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**INFORMATION PAPER ON INTERIM HARVEST STRATEGIES FOR TROPICAL
TUNA IN ARCHIPELAGIC WATERS OF INDONESIA: UPDATE**

**WCPFC15-2018-DP28
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Paper by Indonesia

Introduction and scope

As part of a range of initiatives aimed at achieving sustainability of the stock while taking into account social and economic benefits from the harvest of tuna resources in archipelagic waters which is a sovereignty right for Indonesia and not managed by the WCPFC, Indonesia intends to develop and implement scientifically-tested harvest strategies to manage the level of targeted fishing on these important resources.

The development and implementation harvest strategies for major tuna species is also consistent with Indonesia's rights and obligations as a member of the international governance bodies for these highly migratory stocks: Regional Fisheries Management Organizations (RFMOs). Indonesia intends to develop Harvest Strategies within its archipelagic waters which are compatible with measures mandated by the RFMOs. In addition, implementation of the monitoring, assessment and management measures, which form the essential elements of a harvest strategy, are central to achieving certification for fisheries, such as Marine Stewardship Council (MSC).

Indonesia Archipelagic Water (IAW), Fisheries Management Areas (FMAs) 713, 714 and 715 have been identified as a priority area for this initiative due to the significant role it plays for Indonesia tuna fisheries. Approximately 60% of national catch are from those areas. A strong residential behavior has been reported by Rice et al. (2014)¹ for skipjack and highlighted during the WPEA Three Country Stock Assessment Workshop, held in Vietnam in 2015, for skipjack and yellowfin. Therefore, the development and implementation of harvest strategies for tuna fisheries in Indonesian archipelagic waters demonstrates Indonesia's commitment to long-term sustainability of these nationally and regionally important resources. It is the intention that this process will initially focus on these 3 FMAs but will, at a later date, be expanded to include all national waters.

The purpose of this Harvest Strategy development is to establish a clear and transparent management system that is capable of responding quickly to warning signals in the fishery and aims to take into consideration best practices in fisheries management and long-term sustainability of the stock while balancing social and economic concerns.

Fishery Policy and Regulatory Context

The following section identifies the existing policy and regulatory framework which requires Indonesia to develop its management under the context of a Harvest Strategy process.

To carry out the mandate of Article 10 paragraph 2 Law No. 31 Year 2004 on Fisheries as amended by Law No. 45 year 2009, Indonesia became the member of Regional Fisheries Management Organization (RFMO) which has a mandate to ensure the realization of sustainable tuna management, as follows:

- a. Indian Ocean Tuna Commission (IOTC) according to Presidential Decree No. 9/2007 date 5 March 2007 on the Agreement of IOTC Establishment.

¹ Rice, J., Harley, S., Davies, N. & Hampton, J. (2014). Stock assessment of skipjack tuna in the Western and Central Pacific Ocean. Presented at the Scientific Committee Tenth Regular Session in Majuro, Republic of the Marshall Islands 6-14 August 2014. WCPFC-SC10-2014/SA-WP-05.

- b. Commission for the Conservation of Southern Bluefin Tuna (CCSBT) according to Presidential Decree No. 109/2007 date 6 December 2007 on Ratification of the Convention for the CSBT.
- c. Western and Central Pacific Fisheries Commission (WCPFC) according to Presidential Decree No. 61/2013 date 28 August 2013 on the Ratification of WCPFC Convention.

In a national context, the development and implementation of a harvest strategy framework fulfils a priority action of the National Tuna Management Plan (NTMP) for tropical and neritic tuna species and its associated action plans (MMAF, 2015b). This is an important step in the process of development, testing and implementation of harvest strategies for yellowfin, skipjack and bigeye tuna fisheries in the Indonesia's archipelagic waters (FMAs 713, 714 and 715).

The NTMP sets a five-year plan for implementing action plans including harvest strategies development and implementation, and to support the process of FIPs (Fisheries Improvement Projects) and fisheries certification.

The NTMP is stated in the Ministerial Decree of Marine Affairs and Fisheries No. 107/2015. This decree describes the interim management objectives and harvest strategy framework developed through a 3 years technical and consultative process. The harvest strategy framework details the form of harvest strategy that will be developed, refined and implemented for managing level of fishing for tropical tuna in the Indonesian Archipelagic Waters. It includes a workplan of specific data and information requirements, consultation processes and technical refinement and evaluation of the species-specific harvest strategies prior to implementation.

Management Objectives

The determination of management objectives and management measures was done through series of related stakeholder meetings by conducting selection process and risk-assessment (Fletcher, 2016).

From 9 (nine) capture fisheries development objective as stipulated in Article 3 Law No 31 year 2004 on Fisheries as amended by Law 45 year 2009 on Fisheries, it was agreed through a series of 7 stakeholder workshops that the management objective for skipjack and yellowfin tuna is to ensure the sustainability of skipjack, yellowfin tuna and bigeye tuna resources, with the first attempt is for skipjack and yellowfin tuna, through harvest strategy implementation in the archipelagic waters.

Reference Points

Limit Reference Point

The default limit reference point for tuna in archipelagic waters is to maintain spawning stock biomass above 0.2 of the unfished level with a probability of 90 percent.

Target Reference Point

A target reference point for tuna in archipelagic waters has not been agreed as this requires more detailed consideration of the implications for social and economic objectives for the fishery.

The current WCPFC target reference point that the spawning biomass should be 0.5 estimated unfished spawning biomass on average (i.e. 50% of the time), as defined by the most recent regional stock assessment of the WCPFC Scientific Committee. While IOTC has agreed to have a target reference point as 0.4 of estimated unfished spawning biomass (IOTC Resolution 16/02 on harvest control rules for skipjack tuna in the IOTC area of competence). The IAW has a specific characteristic and located between the Pacific and Indian Oceans and might have a connection to the two oceans. Therefore, the target reference point for the skipjack in IAW will be set and tested between 0.4 and 0.5 of estimated unfished spawning biomass.

Alternative target reference points for yellowfin and bigeye tuna will be investigated, based on continuing technical and consultative work program for harvest strategy implementation.

Performance measures for HS selection

The aim of a harvest strategy is to achieve the overall objectives for the fishery. Performance measures are more detailed summary statistics generated during the testing and selection harvest strategies that relate to the performance of the harvest strategy with respect to stock, fishery, economic and social objectives. Having a wide range of performance measures, that relate directly to the important components of the fishery and wider community and economy, allows government and stakeholder to make judgements about the trade-offs among social and economic benefits for alternative harvest strategies and select one to implement that is most likely to provide the best compromise and acceptable performance overall. This is done as part of the Management Strategy Evaluation process (see Implementation Plan).

Initial input for the development of performance measures was obtained from stakeholder using a structure survey at the 4th stakeholder workshop in November 2016 and refined subsequently through the 5th-7th stakeholder workshops. This performance measures development is a participatory and adaptive process, allowing for improvement.

Interim Harvest Strategy Framework for tropical tuna in Indonesia's Archipelagic waters

General Harvest Strategy framework

A harvest strategy is a carefully considered, detailed plan for *monitoring* and *assessing* a fishery and adjusting the level of fishing (relative to the previous year) using a specified *management measure* according to the *harvest control rule* to meet specific the objectives for the fishery (Figure 1).

Empirical harvest strategy

In the case of tropical tuna in FMAs 713, 714 and 715, it was considered that empirical harvest strategies were most appropriate. An empirical harvest strategy is based on indices of relative abundance, such as standardised catch rates, and/or size structure of the catch, and relatively simple analysis methods, rather than the population dynamics/stock assessment models used in model-based harvest strategies. Empirical harvest strategies have the advantages of being more transparent and more easily explained to non-technical audience and being less complicated to more straightforward to implement.

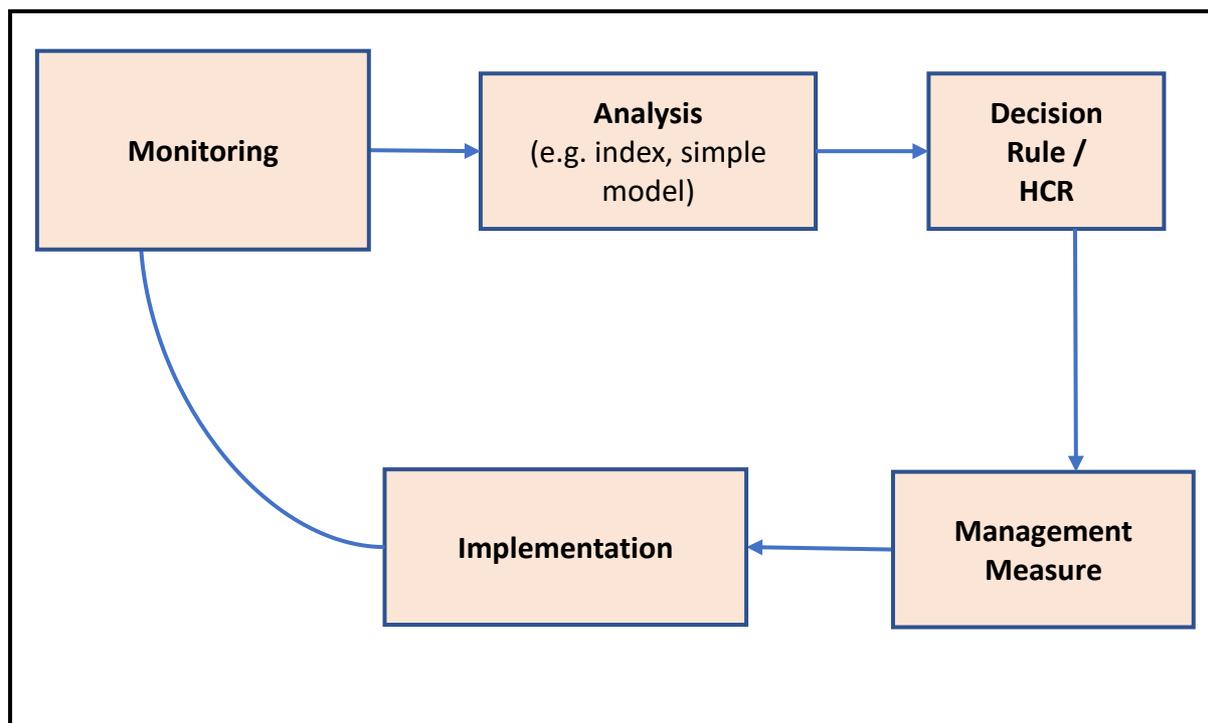


Figure 1: Conceptual illustration of the components of a harvest strategy. It is the combination of components that define an individual harvest strategy and determine its likely performance. Hence, if one, or more component(s) is (are) changed, this is considered a different harvest strategy. As part of the harvest strategy development and evaluation process, each component is specified in detail (Presentation by Campbell Davies (2016)).

Management Strategy Evaluation

In order to determine, to the extent possible, that the harvest strategy selected for implementation is likely to (a) meet the specified objectives for the fishery; and (b) be robust to major uncertainties in the status and dynamics of the stock and the fishery and effectiveness of monitoring and management, it is considered best practice to develop a range of alternative, practically feasible harvest strategies and compare the relative performance using a simulation modelling approach known as Management Strategy Evaluation (MSE).

Prototype operating models (OMs) have been developed for skipjack and yellowfin tuna, based on the relevant WCPFC regional stock assessments. These models provide the basis for testing the performance of specific alternative harvest strategies and providing government and stakeholders with results to select the most appropriate harvest strategy for each species for implementation. Summary of specification and process of developing prototype OMs and preliminary examples of harvest strategy framework for skipjack tuna and yellowfin tuna in Indonesian archipelagic waters is provided by Hoshino *et al.* (2018)². The prototype OMs consisted of a biological component of the system, the fisheries that operate in region 4 (skipjack) and region 7 (yellowfin) of the WCPO statistical areas, and a feedback loop which enables feedback of data and management actions to simulated fish population. These models

² Hoshino E, Hillary RM, Davies C, Sarwono ET, Sadiyah L, Satria F, and Proctor C. (2018). Development of prototype operating models for exploring harvest strategies for tropical tuna in Indonesian archipelagic waters: case studies for skipjack and yellowfin tuna. Report to the Western Central Pacific Fisheries Commission. CSIRO Oceans and Atmosphere, Hobart, Australia.

are conditioned using the WCPO stock assessment outputs as well as Indonesian port-sampling data.

Within the current OMs work, only several key variations of the preliminary harvest strategies were explored. Further, more comprehensive exploration is required to identify highly plausible and important hypothesis to be included in the OMs (reference set OMs) as well as further simulation trials including less plausible or important hypothesis, termed “robustness test”. This work will be continued to explore operational candidate harvest strategies that include a wider range of alternative hypothesis about the system, fishery as well as social and economic considerations.

Consultation

The process of development to current status of the harvest strategy has been conducted in a consultative, collaborative and multi-stakeholder approach. Lead government institutions have been the Directorate of Fish Resources Management, Directorate General of Capture Fisheries and the Centre for Fisheries Research, both under the Ministry of Marine Affairs and Fisheries.

Under the direction of the Directorate of Fish Resources Management and by instruction from the Director General for Capture Fisheries a steering committee was established comprised of officials from DGCF, Centre for Fisheries Research and some external expert advisors.

Additionally, a technical group was established and led by the Centre for Fisheries Research which included technical guidance and input from Commonwealth Science and Industrial Research Organisation (CSIRO), with extensive experience in the harvest strategies and MSE, and supported by various stakeholders, including NGOs and academia.

Thirdly, coordinated again by the Directorate for Fish Resources Management, the progress was regularly communicated to and input sought from a wider stakeholder group including government officials and scientists, provincial governments, NGOs and industries.

Multiple stakeholder consultations and technical workshops have taken place over the last years, fostering a transparent and participative environment for harvest strategy development. Summary of harvest strategy development process for tropical tuna in the Indonesia’s Archipelagic Waters (Figure 2).

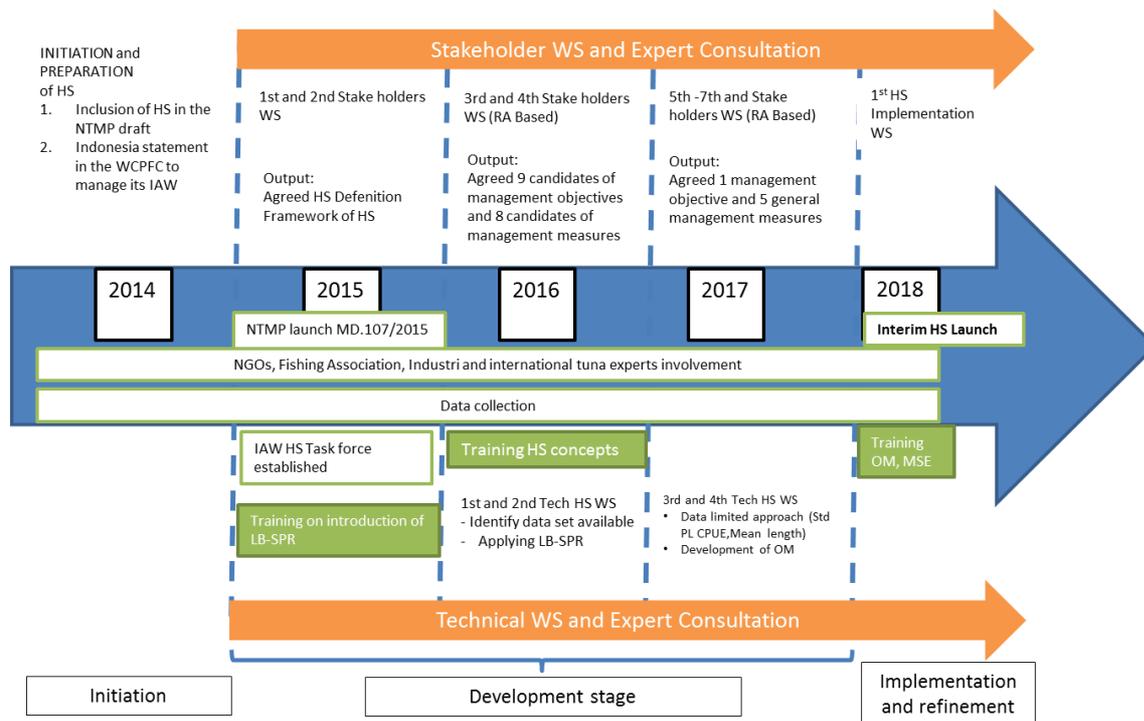


Figure 2: Summary of Harvest Strategy Development Process for Tropical Tuna in the Indonesia's Archipelagic Waters (modified from Satria and Sadiyah (2018)³)

Management Measures

From the 15 (fifteen) management measures stipulated in Article 3, Law No 31 Year 2004, on Fisheries, and amended by Law 45 year 2009 on Fisheries, 8 (eight), management measures were selected through selection processes at the 4th and 5th Stakeholder Workshop. Subsequently, a risk-assessment process was completed at the 6th Stakeholder Workshop, and the following 5 (five) priority selected management measures were selected:

- Limit on use of Fish Aggregating Devices.
- Spatial closures (of important spawning or nursery grounds) and temporal closures (during important events such as spawning).
- Number of fishing days (per gear, for semi industrial and industrial vessels).
- Number of vessels – limited entry (per gear; for semi industrial and industrial vessels through licensing, permits, taxing, royalties).
- Total Allowable Catch (TAC) limits per Fishery Management Area.

The 1st harvest strategy implementation workshop recommended that there are no additional fishing permits for industrial fishing vessels (>30 GT) catching YFT and SKJ until the NTMP being reviewed in 2019.

Implementation plan for refinement, testing and selection of harvest strategies and operational implementation

1. Monitoring

³ Satria F and Sadiyah L. (2018) The development of harvest strategies for tropical tuna in Indonesia's archipelagic waters. *Indonesia Fisheries Research Journal* vol 24, No 1 : (June) 2018

2. Targeted research
 - a. Representative age, growth and reproductive biology parameters for Archipelagic waters;
 - b. Operational catch and effort data for pole and line and hand line and/or longline fisheries to improve CPUE standardization;
 - c. Review and optimization of port monitoring programs to improve estimation of total catch and effort in archipelagic waters.
3. Testing, refinement and selection of operational objectives and harvest strategy
 - a. Technical work program;
 - b. Stakeholder consultation.
4. Specification and implementation of management measures
 - a. Refine detail of preferred management measure(s);
 - b. Determine necessary regulatory and monitoring requirements for implementation.
5. Policy development and institutional arrangements required for harvest strategy implementation
 - a. Regulations

Identification on the regulations and policy which need to be developed specifically relating to the responsibility of implementation. A guidance to the following components will need to be incorporated into policy over the medium term:

 - Monitoring of the HS;
 - Scientific overview of the HS;
 - Infrastructure required for HS process (decision making loop and enforcement);
 - Monitoring control and surveillance for HS;
 - Jurisdiction between national and provincial governments for implementation of the HS;
 - Budget allocations for HS;
 - Sanctions related to HS.
 - b. Institutional roles and responsibilities

The direct management of the harvest strategy will fall under the jurisdiction of the Directorate for Fish Resources Management under the Directorate General for Capture Fisheries, Ministry of Marine Affairs and Fisheries. The scientific component of the Harvest Strategy implementation will be performed by the Centre for Fisheries Research. The provincial governments, under provincial regulation, will be responsible for the implementation of the harvest strategy within their jurisdictions, considering Law No 23/2014 (concerning on local government).
 - c. Consultative and advisory forums

The steering committee initially established under direction from the Directorate General Capture Fisheries will continue to act as an advisory group to the harvest strategy process for the period 2018-2021, at a minimum. The technical advisory group and the stakeholder forum established during the development phase will also continue to exist to support the initial implementation and testing phases of the harvest strategy process for Indonesian Archipelagic Waters 713, 714, and 715 for the period 2018-2021. The continuation of the technical and stakeholder groups will allow for the Interim Harvest Strategy process to proceed in a consultative and adaptive method,

allowing for learning, improvement and multi-stakeholder acceptance of this new management approach.

6. Stakeholder capacity building and continuous training

Current Status and Near Future

The Indonesian Harvest Strategy process is currently entering the implementation phase, in 2018. The Indonesian government will aim to develop the relevant regulatory framework to initiate the phase two work for period 2018-2021.

We look forward to have a further discussion on Indonesia's Harvest Strategy development with other CCMs during WCPFC15 in Honolulu, Hawaii.

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