

# INTERIM HARVEST STRATEGIES FOR TROPICAL TUNA IN ARCHIPELAGIC WATERS OF INDONESIA

---



---

Ministry of Marine Affairs and Fisheries of  
The Republic of Indonesia  
2018

## INTRODUCTION

Indonesia archipelagic water within the Indonesia Fisheries Management Areas (IFMA) number 713, 714, and 715 are Indonesia sovereignty. Those waters are well-known for the abundance of tuna resources such as skipjack tuna, yellowfin tuna, and bigeye tuna, which are categorized as highly migratory species. Based on the tagging study result by Secretariat of the Pacific Community (SPC) during 2009-2010, in those IFMAs, not many of those species migrating in and out the archipelagic waters.

However, with accordance to United Nation Convention of the Law of the Sea (UNCLOS) 1982, which has been ratified by Indonesia through Act No. 17 Year 1985, highly migratory species are managed by international or regional cooperation. In this case, Indonesia has strong commitment and concern on managing tuna resources in all Indonesia waters including its archipelagic waters based on the provisions adopted by Tuna Regional Fisheries Management Organizations (RFMOs).

In 2015 as one of the significant outputs of the 1<sup>st</sup> Bali Tuna Conference held at the end of 2014, the implementing rules and standard from RFMOs has been set into by the Ministerial Decree of Marine Affairs and Fisheries of the Republic of Indonesia Number 107/KEPMEN-KP/2015 concerning Fisheries Management Plan of Tuna, Skipjack and Neritic Tuna (NTMP). As mandated by this Ministerial Decree and in compatible with the Western Central and Pacific Commission (WCPFC) conservation and management measures number 2014-06, the Interim Harvest Strategies Document for Tropical Tuna in Archipelagic Waters of Indonesia is introduced during the organization of the 3<sup>rd</sup> Bali Tuna Conference in May 2018.

This interim document will be served by the Indonesian stakeholders as the basis for harvesting strategy in the Indonesia archipelagic water in (IFMA 713, 714, and 715) to ensure the sustainability of yellowfin tuna, bigeye tuna and skipjack tuna resources in those waters areas. This Harvest Strategy Framework is interrelated processes of monitoring, analysis,

implementation and evaluation based on agreed management objective, operational objective, and management measures or harvest control rules.

This document has been developed after going through several processes since 2014 by cooperating with related stakeholders. The supports and sustained cooperation from the relevant domestic tuna stakeholders and also international fisheries experts from Commonwealth Scientific and Industrial Research Organization (CSIRO) and WCPFC who have given significant contribution to the development and in the implementation of this harvest strategy are very much appreciated.

Jakarta, May 2018

Director General of Capture Fisheries

Sjarief Widjaja

# LIST OF CONTENT

INTRODUCTION .....	ii
LIST OF CONTENT .....	iv
LIST OF APPENDIX .....	v
1. Interim harvest strategies for tropical tuna in archipelagic waters of Indonesia .....	1
1.1. Fishery Policy and regulatory context .....	1
1.2. Management Objectives .....	2
1.3. Operational Objectives .....	2
1.3.1. Reference Points .....	2
1.3.1.1 Limit Reference Point.....	2
1.3.1.2 Target Reference Point .....	3
1.3.2. Performance measures for HS selection.....	3
2. Harvest Strategy Framework for skipjack, yellowfin tuna and bigeye tuna in Archipelagic waters .....	4
2.1. Empirical harvest strategy.....	5
2.2. Management Measures .....	5
2.3. Management Strategy Evaluation.....	6
2.4. Consultation .....	7
3. Relationship between Interim Harvest Strategy for archipelagic waters and relevant Regional Fisheries Management Organizations .....	7
4. Action plan for refinement, testing and selection of harvest strategies and operational implementation.....	8

## LIST OF APPENDIX

<b>APPENDIX 1.</b>	Framework for Harvest Strategy for Skipjack, Yellowfin, and Bigeye tuna in the Archipelagic Waters of Indonesia .....	10
<b>APPENDIX 2.</b>	Summary of Technical and Consultative Process for Development of Harvest Strategy Framework for Skipjack, Yellowfin Tuna and Bigeye Tuna in Indonesian Archipelagic Waters.....	14
<b>APPENDIX 3.</b>	Action Plan for Indonesian Archipelagic Waters Tuna Harvest Strategy 2018-2023 .....	15
<b>APPENDIX 4.</b>	Detail action Plan for a-five years implementing the IAW tuna Harvest strategy (2018-2023).....	17

# 1. Interim harvest strategies for tropical tuna in archipelagic waters of Indonesia

## 1.1. Fishery Policy and regulatory context

As part of a range of initiatives aimed at achieving sustainable social and economic benefits from the harvest of tuna resources in archipelagic waters, Indonesia intends to develop and implement scientifically-tested harvest strategies to manage the level of targeted fishing on these tuna resources. The development and implementation of harvest strategy framework is a priority action of the National Tuna Management Plan (NTMP) for tuna and neritic species and associated action plans which been set into by the Ministerial Decree of Marine Affairs and Fisheries of the Republic of Indonesia Number 107/KEPMEN-KP/2015. The harvest strategy framework is an important step in the process of development, testing and implementation of harvest strategies for yellowfin tuna, skipjack tuna and bigeye tuna fisheries in Indonesian archipelagic waters (Indonesia Fisheries Management Areas/IFMA number 713, 714 and 715).

The development of harvest strategies for major tuna species is also consistent with Indonesia's rights and obligations as a member of the Regional Fisheries Management Organizations (RFMOs) responsible for governance of these highly migratory stocks: the Western Central Pacific Fisheries Commission, Indian Ocean Tuna Commission and Commission for the Conservation of Southern Bluefin Tuna. Importantly, implementation of the monitoring, assessment, harvest control rules and management measures, which are essential elements of a harvest strategy, are central to achieving Marine Stewardship Council (MSC)-certification for these fisheries.

The NTMP sets a five-year plan for implementing action plans including development and implementation of harvest strategies, and to gain MSC

certification. This addendum to the NTMP describes the management objectives and harvest strategy framework (Appendix 1) developed through a 2 year technical and consultative process (Appendix 2). The harvest strategy framework details the forms of harvest strategy developed through this process, that will be refined and implemented for management of fishing effort targeted at tropical tuna in Indonesian Archipelagic Waters. It includes an updated action plan (Appendix 3 and 4) of specific information requirements, consultation processes and institutional arrangements required for the implementation of the harvest strategies for each species.

## 1.2. Management Objectives

From the nine management objectives for capture fisheries, as stipulated in Article 3 Law No 31 year 2004 on Fisheries, and amended by Law 45 year 2009 on Fisheries, it was agreed by series of stakeholder workshops that the management objective for yellowfin tuna, bigeye tuna and skipjack tuna is:

“to ensure the sustainability of yellowfin tuna, bigeye tuna and skipjack tuna resources” through harvest strategy implementation.

## 1.3. Operational Objectives

To maintain spawning stock biomass (SSB) above the limit reference point (LRP) of 0.2 of the unfished level, with the probability of 90% over the 10-year projection period.

### 1.3.1. Reference Points

Reference point is the benchmarks that scientist and managers use to compare the current status of a stock or fishery to a desirable state.

#### 1.3.1.1. 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%.

### 1.3.1.2. Target Reference Point

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

The current WCPFC target reference point for skipjack is that the spawning biomass should be 0.5 of the unfished spawning biomass on average (CMM 2017-01), while current IOTC Target Reference Point for skipjack that the spawning biomass should be 0.4 estimated unfished spawning biomass on average (IOTC Resolution 2016-02).

Alternative target reference points for skipjack tuna, yellowfin tuna and bigeye tuna will be investigated, based on stakeholder surveys and using Management Strategy Evaluation (MSE) testing as part of the Action Plan for harvest strategy implementation (Appendix 3 and 4).

### 1.3.2. Performance measures for HS selection

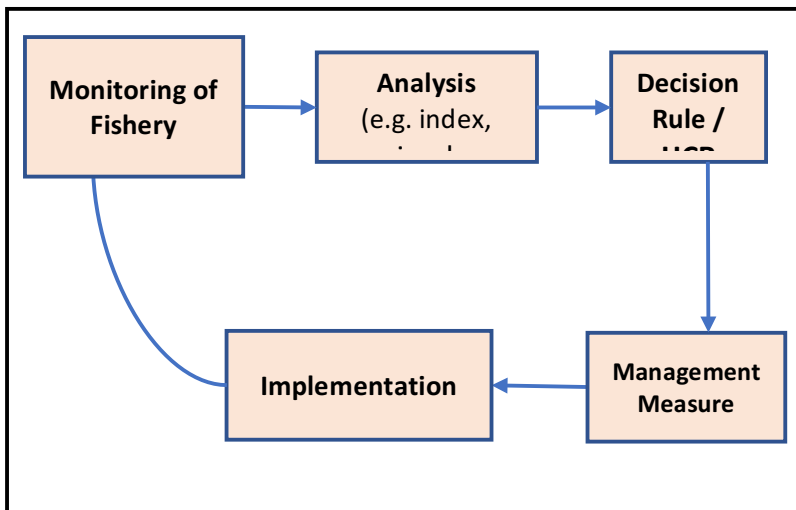
The aim of a harvest strategy is to achieve an appropriate balance of the social, economic and stock conservation objectives for the fishery. Performance measures are more detailed summary statistics generated during the testing and selection of harvest strategies that relate to the performance of the harvest strategy with respect to stock, fishery, economic and social objectives. It is desirable to have a wide range of performance measures that relate directly to the important components of the fishery and wider community and economy. This allows government and stakeholder to make judgements about the trade-offs among social and economic benefits for alternative harvest strategies and select a final form of harvest strategy 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 Figure 1 and Action plan).



Initial input for the development of performance measures was obtained from stakeholder using a structured survey at the 4th stakeholder workshop in 14-16 November 2016<sup>1</sup>.

## 2. Harvest Strategy Framework for skipjack, yellowfin tuna and bigeye tuna in Archipelagic waters

A harvest strategy is a carefully considered and agreed 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 the specific objectives *for the fishery* (Figure 1).



**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.

---

<sup>1</sup> Anon 2016. DGCF Report on 4<sup>th</sup> Stakeholder Workshop

## 2.1. Empirical harvest strategy

In the case of tuna in WPP 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 and, hence, requiring less technical expertise. Experience in other fisheries and modelling studies comparing empirical and model-based harvest strategies indicate that it is possible to achieve comparable management outcomes from empirical harvest strategies.

## 2.2. Management Measures

From the 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 4<sup>th</sup> and 5<sup>th</sup> Stakeholder Workshop. Subsequently a risk-assessment process was completed at the 6<sup>th</sup> Stakeholder Workshop, and the following five priority selected management measures were selected:

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

### 2.3. Management Strategy Evaluation

In order to determine, to the extent possible, that a 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 their relative performance using a simulation modelling approach known as Management Strategy Evaluation (MSE)<sup>2</sup>.

A set of MSE models have been developed for skipjack and yellowfin tuna, based on the relevant WCPFC regional stock assessments<sup>3</sup>. These MSE models have been used to develop and conduct preliminary testing of empirical harvest strategies for skipjack and yellowfin tuna, based on the available information<sup>4</sup> and monitoring series<sup>5</sup>, and examine the general feasibility of proceeding with the framework for harvest strategies for skipjack tuna, yellowfin tuna, and bigeye tuna.<sup>6</sup>

These MSE models also 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. This will be completed as part of the MSE technical and consultation process (see Action Plan, appendix 3)

---

<sup>2</sup> Punt and Donavan 2007, REF

<sup>3</sup> Hoshino et al 2017. SPC assessments used in 2017 Tech WS, Sidayah et al 2017.

<sup>4</sup> Dutto et al report on the available data series

<sup>5</sup> Sidayah et al 2017 CPUE and Ernawati et al selectivity

<sup>6</sup> Davies et al 2017, summary and conclusion presentation to stakeholder 2017 workshop

## 2.4. 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 departments 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.

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 Organization (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 industry.

## 3. Relationship between Interim Harvest Strategy for archipelagic waters and relevant Regional Fisheries Management Organizations.

Indonesia archipelagic waters (IFMA 713, 714, and 715) are Indonesia sovereignty. These waters are well-known for the abundance of tuna resources such as skipjack tuna, yellowfin tuna, and bigeye tuna. These species are categorized as highly migratory species.

According to UNCLOS (1982) which has been ratified by Indonesia through Act No. 17 Year 1985 that highly migratory species are managed by international or regional agreement, in this case is tuna Regional Fisheries Management Organization (tRFMO). Based on the results of tagging (SPC 2009-2010) and genetic (CFR-CSIRO) in those IFMAs, not many of those species migrate in and out the archipelagic waters. However, Indonesia has strong commitment to managing tuna resources within its archipelagic waters in a sustainable manner and consistent with the intent of measures adopted by RFMOs, such as through the implementation of harvest strategy. This includes the use of the most recent WCPFC stock assessments in the MSE models used to develop and test the harvest strategies for skipjack and yellowfin tuna (See Appendix 1 and 2).

#### 4. Action plan for refinement, testing and selection of harvest strategies and operational implementation

Implementation of harvest strategies for tuna in IAW requires the following priority activities to be completed:

1. Maintenance, extension and improvement of fisheries monitoring and data collection programs
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 fisheries to improve CPUE standardisation
  - c. Review and optimisation 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. Confirmation of regulatory and institutional arrangements required for harvest strategy implementation
  - a. Regulations
  - b. Institutional roles and responsibilities
  - c. Consultative and advisory forums
- 6. Policy, stakeholder and science capacity development for harvest strategy implementation

The action plan for implementation (appendix 3) provides an overview of the activities, schedule, responsible agency and contributing partners.

## **APPENDIX 1. Framework for Harvest Strategy for Skipjack, Yellowfin, and Bigeye tuna in the Archipelagic waters of Indonesia**

### **1. Management Objectives**

Ensure the sustainability of tuna resources in archipelagic waters of Indonesia through harvest strategy implementation.

#### **a. Reference Points**

##### **i. Limit Reference Point**

The default limit reference point for skipjack, yellowfin and bigeye tuna in archipelagic waters is to maintain spawning stock biomass above 0.2 of the unfished level.

This is consistent with the default limit reference points recommended by the WCPFC Scientific Committee and adopted by WCPFC<sup>7</sup>.

##### **ii. Target Reference Point**

A target reference point for tuna in archipelagic waters has not been decided. The issue of target reference points requires more detailed consideration of the implications of species specific target reference points for the broader social and economic objectives for the fishery.

The WCPFC adopted target reference point for skipjack tuna of 0.5 of unfished spawning biomass on average<sup>8</sup>, while the IOTC has adopted Target

---

<sup>7</sup> Report of the 7th meeting of the Scientific Committee of the WCPFC (<https://www.wcpfc.int/meetings/7th-regular-session-scientific-committee>) and adopted at WCPFC8, based on Preece et al 2012 (<https://www.wcpfc.int/node/2745>).

<sup>8</sup> WCPFC14, CMM 2015-06, <https://www.wcpfc.int/system/files/CMM%202015-06%20CMM%20on%20a%20Target%20Reference%20point%20for%20WCP%20Skipjack%20Tuna.pdf>

Reference Point for skipjack of 0.4 estimated unfished spawning biomass on average<sup>9</sup>.

Alternative target reference points for skipjack tuna, yellowfin tuna and bigeye tuna in the Indonesian archipelagic water will be investigated, based on stakeholder consultation, as a part of technical and consultative work program for harvest strategy implementation

#### **b. Performance measures for HS selection**

Performance measures are detailed statistics generated during the testing and selection of harvest strategies and may reflect the performance of a 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 informed decisions about the trade-offs among social and economic benefits for alternative harvest strategies and select one 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 14-16 November 2016

## **2. Harvest strategy Framework**

### **a. Potential Monitoring data series**

The potential monitoring data series that could be used as input to harvest strategies have been identified during the technical consultation process during 2015-2016? (Anon 2016). These are:

---

<sup>9</sup> IOTC Resolution 2016-02, <http://iotc.org/cmm/resolution-1602-harvest-control-rules-skipjack-tuna-iotc-area-competence>.



- i. Catch and effort data from pole and line fishery for skipjack tuna, deep hand line fishery (and potentially longline fishery) for yellowfin and bigeye tuna [through port sampling, logbook, and observer on board data] used to calculate CPUE
  - ii. Size distribution of catch from pole and line fishery for skipjack tuna, deep hand line fishery (and potentially longline fisher) for yellowfin and bigeye tuna based on port-based sampling programs (CFR-WCPFC- WPEA project, MDPI, etc.)
- b. Analysis method
  - i. CPUE standardization to provide a relative abundance index.
  - ii. Calculation of trend in average size of fish in catch from pole and line fishery.
- c. Forms of Harvest Control Rule
  - i. Empirical harvest control rule, and could be a weighted combination of standardized CPUE and average mean length of fish in catch from pole and line fishery
- d. Management Measure
  - i. Effort controls
  - ii. Specific details of management measures and implementation will be determined through consultation and technical work plan.

### **3. Priority information needs**

- a. Operational disaggregated catch and effort information for the Indonesian fisheries to improve the accuracy of estimating CPUE index from monitoring data series
- b. Continuation and expansion of coverage of port-based monitoring (e.g. through increasing the number of sample sizes or sampling locations) for estimation of total catch and size distribution of catch.
- c. Basic biology of skipjack, yellowfin and bigeye tuna in archipelagic waters (age, growth, reproduction) in order to better understand the productivity of those species in the Indonesian archipelagic waters.

- d. Given that social and economic objectives have been identified as important during the Stakeholder consultations, social and economic data and indicators need to be collected.
- e. Improve the data collection for small scale fisheries.
- f. Feasibility assessment for implementation of alternative forms of effort management measures

## APPENDIX 2. Summary of Technical and Consultative Process for Development of Harvest Strategy Framework for Skipjack, Yellowfin Tuna And Bigeye Tuna in Indonesian Archipelagic Waters

Multiple stakeholder consultations and technical workshops have taken place over the last years, fostering a transparent and participative environment for harvest strategy development.

Date	Meeting type	Location
November 2014	Preparation meeting	Bogor, Java
March 25-27, 2015	Harvest Strategy preparation and introduction meeting	Bogor, Java
May 18-22, 2015	Stakeholder consultation and expert meeting	Bogor, Java
August 10, 2015	Pre-workshop for data analysis	Bogor, Java
November 16-18, 2015	Stakeholder consultation	Kuta, Bali
November 19-20	Baseline data to develop harvest strategies	Kuta, Bali
April 4-7, 2016	1 <sup>st</sup> technical meeting for harvest strategy development	Bogor, Java
November 10-11, 2016	2 <sup>nd</sup> technical meeting for harvest strategy development	Denpasar, Bali
November 14-16, 2016	Stakeholder consultation	Bogor, Java
March 6-7, 2017	3 <sup>rd</sup> technical meeting for harvest strategy development	Jakarta, Java
March 8-10, 2017	5 <sup>th</sup> Stakeholder consultation	Jakarta, Java
July 12-13, 2017	6 <sup>th</sup> Stakeholder consultation	Loka Tuna, Bali
October 2017	4 <sup>th</sup> Technical Meeting	Bogor, Java
November 2017	7 <sup>th</sup> Stakeholder consultation	Bogor, Java

### APPENDIX 3. Action Plan for Indonesian Archipelagic Water Tuna Harvest Strategy 2018-2023

HS Component		Progress to date as per may 2018		Required Action	Lead Agency	Time frame
Management Strategy Evaluation	Harvest Strategy	Management Objectives	To ensure the sustainability of yellowfin tuna, bigeye tuna and skipjack tuna resources	familiarize the agreed Management objectives at national levels (Province and district)	DGCF	2018-2019
		Operational Objectives	To maintain spawning stock biomass (SSB) above the limit reference point (LRP) of 0.2 SSBF=0, <i>with the probability of 90% during the 10 years projection period</i>	take into account in the determination of MM to the OM and tested; Consider TRP in light of results of MSE testing	DGCF,AMFRHR	2018
		Monitoring	MAINTAIN Port sampling data collection Bitung, Kendari, Sodohoa, Sorong, Majene (since 2011) and (EXTEND to XX,YY,ZZ PORTS?)	Increase Data collection program by X % from the 2018 base line through strong collaboration with industry, fishing association and NGOs, log book, observer, RVIA, SIMKADA	DGCF, AMFRHR, MDPI, AP2HI, SFP, ATLI, ASTUIN	2018-end (Long term continues program)
		Analysis	SKJ: CPUE Standardization for Pole and Line; YFT: Selectivity (Mean length) from Hand Line .	Conduct annual assessment, Data maintenance, handling and exploration, consulting , reporting and refine CPUE	AMFRHR, CSIRO	
		Harvest Control Rule (HCR)	Empirical harvest strategy indices of relative abundance (standardized catch rates), and/or size structure of the catch	Complete MSE testing of final HCRs; Adopt and implement the HCR	DGCF, PROVINCE, DISTRICT DGCF, PROVINCE, DISTRICT	2018-2019

		Management Measure (MM)	1. Limit on use of Fish Aggregating Devices, 2. Spatial closures (of important spawning or nursery grounds) and temporal closures (during important events such as spawning). 3. Number of fishing days (per gear, for semi industrial and industrial vessels). 4. Number of vessels – limited entry (per gear; for semi industrial and industrial vessels through licensing, permits, taxing, royalties).	Issue the HS management measures through MMAF Decree/regulation, familiarize and enforce the measure to Province and District as well as Industry; Register All Fishing Boat/gear through RVIA and SIMKADA	DGCF, PROVINCE, DISTRICT	2018-2019
			5. Total Allowable Catch (TAC) limits per Fishery Management Area.	Evaluate the compliance and Effectiveness of the MM	DGCF	2020
	MSE testing	OM has been developed and updated	Update OMs with most recent SPC stock assessment and new biology and fishery parameters; Complete MSE testing of final HSs	DGCF, AMFRHR, CSIRO	2018-2020	
Targeted Research	<b>Biology and fishery parameters has been defined for IAW</b>	age, growth and reproductive biology to estimate productivity, operational catch and effort data for CPUE indices	AMFRHR, CSIRO	2018-2023		

**Note:** **AMFRHR:** Agency for Marine and Fisheries Research and Human Resource; **CSIRO:** Commonwealth Scientific and Industrial Research Organisation; **DGCF:** Directorate General for Capture Fisheries; **MDPI:** Masyarakat dan Perikanan Indonesia; **NGO:** Non-Government Organization; **RVIA:** Record of Vessels Authorized to fish for tuna skipjack tuna and neritic tuna; **SIMKADA:** Sistem Informasi Kapal Ijin Daerah.

#### APPENDIX 4. Detail action Plan for a-five years implementing the IAW tuna Harvest strategy (2018-2023)

No	Technical Activity	Rational for activity	Location	WPP	Gear	Species	Project/ Management Organization	Implementing Organization	Timeline Proposed
<b>MONITORING</b>									
1	Port side enumeration	Gathering information on tuna for submission to Indonesian research and stock assessments. Monitoring to gather length, CPUE and other data for the HS OM.	Lombok, Kupang, Seram Utara, Seram Selatan, Buru Utara, Buru Selatan, Ambon, Bisa, Manado, Sangihe, Bitung, Sorong, Toli-Toli, Bone	713, 714, 715, 716, 717, 572, 573	HL, PL, TL	YFT, BET, SKJ, ALB	MDPI, SEA USAID, Oceans USAID	MDPI	Ongoing
15	Port side enumeration	Gathering information on all aspects of the tuna FAD-based fisheries. Hopefully to assist HS development process.	Padang, Palabuhanratu, Kendari, Sorong	572, 573, 714, 715, 717	HL/TL, PL, PS	Main focus YFT, SKJ, BET but also non-target species (i.e. characterisation of all catch on tuna FADS).	<b>ACIAR Project FIS/2009/05 9</b> , CSIRO in partnership with CFR	CFR-CSIRO	Oct 2013 - present (at Kendari and Palabuhanratu). Oct 2013 - March 2015 (at Padang and Sorong).

16	Landing/port site enumeration	Monitoring to gather length, CPUE and other data for the HS OM	Bandaneira, Ambon	714	HL	YFT, BET	SFP-LINI	SFP-LINI	Ongoing
19	Port side enumeration	Monitoring to gather length, CPUE and other data for the HS OM	Bandaneira	714	HL	YFT	PT Intimas Surya; PT KML	PT Intimas Surya; PT KML	Ongoing
20	Port side enumeration	Monitoring to gather length, CPUE and other data for the HS OM	Ambon	714	LL	YFT, BET	PT MPM/PT KML	PT MPM/PT KML	yearly, starting 2017 data
23	Port side enumeration	Monitoring to gather length, CPUE and other data for the HS OM	Bitung, Kendari, Sodohoa, Sorong, Majene, Gorontalo	713, 714, 715, 716, 717	PL, PS, HL, TL, LL, GN	YFT, BET, SKJ	WCPFC (WPEA project)	CFR	Starting 2010
24	Observer onboard	Collect operational CPUE and fishing position, length in catch		All 11 areas	PL, PS, HL, LL	YFT, BET, SKJ, ALB	DGCF (National Observer Program)	DGCF	Starting 2013
25	Logbook filled by captains onboard	Collect operational CPUE and fishing position		All 11 areas		YFT, BET, SKJ, ALB	DGCF (National Logbook Program)	DGCF	Starting 2013
<b>DATA MANAGEMENT</b>									
26	E-BRPL (E-national stock assessment data)	One gate stock assessment data from Port sampling and Scientific observer	Indonesia	All	All	all species	BRPL-CFR, KOMNAS,	BRPL	On Going

27	Production data (One Data)	Contribute to National Statistic data, One Data	Indonesia	All	All	all species	One Data	One data	Ongoing
28	Logbook	CPUE for the HS	Indonesia	All	All	all species	DGCF	DGCF	Continuing
29	Database- I-Fish for fisheries data management. Protocols developed to meet RFMO and national government standards.	To create template for industry oriented data collection in the supply chain to contribute to high level data, especially for small scale fisheries where a current gap exists. Support data needs towards eco-certification	Indonesia	573, 713, 714, 715, 716, 717	HL/TL, PL	Main focus YFT, SKJ, BET but also non-target species and encounters with Endangered, threatened and protected species	MDPI	MDPI	2012-present
30	IDAPAR- Indonesian data coordination platform.	Aiming to create one door into Indonesian government for 'external' data. Aim to create coordination amongst industry, NGOs and others creating data and wishing to share with government- type of coordination platform.	Indonesia	All	all	all species	MDPI	MDPI	In development



TARGETED RESEARCH									
31	<ul style="list-style-type: none"> <li>• Complete biological sampling of yellowfin, bigeye and skipjack tuna across the Indonesian archipelago;</li> <li>• Analyse biological samples and model the resulting data to estimate life-history parameters.</li> </ul>	Determine the productivity of skipjack, yellowfin and bigeye tuna in Indonesia by estimating relevant life-history parameters (age, growth, reproduction)		713.714.715		BET,SKJ,YFT	<b>ACIAR Project FIS/2016/11 6</b> , CSIRO in partnership with CFR	CSIRO	2014- 2020
32	<ul style="list-style-type: none"> <li>• Socio-economic analyses and bio-economic modelling of tuna fisheries sectors and relevant communities;</li> <li>• Propose potential social and economic performance measures or indicators that can be incorporated in to the simulation evaluation framework (Management Strategy Evaluation);</li> <li>• Examine the potential trade-offs</li> </ul>	Examine the potential social and economic impacts of alternative management measures through surveys and bio-economic modelling		713.714.715		BET,SKJ,YFT	<b>ACIAR Project FIS/2016/11 6</b> , CSIRO in partnership with CFR	CSIRO	Ongoing until minimum 2019

	among social, economic and stock conservation objectives of various harvest strategies.								
33	Observer onboard	Fishing activities, CPUE, Biological Data, ETP inventory	Ambon	714	LL	YFT, BET and other pelagic	Loka Tuna Benoa and RIMF	Loka Tuna Benoa and RIMF Cibinong	starting in 2018
34	Marine and fisheries Survey	Exploratory, Ground check, sampling (Hydro acoustics, experimental fishing)	All	All	all	All	RIMF	Cibinong	Continuing
<b>Fisheries management</b>									
35	Provide expert advice to DGCF and CFRDCFR on the development and selection of operation harvest strategies, consistent with the National Tuna Harvest Strategy Framework (see Objective 1);	Evaluate operational harvest strategies for tropical tuna in Indonesia's Fisheries Management Areas 713 – 715 and provide technical advice to MMAF on selection and implementation of trial harvest strategies		713.714.715		BET,SKJ,YFT	<b>ACIAR Project FIS/2016/11 6</b> , CSIRO in partnership with CFR	CSIRO	
36	Supporting HS process at National government for Indonesian	Evaluate operational harvest strategies for tropical tuna in Indonesia's Fisheries		713.714.715		BET,SKJ,YFT	MDPI- Various donors	MDPI	2017- 2018

	Archipelagic waters- 713, 714, 715 for SKJ, BET and YFT	Management Areas 713 – 715 and provide technical advice to MMAF on selection and implementation of trial harvest strategies							
37	Supporting implementation of the NPOA Tuna on various topics	Certification, FIP implementation	Indonesia general			BET,SKJ,YFT	MDPI- Various donors	MDPI	
38	Support provincial level co-management initiatives- DMC/KPDP- data Management committees.	To support provincial level capacity building, to create multi stakeholder for a on fisheries management and to create data improvements to lead to better management on provincial levels.	Maluku, Maluku Utara, Sulawesi Utara, Sulawesi Selatan, NTT, NTB	573, 713, 714, 715, 716, 717	HL, TL, PL	BET,SKJ,YFT	MDPI- Various donors	MDPI	
39	Boat registration	Compliance to traceability	Ambon and Banda	714	HL	YFT	PT Intimas Surya; PT KML	PT Intimas Surya; PT KML	Ongoing
40	Vessel tracking	Understanding fishing grounds	Banda Sea	714	HL	YFT	SFP - LINI	SFP - LINI	ongoing
<b>LEGISLATION</b>									
41	Development of Fads Regulation						DGCF, Bureau of Law MMAF	DGCF, Bureau of Law MMAF	2019

42	Develop Ministerial decree for Harvest Strategy	Current regulation related to tuna management are scattered and aim to have a single regulation for tuna fisheries		ALL	ALL	ALL	DGCF, Bureau of Law MMAF	DGCF, Bureau of Law MMAF	2019
43	Supporting development of FAD regulatory update	Current FAD regulation has not been adequate in reaching FAD management objectives. Increasing pressure has created a need for an update to FAD regulation initiated by a proposed FAD amnesty to get an initial understanding on FAD density	National	National	HL, TL, PL, PS	all Tuna	MDPI- Various donors	MDPI	January 2018- December 2021

CAPACITY BUILDING										
44	<ul style="list-style-type: none"> <li>• Review of current and proposed tuna research and monitoring activities and staff capabilities across CFRDCFR and DGCF, where appropriate, and institutional mechanisms for scientific advice and engagement in tuna RFMOs;</li> <li>• Develop a 5-10 year capability plan for tuna research and management and tuna RFMO engagement.</li> <li>• Provide targeted support for individual participation in formal and informal tuna RFMO technical meetings, for example through small grant proposals for capacity development funding from CCSBT.</li> </ul>	Develop an operational capability plan for Indonesian tuna fisheries science and engagement in the relevant						<b>ACIAR Project FIS/2016/11 6</b> , CSIRO in partnership with CFR	CSIRO	January 2018-December 2021

45	Conduct training workshops for Indonesian scientists to build capacity in contemporary population biology laboratory and analysis methods	Determine the productivity of skipjack, yellowfin and bigeye tuna in Indonesia by estimating relevant life-history parameters (age, growth, reproduction)		713.714.715		BET,SKJ,YFT	<b>ACIAR Project FIS/2016/116</b> , CSIRO in partnership with CFR	CSIRO	
	Supporting capacity building of HS technical team through funding for capacity building	To ensure the HS process developed for Tuna can be multiplied to other Indonesian fisheries by creating a strong base and understanding for HS methodology within the wider Indonesian government scientific and management team.	Indonesian	all	all	all	MDPI-Various donors	MDPI	
46	Safety at sea	Support fishers safety knowledge	Banda	714	HL	YFT	SFP-LINI	SFP-LINI	yearly
47	Best practice in post harvest	Support fishers knowledge in maintaining quality	Banda	714	HL	YFT	PT Intimas Surya	PT Intimas Surya	yearly

CONSULTATION									
48	Conduct policy, management and research training workshops on harvest strategy development and implementation with Department of Agriculture and Water Resources (DAWR), Australian Fisheries Management Authority (AFMA) and CSIRO. These will focus on practical experience with the Commonwealth Harvest Strategy Policy and providing concrete examples of the interaction between fisheries policy, management and science.	Facilitate policy and technical consultative processes for Harvest Strategy development		713.714.715		BET,SKJ,YFT	<b>ACIAR Project FIS/2016/11 6</b> , CSIRO in partnership with CFR	CSIRO	Ongoing-minimum 2020
OTHER									
49	Certification- FT and FIP work focused on MSC	These approaches create strong motivation for HS	National	all	all	HL, TL, PL	MDPI	MDPI	

		development and create a framework for moving towards good management							
50	social economy survey	understanding the socio economic aspects	Banda	714	HL	YFT	SFP-LINI	SFP-LINI	ongoing