



Scoping the next stock assessment platform

Stage I: Reaching out to tuna RFMOs and the scientific community

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SPC Online Workshop

13–16 May 2024

Meeting Objectives

Communicate *project 123, explorations, decisions, development*

Discuss *succession plans, admb, multifan-cl, stock synthesis*

Seek Advice *insights, opinions, experiences, predictions, ideas*

Seek Collaboration *tuna RFMOs, research labs*

Meeting Schedule

- ⇒ 0:00–0:20 Introduction
- 0:20–0:30 **Platforms** currently used in tuna stock assessments (presentation, round table)
- 0:30–0:50 **Common challenges** for all tuna RFMOs, **longevity** of Stock Synthesis and MULTIFAN-CL, **succession plans** (round table)
- 0:50–1:00 SPC challenges and **project plan** (presentation)
- 1:00–1:10 **Features** of current and future platforms (presentation)
- 1:10–1:25 Discussion on platform **features** most **relevant for tuna** (round table)
- 1:25–1:35 **State-space** models and latest developments (presentation)
- 1:35–1:50 What do you think is the **best way forward for SPC?** (round table)
- 1:50–2:00 Summary of discussions, next steps, **collaboration** (round table)

Who Are Here Today?

People with expertise in

- ▶ Tuna
- ▶ Stock assessment
- ▶ Software development

What is your main line of work?

What part of your work is related to tuna/stock assessment/software development?

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Platforms currently used in tuna stock assessments

ICCAT	Atlantic	Stock Synthesis , JABBA, one-off models
IOTC	Indian	Stock Synthesis for all stocks?
IATTC	Pacific, Eastern	Stock Synthesis for all stocks?
SPC	Pacific, Western & Central	MULTIFAN-CL for all stocks
CCSBT	Southern bluefin tuna	sbt

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Round Table

- ▶ Common challenges for all tuna RFMOs
- ▶ Longevity of Stock Synthesis and MULTIFAN-CL
- ▶ Succession plans

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SPC Challenges



MFCL Team (Dave Fournier, John Hampton, Nick Davies) retiring in the 2020s

Quick turnover rate of stock assessment staff

Takes many years to become an expert in MFCL, John typically makes the main modeling decisions and guides new staff, with the help of Nick

We must prepare for an era where there might be no long-term staff, only short-term

Project P123

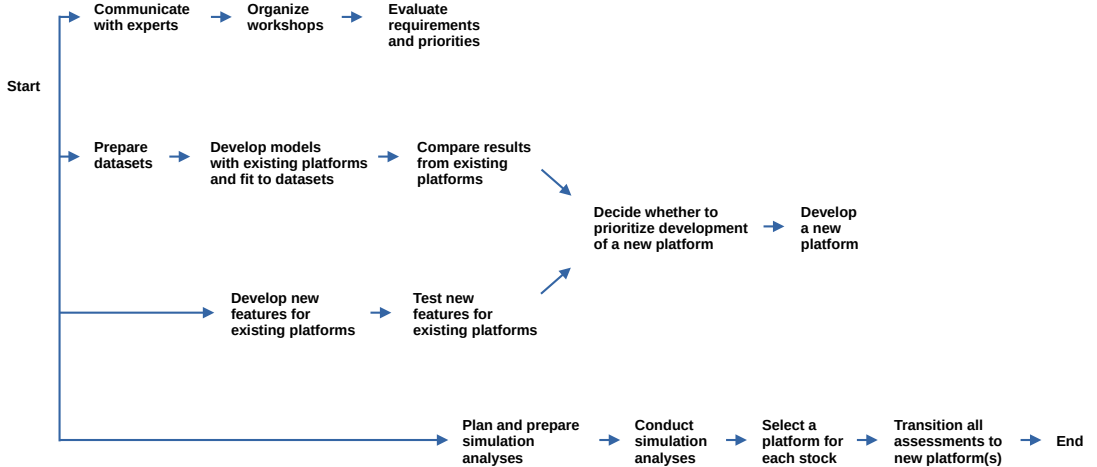
Scoping the next tuna stock assessment software

Project scheduled 1 Feb 2024 to 31 Dec 2026

This initial project will:

- evaluate **features and capabilities** that will be important in future tuna assessments
- explore fitting models to tuna data using **existing software platforms**
- guide decisions on what kind of **new software development** will be required
- establish **collaboration** with tRFMOs and research labs to achieve these goals

Additional projects can be launched in parallel to power up the model exploration and software development



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Features of Current and Future Platforms

Incorporating data

- ▶ Fit to length comps
- ▶ Fit to weight comps
- ▶ Fit to tagging data
- ▶ Fit to CKMR data
- ▶ Estimate growth curve using otolith data
- ▶ Utilize tag-recapture growth increment to estimate growth

Specifics

- ▶ Age-specific M
- ▶ Length-specific selectivity
- ▶ Region-specific growth

Dimensions

- ▶ Explicit regions with movement
- ▶ Tracking age and length in population
- ▶ Time steps within a year

Ecology

- ▶ Multispecies interactions
- ▶ Climate change

Implementation

- ▶ Random effects, state space
- ▶ Parallel computing
- ▶ Computation time

Terms of Reference

2024

1. Review and identify important model features for tuna assessments
2. Identify existing platforms that have these features or can be extended
3. Reach out to and initiate collaboration with model developers
4. Conduct two workshops in 2024, one online and one in person

2025–2026

5. Explore and compare existing platforms, fitting to SPC tuna data
6. Determine which platforms can be considered viable candidates
7. If a viable platform has been identified, plan transition
8. If no viable platform is identified, extend a platform or create a new one

Software Platforms

Existing platforms that fit to length composition data

Stock Synthesis

Casal2

Gadget

Ongoing development

SAM fitted to length comps *Colin Millar, Anders Nielsen*

WHAM fitted to length comps *Giancarlo Correa, Tim Miller*

ALSCL *Fan Zhang, Noel Cadigan*

CCSBT *D'Arcy Webber, Rich Hillary*

FIMS *NOAA*

SStag *Nicholas Ducharme-Barth, Arni Magnusson*

CAPAM 2019 Discussions

Tunas every 3 years

Swordfish every 4 years

Striped marlin every 5 years

2024 ALB MLS

2025 SKJ SWO

2026 BET YFT

2027 ALB

2028 SKJ

2029 BET YFT SWO MLS

2030 ALB

Possible Outcomes

If commitment and funding is limited, then the following unwanted outcome, characterized by a lack of progress, could well occur...

Upcoming assessments:

2024 MFCL with config changes, other platform(s) did not work well, workshop

2025 MFCL with config changes, other platform(s) did not work well, workshop

2026 MFCL without config changes, other platform(s) did not work well, workshop

2027 MFCL without config changes, other platform(s) did not work well, workshop

2028 MFCL without config changes, other platform(s) did not work well, workshop

2029 MFCL without config changes, other platform(s) did not work well, workshop

2030 MFCL without config changes, other platform(s) did not work well, workshop

Possible Outcomes

will depend on:

Level of funding

Level 0 – Annual workshops, coordination

Level 1 – Hire one person for 5 years

Level 2 – Hire two people for 5 years

Partnerships

Tuna RFMOs – funding and scientists' time

Domain experts in state-space model development – scientists' time

Other funding sources

Summary

Project P123 *objective, background, terms of reference*

Software Platforms *operational, current and future development*

Road Ahead *assessments, workshops, collaboration, adaptive plan*

Possible Outcomes *level of funding, partnerships*