 (16.9%)	490 (15.6%)	7,467 (14.6%)
WP3 Jul-Oct 2009	30,722	7,340	735	38,797	6,815 (22.2%)	1,449 (19.7%)	199 (27.1%)	8,463 (21.8%)
PNGTP1 Apr-Jul 2011	28,730	11,571	355	40,656	5,780 (20.1%)	2,489 (21.5%)	60 (16.9%)	8,329 (20.5%)
PNGTP2 Jan-Mar 2012	28,312	9,607	2,008	39,927	7,304 (25.8%)	1,725 (18%)	531 (26.4%)	9,560 (23.9%)
PNGTP3 Apr-Jun 2013	23,402	5,955	564	29,921	3,358 (14.3%)	895 (15%)	46 (8.2%)	4,299 (14,4%)
PG6 Jul-Jul 2016	0	17	2	19	0 (NA%)	4 (23.5%)	0 (0%)	4 (21.1%)
WP4 Sep-Nov 2017	25,457	2,376	20	27,853	6,094 (23.9%)	462 (19.4%)	1 (5%)	6,557 (23.5%)
WP5 Jul-Sep 2019	15,595	1,077	146	16,818	1,355 (8.7%)	55 (5,1%)	13 (8.9%)	1,423 (8.5%)
Totals	**287,363**	**108,130**	**9,686**	**405,179**	**50,869 (17.7%)**	**18,328 (16.9%)**	**2,030 (21%)**	**71,227 (17.6%)**

Table 7: Recapture rate by gear, tag, and selected cruise-focus types. Equatorial releases consist of tags released in the EEZs of Palau, Fed. States of Micronesia, the Marshall Islands, Nauru, Kiribati and Tuvalu.

				Recapture rate (%)			
Gear	**Cruise Type**	**Tag Type**	**Releases**	**SKJ**	**YFT**	**BET**	**T**
CP Mixed	Pre-dFAD 2008-2013	Conventional	36,826	5.8	18.2	30.8	30.0
		Archival	712	0.0	8.7	22.4	18.5
	dFAD Access 2013+	Conventional	19,717	2.6	6.3	9.3	8.4
		Archival	681	0.0	8.7	10.2	9.7
		Sonic	372	1.6	8.0	10.1	8.1
WP Pole&Line	Archipelagic (Sol+PNG) pre2016	Conventional	266,683	17.8	17.8	23.7	17.9
		Archival	481	6.9	17.6	29.7	19.8
		Sonic	222	4.3	10.4	38.9	10.8
	Archipelagic (Sol+PNG) 2016+	Conventional	29,286	23.9	18.8	3.1	23.5
		Archival	17	11.1	0.0	0.0	5.9
	Indonesia	Conventional	40,383	21.9	17.3	26.7	21.0
		Archival	33	6.9	0.0		6.1
	Equatorial Oceanic	Conventional	67,212	11.3	11.3	17.1	11.7
		Archival	255	0.9	2.9	2.6	2.0

3.2. Tag Recovery Network

Since September 2021, a service provider, MRAG, assumed responsibility for centralizing data from the following countries: Palau, Nauru, Tuvalu, Tokelau, Papua New Guinea, Solomon Islands, Vanuatu, American Samoa, Federated States of Micronesia, Marshall Islands, Fiji, Kiribati and Cook Islands. MRAG also makes payments to the Tag Recovery Officer (TRO), and anyone who finds a tag in these countries.

To encourage more returns at point of capture, greater communication efforts with vessel-level tag finders are being made. For each tag recovered in this way, a letter is generated and sent to the fleet manager with feedback on the migration pattern of the fish, the school type it was tagged on, the number and type of tagged fish associated with the school, as well as growth information of the tagged fish. It is hoped that this will encourage greater engagement and more accurate return information.

A special reward scheme for those fleets collaborating in the buoy-sharing programme for PTTP cruises has been created. This reward scheme includes rewards at vessel- and fleet-level as well as for the individual tag finder, including rewards for all crew of the vessel reporting the most tags during a season and a special raffle for all vessels participating in the programme. Two reward seasons are run a year: a lottery, the second since 2020, has been organized from September 2021 to March 2022. The third lottery has been ongoing since March 2022 and will end in September 2022.

To encourage observers at sea to support tag finders and the tagging program during the suspension of the 100% coverage onboard fishing vessels, the observers are rewarded USD20 if they report tags directly and immediately to SPC with a picture of the tagged fish as well as accurate length measurement.

3.3. Tag Seeding

To date nearly 58.3% of seeded tags have been returned to SPC. In addition to allowing estimation of tag reporting rates, the tag seeding data also allow the error rate in tag return information to be determined (Peatman, T. 2020). From February 2007 to July 2022, a total of 604 tag seeding kits (consisting of seeding tags, applicators, guidebooks and data forms) for a total of 15,223 tags have been given to observer coordinators and TROs in Tonga, Ecuador, PNG, Solomon Islands, Fiji, FSM, Marshall Islands, Kiribati, New Zealand and American Samoa for deployment on purse seine vessels by senior observers. When a kit is not completely deployed during a trip, the kit is either kept aside or used in another kit for deployment. Table 8 details the number of seeded tags deployed per observer programme each year.

Tag Recovery Officers in the ports of, Honiara, Rabaul, Madang, Lae, Pago Pago, Port Moresby, and Majuro continue to liaise closely with observer coordinators, observer debriefers and observers to implement tag seeding experiments and to recover the tag seeding logs for deployed kits.

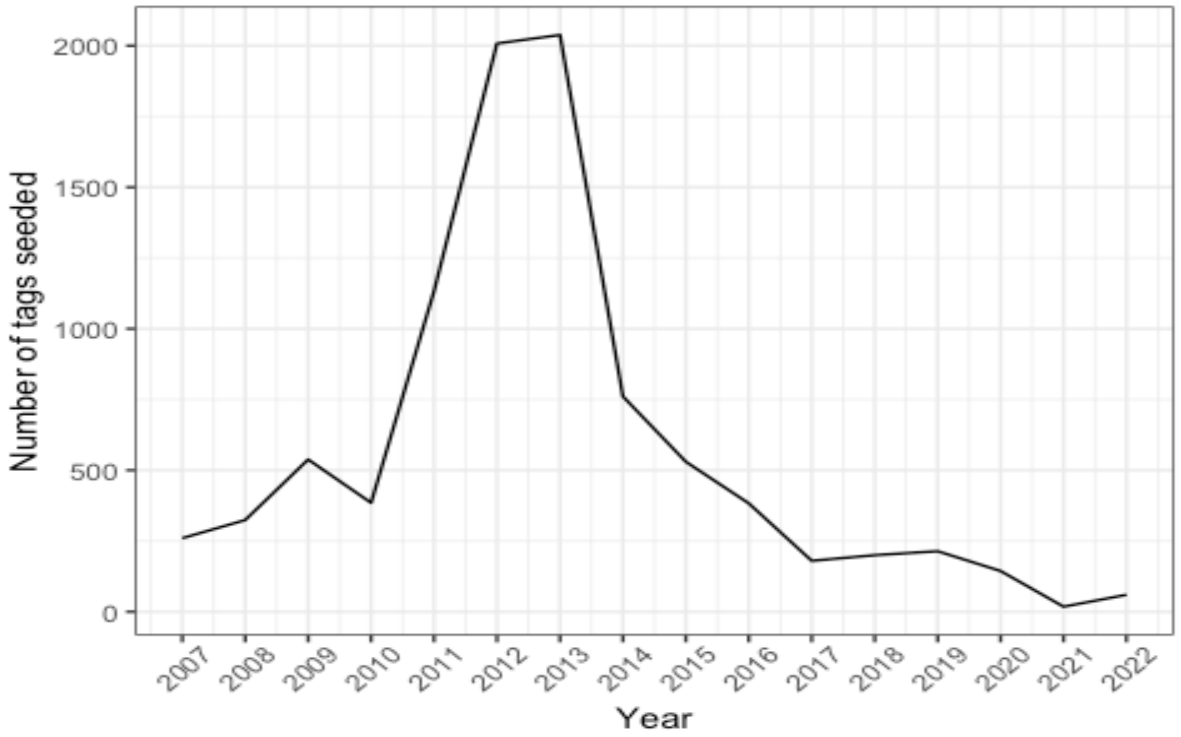


Figure 6: Number of seeded tags deployed per year since the beginning of PTTP.

Table 8: Number of seeded tags deployed per observer programme since the beginning of the PTTP.

Year	FAOB	FJOB	FMOB	IATTC	KIOB	MHOB	PGOB	SBOB	TOOB	TTOB
2007			12				199			49
2008						25	249	50		
2009		25				51	267	75		120
2010	23	20				59	120	48		115
2011		75	44		25	60	212	519		198
2012		78	144		209	60	282	1,123	25	87
2013			192		169		927	720		30
2014		30			240		329	132	30	
2015	30	30			140		150	120	60	
2016				126	95	24	90	48		
2017							30	120	30	
2018	30						60	50		60
2019	30						184			
2020							144			
2021							18			
2022							60			

4. PTTP 2022-2025 WORK-PLAN

The work-plan identified for 2021 (SPC-OFP 2021) has been completed. The proposed work-plan for the PTTP for 2022-2025 is highlighted in Table 9 below. The work-plan recognises the decisions of the scientific committee in 2016 to normalise the tagging programme, and the decisions of SC13 in 2017 where this rolling medium-term research work-plan was endorsed, though on-going travel restrictions due to the ongoing COVID-19 pandemic have required a temporary change to alternating western Pacific and central Pacific cruises.

5. RECOMMENDATIONS

SC18 is invited to note the report of ongoing progress in implementation of the PTTP. In particular, we recommend that SC:

- Note the successful 2021 CP15 tagging voyage, despite the unfolding Covid19 pandemic.
- Note the critical importance of effective tag seeding to informing stock assessment, and support an urgent increase (when feasible) in deployment and fleet coverage of tag seeding experiments and assist with developing alternative approaches to understand the flow of tags through tuna product networks.
- Note the need for continued member participation and support in tag reporting;
- Support the 2023 tagging programme, and associated budget;
- Support the 2024-2025 tagging programme, and associated indicative budget; and
- Consider and support the PTTP work-plan for 2022-2025.

Table 9: Proposed PTTP work-plan for the period 2022-2025.

Activity		2022	2023	2024	2025
Tagging	Pole and line tagging research cruise - Skipjack-focused - Yellowfin secondary	Solomon Islands focused WP6 cruise Seek support for regional research vessel		Continued skipjack-focused research cruise	
	Dangler trolling/rod & reel tagging research cruise - Bigeye-focused - Yellowfin secondary		CP16 bigeye-focused cruise with increased electronic tagging		Bigeye-focused central Pacific cruise
	Tag Seeding - Deployment of seeding kits via regional observer programmes	Continued suspension of observer programme causing disruption to seeding kit deployment	Seek a return to ongoing tag seeding		
Tag Recovery	Support and development of tag recovery network - Development of tools to increase tag recovery efficacity	Continued tag recovery intelligence tools development. Review of MRAG performance	Exploration of tuna product flow using network analysis Roll-out of key-coded tags		
	Implementation and revision of tag reward schemes	Further revision of tag reward schemes			
Data management	Tagging data validation using VMS, logbook, and cannery data	Ongoing			
	Maintain and develop PTTP databases and related tools	Continued development of updated PTTP database			
Data Analyses	Provide tagging data for inclusion in stock assessment	Skipjack tagging data for stock assessment	Provision of yellowfin and bigeye tagging data		Skipjack tagging data provision
	Reduce uncertainty in WCPO stock assessments	Ikamoana tag mixing simulations included in skipjack stock assessment	Explore potential for bigeye and yellowfin tag mixing simulations		
	Increase understanding of tuna-fishing gear interactions and interpretation of fisheries data	Exploration and trials of new electronic tagging technologies	Review potential for large-scale acoustic tagging around dFADs		

6. ACKNOWLEDGEMENTS

We gratefully acknowledge the voluntary contributions from all the entities listed in 1.2 Programme Funding. We acknowledge the support of national fisheries administrations, observer programmes and the tuna fishing industry in assisting with the project, in particular the recovery of recaptured tags. The contribution of both vessel and scientific crew to the successful implementation of the PTTP is gratefully acknowledged. Particular thanks to Jeff Muir for logistics and implementation of tagging cruises operating out of Hawaii during the Covid19 pandemic.

This report was provided by J. Scutt Phillips, B. Leroy, A. Guillou, M. Ghergariu and F. Roupsard.

7. REFERENCES

Peatman, T. 2020. “Analysis of tag seeding data and reporting rates. WCPFC-SC16-2020/SA-IP-04, Online, 11-20 August 2020.”

SPC-OFP. 2021. “Project 42: Pacific Tuna Tagging Project Report and Workplan for 2021-2024. WCPFC-SC17-2021/RP-PTTP-02, Online meeting, 11-19 August 2021.”

APPENDIX A. PLANNING ADVISORY COMMITTEE 2021-2022 MEETING REPORTS

PTTP 2021 Cruise Planning Advisory Committee Meeting

2nd November 2021

10:00-11:00

Virtual: Microsoft Teams

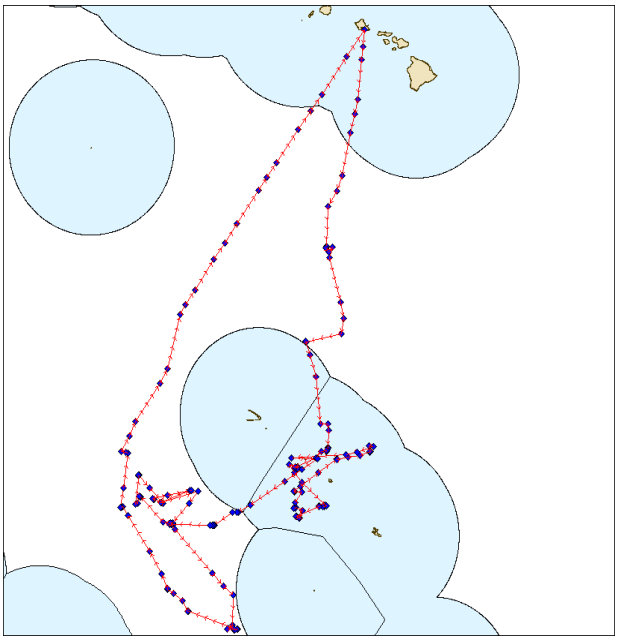
Participation: SungKwon Soh, Elaine Garvilles, Russell Dunham, Dave Itano, Ren-Fen Wu, Beth Vanden Heuvel, Chloe-Ane Wragg, Joe Scutt Phillips, Bruno Leroy, Simon Nicol (Chair), Tiare Nicholas, Lui Bell, Beau Bigler

Welcome and Preliminaries

1. The chair welcomed all participants and presented the Meeting Agenda (Annex 1). No additions or alterations to the agenda were requested.

2021 CP15 Cruise results

2. Bruno Leroy provided a recap of the cruise objectives and briefly presented the main results. The CP15 cruise was implemented within the travel restrictions imposed by the ongoing Covid-19 pandemic, requiring only Hawaiian citizens to compose the scientific team. Nevertheless, the 40-day trip at sea managed to release a total of 7,866 tagged tuna (82 % Bigeye) in the Line Islands waters and the surrounding international waters (see Picture 1). This total includes 166 archival tags deployed in 113 bigeye and 53 yellowfin tunas (see Table 1). Along with the tag releases, biological sampling was undertaken from 334 captured fish including 281 tunas not suitable for tag and release.



Picture 1: CP15 cruise track

Tag type	BET	YFT	SKJ	others	Total
Lotek ArcGeo-9TS	97	16	-	-	**113**
Wildlife Comp. MK9	43	10	-	-	**53**
Satellite (miniPAT)	-	-	-	3	**3**
Conventional Y13	6424	1344	98	-	
Total fish tagged	**6564**	**1370**	**98**	**3**	**7869**

Table 1: CP15 tag releases per species and tag type. Satellite tags were deployed on sharks.

3. Bruno Leroy highlighted the fact that the CP15 cruise was highly successful (resulting in the largest number of releases from all CP type cruises), again possible in large part due the great numbers (up to 400) of drifting FADs shared through industry-science partnerships. The dependence of central Pacific cruises with these fishing gears on such dFAD access is clear.

2021 and future tag recovery planning

4. Joe Scutt Phillips provided an overview of tag recaptures from CP15, which have been very positive in the initial months following the end of the cruise. Excellent engagement has been shown by fishing fleets, in particular the US and Korean vessels, who have been contacting us directly with tag recapture information including length data. The scientific benefits of such accurate and immediate tag recapture data are very clear, and the team thanked the industry for its increasing engagement with Pacific tuna science.

5. Increased reward structures for vessels who wished to participate were also again outlined, with US vessels and a number of Chinese Taipei and FSM flagged purse seiners currently included in extra rewards and seasonal bonus raffles. In addition, vessels who share their dFAD buoy positions during the tagging cruise are included in a second raffle each season. Information and season leaderboards can be found at the following website:
https://www.spc.int/webtagging/Home/Raffle

6. Any national fisheries departments or fishing companies wishing to support Pacific tuna science were encouraged to contact SPC at:
TunaSciencePartnership@spc.int

Planning 2022 PTTP cruise

7. Joe Scutt Phillips reminded participants that skipjack tuna tagging was the critical priority for 2022 in regard to collecting necessary data for the stock assessment that is scheduled for the species in 2025. As the ongoing C19 restrictions are likely to limit 2022 Pacific Island travel possibilities, a number of possible field work options to maximise skipjack releases were outlined.

8. The first of these options was to continue and potential augment current collaboration with Japanese partners and their tagging programme. An equatorial pole and line skipjack tagging cruise is currently planned by the Japanese FRA programme during Jan-Feb 2022. Previously, SPC has provided tags to be released on behalf the PTTP (with a reciprocal agreement during PTTP cruises), and this something the team would like to continue. Furthermore, discussing the possibility of providing increased charter time, equipment, or science staff on these cruises would be welcome, should it result in increased tag releases. Unfortunately, there were no Japanese representatives present for comment at the meeting.

9. Bruno Leroy presented possible options to undertake skipjack tag releases with the collaboration of the NFD pole and line fleet in the Solomon Islands.

a) **Continuous tagging during commercial P&L fishing operations**
   - This could be organised independently of implementing classic SPC crewed tagging cruise if possibility arise.
   - Many crew are familiar with tagging processes
   - All gears already available and stored at NFD/Noro base
   - 50-100 tag per day easy target with one cradle (yearly min target of 5,000)
   - In contact with NFD to confirm the possibility and find arrangement to put process in place with an appropriately skilled crew-member

b) Charter one NFD P&L boat for tagging in Solomon waters
   - This will be linked to the possibility to travel to Solomon Islands

10. In this regard, Russel Dunham intervened to announce that the SI Government has scheduled to open the borders in June 2022 with 7 to 10 quarantine days to be applied for persons coming from low to medium risk countries. With vessel days accounting as quarantine time, Russel raised the possibility for one of their vessels to pick-up SPC staff from Noumea. He also said NFD will assure the needed overall maintenance schedule of one of their P&L boats, allowing it to be ready for charter by SPC at the appropriate time. There are currently a good number of accessible bait grounds that are mostly located closed to New Georgia, with possibilities to expand, but it would require agreement with local owners. This seems to be a very possible solution, with communities looking for increased income during the current restricts.

11. The situation will be monitored with NFD collaboration, and it seems plausible to envisage implementing a P&L tagging cruise in Solomon waters around mid-2022, though many unknowns still exist.

c) **Implement a Central Pacific type of cruise** (CP16)

12. Such a cruise would be orientated to deploy archival tags on skipjack along with some acoustic transmitters to study school cohesion and behavior around dFADs, alongside the typical conventional releases on bigeye and yellowfin tuna. Conventional tag releases in skipjack would be maximised, but likely to remain very low.

13. SungKwon Soh asked if there had been consideration of the experimental design in consultation with the stock assessment team, and why the Papua New Guinea and Solomon Islands area remained so critical for the tagging and release of skipjack tuna. Joe replied that the main reason was due to logistics, this being an area with a still-operating equatorial pole and line fleet, with good access to bait grounds. However, assessment of the experimental design was an ongoing process with the stock assessment team, the principal users of the PTTP data. Examples of this were the attempt to spread tag releases out over multiple assessment regions and time periods during WP5, and the development of movement models which can quantify processes such as dispersion and mixing.

14. David Itano asked about the number of recoveries for skipjack been tagged with archival tags during the past WP5 cruise in 2019. Bruno Leroy replied that 2 tagged fish have been recovered so far.

Other Business

15. No other business was raised

Next meeting

16. Next meeting date to be determined, but anticipated as Feb-March 2022.

THE FIFTH PTTP ADVISORY COMMITTEE MEETING

Location: Virtual meeting (Microsoft Teams), led from SPC Headquarters, Noumea, New Caledonia
Date & time: 12th April 2022, 11:00 to 11:30
Theme: 2022 Cruise Planning

Attendees online: David Itano, SungKwon Soh, Elaine Garvilles, Russell Dunham, Ren Fen Wu, Berry Muller, M. Matsubara, Aoki Yoshinori, Bradley Philip, Kathryn Gavira O'Neill, Beth Vanden Heuvel, Il-kang Na,
Attendees in Noumea: Joe Scutt Phillips, Bruno Leroy, Aurelie Guillou, Simon Nicol, Ludwig Kumoru

1. Welcome and preliminaries

The chair, Simon Nicol, opened the meeting, welcomed all participants and introduced Bruno Leroy and Joe Scutt Phillips to go through the agenda.

2. Agenda

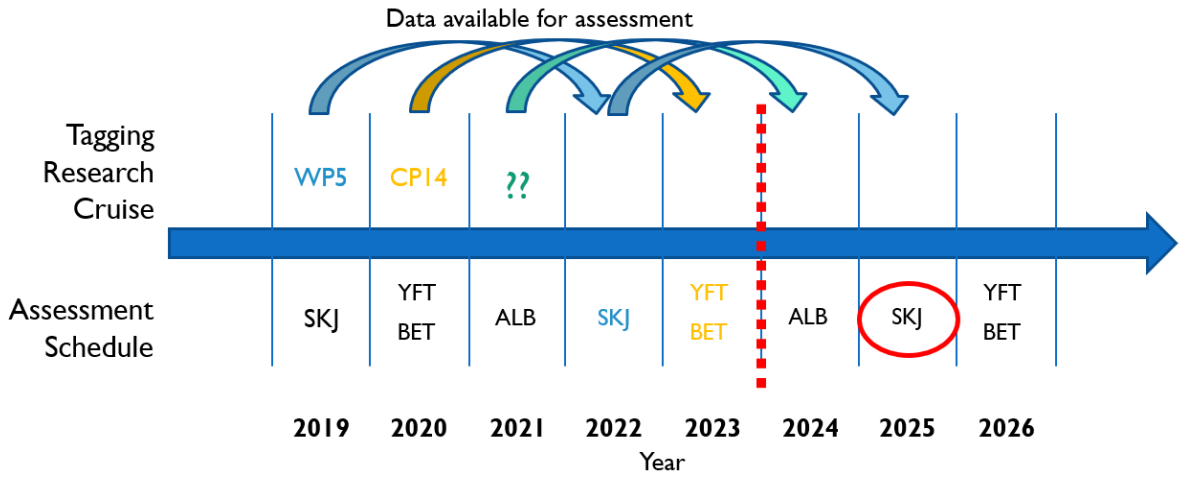
Joe briefly outlined the purpose of, and schedule for the meeting. These were:

- Brief review of upcoming PTTP priorities
- Outline and discuss planned tagging activities for 2022
- Overview of tag recovery activities since 2021 CP15
- Update on Japanese regional tagging activities, and coordination of potential research objectives
- Anticipate administrative and technical requirements

3. Tagging data requirements

Joe provided overview of tagging data requirements. Ideally, there is a 3-year cut-off for tagging data integration into the stock assessments, to allow for the recapture and validation of tag recovery to occur. With SKJ assessment planned for 2025, it is of key importance to continue tagging time series in time for that 2025 assessment.

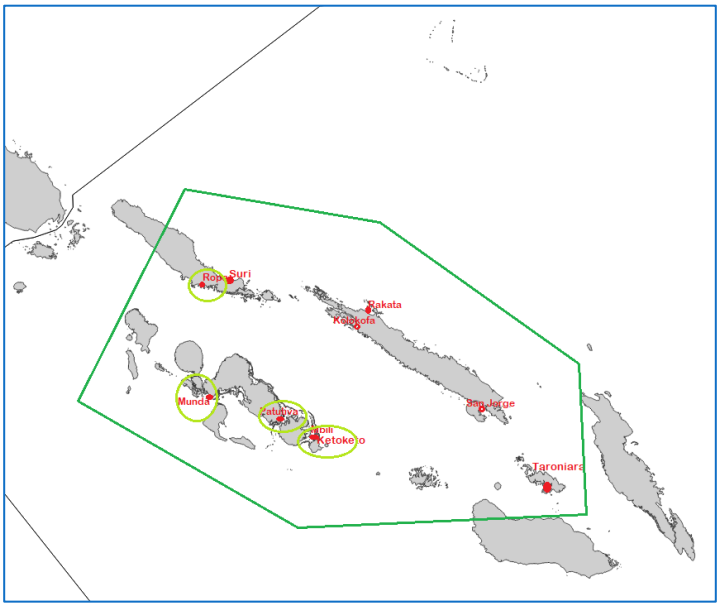
The post COVID-19 situation is still difficult in the Pacific with many country borders staying closed.



4. 2022 cruise implementation

Bruno presented the 2022 tagging cruise plan scheduled to be implemented in the Solomon Islands EEZ in Aug-Sep. At the time of this meeting, tagging cruise implementation seemed only possible in SI waters as other close-by countries are not confirming any opening of their border schedule. Bradley P. mentioned later in the meeting that FSM might open in late August.

Contact has been made with National Fisheries Development (NFD) company and a charter agreement is under writing to use one of their P&L vessels. The area options for the releases are limited due to the difficulties of accessing bait grounds outside the current agreements in place between NFD and local communities.



Current accessible bait grounds are circled with light green color. It is likely that the bulk of releases will happen within the darker-green polygon area.

The cruise objective is to release 10,000 conventional tags in skipjack tuna.

5. Tag recovery

Joe provided an overview of the work and highlighted the last CP15 cruise with a good recapture rate.
There was excellent engagement from the US PS fleet and some Korean vessels providing high quality recapture information directly from the vessel. SK asked how the contact with those vessels was done and Simon replied that this has been through tag recovery officers during catch transfer in Kiribati. SK said he will carry-on trying to contact Korean government for collaboration improvement.

FSM asked about the likely recapture of tags in their ports. Joe answered that communication would ramp up regarding tag recovery leading up to the planned WP6 cruise, and that if there was a need for any promotional material to let the PTTP team know.

Presentation on Japanese tagging cruise plans for 2022 and 2021 results

Aoki-san and Matsubara-san provided an overview of the Japanese tagging cruises. Two cruises were implemented in 2021-2022:

- one close to Japan in Oct-Nov that released 1199 SKJ (between 50 and 60 cm FL) tagged with CT and 216 with AT; and
- the other between 0 – 25º N and 135-180º E in Jan-Feb 2022, that released 6,509 CTs and 168 ATs in SKJ between 31 and 65 cm FL.

Similarly, 2 other cruises are planned in Oct 22:

- one in JP waters planning to release 2,500 CTs and 100 ATs; and
- the other in North FSM waters, planning to release 5,000 CTs and 130 Ats.

Collaboration between Japan and SPC should continue with tag exchanges to compare recovery rates.

6. Other business

There was agreement across the advisory committee that aside from the Soltai 105, no other suitable tagging platform was available to carry out the proposed WP6 cruise plan. The chartering of this vessel would also provide consistent operational comparison with previous tagging data in the region.

11:30 – Meeting closed and thanks all.