INDONESIA NATIONAL REPORT TO THE SCIENTIFIC COMMITTEE OF THE INDIAN OCEAN TUNA COMMISSION 2020

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INFORMATION ON FISHERIES, RESEARCH AND STATISTICS

In accordance with IOTC Resolution 15/02, final scientific data for the previous year was provided to the IOTC Secretariat by 30 June of the current year, **for all fleets other than longline** [e.g. for a National Report submitted to the IOTC Secretariat in 2020, final data for the 2019 calendar year must be provided to the Secretariat by 30 June 2020)	YES 29/06/2020
In accordance with IOTC Resolution 15/02, provisional **longline data** for the previous year was provided to the IOTC Secretariat by 30 June of the current year [e.g. for a National Report submitted to the IOTC Secretariat in 2020, preliminary data for the 2019 calendar year was provided to the IOTC Secretariat by 30 June 2020). **REMINDER:** Final longline data for the previous year is due to the IOTC Secretariat by 30 Dec of the current year [e.g. for a National Report submitted to the IOTC Secretariat in 2020, final data for the 2019 calendar year must be provided to the Secretariat by 30 December 2020).	YES 29/06/2020
If no, please indicate the reason(s) and intended actions:	

EXECUTIVE SUMMARY

For fisheries management purpose, Indonesian waters are divided into eleven Fisheries Management Areas (FMA). Three of them located within the IOTC area of competence, namely FMA 572 (Western Sumatera and Sunda Strait), FMA 573 (South of Java to East Nusa Tenggara, Sawu Sea and western part of Timor Sea) and 571 (Malacca Strait and Andaman Sea). Indonesian fishers operate various fishing gears such as Long line, Purse seine, hand line to catch large pelagic fishes such as tuna, skipjack, marlins etc. Longline is the main fishing gear type targeting tunas which operated in those FMAs.

Number of active fishing vessel operated in 2019 were 383 vessels dominated by longline vessel followed by purse seine vessel. Total catch of main species of tunas in 2019 was estimated around 189,021 tons which composed of albacore (3,921 mt), bigeye tuna (13,654 mt), skipjack tuna (128,939 mt) and yellowfin tuna (42,507 mt).

Nominal hook rates derived from logbook data 2019 for albacore, bigeye and yellowfin in kg/1000 hooks were 33.47, 18.85, and 52.22 respectively. Meanwhile, nominal hook rates for swordfish, indo-pacific sailfish and black marlin were increased compared than previous years, while hook rates for blue marlin, striped marlin, and short-billed spearfish continued to depleted. Observer coverage 2019 in longline vessel was reported 3.53% decreased from previous year in term proportion number of vessel observed. Interaction longline fishery with ERS still dominated by blue sharks. Interaction with seabird reported slightly increased from previous year involving petrels while interaction with marine turtle reported decreased from previous years and mitigation measures for those ERS has taken in account by fishermen.

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1. BACKGROUND/GENERAL FISHERY INFORMATION

Indonesia is an archipelagic nation located between the continents of Asia and Australia surrounded by two oceans, Pacific Ocean in the northern part and Indian Ocean in southern part. It consists of approximately 17,508 islands and coast line of 81,000 km. Totally, Indonesia has 5.8 million km^2 of marine waters consisting of 3.1 million km^2 of territorial waters (<12 miles) and 2.7 million km^2 of EEZ (12-200 miles). For fisheries management purpose, Indonesian waters are divided into eleven Fisheries Management Areas (FMA). Three of them located within the IOTC area of competence, namely FMA 572 (Western Sumatera and Sunda Strait), FMA 573 (South of Java to East Nusa Tenggara, Sawu Sea and western part of Timor Sea) and 571 (Malacca Strait and Andaman Sea). are located within the IOTC area of competence (Figure 1a).

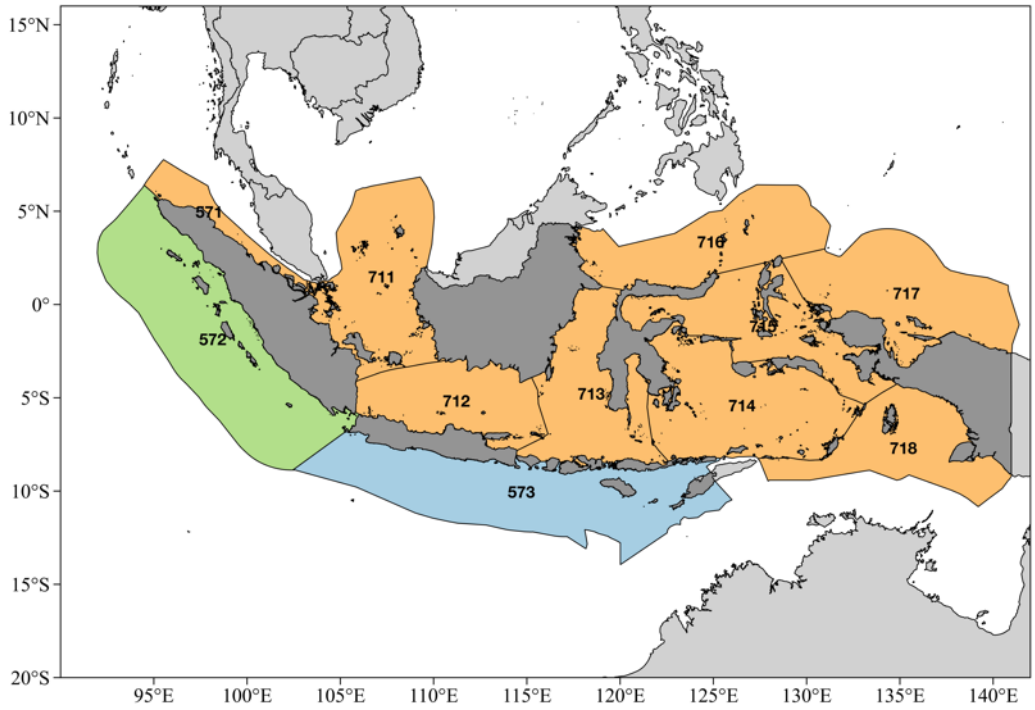


Figure 1a. The eleven of Fisheries Management Area (FMA) in Indonesian waters

Main landing sites for tuna and tuna-like species are widespread across the western of Sumatra, south of Java, Bali and Nusa Tenggara (Figure 1b). Area of western Sumatra are dominated by purse seine fleets (Lampulo and Sibolga) and longline fleets (Bungus). On the other hand, southern part of Java, Bali and Nusa Tenggara are dominated by handline/troll line fleets (Pacitan, Prigi and Labuhan Lombok) and longline fleets (Palabuhanratu, Cilacap and Benoa). Benoa Port is considered as main tuna landing port for Indonesia.

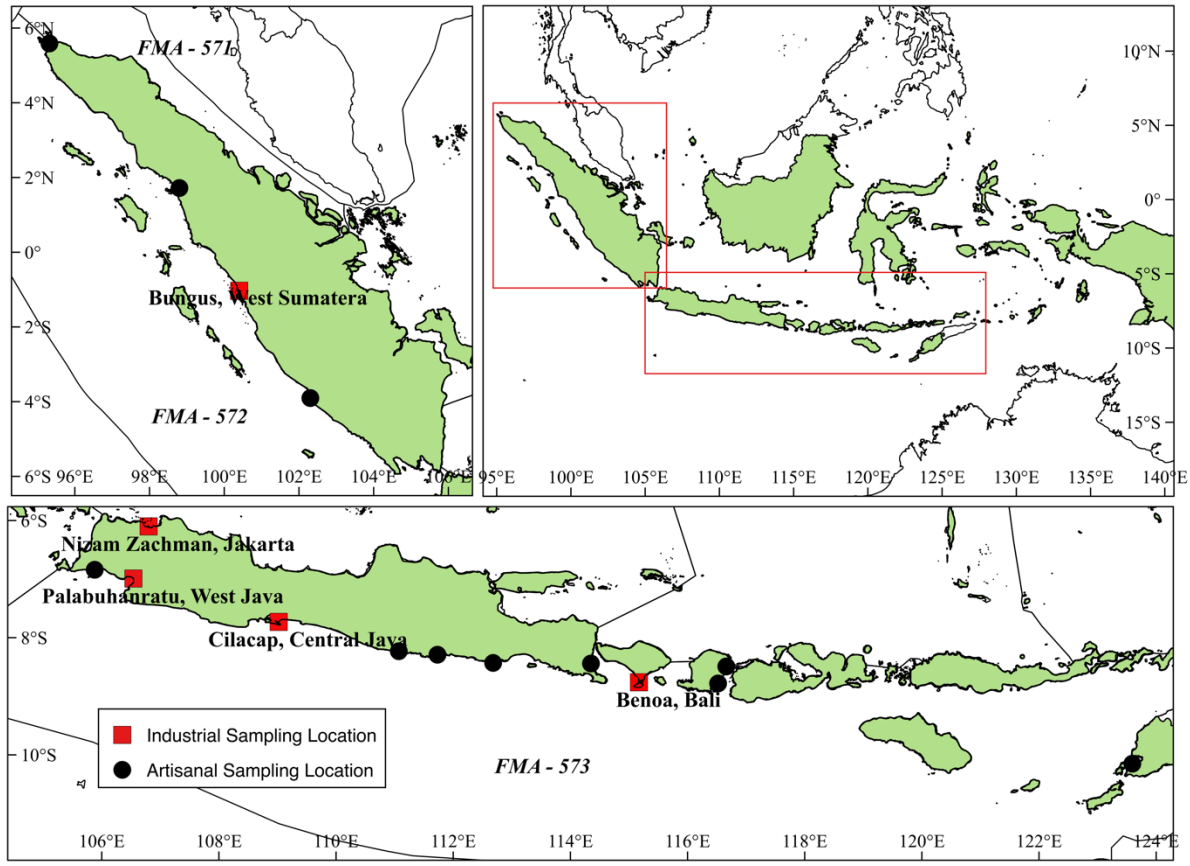


Figure 1b. Primary fishing port/landing sites the industrial (*blue label*) and artisanal (*red label*).

2. FLEET STRUCTURE

The number of active fishing vessels operated, based on grouped gross tonnage (GT) as per reported to IOTC on 6th of February 2020 in the FMAs 572, 573 and high seas Indian Ocean were 383 fishing vessels, which consisted of longline (283), purse seine (91), and 9 registered carrier/cargo freezer.

Table 1. Summary of active fishing vessels by size (GT) as per reported to IOTC on 6th of February 2020 (Source: DGCF).

Size	Longline	Purse seine	Gillnet	Carrier/Cargo Freezer	Other	Total
<50	92	0	0	0	0	92
51-100	100	6	0	0	0	106
101-200	91	84	0	4	0	179
201-300	0	1	0	4	0	5
301-500	0	0	0	1	0	1
501-800	0	0	0	0	0	0
>800	0	0	0	0	0	0
Total	**283**	**91**	**0**	**9**	**0**	**383**

3. CATCH AND EFFORT (BY SPECIES AND GEAR)

Total catch for four main tuna species, namely albacore, bigeye tuna, skipjack and yellowfin tuna in 2019 was 189,021 tons, substantially higher (~20%) compared to previous year and recorded as the highest catch in the last 5 years. Skipjack tuna remained the main contributor, 128,939 tons, followed by yellowfin, bigeye and albacore tuna which around 42,507; 13,654; and 3,921 tons, respectively. The average catch estimation of four species tunas from 2015 to 2019 was 158,394 tons. The proportion average catch across all gear was dominated by skipjack (49.1%), yellowfin (21.1%), bigeye (10.2%) and albacore (3.3%).

Table 2. Annual catch by gear and primary species of tuna (ALB, BET, SKJ and YFT) derived from Indian Ocean from 2015-2019.

Gear Type	Species	Year					Average
		2015	2016	2017	2018	2019	MT
Gillnet	ALB	965	20	nil	97	80	232
	BET	938	729	1,120	1,139	1,339	1,053
	SKJ	7,652	12,892	6,023	6,738	10,904	8,842
	YFT	1,241	2,912	1,161	1,603	3,726	2,129
	Sub-total	**10,796**	**16,553**	**8,304**	**9,577**	**16,049**	**12,256**
Line	ALB	1,179	860	566	697	1,011	863
	BET	1,908	2,872	2,938	4,464	6,083	3,653
	SKJ	19,474	16,964	24,594	25,304	38,547	24,977
	YFT	9,645	9,276	9,034	8,928	11,731	9,723
	Sub-total	**32,206**	**29,972**	**37,132**	**39,393**	**57,372**	**39,215**
Longline	ALB	4,488	6,278	6,399	4,689	2,749	4,921
	BET	7,919	7,642	8,302	5,474	3,976	6,663
	SKJ	4,763	2,281	6,555	4,568	2,111	4,056
	YFT	10,549	10,404	10,527	9,610	5,172	9,252
	Sub-total	**27,719**	**26,605**	**31,783**	**24,341**	**14,007**	**24,891**
Others	ALB	662	3	nil	96	81	168
	BET	2,121	1,692	140	3,408	873	1,647
	SKJ	30,452	11,394	16,086	12,782	14,977	17,138
	YFT	10,773	3,107	7,593	7,824	5,751	7,010
	Sub-total	**44,008**	**16,196**	**23,819**	**24,110**	**21,681**	**25,963**
Purse Seine	ALB	7	18	29	25	nil	16
	BET	5,779	9,199	9,445	5,919	1,384	6,345
	SKJ	18,597	28,828	43,614	35,885	62,400	37,865
	YFT	8,363	10,786	11,598	12,342	16,127	11,843
	Sub-total	**32,746**	**48,831**	**64,686**	**54,171**	**79,912**	**56,069**
Grand Total	ALB	7,301	7,179	6,994	5,604	3,921	6,200
	BET	18,665	22,134	21,945	20,404	13,654	19,360
	SKJ	80,938	72,359	96,872	85,277	128,939	92,877
	YFT	40,571	36,485	39,913	40,307	42,507	39,957
	Sub-total	**147,475**	**138,157**	**165,724**	**151,592**	**189,021**	**158,394**

Data collection validation from e-logbook program showed significance improvement since implemented in 2017. Summary of spatial and temporal of the catch and effort information derived from logbook data is presented in Annex 1.

The distribution of effort (hooks) from longline fleets in 2019 derived from logbook data was concentrated on area of western Sumatra and south of Java, concentrated mainly between 0°-35°S and 95°-110°E. The range of effort used was between 500-2,000 hooks/set with average 1,200 hooks/set (Figure 2). To be noted, catch proportion of logbook data was merely ~5% from total estimated catch submitted.

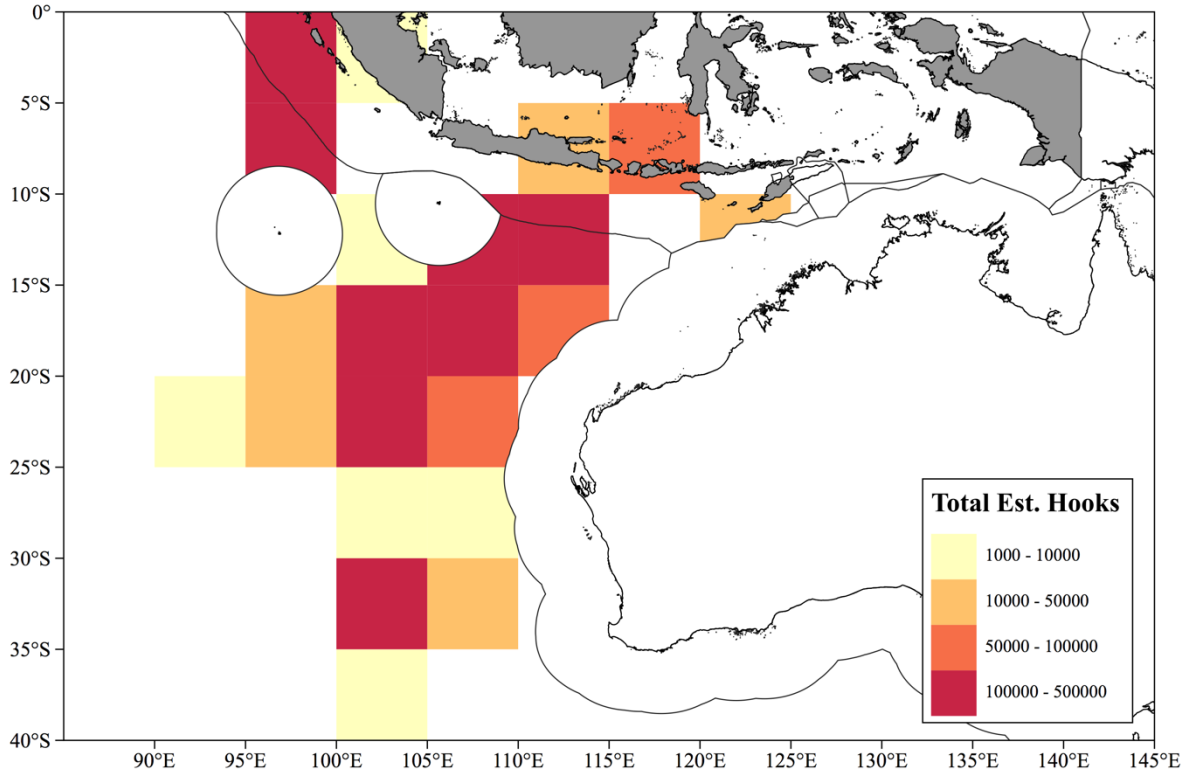


Figure 2. Map of the distribution of Indonesian tuna longline efforts year 2019 (source: Logbook data).

Reported catch distribution for three main species of tuna (ALB, BET and YFT) in 2019, derived from logbook data. Sum of catch declared in kilogram (kg). In general the concentration mainly appeared between above 20°S. (Figure 3).

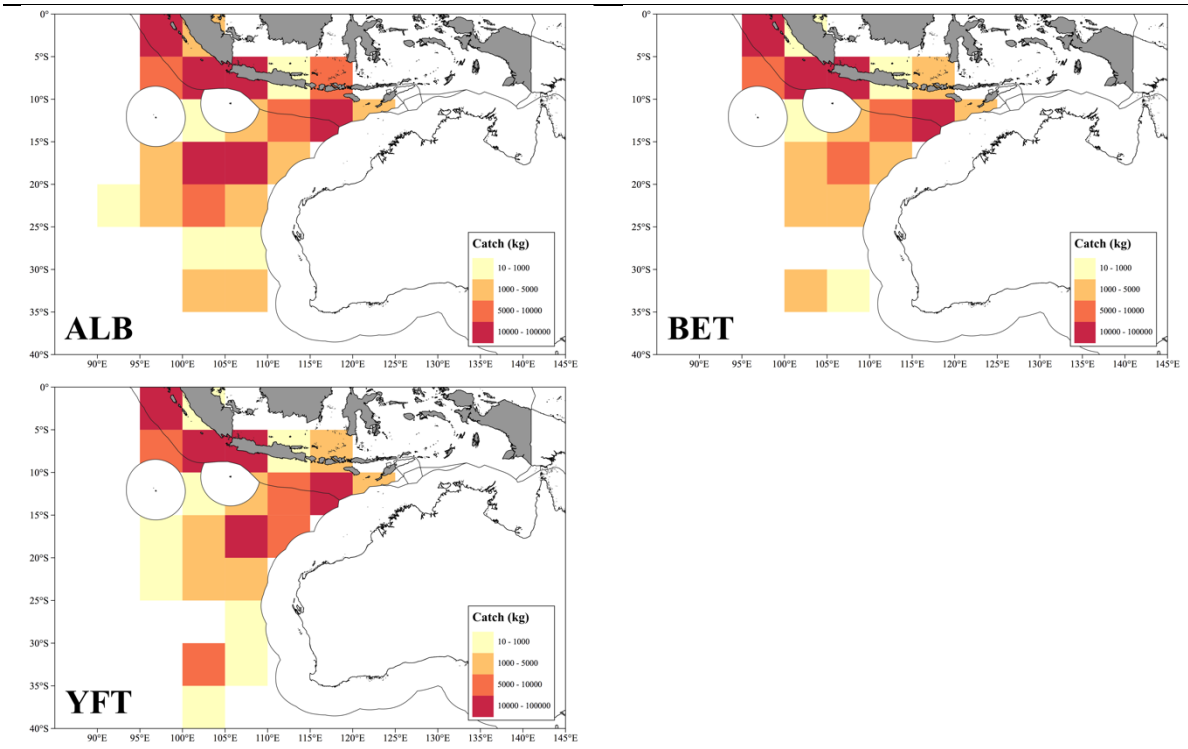


Figure 3. Map of reported catch distribution in 2019, aggregated by species, and by 5x5 degree blocks (source: Logbook data).

3.1. Annual catch estimation at Benoa Port

Annual catch estimation from scientific port sampling program at Benoa port reported a continuous declining trend since 2013, moreover total estimated catch was reduced slightly to around 2,421 tons, or approximately 1% lower compared previous year. The recent year also recorded as the lowest estimated catch in the last 5 years (Table 3). The number of effort (number of landing) also showed a declining trend over the last 5 years, whereas total number of landing in recent year was drop more than half from 2014 observation (Figure 4).

Table 3. Annual catch estimation by gear (LL) and primary species of tuna (ALB, BET and YFT) landed in Benoa Port from 2014-2019.

Year	Annual Catch Estimation (ton)			
	YFT	BET	ALB	**TOTAL**
2014	2,654	2,312	687	**5,653**
2015	1,283	2,989	631	**4,903**
2016	2,562	2,385	1,584	**6,110**
2017	1,135	1,367	357	**2,859**
2018	1,362	1,095	279	**2,457**
2019	990	1,208	223	**2,421**

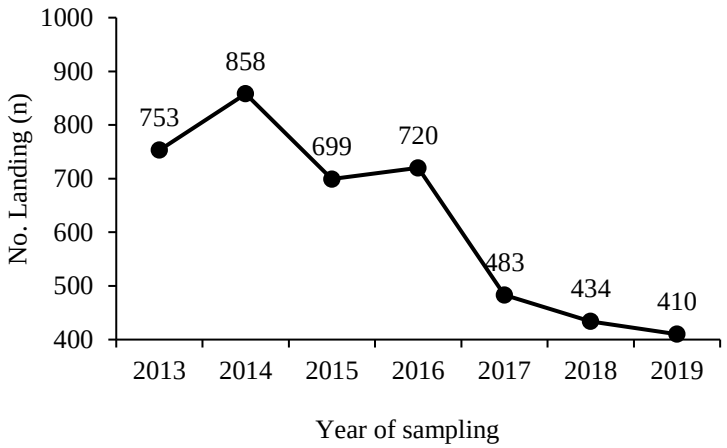


Figure 4. Total number of landing of Indonesian tuna longline vessels based in Benoa port during 2013-2019

3.2. Catch and Effort from Coastal and Artisanal Fisheries

Apart of daily monitoring on tuna landing activity in industrial-scaled locations, Research Institute of Tuna Fisheries (RITF) also conducting in small-scaled landing sites since 2013. The sampling coverage should be at least 30% from total landing for each particular month (Table 4).

Table 4. Observed catch (kg) and effort (days) by gear from coastal and artisanal fisheries in Indonesia during 2015-2019 (Source: RITF port monitoring program)

FMA	Location	Gear	2015		2016		2017		2018		2019	
			C (mt)	L (N)	C (mt)	L (N)	C (mt)	L (N)	C (mt)	L (N)	C (mt)	L (N)
573	Labuhan Lombok	HL	96	73	307	264	467	295	269	203	na	na
573	Pacitan	HL	565	564	421	381	1,629	632	639	358	na	na
573	Pacitan	PS	1,852	309	944	342	1,934	361	1,052	291	na	na
572	Sibolga	PS	9,505	903	9,953	1641	15,753	1,681	na	na	13,200	1,527

**) C = number of catch ; L = number of landing vessel*

3.3. Catch and Effort Data from Scientific Observer Program

Indonesia's Regional Observer Scheme (ROS) was conducted by Research Institute for Tuna Fisheries (RITF) in Bali which fully supported and funded by Indonesian government. The data collected by ROS covers catch (in number), composition by species, real time fishing ground, number of setting, number of hooks etc. Catch per unit of effort (CPUE) for the main tuna species (ALB, BET and YFT) based on ROS data during 2006-2019 was presented in Figure 5. Both YFT and BET hook rates were relatively stable, at average 0.08/100 hooks and 0.19/100 hooks, respectively. By contrast, the hook rate of ALB was highly fluctuated over the years of observation.

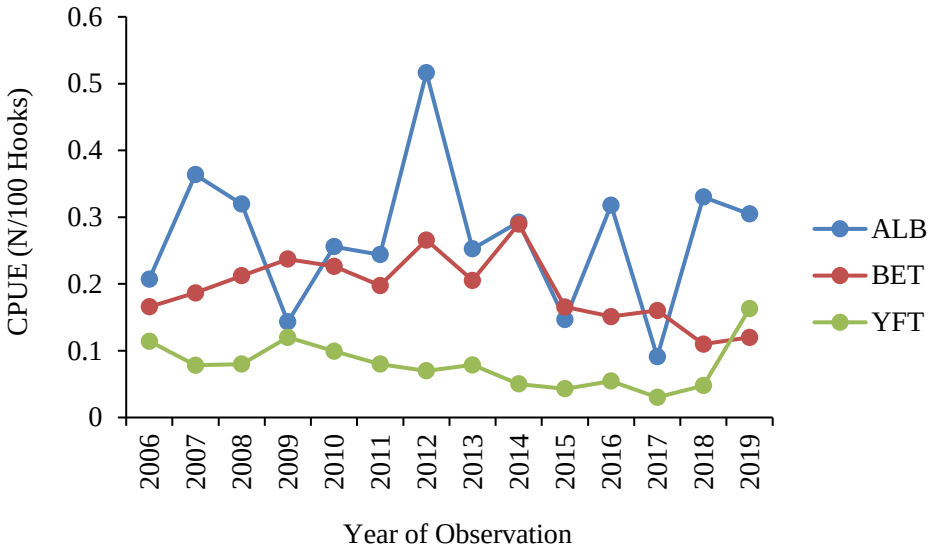


Figure 5. Nominal hook rate series (N/100 hooks) for large tuna (ALB, BET and YFT) based on RITF scientific observer data in the Indian Ocean (2006- 2019).

4. RECREATIONAL FISHERIES

There is no official reported catch from Indonesia recreational fishing. An organization deal with sport fishing has been established since 1997, namely "FORMASI" (*Indonesia Fishing Sport Federation*) where this organization is a member of International game fish association (IGFA), Currently no update of FORMASI activities. Indonesia government is focusing on assessing and managing commercial fishing, and would including recreational fishing in the near future.

5. ECOSYSTEM AND BYCATCH ISSUES

5.1. Sharks

Sharks and rays fisheries management is regulated through Ministerial Regulation No. 12/PERMEN-KP/2012 and 30/PERMEN-KP/2012. Specifically listed on chapter 10 and 73, respectively, which regulate management and conservation of bycatch and ecological related species both in high seas and Indonesian jurisdiction waters. Several activities to raise the fishers awareness on the importance of sharks resource sustainability are through workshops, seminars and producing and distribute posters which prohibit several keys species of sharks to catch. In the framework of fisheries management of sharks and rays in Indonesia, several regulations have been issued, such as: ministerial decree No. 18/KEPMEN-KP/2013 and 04/KEPMEN-KP/2014 related to determination of full protection on whale shark (*Rhincodon typus*) and manta rays (*Manta spp.*). Additionally for the hammerhead sharks (*Sphyrna* spp.) the annual catch is based upon quota listed on the Decree of Director General of Natural Resources Conservation and Ecosystem number SK.1/KSDAE/KKH/KSA.2/1/2020.

According to scientific observer data, both blue shark (*Prionace glauca*) and crocodile shark (*Pseudocarcharias kamoharai*) dominated the incidental catch for sharks during 2014-

2019. While most of the blue sharks were retained, crocodile sharks usually discarded dead (Table 5). A data series of nominal CPUE from 2005-2019 is presented in Annex 3.

Table 6. Total observed number of sharks, by species, released/discarded by the Indonesian tuna longline fleet in the IOTC area of competence (2014–2019).

Code	2014				2015				2016				2017				2018				2019			
	N	Retained	Discarded		N	Retained	Discarded		N	Retained	Discarded		N	Retained	Discarded		N	Retained	Discarded		N	Retained	Discarded	
			Alive	Dead			Alive	Dead			Alive	Dead			Alive	Dead			Alive	Dead			Alive	Dead
PTH	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	2	2	nil	nil	2	nil	1	1	3	2	nil	1
BTH	1	1	nil	nil	nil	nil	nil	nil	4	4	nil	nil	3	3	nil	nil	15	13	nil	2	4	3	nil	1
CCB	17	17	nil	nil	1	1	nil	nil	3	3	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil
FAL	nil	nil	nil	nil	26	26	nil	nil	nil	nil	nil	nil	2	1	1	nil	12	12	nil	nil	10	10	nil	nil
OCS	9	8	nil	nil	4	4	nil	nil	4	4	nil	nil	4	4	nil	nil	nil	nil	nil	nil	6	4	nil	2
CCL	nil	nil	nil	nil	1	1	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	3	3	nil	nil
SMA	2	2	nil	nil	1	1	nil	nil	5	5	nil	nil	39	8	30	1	13	9	nil	4	6	6	nil	nil
LMA	2	2	nil	nil	1	1	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	5	nil	nil	5	3	2	nil	1
BSH	67	62	nil	nil	nil	nil	nil	nil	105	105	nil	nil	184	160	24	nil	300	194	6	100	202	98	nil	104
PSK	91	nil	nil	nil	137	137	nil	nil	174	nil	nil	174	84	17	67	nil	148	2	nil	146	119	4	nil	115
SPL	nil	nil	nil	nil	108	nil	nil	108	nil	nil	nil	nil	nil	nil	nil	nil	1	nil	nil	1	nil	nil	nil	nil
TIG	nil	nil	nil	nil	1	1	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	3	2	nil	1	4	nil	nil	4
ISB	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	39	1	35	3	9	2	nil	7	nil	nil	nil	nil
TSK	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	6	6	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil
SPY	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil
THR	2	2	nil	nil	6	6	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil
SHK	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil

5.1.1. NPOA sharks

In response to mandate for establishment of international plan of action in term of conservation and management of sharks and rays by the member of United Nations through Fisheries and Agricultural Organization (FAO), as well as increasing global concern towards sharks and rays sustainability, Indonesia issued the first National Plan of Action (NPOA) for sharks and rays for 2010-2014. The document outlines strategy and action plan for the sustainability of the entire sharks and rays species. The extension, for period 2016-2020 is currently running and being updated. In addition, in the upcoming action plan whale sharks will be put as fully protected species as work is still in progress.

5.1.2. Sharks finning regulation

Indonesia prohibit shark finning, targeting juvenile and/or pregnant sharks and rays, as per declared in ministerial regulations No. 12/PERMEN-KP/2012 and 30/PERMEN-KP/2012. All carcasses of sharks and rays incidentally caught during operation must be landed in whole (all fins attached to its body), except for thresher sharks (*Alopias spp.*) whereas if it incidentally caught, it must be discarded at sea whether alive or dead and must be recorded in the logbook.

In addition, domestic trading and export any parts of sharks and rays which are **not currently protected** by law, and/or not included in the appendix of CITES are regulated through ministerial regulation No. 33/PERMEN-KP/2017, as an amendment from previous regulation No. 32/PERMEN-KP/2012. Such trading activities must be equipped with letter of recommendation from Directorate General of Marine Spatial Management as per mentioned in regulation No. 13/PER-DJPRL/2018. Carcasses, and fins are the commonly traded for both domestic and/or export market. As per recorded by Marine and Coastal Resources Management Office (BPSPL), Denpasar during 2018-2019 period, most of the sharks and rays carcasses and fins were intended for domestic market, with nearly 3,000 tons in 2018 and reduced to 2,000 tons last year. On the other hand, the number of fins intended for overseas market (~71 tons)

was relatively on par with domestic, with the later was a quarter more (~96 tons) in 2019. No fins trade data recorded in 2018 (Table 6a). In term of value, fins for export resulted in ~USD. 1.72 million in revenue, compared to local market (~USD 453,154), despite having 30% less in volume. In addition, the average value per kilogram of carcasses for export (~USD. 2.5/kg) was double compared to local destination (~USD 1.0/kg). No fins trade data recorded in 2018 (Table 6b).

Table 6a. Summary of trade traffic volume (kg) for carcasses and fins of sharks and rays from Denpasar, Bali for period 2018-2019 (Source: ROMCRM, Denpasar).

Destination	Products	Volume (ton)	
		2018	2019
Export	Carcasses	226.1	183.3
	Fins	na	71.8
Domestic	Carcasses	2,815.2	2,142.1
	Fins	295.5	96.4

Table 6b. Summary of trade traffic value (millions) for carcasses and fins of sharks and rays from Denpasar, Bali for period 2019 (Source: ROMCRM, Denpasar).

Destination	Products	Value USD (millions)
		2019
Export	Carcasses	0.45
	Fins	1.72
Domestic	Carcasses	2.16
	Fins	0.55

5.1.3. Blue shark

Blue shark is the most common by-catch in tuna longline fisheries. In order to monitor the catches both scientific port sampling and logbook program has been applied since 2002 and 2017 respectively. In addition, catch and effort of blue shark is closely examined through scientific observer program since 2005.

5.2. Seabirds

Seabirds data collection on longline fleets are continuously monitored through ROS since mid-2005, however, only the last 5 years data are presented. In total, there were 46 incidental interaction with seabirds reported by the observers during observation. Data presented limited only for interaction above 25^{o}S, in accordance with IOTC Resolution No. 12/06. The identification of seabirds was simplified by just three categories prior to 2017 (B1=Seagull, B2=White Albatross and B3=Black Albatross). Afterwards, the improvement on seabirds identification was expected courtesy of workshop on seabird mitigation measures.

No interactions reported in the area above 25^{o}S during longline operation in 2019, due to the absence of observation in that particular region, however, in the low latitude (5^{o}-10^{o}S) there

were five observed accidental catch of petrels (Table 7). Mitigation measure on seabirds is regulated through Ministerial Decree (PERMEN KP) No. 12/2012 related to mitigation for ecologically related species mitigation, including seabirds in which instalment of tori line is obligatory for every vessel operated beyond 25°S (high seas). Identification card for Seabird from IOTC had been translated into Bahasa. In addition, Indonesia also already developed NPOA for Seabird back in 2016 and has been reviewed by Birdlife South Africa, with fully compliance remarks and obtained the green status.

Table 7. The number of observed incidental interaction of seabirds in tuna longline fishery from 2014-2019 (Source: RITF scientific observer data)

Code	Species	2014	2015	2016	2017	2018	2019
DCU	Shy albatross	nil	nil	nil	1	nil	na
PDM	Great-winged petrel	nil	nil	nil	18	1	na
PTZ	Petrels nei	nil	nil	nil	nil	nil	5
PHU	Sooty albatross	nil	nil	nil	1	nil	na
USB	Other seabirds	1	7	nil	nil	nil	na

5.3. Marine Turtles

Six out of 7 world's marine turtles are known to inhabit Indonesian waters. Since 1999, they are nationally protected species in the country in accordance with the latest regulation from Ministry of Environment and Forestry Decree No. P.106/2018. Any catch and/or direct use is prohibited. In 2019, there were 2 olive-ridley turtles and 1 green turtle reported as incidental catch. Two of them were discarded dead (olive-ridley turtles) and the other (green turtle) reported released alive (Table 8). Olive ridley turtle, loggerhead and leatherback turtles are classified as vulnerable. While green turtles are in a state endangered and even hawksbill in a state extremely endangered. Indonesia established National Plan of Action for marine turtles 2016-2020 through Directorate of Conservation of Marine Biodiversity (KKHL), Ministry of Marine Affairs and Fisheries (MMAF). Indonesia also develop cooperation with Coral Triangle countries like Malaysia, The Philippines, Solomon Islands, Papua New Guinea and Timor Leste through Coral Triangle Initiatives on Coral Reefs, Fish and Food Security (CTI CFF) platform in order to protect threatened migratory species, including marine turtles. The CTI CFF now underway to develop regional plan of action (RPOA) 2020-2030. Areas of critical habitats, such as migratory corridors, nesting beaches, and Inter-nesting and feeding areas were identified. Map that shows migration corridors, nesting beaches, and critical habitats for marine turtle in Indonesia are produced and available online http://kkji.kp3k.kkp.go.id/sig. We also currently developing a web-based information system for priority species that may be found at https://bit.ly/ARCGIS-jenisikanterancampunah-dilindungi.

Table 8. The number of observed incidental interaction with marine turtles in tuna longline fishery from 2014-2019 (Source: RITF scientific observer data)

Code	Species	2014	2015	2016	2017	2018	2019
DKK	Leatherback turtle	nil	nil	nil	nil	nil	nil
LKV	Olive-ridley turtle	12	1	15	5	12	2
TTH	Hawksbill turtle	nil	nil	nil	nil	nil	Nil
TUG	Green turtle	nil	nil	nil	nil	nil	1
TTX	Marine turtles nei	nil	nil	nil	nil	nil	nil

5.4. Billfishes

Billfishes catch contributed around 5% to total catch of tuna longline during 14 years of observation (2005-2018). There were 6 species of billfishes caught by Indonesian tuna longline fleets. Swordfish has the higher nominal CPUE, range from 0.093-0.608 (mean = 0.322), followed by black marlin (0.004-0.176, mean = 0.093) and blue marlin (0.006-0.156, mean = 0.073). On the other hand, sailfish, striped marlin and shortbill spearfish were considered as insignificant contributors (Figure 6). A data series of nominal CPUE from 2006-2019 is presented in Annex 2.

Most of the billfish landed in frozen condition and expected to be marketed as processed product, such as: loins, steak and saku. Most of marlin (~90%) are intended for Japan market, whereas swordfish is bound for EU and US. In addition, some of the local grade products also distributed for domestic market.

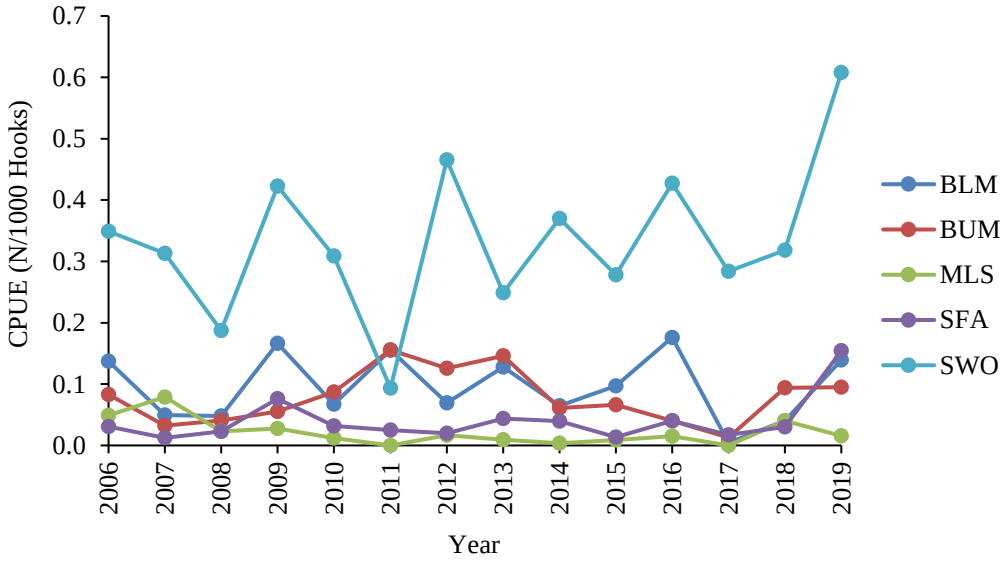


Figure 6. The nominal hook rate of known billfishes species caught by Indonesian tuna longline fisheries from 2006-2019.

5.5. Neritic Tuna

A result from DGCF-OFCF project to monitor neritic catch data in West Sumatera showed estimation of landing data for neritic tuna were 549,858 kg (2014), 2,222,237 kg (2015)

and 786,668 kg (2016) respectively (DGCF, 2016). Average catch of neritic tuna landed in west and north Sumatera was 1,187,960 kg, dominated by frigate tuna (FRI), bullet tuna (BLT), kawakawa (KAW) and longtail tuna (LOT).

The recent issues from 10th Working Party on Neritic Tunas is developing stock status indicators for neritic tunas in the Indian Ocean through CPUE standardisation. The purpose of this work is to develop the stock assessment. The species that highlight by the IOTC for Indonesia are kawakawa, bullet tuna, and frigate tuna (IOTC–WPNT10, 2020). Catch and effort data for neritic tunas species has been reported to the IOTC Secretariat, as well as the size-frequency data (Resolution 15/02) for 2019, using the recommended Form 4SF.

5.6. Other ecologically related species (e.g. marine mammals, whale sharks)

Pomfret, sickle pomfret, escolar and lancetfish were the most common species caught as a by-product from tuna longline operations 2014-2019. Neither marine mammals or whale sharks were reported to be incidentally caught during that periods (Table 9).

Tabel 9. The number of observed catch of others ecologically related species in longline fisheries from 2014-2019 (source: RITF scientific observer data).

Code	Species	2014	2015	2016	2017	2018	2019
BAR	Baracuda	4	5	6	nil	2	15
DOL	Common dolphinfish	15	7	13	32	11	29
DCO	Dolphin	nil	nil	nil	1	2	nil
EIL	Brilliant pomfret	nil	nil	nil	1	1	nil
HAR	Long nose chimaeras	3	14	46	nil	1	nil
LEC	Escolar	666	490	353	240	613	550
LAG	Moonfish	29	30	60	13	57	38
MOX	Ocean Sunfish	3	2	1	nil	3	2
ALX	Long snouted lancetfish	921	739	693	796	1760	613
OHR	Other hairtail fish	nil	nil	nil	nil	nil	nil
OIL	Oilfish	58	16	8	24	19	20
TCR	Pomfret	90	45	62	42	nil	11
TRF	Tappertail ribbon fish	1	nil	nil	nil	nil	nil
TST	Sickle pomfret	110	29	117	105	131	25
WAH	Wahoo	96	63	61	30	74	61

6. NATIONAL DATA COLLECTION AND PROCESSING SYSTEMS

6.1. Logsheet data collection and verification

Fisheries logbook submission is mandatory for fleets above 10 GT, according to Ministerial Regulation No. PER.18/MEN/2010 issued on 5 October 2010. A total of 1,774 vessels were comply to fill and hand out the logbook to the port authorities (Table 10). There was a noticeable 27% increase compared to last years' submission, with e-logbook adoption has reached out up to 40% for all gears. Although, the data quality is incrementally getting better every year, data entry and validity as well as the need for verification and validation prior to analysis are still the remaining issues. Hence, for effective implementation of this program, it is necessary to keep introducing this program and strengthen capacity to both fishers and port officers.

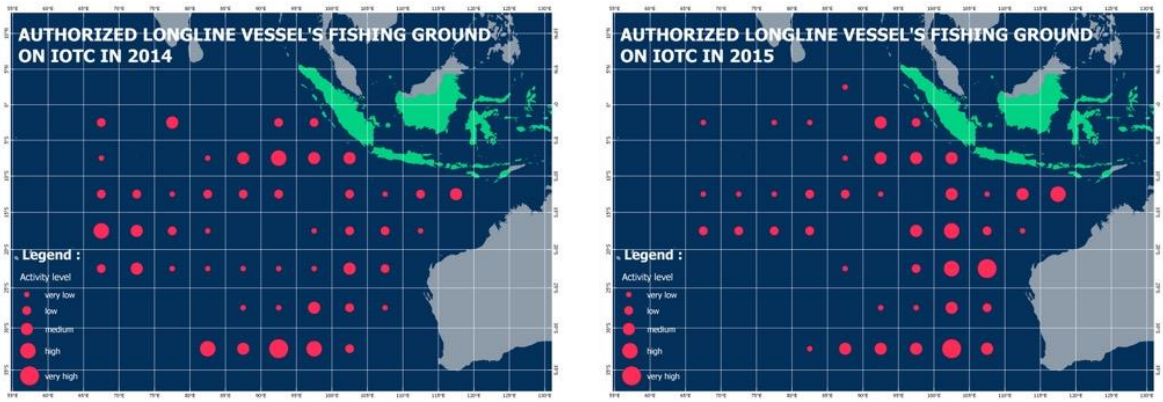
Table 10. The number of vessels submitted logbook (source: DGCF).

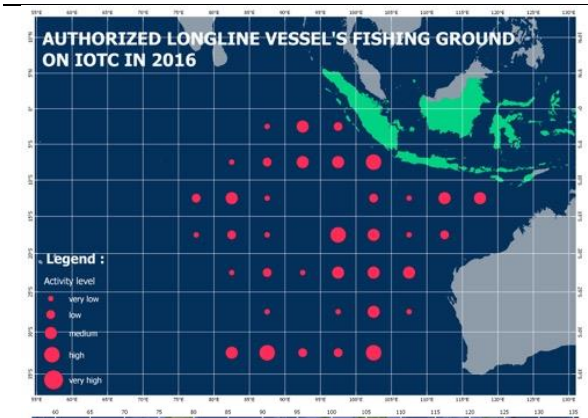
No	FMA	2014	2015	2016	2017	2018	2019
1	571	53	58	24	1	5	109
2	572	720	1,202	1,182	639	575	872
3	573	1,210	1,031	941	796	713	793
	Total	**1,983**	**2,291**	**2,147**	**1,436**	**1,293**	**1,774**

6.2. Vessel Monitoring System

Vessel Monitoring System (VMS) for fishing vessels has been started to be implemented in Indonesia since 2003, Currently, trough Ministerial Regulation No. 42/2015 about fisheries vessel monitoring system, all fishing vessel above 30 GT or operating in high seas are mandatory to be equipped with VMS transmitter. Without VMS transmitter on board, the fishing vessel will not get permission to leave the fishing port for their fishing operations, Fishing monitoring centre (FMC) for Indonesia's VMS is base in Jakarta, In order to fight against illegal, unreported and unregulated (IUU) Fishing, Indonesia has started to implement Database Sharing Systems for Fisheries Management, The system is developed to integrate a number of databases, including the licensing, logbook and VMS databases, The Launching of the system application has recently been made by the Minister of Marine and Fisheries on 19 November 2013 in Jakarta that will be applied to 45 fishing ports of Indonesia, fisheries Information and services for Indonesia VMS is provided and could be accessed at http://dkpvms.dkp.go.id. Interactive VMS data visualization can also be accessed at http://globalfishingwatch.org/map/, which showing a strong statement from Indonesian government in response to fisheries transparency. Figure 7 showed the spatial distribution of Indonesia fleets based on VMS information.

A)




AUTHORIZED LONGLINE VESSEL'S FISHING GROUND
ON IOTC IN 2016
Legend :
Activity level
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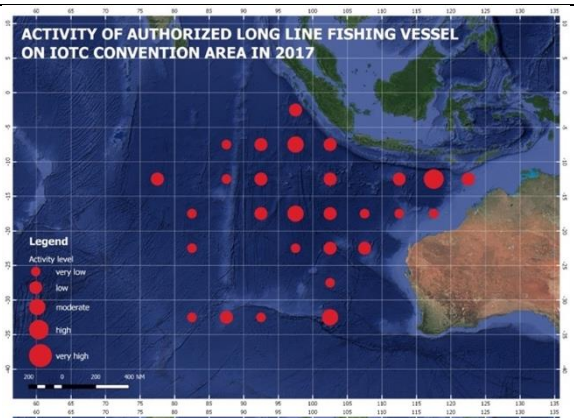
low
medium
high
very high


ACTIVITY OF AUTHORIZED LONG LINE FISHING VESSEL
ON IOTC CONVENTION AREA IN 2017
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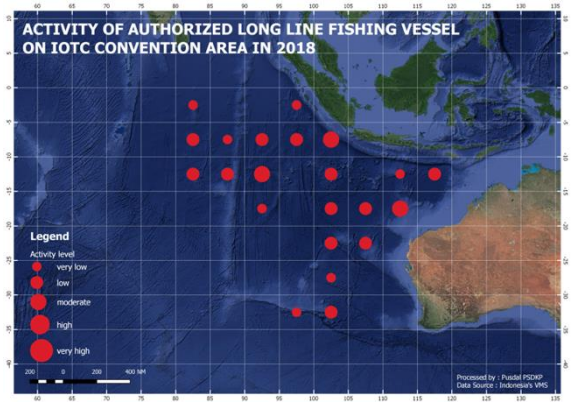
ACTIVITY OF AUTHORIZED LONG LINE FISHING VESSEL
ON IOTC CONVENTION AREA IN 2018
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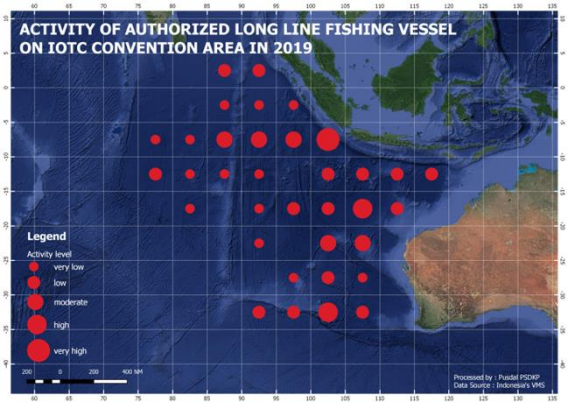
Processed by : Pusdal PSDKP
Data Source : Indonesia's VMS


ACTIVITY OF AUTHORIZED LONG LINE FISHING VESSEL
ON IOTC CONVENTION AREA IN 2019
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Activity level
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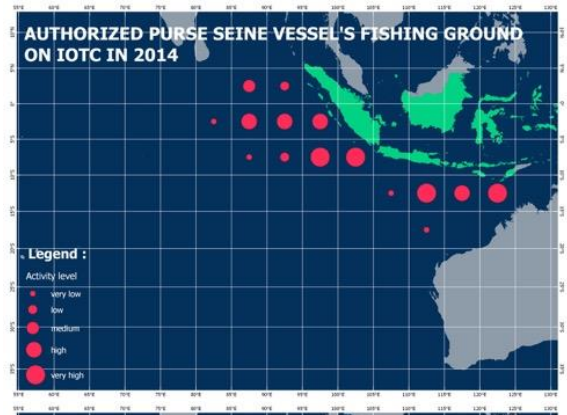
Processed by : Pusdal PSDKP
Data Source : Indonesia's VMS

B)


AUTHORIZED PURSE SEINE VESSEL'S FISHING GROUND
ON IOTC IN 2014
Legend :
Activity level
very low
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medium
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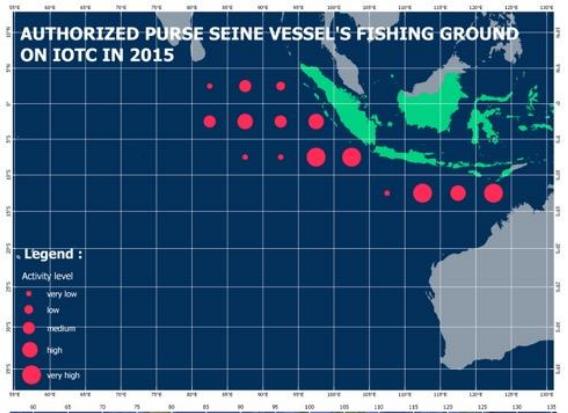
AUTHORIZED PURSE SEINE VESSEL'S FISHING GROUND
ON IOTC IN 2015
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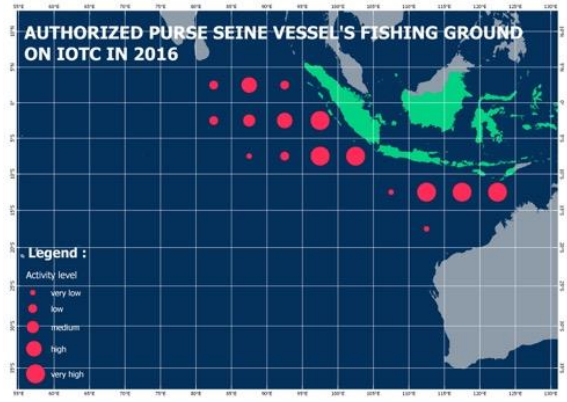
AUTHORIZED PURSE SEINE VESSEL'S FISHING GROUND
ON IOTC IN 2016
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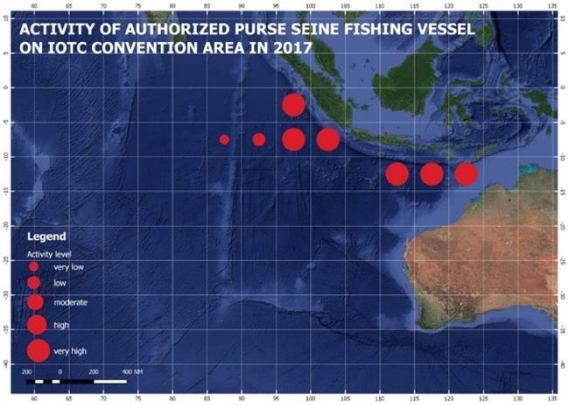
ACTIVITY OF AUTHORIZED PURSE SEINE FISHING VESSEL
ON IOTC CONVENTION AREA IN 2017
Legend
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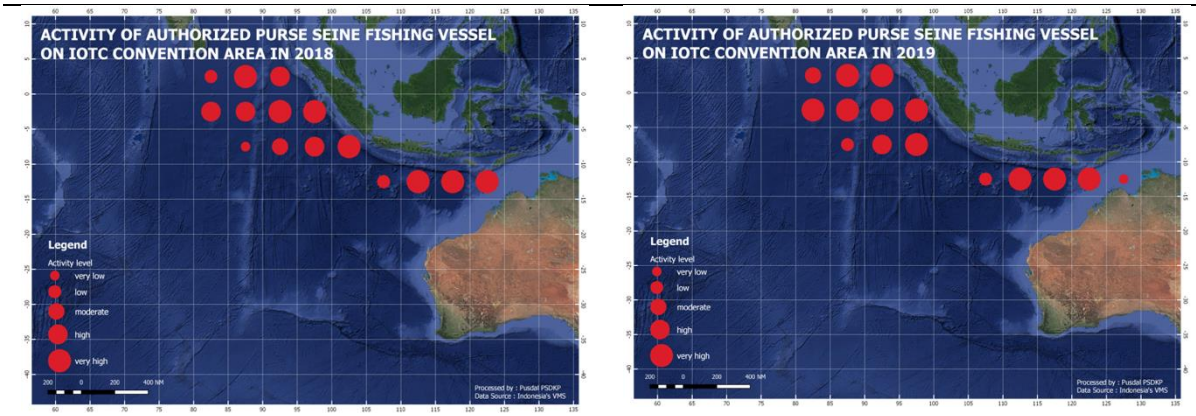

Figure 7. Map of spatial distribution of longline (A) and purse seine (B), aggregated from 2014 to 2019 based on VMS data (Source: PSDKP).

6.3. Observer Scheme

Indonesia have joined Regional Observer Program (ROP) for Transhipment at Sea since 2009 under resolution IOTC No, 08/02, which has been superseded by Resolution 11/05 and Resolution 12/05 concerning on establishing a program for transhipment by large-scale fishing vessels stated that "Each CPC shall ensure that all carrier vessels transhipping at sea have on board an IOTC observer". Indonesia also established scientific observer program in accordance with IOTC resolution 11/04 related to Regional Observer Scheme (ROS). The number of scientific observers recorded until 2019 was 15 observers, however the number may decline in the future due to other arrangement among the personnel. New recruitment are imminent for the continuation of the program. Since 2013 the deployment of observers are extended to other gears, such as: small scale purse seine, coastal drifting gillnet and troll line/hand line (Table 11a-d). Ministerial Regulation No. 1/PERMEN-KP/2013 formally regulates national observers for fishing and carrier vessel, a positive progress to secure government budget for observer program in the future.

Table 11a. Activity summary of Indonesian ROS from 2014-2019 (gear= longline).

Year	No. Of Obs	No. Of Trips	No. Of Company	Total Day at Sea	Days/Trip	Avg (d/trip)
2014	20	28	13	875	29-135	62
2015	4	5	5	241	31-61	48
2016	6	6	6	289	18-86	57
2017	12	15	13	524	15-108	58
2018	10	10	10	322	9-71	33
2019	6	10	5	348	14-104	36

Table 11b. Activity summary of Indonesian ROS from 2014-2019 (gear= purse seine).

Year	No. Of Obs	No. Of Trips	No. Of Company	Total Day at Sea	Days/Trip	Avg (d/trip)
2014	3	2	2	11	1-9	2
2015	2	1	1	10	8-15	11
2016	23	18	9	1088	2-240	25
2017	na	na	na	na	na	na
2018	4	20	15	126	8-13	9
2019	10	17	17	345	4-56	20

Table 11c. Activity summary of Indonesian ROS from 2014-2019 (gear= hand line).

Year	No. Of Obs	No. Of Trips	No. Of Company	Total Day at Sea	Days/Trip	Avg (d/trip)
2014	10	70	10	70	1	1
2015	na	na	na	na	na	na
2016	9	9	4	150	8-15	10
2017	24	37	2	734	10-173	11
2018	21	48	38	903	28-78	41
2019	8	9	6	101	8-15	11

Table 11d. Activity summary of Indonesian ROS from 2014-2019 (gear= gillnet).

Year	No. Of Obs	No. Of Trips	No. Of Company	Total Day at Sea	Days/Trip	Avg (d/trip)
2014	na	na	na	na	na	na
2015	6	3	3	41	12-15	13
2016	na	na	na	na	na	na
2017	3	3	1	46	14-18	14
2018	3	15	7	31	1-19	1
2019	1	1	1	8	8	8

6.4. Port sampling program

Port sampling program conducted at Benoa Fishing Port as main industrial tuna fishing port in Indian ocean with a minimum 30% coverage of landings at each processing plants a target coverage, as reported in previous year the coverage of port sampling in 2014-2019 was above 50% (Table 12a-b).

Table 12a. Number of individuals sampled (weight), by species and gear from daily tuna and tuna-like species monitoring based in Benoa Port 2014-2019.

Code	Species	No. fish sampled					
		2014	2015	2016	2017	2018	2019
ALB	Albacore	27,740	21,648	22,643	21,452	7,641	13,812
BET	Bigeye tuna	40,431	45,039	34,415	25,695	16,247	16,210
YFT	Yellowfin tuna	41,720	17,909	29,229	20,610	22,998	13,147
BUM	Blue marlin	716	780	219	216	82	60
BLM	Black marlin	342	120	111	48	20	20
MLS	Striped marlin	108	115	201	60	36	54
SSP	Shortbill spearfish	68	192	337	209	125	1,020
SFA	Indo-Pacific sailfish	383	546	440	391	325	108
SWO	Swordfish	4,177	4,336	2,966	2,318	1,198	2
LEC	Escolar	13,705	9,567	5,201	15,006	1,603	8
OIL	Oilfish	1,120	1,842	1,394	849	349	349
WAH	Wahoo	1,776	1,102	913	325	47	229
DOL	Common dolphinfish	221	359	445	921	42	459
BSH	Blue shark	2,058	4,732	9,148	8,404	10,055	10,483
MAK	Mako sharks nei	83	124	166	168	227	154
OCS	Oceanic whitetip shark	99	153	66	20	14	1
THR	Thresher sharks nei	2	32	nil	2	nil	2
LAG	Moonfish	6,795	9,709	5,690	4,820	2,970	4,653
BAR	Barracuda	19	15	nil	5	nil	nil

Table 12b. Coverage percentage of daily tuna and tuna-like species monitoring program based in Benoa port 2014-2019.

Year	No. Landed Vessel	No. Sampled Vessel	Sampling Coverage
2014	858	521	60.72%
2015	699	477	68.24%
2016	720	434	60.28%
2017	483	374	77.43%
2018	434	233	53.69%
2019	410	183	44.63%

IOTC required at least a representation of a fish every 1 metric ton produced to sampled from all CPC. The proportion of size data collected relative to tuna and tuna-like species catches from Indian Ocean region is presented in Annex 4. The data derived from port monitoring program conducted by RITF and DGCF (PELAGOS).

6.5. Unloading/Transhipment of flag vessels

In connection with Covid-19 pandemic outbreak which results in disruption of fishery logistics and distribution, Ministry of Marine Affairs and Fisheries has issued circular letter No. B-239/MEN-KP/IV/2020 on 21st of April, 2020 in order to provide relaxation for fishery industries. One of which was the ease in terms of transhipment as follows:

- The possession of VMS (Vessel Monitoring System) and CCTV (Close Circuit Television) are mandatory and must be installed on-board
- Join partnership with officially licensed vessel
- Must unload the catch at Indonesian territory ports
- Report the transhipment activities enclosed with CCTV recording to port authorities

The relaxation initially commenced until 18th of August 2020; however, it was extended until 31st of January 2021 through the issuance of circular letter No. B-483/MEN-KP/IX/2020.

6.6. Actions taken to monitor catches & manage fisheries for Striped Marlin, Black Marlin, Blue Marlin and Indo-pacific Sailfish

The catch of striped marlin, black marlin, blue marlin and Indo-Pacific sailfish are closely monitored through logbook, scientific port sampling at main landing sites, and deployment of observers.

6.7. Gillnet observer coverage and monitoring

Scientific observers have been put on gillnet fleets since 2015 (Table 10-d), despite low coverage, continuity is still the main priority. In addition, scientific port sampling on gillnet fishery also has been conducted since as early as 2012, with Cilacap as the main monitoring site. Nowadays, gillnet targeting tuna is no longer considered as economical option for fishers, most of them decided to convert to handline, utilising FADs and upgraded the storage with refrigerated-type chiller for better quality product.

6.8. Sampling plans for mobulid rays

Scientific port sampling on sharks and rays, especially mobulid rays from small-scaled fisheries has been continuously conducted in Tanjung Luar, Nusa Tenggara Barat. More sampling locations are considered alongside with possible collaboration with Non-Government Organization (NGO) in near future.

7. NATIONAL RESEARCH PROGRAMS

Research on tunas, tuna-like species, billfishes, sharks and rays in Indian Ocean has been national research priority as mandated in Indonesia NPOA Tuna. Most of national research program conducted by Research Institute for Tuna Fisheries, Bali and several research activity conducted by local university and NGO.

7.1. National research programs on blue shark

Research title : Study of the Effectiveness of Implementing Shark Conservation Policies
Population Structure of Tuna, Billfishes and Shark in EEZ of Indonesia and High Seas Area

7.2. National research programs on Striped Marlin, Black Marlin, Blue Marlin and Indo-pacific Sailfish

Research title : Population Structure of Tuna, Billfishes and Shark in EEZ of Indonesia and High Seas Area

7.3. National research programs on sharks

Research title : Study of the Effectiveness of Implementing Shark Conservation Policies
Population Structure of Tuna, Billfishes and Shark in EEZ of Indonesia and High Seas Area

7.4. National research programs on oceanic whitetip sharks

Research title : Study of the Effectiveness of Implementing Shark Conservation Policies
Population Structure of Tuna, Billfishes and Shark in EEZ of Indonesia and High Seas Area

7.5. National research programs on marine turtles

Research title : Marine Turtles Critical Habitat Mapping in Fisheries Management Area of Indonesia

7.6. National research programs on thresher sharks

Research title : Study of the Effectiveness of Implementing Shark Conservation Policies
Population Structure of Tuna, Billfishes and Shark in EEZ of Indonesia and High Seas Area

8. IMPLEMENTATION OF SCIENTIFIC COMMITTEE RECOMMENDATIONS AND RESOLUTIONS OF THE IOTC RELEVANT TO THE SC.

Indonesia participates in several IOTC SC working parties. Scientific observer and port sampling program are continued to monitor catch and effort of tuna and other ecologically related species in order to implement scientific Committee Recommendation.

Table 13. Scientific requirements contained in Resolutions of the Commission, adopted between 2012 and 2019.

Res. No.	Resolution	Scientific requirement	CPC progress
11/04	On a regional observer scheme	Paragraph 9	Indonesia regional observer scheme is governed through Ministerial Regulation No. 1/PERMENKP/2013 and it has been implemented ever since. Report of number active vessel monitored through ROS reported through national report to SC-IOTC annually
12/04	On the conservation of marine turtles	Paragraphs 3, 4, 6–10	Conservation and protection of ecologically related species, especially marine turtles is governed through Ministerial Regulation No. 12/PERMEN-KP/2012. Data submission related ERS data 2019 had been submitted to IOTC on 29th June, 2020 Indonesia had NPOA for Marine Turtles 2016-2020 and in update process for regional working plan 2020-2030
12/06	On reducing the incidental bycatch of seabirds in longline fisheries.	Paragraphs 3–7	Conservation and protection of ecologically related species, especially reducing incidental by-catch of seabirds is governed through Ministerial Regulation No. 12/PERMEN-KP/2012. Indonesia had NPOA for Seabird Mitigation Measures since late 2016 and implemented since early 2017
12/09	On the conservation of thresher sharks (family Alopiidae) caught in association with fisheries in the IOTC area of competence	Paragraphs 4–8	Conservation and protection of ecologically related species, especially thresher sharks (family Alopiidae) is governed through Ministerial Regulation No. 12/PERMEN-KP/2012.

Res. No.	Resolution	Scientific requirement	CPC progress
			Report of ERS interaction monitored through ROS reported through national report to SC-IOTC annually
13/04	On the conservation of cetaceans	Paragraphs 7–9	Conservation and protection of ecologically related species, especially cetaceans are governed through Government Regulation No. 7/1999 and Ministerial Regulation No. 12/PERMEN-KP/2012 Report of cetacean interaction monitored through ROS reported in to national report to SC-IOTC annually, however there are no incident occurred related cetacean interaction with tuna fishery
13/05	On the conservation of whale sharks (*Rhincodon typus*)	Paragraphs 7–9	Whale sharks (*Rhincodon typus*) is fully protected under Ministerial Decree No. 18/KEPMEN-KP/2013. Report of whale sharks interaction monitored through ROS reported in to national report to SC-IOTC annually, however there are no incident occurred related whales sharks interaction with tuna fishery
13/06	On a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries	Paragraph 5–6	Aside from Ministerial Regulation No. 12/PERMEN-KP/2012 which governed the conservation and protection of ecologically related species, Indonesia also issued the first National Plan of Action (NPOA) for sharks and rays for 2010-2014. The second one, for period 2016-2020 is currently running. Report of sharks interaction monitored through ROS, Port Sampling Program and Logbook Fishing vessel and reported through national report to SC-IOTC annually
15/01	On the recording of catch and effort by fishing vessels in the IOTC area of competence	Paragraphs 1–10	Catch and effort are mandatory documented for vessels above 10 GT, based on Ministerial Regulation No. 48/PERMEN-KP/2014 regarding logbook program and Ministerial Regulation No. 1/PERMEN-KP/2013 regarding observer scheme which

Res. No.	Resolution	Scientific requirement	CPC progress
			record commercial fisheries operation onboard. All mandatory data reporting have been submitted annually.
15/02	Mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating Non-Contracting Parties (CPCs)	Paragraphs 1–7	All mandatory statistical reporting forms (1RC, 1DI, 1DR, 3CE, 4SF) have been submitted annually.
17/05	On the conservation of sharks caught in association with fisheries managed by IOTC	Paragraphs 6, 9, 11	Aside from Ministerial Regulation No. 12/PERMEN-KP/2012 which governed the conservation and protection of ecologically related species, Indonesia also issued the first National Plan of Action (NPOA) for sharks and rays for 2010-2014. The second one, for period 2016-2020 is currently running. Data submission related sharks data 2019 had been submitted to IOTC on 29th June, 2020
18/02	On management measures for the conservation of blue shark caught in association with IOTC fisheries	Paragraphs 2-5	No management measure specific for blue shark issued at present. However, in general, conservation and protection of ecologically related species, including sharks and rays are governed through Government Regulation No. 7/1999 and Ministerial Regulation No. 12/PERMEN-KP/2012 Data submission related blue sharks data 2019 had been submitted to IOTC on 29th June, 2020 and reported through national report to SC-IOTC
18/05	On management measures for the conservation of the Billfishes: Striped marlin, black marlin, blue marlin and Indo-Pacific sailfish	Paragraphs 7 – 11	No management measure specific for billfishes: striped marlin, black marlin, blue marlin and Indo-Pacific sailfish issued at present. However, the catches are closely monitored through ROS and port sampling program at main landing sites.
18/07	On measures applicable in case of non-fulfilment of reporting obligations in the IOTC	Paragraphs 1, 4	All mandatory statistical reporting forms (1RC, 1DI, 1DR, 3CE, 4SF) have been submitted annually.

Res. No.	Resolution	Scientific requirement	CPC progress
			Improvement of data quality conducted by national validation data workshop twice/year and Refreshment program for data field officer conducted annually every year
19/01	On an Interim Plan for Rebuilding the Indian Ocean Yellowfin Tuna Stock in the IOTC Area of Competence	Paragraph 22	Observer for gillnet fisheries conducted despite number of gillnet fisheries very limited and operated in EEZ
19/03	On the Conservation of Mobulid Rays Caught in Association with Fisheries in the IOTC Area of Competence	Paragraph 11	In general, conservation and protection of ecologically related species, including sharks and rays are governed through Government Regulation No. 7/1999 and Ministerial Regulation No. 12/PERMEN-KP/2012. In addition, Manta rays (*Manta spp.*) are fully protected under Ministerial Decree No. 4/KEPMEN-KP/2014. Report of mobulid interaction monitored through ROS reported in to national report to SC-IOTC annually, however there are no incident occurred related mobulid interaction with tuna fishery

9. WORKING PAPERS

A total of 9 documents were submitted and presented during IOTC online meetings in 2020, which belong to 5 working parties and 1 scientific committee.

- **WPNT10 (Working Party on Neritic Tuna), July 2020 (1 document)**
  IOTC-2020-WPNT10-11; Nominal CPUE, length distribution and condition factor of kawakawa (*Euthynnus affinis*) in Indian Ocean; Maya Agustina, Ririk K. Sulistyaningsih, Zulkarnaen Fahmi
- **WPB18 (Working Party on Billfish), September 2020 (1 document)**
  IOTC-2020-WPB18-20; Standardized CPUE of swordfish (*Xiphias gladius*) from Indonesian tuna longline fleets in the north-eastern Indian Ocean; Bram Setyadji, Denham Parker, Sheng-ping Wang and Zulkarnanen Fahmi
- **WPEB16 (Working Party on Ecosystem and By-catch), September 2020 (1 Document)**
  IOTC-2020-WPEB16-21; Trend of catch and effort on the blue shark (*Prionace glauca*) as bycatch of Indonesian tuna longline fishery; Arief Wudji, Bram Setyadji, Irwan Jatmiko and Zulkarnaen Fahmi
- **WPTT22 (Working Party on Tropical Tuna), June and October 2020 (1 Document)**

1. IOTC-2020-WPTT22(DP)-INF06; CPUE standardization of yellowfin tuna, *Thunnus albacares* (Bonnaterre, 1788) from Indonesian tuna longline fishery in the north-eastern Indian Ocean; Bram Setyadji, Hety Hartaty, Zulkarnaen Fahmi
2. IOTC-2020-WPTT22(AS)-08; Reproductive Biology of Skipjack Tuna (Katsuwonus pelamis) in Indonesian Exclusive Economic Zone; Hety Hartaty, Bram Setyadji, Zulkarnaen Fahmi

- **SC23 (Scientific Committee), December 2020 (1 Document)**
  IOTC–2020-SC23- NR09 National Report (Indonesia)

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Wudji, A., Setyadji, B., Jatmiko, I., Fahmi, Z. 2020. Trend of Catch and Effort on The Blue Shark (*Prionace glauca*) as Bycatcth on Indonesian Tuna Longling Fishery. IOTC-2020-WPEB16-21.

Annex 1. Summary of average monthly CPUE of tuna (kg/1000 hooks) derived from logbook data year 2019 (gear = longline).

Month	ALB	BET	YFT	Fishing Ground
1	45.62	11.27	42.37	Eastern Indian Ocean
2	61.01	28.07	53.61	Eastern Indian Ocean
3	35.42	34.40	52.54	Eastern Indian Ocean
4	34.23	24.38	55.83	Eastern Indian Ocean
5	13.60	12.17	36.75	Eastern Indian Ocean
6	18.34	20.08	24.28	Eastern Indian Ocean
7	24.95	27.99	35.65	Eastern Indian Ocean
8	13.45	18.01	60.83	Eastern Indian Ocean
9	17.71	14.12	47.17	Eastern Indian Ocean
10	43.98	20.47	55.35	Eastern Indian Ocean
11	51.75	5.98	55.97	Eastern Indian Ocean
12	41.57	9.27	106.25	Eastern Indian Ocean

Annex 2. Summary of nominal CPUE of billfish (N/1000 hooks) derived from observer data.

Year	Coverage (No. boat covered)	BLM	BUM	MLS	SFA	SSP	SWO	Fishing Ground
2005	0.4%	0.05	0.01	0.06	nil	nil	0.16	Eastern Indian Ocean
2006	1.6%	0.15	0.09	0.05	0.03	0.13	0.37	Eastern Indian Ocean
2007	1.3%	0.05	0.03	0.08	0.01	0.12	0.31	Eastern Indian Ocean
2008	1.4%	0.06	0.05	0.03	0.03	0.17	0.22	Eastern Indian Ocean
2009	1.3%	0.22	0.07	0.04	0.10	0.02	0.57	Eastern Indian Ocean
2010	0.8%	0.08	0.10	0.01	0.04	0.10	0.35	Eastern Indian Ocean
2011	0.5%	0.23	0.23	nil	0.04	0.03	0.14	Eastern Indian Ocean
2012	0.6%	0.07	0.13	0.02	0.02	0.02	0.49	Eastern Indian Ocean
2013	0.2%	0.18	0.20	0.01	0.06	0.03	0.34	Eastern Indian Ocean
2014	0.5%	0.08	0.08	0.00	0.05	0.01	0.48	Eastern Indian Ocean
2015	0.4%	0.13	0.09	0.01	0.02	0.02	0.37	Eastern Indian Ocean
2016	3.4%	0.20	0.05	0.02	0.05	0.01	0.48	Eastern Indian Ocean
2017	6.9%	0.05	0.02	0.03	0.04	0.11	0.24	Eastern Indian Ocean
2018	1.9%	0.04	0.10	0.04	0.03	0.05	0.33	Eastern Indian Ocean
2019	6.2%	0.14	0.09	0.02	0.15	0.04	0.61	Eastern Indian Ocean

Annex 3. Summary of nominal CPUE of some sharks (N/1000 hooks) derived from observer data.

Year	Coverage (No. boat covered)	BSH	FAL	Fishing Ground
2005	0.4%	1.27	0.00	Eastern Indian Ocean
2006	1.6%	1.62	0.12	Eastern Indian Ocean
2007	1.3%	1.21	0.02	Eastern Indian Ocean
2008	1.4%	0.94	0.01	Eastern Indian Ocean
2009	1.3%	0.75	0.17	Eastern Indian Ocean
2010	0.8%	0.77	0.12	Eastern Indian Ocean
2011	0.5%	0.76	0.00	Eastern Indian Ocean
2012	0.6%	2.05	0.00	Eastern Indian Ocean
2013	0.2%	1.10	0.00	Eastern Indian Ocean
2014	0.5%	1.10	0.00	Eastern Indian Ocean
2015	0.4%	1.26	0.24	Eastern Indian Ocean
2016	3.4%	0.01	0.00	Eastern Indian Ocean
2017	6.9%	0.10	0.06	Eastern Indian Ocean
2018	1.9%	1.68	0.08	Eastern Indian Ocean
2019	6.2%	0.98	0.05	Eastern Indian Ocean