



**SCIENTIFIC COMMITTEE  
SIXTEENTH REGULAR SESSION**

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**Draft research plan for 'key' tuna species in the WCPO**

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**WCPFC-SC16-2020/SA-IP-20**

**OFP, SPC**

Pacific Community (SPC), Noumea, New Caledonia

## Executive Summary

This paper presents a draft research plan for improving the stock assessments of 'key' WCPO tuna stocks: skipjack, bigeye, yellowfin and South Pacific albacore. Given the online format of SC16, we do not suggest that SC aim to adopt this plan in 2020; we therefore present this paper to raise awareness of the proposed approach, and to highlight some important research and development areas that SC17 will need to consider, in the hope that 2021 will allow a physical meeting to be held.

Every stock assessment performed by SPC-OFP identifies areas for improvement and provides recommendations for future work. Some recommendations are pointers for assessment scientists on areas to consider in subsequent assessments. Others indicate key gaps in understanding that, if filled, may reduce future model misspecification and reduce uncertainty in assessment outcomes. Many of the latter have led to specific WCPFC research projects, but key areas of work remain and continue to be highlighted in assessments reports.

In turn, SPC-OFP is undertaking research to enhance the MULTIFAN-CL assessment platform, with the aim of improving performance, stability and reduce model complexity. These are regularly reported in an Information Paper to the Scientific Committee meeting, but their importance and potential impact may not be recognized by all SC members.

The proposed research plan therefore:

- More formally captures key research and development recommendations arising from a stock assessment;
- Allows prioritization of that required research and development prior to subsequent assessments of that stock;
- Clearly indicates how ongoing SC Projects support improved assessment advice for tuna stocks;
- Captures research being undertaken outside WCPFC's direct funding that will contribute to improvements in assessments;
- Allows SC and the Commission to better prioritise the research budget needed for improved assessment advice;
- Identifies gaps in funding that can be the subject of proposals external to WCPFC;
- Enables the Scientific Services Provider to clearly report activities in the coming years, with progress against the research plan summarised to each SC meeting.

The draft research plan focusses on activities and projects specifically relevant to the stock assessments. For example:

- Developments to the MULTIFAN-CL assessment platform;
- Research on biological inputs into stock assessments, to reflect the need to improve and update our understanding of these inputs, as demonstrated in all tuna assessments in recent years;
- Development of inputs into stock assessments, for example models used for the standardization of CPUE, tagging information, etc.; and

- Work undertaken to address specific requests by WCPFC SC members.

The tuna research plan would be reviewed by SC each year to reflect progress, capture research and development recommendations identified in adopted assessments, identify key emerging areas, plan activities and document requests. As a result, it would be a living document. SC would also use the plan to prioritise key activities for subsequent years. SC may consider the development of an 'urgent and important' matrix to aid prioritization and budgetary discussions, relative to the planned tuna assessment timetable.

Many of the enhancements to MULTIFAN-CL and SPC-authored stock assessments arose through the independent peer review of the bigeye stock assessment undertaken in 2012 (Ianelli et al., 2012). To ensure WCPO assessments remain the best scientific information available, the research plan can be used to schedule reviews of specific tuna assessments, for which necessary funds can then be identified.

As with the shark research plan, the tuna research plan is viewed as a document for SC's focus. Implications for Commission decision making would arise purely through budgetary requests. If this is demonstrated as an aid to work and budget planning the SC may also wish to consider developing similar research plans for its other themes (Data and Statistics, Ecosystems and Bycatch, Management Issues) in the coming years.

Development and delivery of the research plan does have implications. SPC-OFP has three stock assessment positions (we currently await the arrival of the third assessment scientist, delayed due to the COVID-19 pandemic). One of those positions would be dedicated each year to undertake specific work within the research plan. Under the current regime of two key assessments per year, that would be feasible, but adoption of the plan would require that this be considered in future. In turn, in years where SPC-OFP was an assessment scientist down, discussions with SC would be required to re-prioritise activities across assessments and the research plan.

We invite WCPFC-SC16 to:

- Discuss the concept of a tuna research plan and suggest modifications to the approach.
- Task the SSP to review and update the draft tuna research plan for formal discussion at SC17.

**Table 1. WCPFC stock assessment schedule for 2020-2023 – ‘key’ tuna**

Species	Stock	Last assessment	2021	2022	2023	2024
Bigeye tuna	WCPO	2020			X	
Skipjack tuna	WCPO	2019		X		
Yellowfin tuna	WCPO	2020			X	
Albacore	S Pacific	2018	X			

**Table 2. Research plan for WCPO ‘key’ tuna stocks**

Shaded cells in the species section indicate the year of next scheduled assessment. Note timescales are to be refined/prioritised by SC.

Stock/Focus area	Research need	Activity	Funding	Timescale				
				2020 <sup>1</sup>	2021	2022	2023	2024
Common across stocks	Improved MULTIFAN-CL performance	Testing of newly developed features for assessments: e.g. catch-conditioned model; self-scaling multinomial approach; ‘orthogonal recruitment’	Existing ‘additional SPC WCPFC resourcing’ funding line	X	X	X	X	X
		Development of new features within MULTIFAN-CL: e.g. addressing final Ianelli et al. (2012) requests (and ongoing testing) <sup>2</sup>	Existing ‘additional SPC WCPFC resourcing’ funding line	X	X	X	X	X
	Improved provision of advice	Objective approaches to weighting model grids	Existing SPC resourcing, ‘additional SPC WCPFC resourcing’	X	X			
		Improved diagnostic presentation approaches for all grid models	Existing SPC resourcing, ‘additional SPC WCPFC resourcing’	X	X	X		
	Improved abundance indices	Further development of geostatistical approach for CPUE analyses	Existing SPC resourcing, ‘additional SPC WCPFC resourcing’ funding line, EU PEUMP project	X	X	X	X	X
			Improved understanding of oceanographic influences related to gear deployment and tuna behaviour to inform modelling	Existing SPC resourcing, ‘additional SPC WCPFC resourcing’ funding line, EU		X	X	

			PEUMP project					
		Improved CPUE through archival tagging to define school and behavioural influences	Existing SPC resourcing, SC Project 42		X	X	X	X
Evaluation of model spatial structure		Investigation of tuna stock structure (e.g. through genetics, etc.)	EU PEUMP project; existing SPC resourcing, <b>new resourcing required</b>	X	X	X	X	X
		Examination of data needs to support existing model spatial structures, and re-evaluate where necessary	Existing SPC resourcing	X	X	X		
Tagging and tag modelling		Examination of tagging programme design (WPO, CPO), e.g. cf model spatial structure	Existing SPC resourcing, SC Project 42	X	X	X	X	X
		Investigation of release event-specific tag mixing rates	Existing SPC resourcing, SC Project 42	X	X	X		
		Refinement of release event, shedding and tagging induced mortalities	Existing SPC resourcing, SC Project 42	X	X	X		
		External review of how tag/recapture data are treated and applied in stock assessment modelling	Existing SPC resourcing and 'additional SPC WCPFC resourcing' funding line		X	X		
Improved cross-stock biological understanding		Utility of Radiocarbon approaches for validation of otolith ageing methods	SC Project 98, <b>new resourcing required</b>					
		Utility of close-kin mark-recapture approaches	<b>New resourcing required</b>					
		Re-evaluation of reproductive biology (maturity, sex ratio/female mortality, fecundity) for all stocks	EU PEUMP project, SC Project 35b, new resourcing may be required	X	X	X	X	X
		Examine approaches to capture spatial patterns and variation in biological features into assessments	<b>New resourcing required</b>					
Spatial dynamics		Examine ways to formally incorporate the spatial results of SEAPODYM models into assessments	Existing SPC resourcing		X	X	X	X
Improved fishery input data		Improved data for WPEA fisheries	NZ-funded WPEA project	X	X	X		
		Improved accounting for discards and longline depredation losses in stock assessments	<b>New resourcing required</b>					
Skipjack	Biological inputs	Improved length-weight relationship	SC Project 90		X			
		Validate growth and improve growth estimates	<b>New resourcing required</b>		(X)	(X)		

	Fishery inputs	Development of alternative PS-based CPUE time series inputs	EU PEUMP project	X	X	X		
		Evaluation of tagging data mortality and school cohesion analyses	Existing SPC resourcing, SC Project 42		X	X		
Bigeye	Biological inputs	Improved length-weight relationship	SC Project 90	X	X			
		...						
Yellowfin	Biological inputs	Improved length-weight relationship	SC Project 90	X	X			
		...						
	Fishery inputs	Development of alternative PS-based CPUE time series inputs	EU PEUMP project	X	X	X		
		...						
South Pacific albacore	Biological inputs	Evaluation of alternative growth model formulations	Existing SPC resourcing		X			
		Evaluate ages of troll-caught fish	<b>New resourcing required</b>			(X)	(X)	
		Sex-specific population modelling					X	X
	Fishery inputs	...						

<sup>1</sup> Remainder of 2020

<sup>2</sup> see SC16-SA-IP-01 Section 7 and Table 2 for further planned activities and timeline