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**Progress against the 2021-2030 Shark Research Plan - 2025**

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**WCPFC-SC21-2025/SA-IP-19**

**Stephen Brouwer<sup>1</sup> and Paul Hamer<sup>2</sup>**

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<sup>1</sup> Saggitus Environmental Science Limited

<sup>2</sup> Oceanic Fisheries Programme, The Pacific Community (SPC)

## Introduction

The Shark Research Plan (Brouwer and Hamer 2020) (report of Project 97) was adopted by SC16 and endorsed by WCPFC17 in December 2020. The current Shark Research Plan (SRP) is the 3<sup>rd</sup> phase of the WCPFC's SRP that builds on the previous two plans. This plan had a mid-term review in 2023 (Brouwer and Hamer 2023) and as part of that review the SC19 recommended that the 2021-2025 SRP be extended to 2030. The 2021 – 2030 SRP is a living document that can evolve based on the information needs and priorities of the WCPFC. The plan has annual reviews to evaluate the progress and ensure that the next years' work remains relevant and required.

SC19 and WCPFC20 agreed that shark assessments would be carried out over two years. The first year provides time (4-5 months) to collate the data, undertake fishery characterisations, develop catch reconstructions and provide SC with a recommendation on the possibility and approaches that might be suitable for a stock assessment. The second year of the assessment focuses on the stock assessment modelling, which may also include risk assessment methods if requested by SC.

## Purpose and tasks of the SRP

The purpose of this document is to review progress against the SRP and facilitate future planning of WCPFC shark research. The SC is tasked to review the proposed work in the SRP and update the research plan as needed. These updates on the 2021 - 2030 SRP as well as the work progressed against that project list are included in Table 1. In addition, Table 2 is provided to update the Scientific Committee's assessment schedule for sharks. It is suggested that data rich assessments be attempted for blue, shortfin mako, silky and oceanic whitetip sharks, with the remainder being evaluated through fishery characterisations and/or low information estimations of fishing mortality (F). A new assessment for southwest Pacific blue shark is due to start with the data exploration and catch reconstruction work beginning in 2026. We suggest changing the southwest Pacific shortfin mako shark assessment to a low information assessment, risk assessment or characterisation given the data issues experienced with the last assessment, which will not be improved.

Under Table 1 section c(i) there is an item to *Include data poor assessment metrics as standard outputs for data rich assessments where possible*, this is a standing item currently and these metrics have been included in SP-blue shark, and WCPO oceanic whitetip and silky shark assessments. The SC21 ISG-Sharks may want to review these and provide a specific list for future assessments. If they are able to do that then this item could be removed from the list, if not it should remain until such time as firm recommendations on these metrics are accepted by the SC.

For SC21 one project has been completed (Stock assessment of WCPO oceanic whitetip shark (phase 2) (SA-WP-08)), and one ongoing project is reporting to SC21 (Project 126: Optimised sampling for shark biological data collection (SA-WP-12)).

Three projects that sit outside of the SRP are being tabled at SC21 ('*Trialling shark bycatch release devices on board purse seiners in the Pacific Ocean to enhance shark survival*'; '*Can lifting large sharks by the tail with bycatch release devices be a best practice for improved crew safety and shark survival?*'; and '*Both environmental conditions and fisher behaviour influence the occurrence of shark and odontocete depredation on the longline catch in New Caledonia*').

There are ten projects that are scheduled to start pending agreement at SC21 ISG-Sharks and approval of the budget at WCPFC22. There are two stock assessment for north and south Pacific blue sharks (stock assessment projects a(i) and a(ii)). Two projects (stock assessment projects a(vii) and a(viii)) that could be combined to be a broader characterisation of low information sharks and mobulids as there are likely some cost savings in doing this, we have included a draft project specification included in Appendix 1 for review by SC21 ISG-Sharks. Two other projects (stock assessment b(v) - Spatio-temporal abundance patterns and drivers of abundance indices for SP shortfin mako and b(vii) - Feasibility of tag-recapture methods to obtain estimates of M for SP shortfin mako) need to be evaluated by the ISG-Sharks and SC21. The question to be considered is, if low information assessment are to be the focus for south Pacific mako, is there a need to conduct expensive tagging research to try to estimate M and/or research on drivers of CPUE? If conventional tagging is considered, a feasibility study would be recommended first. ISG-Sharks should consider if all the biology projects could be postponed pending the outcomes of *Project 126: Optimised sampling for shark biological data collection (SA-WP-12)* as these projects all rely on biological data collection and could be rolled into a broader shark biological data collection program informed by Project 126.

The mitigation project (mitigation projects b(i) to estimate post-release survival for silky and oceanic whitetip sharks should continue to have a high priority given the importance of these estimates for the stock assessments and understanding the impacts of non-retention in reducing shark mortality. The whale shark post release survival project (Mitigation project 2b(ii) should be prioritised as it currently has no priority ranking and the work needs to be scheduled by the ISG-Sharks. We have included a draft project specification included in Appendix 1 for review by SC21 ISG-Sharks. Mitigation project a(iii) Estimate the retention time of elasmobranchs entangled in FADs, should be removed as the WCPFC has moved to the use of non-entangling FADs and this work is probably no longer relevant.

One last stock assessment project a(vi) Satellite tagging of mako sharks (juveniles and adults) in NZ, AU and the high seas east of NZ) should be considered to be re-purposed. Experience shows these satellite tagging projects, due to the expense and limited numbers of tags released on selected size classes, generally fail to provide the level of connectivity information to really inform stock assessment structure. If satellite tags are used in any projects, they should focus on post-release survival. The project could be refocused as a genetics project and draw on the information on sampling design from Project 126: Optimised sampling for shark biological data collection (SA-WP-12), and other regional genetics sampling programs on tuna.

## **Recommendations**

1. SC21 ISG-Sharks review the work plan and project list for the 2025/26 year, and make recommendations to SC21 for any changes the SC may want to consider.
2. SC21 ISG-Sharks review the proposed amendments to the stock assessment schedule and make recommendations to SC21.
3. SC21 ISG-Sharks review the project specifications and make any changes for SC21's review.
4. SC21 consider proposing the southwest Pacific shortfin mako shark assessment as a low information assessment.
5. SC21 re-purposing stock assessment project a(vi) Satellite tagging of mako sharks as a genetic project and include the sampling in Project 126.

6. SC21 get a priority ranking for the whale shark post-release survival study (mitigation project b(ii)) and schedule the work.
7. Postpone all the biology projects pending the outcomes of Project 126.
8. Remove the project to estimate the retention time of elasmobranchs in FADs (Mitigation project a(iii)).

## **References**

Brouwer, S. and Hamer, P. 2020. Brouwer, S. and Hamer, P. (2020). 2021-2025 Shark Research Plan. SC16-EB-IP-01 Rev1.

Brouwer, S. and Hamer, P. 2023. Shark research plan 2021-2025 mid-term review. SC19-EB-WP-06.

ISC. 2024. Stock Assessment of Shortfin Mako Shark in the North Pacific Ocean through 2022. SC20-SA-WP-14.

Brouwer, S. and Hamer, P. 2024. Progress against the 2021-2030 Shark Research Plan - 2024. SC20-EB-IP-10

## **Relevant recent publications from outside of the WCPFC**

Moore, B.R.; Finucci, B. (2024). Estimation of release survival of pelagic sharks and fish in New Zealand commercial fisheries. *New Zealand Fisheries Assessment Report 2024/07*. 129 p

**Table 1:** The 2021-2030 shark work as agreed at SC19 (TABLE SHK-01) and updated for 2025.

1. Stock assessment						
Title		Priority	Start year	End year	Comments	
(a) Determine the stock status for WCPFC key sharks						
i)	Southwest Pacific blue shark assessment	High	2026	2027		
ii)	North Pacific blue shark assessment	High	2026	2027	2025 - ISC indicator analysis completed (SC21-SA-IP-21?)	
iii)	Southwest Pacific shortfin mako shark assessment	High	2027	2028		
iv)	North Pacific shortfin mako shark assessment	High	2023	2024	Year-1 completed (Data preparatory meeting in November 2023) Year-2 completed (SC20-SA-WP-14).	
v)	WCPO silky shark assessment	High	2023	2024	Year-1 completed (papers for SC19-SA-WP-103 and SC19-SA-IP-094) Year 2 completed (papers SC20-SA-WP-04)	
vi)	WCPO oceanic whitetip shark assessment	High	2024	2025	1-year Completed in 2024 (papers SC20-SA-WP-11 and SC20-SA-IP-23) Phase 2 tabled at SC21 (SA-WP-12)	
vii)	Fishery characterisation of manta and mobulid rays and whale sharks	High	2026	2026	Recommend merging these two projects.	
viii)	Fishery characterisation of hammerhead and thresher sharks	Medium	2026	2026		
(b) Develop reliable catch histories, assessment methods and data input improvements						
i)	Redefining the fleets currently assumed in the BSH NP stock assessment	Medium	2021	2022	Work completed (ISC/21/SHARKWG-2/I-01) the results indicate that no change to the fleet composition used in the assessment was required.	
ii)	Developing a statistically robust and spatial/temporal optimized sampling strategy for biological data collection – consider ISC’s approach	High	2025	2025	Project 126 project report to be tabled at SC21 (SA-WP-12)	

iii) Future options for assessments with less data due to ongoing reduction in retention of sharks	Medium	2027	2027	SC19 survey 64% medium start date 2024-2027 chose the mid
iv) (i.e., degradation of data for CPUE and estimation of catch)				
v) Spatio-temporal abundance patterns and drivers of abundance indices for SP shortfin mako	Medium	2026	2026	SC19 survey 55% medium start date 2025
vi) Satellite tagging of mako sharks (juveniles and adults) in NZ, AU and the high seas east of NZ (genetic analysis also mentioned regarding natal homing)	Medium	2025	2027	This project should be re-purposed as a genetics project.
vii) Feasibility of tag-recapture methods to obtain estimates of M (for SP shortfin mako)	Medium	2026	2026	SC19 survey 60% medium start date 2025. This would need a feasibility study prior to beginning. This project could be dropped if the ISG-Sharks thinks it's no longer required.
(c) Test and improve medium and data poor assessment methods to inform management decisions				
i) Include data poor assessment metrics as standard outputs for data rich assessments where possible	High	Ongoing	Ongoing	Done in SP-BSH, SP-mako and FAL - SC Shark ISG may want to review these and provide a specific list for future assessments.
(d) Assess the success of management				
Review the impact of CMM 2022-04	High	2028	2028	SC19 survey 100% agreement on priority and start date

2. Mitigation				
Title	Priority	Start year	End year	Comments
(a) Provide advice on mitigation Sharks with non-retention policies and unwanted elasmobranchs				
i) Investigate effective mitigation for WCPFC Key Sharks	Medium	2023	2025	Project continues to be considered low priority - this project should be dropped.

ii) Investigate mitigation method trade-offs between mitigation methods for sharks, seabirds and sea turtles	Medium	2023	2025	Project continues to be considered low priority - this project should be dropped.
<b>(b) Provide advice on safe release methods and assess release survival of WCPFC Key Sharks</b>				
i) Estimate silky and oceanic whitetip shark post release survival from WCPO longline fisheries	High	2025	2026	SC19 survey 59% high priority. Post-release survival estimates are now included in the assessment, and non-retention is the primary shark conservation measure.
ii) Estimate whale shark post release survival from WCPO purse seine fisheries	TBD	TBD	TBD	SC-ISG-Sharks to add a schedule and SC21 should prioritise this project.
iii) Estimate the retention time of elasmobranchs entangled in FADs	Low	2025	2027	Drop this project as no longer needed.

<b>3. Biology</b>				
<b>Title</b>	<b>Priority</b>	<b>Start year</b>	<b>End year</b>	<b>Comments</b>
<b>(a) Increase the understanding of important biological parameters of WCPFC Key Sharks</b>				
i) Silky shark and oceanic whitetip shark reproductive biology and longevity	High	2027	2030	Include in general biological sampling (project 126).
ii) Biology and life history of hammerhead sharks	High	2025	2027	Include in general biological sampling (project 126).
iii) Resolving blue shark reproductive biology and reproductive schedule	Medium	2025	2027	Include in general biological sampling (project 126).
iv) Biology of the longfin mako shark	Medium	2025	2027	Include in general biological sampling (project 126).
v) Life history of thresher sharks	Medium	2025	2027	Include in general biological sampling (project 126).
vi) Validated life history, biology, and stock structure of the shortfin mako in the South Pacific	Medium	2025	2027	Include in general biological sampling (project 126).

vii) Age validation and stock structure of the silky shark and oceanic whitetip shark	Low	2025	2027	Include in general biological sampling (project 126).
<del>viii) Stock structure and life history of southern hemisphere porbeagle shark</del>	Low			SC19 removed this project as should be undertaken by CCSBT.
ix) Biology of manta and mobulid rays	High	2027	2030	Include in general biological sampling (project 126).
x) Stock structure of manta and mobulid rays	High	2027	2028	Include in general biological sampling (project 126).
xi) Stock structure of hammerhead sharks	Low	2026	2030	Include in general biological sampling (project 126).
xii) Genetic CKMR (and stock structure and natal homing) scoping study all species	Medium	2026	2027	Include in general biological sampling (project 126).
xiii) Review of non-lethal approaches to collect life-history data (e.g., reproductive status from blood samples) to inform observer training	Medium	2025	2026	Include in general biological sampling (project 126).



4. Observer data				
Title	Priority	Start year	End year	Comments
(a) Improve spatio-temporal observer data for informing scientific needs				
i) Training observers in the WCPO to be proficient in species identification	High	ongoing	ongoing	Material developed by SPC: Park T., Marshall L., Desurmont A., Colas B. and Smith N. 2019. Shark and ray identification manual for observers and crew of the western and central Pacific tuna fisheries. Noumea, New California: Pacific Community . 79p. Observer training ongoing
ii) Training observers for extraction and storage of vertebrae and shark reproductive material	High	2021	ongoing	SPC currently getting the protocols developed for shark biological sampling through a consultant. This work is underway. This should also ensure that observer training covers good sampling practices for genetic tissue sampling to reduce cross-contamination.
iii) Training observers for on-deck reproductive staging of elasmobranchs	High	2021	ongoing	SPC currently getting the protocols developed for shark biological sampling through a consultant. This work is underway.
iv) Measuring elasmobranchs on purse seine and longline vessels for length-length and length-weight conversion factor development	High	ongoing	ongoing	ROP training conversion factor measurements have just been introduced – COVID delay.

9. Management advice				
i) Oceanic whitetip and silky shark in longline fisheries between 20N and 20S and outside the area to evaluate CMM 2022-04 )	NA	2024	2024	Completed - SC20-EB-WP-05

*Table 2: Shark stock assessment table. Note this includes all assessment types from data rich to low information assessment models. The assessment type will be determined by the SC ISG-Sharks for each successive year. Shark assessments are currently scheduled 5-yearly. A = Assessment; I = Indicator analysis; L/C = Low information assessment or characterisation; X = Scheduled work moved; U = Assessment tabled but not accepted. Red letters indicate proposed change from the SRP or additions. A\* - revised assessment grid and management advice.*

Species	Stock	Last assessment	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Blue shark	Southwest Pacific	2021	A	A*				A				
	North Pacific	2022		A			I	A	A			
Shortfin mako	Southwest Pacific	2022		A				L/C				
	North Pacific	2024			A			I		A		
Silky shark	WCPO	2024			A					A		
Oceanic whitetip shark	WCPO	2019				A						A
Pelagic thresher	WCPO	-					U	L/C				X
Bigeye thresher	Pacific	2017					U	L/C				X
Common thresher	WCPO	-					U	L/C				X
Greater hammerhead	WCPO	-					U	L/C				X
Smooth hammerhead	WCPO	-					U	L/C				X
Scalloped hammerhead	WCPO						U	L/C				X
Winghead shark	WCPO	-					U	L/C				X
Whale shark	WCPO	-					U	L/C				X
Giant manta	WCPO	-					U	L/C				X
Reef manta	WCPO	-					U	L/C				X
Spinetail devil ray	WCPO	-					U	L/C				X

**Appendix 1 – Draft project specifications for 2026 projects for evaluation and completion by SC21 ISG-Sharks**

Project xxx	Fishery characterisation of characterisation of low information sharks and mobulids
Objectives	To evaluate trends and characterise the fisheries catching low information shark and mobulid species in the WCPO
Notes	This project has merged two other projects and will need to be re-prioritised.
Rationale	<p>While whale shark populations in the WCPO have been evaluated to some extent (WCPFC-SC9-2013/EB-WP-01; WCPFC-SC14-2018/SA-WP-12 (rev.1); and WCPFC-SC11-2015/EB-WP-03) there has been little focused evaluations on other species. Some general characterisations of the data have been undertaken (WCPFC-SC12-2016/EB-WP-08) and methods for assessment have been proposed (WCPFC-SC16-2020/SA-IP-12). Some species are all listed on CITES Appendix II and mantas are considered to be globally endangered by IUCN. There are relatively high observed longline catches of mantas and mobulids and some whale shark unintended interactions with the purse seine fishery.</p> <p>Other species such as hammerheads have unknown trends and fishery interactions.</p>
Assumptions	<ul style="list-style-type: none"> <li>• Sufficient existing fisheries and biological data are readily available from the WCPO or other sources.</li> <li>• Personnel are available to undertake this work.</li> </ul>
Scope	<ul style="list-style-type: none"> <li>• Reviewing the previous work in the WCPO to assess and improve on methods and update the information on stock trends.</li> <li>• Present a characterisation of the fisheries catching these species.</li> <li>• Attempt to develop WCPO abundance indices using observer data.</li> <li>• Attempt to present the stock status or trends in terms of the metrics outlined in the 2021-2025 Shark Research Plan.</li> <li>• Prepare a report containing the above results for SC21.</li> </ul>
Timeframe	March 2026- August 2026
Budget	<p>Standalone assessment:  0.5 FTE (\$50,000)  Travel to SC22 (\$10,000)  Total: \$60,000</p>
References	<p>WCPFC-SC09-2013/EB-WP-01  WCPFC-SC11-2015/EB-WP-03  WCPFC-SC12-2016/EB-WP-08  WCPFC-SC14-2018/SA-WP-12 (rev.1)  WCPFC-SC16-2020/SA-IP-12</p>

Project xxx	Post release survival of silky and oceanic whitetip sharks from WCPO longline fisheries
Objectives	Estimate the post release survival of silky and oceanic whitetip sharks from longline fisheries in the WCPO
Notes	The budget may limit the number of flagged vessels to undertake the work. If the ISG-Sharks believes the many fleets need to be covered (if practicable) the budget would need to be amended.
Rationale	<p>Silky and oceanic whitetip sharks are required to be released when inadvertently caught in fisheries management by the WCPO.</p> <p>Some estimates exist for juvenile silky and oceanic whitetip sharks from purse seine fisheries (Hutchinson 2015; Sabarros et al. 2023) but there are few reliable estimates from longline releases (Francis, et al. 2023). Post release survival estimates are included in, and influential for, the stock assessments of silky and oceanic whitetip sharks. Determining reliable estimates of post release mortality would reduce the uncertainty of the stock assessments, and contribute to the understanding of the effectiveness of non-retention in mitigating longline fishing mortality on these species.</p>
Assumptions	<ul style="list-style-type: none"> <li>• Access to sufficient numbers of sharks on board commercial longliners from the WCPO.</li> <li>• Suitable trained personnel, including observers, are available to undertake this work.</li> <li>• Technical staff resources are available to run the project and analyse the data.</li> </ul>
Scope	<ul style="list-style-type: none"> <li>• Reviewing the previous work.</li> <li>• Undertake tagging to estimate post-release mortality.</li> <li>• Assess the results and estimate post-release mortality/survival rates for the WCPO longline fisheries. Noting that these may vary between fleets and the work should be undertaken from different flagged vessels to the extent possible.</li> </ul>
Timeframe	March 2026- August 2028
Budget	Ongoing \$50,000 a year for two years for tags and tag deployment, and a further \$25,000 for data analysis and reporting for 2028.
References	<p>Francis, M.P. et al. 2023, Post-release survival of shortfin mako (<i>Isurus oxyrinchus</i>) and silky (<i>Carcharhinus falciformis</i>) sharks released from pelagic tuna longlines in the Pacific Ocean. Aquatic Conservation. Volume 33, Issue 4. <a href="https://doi.org/10.1002/aqc.3920">https://doi.org/10.1002/aqc.3920</a>.</p> <p>Hutchinson, M.R., Itano, D.G., Muir, J.A. and Hilland, K.N. 2015. Post-release survival of juvenile silky sharks captured in a tropical tuna purse seine fishery. Mar Ecol Prog Ser 521:143-154.</p> <p>Sabarros, P.S., Mollier, E., Tolotti, M., Romanov, E.V. and Bach, P. 2023. Post-release mortality of oceanic whitetip sharks caught by purse seiners. IOTC-2023-WPEB19-18</p>