Report of the ICCAT Tropical Tuna Research and Data Collection Program (TTRaD)
(Expenditures/Contributions 2024 and Programme plan for 2025)

Summary and Programme objectives

A draft Tropical Tuna Research and Data collection plan (TTRaD) was adopted in 2023, and in 2024, the Group updated this plan with the inclusion of more detailed information on time frames, costings and deliverables for 2025. The programme coordinator during 2024 was Dr. Serena Wright (United Kingdom).

The plan (established in 2023) for TTRaD included the following objectives: 1) improve sampling; 2) improve and update life history parameters; 3) improve stock assessments and 4) assist in collecting data for age and growth studies. During the Tropical Tuna Species Group meetings in 2024, the Group reviewed the objectives of TTRaD and prioritised work areas intersessionally with preliminary costings and timelines developed (**Table 1**).

The specific funding for TTRaD is combined with the general research fund (ICCAT Science Envelope) with project funding allotted on a competitive basis with other Species Groups.

Table 1. Tropical Tuna Research and Data Collection Plan with preliminary estimates of cost in €kt per year. A colour key is provided at the bottom of the table. Data collection and research from national scientists (NS) or research programmes are shown in grey.

Theme	***Short***			***Medium***		***Long***	
	2025	***2026***	***2027***	***2028***	***2029***	***2030***	***2031***
Sampling							
Review and targeted sampling of tropical tunas (hard parts, mucus, and other tissue sampling for biological parameters and to develop a long-term hard part and tissue bank)	15	50	50	50	50	50	50
AOTTP awareness and tag recovery activities	8.75	5	5	5	15	15	15
New tagging programs				10	50	50	50
Life history							
Improved natural mortality and growth estimates from available processed samples (biological samples and tagging).	50	50			25		25
(1) Improved estimation of growth curves and maximum age, (2) determine the best hard structure used for ageing (otolith vs spines) for SKJ, (3) explore alternative age validation for SKJ, and (4) Update tropical tuna reproductive parameters [ITUNNES]							
Assess if epigenetic approaches work for tropical tunas (feasibility and costing)		30					
Developing indicators for maturation / spawning of tropical tuna using mucus swabs (feasibility and costing) (All)		20			`		
Update length-weight relationships using recent data sources [NS]							
Workshop on age, growth and trophic dynamics		40					
Update tropical tuna reproductive parameters				25		25	
Assess the influence of conversion factors [NS]							
Stock Assessment							
Tropical tuna MSE development and review	75	75	75	50	50	50	50
Estimate SKJ exploitation from tag data to support MSE development	25						
Clean format and subset tag data for SS & analysis of long-term c-tag recoveries			175				
Caribbean data improvements							
MSE engagement workshops			50				

Data improvement and research workshops	40			40		40	
Close Kin Mark Recapture feasibility study (abundance)		15					
Advice, ecology and population dynamics							
YFT/BET environmental habitat definition		50	50				
Spatio-temporal model to improve FAD management – (POSEIDON) (All)	100	100					
Changes in productivity and distribution of tropical tunas in relation to the environment - climate (All)		50			50		
Spatio-temporal modelling including FAD density– (VAST & other approaches) (All)		50	50				
Check validity of stock unit				100	100	100	
SKJ-E population structure [ITUNNES]							
Trophic dynamic update [ITUNNES]							

2024 activities

In 2024, the top priority activities were identified as Management Strategy Evaluation (MSE) developments, sample collection for age and growth, and the continuation of funds for tag recovery and maintenance of Atlantic Ocean Tropical tuna Tagging Programme (AOTTP) databases.

The highest priority work area was to advance the development of the multi-stock MSE and the western skipjack MSE, including training workshops and the independent technical review of the MSEs. MSE developments have been provided throughout the year at the 2024 Yellowfin Tuna Data Preparatory Meeting (ICCAT, 2024a) and the 2024 Yellowfin Tuna Stock Assessment Meeting (ICCAT, 2024b) and intersessional MSE subgroup meetings. For the Western Skipjack MSE, updates include development of Candidate Management Procedures (CMPs), incorporation of abundance indices and robustness tests to account for the effects of climate change. For the multi-stock MSE, technical work has been undertaken to explore uncertainties, develop conditioned operating models (OMs) and observation error models, incorporation of Climate Change impacts, and multi-stock management procedures (harvest control rule development). To aid in building understanding of the developed MSEs, the Panel 4 Intersessional Meeting on Northern Atlantic Swordfish MSE (Online, 8 October 2024) was held focused on building understanding of tropical tuna-specific MSEs.

The next highest priority activity was to continue progressing the estimation of growth, maximum age and natural mortality for the three species of tropical tunas, by continued collection and ageing of specimens of the three species and by taking advantage of data collected during the AOTTP. In 2024 the focus was on improving age/length sample collection and processing of small yellowfin tuna, and small and large bigeye tuna, with a new contract signed for collection and processing of samples from the Gulf of Guinea, Central and South Atlantic. Initial processing of available samples was presented at the Tropical Species Group

Species Meeting (hybrid, Madrid, Spain September 2024), with additional samples available following collections in the final half of the year. Both collection and processing of samples is ongoing, noting that there has been considerable difficultly collecting samples of small and large specimens through observers in industrial and artisanal fleets with additional impacts related to closure of fishing in important areas.

Finally, the last research priority was to continue to invest in the recovery of AOTTP tagged fish, tag seeding and maintenance of the tagging database.

2025 plan and activities

In 2024 the TTRaD was updated by the Group with the inclusion of more detailed information on time frames, costings and deliverables.

The highest priorities for 2025 are to support the objectives established by the Tropical tuna Workplan and the TTRaD, including the continuation of sampling, updating life history parameters, continuing MSE development and improving advice to the Commission through spatio-temporal model development. Specific activities for 2025 include the following:

1. Support developments for Western skipjack and multi-stock MSEs;

2. Update fishing and natural mortality for bigeye tuna;

3. Continuation of sample collection for age and growth;

4. Continuation of tag recovery activities and offices for the AOTTP;

5. Development of a spatio-temporal model to support the development of responses to the Commission related to fish aggregating device (FAD) management;

6. Estimate skipjack exploitation rates from AOTTP data.

All these activities depend on successful coordination, sufficient financial resources and adequate in-kind support by the CPCs involved. Details of TTRaD funded activities for 2025 are provided below.

Biological studies

A core aim of the TTRaD is to set up routine biological sampling for tropical tunas, with specimens collected and available for relevant analysis and research needs. Routine biological sampling is critical for broader program objectives, including updating age and maturity parameters and genetic studies that can reduce uncertainty in stock assessments and aid in developing MSE OMs. Where possible, ITUNNES will provide updates to growth curves and maximum age, determine the best hard structure to age skipjack and explore alternative age validation method for this species in 2026.

Tagging studies

The AOTTP was in operation until 2021 with the release of conventional and electronic tags on tropical tuna. Although the operation of the program was terminated in 2021, tag recovery continues. The full potential of information derived from this program is yet to be realized and additional analysis has been prioritized in 2025.

A preliminary analysis of the AOTTP data was conducted for yellowfin tuna using modified Brownie models to estimate fishing and natural mortality rates (Ailloud, 2024). Similar analyses will be conducted for bigeye tuna in 2025. In addition, more detailed analyses will be carried out that explores our ability to estimate age and time-varying mortality rates while taking into account fleet-specific reporting rates, the potential for species misidentification, tag-induced mortality, and incomplete mixing for shorter-term recoveries.

Finally, analysis will be undertaken in 2025 to estimate the exploitation rate of skipjack tuna using data from the AOTTP. Stock assessments of skipjack are notoriously difficult. One reason being the lack of reliable abundance or exploitation rate for the purse seine fishery based on catch per unit effort (CPUE). Work will focus on assessing the potential to use AOTTP tagging data to see if it can be used to estimate skipjack exploitation rate.

MSE

The Group will continue to support the development and implementation of the SKJ-W and multi-stock MSE. The work to be undertaken in 2025 will be based on requirements specified in the MSE roadmap adopted by the Commission in late 2024.

For the SKJ-W MSE specific tasks will include:

- Re-evaluation of possible uncertainties in stocks assessments and closed-loop simulations (to avoid biologically implausible scenarios);
- Test and evaluate new objectives defined by the Commission;
- Implement robustness test scenarios (incorporating potential effects of climate change);
- Prepare communication materials for the ICCAT Commission;
- Summarise primary sources of uncertainty;
- Organize an Ambassadors' webinar.

For the multi-stock MSE tasks will include:

- Follow guidance from the Commission on how to handle: trade-offs in species yields; changes in effort over time; changes in gear use over time; changes in closure periods over time; and, variable allocations over time (and therefore changes in geospatial effort and gear type over time);
- Propose and discuss with Panel 1 the CMPs, operational management objectives, and performance indicators;
- Refine CMPs based on feedback by Panel 1:
- Recommend final operational management objectives and identify performance indicators;
- Organize an Ambassadors' webinar.

Advice, ecology and population dynamics

To support the development of responses to the Commission, the Group recommends creating an integrated bioeconomic agent-based model to support FAD management in the Atlantic. The model will provide a means to simulate and evaluate complex management scenarios allowing the assessment of social, biological and economic trade-offs.

Programme management

The TTRaD budget is part of the ICCAT Science Envelope and management is assumed by the programme coordinators, with the support of the Secretariat. Reporting to the SCRS is a responsibility of the Coordinators. Countries that are allocated budget lines for programme activities need to prepare requested reports on activities conducted which should be sent to the programme Coordinator and ICCAT to obtain reimbursement. Funding requests need to follow ICCAT protocols for the use of funds (see Addendum 2 to Appendix 7 of *Report for Biennial Period 2010-2011, Part II (2011), Vol. 2*).

Conclusion

The TTRaD is an important programme to ensure that the highest quality information is available to support the assessment of tropical tuna stocks. The TTRaD has helped to improve the data available to support future ICCAT tropical tuna assessments and the SCRS advice to the Commission. The TTRaD will continue to require support from ICCAT and other sources to operate and address the needs of the Commission.

References

Ailloud L.E. 2024. Preliminary estimates of natural mortality using the AOTTP conventional tagging data. Collect. Vol. Sci. Pap. ICCAT, 81 (2): 1-9.

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ICCAT. 2024b. Report of the 2024 ICCAT Yellowfin Tuna Stock Assessment Meeting (hybrid/Madrid, Spain, 8-12 July 2024). Collect. Vol. Sci. Pap. ICCAT, 81(2), SCRS/2024/009: 1-137.