



**SCIENTIFIC COMMITTEE
FOURTEENTH REGULAR SESSION**

Busan, Republic of South Korea

8-16 August 2018

Report of the Pacific Tuna Tagging Programme Steering Committee

WCPFC-SC14-2018/RP-PTTP-01

PTTP Steering Committee

Preliminaries

Background

The Pacific Tuna Tagging Programme (PTTP) is a joint research project being implemented by the Oceanic Fisheries Programme (OFP) of the Pacific Community (SPC). The goal of the PTTP is to improve stock assessment and management of skipjack, yellowfin and bigeye tuna in the Pacific Ocean. The objectives of the PTTP, originally specified in WCPFC Regional Tagging Project Steering Committee (2006) were revised in 2016 (PTTP Steering Committee, 2016) and 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.

The PTTP Steering Committee was established by SC2 to provide guidance and oversight in the development of firstly the project document (WCPFC Regional Tagging Project Steering Committee, 2006) and subsequently of operational plans, implementation and analytical work. The 12th meeting of the PTTP Steering Committee was held at the 14th Regular Meeting of the WCPFC Scientific Committee, Busan, Republic of Korea on 09th August 2018. The current donors to the project are the European Union, the Republic of Korea, the Pacific Community (SPC), the WCPFC and ISSF.

Review and adoption of agenda

The provisional agenda was adopted.

PTTP Progress Report (SC14 RP PTTP 02)

Since the last PTTP Steering Committee meeting, one tagging voyage, WP4, in the tropical western Pacific has been conducted, and in addition, continued implementation and refinement of tag recovery processes, tag data curation, tag seeding, data preparation for use in WCPO stock assessments, and a range of tag related analyses and modelling conducted (SPC-OFP, 2018).

Research voyages

WP4 was a research voyage of 50 days duration conducted in Sep-Nov 2017 targeting skipjack tuna in Papua New Guinea (21 days) and Solomon Islands EEZs (29 days). WP4 was a large-scale tagging voyage designed to collect data collection on tuna movements, exploitation rates, biology and ecology.

The Noro-based pole and line fishing vessel *Soltai 105* was chartered for the voyage. A total of 27,779 tuna (25,424 skipjack, 2,335 yellowfin, and 20 bigeye) were tagged. Very limited numbers of good size yellowfin and bigeye were caught during this voyage and only seven archival tags were released in five yellowfin and two bigeye tunas. For skipjack, the size distribution of fish tagged in PNG was smaller than in the Solomon Islands, although with very small numbers of fish out to 65cm. In the Solomon Islands, two strong size modes were tagged and good numbers of larger fish tagged, around 60-65cm. For yellowfin, more small fish were tagged in PNG, although the distribution of sizes in PNG was very broad. In the Solomon Islands, there was a mode around 50cm and the range of sizes was smaller than in PNG.

The lack of bait and fish hampered the PNG leg of the WP4 voyage, resulting in in 50% lower success (in terms of tags per day) than expected from past experiences in those waters. In contrast, the skipjack tagging in Solomon Islands waters was exceptional in terms of the numbers and size of the fish tagged. The pole and line method of tag and release again allowed large-scale release of tagged skipjack tuna in a relatively short period. In summary, this was a successful research voyage.

Tag recovery

The total tag releases for the PTTP are 429,425 tuna including 1,733 that were tagged with archival tags. Over 78,259 tagged tuna had been recaptured and the data reported to SPC. Tag attrition follows the expected declining pattern 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 pattern of recoveries from WP4 is already very similar to that reported from WP1-3, and across all voyages similar to that reported to the steering committee at SC13 in 2017. The yellowfin and bigeye remain very useful for stock assessment purposes, but it is clear that there remains a significant gap in the tagging of larger BET in the western central Pacific. The successful re-establishment of skipjack tagging with WP4 should be very useful for the next skipjack stock assessment.

Tag Recovery staff continued their work in Wewak, Madang, Honiara, Rabaul, General Santos, Noro and Tarawa. Across the region, the previously full-time Tag Recovery Officers (TROs) have now taken on other duties at their respective local fisheries agencies, however they generally continue to act as TROs. New fisheries officers in American Samoa, Tonga, Samoa, Taiwan and Tuvalu are now acting as TROs. As of mid-2017, negotiations with Kiribati MFMRD to re-establish a full time TRO position in Tarawa are still under progress. The establishment of these positions has provided greater opportunity for collection of tags during unloading, transshipments and processing in canneries with more complete and reliable capture information. The re-establishment of the position in Noro has provided greater opportunity for collection of tags during unloading, transshipments and processing arising from WP4 tags. Re-establishment of the position in Lae is needed (and is included in the 2018-19 work plan).

Biological sampling during tagging voyages

The PTTP continues to collect biological samples as part of long-term projects to characterize tuna biology and ecology, and the trophic status of the western and central Pacific pelagic ecosystem. Since the beginning of the PTTP, 6,279 stomach samples have been collected, mainly from skipjack, yellowfin, bigeye and albacore tuna (including 290 additional stomachs from WP4, mostly skipjack and yellowfin). These research voyages have provided

the opportunity to measure the fat content of 4,167 specimens a specialist type of sampling that cannot be conducted by observers undertaking biological sampling on industrial fishing vessels. Additionally, the tagging research voyages have provided a large volume of biological samples for the WCPFC Tuna Tissue Bank with a total of 6,479 fish sampled to date (these tagging research voyage samples represent 25.5% of the total fish sampled for the tissue bank).

Tag database and data capture improvements

A new dedicated web application allowing access to TagDager for approved users has been developed. The purpose of the app includes improved identification of fake tag recovery and/or tag data validation (e.g. through immediate access to release information such as species and length). These improvements to the tag databases will improve tag quality and reduce the risk of potential tag reward fraud.

Tag data analyses

Reporting rate (RR) prior parameters were calculated for the alternative regional structure included in the 2018 bigeye re-assessment, using the approach outlined in Peatman et al. (2016). The RR prior parameters were insensitive to the shift of the northern boundary between regions 1 & 2 and 3 & 4 due to the low levels of purse seine effort between 10N and 20N west of 140E.

Scutt Phillips et al. (2018) have developed a tagging simulator for skipjack tuna in the WCPO known as IKAMOANA. It provides a framework to examine the potential movement of individual tuna schools under a variety of behavioural assumptions. The movement of both individual or cohesive schools of skipjack are simulated. An initial suite of simulations for skipjack tag releases in skipjack stock assessment region five has been undertaken to examine the degree of tag mixing that may have occurred during recent years. Simulation results were highly dependent on the environmental forcing of the ENSO phase being examined. Releases in the Solomon Sea show lower initial dispersal than other locations but good levels of mixing in skipjack stock assessment region five. Simulated releases in the Bismarck Sea area were, in general, consistently over-depleted compared to fish of the same cohort for all assessment regions into which tagged fish subsequently moved. Releases in logistically more challenging locations appear to drive greater within-region mixing of tagged fish compared with releases in core fishing areas where high fishing effort result in tag return data that are less representative of the stock. Further examination of these results and additional simulations would provide guidance on future design of PTTP skipjack research voyages (including WP5 planned for 2019).

2018 2021 Work Plan

Issues arising from 2017-18

The PTTP continues to be successful, recently with WP4 completed in November 2017 and with CP13 underway during SC14. The PTTP and the data it produces are set to continue as a strong part of WCPFCs science for the medium term, but there remain significant issues to resolve. The significant commitment from the Commission to ongoing funding is helping to finance annual tagging voyages; however, the increasing costs of vessel time and the staged

approach to funding increases (Appendix J, SC report, 2017) mean SPC still needs to obtain funds from external sources to complete the tagging work programme.

Beyond budget, the most significant issue is the availability of suitable research vessels. This is particularly an issue for pole and line vessels required for large-scale tagging of skipjack tuna. Those that remain in the south Pacific are either too small, or are rapidly ageing and through a combination of deterioration and limited spare parts availability no longer offer sufficiently reasonable conditions to be used for research. This creates considerable difficulty in procuring a vessel for this pole and line research, and places significant cost pressure on the research programme. Although several suitable longline vessels exist in the region for the various line fishing techniques used to target bigeye tuna, very few possess the range required for current research needs, and none are designed for research fishing. These issues build a strong case for identifying a long-term multi-purpose tagging platform in the WCPFC area. A comprehensive cost analysis of such an approach to fisheries and ecosystem research for WCPFC is urgently required to progress this concept.

Work plan

The proposed PTTP work plan for the period 2018-2021 was discussed by the PTTP SC and is set out in Table 1. There are five main work streams covering tagging, tag recovery, data management, data analyses and planning.

Tagging research voyages include:

-) CP13 (underway at the time of SC14) a BET target and focused in the Western tropical Pacific;
-) WP5 is planned for 2019, to have a skipjack focus within the warm pool;
-) CP14 is planned to occur second half of 2020, to have a BET focus, and is likely to include a return to the central Pacific area; and
-) WP6 is planned for 2021, to have a skipjack focus within the warm pool.

Note that for the tag research voyages SPC routinely invites participation from Pacific Island fisheries staff and this will continue across this workplan. Participation from other WCPFC CCMs is also welcomed if logistics allow.

As already reported to SC12 (PTTP Steering Committee, 2016) and SC13 (PTTP Steering Committee, 2017), and highlighted again to SC14 (SPC-OFP, 2018), the operational issues in getting a suitable vessel at a reasonable cost have reached limits that will constrain or even totally compromise future implementation of a pole and line tagging voyage. Based on the experience during WP4, it seems that unless a vessel can be procured from outside the region, WP5 may need to be delayed a year (and CP14 bought forward a year to ensure continuous tagging).

The additional work streams include:

-) Continued tag recovery efforts across the region including ongoing tag recovery network development and enhancement;
-) Ongoing verification of tag recapture information with VMS and logbook data, and consolidation of the web-based tag data framework;
-) Further investigations of tag data including further analyses of tag seeding data and reporting rates, inclusion of tag data into MFCL and SEAPODYM analyses; and
-) A review and analysis of the cost-effectiveness of a WCPFC tagging research vessel.

Table 1: Indicative PTPP workplan for the period 2018-2021.

ACTIVITIES		2018 ¹	2019	2020	2021
TAGGING					
1.	<p>Pole and line tagging research voyage</p> <p>Target is skipjack, with secondary target of yellowfin.</p> <p>Following SC recommendations to implement a skipjack tagging experiment every second year, a pole and line research voyage is scheduled for 2019 and biennially thereafter.</p> <p>Note also critical component of biological sampling in support of Project 35b.</p>		Plans to be refined after assessing viable available options		Plans to be refined after assessing viable available options
2.	<p>Dangler/troll tagging research voyage</p> <p>Target is bigeye, with secondary target of yellowfin.</p> <p>Following SC12 recommendation to implement a bigeye tagging experiment every second year, a dangler/troll experiment is scheduled for 2020 and biennially thereafter.</p> <p>Note also critical component of biological sampling in support of Project 35b.</p>	A charter arrangement has been concluded with Hawaiian LL company to use FV GutsyLady4 to implement a 35 day research voyage	Dependent on outcome of obtaining suitable pole and line vessel, may be better to undertake a second consecutive year of dangler/troll research	Focus in the Central Pacific to continue view of bigeye across the WCPO	
TAG RECOVERY					
3.	Establish new TRO positions where required.				
4.	Ongoing support of TROs in PNG, Philippines, Thailand and key Pacific Island locations.				
5.	Develop new tag recovery poster.				
6.	Review and revise tag rewards scheme.				
DATA MANAGEMENT					
7.	PTPP data verification with VMS and Logbook, and cannery data.				
8.	Consolidation of the web tagging database framework.				
9.	New tools to consolidate collection of recapture information.				
DATA ANALYSES					
10.	Tag reporting and seeding.	Purpose: Estimation is a direct scalar for fishing mortality. Tasks: Routine update of analyses, reporting to SC.			
11.	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: Routine update of analyses, reporting to SC.			
12.	Movement.	Purpose: Provide external validation to estimates from within MFCL and SEAPODYM. Tasks: Routine update of analyses, reporting to SC.			
13.	IKAMOANA analyses.		Optimal design for 2019 WP5 voyage		
PLANNING					
14.	Review and update research plan	Ongoing annual task for rolling plan.			
15.	Consultancy on cost-effectiveness of a research vessel.				

¹ This programme is all either complete or well underway (e.g. research voyage CP13).

Other Regional or Sub regional Tagging Projects

PNG

PNG updated the PTTP on its involvement in the work of the PTTP, including:

-) Supporting the implementation of a number of collaborative tagging operations with SPC since 2006, and recently WP4 in 2017, noting PNG has contributed financially and in-kind logistic support for the tagging operations, as well as, recruiting dedicated tag recovery officers in the main ports in PNG and paying tag rewards to fishers;
-) As part of these tagging operations a large number of samples have been collected and sent to SPC for further analysis and the data collected during these tagging operations had become part of the WCPFC Tuna Tissue Bank stored at SPC, and contributes to the work of providing scientific services to PNG and the broader region in managing shared tuna stocks;
-) NFA involvement in WP4 was from September to October 2017, with 19 sea-days spent in the PNG EEZ during the implementation of the tagging operations;
-) Awareness work was undertaken with local communities regarding the collection of baitfish for use during tagging operations, and research visas for the SPC scientists and technicians were facilitated in line with PNG immigration and customs requirements; and
-) Tag recovery rates post WP4 have been low with 188 tags from WP4 recovered by officers in PNG ports.

PNG highlighted that due to several factors at the national level they will not be able to continue the same level of support to the tagging program. The dialogue with SPC on how PNG can continue its collaboration with the PTTP is ongoing. PNG reiterated to the committee that it continues to see the value of a tagging program to inform the stock assessments for tunas in the WCPO and encouraged SC to provide adequate support to the science services provider in this regard.

Japan

Japan advised it had conducted limited tagging of skipjack in the high seas areas in late 2017, and that it hoped to conduct further tagging in late 2018. Collaboration with other organisations and countries will continue to be required to ensure that reporting of tag recoveries is high. The Steering Committee encouraged SPC and Japan to continue to explore the possibility of collaboration in tagging voyages in the coming years.

IATTC

The Steering Committee noted with interest that the IATTC is currently investigating beginning a new phase of large-scale tagging of tunas. This may identify suitable pole and line vessels for charter from outside the WCPO area. Further, it needs to be explored in the proposed investigation of cost effectiveness around obtaining a research vessel for the WCPO.

Administrative Matters

The support of all current and past donors is gratefully acknowledged, as are the efforts of all contributors and project collaborators. The donors have recently included Papua New Guinea,

the Republic of Korea, Australia, the European Union, New Zealand, the Pacific Community (SPC), the WCPFC and ISSF.

WP4 in 2017 was only possible due to a significant input of funding from SPC-OFP (approximately one-third of the total costs). That source of funds has now been fully utilised and we do not anticipate that SPC-OFP will be able to supplement funding for tagging voyages to the same extent in the future. CP13 in 2018, underway during the meeting, is significantly supported by the European Union through the *WCPFC Mitigating bycatch of bigeye tuna and yellowfin tuna juveniles by purse seine fisheries* project.

During the PTTP Steering Committee, the Republic of Korea informed the meeting that it would be able to continue supporting the PTTP over the period 2019-2023 at a level of US\$170,000-180,000 (dependent on the exchange rate in each year). The announcement by the Republic of Korea that it would continue its generous support of the PTTP from 2019-2023 was welcomed.

The indicative budget in 2020, with the contribution from the Republic of Korea, is close to levels that will allow the bigeye tuna programme to continue sustainably. However, the increase of the PTTP budget in out-years remains important for the skipjack tuna programme.

Discussion

The Steering Committee noted that the decision to normalise the tagging programme in 2016 was being implemented (WCPFC, 2017) with the CP12, WP4 and CP13 research voyages and associated activities. The work plan, and in particular funding and the access to suitable tagging vessels in future, were discussed in detail.

With the continued increases in the Commission's budget in 2018 and the indicative budget for out-years and the contribution from the Republic of Korea, the budget is getting closer to necessary levels. However, given the increasing costs of procuring suitable vessels for research, further funds are needed to support the programme. For example, the 2017 research voyage could only be completed due to approximately 33% of the work being funded from SPC sources. The budget needs to continue to increase to the levels indicated in current analyses (e.g. US\$1,470,000 for a pole and line voyage, and US\$900,000 for a dangler and troll voyage).

Access to a more cost effective research vessel would also make the tagging programme more sustainable. The most reliable and successful approach – globally – for large-scale tagging of skipjack tuna is to use the pole and line method of fishing. At the same time, this fleet has shrunk globally to the point where there now remain only a very small number of vessels in the Pacific region that can be utilised for this research. Those that remain are in high demand for industrial fishing as they produce a sought after product. This creates considerable difficulty in procuring a vessel for this research. Although several suitable longline vessels exist in the region for the various line fishing techniques used to target bigeye tuna, the reality is that none are designed for research fishing. In 2017, this led to the development of a proposal for a cost-effectiveness study in 2017 (PTTP Steering Committee, 2017; Appendix J, WCPFC-SC, 2017). That proposal received a medium priority, but even though SPC had identified a source for 50% of the funding, it was not funded by the Commission² (WCPFC 2018). As tagging provides key information on abundance and

² The proposal in 2017 included SPC funding 50% of the costs of the project. As that source of funding is no longer available (used instead to ensure WP4 could proceed), that approach is now not possible.

fishing mortality for skipjack tuna stock assessments, there is increasing urgency to address these issues. The Steering Committee agreed that this project should now receive a high priority. The project proposal includes an assessment of the full range of operational costs, including options on governance, inter-RFMO vessel sharing, multiple research modes, and future vessel replacement, with costs compared with the costs and benefits of the current approach. The Steering Committee agreed to develop the proposal further, especially the budget, for submission to the budget committee and recommendation to SC14.

With respect to securing a vessel for WP5 in 2019, the Steering Committee recommended exploring options to utilise a vessel from outside the WCPO. In the case that a suitable vessel could not be procured, the Steering Committee agreed that the scientific services provider should have the discretion to conduct CP14 in 2019 and defer WP5 to 2020 if necessary.

Recommendations for SC14

The Steering Committee therefore recommended to SC that it:

-) note the successful 2017 research voyage, including participation from local science staff in PNG waters, and that the 2018 voyage is currently underway;
-) request members to actively support the tag recovery network;
-) support the 2019 tagging programme, and associated budget;
-) support the 2020-2021 tagging programme, and associated indicative budget;
-) support the PTPP workplan for 2019-2021, noting that should available budget and pole-and-line vessel availability dictate, that the research voyage schedule be modified to conduct CP14 in 2019 and defer WP5 to 2020 if necessary; and
-) support the project to address the increasingly urgent issue of cost-effectiveness of vessel charter in relation to acquiring a dedicated tagging vessel by increasing its priority from medium to high.

The Steering Committee asked SC14 to consider the following as recommendations to WCPFC.

1. The Commission support the PTPP work plan and associated budget for 2019, and the work plan and associated indicative budget for 2020-2021;
2. Should available budget or pole-and-line vessel availability make it impossible to conduct WP5 in 2019 as scheduled in the work plan, the WCPFC Executive Director may authorise an amendment to the schedule such that CP14 be conducted in 2019 and WP5 be conducted in 2020; and
3. To address the increasingly urgent issue of cost-effectiveness of vessel charter for tagging and associated research, the Commission implement the proposed project to assess the business case for the acquisition and operation of a dedicated research vessel for this purpose.

References

- Peatman, T., Caillot, S., Leroy, B., McKechnie, S., Roupsard, F., Sanchez, C., Nicol, S., and N. Smith. 2016. Analysis of tag seeding data and reporting rates. WCPFC-SC12-2016/SA-IP-13, Bali, Indonesia, 3–11 August 2016.
- PTTP Steering Committee. 2016. Report of the Pacific Tuna Tagging Programme Steering Committee. WCPFC-SC12-2016/RP-PTTP-01, Bali, Indonesia, 3–11 August 2016.
- PTTP Steering Committee. 2017. Report of the Pacific Tuna Tagging Programme Steering Committee. WCPFC-SC13-2017/RP-PTTP-01, Rarotonga, Cook Islands, 9–17 August 2017.
- Scutt Phillips, J., Sen Gupta, A., Senina, I., van Sebille, E. Van, Lange, M., Lehodey, P., Hampton, J., Nicol, S., 2018. Progress in Oceanography An individual-based model of skipjack tuna (*Katsuwonus pelamis*) movement in the tropical Pacific Ocean. *Prog. Oceanogr.* 164, 63–74. <https://doi.org/10.1016/j.pocean.2018.04.007>
- SPC-OFP. 2018. Project 42: Pacific Tuna Tagging Project Report and Workplan for 2018-2021. WCPFC-SC14-2018/RP-PTTP-02, Busan, Republic of Korea, 8-16 August 2018.
- WCPFC. 2017. Summary Report Issued 02-Mar-17. Thirteenth Regular Session of the Commission, Denarau Island, Fiji, 5-9 December 2016. The Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean.
- WCPFC. 2018. Summary Report Issued 16-Mar-18. Fourteenth Regular Session of the Commission, Manila, Philippines, 3-7 December 2017. The Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean.
- WCPFC-SC. 2017. Summary Report. Thirteenth Regular Session of the Scientific Committee, Rarotonga, Cook Islands, 9-17 August 2017. The Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean.
- WCPFC Regional Tagging Project Steering Committee. 2006. Regional Tuna Tagging: Phase 2 Proposal. WCPFC-SC3-2007/GN WP-10, Honolulu, Hawaii, 13-24 August 2006.