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Report of the Pacific Tuna Tagging Programme Steering Committee

WCPFC-SC13-2017/RP-PTTP-01

PTTP Steering Committee

Preliminaries

Background

The PTTP is a joint research project being implemented by the Oceanic Fisheries Programme (OFP) of the Pacific Community (SPC). The goal of the Pacific Tuna Tagging Programme 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-SC6-2010/GN-IP-04 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-SC3-GN-WP-10) and subsequently of operational plans, implementation and analytical work. The 11th meeting of the PTTP Steering Committee was held at the 13th Regular Meeting of the WCPFC Scientific Committee, Rarotonga, Cook Islands on 10th August 2016. The current donors to the project are Australia, New Zealand, Korea, SPC and the WCPFC.

Review and adoption of agenda

The provisional agenda was adopted.

PTTP Progress Report (SC13-RP-PTTP-02)

Since the last PTTP Steering Committee meeting, one tagging cruise, CP12, 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.

Research voyages

CP12 was a research voyage of 35 days duration conducted in Sep-Nov 2016 targeting bigeye tuna aggregations associated with the 5°N, 2°N, equator, 2°S and 5°S TAOs on the 165°E line and 15 dFADs in FSM, Solomon, Tuvalu, and international waters. CP12 was designed to include data collection on tuna movements, exploitation rates and dFAD association dynamics.

The Hawaii-based multipurpose vessel Gutsy Lady 4 was chartered for the cruise. A total of 2,135 fish (1575 bigeye, 371 yellowfin, 109 skipjack, and 80 other fish) were tagged. Within these releases, 93 archival tags were deployed on bigeye tuna and 28 on yellowfin tuna. A majority (<90%) of the total tagged fish were released in association with dFADs and the rest in association with TAO moorings.

Four dFADs were equipped with a satellite communicating acoustic receiver manufactured by Vemco. These types of units utilize Iridium satellite communication and eliminate the need to retrieve the receiver to download information. One hundred and twenty eight fish were implanted with acoustic tags across the 4 equipped dFADs (29 bigeye, 15 yellowfin, 29 skipjack, 26 silky sharks, 13 rainbow runner and 16 ocean triggerfish).

The CP12 cruise met or exceeded all targets for tagging and deployment of experimental gear. It also highlighted that the methods developed in the central Pacific could be applied successfully in the western Pacific. At the same time the operational issues in getting a suitable research platform into the western area constrained the amount of time available for research at sea. This latter point, and the associated costs associated are one of several factors which begin to build the case for identifying a long-term multi-purpose tagging platform in the WCPFC area.

Tag recovery

The total tag releases for the PTTP is 401,684 tuna including 1,726 that were tagged with archival tags. Over 74,000 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 is very similar to that reported to the steering committee at SC12 in 2016. 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.

Tag Recovery staff continued their work in Wewak, Madang, Lae, Honiara, Rabaul, General Santos, 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, transhipments and processing in canneries with more complete and reliable capture information.

Biological sampling during tagging cruises

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, 5,989 stomach samples have been collected, mainly from skipjack, yellowfin, bigeye and albacore tuna. 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 6,188 fish sampled to date (these tagging research voyage samples represent 22.1% of the total fish sampled for the tissue bank).

Tag data analyses

Reporting rate prior parameters for yellowfin and bigeye were estimated from tag seeding data for the different regional structures considered in the 2017 assessments. It should be noted that reporting rates of tags seeded in 2015 were comparatively low (at the time that the work was undertaken), though it is not currently clear whether this reflects delays in tag detection and reporting, or a reduction in reporting of recovered tags.

An individual-based simulation modelling tool has recently been developed for skipjack tuna in the WCPO, named IKAMOANA, which can be used to explore the potential biases in mark-recapture data resulting from different tagging strategies. The tool can be easily extended to other species such as yellowfin and bigeye, for which there already exist estimated movement parameterisations. Preliminary results show that the relative mortality experienced due to fishing can be informative if the correct tagging strategies are chosen, though the tagged fish may not distribute in a manner representative of the untagged population. The current project is due to finish by the end of 2017. IKOMOANA offers an approach to effectively support the ongoing design and analysis of tagging experiments as part of the PTTP.

In 2016/17, TagEst models were fitted to RTTP and PTTP data for skipjack and yellowfin, and SSAP data for skipjack. The estimated movement dynamics for both skipjack and yellowfin varied both between species and tagging programmes. However, a consistent feature across all models was comparatively low rates of movement for tagged fish in the region surrounding the Solomon Islands main group archipelago, as detected for skipjack historically. This has a number of implications, not least on tag mixing at the spatial scale of the Multifan CL assessment models, and warrants further investigation using IKAMOANA.

2017-2020 Work Plan

The proposed PTTP work plan for the period 2017-2020 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:

- WP4 (September - October 2017) noting that this is the first voyage in the normalisation of the tagging programme;
- CP13 (mid-late 2018) noting that this will have a BET target and be focused in the Western tropical Pacific;
- WP5 is planned for 2019; and

- CP14 is planned to occur second half of 2020, have a BET focus, and is likely include a return to the central Pacific area.

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.

Other Regional or Sub-regional Tagging Projects

Japan

Japan advised its intention to move its tagging of skipjack to waters around 10^{o}N in the coming year, a region with comparatively few skipjack releases from previous SPC and Japanese tagging cruises. 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 cruises in the coming years, particularly in the context of the recent increases in costs related to tagging cruises.

Administrative Matters

The support of all current and past donors was gratefully acknowledged as were the efforts of all contributors and project collaborators.

Discussion

The Steering Committee noted that the decision to normalise the tagging programme in 2016 was being implemented with the PTTP continuing in 2017 in the Commission budget and the 2018-19 indicative budget. However, given the increasing costs of procuring suitable vessels for research, further donor funds are needed to support the programme. For example the 2017 research voyage is approximately 50% funded by SPC through support from Australia.

The steering committee supported collaboration between the Japanese tagging programme and the PTTP, including exchanges of scientists and deployment of each other's tags in a designed manner to test elements of tag release, tagged fish survival and tag recapture rates. The steering committee welcomed the further development of IKAMOANA and its intended use in supporting the design of large-scale tuna tagging experiments. The steering committee noted work underway in the north Pacific to tag bigeye with miniPATs in higher latitude fisheries and looked forward to results being provided in future years.

The work plan, and in particular funding and the access to suitable tagging vessels in future, were discussed in detail. Increasing costs of vessel time has two major effects, one is that to stay within existing budgets we constrain the amount of at-sea time and thus the amount of tagging which can be undertaken. The other is that to complete research targets we need to seek additional funding. The increased funding from WCPFC in 2017 and in the indicative budget for out years will help this. However, 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 which 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. By way of example a constraint often encountered is the number of science staff that can be placed on the vessel. This in turn limits the amount of science that can be completed in a day, with the consequence that either more time at-sea is required, or less research is conducted. These issues begin to build a case for identifying a long-term multi-purpose tagging platform in the WCPFC area. Integrating WCPFC biological sampling and other tuna ecosystem research into the design – areas of research which face the same cost pressures – make the case even stronger. The steering committee noted that such a proposal would need to be carefully investigated for WCPFC to progress this concept further. The steering committee supported 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 therefore recommended to SC that it:

- endorse the PTTP workplan for 2017-2020;
- support the ongoing tagging programme as outlined in the 2017-2020 workplan as part of the ongoing work of the SC;
- support efforts to identify sustainable financing of the tagging programme, through a combination of WCPFC budget support to the extent possible and voluntary contributions from WCPFC members or other stakeholders, and
- support an assessment of the cost-effectiveness of acquiring a dedicated tagging vessel.

Table 1: Indicative PTTP workplan for the period 2017-2020.

ACTIVITIES		2017	2018	2019	2020
TAGGING					
1.	**Pole and line tagging research voyage** Target is skipjack, with secondary target of yellowfin Following SC12 recommendation to implement a skipjack tagging experiment every second year, a pole and line cruise is scheduled for 2017 and biennially thereafter. Note also critical component of biological sampling in support of Project 35b.	A charter arrangement has been concluded with the NFD fishing company to use their P&L FV Soltai 105 to implement a 50 day cruise from mid-September.		Plans to be refined after 2017 voyage, but most likely a very similar research voyage in 2019.	
2.	**Dangler/troll tagging research voyage** Target is bigeye, with secondary target of yellowfin Following SC12 recommendation to implement a bigeye tagging experiment every second year, a dangler/troll experiment is scheduled for 2018 and biennially thereafter. Note also critical component of biological sampling in support of Project 35b.		Focus in the Western Pacific to recognize the lack of tags in that area to date		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.	PTTP 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 of optimal design for 2019 research voyage.				
PLANNING					
14.	Review and update research plan	Ongoing annual task for rolling plan.			
15.	Consultancy on cost-effectiveness of a research vessel.				