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**An update on Western and Central Pacific Fisheries Commission shortfin mako and
silky shark post-release mortality tagging studies**

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1 Introduction

The Western and Central Pacific Fisheries Commission (WCPFC), along with the four other tuna Regional Fisheries Management Organizations (t-RFMOs), is a partner in the Areas Beyond National Jurisdiction (ABNJ) – often referred to as Common Oceans – Tuna Project. The objective of this project is to achieve efficient and sustainable management of fisheries resources and biodiversity conservation in marine areas that do not fall under the responsibility of any one country. One set of activities of the GEF-funded ABNJ Tuna Project aims at reducing the impact of tuna fisheries on biodiversity by improving data and assessment methods for sharks thereby promoting their effective management. Within this set of activities, WCPFC is conducting a study of shark post-release mortality (PRM) in its longline fisheries. This paper provides an update on progress to date with this study and identifies the work still to be completed. The results of the study are expected to be available for the consideration of SC15.

1.1 Project Origin and Resourcing

The Common Oceans (ABNJ) Tuna Project, initiated in October 2014 and running through December 2018, provided \$250,000 to the WCPFC for shark PRM tagging studies. All of this funding is designed to support the cost of tagging equipment with no separate allocation for vessels, fuel or tagging personnel's expenses. Fortunately, other Common Oceans (ABNJ) Tuna Project "shark data improvement" funds can support some of the other costs associated with running a large-scale tagging project including consultant time inputs for coordination and reporting of results. There is also funding within the Common Oceans (ABNJ) Tuna Project to support two workshops on bycatch mitigation, the first on planning and design, and a second to convene a panel again to review, synthesize and interpret the shark tagging results in conjunction with similar studies in different fisheries.

In addition to the Common Oceans (ABNJ) Tuna Project funding, the WCPFC received a €400,000 grant from the European Union (EU) for shark PRM studies in December 2016. Although the requirements of the two funding sources are slightly different, the intention is to use them in a synergistic manner to understand shark PRM and its implications for mitigation measures, e.g. no-retention measures, and population status assessments. The major difference in the two funding sources is that the EU funding is prioritized for tagging silky and oceanic whitetip sharks, with a secondary priority on thresher and Porbeagle sharks, whereas the Common Oceans (ABNJ) Tuna Project funding can be used to fund PRM tagging of any WCPFC key shark species. The EU grant also provides funds for both tagging equipment and tagging personnel, but relies on the Common Oceans (ABNJ) Tuna Project for survey design inputs and reporting of results.

2 Project Implementation

The planning and design phase of this project culminated in a workshop in January 2017 that reviewed best practice and developed a survey design for estimating shark PRM (Clarke et al., 2017). The

workshop called for the deployment of 200 ‘survival’ popup electronic tags on 100 shortfin mako (*Isurus oxyrinchus*) and 100 silky (*Carcharhinus falciformis*) sharks in various WCPFC longline fisheries. This included defining shark condition and the condition categories that would be eligible for tagging. Analyses presented at the workshop identified New Zealand (shortfin mako shark) and Fiji (shortfin mako shark and silky shark) as the locations for initial tag deployments.

The second part of the project, i.e. training and deployment, was initiated in May 2017 (Clarke et al., 2017). The National Institute for Water and Atmospheric Research (NIWA) in New Zealand were contracted by WCPFC to co-ordinate the tagging studies across the region with input from The Pacific Community (SPC).

After the completion of planned tag deployments in New Zealand and a slower than expected rate of tag deployments in Fiji, the project team reconsidered the survey design with the intention of expanding the tagging sites to obtain the requisite number of tags per target species. Nominal catch rates of shortfin mako and silky sharks in a taggable condition, i.e. alive at-vessel, were calculated using SPC’s observer data holdings and used to identify fleets that could provide sufficient numbers of tag releases. The characteristics of the observer programmes in each country were also taken into consideration, in particular to ensure that the expected levels of observer coverage were likely to provide sufficient trips to release the targeted number of tagged sharks.

Catch rates of shortfin makos demonstrated strong temporal and spatial variation (Figure 1). Catch rates from 15°S to 25°S and west of 170°W increased in the third and fourth quarters of the year to levels that would support the efficient tagging of shortfin mako sharks. The New Caledonia observer programme was selected as a third tagging location, with the aim to deploy tags on shortfin makos sharks in the third and fourth quarters of the year when catch rates were expected to be highest. Catch rates of silky sharks demonstrated strong spatial variation, with relatively weak seasonality (Figure 2). Catch rates were relatively high from 10°S to 10°N. The Republic of Marshall Islands observer programme was selected as a fourth tagging location, given the expected number of observer placements for 2018 coupled with the observed catch rates in areas where observer effort was likely to be deployed.

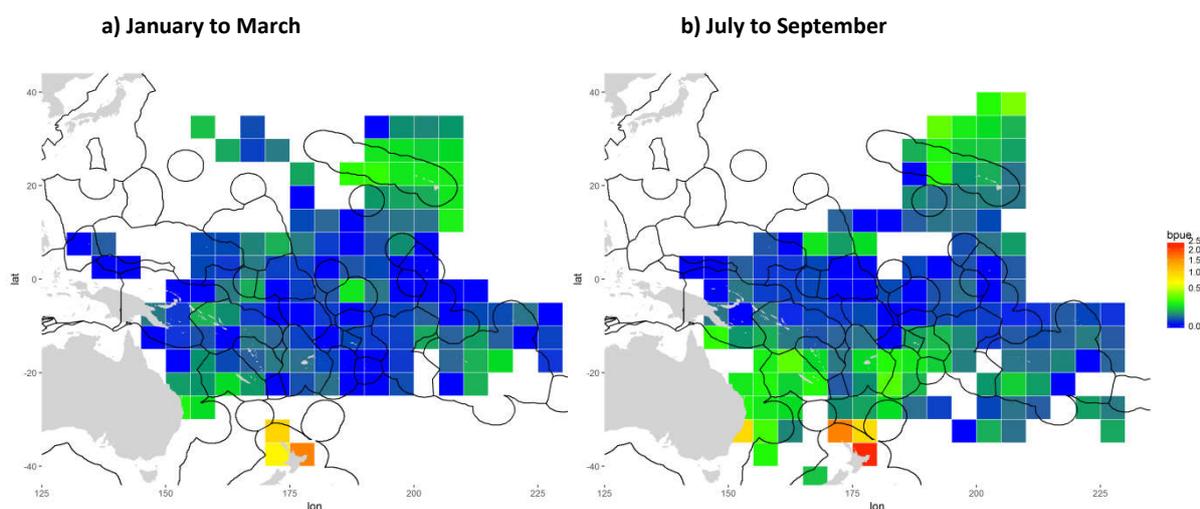


Figure 1 Nominal catch rates (number of sharks per thousand hooks square root transformed) of shortfin mako sharks by 5° grid for a) the 1st quarter (Jan-Mar) and b) 3rd quarter (Jul-Sep) based on SPC’s observer data holdings for 2003 onwards. Shallow sets (≤ 10 hooks between floats) were excluded.

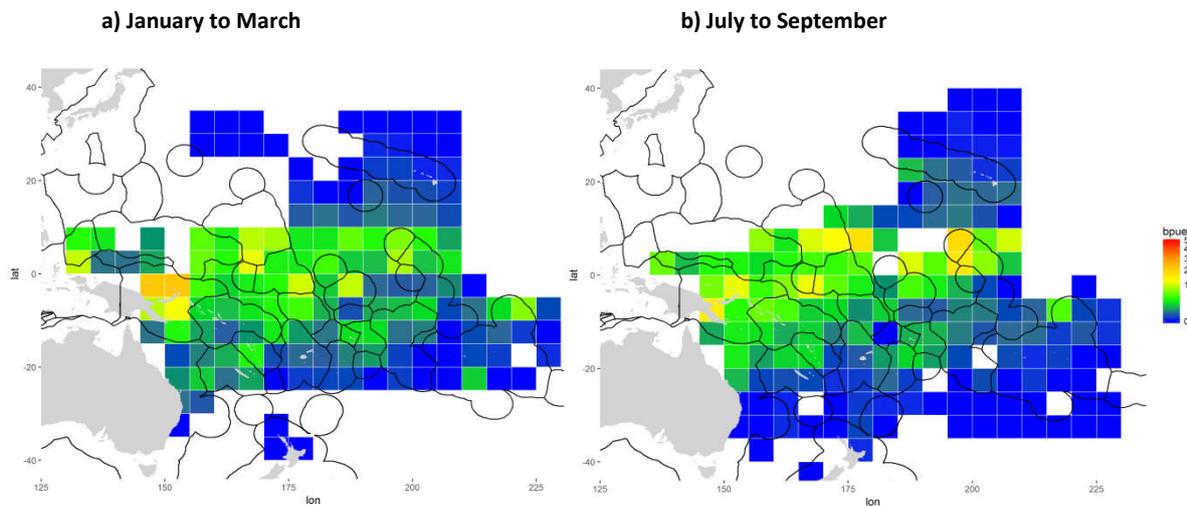


Figure 2 Nominal catch rates of silky sharks for deep longline sets by 5° grid for a) the 1st quarter (Jan-Mar) and b) 3rd quarter (Jul-Sep) based on SPC’s observer data holdings for 2003 onwards. Shallow sets (≤ 10 hooks between floats) were excluded.

2.1 New Zealand

The New Zealand Ministry for Primary Industries (MPI) volunteered five experienced observers to be trained and to attach the tags, and helpfully convened a stakeholders meeting to start the project in New Zealand. With the MPI observers, NIWA launched the first phase of the tagging programme in the northeastern New Zealand longline fishery. New Zealand observers tagged the first shortfin mako sharks in this study in May 2017 (as reported in Clarke et al., 2017). The deployment of 33 tags on shortfin mako sharks caught as bycatch (and two additional prototype popup tags supplied by Wildlife Computers for testing) was completed in early 2018. One of the prototype tags failed, resulting in a sample size of 34 tags from New Zealand. The New Zealand tagging is now complete.

2.2 Fiji

Tagging in Fiji was targeted at both shortfin mako and silky sharks and could thus be supported by both ABNJ and EU funds. An MOU between WCPFC and the Fiji Fishing Industry Association was signed in August 2017. A similar agreement was proposed by the Fiji Ministry of Fisheries but was subsequently deemed unnecessary on the basis of MOF’s support for the project as demonstrated by the participation of 17 MOF observers in the training sessions held in Fiji in September 2017. The target is to deploy 50 tags on silky sharks and 33 tags on shortfin mako sharks in this fishery. As of 30 June 2018, 5 tags have been deployed on shortfin mako sharks and 11 tags on silky sharks. Tag deployment in Fiji is ongoing.

2.3 New Caledonia

With the support of the New Caledonia Direction des Affaires Maritimes (DAM), 34 tags will be deployed by DAM observers in the New Caledonian longline fishery. One fishing vessel has also been engaged to participate in the tagging when observers are not present onboard in order to increase the deployment potential. The first training in New Caledonia occurred in mid-June 2018 and the first observers with tagging kits were deployed in late June 2018. One tag has been deployed at the time of report writing in mid-July 2018. Fisher training will occur in August 2018. Tag deployment in New Caledonia is ongoing.

2.4 Republic of Marshall Islands

With the support of the Marshall Islands Marine Resources Authority (MIMRA), 50 tags will be deployed on silky sharks by MIMRA observers in the RMI surface longline fishery. Observer training was completed in Majuro in early July 2018 and the first tagging kits were deployed with observers in mid-July 2018. Tag deployment is expected to be underway by the opening of SC14.

3 Project Completion

Project completion involves two substantive steps. The first is the completion of the tagging as described in Sections 2.2-2.4 above. This work is planned for completion by the end of October 2018. This timeframe is ambitious and will require considerable effort from NIWA and SPC, and, continued support and collaboration from Fiji, New Caledonia and RMI. It is important to note that irrespective of the collective efforts, tag deployment may be slow due to low catch rates or sharks encountered being predominantly DOA.

The second step involves data analysis and a follow-up workshop. The workshop will integrate information from this study with information from concurrent studies and provide the study results to WCPFC SC15 in August 2019. The timing of the workshop remains uncertain, but is likely to be in February 2019 assuming that tag deployment is completed on schedule.

4 Acknowledgements

This project has required the goodwill, support and hard work of many to get this far. In particular, the New Zealand Ministry for Primary Industries and its observer programme; the Fiji Fishing Industry Association and its vessels, crews and captains; the Fiji Ministry of Fisheries and its observer programme; the New Caledonian Direction des Affaires Maritimes and its observer programme; and, the Marshall Islands Marine Resources Authority and its observers all deserve recognition for their significant contributions. All the fisheries observers and fishing vessel shore staff and crews involved have made this science possible.

Reference

Clarke, S. C., Smith, N., Lyon, W., and Francis, M. 2017. Western and Central Pacific Fisheries Commission Shark Post-Release Mortality Tagging Studies. WCPFC-SC13-2017/EB-IP-06. Thirteenth regular session of the Scientific Committee of the Western and Central Pacific Fisheries Commission. Rarotonga, Cook Islands, 9-17 August 2017.