SCIENTIFIC COMMITTEE
NINETEENTH REGULAR SESSION

Koror, Palau
16-24 August 2023

PROJECT 42: PACIFIC TUNA TAGGING PROJECT REPORT AND WORK-PLAN FOR 2023-2026

WCPFC-SC19-2023/RP-PTTP-01

SPC-OFP

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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 2022-23 including research voyages, number of 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 2023-2026 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;
- 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;
- Heinz Australia;
- the Global Environment Facility;
- the International Seafood Sustainability Foundation;
- the 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 2023 also shown. The spatial distribution of these research voyages in the Western and Central Pacific Ocean is shown in Figure 1.

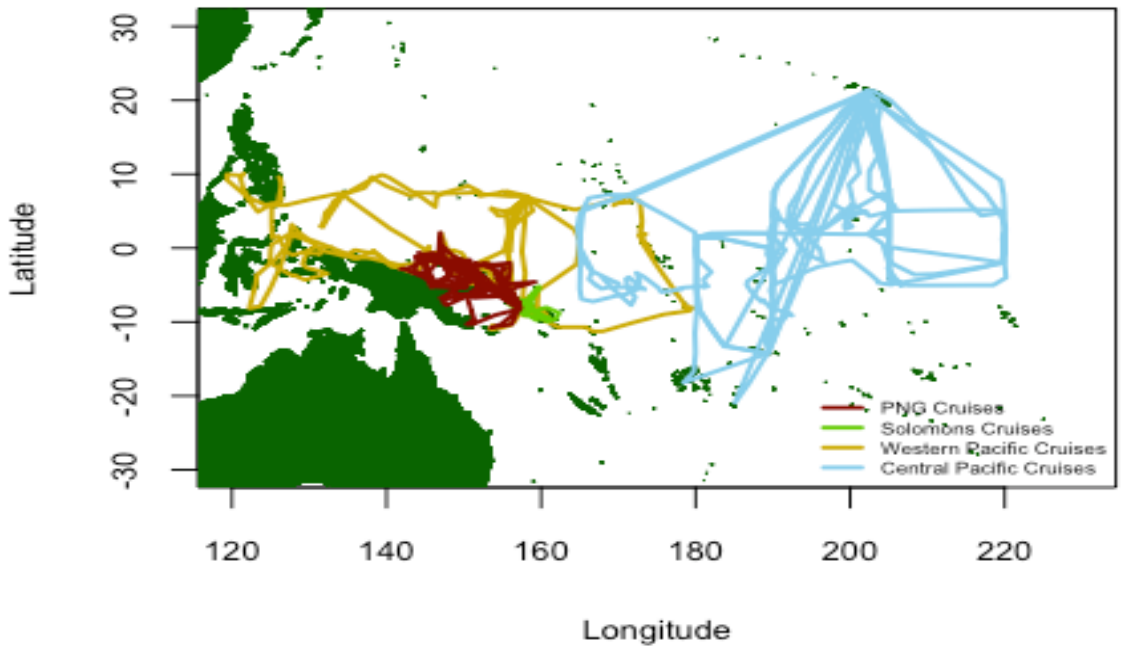


Figure 1: Tagging vessel tracks for all voyages for all PTTP research voyages. Legend relates to the groups of operational areas described in Table 1.

Table 1: Period, area and vessel used in PTTP tagging research voyages since the inception of the programme. Work completed since the last PTTP report to SC18 in 2022 in bold and the scheduled work for 2023 shown in italics.

Phase	Time Period	Operational Area	Tagging Vessel
PNGTP	Apr - Jul 2011	New Guinea 2011	SOLTAI 105
	Jan - Mar 2012	New Guinea 2012	SOLTAI 105
	Aug - Aug 2012	PNG TAO 2012	FTV Pokajam
	Apr - Jun 2013	New Guinea 2013	SOLTAI 101
	Jul - Jul 2016	PNG TAO 2016	Pokajam
Phase 1	Aug - Nov 2006	Papua New Guinea	SOLTAI 6
	Feb - May 2007	Papua New Guinea	SOLTAI 6
	Oct - Nov 2007	Solomon Islands	SOLTAI 6
	Feb - Mar 2008	Solomon Islands	SOLTAI 6
	Mar - Apr 2008	Solomon Islands	SOLTAI 105
Phase 2	May - Jun 2008	Central Pacific #1	Double D
	Jun - Nov 2008	Western Pacific #1	SOLTAI 105
	Mar - Jun 2009	Western Pacific #2	SOLTAI 105
	May - Jun 2009	Central Pacific #2	DOUBLE D
	Jul - Oct 2009	Western Pacific #3	SOLTAI 105
	Oct - Nov 2009	Central Pacific #3	AO SHIBI GO
	May - Jun 2010	Central Pacific #4	AO SHIBI GO
	Nov - Dec 2010	Central Pacific #5	PACIFIC SUNRISE
	Oct - Oct 2011	Central Pacific #6	PACIFIC SUNRISE
	Nov - Dec 2011	Central Pacific #7	AO SHIBI GO
	Sep - Oct 2012	Central Pacific #8	PACIFIC SUNRISE
	Nov - Dec 2013	Central Pacific #9	PACIFIC SUNRISE
	Aug - Aug 2014	Central Pacific #10	PACIFIC SUNRISE
	Sep - Nov 2015	Central Pacific #11	GUTSY LADY 4
	Sep - Oct 2016	Central Pacific #12	GUTSY LADY 4
	Sep - Nov 2017	Western Pacific #4	SOLTAI 105
	Jul - Aug 2018	Central Pacific #13	GUTSY LADY 4
	Jul - Sep 2019	Western Pacific #5	SOLTAI 105
	Aug - Oct 2020	Central Pacific #14	GUTSY LADY 4
	Jul - Aug 2021	Central Pacific #15	GUTSY LADY 4
	Sep - Oct 2022	**Western Pacific #6**	**SOLTAI 105**
	Aug - Sep 2023	*Central Pacific #16*	*GUTSY LADY 4*

2. SUMMARY OF PTTP ACTIVITIES IN 2022-2023

Since SC18, PTTP activities have included one Western Pacific voyage, WP6, focused on skipjack tuna in the waters of the Solomon Islands, and continued implementation of tag recovery processes.

2.1 WP6 tagging voyage

The 2022 tagging experiment was focused on skipjack tuna onboard one of the NFD company pole and line vessels based in Noro/Solomon Island. The research voyage started from Noro on the 14th of September and operated around the main archipelago islands for a total duration of 24 days (see voyage track in Figure 2).

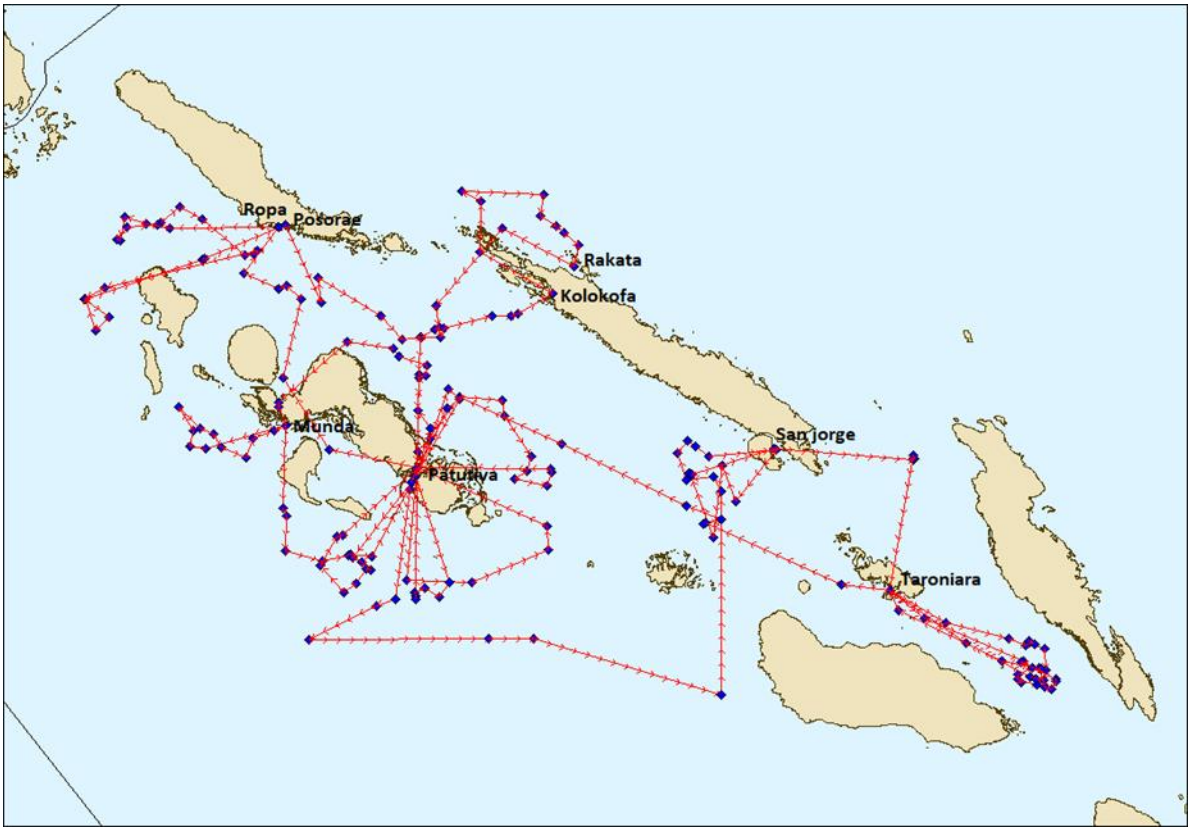


Figure 2: Voyage track during WP6 with daily positions for the vessel and baitground positions

2.1.1 WP6 tag releases

Of the 24 days of the cruise, the first day was spent transiting to baitground; then 23 days were spent searching and fishing, including one half-day in port and two other half-days waiting for engine repairs. A total of 16,977 fish were tagged and released during the cruise, at an average of 738 fish per day, across 67 separate events. The species composition was 98% skipjack and 2% yellowfin with only 2 bigeye tuna tagged. Only 1.5% of the releases used the smaller 11 cm tags (fish size < 38 cm FL). 21% of releases were in association with anchored FADs (22 events), 1% with seamount, (2 events) and free school releases represented a large majority of 78**%** (43 events)**.** Table 2 summarizes the number of fish tagged per species and tag type. Figure 3 shows the spatial distribution of releases during the cruise and the length frequency of tagged tuna is shown in Figure 4.

Table 2: Numbers of fish tagged during WP6, by tag type and species.

Tag type	SKJ	YFT	BET	Others	Total
White conventional - 13cm	631	0	0	0	631
Yellow conventional - 11cm	175	87	0	0	262
Yellow conventional - 12cm	967	25	0	0	992
Yellow conventional - 13cm	14,874	222	2	2	15,100
Total fish tagged	**16,647**	**334**	**2**	**2**	**16,985**

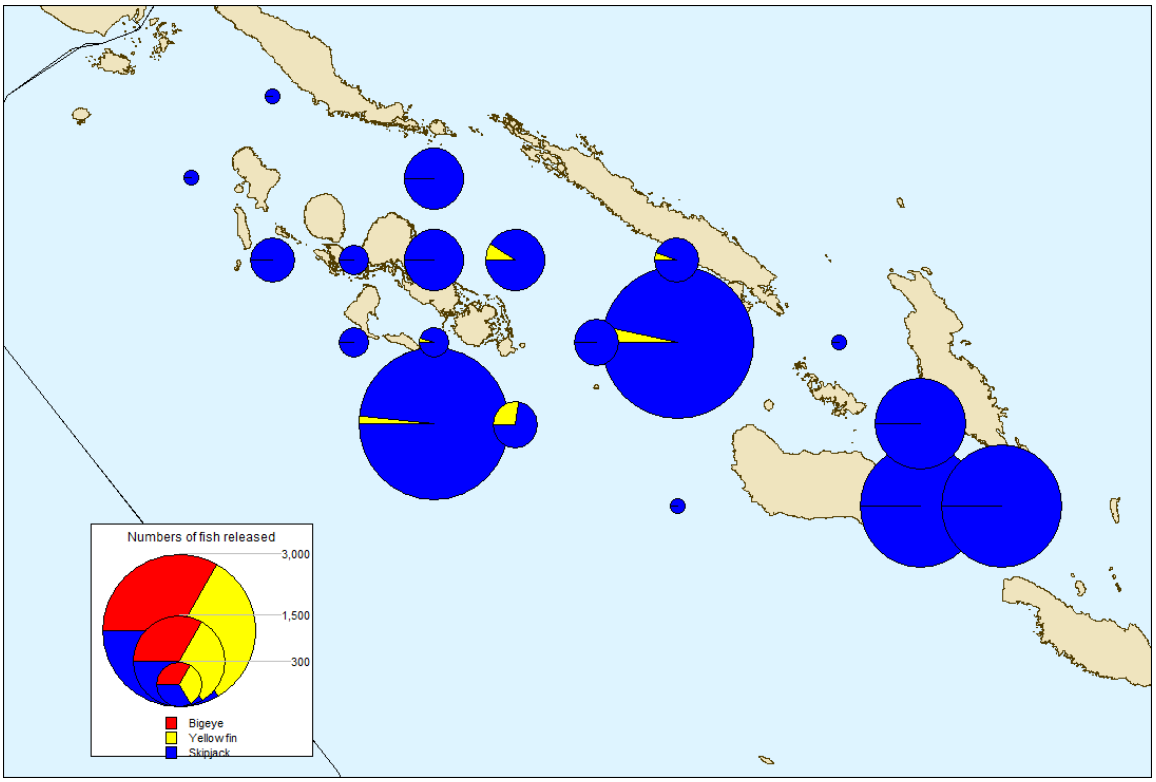


Figure 3: Spatial distribution of tag releases by species during WP6, by 1° grid cell

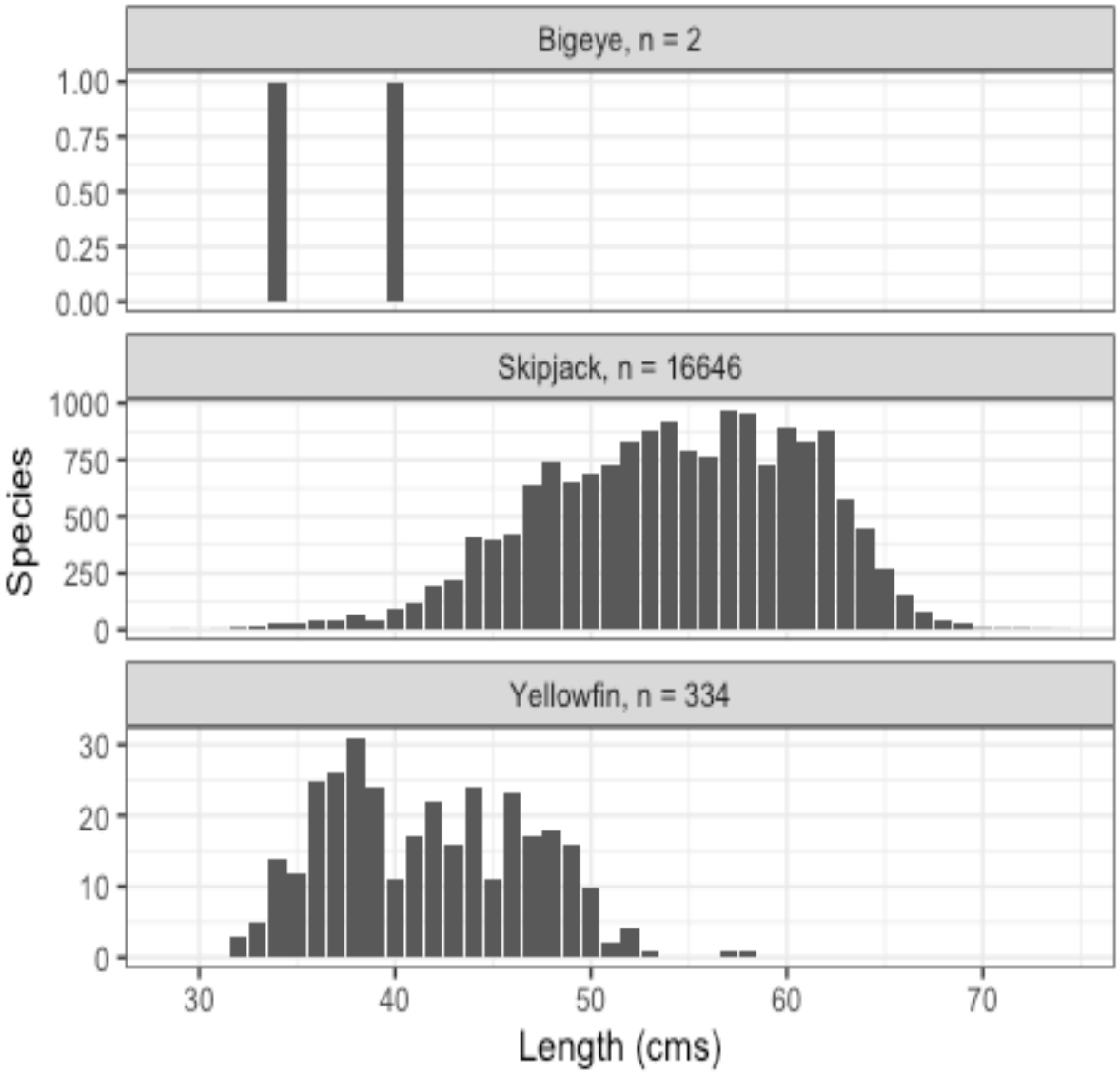


Figure 4: Size distribution (cm) of conventionally tagged tuna during WP6.

2.1.2. Biological sampling

As part of its planned activities, the WP6 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 SC19-RP-P35b-01).

Table 1: Number of samples taken during WP6, per species and sample type.

Species	Muscle	Liver	Otolith	Stomach	Spine	Gonads	Gut lining	Heart	Fatmeter
BLT	3	2		3	1				
SKJ	773	231	223	231	231	229	99	49	645
YFT	47	24	20	24	24	24			24
Total	823	257	243	258	256	253	99	49	669

During WP6, about 150 skipjack were utilised for the "Microbiome" project: recent analyses on the microbiome in the stomach of living organisms is demonstrating its utility as an early indicator of changing conditions. As such, monitoring of the stomach microbiome in fish populations has the potential to be an early sentinel of change. For this project, SPC has initiated a collaboration with the genomics departments at the University of Canberra (Australia), National fisheries Authority (PNG), Okinawa Institute of Science and Technology Graduate University (Japan) and Victoria University (New Zealand). This collaboration is a component of a PhD thesis by Yufei Zhou (University of Canberra).

The sampling protocol for this specific project is more complicated than that of the Pacific Marine Specimen Bank standard procedures, with a significant number of fish required for sampling per set (50 skipjack from the same set, 3 sets to sample). This sampling design would have been very hard to implement on a commercial vessel. Thanks to the effort of the staff embarked, the sampling was successful, and samples were delivered to the University of Canberra.

2.2. CP16 tagging voyage planned for August-September 2023

The planned CP16 cruise will consist of a 45-day cruise operating from Honolulu, Hawaii and is scheduled to depart on the 15th August and be completed on the 28th September using the multipurpose fishing vessel Gutsy Lady 4.

The objectives for WP6 are listed below:

1. Provide information for the assessment and management of bigeye and yellowfin tuna in the Pacific Ocean. The methodology will implement tag and release of bigeye and yellowfin tuna with conventional (CT) yellow and white CTs, with an emphasis on releasing as many Stronitum-marked fish as possible using the latter. Additionally, acoustic tags (AcT) will be implanted in yellowfin and skipjack tuna in a cluster of instrumented dFADs to assess on FAD residency and continous absence time within this array. All tagging work will be conducted on tuna schools associated with drifting FADs located between the 170W and 155W, and around the equatorial TAO moorings on the 155W longitude line (see Figure 5). Agreements between SPC, Satlink company and several fishing companies have been signed, allowing real time access to the GPS-Echosounder buoys associated to hundreds of FADs drifting in the research area during the cruise. A research permit has been obtained for Palymra and Jarvis EEZs which will also significantly increase the available work area for CP16. A research permit for Kiribati, Line Islands is pending.

2. Supplement the WCPFC tuna tissue bank.

Samples will be taken on fish too damaged to be tagged and released, and will consist of:

- For tuna: biopsy punch (genetic), muscle, stomach, gonads, liver and otoliths.
- For other species (Mahi mahi, wahoo, billfish): biopsy punch (genetic), muscle, stomach, gonads, liver, and otoliths.

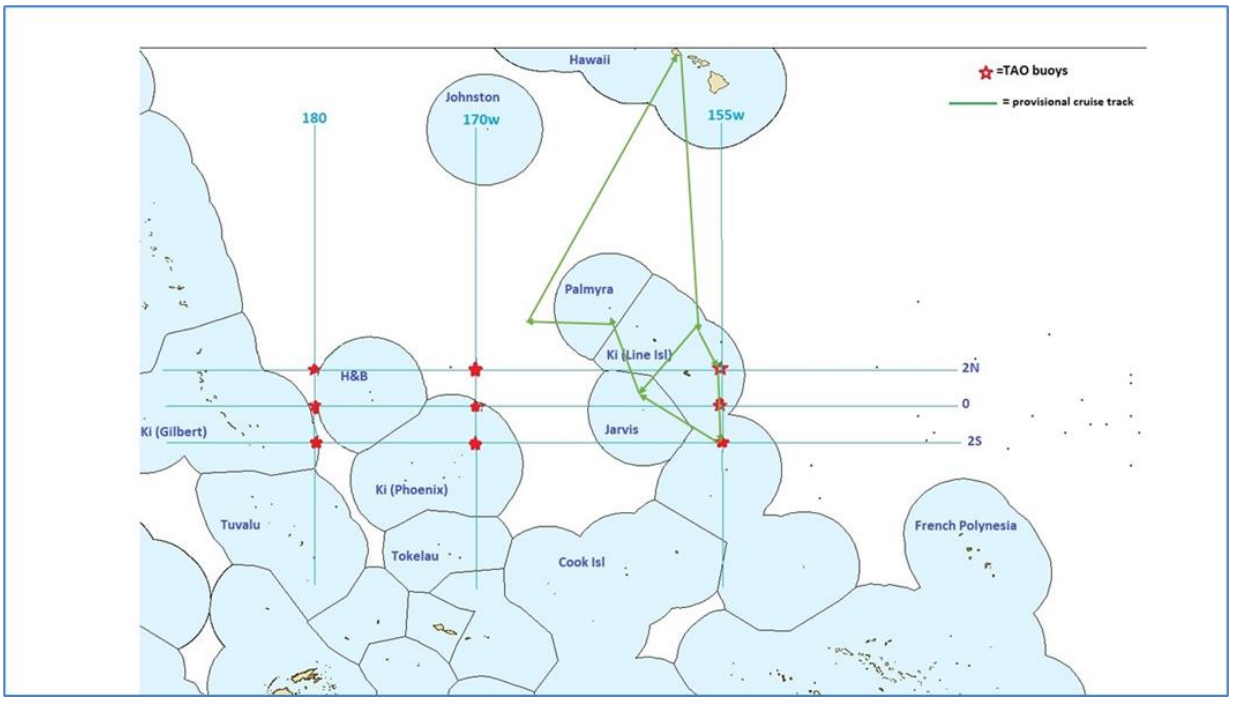


Figure 5: Provisional cruise track and research area for CP16 cruise. The final vessel cruise track will depend on the available dFAD positions within the research area.

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 undertaking research voyages in areas with methods allowing 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 2023) of conventional and archival tags.

Project	Tag Type	Release numbers				Recapture rate (%)			
project	tag_type	SKJ	YFT	BET	Total	SKJ	YFT	BET	Total
CP	ARC	32	368	992	1,392	0.0	10.9	19.6	16.3
	CON	1,289	6,331	50,657	58,372	3.6	10.0	26.2	23.9
PTTP Phase 1	ARC	2	328	68	398	50.0	18.0	26.5	19.6
	CON	143,691	65,771	4,173	213,635	17.7	18.1	22.9	17.9
total PTTP	ARC	208	787	1,183	2,178	2.9	13.7	19.4	15.1
	CON	305,301	114,795	60,345	480,538	18.4	16.6	25.4	18.9
WP Phase 2	ARC	174	91	123	**388**	2.9	11.0	17.9	**9.5**
	CON	160,321	42,693	5,515	**208,531**	19.2	15.4	19.5	**18.4**

3.1. Tag recoveries for the PTTP

As at the 27 June 2023 480,538 conventional tags have been released, of which 90,822 have been recaptured. The 2022 WP6 cruise saw the highest levels of tag recaptures for any western Pacific cruise since the start of the PTTP, with a large proportion of these recaptures occurring within two weeks of the end of the campaign. Strontium chloride marking of skipjack was carried out at a higher rate than previously (3.8% of releases), with sampling of those recaptured fish carried out in early 2023.

Bigeye tuna tag recaptures from 2020 (CP14) and 2021 (CP15) have continued during the last 12 months, with the rate for CP15 increasing from 12.7% to 18.5% during that time. Many of these recaptures have been found during offloading in EPO ports, via IATTC-supported tag recovery officers, as well as increased returns from vessels who support buoy-sharing during tagging cruises.

No new albacore tags have been recaptured.

Table 5: Tag releases and recaptures for PTTP Central Pacific cruises to date (as 27/06/2023).

	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%)	580 (33.4%)	609 (31.9%)
CP2 May - Jun 2009	169	205	2,309	2,683	5 (3%)	26 (12.7%)	578 (25%)	609 (22.7%)
CP3 Oct - Nov 2009	66	237	4,802	5,105	2 (3%)	64 (27%)	1793 (37.3%)	1859 (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%)	1977 (32.5%)	2030 (31.9%)
CP6 Oct - Oct 2011	2	123	3,804	3,929	0 (0%)	29 (23.6%)	1043 (27.4%)	1072 (27.3%)
CP7 Nov - Dec 2011	52	245	4,212	4,509	1 (1.9%)	23 (9.4%)	1471 (34.9%)	1495 (33.2%)
CP8 Sep - Oct 2012	20	140	6,014	6,174	2 (10%)	32 (22.9%)	2327 (38.7%)	2361 (38.2%)
CP9 Nov - Dec 2013	29	135	4,296	4,460	2 (6.9%)	11 (8.1%)	637 (14.8%)	650 (14.6%)
CP10 Aug - Aug 2014	12	98	195	339	0 (0%)	7 (7.1%)	11 (5.6%)	18 (5.3%)
CP11 Sep - Nov 2015	231	775	1,966	2,977	6 (2.6%)	33 (4.3%)	218 (11.1%)	257 (8.6%)
CP12 Sep - Oct 2016	109	371	1,575	2,110	3 (2.8%)	85 (22.9%)	272 (17.3%)	360 (17.1%)
CP13 Jul - Aug 2018	79	443	611	1,134	4 (5.1%)	34 (7.7%)	46 (7.5%)	84 (7.4%)
CP14 Aug - Oct 2020	318	1,751	4,318	6,387	8 (2.5%)	93 (5.3%)	488 (11.3%)	589 (9.2%)
CP15 Jul - Aug 2021	98	1,344	6,445	7,887	1 (1%)	115 (8.6%)	1343 (20.8%)	1459 (18.5%)
Totals	**1,289**	**6,331**	**50,657**	**58,372**	**46 (3.6%)**	**636 (10%)**	**13282 (26.2%)**	**13957 (23.9%)**

Table 6: Tag releases and recaptures for PTTP Pole & Line cruises to date (as at 27/06/2023).

	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	2651 (19%)	1810 (23.2%)	230 (40.9%)	4691 (21%)
PG1 Feb - May 2007	26,493	12,845	129	39,467	2512 (9.5%)	1730 (13.5%)	8 (6.2%)	4250 (10.8%)
PG2 Apr - Jul 2011	28,730	11,571	355	40,656	5800 (20.2%)	2495 (21.6%)	60 (16.9%)	8355 (20.6%)
PG3 Jan - Mar 2012	28,312	9,607	2,008	39,927	7345 (25.9%)	1735 (18.1%)	532 (26.5%)	9612 (24.1%)
PG5 Apr - Jun 2013	23,402	5,955	564	29,921	3366 (14.4%)	899 (15.1%)	47 (8.3%)	4312 (14.4%)
SB1 Feb - Apr 2008	15,327	14,405	414	30,146	1782 (11.6%)	2430 (16.9%)	62 (15%)	4274 (14.2%)
SB1 Oct - Nov 2007	7,479	3,565	139	11,183	1981 (26.5%)	786 (22%)	18 (12.9%)	2785 (24.9%)
WP1 Jun - Nov 2008	37,691	17,647	1,467	56,805	6631 (17.6%)	2147 (12.2%)	372 (25.4%)	9150 (16.1%)
WP2 Mar - Jun 2009	34,207	13,919	3,145	51,271	4628 (13.5%)	2363 (17%)	496 (15.8%)	7487 (14.6%)
WP3 Jul - Oct 2009	30,724	7,340	735	38,799	6825 (22.2%)	1452 (19.8%)	199 (27.1%)	8476 (21.8%)
WP4 Sep - Nov 2017	25,457	2,376	20	27,853	6120 (24%)	470 (19.8%)	3 (15%)	6593 (23.7%)
WP5 Jul - Sep 2019	15,595	1,077	146	16,818	1395 (8.9%)	62 (5.8%)	16 (11%)	1473 (8.8%)
WP6 Sep - Oct 2022	16,648	334	2	16,986	5727 (34.4%)	116 (34.7%)	0 (0%)	5843 (34.4%)
totals totals	**304,013**	**108,464**	**9,688**	**422,167**	**56763 (18.7%)**	**18499 (17.1%)**	**2041 (21.1%)**	**77303 (18.3%)**

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			
Gear	Cruise Type	Tag Type	Releases	SKJ	YFT	BET	Total
CP Mixed	Pre-dFad 2008-2013	ARC	712	0.0	10.0	22.7	18.7
		CON	37,538	5.4	17.2	30.7	29.8
	dFad Access 2013+	ARC	680	0.0	11.5	17.4	15.0
		CON	20,739	2.6	7.6	15.7	13.3
		SON	372	0.0	6.2	5.1	4.6
WP Pole&Line	Archipelagic (Sol+PNG) 2016+	ARC	93	2.5	55.6	40.0	9.7
		CON	61,674	22.9	17.0	10.0	22.5
	Archipelagic (Sol+PNG) pre2016	ARC	658	4.1	15.4	21.3	15.3
		CON	319,162	17.8	16.9	21.6	17.6
		SON	222	4.3	9.6	38.9	10.4

3.2. Tag Recovery Network

Since September 2021, a service provider, MRAG, assumed responsibility for centralizing tag recovery 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 Officers (TROs), and anyone who finds a tag in these countries.

A new agreement between SPC and IATTC has been signed to maintain the tag recovery network in Ecuador and Mexico. Reimplementation of a tag recovery network in Thailand is currently underway.

To increase collaboration with the South Korean fishing industry, a visit to Busan and Seoul was undertaken, along with other members of the Oceanic Fisheries Programme and WCPFC Secretariat. An awareness campaign was undertaken at the Ministry of Oceans and Fisheries (MOF), the National Institute of Fisheries Science (NFIS), the Fisheries Monitoring Center, the Korean Overseas Fisheries Association (KOFA) and Dongwon Industries. A representative of NFIS is now acting as a tag recovery officer for South Korea.

The special reward scheme for the fleets collaborating in the buoy-sharing programme for PTTP cruises has now been running annually since 2020. This reward scheme includes rewards at vessel- and fleet-levels 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:

- 2020: first raffle
- September 2021 to March 2022
- March 2022 to September 2022
- September 2022 to March 2023
- The 5th lottery runs until September 2023

To encourage finders to provide accurate data, USD$5 are given as a reward in addition to the USD$20 if the fish is provided to the TRO with the tag. The observers at sea who support tag finders and the tag recovery network are rewarded USD20 to report tags directly and immediately to SPC with a picture of the tagged fish as well as accurate length measurement. A tutorial video on how to complete the tag recovery form is now

available on the SPC YouTube channel. The training for observers has been entirely revised and currently under development on the Moodle platform, allowing access of the training material online and remotely.

3.3. Tag Seeding

To date (06/07/2023) nearly 59.9% of seeded tags have been returned to SPC (5702 recovered/9522 deployed). In addition to allowing estimation of tag reporting rates, tag seeding data also allow the error rate in tag return information to be determined (Peatman, T. 2020). As of the 6th July 2023, a total of 615 tag seeding kits have been prepared (consisting of seeding tags, applicators, guidebooks and data forms) and given to observer coordinators and TROs in Tonga, Ecuador, Mexico, 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, Pohnpei and Majuro continue to liaise closely with observers, observer debriefers and coordinators to implement tag seeding experiments and to recover the tag seeding logs for deployed kits. With the post-covid return to 100% observer coverage, tag seeding kits stocks have been replenished across the region, including IATTC.

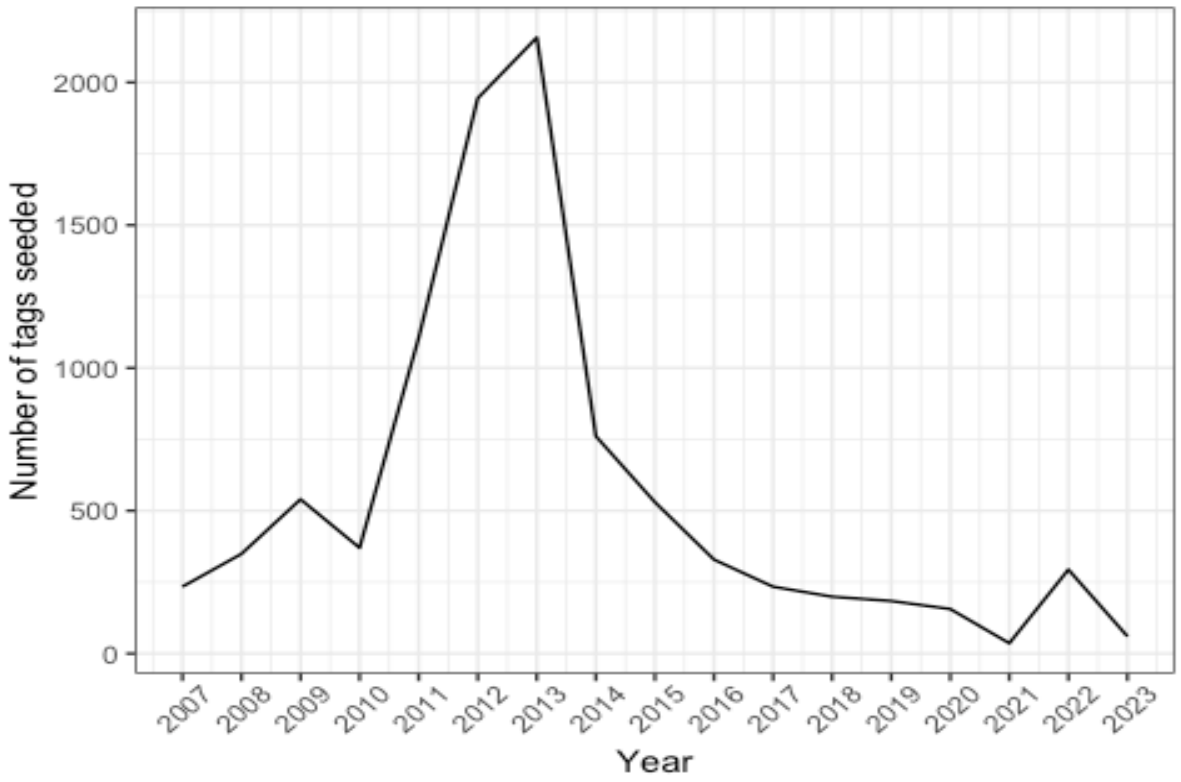


Figure 6: Number of seeded tags deployed per year since the beginning of PTTP.

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	0	0	12	0	0	0	173	0	0	49
2008	0	0	0	0	0	25	274	50	0	0
2009	0	25	0	0	0	51	268	75	0	121
2010	23	20	0	0	0	59	105	48	0	115
2011	0	75	45	0	25	60	221	486	0	193
2012	0	73	144	0	209	48	288	1,065	25	92
2013	0	6	191	0	169	12	939	810	0	30
2014	0	30	0	0	240	0	329	132	30	0
2015	30	30	0	0	140	0	150	120	60	0
2016	0	0	0	126	95	0	60	48	0	0
2017	0	0	0	0	0	24	60	120	30	0
2018	29	0	0	0	0	0	60	50	0	60
2019	30	0	0	0	0	0	154	0	0	0
2020	0	0	0	0	0	0	156	0	0	0
2021	0	0	0	0	0	0	36	0	0	0
2022	0	0	0	0	0	0	294	0	0	0
2023	0	0	0	0	0	0	60	0	0	0

4. PTTP 2023-2026 WORK-PLAN

The proposed work-plan for the PTTP for 2023-2026 is highlighted in Table 9 below. The work-plan recognises the decisions of SC in 2016 to normalise the tagging programme, and the decisions of SC in 2017 where this rolling medium-term research work-plan was endorsed (WCPFC-SC 2017). The work-plan also includes relevant, related activities, likely to significantly impact PTTP implementation (e.g. tagging platform refurbishments, etc.).

5. RECOMMENDATIONS

SC19 is invited to note the report of ongoing progress in implementation of the PTTP. In particular, we recommend that the SC:

- Note the successful 2022 WP6 tagging voyage, despite the mechanical issues arising from the ageing charter vessel;
- Note the urgent need for refurbishment of the current pole & line tagging platform in time for the scheduled 2024 skipjack-focused tagging cruise;
- Note the critical importance of effective tag seeding to informing stock assessment, support further increasing recent improvements in deployment number and fleet, 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 cruise permitting, tag reporting, and industry support of the tagging programme (e.g. through the sharing of drifting FAD buoy data);
- Consider and support the 2024 tagging programme, work-plan and associated budget (WCPFC19 Summary Report);
- Consider and support the 2025-2026 tagging programme, work-plan, and indicative budget;

Table 9: Proposed PTTP work-plan for the period 2023-2026, planned/implemented activities highlighted in green, potential activities in yellow.

Activity		2023	2024	2025	2026
Tagging	Skipjack-focused Cruise		Pole & Line Western Pacific skipjack-focused cruise		Skipjack-focused cruise
	Bigeye-focused research cruise	CP16 Central Pacific bigeye-focused cruise		Bigeye-focused cruise	
	Tagging platform	Dedicated Research Vessel Functionality Study Underway	Potential construction of dedicated, regional research vessel		Potential first cruise
		Call for trolling-capable vessel charter put out to tender	Refurbishment of current Pole & Line charter vessel		
		Evaluation of business case for P&L refurbishment			
	Tag Seeding through Regional Observer Programmes	Continue increase in tag seeding to support reporting rate estimates			
Tag Recovery	Support and development of tag recovery network	Korean industry and cannery visit	Training of new TRO for Thailand canneries. Support TROs for Americas ports		
	Increase tag recovery efficacity	Tuna product flow proof of concept completed	Trial integration of cannery data into tuna product flow network		
		Key-coded conventional tags rolled out			
	Implementation and revision of tag reward schemes	Updated tag-rewards and purse seine reward schemes			
Data management	Tagging data validation	Continue development of automatic validation tools	Ongoing		
	Maintain and develop PTTP databases and related tools	Tagging database migrated to TUFMAN2 platform	Migrate tag release data entry software to TUFMAN2		
Data Analyses	Provide tagging data for inclusion in stock assessment and related analyses	Provision of yellowfin and bigeye tagging data for stock assessments	Integration of yellowfin tagging data into SEAPODYM	Skipjack tagging data provision	Yellowfin and bigeye data provision
	Reduce uncertainty in WCPO stock assessments	Updated tagging effects and reporting rate analyses completed		Tag mixing analyses	
	Increase understanding of tuna-fishing gear interactions and interpretation of fisheries data	Acoustic array experiment to understand movement between drifting FADs (IRD collaboration)			

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.

This report was provided by J. Scutt Phillips, B. Leroy, A. Guillou, M. Ghergariu, C. Sanchez 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. 2022. “Project 42: Pacific Tuna Tagging Project Report and Workplan for 2022-2025. WCPFC-SC18-2022/RP-PTTP-02, Online meeting, 11-20 August 2020.”

8. APPENDIX A.

8.1. Minutes of PTTP Planning Advisory Committee Meetings 2022-2023

PTTP 2023 Cruise Planning Advisory Committee Meeting

21th April 2023

11:00-12:00 (UTC+11)

Hybrid Meeting: Nouméa and Microsoft Teams

Participation

Present in Nouméa: Joe Scutt Phillips, Bruno Leroy, Tsuda Yuichi, Aoki Yoshinori, Kiyofuji Hidetada, Hasegawa Takaaki, Kathryn Gavira O'Neill, Beth Vanden Heuvel, Jeff Muir, Fabien Forget

Present online: Elaine Garvilles, Russell Dunham, Simon Nicol, Aurelie Guillou, Jamel James, Ren-fen Wu

EXECUTIVE SUMMARY

- 2022 WP6 cruise completed, with 17,000 conventional tags released
- 2023 CP16 planned for august, a 45-day cruise in the Line Islands, Jarvis, Palmyra and high seas
- A new EU fleet added to buoy sharing programme, supporting WCPFC scientific work
- The Japanese tropical campaigns for skipjack tagging have been suspended, pending extremely low recapture rates. Annual tagging offshore of Japan will continue.
- There is an urgent need to secure a tagging platform for the schedule 2024 skipjack-focussed cruise in the WCPO. The only option appears to be a major refurbishment of the NFD Soltai 105 vessel.

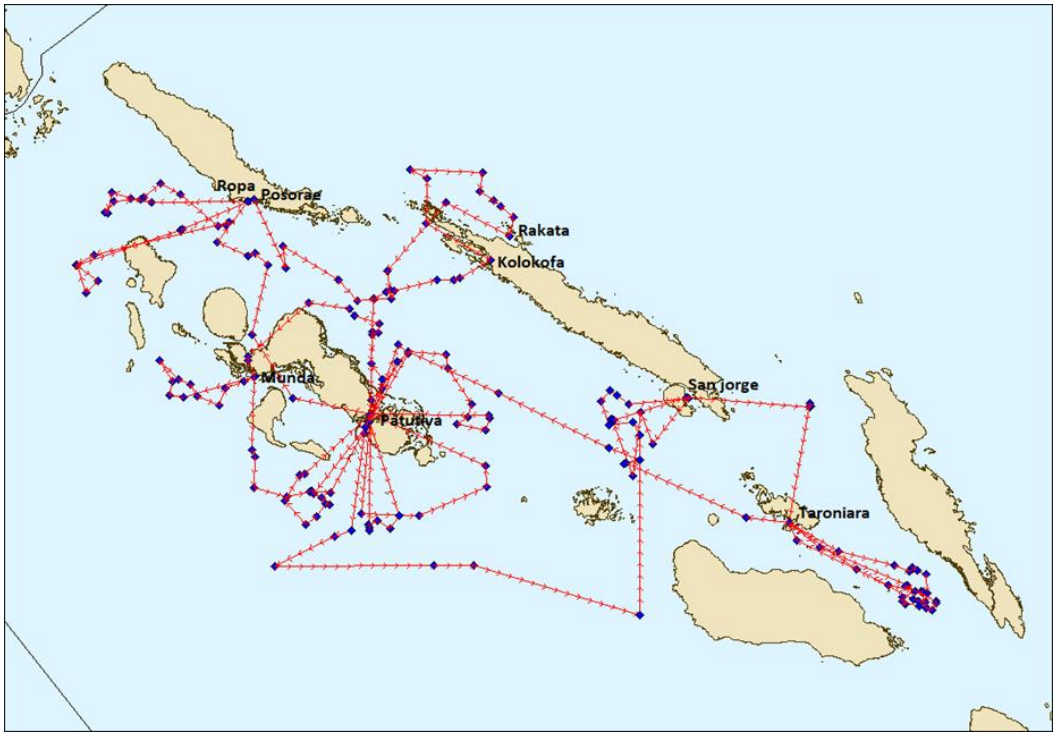
1. Welcome and Preliminaries

Joe Scutt Phillips acted as chair, and welcomed all participants and presented the draft Agenda (Annex 1). No additions or alterations to the agenda were requested, and so was adopted.

2. 2022 WP6 Tagging Campaign Summary

Bruno Leroy outlined a summary of the previous years' 24 day, skipjack-focussed research cruise in the Solomon Islands: Western Pacific 6 (WP6). Around 17,000 tags were released, of which 98% were skipjack tuna. These releases also included 630 fish injected with strontium chloride for to support future growth studies, of which almost half were also sampled with live biopsy genetic samples. Around 250 fish were sampled for the Pacific Marine Specimen Bank, including the usual suite of samples alongside fat content, weight, and genetic biopsies.

The most notable fishing was focussed in the Slot and south of New Georgia, with very poor success on the north-east coast of Choiseul due to a lack of fish during the time searching there.



Vessel track of the research cruise during WP6 2022

Bruno noted the very poor condition of Soltai 105, the vessel that is chartered for skipjack-focussed cruises. Several fishing days were lost due to mechanical issues during WP6, with the vessel only suitable for domestic waters. A major retrofit will be required if SPC is to carry out skipjack-focussed tagging as scheduled in 2024 and beyond.

Project PTTP Phase 2 - Western Pacific #6 **Cruise** 1 **To** 1

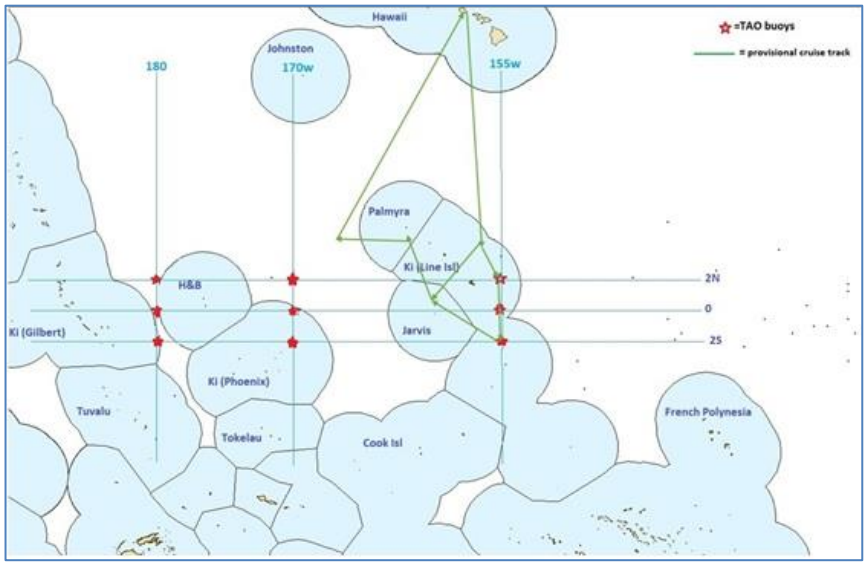
Tag code	Tag description	Releases BET	SKJ	YFT	OTH	TOTAL	Recoveries BET	SKJ	YFT	OTH	TOTAL
W13	White conventional - 13cm	-	630	-	-	**630**	-	172	-	-	172
Y11	Yellow conventional - 11cm	-	175	87	-	**262**	-	81	35	-	116
Y12	Yellow conventional - 12cm	-	965	25	-	**990**	-	292	11	-	303
Y13	Yellow conventional - 13cm	2	14869	222	2	**15095**	-	4725	53	-	4778
TOTAL FISH WITH CON		**2**	**16639**	**334**	**2**	**16977**	**-**	**5270**	**99**	**-**	**5369**
TOTAL FISH		**2**	**16639**	**334**	**2**	**16977**	**-**	**5270**	**99**	**-**	**5369**

Release and current recovery numbers for WP6

3. 2023 CP16 Cruise Plan Outline

Bruno Leroy outlined the plan for the forthcoming CP16 cruise for 2023. A new call to tender is closing soon, to identify vessels who might be suitable for charter to undertake this cruise.

CP16 is planned to be 45 days, departing from Honolulu, Hawaii mid-august, to once again target drifting FADs, whose positions are shared with the science team, in the Line Islands, Palmyra and Jarvis EEZs, and high seas. The exact nature of the cruise track will be entirely dependent on dFAD availability and location at the time of the cruise.



Proposed cruise track for the upcoming CP16 2023

Joe Scutt Phillips gave an overview of the scientific objectives for CP16. Based on recent central Pacific cruises that have followed the same drifting FAD strategy, a minimum target of 4000 conventional releases was set, which will also include effort to release strontium chloride injected bigeye and yellowfin tuna. Standard biological sampling, including biopsies for genetics, will be undertaken for contributions to the Pacific Marine Specimen Bank.

Significant supply and component manufacturing problems with electronic tagging suppliers have meant that none of the typical electronic tagging experiments to explore interactions and vulnerability to fishing gears will be undertaken. However, collaborators at IRD are providing equipment and acoustic telemetry equipment to explore tuna behaviour within clusters of drifting FADs, allowing the PTTP to continue this work for CP16.

4. CP16 Logistics

Bruno outlined the key logistics for the upcoming crew. Four scientific staff were currently planned alongside the vessel crew, with an additional technician likely needed to support biological sampling. 15,000 conventional tags, and 200 applicators have been purchased, with IRD responsible for procurement and shipping of electronic tagging equipment.

5. Formalities and permitting

Bruno outlined the next steps for planning CP16, which required fishing permits for Kiribati, and the US territories in Jarvis and Palmyra Islands.

6. Drifting FAD Access for CP16

Joe summarised the planned agreements for the sharing of real-time drifting FAD positions and echosounder data, again highlighting its critical important for central Pacific, bigeye-focussed research cruises. The US Cape Fisheries Fleet and US Tuna Group FIP will once again sign a Letter of Agreement with SPC to share these data during the cruise period and within a pre-defined zone around the tagging area. This year a third fleet will also join the buoy-sharing programme, the EU Trimarine group who have four vessels fishing in the Pacific. This now constitutes around 25 vessels who are working with SPC to support the WCPFC PTTP project.

Kathryn Gavira O'Neil from Satlink made the comment that they were supportive of the tagging programme and would continue to help and facilitate in any way that they could. Beth Vanden Heuvel from the US Cape Fisheries fleet agreed and echoed that sentiment.

7. Tag Recovery

Joe highlighted the increasing tag recapture rate for recent CP cruises, which may be partially a result of the new reward schemes introduced in 2020, and will be continued for all buoy-sharing purse seine vessels.

There was a recent trip to Korea by SPC and WCPFC staff to solidify working relationships with industry, and strengthen the tag recovery network in Korean canneries for which there have been very low tag returns since 2011.

A new tag recovery officer contract was currently being finalised to replace staff in Thailand, who has provided excellent services and quality of data for many years now.

8. Other Regional Tagging Activities

Yoshinori Aoki provided an overview of the previous years' skipjack tagging activities from the JP tagging programme. This included an offshore Japan campaign in October 2022 for 17 days, with a 1250 conventional tag releases and 75 archival tag releases. The range of fork lengths was 29-57cm. There was also a distant water, tropical campaign during February and March of 2023 lasting 34 days. 5995 conventional tags and 181 archival tags were released in skipjack ranging from 35-64cm fork length. These two campaigns have followed the same strategy since 2018, tagging offshore near Japan in the autumn and in the tropical zone during the first quarter of the year. However, following extremely low recapture rates of 0.8% for the tropical releases, the tagging in this region has been suspended by the Japanese government until this result can be explained.

The planned offshore Japan cruise for 2023 will target skipjack larger than 50cm fork length, and aim to release 5000 conventional and 80 archival tags over 30 days.

9. PTTP Prospective Planning

For mid-term planning, Bruno highlighted the urgent need to for a skipjack-tagging platform meant that discussions on the potential refurbishment of the Soltai 105 are ongoing. Pending an agreement with the vessel owner NFD and funding availability, the scheduled 2024 research cruise will be dependent on this refurbishment. Discussion with Japanese colleagues, during an informal tagging workshop the week preceding the advisory committee meeting, suggested that the possibility of the PTTP chartering a Japanese pole & line vessel would be very low. Given the current suspension of Japanese tagging in the tropical zone, a joint cruise is also not possible at the current time.

Work on the longer-term potential for a regional research vessel continues, with a call to tender for technical assistance recently completed and a vendor selected. The vessel functionality study will be carried out during April-June of 2023, allowing for a call to tender to be made to shipyards during July-September.

Jamel James from FSM asked if the vessel would likely be completed by 2024. Bruno Leroy replied that a more realistic timeframe would be built and ready for initial work in 2026.

No other business was raised.

Next meeting: The next meeting will be the standing PTTP Steering Committee, to be held prior to the WCPFC Scientific Committee in early august.