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Global Standard for Responsible Supply of Marine Ingredients

Fishery Assessment Methodology and Template Report V2.0

Fishery Under Assessment	**Albacore tuna (*Thunnus alalunga*) FAO 77, 81, 87 (Southern Pacific Ocean)**
Date	**July 2019**
Assessor	**Jim Daly**

Application details and summary of the assessment outcome				
Name: TC Union Agrotech Co Ltd and others				
Address:				
Country: Thailand		**Zip:**		
Tel. No.:		**Fax. No.:**		
Email address:		**Applicant Code**		
Key Contact:		**Title:**		
Certification Body Details				
Name of Certification Body:		**SAI Global Ltd**		
Assessor Name	**Pier Reviewer**	**Assessment Days**	**Initial/Surveillance/Re-approval**	**Whole fish/ By-product**
Jim Daly	Virginia Polonio	0.5	Surveillance 2	By-product
Assessment Period	2018			

Scope Details	
Management Authority (Country/State)	Western and Central Pacific Fisheries Commission (WCPFC);Thailand
Main Species	Albacore tuna (*Thunnus alalunga*)
Fishery Location	FAO 77, 81, 87 (Southern Pacific Ocean)
Gear Type(s)	Longline, pole and line, purse seine, troll
Outcome of Assessment	
Overall Outcome	PASS
Clauses Failed	NONE
Pier Review Evaluation	APPROVE
Recommendation	PASS

Assessment Determination
Albacore's range spans multiple Regional Fishery Management Organizations (RFMOs) in particular the Western and Central Pacific Fisheries Commission (WCPFC) and the Inter-American Tropical Tuna Commission (IATTC). Convention texts from these two RFMO's calls for cooperation in the management of albacore throughout its migratory range. Albacore tuna comprise a discrete stock in the South Pacific. Further developments were undertaken in 2018 to address recommendations of the previous stock assessment (2015) and to explore uncertainties in the assessment model, particularly in response to the inclusion of additional years of data. Improvements were also made to diagnostic weaknesses noted in previous assessments. The latest assessment is supported by analysis of longline CPUE data, background analyses of other data inputs and improved definition of regional and fisheries structures. Fishery removals of the species in the fishery under assessment are included in the stock assessment process. Legal and administrative frameworks exist at the Thai national level, in addition to research and management frameworks implemented at the international level by the RFMOs. Following the latest stock assessment carried by the Scientific Committee (SC) of the Western and Central Pacific Fisheries Commission (WCPFC, 2018) all models indicate that the stock is above the limit reference point (of 0.2SBF=0). Recent average fishing mortality is estimated to be well below FMSY (median Frecent=FMSY = 0.2, 80 percentile range 0.08-0.41). Natural mortality remains a key uncertainty in this assessment, and it is appropriate that such uncertainty continue to be reflected in the overall stock assessment results. The stock is considered, in its most recent stock assessment, to have biomass above the limit reference point (or proxy), IUCN has categorised albacore tuna (global stock) as a near threatened species. The species does not appear on the current list of CITES appendices (both sites accessed 16.07.19). The assessment team recommends the approval of albacore tuna as a by-product species under the current IFFO RS By-product Standard v 2.0.
Pier Review Comments
Although the population as a whole is considered healthy, there is the possibility that localized depletion's have occurred. Scientific advice has been that managers pay attention to longline catches and catch rate trends from the past ten years, further, longline observer coverage rates are low (5%). there are no target reference points in place and no harvest control rule. There are some MSC fisheries certified and FIP projects to improve the quality of the stock assessment and data available. However, there weaknesses in the quality of the data and the stock assessment methodologies, the PR recommends the approval of this by-product.
Notes for On-site Auditor

Note: This table should be completed for whole fish assessments only.

General Results

General Clause	Outcome (Pass/Fail)
M1 - Management Framework	
M2 - Surveillance, Control and Enforcement	
F1 - Impacts on ETP Species	
F2 - Impacts on Habitats	
F3 - Ecosystem Impacts	

Species-Specific Results

Category	Species	% landings	Outcome (Pass/Fail)	
Category A			A1	
			A2	
			A3	
			A4	
Category B				
Category C	Albacore tuna (*Thunnus alalunga*)	N/A	PASS	
Category D				

[List all Category A and B species. List approximate total %age of landings which are Category C and D species; these do not need to be individually named here]

HOW TO COMPLETE THIS ASSESSMENT REPORT

This assessment template uses a modular approach to assessing fisheries against the IFFO RS standard.

Whole Fish

The process for completing the template for a **whole fish** assessment is as follows:

1. ALL ASSESSMENTS: Complete the Species Characterisation table, to determine which categories of species are present in the fishery.
2. ALL ASSESSMENTS: Complete clauses M1, M2, M3: Management.
3. IF THERE ARE CATEGORY A SPECIES IN THE FISHERY: Complete clauses A1, A2, A3, A4 for **each** Category A species.
4. IF THERE ARE CATEGORY B SPECIES IN THE FISHERY: Complete the Section B risk assessment for **each** Category B species.
5. IF THERE ARE CATEGORY C SPECIES IN THE FISHERY: Complete clause C1 for **each** Category C species.
6. IF THERE ARE CATEGORY D SPECIES IN THE FISHERY: Complete Section D.
7. ALL ASSESSMENTS: Complete clauses F1, F2, F3: Further Impacts.

A fishery must score a pass in **all applicable clauses** before approval may be recommended. To achieve a pass in a clause, the fishery/species must meet **all** of the minimum requirements.

By-products

The process for completing the template for **by-product raw material** is as follows:

1. ALL ASSESSMENTS: Complete the Species Characterisation table with the names of the by-product species and stocks under assessment. The '% landings' column can be left empty; all by-products are considered as Category C and D.
2. IF THERE ARE CATEGORY C BYPRODUCTS UNDER ASSESSMENT: Complete clause C1 for **each** Category C by-product.

3. IF THERE ARE CATEGORY D BYPRODUCTS UNDER ASSESSMENT: Complete Section D.
4. ALL OTHER SECTIONS CAN BE DELETED. Clauses M1 - M3, F1 - F3, and Sections A and B do not need to be completed for a by-product assessment.

By-product approval is awarded on a species-by-species basis. Each by-product species scoring a pass under the appropriate section may be approved against the IFFO RS Standard.

SPECIES CATEGORISATION

The following table should be completed as fully as the available information permits. Any species representing more than 0.1% of the annual catch should be listed, along with an estimate of the proportion of the catch each species represents. The species should then be divided into Type 1 and Type 2 as follows:

- **Type 1 Species** can be considered the 'target' or 'main' species in the fishery. They make up the bulk of annual landings and are subjected to a detailed assessment.
- **Type 2 Species** can be considered the 'bycatch' or 'minor' species in the fishery. They make up a small proportion of the annual landings and are subjected to relatively high-level assessment.

Type 1 Species must represent 95% of the total annual catch. Type 2 Species may represent a maximum of 5% of the annual catch (see Appendix B).

Species which make up less than 0.1% of landings do not need to be listed (NOTE: ETP species are considered separately). The table should be extended if more space is needed. Discarded species should be included when known.

The 'stock' column should be used to differentiate when there are multiple biological or management stocks of one species captured by the fishery. The 'management' column should be used to indicate whether there is an adequate management regime specifically aimed at the individual species/stock. In some cases it will be immediately clear whether there is a species-specific management regime in place (for example, if there is an annual TAC). In less clear circumstances, the rule of thumb should be that if the species meets the minimum requirements of clauses A1-A4, an adequate species-specific management regime is in place.

NOTE: If any species is categorised as Endangered or Critically Endangered on the IUCN Red List, or if it appears in the CITES appendices, it **cannot** be approved for use as an IFFO RS raw material. This applied to whole fish as well as by-products.

TYPE 1 SPECIES (Representing 95% of the catch or more)
Category A: Species-specific management regime in place.
Category B: No species-specific management regime in place.

TYPE 2 SPECIES (Representing 5% OF THE CATCH OR LESS)
Category C: Species-specific management regime in place.
Category D: No species-specific management regime in place.

Common name	Latin name	Stock	% of landings	Management	Category
Albacore tuna	*Thunnus alalunga*	Southern Pacific	N/A	WCPFC	C

CATEGORY C SPECIES

In a whole fish assessment, Category C species are those which make up less than 5% of landings, but which are subject to a species-specific management regime. In most cases this will be because they are a commercial target in a fishery other than the one under assessment. In a by-product assessment, Category C species are those which are subject to a species-specific management regime, and are usually targeted species in fisheries for human consumption.

Clause C1 should be completed for **each** Category C species. If there are no Category C species in the fishery under assessment, this section can be deleted. A Category C species does not meet the minimum requirements of clause C1 should be re-assessed as a Category D species.

Species Name		**Albacore tuna (*Thunnus alalunga*)**	
C1	**Category C Stock Status - Minimum Requirements**		
	C1.1	Fishery removals of the species in the fishery under assessment are included in the stock assessment process, OR are considered by scientific authorities to be negligible.	PASS
	C1.2	The species is considered, in its most recent stock assessment, to have a biomass above the limit reference point (or proxy), OR removals by the fishery under assessment are considered by scientific authorities to be negligible.	PASS
		Clause outcome:	**PASS**

Evidence

C 1.1:

A further three years data were available since the last stock assessment was conducted in 2015, the model time period extends to the end of 2016. Further developments to the stock assessment were undertaken to address recommendations of the 2015 report and to explore uncertainties in the assessment model, particularly in response to the inclusion of additional years of data and also to improve diagnostic weaknesses noted in previous assessments.

This assessment is supported by the analysis of longline CPUE data, background analyses of other data inputs and definition of regional and fisheries structures for the updated assessment.

Key changes made in the progression from the 2015 reference case to the 2018 diagnostic case model Included:

- Updating all data to end 2016.
- Utilising standardised CPUE indices calculated from the recently collated operational longline CPUE data set, including historical Japanese longline data within the CPUE not available in 2015, and treating targeting cluster as a covariate (rather than filtering the data).
- Moving to a simplified regional structure (2018 regional structure).
- Moving from the traditional CPUE standardized index to one based upon a geostatistical model.

Across the range of models run in this assessment, the most important factors when evaluating stock status were the assumed level of natural mortality, and growth. For natural mortality, age invariant M values of 0.3 yr^{-1} (consistent with the 2015 assessment) and 0.4 yr^{-1} were assumed, with the latter resulting in more optimistic assessment outcomes. Natural mortality remains a key uncertainty in this assessment, and it is appropriate that such uncertainty continue to be reflected in the overall stock assessment results.

For growth, the conditional age-at-length data from recent work was incorporated into the diagnostic case model, while an alternative scenario fixed at the parameter values of the sex combined `Chen-Wells' growth model used within the 2017 North Pacific albacore reference case model run was also evaluated. Use of the latter resulted in more pessimistic assessment outcomes.

A steady increase in fishing mortality of adult age-classes is estimated to have occurred over most of the assessment period, accelerating since the 1990s but declining following the decline in longline catches seen since 2010. Juvenile fishing mortality increased until around 1990, and has remained stable at a low level since that time.

Catch and effort data were compiled according to the fisheries defined. All catches were expressed in numbers of fish, with the exception of the driftnet fishery, where catches were expressed in weight (metric tonnes). For longline fisheries, effort was standardized; while for troll and driftnet fisheries, the number of vessel days of fishing activity was used.

Fishery removals of the species in the fishery under assessment are included in the stock assessment process.

C1.2:
Overall, recruitment is estimated to have declined during the 1960s and 1970s, and to have then gradually increased to a moderate level throughout the 1980s and 1990s. The estimated initial decline in recruitment should be interpreted with caution, because it is responding to sharply declining longline CPUE during this period that cannot be explained by fishing mortality due to the relatively small level of catch. It is more likely that the initial decline is a catchability effect as it occurs during a period when the Japanese longline fleet was transitioning to target tropical tunas.

The absolute spawning potential is scaled up compared to the 2015 assessment, largely as a result of additional younger age classes being included in the spawning potential with the incorporation of the relative maturity at length data.

While biomass is estimated to have declined initially, estimates of spawning potential, and biomass vulnerable to the various longline fisheries have been stable or possibly increasing slightly over the past 20 years. This has been influenced mainly by the estimated recruitment, which has generally been somewhat higher since 2000 than in the two previous decades.

Quality of the assessment:
The main underlying source of difficulty in the assessment concerns the basic structure of the fishery. Exploitation is focused on the oldest segment of the population with relatively little exploitation of pre-adult fish. This means that there is relatively little information in the model to inform on recruitment variability.

With the majority of the exploitation focused on fish that are growing very slowly, or have essentially ceased growing, estimating the age composition of catches from length composition, regardless of the quality of growth estimates, is subject to considerable uncertainty.

The most influential sources of uncertainty in the stock assessment results are the assumed level of natural mortality and growth (**Figure 1**). For the diagnostic case, an age-invariant M of 0.3^{-1} was assumed to be consistent with the 2015 assessment, and a level of 0.4^{-1} as the alternative setting in the structural uncertainty grid was also used. The higher setting results in substantially more optimistic assessment outcomes:

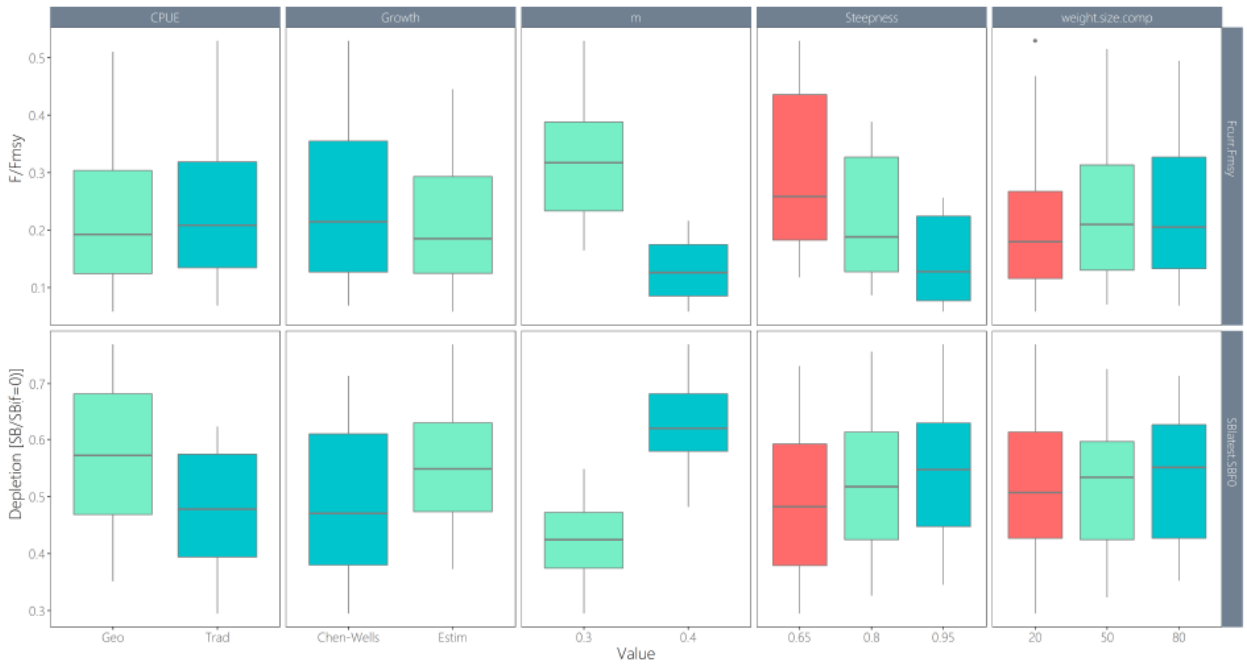

Figure 1: Boxplots summarising the results of the structural uncertainty grid with respect to the spawning potential reference point (left panels), and the fishing mortality reference point Frecent=FMSY (right panels). Colours indicate the level of the model with respect to each uncertainty axis **R1**

The grid contains 72 models showing a wide range of estimates of stock status, trends in abundance and reference points. The uncertainty identified is higher than for previous assessments for this stock, but none of the runs fell below the LRP of 20% SBF=0. The terminal depletion (2016) ranges from 0.30 to 0.77 of SBF=0 (0.32 to 0.72 for SBrecent=SBF=0 with distinct patterns under some axes. All models indicate that the stock is above the limit reference point (of 0.2SBF=0).

A steady increase in fishing mortality of adult age-classes is estimated to have occurred over most of the assessment period accelerating since the 1990s but declining following the decline in catch since 2010. Juvenile fishing mortality increased until around 1990, with a large spike in the late 1980s due to the driftnet fishery, and has remained stable at a comparatively low level since that time.

Kobe plots show estimates of Frecent=FMSY and SBlatest=SBF=0 (and SBrecent=SBF=0 for comparison) across all models in the grid **Figure 2:**

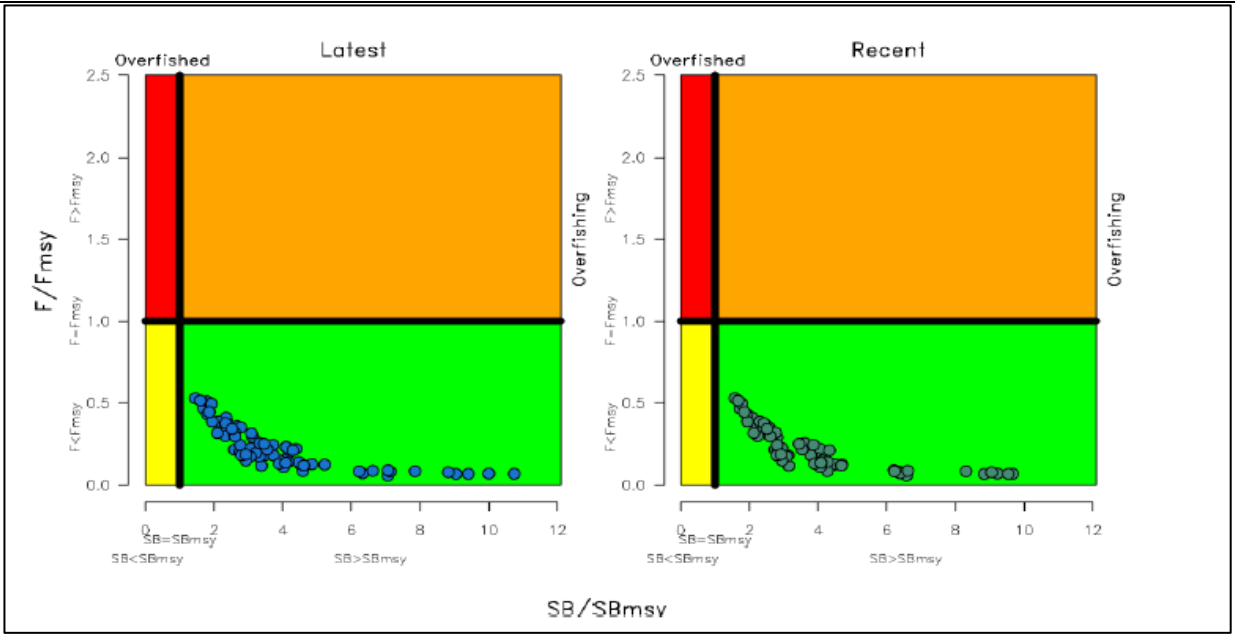

Figure 2: Kobe plots summarising the results for each of the models in the structural uncertainty grid under the SBlatest=SBF=0 and the SBrecent=SBF=0 reference points. **R1**

The species is considered, in its most recent stock assessment, to have a biomass above the limit reference point (or proxy) and therefore clause C1.2 is met.

References

R1 Tremblay-Boyer, L., J. Hampton, S. McKechnie and G. Pilling (2018) WCPFC Scientific Committee: Stock Status &Trends plus Management Advice and Implications: https://www.wcpfc.int/doc/04/south-pacific-albacore-tuna

R2 FAO country fisheries overview, Thailand: http://www.fao.org/fishery/facp/THA/en

R3 Pilling G., R. Scott, P. Williams, S. Brouwer and J. Hampton (August 2017) WCPFC Scientific Committee: A compendium of fisheries indicators for tuna stocks 37pp https://www.wcpfc.int/node/29521

R4 CITES Species Endangered list: http://checklist.cites.org/#/en accessed 16.07.19

R5 IUCN Red list: https://www.iucnredlist.org/species/21856/9325450 accessed 16.07.19

Standard clauses 1.3.2.2