



**SCIENTIFIC COMMITTEE
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**TUNA ASSESSMENT RESEARCH PLAN (TARP) FOR 'KEY' TUNA SPECIES ASSESSMENTS
IN THE WCPO, 2026-2029**

WCPFC-SC22-2026-SA-IP22

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Executive Summary

This paper updates the Scientific Committee (SC) tuna research plan, with an increasing focus to inform the monitoring of adopted and developing harvest strategies of 'key' WCPO tuna stocks: WCPO skipjack, bigeye and yellowfin and South Pacific albacore. It highlights some important potential research and development areas to reduce uncertainty and hence inform the operating models underlying those harvest strategies, and to improve the stock assessments used to monitor resulting stock status. SC may wish to consider these areas for submission as SC projects into the meeting's prioritization process.

The operating models developed to test the robustness of candidate management strategies highlight key areas of uncertainty, some of which can be addressed over time. In turn, every stock assessment performed by SPC-OFP identifies areas for improvement and provides recommendations for future work. Some recommendations focus on areas to consider in future assessments. Others indicate key gaps in fishery data and understanding of biology and population structure that, if filled, may reduce both model misspecification and uncertainty in assessment outcomes, and refine harvest strategies.

Many of these issues cannot be directly rectified through improvements to models alone; ongoing efforts to improve regional fishery data collection and a well-structured and appropriately resourced programme of biological studies that target the areas required to reduce uncertainty are needed. Furthermore, for stock assessments, many of the enhancements arose through the independent peer review of the bigeye stock assessment undertaken in 2012 ([lanelli et al., 2012](#)) while the 2022 yellowfin assessment review ([Punt et al. 2023](#)) identified further recommendations, and relevant issues are captured in this TARP.

Some of this work is undertaken by WCPFC members and the SPC-OFP through specific SC research projects that arise directly from SC discussions on these issues. Other key work is undertaken by WCPFC members or SPC-OFP through other funding sources, and capturing these efforts within the plan will enhance SC's research planning and facilitate the identification of gaps to be filled.

The Scientific Committee Tuna Assessment Research Plan aims to:

- Capture key research and development recommendations arising from stock assessments;
- Enable SC prioritization of research;
- Clearly indicate how ongoing SC Projects support improvements to harvest strategies and tuna stock assessments and the reduction of uncertainty;
- Capture relevant WCPFC-member research on key tuna stocks being undertaken outside WCPFC's direct funding that will contribute to improvements;
- Allow the SC and Commission to better prioritise the research budget needed for improved monitoring and advice;
- Identify gaps in funding that can be the subject of proposals external to WCPFC;
- Enable the SC to review activities and progress over time; an appendix capturing completed elements is included, with hyperlinks to relevant documentation for reference/auditing purposes.

The plan currently focusses on activities and projects of relevance to key tuna stocks. For example:

- Developments to the MULTIFAN-CL assessment platform, including future proofing WCPO stock assessments through the scoping of the next generation of tuna stock assessment software;
- Research into appropriate assessment model specifications;
- Research on biological characteristics of stocks;
- Data gaps and areas for improved fishery data collection;
- Development of data inputs into stock assessments, for example models used for the standardization of CPUE, tagging information, age at length data etc.; and
- Work undertaken to address specific requests by WCPFC SC members.

The TARP has been reviewed to reflect progress and the latest SC projects, and to capture research and development recommendations, allowing SC to identify key emerging areas, plan activities, and document requests. As with the shark research plan (e.g. [Brouwer and Hamer, 2025](#)) and billfish research plan ([Brouwer and Hamer, 2025a](#)), the tuna assessment research plan is viewed as a document for SC's focus. Implications for Commission decision making would arise through prioritised budgetary requests.

Development and delivery of the TARP does have implications for and must reflect the available capacity of SC members and the SPC-OFP, balancing the delivery of work with planned developments and the budget available. SC may consider the development of an 'urgent and important' matrix to aid prioritization and budgetary discussions, relative to the planned assessment and harvest strategy timetables. Planning should consider the 2-3 year time lag between e.g. SC project prioritization and the delivery of project results into the work of the SC.

We invite WCPFC-SC22 to:

- Discuss and refine the tuna assessment research plan.
- Provide feedback on potential gaps in or improvements to the plan, including approaches to better capture SC member activities and plans.
- Consider convening a small working group during SC22 to:
 - assess the TARP and fill identified gaps,
 - identify priority work areas for the development of new SC project proposals for consideration at SC22.
- Task the WCPFC Secretariat, with the assistance of the SSP, to review and update the tuna assessment research plan annually.

Declaration of generative AI and AI-assisted technologies in the SC paper preparation process

No AI technologies were used in the preparation of this paper.

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Table 1. WCPFC stock assessment schedule for 2026-2029 – ‘key’ tuna

Species	Stock	Last assessment	2026	2027	2028	2029
Bigeye tuna	WCPO	2023	X			X
Skipjack tuna	WCPO	2025			X	
Yellowfin tuna	WCPO	2023	X			X
Albacore	S Pacific	2024		X		

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

Shaded cells in the species’ section indicate the year of next scheduled assessment. Note that timescales are to be refined/prioritised by SC. ‘Lead’ is indicative and does not exclude the involvement of any Scientific Committee member. Specific yellowfin tuna (YFT)-peer review research area paragraphs noted in parentheses. With respect to timescale, (X) (X in parentheses) indicates years in which work is desirable but cannot yet be undertaken without specific funding. For ongoing projects, an X is subject to the decisions of SC and the Commission regarding funding priorities.

Stock/Focus area	Research need	Activity	Funding (incl. SC budget lines)	Timescale				Lead
				2026 ¹	2027	2028	2029	
Common across stocks	Improved stock assessment software performance and features suited to WCPFC tuna assessments	Refinement of MULTIFAN-CL: e.g. addressing 1) remaining Ianelli et al. (2012) recommendations (and ongoing testing), 2) addressing relevant outcomes of 2022 YFT assessment review (report Section E3)	Existing WCPFC SC ‘additional resourcing SPC’ funding line	X	X	X	X	SSP
		Testing of newly developed MULTIFAN-CL features for assessments, with a focus on those to reduce model complexity.	Existing WCPFC SC ‘additional resourcing SPC’ funding line.	X	X	X	X	SSP
		Explore approaches to capture spatial patterns and variation in biological parameters into assessments	Existing ‘Scientific Services (SPC)’ funding line in early 2026 (e.g. WCPFC-SC22-2026-SA-IP11).		(X)	(X)	(X)	TBD

			Additional resourcing required (related to Project 123 “ <i>Next generation of tuna stock assessment software</i> ”)					
		Continued development and support of features to progress harvest strategy MSE	Existing WCPFC SC ‘additional resourcing SPC’ funding line	X	X	X	X	SSP
		Investigation of approaches to ensure WCPO assessment software remains fit-for-purpose, including enhancing existing or developing and testing new/alternative modelling software	Existing WCPFC SC ‘additional resourcing SPC’ funding line; SC project 123 “ <i>Next generation of tuna stock assessment software</i> ” (Additional funding will be required after P123 end)	X	(X)	(X)	(X)	SSP/SC/others
	General	Developments to improve model stability and convergence, including alternative model structures and reduced model complexity	Existing ‘Scientific Services (SPC)’ funding line	X	X	X	X	SSP
	Improved provision of advice	Review and recommend approaches for characterising stock assessment uncertainty	Existing ‘Scientific Services (SPC)’ funding line	X	X	X	X	SC
		Identification and approaches to resolve data conflicts affecting assessment outcomes	Existing ‘Scientific Services (SPC)’ funding line,	X	X	X	X	SSP
		Improved diagnostic presentation approaches for all grid models and ability to characterise output uncertainty	Existing WCPFC SC ‘additional resourcing SPC’ funding line	X	X	X	X	SSP
	Improved abundance indices	Further development of geostatistical and other relevant approaches for CPUE analyses (E1(6))	Existing WCPFC SC ‘additional resourcing SPC’ funding line, EU PEUMP2 project	X	X	X	X	SSP/SC
		Global Joint Tuna RFMO Longline CPUE Technical Workshop.	Remaining funds from P122 “ <i>Longline Effort Creep in the WCPO</i> ” + co-funders supporting workshop in October 2026	X				SSP
		Improved understanding of oceanographic influences related to gear deployment and tuna	Existing WCPFC SC ‘additional resourcing SPC’ funding line, EU PEUMP2 project. Note this type	X	X	X	X	SSP/SC

		behaviour (e.g. ‘habitat-based models) to inform CPUE modelling	of issue would be considered in the proposed cross RFMO workshop on longline CPUE analysis.					
	Understanding of stock structure	Investigation of tuna stock and sub-population structure (e.g. through genetics, otolith chemistry etc.)	Other SPC funding. Note that Project 128a “ <i>Understanding connectivity of the yellowfin and skipjack stocks in the Western Pacific and East Asia region with the WCPFC Convention Area</i> ” is relevant and important under this need. The scoping phase was conducted by CSIRO in 2025. Second phase proposed to SC21 and WCPFC22 was not prioritised for funding. No progress in 2026. Funding will be required.		(X)	(X)	(X)	SSP
		Examination of data needs to support existing model spatial structures, and re-evaluate spatial structures where necessary to improve model fits	Existing ‘Scientific Services (SPC)’ funding line, SC Project 117 “ <i>WCPFC Tuna Biological Sampling Plan</i> ”.	X	X	X	X	SSP/SC
	Tagging and tag modelling	Examination and review of tagging programme design (WPO, CPO), e.g. cf model spatial structure	SC Project 42 “ <i>Pacific Tuna Tagging Project</i> ”, other SPC funding	X	X	X		SSP/SC
		Further investigation of release event-specific tag mixing rates and approaches to better deal with tag mixing assumptions in stock assessment models (E2(7))	SC Project 42, other SPC funding. Tag mixing simulation attempted for bigeye and yellowfin tuna for 2026 assessments	X	X	X	X	SSP
		Improved data and modelling of release event, shedding and tagging induced mortalities (E1(5))	SC Project 42, other SPC funding	X	X	X	X	SSP
		Increase tag seeding experiments to get better estimates of reporting rates (E4(3))	SC Project 42, other SPC funding	X	X	X		SSP/SC

		Review of wider options to maximise the utility of tag/recapture data for assessments, including the analysis of tag/recapture data external to the assessment model.	Existing ‘Scientific Services (SPC)’ funding line, SC Project 42. Project 123 also contributing through external tag data analysis in collaboration with DTU.	X	X	X		SSP
	Improved cross-stock biological understanding and fishery independent estimates of biomass	Explore utility of close-kin mark-recapture approaches to estimate absolute biomass, spawning biomass and reproductive potential for tuna stocks (see also SPA, below)	EU and SC Project 100d, other SPC funding and additional AU support	X	X	(X)	(X)	SSP/AU
	Spatial dynamics	Examine ways to formally incorporate the spatial results of explicit movement models (e.g. SEAPODYM, IKAMOANA, archival tags) into assessments	Other SPC funding	X	X	X		SSP
	Improved fishery input data	Improved data for WPEA fisheries (E1(7))	NZ SPF project (Project 128a is potentially relevant here)	X	X	X		WCPFC Sec/SSP (CSIRO)
		Enhanced data collection, auditing and validation processes, incl. species ID	Other SPC funding, SC member activities	X	X	X		SC
		Collection of processor (cannery) time series data for the validation of tuna species composition	SC project 114 “Improved coverage of cannery receipt data” no-cost extension	X	(X)			SSP
		Improved accounting for discards and longline depredation losses in stock assessments	Not currently resourced	(X)	(X)			TBD
		Enhanced approaches to input data weighting within models	Other SPC funding	X	X	X		SSP
		Improved/enhanced collection of logbook and observer longline data, including the use of EM, to improve SC analyses (CPUE standardisation focus)	Requires WCPFC mandate	(X)	(X)	(X)	(X)	SC
	Biological inputs	Improved length-weight, weight-weight and length-length conversion factor data sets (e.g. E1(8))	Other SPC funding (Project 127a “ <i>Reconciliation of size composition data for stock assessments</i> ” has relevance here)	X	(X)	(X)		SSP/SC

		Evaluation of alternative appropriate natural mortality models	Other SPC funding and collaborators (NOAA)	X	X	X		SSP/US
		Enhanced collection of fish hard parts and measurements from across the WCPO region for all relevant stocks, with a focus on age-length data (E4(6))	SC Project 35b “Pacific Marine Specimen Bank”, Project 117, and Project 129 “Age-length data stream for tuna assessments”	X	X	X		SSP/SC
		Re-evaluation of and monitoring for non-stationarity in key life history parameters (reproductive biology, growth) for all stocks (see also species-specific areas below)	EU PEUMP2, SC Project 35b, EU and SC funding through Project 120 “Updated reproductive biology of tropical tunas”, Project 129 will be critical.	X	X	X		SSP/SC
		Further investigation of input size composition data, with review of all size composition data for tuna assessments (E1(1); E1(2); E1(3))	Other SPC funding, SC Project 127a	X	(X)	(X)		SSP
Skipjack	Biological inputs	Update estimates of reproductive potential (E4(4))	EU and SC resources through Project 120	X				SSP
		Validate growth and improve growth estimates	SC Project 129	X	X	X		AU/SSP
		Better understanding of the connectivity between the western tropical and wider WCPO regions	SC Project 128a (requires prioritisation by SC/WCPFC)		(X)	(X)	(X)	WPEA/AU
	Fishery inputs	Ongoing development of alternative PS-based CPUE abundance indices	EU PEUMP2, NZ SPF	X	X	X	X	SSP
		Examine likelihood profiles under alternative tag mixing scenarios (SC21 discussion)	Other SPC funding		X	X		SSP
		Evaluation of tagging mortality and school cohesion analyses	Other SPC funding, SC Project 42	X	X	X	X	SSP
		Better account for effort creep in stock assessment and CPUE indices	EU PEUMP2	X	X	X	X	SSP/JP/SC
Bigeye	Biological inputs	Age validation and improved growth estimates	SC Project 129	X	X	X		TBD

		Epigenetic ageing evaluation	Other SPC funding, additional resourcing required (not part of SC Project 100d TOR but overlap with Project 129).		(X)	(X)	(X)	SSP/AU
		Update reproductive biology estimates (E4(4))	Note Project 120 has concentrated on yellowfin tuna. Additional resourcing required		(X)	(X)	(X)	SSP
		Improved weight conversion factors (e.g. G&G to whole wt) (E4(5))	Project 127a. Additional resourcing required	X	(X)			SSP/SC
	Fishery inputs	Investigation of effort creep in fisheries used for abundance indices (E2(9))	EU PEUMP2, Project 122a	X	X	X		SSP/JP/SC
Yellowfin	Biological inputs	Age validation and improved growth estimates	SC Project 129	X	X	X		TBD
		Epigenetic ageing evaluation	Other SPC funding, additional resourcing required (not part of SC Project 100d TOR, but overlap with Project 129).		(X)	(X)	(X)	SSP/AU
		Update reproductive biology estimates (E4(4))	EU and SC resources through Project 120	X				SSP
		Improved weight conversion factors (e.g. G&G to whole wt) (E4(5))	Project 127a. Additional resourcing required.	X	(X)			SSP/SC
		Better understanding of the connectivity between the western tropical and wider WCPO regions	SC Project 128, additional resourcing will be required. Phase 2 work not funded by WCPFC22 for 2026.		(X)	(X)	(X)	WPEA/AU
	Fishery inputs	Evaluation of alternative selectivity assumptions	Existing ‘Scientific Services (SPC)’ funding line	X	X			SSP
		Investigation of effort creep in fisheries used for abundance indices (E2(9))	EU PEUMP2, Project 122a	X	X	X	X	SSP/JP/SC
South Pacific albacore	Biological inputs	Sex-specific population modelling	Existing ‘Scientific Services (SPC)’ funding line	X	X			SSP
		Epigenetic ageing evaluation	EU and SC Project 100d and additional AU support	X	X			SSP

		Utility of close-kin mark-recapture approach for SPA to estimate population size and structure and inform SPA stock assessments	EU and SC Project 100d and additional NZ and GCF support	X	X			SSP/AU
		Ongoing NZ troll fishery characterisation and CPUE	Undertaken by NZ, additional funding required	(X)	(X)	(X)		NZ
	Fishery inputs	Investigation of effort creep in fisheries used for abundance indices (E2(9))	EU PEUMP2, Project 122a	X	X	X	X	SSP/JP/SC
		Better understanding of movement rates and connectivity between WCPO and EPO for the South Pacific wide assessments	EU and SC Project 100d and additional AU support	X	X			SSP/AU

¹ Remainder of the year

Appendix: Completed tasks

Tasks completed since the first draft of the TARP in 2020 are captured here, with relevant references.

Stock/Focus area	Research need	Activity	Lead	Reference
Common across stocks	Improved cross-stock biological understanding and fishery independent estimates of biomass	Review approaches for estimating natural mortality and apply to the four key tuna stocks following the recent CAPAM meeting	SSP/SC	Articles in Fisheries Research
	Size data	Reconciliation and documentation of size data sources for stock assessment: phase 1 (Project 127)	SSP	SC21-ST-WP-02
	Conversion factors	Better Data on Fish Weights and Lengths for Scientific Analyses (project 90)	SSP	SC21-ST-IP-03
	Tagging and tag modelling	External review of tag/recapture data treatment prior to input into stock assessments	SSP /SC	Online workshop undertaken
		Improved CPUE through archival tagging (AT) to define school and behavioural influences	-	Abandoned due to changes in AT production
Skipjack	Spatial dynamics	Updated SEAPODYM Reference model with fully integrated tagging data	SSP	Article in CJFAS
	Biological inputs	Better understanding of recruitment trends estimated by stock assessment models – SC Project 115		SC20-SA-WP-06
	Stock Structure	Preliminary Analyses of SKJ structure	USP/ SSP	Article in FMS
	Fishery Inputs	Better account for effort creep in stock assessment and CPUE indices – SC Project 115		SC20-SA-WP-06 Article in Frontiers in Marine Science
Bigeye	Spatial dynamics	Updated SEAPODYM Reference model with fully integrated tagging data	SSP	SC17-EB-IP-08
	Biological inputs	Age Validation – SC Project 105	US/JP/AU/ SSP	SC17-SA-IP-14a
		Additional age length data	SSP/JP	[SC22 project 129 paper]
Yellowfin	Biological inputs	Age Validation – SC Project 105	US/JP/AU/ SSP	SC17-SA-IP-14a
		Morphometrics ageing developments and additional age length data	SSP/JP	[SC22 project 129 paper]
		Reproductive biology	SSP	[SC22 project 120 paper]

South Pacific albacore	Biological inputs	Evaluation of alternative growth model formulations	SSP	SC17-SA-WP-02
		Stock connectivity of South Pacific albacore (ongoing)	AU/SSP	SC21-SA-WP-10