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Preliminary Assessment Report of Fisheries Practice towards Marine Stewardship Council Standard of Yellowfin and Skipjack Tuna in Sendang Biru by PT Hatindo Makmur in Seafood Savers Membership Mechanism

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**Preliminary Assessment of Implemented Area:**

Indian Ocean (Indonesian Fisheries Management Area 573)

**Client:**

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## **ACRONYM**

CPUE	Catch Per Unit Effort
DKP	Dinas Kelautan dan Perikanan (Fisheries Offices at District Level)
KKP	Kementerian Kelautan dan Perikanan (Ministry of Marine Affairs and Fisheries)
MPA	Marine Protected Area
MSC	Marine Stewardship Council
MSY	Maximum Sustainable Yield
IP	Indikator Performa
RBF	Risk Based Framework
SICA	Scale Intensity Consequence Analysis
ETP	Endangered, Threatened, or Protected species
WWF	World Wildlife Fund

## 1. INTRODUCTION

The Marine Stewardship Council (MSC) ecolabel certification, since its first method was introduced in 1999, has been widely accepted as a certification system in line with the Eco-labeling Guidelines and CCRF (Code of Conduct for Responsible Fisheries) of FAO (Food and Agriculture Organization). In the recently released independent report (2010), Accentura mentioned that this certification system was listed as the best of 6 other similar certification systems. Using the MSC standard, certified fisheries products are expected to have good characteristics in fisheries management, ecological sustainability and traceability mechanism. This ecolabel certification system has become the standard of environmentally friendly and sustainable fishery products that become the main requirement for the products to be sold in Europe and America. The majority of large retailers with the widest network on both continents have committed that from 2012 they will only receive MSC certified fisheries products.

Export fisheries for Indonesia is one of the main contributors of country's stock exchange. As a country comprised by water territories, Indonesia is considered as the big 10 exporter countries in the world with export value US\$ 1.69 billion in 2004 (FAO 2004) and increased to US\$ 1.91 billion in 2005 (DKP). Recognizing the demand of Europe and the United States market for ecolabel certified seafood products and added by DKP's mission to be the biggest seafood producer, a big effort to accommodate these facts is needed.

WWF-Indonesia initiated Seafood Savers to support fisheries industry players that are willing to have sustainable and responsible business. One of the implementation is by conducting assessment by using MSC standard to assess the industry players towards this ecolabel certification.

### Preliminary Assessment Scope of Study

The initial assessment covers the certification unit under study, which means fisheries or fishery stocks combined with the means/gears and fishing practices of the fisheries mentioned. This information will be important to be given to the MSC auditor in the certification process.

Chart 1: Certification unit

Species	3 Types of tuna; 1 Lemadang; ( <i>see chart. 4 below</i> )
Geographical Location	Sendang Biru, Sumber Manjing Wetan sub district, Malang district
Fisheries Management	Open access harvest strategy with regional management under IOTC
Fishing Gears	Handline, troll line, traditional FAD ( <i>pancing layang-layang</i> ) and <i>rumpon</i>
Management Authority	- Ministry of Marine Affairs and Fisheries - Fisheries Offices of East Java Province and Malang District - Indian Ocean Tuna Commission
Client	PT Hatindo Makmur

### Preliminary Assessment Objective

Preliminary Assessment is aiming for providing general information about the assessed fisheries based on collected data from client and management authorities where fisheries activities are located. Other purpose of this Preliminary Assessment is to identify obstacle or problem possibility during conducting fisheries improvement program towards MSC eco-label certification. Although using the same method, the result of pre-assessment and full assessment might be different.

## 2. INFORMATION REFERENCES

The preliminary assessment is created according to these information references:

### Meetings

Chart 2: List of meeting

Date & Location	Name & Title	Institution	Contact
24 Nov 2011	Mansur, Miniplan	PT Hatindo Makmur	081217536677
24 Nov 2011	Aris, Fisher		081251506287
24 Nov 2011	Udin, Fisher		081251506287
24 Nov 2011	Wahyu, miniplan, catcher recorder	PT Hatindo Makmur	081358269229
24 Nov 2011	Eko Mulyono, Port staff	Fisheries Offices of East Java Province	081347887271

### Reference

Anonim. 2010. Marine Stewardship Council Fisheries Assessment Methodology and Guidance to Certification Bodies. Version 2.1. Release date 1 May 2010. Diakses dari [www.msc.org](http://www.msc.org) pada tanggal xxx

Ghofar, A., Schorr, D.K., Halim, A. 2008. Selected Indonesian Fisheries Subsidies: Quantitative and qualitative assessment of policy coherence and effectiveness. The Nature Conservancy, Bali

[www.fishbase.org](http://www.fishbase.org). Accessed on March 5<sup>th</sup>, 7<sup>th</sup>, 8<sup>th</sup>, 2012

[www.iss-foundation.org](http://www.iss-foundation.org). Accessed on March 5<sup>th</sup>, 7<sup>th</sup>, 8<sup>th</sup>, 2012

Ministerial Decree 45/2009 about Fisheries Resources Potential Estimation in Indonesian Fisheries Management Area.

Ministerial Decree 18/2010

## 3. FISHERIES BACKGROUND

The tuna fishing practice is mainly done to meet Japan, Europe and the United States' market. The harvesting methods are mainly two types; using traditional trawl or traditional line. PT Hatindo Makmur uses line and *rumpon*. There is 400 vessels operated in Sendang Biru representing 2000 fishers, 60% of them are PT Hatindo Makmur. The fishing practice in Sendang Biru started in 2000s and since 2004 PT Hatindo Makmur have bought tuna from this fishing ground.

### Season and Fishing Ground

Fresh tuna fishing activity is done during the year, the detail of fishing activity is shown below.

Chart 3: Seasonal Fishing Activity

Location	Season	Month												Note
		1	2	3	4	5	6	7	8	9	10	11	12	
South Java Sea	Peak						x	x	x					
	Normal		x	x	x	x				x				
	Low	x									x	x	x	
	Spawning	?	?	?	?	?	?	?	?	?	?	?	?	-

Tuna fishing activity for PT Hatindo Makmur is in south part of Malang District, in Prigi water territory, Jember territory, ranging from 100-200 miles from the sea shore.

### Target Species

Target species in PT Hatindo Makmur submitted to MSC certification is shown below.

Chart 4: List of Target Species of PT Hatindo Makmur

English Name	Scientific Name	Indonesian Name
Yellowfin Tuna	<i>Thunnus Albacares</i>	Tuna Sirip Kuning

#### 4. FISHERIES SOURCES

##### Catches Characteristics

Generally, tuna is a highly migratory and communal species. Tuna have migration pattern and regular pathway every year. The specific character of tuna is that this species able to maintain body temperature, warmer than the surrounding area. The stable temperature leads tuna to successfully adapt in thermohaline condition when significant temperature changing occurs. Being different with other fish which having white color flesh, tuna muscle lipid is pink or dark red. This is because of the greater number of myoglobin comparing to other species.

Tuna have streamlined and sleek body whose tail is sickle shaped. This body shape supports tuna to swim faster. The fastest tuna can reach up to 70 kmph which support the migration pattern acrossing oceans in the world, from tropical, warm and sometimes cold water territory. The diet are mainly small fish, squid and planktonic organism.

Below is an biological information of Yellowfin tuna, submitted fish to MSC certification.

Chart 5: Biological Characteristics of Yellowfin Tuna

Scientific name	Common characteristics	Average length	maximum length	length at maturity	Reproductive strategy	Trophic level (from diet composition unless otherwise stated)
<i>Thunnus Albacares</i>	<ul style="list-style-type: none"> <li>➤ An oceanic species occurring above and below the thermoclines. Pelagic in open water, but rarely seen near reefs (Ref. 48637). They school primarily by size, either in monospecific or multi-species groups. Larger fish frequently school with porpoises, also associated with floating debris and other objects. Feed on fishes, crustaceans and squids. It is sensitive to low concentrations of oxygen and therefore is not usually caught below 250 m in the tropics (Ref. 28952, 30329). Peak spawning occurs during the summer, in batches (Ref. 9684, 51846). Eggs and larvae are pelagic (Ref. 6769). Encircling nets are employed to catch schools near the surface (Ref. 9340). Marketed mainly frozen and canned (Ref. 9684), but also fresh (Ref. 9340) and smoked (Ref. 9987). Highly valued for sashimi (Ref. 26938)</li> <li>➤ Resilience : Medium, minimum population doubling time 1.4 - 4.4 years (K=0.13-0.42; tm=2-5; tmax=8; Fec=200,000)</li> <li>➤ Vulnerability : Moderate to high vulnerability (46 of 100)</li> <li>➤ Price Category :-</li> <li>➤ IUCN Red List : Lower Risk: least concern (LR/lc)</li> </ul>	150 cm	239 cm	107.5 cm	Spawn throughout the tropical and equatorial waters of the major oceans (Ref. 6390). At higher latitudes, spawning is seasonal, with peaks in summer; may continue throughout the year at lower latitudes (Ref. 6390). Yellowfin tuna are multiple spawners, ie they spawn every few days over the spawning period (Ref. 6390). Eggs and sperm are released into the water for fertilisation (Ref. 6390).	4.34 s.e. 0.71 Based on diet studies

Source: www.fishbase.org

##### Fish stock estimation

Tuna stock is mainly studied by the Research Centre for Fishery Management and Conservation of

Fishery Resources collaborating with others international institutions (IOTC, CGIAR, CSIRO). Therefore, tuna stock information covers species level, better than information of other species stock which is only based on fish group type. More detail information regarding Yellowfin tuna stock in Indian Ocean is shown below:

### Harvesting of target species by other fishing activity

Tuna fishing activity in Sendang Biru, Malang is part of harvesting strategy in Fisheries Management Area 573 where the practices involve broader fishers; local fisher and also fishers from Java and Bali. Moreover, due to the vast swimming area characteristic, its fishing ground reaches Eastern Indian Ocean, member of IOTC. Therefore, to know the harvest strategy in this location we should also look up to harvesting on Eastern Indian Ocean.

## 6. FISHERIES INTERACTION WITH ECOSYSTEM

### Retained species

Called as retained species due to the catch volume percentage equals to or under the target species catch result, but its catch volume is above 5% and later on harvested by the fishers.

Tabel 4: Name of Retained Species caught using bottom handline

Local Name	Indonesian Name	Scientific Name
Tuna Mata Besar	Tuna Mata Besar	<i>Thunnus obesus</i>
Tuna Albakor	Tuna Albakor	<i>Thunnus alalunga</i>
Lemadang	Mahi-mahi, lemadang	<i>Coryphaena hippurus</i>
Hiu	Hiu	<i>Alopias pelagicus</i>
Marlin	Marlin	<i>Makaira nigricans</i>

Biological characteristics of the retained species are below.

Chart 5: Biological characteristics of retained species caught using handline

Scientific name	Common characteristics	Average length	maximum length	length at maturity	Reproductive strategy	Trophic level (from diet composition unless otherwise stated)
<i>Thunnus obesus</i>	<ul style="list-style-type: none"> <li>➤ Occur in areas where water temperatures range from 13°-29°C, but the optimum is between 17° and 22°C. Variation in occurrence is closely related to seasonal and climatic changes in surface temperature and thermocline. Juveniles and small adults school at the surface in mono-species groups or mixed with other tunas, may be associated with floating objects. Adults stay in deeper waters (Ref. 5377). Eggs and larvae are pelagic (Ref. 6390). Feed on a wide variety of fishes, cephalopods and crustaceans during the day and at night (Ref. 9340). Meat is highly prized and processed into sashimi in Japan. Marketed mainly canned or frozen (Ref. 9684), but also sold fresh (Ref. 9340).</li> <li>➤ Resilience : sedang, Waktu penggantian populasi minimum 1.4 - 4.4 tahun (K=0.11-0.23; tm=3; tmax=11; Fec=2 million)</li> <li>➤ Vulnerability : High to very high vulnerability (72 of 100)</li> <li>➤ Price Category : Bycatch of swordfish fishery.</li> <li>➤ IUCN Red List : Rentan, lihat daftar merah IUCN (VU) (A1bd)</li> </ul>	180 cm	range 100 - 125 cm	100 cm	Are multiple spawners that may spawn every 1 or 2 days over several months (Ref. 30330). They spawn over periods of the full moon (Ref. 6390). Spawn throughout the year in tropical waters (Ref. 6390). ; nonguarders open water/substratum egg scatterers; external	
<i>Thunnus alalunga</i>	<ul style="list-style-type: none"> <li>➤ An epipelagic and mesopelagic, oceanic species, abundant in surface waters of 15.6° to 19.4°C; deeper swimming, large albacore are found in waters of 13.5° to 25.2°C; temperatures as low as 9.5°C may be tolerated</li> </ul>	100 cm	85.0 cm	85 cm-?	The sex ratio in catches is about 1:1 for immature individuals, but males	4.37 s.e. 0.77 Based on diet studies.

	<p>for short periods (Ref. 168). Known to concentrate along thermal discontinuities (Ref. 168). Form mixed schools with skipjack tuna (<i>Katsuwonus pelamis</i>), yellowfin tuna (<i>Thunnus albacares</i>) and bluefin tuna (<i>T. maccoyii</i>), schools may be associated with floating objects, including sargassum weeds (Ref. 168). Feed on fishes, crustaceans and squids. Eggs and larvae are pelagic (Ref. 6769)</p> <ul style="list-style-type: none"> <li>➤ Resilience : sedang, Waktu penggandaan populasi minimum 1.4 - 4.4 tahun (K=0.13-0.18; tm=4-6; tmax=10; Fec=2 million)</li> <li>➤ Vulnerability : High vulnerability (58 of 100)</li> <li>➤ Price Category : High</li> <li>➤ IUCN Red List : <i>lack of data</i></li> </ul>				predominate among mature fishes, which is possibly due to both differential mortality of sexes and differential growth rate after maturity; external	
<i>Makaira nigricans</i>	<ul style="list-style-type: none"> <li>➤ Atlantic Ocean: in tropical and temperate waters. We follow Nakamura 1985 (Ref. 43) in recognizing <i>Makaira mazara</i> and <i>Makaira nigricans</i> as two distinct species chiefly because of differences in the pattern of the lateral line system. Many scientists, however, do not recognize this character as specifically diagnostic and consider the latter species as a single pantropical species occurring in the Atlantic, Pacific and Indian oceans. Highly migratory species, Annex I of the 1982 Convention on the Law of the Sea (Ref. 26139). Oceanic fish</li> <li>➤ Resilience : sedang, Waktu penggandaan populasi minimum 1.4 - 4.4 tahun (K=0.1-0.3)</li> <li>➤ Vulnerability : Moderate to high vulnerability (52 of 100)</li> <li>➤ Price Category : <u>By-catch of tuna fishery.</u></li> <li>➤ IUCN Red List : <u>Vulnerable</u></li> </ul>	Female : 500 cm Male : 290 cm	50 cm	50 cm	nonguarders open water/substratum egg scatterers; external; dioecisms	4.5 s.e. 0.71 Based on diet studies
<i>Euthynnus affinis</i>	<ul style="list-style-type: none"> <li>➤ Indo-West Pacific: in warm waters including oceanic islands and archipelagos. Occurs in open waters but always remains close to the shoreline. The young may enter bays and harbors. Forms multi-species schools by size with other scombrid species comprising from 100 to over 5,000 individuals. A highly opportunistic predator feeding indiscriminately on small fishes, especially on clupeoids and atherinids; also on squids, crustaceans and zooplankton (Ref. 9684). Generally marketed canned and frozen; also utilized dried, salted, smoked (Ref. 9684) and fresh (Ref. 9987).</li> <li>➤ Resilience : Tinggi, Waktu penggandaan populasi minimum kurang dari 15 bulan (K=0.4-0.5; tm=3; Fec=210,000)</li> <li>➤ Vulnerability : Moderate vulnerability (37 of 100)</li> <li>➤ Price Category : medium</li> <li>➤ IUCN Red List : <u>Least Concern</u></li> </ul>	60 cm	40 – 65 cm	40 cm	nonguarders open water/substratum egg scatterers; external; dioecism;	4.5 s.e. 0.79 Based on diet studies.
<i>Katsuwonus pelamis</i>	<ul style="list-style-type: none"> <li>➤ Found in offshore waters; larvae restricted to waters with surface temperatures of 15°C to 30°C (Ref. 6390). Exhibit a strong tendency to school in surface waters with birds, drifting objects, sharks, whales and may show a characteristic behavior like jumping, feeding, foaming, etc. Feed on fishes, crustaceans, cephalopods and mollusks; cannibalism is common. Spawn throughout the year in the tropics, eggs released in several portions (Ref. 35388). Eggs and larvae are pelagic (Ref. 6769). Preyed upon by large pelagic fishes (Ref. 6885). Also taken by trolling on light tackle using plugs, spoons, feathers, or strip bait (Ref. 9684). Marketed fresh, frozen or canned (Ref. 9340); also dried-salted and smoked (Ref. 9987)</li> <li>➤ Resilience : Medium, minimum population doubling time 1.4 - 4.4 years (K=0.3-0.5; tm=2-3; tmax=12; Fec=80,000)</li> <li>➤ Vulnerability : Moderate vulnerability (41 of 100)</li> <li>➤ Price Category : -</li> <li>➤ IUCN Red List : <u>least concern</u></li> </ul>	80 cm	100 cm	40 cm	External fertilitation, dioecism mode, Spawning frequency variable throughout range	3.75 s.e. 0.61 Based on diet studies.
<i>Trichiurus</i>	<ul style="list-style-type: none"> <li>➤ Generally over muddy bottoms of shallow coastal waters</li> </ul>	100 cm	Male =	46,3 cm	External	4.45 s.e. 0.77



<i>lepturus</i>	<p>(Ref. <a href="#">9351</a>). Often enter estuaries (Ref. <a href="#">9351</a>). Juveniles feed mostly on euphausiids, small pelagic planktonic crustaceans and small fishes; adults feed mainly on fishes and occasionally on squids and crustaceans (Ref. <a href="#">6181</a>). Adults and juveniles have opposing complementary vertical diurnal feeding migration. Large adults usually feed near the surface during the daytime and migrate to the bottom at night. Juveniles and small adults form schools 100 m above the bottom during the daytime and form loose feeding aggregations at night near the surface. Pelagic eggs (Ref. <a href="#">35388</a>) and larvae (Ref. <a href="#">6768</a>)</p> <ul style="list-style-type: none"> <li>➤ Resilience : sedang, Waktu penggandaan populasi minimum 1.4 - 4.4 tahun (K=0.25-0.29; tm=2; tmax=15)</li> <li>➤ Vulnerability : High vulnerability (57 of 100)</li> <li>➤ Price Category :-</li> <li>➤ IUCN Red List : -</li> </ul>		234 cm; Female = ?		fertilitation, dioecism mode, Spawning frequency variable throughout range	Based on diet studies.
<i>Altopias pelagicus</i>	<ul style="list-style-type: none"> <li>➤ Primarily an oceanic species but sometimes close inshore (Ref. <a href="#">247</a>, <a href="#">5578</a>, <a href="#">58302</a>); neritic to oceanic, 0-152 m (Ref. <a href="#">11230</a>). Epipelagic (Ref. <a href="#">58302</a>). Mesopelagic in the tropics; may enter atoll lagoons (Ref. <a href="#">37816</a>). Stuns its prey with its tail, presumably feeding on small fishes and cephalopods (Ref. <a href="#">6871</a>). Ovoviviparous, embryos feeding on yolk sac and other ova produced by the mother (Ref. <a href="#">43278</a>, <a href="#">50449</a>). Sometimes caught by ski-boat anglers (Ref. <a href="#">5578</a>). Utilized for human consumption, liver oil for vitamin extraction, hides for leather, and fins for shark-fin soup (Ref. <a href="#">13570</a>). A very common catch in the tuna and shark longline, and tuna drift net fisheries (Ref.58048). Maximum and common size of males estimated from discussion in Ref. <a href="#">247</a>. Adult females may reach at least 330 cm TL (Ref. <a href="#">47613</a>)</li> <li>➤ Resilience : sangat rendah, Waktu penggandaan populasi minimum lebih dari 14 tahun (Fec=2; tm=7-9; tmax = 29)</li> <li>➤ Vulnerability : High to very high vulnerability (73 of 100)</li> <li>➤ Price Category : <u>Fully utilized.</u></li> <li>➤ IUCN Red List : <u>Rentan, lihat daftar merah IUCN (VU)</u></li> </ul>	common length : 276 cm	Max length : 347 cm TL jantan/ (Ref. <a href="#">48844</a> ); 383 cm TL (female)	range 260 - 292 cm	Internal (oviduct) fertilitation, dioecism mode, Spawning frequency :-	4.5 s.e. 0.66 Based on food items.
<i>Coryphaena hippurus</i>	<ul style="list-style-type: none"> <li>➤ Duri punggung (Keseluruhan (total)): 0; duri punggung lunak (Keseluruhan (total)): 58-66; Duri dubur 0; Sirip dubur lunak: 25 - 31; vertebrata, bertulang belakang: 31. Greatest body depth in adults less than 25% of standard length; tooth patch on tongue small and oval; single dorsal fin extending from above eye almost to caudal fin with 58-66 rays; a concave anal fin extending from anus almost to caudal fin; pectoral fin more than half of head length (Ref. <a href="#">10948</a>). Caudal vertebrae usually 18 (Ref. <a href="#">10998</a>). Mature males possess a prominent bony crest in front of the head. The color is striking with golden hues on the sides, metallic blues and greens on the back and sides, with white and yellow on the underparts. Small specimens have pronounced vertical bars on the sides of the body.</li> <li>➤ Resilience : Tinggi, Waktu penggandaan populasi minimum kurang dari 15 bulan (K=0.4-1.2; tm&lt;1; tmax=5; Fec=85,000)</li> <li>➤ Vulnerability : Moderate vulnerability (39 of 100)</li> <li>➤ Price Category :-</li> <li>➤ IUCN Red List : Least Concern</li> </ul>	common length : 100.0 cm	65.0, cm	range 35 - 55 cm	External fertilitation, dioecism mode, Spawning frequency variable throughout range	4.37 s.e. 0.77 Based on diet studies

Source: fishbase.org

Due to the lack of information about bycatch species data, an advance assessment on resource stock using SICA/PSA is required.

### Bycatch species

Tuna fishing activities in Sendang Biru is practiced by using handline and kite fishing with natural bait (scad, flying fish, squid) and artificial lures (synthetic materials resembling flying fish or squids). To assist the fishing activity, fishers use traditional FADs called as *rumpon* to collect tuna in one fishing ground. Common size of hooks which are used are 3,5 and 7. Hook number 3 is applied to catch bait, while number 5 and 7 to catch target species.



Picture. Fishing gear of Fishers in Sendang Biru, Malang

Hooks 5 and 7 is expected to catch more tuna, but at the same time it also catches juvenilles.

Bycatch is not discarded because fishers harvest all types of fish to be sold and consumed as well.

### ETP species

Bycatch species of fishing activity using bottom longline is shark. Currently PT Hatindo Makmur do not receive that species. However, due to the lack of regulation on shark, some fishers still sell shark to middlemen to be sold in Surabaya.

Chart 6: List of ETP species caught using line in Sendang Biru

Local Name	English Name	Scientific Name
Hiu mata besar	Shark (Pelagic Tresher Shark)	<i>Alopias pelagicus</i>



Picture. Caught Pelagic Thresher Shark (*Alopias pelagicus*)

### Impact to aquatic habitat

Longline is considered as relatively to be more eco-friendly than other fishing gears. Comparing to purse-seine, longline tuna or other fishing gear that have higher risk on bycatch, longline is more selective on choosing the target species. Longline fishers in Sendang Biru, Malang uses stone as material stick it in the strain. It aims to make the bait goes deeper and is not eaten by non-target species. Stone will be left in bottom sea and so far there is no effect of stone left there. Those stone is being a new habitat for other organism instead.



Picture. The usage of stone for fishing gear in Sendang Biru

### Trophic effect

As the top level consumer, the trophic level of this species is around 7.7 s.e. 0.71. Tuna as predator can maintain the balance of organisms under its trophic level. According to food pyramid principles stating that the decreasing species in a trophic level will influence the number of species under or above its trophic level.

## 7. FISHERIES MANAGEMENT

### Fisheries management agency

As a highly migratory species, the management of tuna is done by the regional fishery management organizations. Tuna fishing activity in Indian Ocean is managed under the Indian Ocean Tuna Commission. Nationally, it is regulated by Indonesian MMAF, particularly in Fish Resources Directorate.

Although now in Indonesia there is Komisi Tuna Indonesia (Indonesian Tuna Commission), this commission do not have significant role. In addition, this commission is operated under P2HP-KKP Directorate which does not have the authority in tuna management and catch activity.

### General management strategy

In RFMO level, Indonesia as a full member of IOTC has an obligation to follow all resolutions given and agreed by all members. Resolutions are the authority to give instruction to the country member to have catch data record, decrease bycatch, catch and avoid IUU fishing as well.

Nationally fishery management is regulated in UU 31 year 2004 and revised in UU 45 year 2009 stating that Minister has a duty to create regulation about potential resources and its harvest strategy; define applicable total catch; type, amount and size of fishing gear; harvesting and end of harvesting season; size and minimum weight; fishery protection; protected species. Current regulation does not enough to manage reef fish fishing activity using handline because this fishing gear has less impact to ecosystem.

The delegation of fishery management is done by top-down process supported by socialization to DKP/Fisheries Offices at Province Level which is continued to the Fisheries Offices at District Level. In some cases, other governmental institutions and NGO support this management to be run effectively.

### Specific fisheries management

Although currently there is a draft of specific fisheries management for tuna, the specific fisheries management has not been legalized by the MMAF. Considering that tuna is a species that has high economical value, economical interactions with many countries and with other bycatches (ecologically), it is important to finalize the draft and implement it. Thus this species can be maintained sustainably.

### Monitoring activity

Currently, monitoring activity is done in Pondok Dadap Port, Sendang Biru District, Manjing Wetan Sub-district, Malang District. Sea monitoring is not done due to the lack of facilities.

Indonesia's regulation states that vessel under 5 GT is not required to be registered and is free to catch fish in any Indonesian sea waters below 4 miles. In facts, lot of vessels do not have clear GT size or minimize their GT size to avoid costly licensing fees. Same thing also happen in the usage of *rumpon*, where some of fishers use *rumpon* in fishing ground above 12 miles of shores.



Picture. A vessel without GT size information

According to Per/18/Men/2010, tuna catch should be recorded. However, in fact there is only limited socialization and monitoring program from government.

### Subsidy

Subsidy is implemented by providing fewer price of gas fuel, IDR 4,500 vs IDR 6,000 for non subsidy. By the signing of Presidential Regulation No. 15 Year 2012, gas fuel subsidy is only for vessels sizing under 30 GT. The revised of this regulation ensures that the subsidy is also for vessels under 60 GT.

Ghofar et.al (2008) states that subsidy is one of the factor of overfishing. WWF-Indonesia currently conducts a research on the impact of subsidy in Indonesia Fisheries and create Better Management Practices to ensure that subsidy can run without futher decreasing number of resources.

## 8. PRELIMINARY ASSESSMENT TOWARDS PRINCIPLES AND CRITERIA OF MSC

### Principle 1. Fishery stock sustainability

No	Performance Indicator	Below (< SG 60)	Average (SG 60-80)	Above (> SG 80)	References
1.1.1	Resources Stock Status				
	The stock is at a level which maintains high productivity and has a low probability of recruitment overfishing	There is no accurate stock data. In preparing the pre-assessment activity, it is suggested to collect detail data about biological information of target species so the <i>Risk Based Framework</i> assessment can be done.			
1.1.2	Reference point		√		
	Limit and target reference points are appropriate for the stock.	Due to the usage of RBF, it automatically gets SG 80			

1.1.3	Stock Rebuilding				
Where the stock is depleted, there is evidence of stock rebuilding within a specified timeframe.		Due to the usage of RBF it is not assessed			
1.2.1	Harvest strategy	√			
There is a robust and precautionary harvest strategy in place		There is no sustainable harvest strategy from government or any regulation on reef fish catching activity.			
1.2.2	Harvest control rules and tools	√			
There are well defined and effective harvest control rules in place		<p>Company applies systems (i) monitoring system based on local people, (ii) only local fishers who can harvest fish in the fishing ground to avoid overfishing, and (iii) catching activity is done according to the limit size. However, some fishers sell smaller fish to other middlemen.</p> <p>Fisheries act no 31 Year 2004 states that any reef fish catching activity using vessel under 5 GT is not required any legalization and is free to catch fish. This regulation can cause the increasing of other small catching activity if it is not monitored well.</p> <p>Spawning location has not been monitored well.</p>			
1.2.3	Information/ monitoring	√			
Relevant information is collected to support the harvest strategy		<p>The accuracy of fishery statistic data from Fisheries Offices is questionable, the number of fishers and vessels data that practice fishing activity is different with data collected by government.</p> <p>The accuracy of record activity should be improved, data CpUE should be used to create fishery catch management.</p>			
1.2.4	Status stock assessment		√		
There is an adequate assessment of the stock status		<p>Due to the usage of RBF, it automatically gets SG 80</p> <p>Data recording system should be improved, involving fishery research institution to analyze the result</p>			

## Principle 2. Impact of Fishery Activity to Ecosystem

No	Performance Indicator	Below (< SG 60)	Average (SG 60-80)	Above (> SG 80)	Reference
2.1.1	Retained species stock status				
The fishery does not pose a risk of serious or irreversible harm to the retained species and does not hinder recovery of depleted retained species.		There is no resource stock information of retained species. Further research using Risk Based Framework is required.			

2.1.2	Retained species harvest strategy	√			
There is a strategy in place for managing retained species that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to retained species.		There is no regulation that specifically manage retained species			
2.1.3	Retained species Information/ monitoring				
Information on the nature and extent of retained species is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage retained species.		There is no information about CPUE and complete monitoring data of catch total number. The accuracy of fishery statistic data from Fisheries Offices is questionable, the number of fishers and vessels data that practice fishing activity is different with data collected by government.  The accuracy of record activity should be improved, data CPUE should be used to create catch management.			
2.2.1	Bycatch status stock				
The fishery does not pose a risk of serious or irreversible harm to the bycatch species or species groups and does not hinder recovery of depleted bycatch species or species groups.		There is no discarded bycatch. Risk Based Framework is required to assess this PI.			
2.2.2	Bycatch species management strategy	√			
There is a strategy in place for managing bycatch that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to bycatch populations.		There is no harvest strategy for bycatch species.			
2.2.3	Bycatch species information/ monitoring	√			
Information on the nature and amount of bycatch is adequate to determine the risk posed by the fishery and the effectiveness of the strategy to manage bycatch.		There is no information about this. It is required to record.			
2.3.1	ETP stock		√		

	status				
<p>The fishery meets national and international requirements for protection of ETP species.</p> <p>The fishery does not pose a risk of serious or irreversible harm to ETP species and does not hinder recovery of ETP species.</p>					
2.3.2	ETP species management strategy		√		
<p>The fishery has in place precautionary management strategies designed to:</p> <ul style="list-style-type: none"> <li>- meet national and international requirements;</li> <li>- ensure the fishery does not pose a risk of serious or irreversible harm to ETP species;</li> <li>- ensure the fishery does not hinder recovery of ETP species;</li> <li>- minimise mortality of ETP species.</li> <li>-</li> </ul>		Indonesia refers and ratifies IUCN system, collaborating with LIPI which regulate quota for this species.			
2.3.3	ETP species Information / monitoring		√		
<p>Relevant information is collected to support the management of fishery impacts on ETP species, including:</p> <ul style="list-style-type: none"> <li>- information for the development of the management strategy;</li> <li>- information to assess the effectiveness of the management strategy;</li> <li>- - information to determine the outcome status of ETP -species.</li> </ul>		<p>There is record data activity done by LIPI. NGO collaborates with the authority of MPA management and also conducts monitoring program.</p> <p>There is IUU Fishing practices done by other exporters.</p>			
2.4.1	Habitat status		√		Macfadyen et al, 2009. Abandoned, lost or otherwise discarded fishing gear. UNEP/FAO report
<p>The fishery does not cause serious or irreversible harm to habitat structure, considered on a regional or</p>		<p>Fishing practice using bottom longline has very low impact to coral reef ecosystem, so fishing gear is categorized as an eco-friendly fisheries.</p>			



bioregional basis, and function.					
2.4.2	Habitat management strategy		√		
There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types.		There are actions to maintain coral reef habitat from the government, COREMAP, NGO and local people.			
2.4.3	Informasi/ monitoring Habitat		√		
There is a strategy in place that is designed to ensure the fishery does not pose a risk of serious or irreversible harm to habitat types.		There is habitat assessment by NGO, government and local people			
2.5.1	Ecosystem status		√		
The fishery does not cause serious or irreversible harm to the key elements of ecosystem structure and function.		There is no harmful impact to the aquatic ecosystem and the habitat.			
2.5.2	Ecosystem management strategy		√		
There are measures in place to ensure the fishery does not pose a risk of serious or irreversible harm to ecosystem structure and function.		Planting of artificial coral reef by PMB			
2.5.3	Ecosystem Information/ Monitoring		√		
There is adequate knowledge of the impacts of the fishery on the ecosystem.		There is no relevant information on it, currently is only based on assumption that this will have low risk to the environment.			

### Principle 3. Fishery management effectivity

No	Performance Indicator	Below (< SG 60)	Average (SG 60-80)	Above (> SG 80)	Reference
3.1.1	Legal framework		√		
The management system exists within an appropriate and effective legal and/or		MMAF regulates fisheries with vessel sizing > 30 GT and fishing ground 12-200 miles. Fishing activity up to 4 miles and using vessels under 5 GT to catch reef fish is regulated by Fisheries Offices at District			

<p>customary framework which ensures that it:</p> <ul style="list-style-type: none"> <li>- Is capable of delivering sustainable fisheries in accordance with MSC Principles 1 and 2</li> <li>- Observes the legal rights created explicitly or established by custom of people dependent on fishing for food or livelihood</li> <li>- Incorporates an appropriate dispute resolution framework</li> </ul>		<p>Level. Things needed to be considered is the lack of management plan for reef fish according to Fisheries act No 31 Year 2004, even though currently reef fish management strategy is being drafted.</p> <p>PT Hatindo Makmur conduct research on implemented Circle Hook subsidy. Challenges and inputs from fishers.</p>			
3.1.2	Consultation, role and responsibility in regulation		√		
<p>The management system has effective consultation processes that are open to interested and affected parties.</p> <p>The roles and responsibilities of organizations and individuals who are involved in the management process are clear and understood by all relevant parties..</p>		<p>Indonesia applies top-down governmental structure, there is consultation mechanism to local people for every legalized regulation.</p> <p>Local people is initiated in groups and directed to have bargaining power in the management.</p> <p>PMB and Brawijaya University create cooperation in Sendang Biru in terms of fisheries scientific research.</p>			
3.1.3	Long term objectives		√		
<p>The management policy has clear long-term objectives to guide decision-making that are consistent with MSC Principles and Criteria, and Incorporates the precautionary approach.</p>		<p>Fisheries act no 31 Year 2004 provides well objectives in terms of supporting sustainable fisheries. However, this act also refers to any actions to decrease production without involving precautionary approach.</p> <p>Management Plan which supports the resources sustainability in each MPA fills in this flaws</p>			
3.1.4	Incentive for sustainable fisheries		√		
<p>The management system provides economic and social incentives for sustainable fishing and does not operate with subsidies that contribute to unsustainable fishing</p>		<p>There is no system which regulates this due to the lack of reef fish management system authorized by the government.</p> <p>Company provides better price comparing to price offered by other companies which uses less eco-friendly fishing gear. It is not clear whether this system would cause the high number of reef fish catching activity or not.</p>			
3.2.1	Fishery	√			

	specific objective				
	The fishery has clear, specific objectives designed to achieve the outcomes expressed by MSC's Principles 1 and 2	There is no specific management system, currently government is drafting national reef fish fishery management.			
3.2.2	Decision making process		√		
	The fishery-specific management system includes effective decision-making processes that result in measures and strategies to achieve the objectives.	Indonesia applies top-down governmental structure. However, there is consultation mechanism to local people for every regulation authorized by government and NGO.			
3.2.3	Compliance and enforcement		√		
	Monitoring, control and surveillance mechanisms ensure the fishery's management measures are enforced and complied with	There is no surveillance mechanism for sea			
3.2.4	Reserach plan	√			
	The fishery has a research plan that addresses the information needs of management.	The lack of support form government for scientific research causes limited result which can be used to support management. Sometimes recommendations from reserach institution is not accomodated by the government, particularly governmental institution at provincial and district level which usually tend to accomodate local politicia			
3.2.5	Management performance evaluation		√		
	There is a system for monitoring and evaluating the performance of the fishery-specific management system against its objectives.  There is effective and timely review of the fishery-specific management system.	There is peer review system at internal government level, national level and regional level.			

## 9. FISHERIES IMPROVEMENT PLAN

Fisheries improvement plan for company is divided into two steps; intermediate and advance. Intermediate step is designed to improve fishery practices at company's internal level, while in advance level company and other companies collaborates to make collective improvement program.

## Intermediate Fisheries Improvement Plan

1 NATIONAL FISHERIES MANAGEMENT AND OBJECTIVES				
	Priority Actions	Review	PI	Institution Participations
1.4	Deciding specific management plans	Deciding objective and target, compliancing with RMFO convention, applying national tools and regulation on cacch quota/HCR (see 3.4 below), applying precautionary approach, drafting mitigation strategy for bycatch (3.5), applying MCS (monitoring, controlling and surveillance) and reviewing strategy.		SDI, P4KSI, PUP, PSDKP, KTI and related association (ASTUIN, ATLI, Fisheries Offices at Provincial and District level, etc) and WWF/SFP.

2 ENHANCING INSTITUTIONAL FRAMEWORK				
	Priority Actions	Review	PI	Institution Participations
2.1	Decision making process and consultation related to the implementation of management strategies in water territories, archipelago and EZZ consolidated trough FKPPS and KTI	Enhancing the role of related stakeholders in the decision making.	3.2.2	SDI, P4KSI, PUP, PSDKP, KTI and related association (ASTUIN, ATLI, Fisheries Offices at Provincial and District level, etc)
2.3	Enhancing the role of organization/fishers association	Forming POKMASWAS for handline fishery and other fishery at local level	3.1.2	SDI, Fisheries Offices at Provincial and District level, fishers association, processor, middlemen and NGO (WWF/TNC).

3 RESEARCH ACTIVITY				
	Priority Actions	Review	PI	Institution Participations
3.2	Completing data	Stock data		

		Vessel composition	1.2.3	P4KSI, BRPL, SDI, industry (direct or through industrial association)
		Pstock productivity		
		Stock structure		
3.6	Collecting bycatch data	All available information covers bait fishery, shark, marlin and other major pelagic target are collected and reviewed again		
		Forming training program for observer and drafting training modul (examples can be from WWF/SPF)	2.1.3, 2.2.3, 2.3.3, 3.2.2	P4KSI, BRPL, SDI, industry, WWF/NGO, university, SPC

<b>4</b>	<b>IMPROVEMENT OF COMPLIANCE</b>			
	Priority Actions	Review	PI	Institution Participations
4.3	Forming educational and training program for fishers in order to socialize management strategy of target species, decreasing bycatch and consequence of ecosystem interaction.	Implemented for all stakeholders and expanded to POKMAS network. It is required a strong commitment (buy-in) of the processor and middlemen.	3.2.3,	PSDKP, BPSDM KP, SDI, P4KSI, KAPI, Fisheries Offices at Provincial and District level, processor, middlemen and WWF
4.4	Enhancing management system based on community for handline and other fisheries	Has been formed but function, empowerment and support to POKMASWAS should be improved.	3.2.3	PSDKP, Fisheries Offices at Provincial and District level, all related stakeholders

<b>5</b>	<b>OTHER CHALLENGES</b>			
5.1	Rereviewing the impact of gas fuel's subsidy towards the sustainability of fisheries, vessels sizing 5-30 GT and < 5 GT	Conducting research on the impact of subsidy to all fisheries (regardless it is eco-friendly or not) and several size of vessels (GT)	3.1.4	PDN, PLN, BBRSE

5.2	Evaluating the probability of subsidy's disfunctionalization, from gas fuel subsidy to a more positive impact action, such as an insentives which support sustainable fisheries practices.	Evaluating any probability of subsidy alocoation which support sustainable fishery practices, for instances the usage of pole and line fishing gear		PDN, PLN, BBRSE
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### Advance Fishery Improvement Plan

1 NATIONAL FISHERIES MANAGEMENT AND OBJECTIVES				
	Priority Actions	Review	PI	Institution Participations
1.1	Redrafting the objectives to ensures that the primary priorities are for sustainable fisheries and implementation of ecosystem approach to fisheries management/EAFM at local and national level.	A mechanism to prioritize the fisheries sustainability in the ramework of applicable regulation replaces the development's goals and improvement of production and will accommodate EAFM principles.	3.1.1	SDI, P4KSI, Dinas, PLN, KKJI, PSDKP
1.2	Expanding the management system until regional area	All fisheries management principles including preventing steps/precautionary approach should be expanded up to provincial and district level.	3.1.1, 3.1.3, 3.2.1, 3.2.2	SDI, P4KSI, Dinas, PLN, KKJI, PSDKP
1.3	Being a full member of WCPFC and supporting the drafting process of a strong prevention principle/precautionary approach (in both RMFO) and implementing the decisions.	Continuing the process to be a full member of WCPFC		KKP (SDI, P4KSI, PUSKITA), KTI, KEMLU, SetKab
		Actively being participated in the adoption process of prevention regulation/RMFO's precautionary approach in management fisheries.  Attending RMFO's meetings.	3.1.1	SDI, P4KSI
				SDI, P4KSI

1.4	Deciding specific management plans	Deciding the objective and target, complying with RMFO's convention, implementing national tools and catch quota regulation/HCR (see 3.4 below), implementing precautionary approach, drafting mitigation strategy of bycatch species (3.5), implementing MCS and reviewing strategy.		SDI, P4KSI, PUP, PSDKP, KTI and related associations (ASTUIN, ATLI, Fisheries Offices at Provincial and District level, etc) and WWF/SFP.
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<b>2 ENHANCING INSTITUTIONAL FRAMEWORK</b>				
	Priority Actions	Review	PI	Institution Participations
2.1	Decision making process and consultation related to the implementation of management strategies in water territories, archipelago and EZZ consolidated through FKPPS and KTI	Legalizing FKPPS and KTI as the highest formal institution of national fisheries management	3.1.2	
		Enhancing the role of KTI (at national level) to officially implement the target management fisheries.	3.1.2	SDI, Fisheries Offices at Provincial and District level, related stakeholder
		Decision is authorized by the central government, not the government at regional level. Government at provincial and district level only implement the regulation but do not have rights to formulate or decide a decision which opposes the national regulations.	3.1.2	
2.2	Identifying the responsibilities and capacity improvement in all related institutions.	The delegation of responsibility to the related stakeholders, Satker, MMAF, Fisheries Offices at Provincial and District Level and local people	3.1.2	SDI, Fisheries Offices at Provincial and District level, related stakeholder

<b>3 RESEARCH ACTIVITY</b>				
	Priority Actions	Review	PI	Institution Participations

3.1	Capacity in conducting scientific assessment on national stock is improved to support the management by also considering important biological factors	Improving the human resources capacity in conducting stock assessment and building up research centers in Bena and Bitung.	1.2.4, 3.2.4	P4KSI, BRPL, KOMNAS KAJISKAN, BPSDM.
3.3	Enhancing stock assessment process and deciding Target Reference Point and Limit of Reference Point for specific species	Enhancing stock assessment process (Yellowfin tuna, Skipjack tuna, Bigeye tuna etc.)	1.1.1, 3.2.4	P4KSI, BRPL, KOMNAS KAJISKAN
		Deciding national reference points for each species	1.1.2	P4KSI, BRPL, KOMNAS KAJISKAN, SDI
		Delivering suggestion to oWCPFC and IOTC to decide regional LRP	1.1.2	SDI
3.4 gathered with point 1.4 above	Formal harvest strategy is adopted for Indonesian tuna in Pacific and Indian Oceans connected by (National and RFMOs') reference point limit covering any fisheries (including fisheries which operates vessels < 30 and > 5 GT). The objective of strategy should be in line with RFMO, for instance limiting the catching activity to make it the same level with catch level in 2004 and decreasing Yellowfin tuna and Bigeye tuna 30 %.	MMAF develops harvest strategy connected with CMM 2008-01 for catching activity in ZEE/to Yellowfin tuna and Bigeye tuna and limits catching activity to make it at the same level with catch level in 2001-2004, and implements management steps (for instance, limiting/decreasing the capacity in archipelagic sea water if interaction with juvenils of Yellowfin tuna and Bigeye tuna is high.	1.2.1/3. 2.1	SDI, FKPPS, KTI



gathered with point 1.4 above	Specific management plan covering series of catch regulation (limiting entrance permission, particularly at provincial level;) and impact to Bigeye tuna (limitation of the usage of <i>rumpon</i> in several management levels), improving the line's minimal size, closing are etc. Devices used should consider the uncertainties factors.	Drafting Tuna Management Plan	1.2.2/3.2.1	SDI, FKPPS, KTI
3.6	Collecting bycatch data	An aggregate monitoring towards solidity and size of fish in around the <i>rumpon</i> to decide the possibility of impact related to that species	2.4.3, 3.2.2	
		Fishery removal model to assess the impact to ecosystem using available SPC tools – ECOPATH, etc.	2.5.3, 3.2.2	
3.7	Finalizing assessment based on risk for non-target species and bycatch (skipjack tuna, small tuna, dolphin fish, kawakawa, shark). This requires an independent research to collect qualitative and quantitative data in order to conduct an analysis based on risk using SICA and PSA method.	Related stakeholders get training on risk assessment and participate in specific method workshop to decide risk towards non-target species.	2.1.1, 2.2.1, 2.3.1, 2.4.1, 2.5.1	P4KSI, BRPL, SDI, PSDKP, industry, WWF/NGO, university, multi-stakeholder involvement, RFMO, international reserach agency
		Conducting risk assessment using information in explanation 4.1		
3.8	Deciding/ensuring the national limit on insteraction with ETP species and collecting independent data covering protected species limits to ensure that bycatch is below the national requirements. This effort requires the role	National Action Plan is completed or developed by considering WCPFC CMMs (shark, turtle, sea mammals and seabird)	2.3.2	SDI, FKPPS, KTI

	of observers who will conduct an observation in any fisheries.			
3.9	Management strategy and mitigation	Developing management strategy for bycatch species and baits for later on being gathered in management plan (1.4)	2.1.2, 2.2.2, 2.3.2, 2.4.2, 2.5.2	SDI, FKPPS, KTI
3.10	Drafting research plan by considering obligation and national and international regulation and fitting in with available budget from government, industry and donor.	Tactically, collecting the information to decide the lack of data emphasizing on critical target stock (and unlimited to the available FMA analysis), risk assessment process and affordable analysis tools, implementing ecosystem model, improving capacity to support the implementation, improving awareness on the importance of activity and periodic monitoring (including external monitoring).	3.2.4	P4KSI, (BRPL.BBRSE, KAPI)
		Collaborating with SPC/CSIRO in collecting ecosystem data.		P4KSI, (BRPL.BBRSE, KAPI)
		Raising the awareness on the importance of research plan in order to build up same understanding between related stakeholders at national, province and district level.		P4KSI, (BRPL.BBRSE, KAPI)
		Expanding internal monitoring process (for examples, research, amangement), gathering suggestions from province and district.	3.2.5	
		Planning external monitoring process and sureveillance towards the implementation of plan.		

<b>4</b>	<b>IMPROVEMENT OF COMPLIANCE</b>		
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	Priority Actions	Review	PI	Institution Participations
4.1	Implementing the compliance actions based on the risk analysis and deciding priority of law's compliance in any tuna fisheries	Compliance plan is drafted together with compliance plan at national, province, district level and NGO	3.2.3	PSDKP, Fisheries Offices at Provincial and District level/ POKMAS
4.2	Enhancing legislation in giving punishment	Revising and tightening punishment decision making process to be applied in ne management steps in any fisheries (ZEE, archipelago and sea shore)	3.2.3	PSDKP/ MMAF legal division
4.3	Creating educational and training program for fishers in order to socialize management steps for the target species, depleting bycatch and consequences of ecosystem interactions.	Authorized for all stakeholders and expanded to POKMAS network. This requires strong commitment (buy-in) from processpr and middlemen.	3.2.3,	PSDKP, BPSDM KP, SDI, P4KSI, KAPI, Fisheries Offices at Provincial and District level, processor, middlemen and WWF
4.4	Strengthening management system based on community for handline fisheries and other seashore fisheries	It has been created, but functions, development and support to POKMASWAS needs to be improved.	3.2.3	PSDKP, Fisheries Offices at Provincial and District level, all related stakeholders
4.5	Drafting a report, so that people can access all types of law violation	Drafting report and identifying inspection result, particularly which are related to catching activity.	3.2.3	PSDKP, Fisheries Offices at Provincial and District level
4.6	Training and maximizing the functions of law enforcement apparatus and improving tools/supporting devices needed.	Improving PSDKP training program and expanding it to province and district level.	3.2.4	

5	OTHER CHALLENGES			
5.1	Rereviewing the impact of gas fuel's subsidy towards the sustainability of fisheries, vessels sizing 5-30 GT and < 5 GT	Conducting research on the impact of subsidy to all fisheries (regardless it is eco-friendly or not) and several size of vessels (GT)	3.1.4	PDN, PLN, BBRSE

5.2	Evaluating the probability of subsidy's disfunctionalization, from gas fuel subsidy to a more positive impact action, such as an insentives which support sustainable fisheries practices.	Evaluating any probability of subsidy alocoation which support sustainable fishery practices, for instances the usage of pole and line fishing gear		PDN, PLN, BBRSE
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