INDONESIA NATIONAL REPORT TO THE SCIENTIFIC COMMITTEE OF THE INDIAN OCEAN TUNA COMMISSION, 2021

Authors

Ministry of Marine Affairs and Fisheries (MMAF)

Indonesia

November 2021

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 30/06/2021
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 30/06/2021
If no, please indicate the reason(s) and intended actions:	

EXECUTIVE SUMMARY

For fisheries management purposes, Indonesian waters are divided into eleven Fisheries Management Areas (FMA). Three of them are 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 the Andaman Sea). Indonesian fishers operate various fishing gears such as longline, purse seine, handline, and gillnet to catch large pelagic fishes like tuna, skipjack, marlins, etc. Longline is the primary fishing gear type targeting tunas that operate in those FMAs. The total catch of the main species of tunas in 2020 was estimated at around 205,582 tons[1] which are composed of yellowfin tuna (44,471 tons), bigeye tuna (21,556 tons), skipjack tuna (134,455 tons), and albacore (5,099 tons). Landing ports, both artisanal and industrial, are still consistently monitored through various projects and scientific observer programs conducted altogether by the Research Institute for Tuna Fisheries (RITF) and Directorate General of Capture Fisheries (DGCF).

[1] Preliminary figures

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1. BACKGROUND/GENERAL FISHERY INFORMATION

Indonesia is an archipelagic nation located between Asia and Australia, surrounded by two oceans, the Pacific Ocean in the northern part and the Indian Ocean in the southern region. It consists of approximately 17,508 islands and a coastline of 81,000 km. Indonesia has 5.8 million km^2 of marine waters comprised 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 purposes, Indonesian waters are divided into eleven Fisheries Management Areas (FMA). Three of them are 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 the Andaman Sea) (Figure 1a).

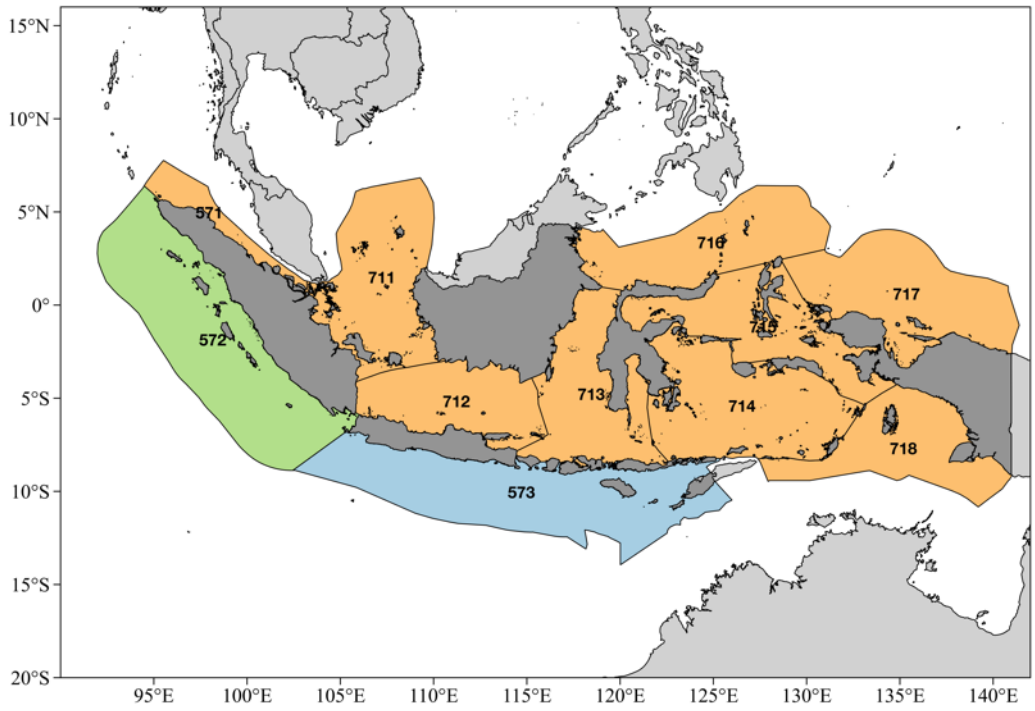


Figure 1a. The eleven Fisheries Management Area (FMA) in Indonesian waters

Main landing sites for tuna and tuna-like species are widespread across the west of Sumatra, south of Java, Bali, and Nusa Tenggara (Figure 1b). The area of western Sumatra is 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 the main tuna landing port for Indonesia.

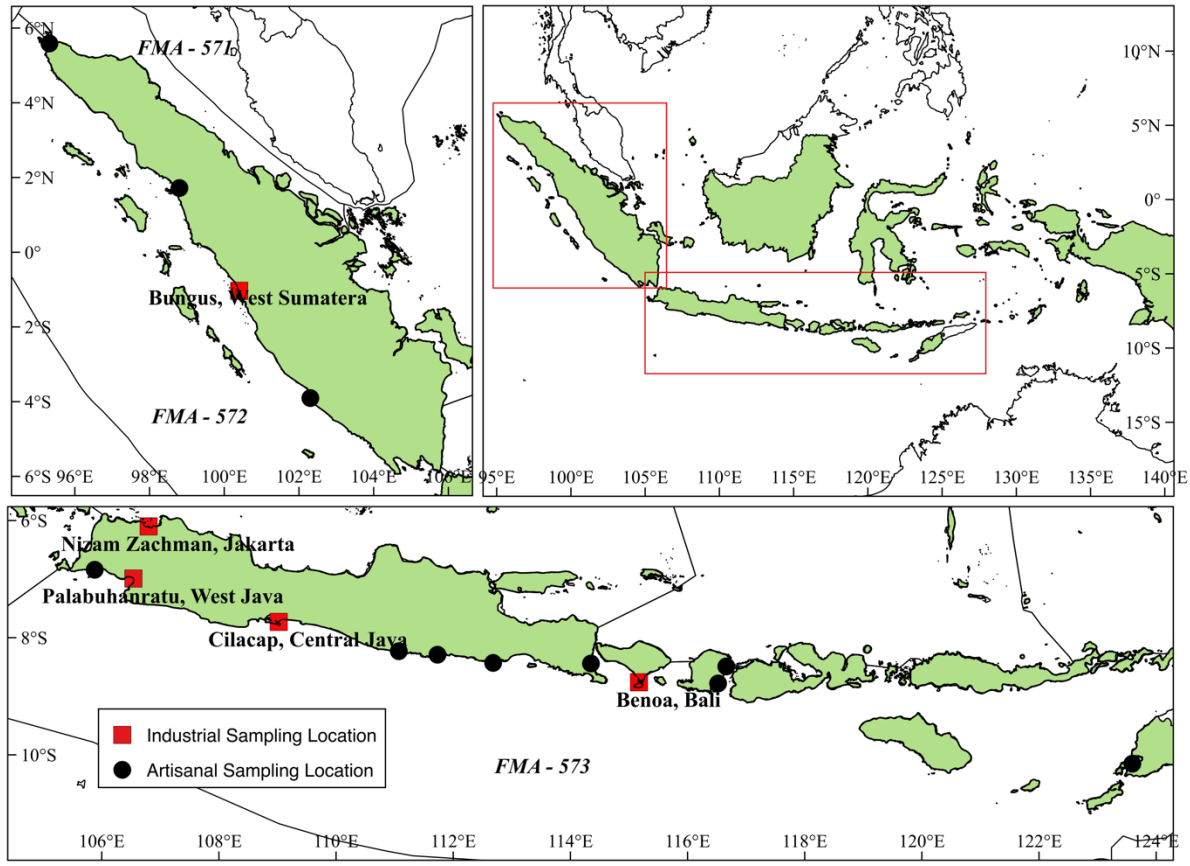


Figure 1b. Primary fishing port/landing sites, industrial (*blue dot*) and artisanal (*red square*).

2. FLEET STRUCTURE

The total number of active fishing vessels operating in the FMAs 572, 573, and high seas area in the Indian Ocean reported to IOTC on 11th February 2021 were 382 fishing vessels. It consisted of longline (278), purse seine (103), and eight registered carrier/cargo freezers (Table 1).

Table 1. Summary of active fishing vessels by size (GT) reported to IOTC on 11th February 2021 (Source: DGCF).

Size	Longliner	Purse Seiner	Gil Netter	Other	Total
<50	78	0	0	0	78
51-100	112	2	0	1	115
101-200	88	100	0	0	188
201-300	0	1	0	0	1
301-500	0	0	0	0	0
501-800	0	0	0	0	0
>800	0	0	0	0	0
Total	**278**	**103**	**0**	**1**	**382**

3. CATCH AND EFFORT (BY SPECIES AND GEAR)

The total catch for four main tuna species, namely albacore, bigeye tuna, skipjack, and yellowfin tuna, in 2020 was estimated 205,582 tons, 10% higher compared to previous year's and recorded as the highest catch in the last five years. Skipjack tuna remained the main contributor, 134,455 tons, followed by yellowfin, bigeye, and albacore tuna, around 5,099 tons, 21,556 tons, and 44,471 tons, respectively. The proportion average catch across all gear was dominated by skipjack (65.4%), yellowfin (21.6%), bigeye (10.5%), and albacore (2.5%). The average catch estimation of four species tunas from 2016 to 2020 was 165,838 tons.

Table 2. Annual catch by gear and primary tuna species (ALB, BET, SKJ, and YFT) derived from the Indian Ocean from 2016-2020.

Gear Type	Species	Year					Average MT
		2016	2017	2018	2019	2020	
Gillnet	Albacore	20	nil	97	80	0	194
	Bigeye	729	0	1,139	1,340	1,498	941
	Skipjack	12,892	2,783	6,738	10,079	6,954	7,850
	Yellowfin	2,912	1,161	1,603	3,726	3,248	2,315
	Sub-total	**16,553**	**3,943**	**9,577**	**15,225**	**11,700**	**11,299**
Line	Albacore	860	566	697	1,011	1,085	900
	Bigeye	2,872	4,058	4,464	5,730	6,426	4,243
	Skipjack	16,964	31,834	25,304	38,432	38,156	28,361
	Yellowfin	9,276	9,034	8,928	11,294	14,818	10,499
	Sub-total	**29,972**	**45,492**	**39,393**	**56,467**	**60,484**	**44,002**
Longline	Albacore	6,278	6,399	4,689	1,754	4,005	4,602
	Bigeye	7,642	8,302	5,474	4,634	5,390	6,560
	Skipjack	2,281	6,555	4,568	2,102	6,092	4,394
	Yellowfin	10,404	10,527	9,610	4,261	5,656	8,501
	Sub-total	**26,605**	**31,785**	**24,341**	**12,751**	**21,143**	**24,057**
Others	Albacore	3	nil	96	81	9	142
	Bigeye	1,692	140	3,408	872	3,688	1,987
	Skipjack	11,394	86	12,782	14,464	17,466	14,441
	Yellowfin	3,107	7,593	7,824	5,814	4,883	6,666
	Sub-total	**16,196**	**7,819**	**24,110**	**21,231**	**26,047**	**23,235**
Purse Seine	Albacore	18	29	25	0	0	13
	Bigeye	9,199	9,445	5,919	1,404	4,554	6,050
	Skipjack	28,828	55,614	35,885	63,034	65,787	44,624
	Yellowfin	10,786	11,598	12,342	16,388	15,866	12,557
	Sub-total	**48,831**	**76,686**	**54,171**	**80,826**	**86,207**	**63,244**
Grand Total	Albacore	7,179	6,994	5,604	2,926	5,099	5,850
	Bigeye	22,134	21,945	20,404	13,981	21,556	19,781
	Skipjack	72,359	96,872	85,277	128,110	134,455	99,669
	Yellowfin	36,485	39,913	40,307	41,483	44,471	40,539
	Total	**138,157**	**165,725**	**151,592**	**186,500**	**205,582**	**165,838**

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

The distribution of effort (hooks) from longline fleets in 2020 derived from logbook data was concentrated on western Sumatra and south of Java, focused mainly between 0°-35°S and 90°-120°E. The range of effort used was between 500-2500 hooks/set with an average of 1300 hooks/set (Figure 2). To be noted, the total reported catch from the logbook was less than 5% of the total estimated catch submitted.

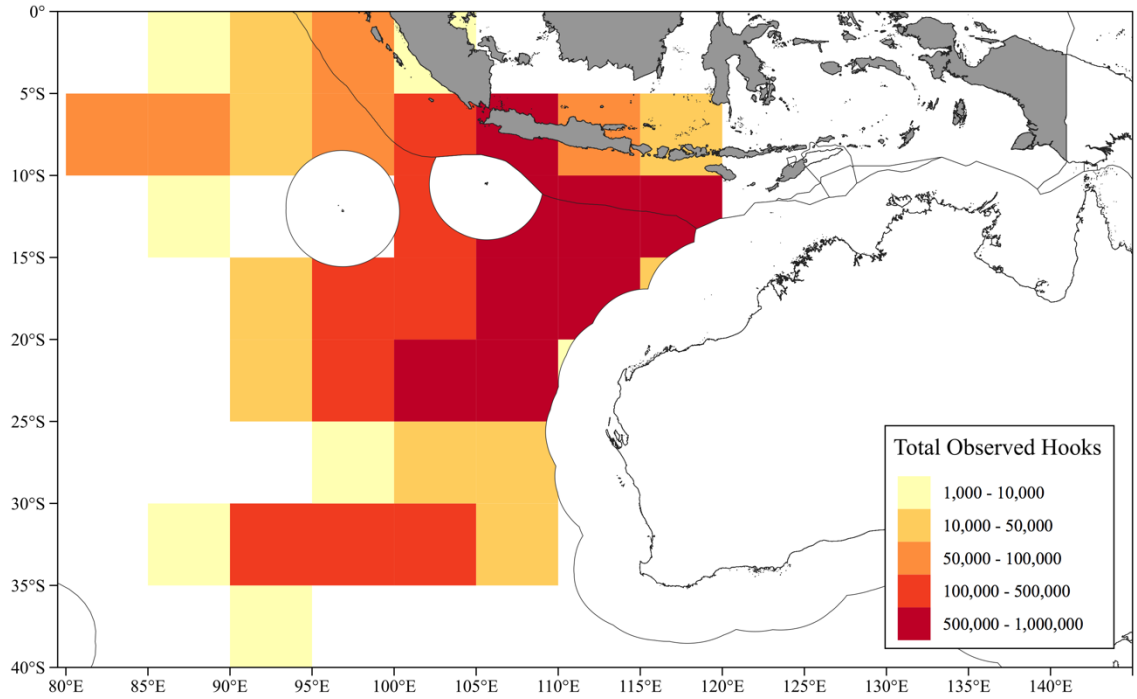
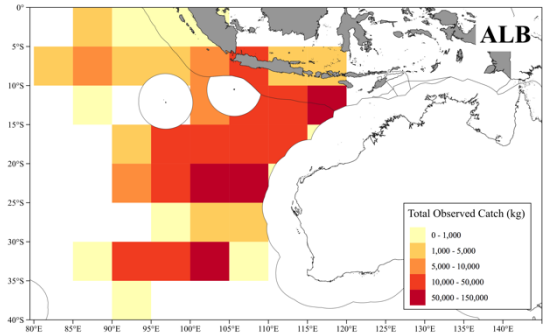
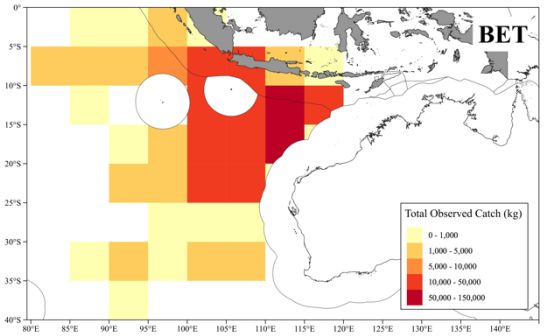


Figure 2. Map of the distribution of Indonesian tuna longline efforts year 2020 (source: Logbook data).

Reported catch distribution for three main species of tuna (ALB, BET, and YFT) in 2020 are derived from the logbook data. Sum of catch declared in kilogram (kg). The catch mainly concentrated above 20°S, except for yellowfin tuna, which high catches also occurred between 30°S-35°S. (Figure 3).





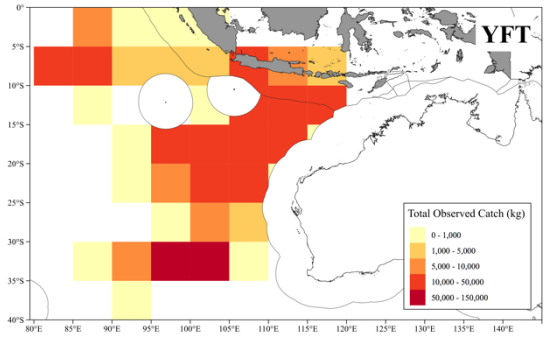


Figure 3. Map of reported catch distribution in 2020, aggregated by species and by 5x5 degree blocks (source: Logbook data).

3.1. Annual catch estimation at Benoa Port

Annual catch estimation of three main tunas from the scientific port sampling program at Benoa port reported a continuous declining trend since 2014. Moreover, the estimated catch was reduced to around 2,070 tons or 17% lower compared previous year. The recent year also recorded the lowest estimated catch in the last five years (Table 3). The number of efforts (number of landings) in the current year was relatively similar to last year's, with a marginal increase of just one. However, in general, the total landing trend has kept dropping over the previous five years (Figure 4).

Table 3. Annual catch estimation by gear (LL) and primary tuna species (ALB, BET, and YFT) landed in Benoa Port from 2014-2020.

Species	Annual Catch Estimation (mt)						
	2014	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
YFT	2,654	1,283	2,562	1,135	1,362	990	496
BET	2,312	2,989	2,385	1,367	1,095	1,208	1,125
ALB	687	631	1,584	357	279	223	449
TOTAL	5,653	4,903	6,110	2,859	2,457	2,421	2,070

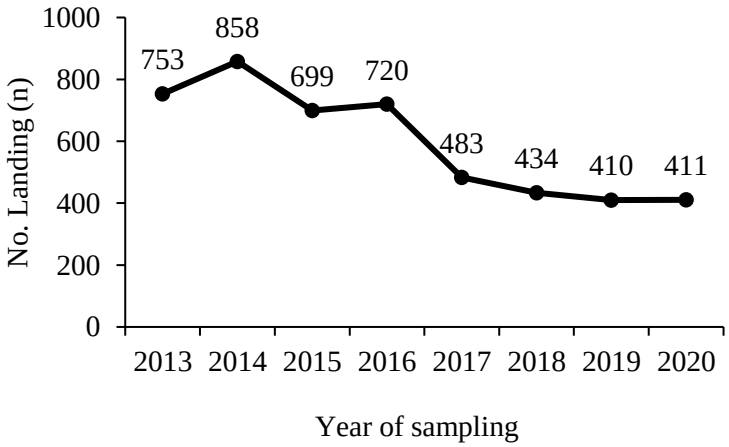


Figure 4. Total number of the landing of Indonesian tuna longline vessels based in Benoa Port during 2013-2020

3.2. Catch and Effort from Coastal and Artisanal Fisheries

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

Table 4. Observed catch (kg) and effort (trip) by gear from coastal and artisanal fisheries in Indonesia during 2016-2020 (Source: RITF port monitoring program)

Location	Gear	2016		2017		2018		2019		2020	
		C (mt)	L (N)	C (mt)	L (N)	C (mt)	L (N)	C (mt)	L (N)	C (mt)	L (N)
Labuhan Lombok	HL	307	264	467	295	269	203	na	na	na	na
Pacitan	HL	421	381	1,629	632	639	358	na	na	101	83
Pacitan	PS	944	342	1,934	361	1,052	291	na	na	105	51
Sibolga	PS	9,953	1641	15,753	1,681	na	na	13,200	1,527	12,152	961

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, fully supported and funded by the Indonesian government. The data collected by ROS covers catch (in number), composition by species, real-time fishing ground, number of settings, number of hooks, etc. Catch per unit of effort (CPUE) for the main tuna species (ALB, BET, and YFT) based on ROS data during 2006-2020 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 year of observations, with an average of 0.27/100 hooks.

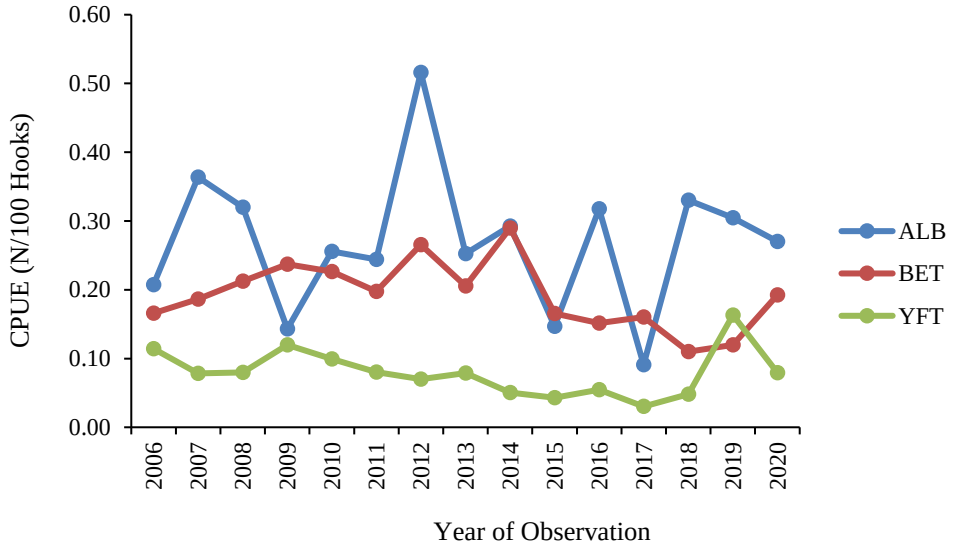


Figure 5. Nominal hook rate series (N/100 hooks) for large tuna (ALB, BET, and YFT) based on RITF scientific observer data in the Indian Ocean (2006- 2020).

4. RECREATIONAL FISHERIES

There is no official reported catch from Indonesia recreational fishing. An organization dealing with sport fishing has been established since 1997, namely "FORMASI" (*Indonesia Fishing Sports Federation*), where this organization is a member of the International game fish Association (IGFA), Currently no update of FORMASI activities. The Indonesian government

focuses on assessing and managing commercial fishing and would include recreational fishing shortly.

5. ECOSYSTEM AND BYCATCH ISSUES

5.1. Sharks

Sharks and rays fisheries management is regulated through Ministerial Regulation No. 58/PERMEN-KP/2020 and 10/PERMEN-KP/2021, listed explicitly in chapter 108-114 and Appendix I and II, respectively. It specifies the management measure and conservation of bycatch and ecologically related species in high seas and Indonesian jurisdiction waters. Several activities to raise the fishers' awareness of the importance of sharks resource sustainability are workshops, seminars, and producing and distributing posters that prohibit several key 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 the determination of full protection on whale sharks (*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, blue shark (*Prionace glauca*) and crocodile shark (*Pseudocarcharias kamoharai*) dominated the incidental catch for sharks during 2015-2020. While most blue sharks were retained, crocodile sharks were usually discarded dead (Table 6). A nominal CPUE data series of blue sharks and the silky shark is presented in Annex 3.

Table 6. The total observed number of sharks, by species, released/discarded by the Indonesian tuna longline fleet in the IOTC area of competence (2015–2020).

Code	2016				2017				2018				2019				2020			
	Retained	Discarded		N	Retained	Discarded		N	Retained	Discarded		N	Retained	Discarded		N	Retained	Discarded		N	Retained	Discarded		N
		Alive	Dead			Alive	Dead			Alive	Dead			Alive	Dead			Alive	Dead			Alive	Dead	
PTH	nil	nil	nil	nil	nil	nil	nil	2	2	nil	nil	2	nil	1	1	3	2	nil	1	0	nil	nil	nil	nil
BTH	nil	nil	nil	4	4	nil	nil	3	3	nil	nil	15	13	nil	2	4	3	nil	1	12	1	nil	11	
CCB	1	nil	nil	3	3	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	0	nil	nil	nil	
FAL	26	nil	nil	nil	nil	nil	nil	2	1	1	nil	12	12	nil	nil	10	10	nil	nil	0	nil	nil	nil	
OCS	4	nil	nil	4	4	nil	nil	4	4	nil	nil	nil	nil	nil	nil	6	4	nil	2	2	nil	nil	2	
CCL	1	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	3	3	nil	nil	2	nil	nil	2	
SMA	1	nil	nil	5	5	nil	nil	39	8	30	1	13	9	nil	4	6	6	nil	nil	2	nil	nil	2	
LMA	1	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	5	nil	nil	5	3	2	nil	1	0	nil	nil	nil	
BSH	nil	nil	nil	105	105	nil	nil	184	160	24	nil	300	194	6	100	202	98	nil	104	119	26	nil	93	
PSK	137	nil	nil	174	nil	nil	174	84	17	67	nil	148	2	nil	146	119	4	nil	115	25	nil	11	14	
SPL	nil	nil	108	nil	nil	nil	nil	nil	nil	nil	nil	1	nil	nil	1	nil	nil	nil	nil	0	nil	nil	nil	
TIG	1	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	3	2	nil	1	4	nil	nil	4	0	nil	nil	nil	
ISB	nil	nil	nil	nil	nil	nil	nil	39	1	35	3	9	2	nil	7	nil	nil	nil	nil	0	nil	nil	nil	
TSK	nil	nil	nil	nil	nil	nil	nil	6	6	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	0	nil	nil	nil	
SPY	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	1	nil	nil	1	
THR	6	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	0	nil	nil	nil	
SHK	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	0	nil	nil	nil	

5.1.1. NPOA sharks

In response to the mandate for the establishment of an international plan of action in terms 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 a strategy and action plan for the sustainability of the entire sharks and rays species. The extension for the period 2016-2020 is currently running and being updated. In addition, as work is still in progress, whale sharks will be put as fully protected species in the upcoming action plan.

5.1.2. Sharks finning regulation

Indonesia prohibits shark finning, targeting juvenile or pregnant sharks and rays, as declared in ministerial regulations No. 58/PERMEN-KP/2020 and 10/PERMEN-KP/2021. Furthermore, 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.*). In contrast, if incidentally caught, it must be discarded at sea, whether alive or dead and recorded in the logbook.

In addition, domestic trading and export of any parts of sharks and rays which are **not currently protected** by law and 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 a letter of recommendation from the Directorate General of Marine Spatial Management as mentioned in regulation No. 13/PER-DJPRL/2018. Carcasses and fins are commonly traded for both domestic and export markets. As recorded by the Marine and Coastal Resources Management Office (BPSPL), Denpasar during the 2018-2020 period, most of the sharks and rays carcasses and fins were intended for the domestic market, with nearly 3,000 tons in 2018, reduced to 2,000 tons in 2019 and slightly raised to around 2,500 tons in recent year. On the other hand, the number of fins designed for the overseas and domestic market was increased around 138% and 28%, respectively. No fins trade data was recorded in 2018 (Table 7a). In terms of value, fins for export resulted in a similar figure as last year's (around IDR. 24.8 billion), whereas the local market increased around 40% (IDR. 10.25 billion) compared to 2019. In addition, the total value for exported carcasses increased threefold to around IDR. 19.3 billion, due to an increasing number of traded carcasses overseas to almost double that of the previous year (Table 7b).

Table 7a. Summary of trade traffic volume (kg) for carcasses and fins of sharks and rays from Denpasar, Bali for period 2018-2020 (Source: BPSPL Denpasar).

Destination	Products	Volume (kg)		
		2018	2019	2020
Export	Carcasses	226,078	183,327	544,125
	Fins	na	71,756	171,272
Domestic	Carcasses	2,815,158	2,142,094	2,384,508
	Fins	295,545	96,392	122,932

Table 7b. Summary of trade traffic value (millions) for carcasses and fins of sharks and rays from Denpasar, Bali for 2019-2020 (Source: BPSPL Denpasar).

Destination	Products	Value (millions)	
		2019	2020
Export	Carcasses	6,429	19,304
	Fins	24,432	24,828
Domestic	Carcasses	30,697	30,843
	Fins	6,451	10,250

5.1.3. Blue shark

The blue shark is the most common bycatch in tuna longline fisheries. Its catch and effort are closely monitored through a scientific observer program, while scientific port sampling and logbook programs are utilized with the sole purpose of monitoring its catches.

5.2. Seabirds

Seabirds' data collection on longline fleets has been continuously monitored through ROS since mid-2005. However, only the last five years' data are presented. In total, there were three incidental interactions with seabirds reported by the observers during observation, one identified as shy albatross, and two other were unidentified seabirds. Data presented limited only for interaction above 25°S, under IOTC Resolution No. 12/06. Just three categories simplified the identification of seabirds prior to 2017 (B1=Seagull, B2=White Albatross, and B3=Black Albatross). Afterwards, the improvement on seabirds identification was expected courtesy of a workshop on seabird mitigation measures.

No interactions were reported in the area below 25°S during longline operation in 2020. It was due to the absence of observation in that particular region. However, in the low latitude (5-10°S), two observed accidental catches of flesh-footed shearwater (Table 8). Mitigation measure on seabirds is regulated through Ministerial Decree 58/PERMEN-KP/2020 and 10?PERMEN-KP/2021 related to mitigation for ecologically related species, including seabirds in which the tori line is obligatory for every vessel operated beyond 25°S (high seas). The identification card for Seabird from IOTC had been translated into Bahasa. In addition, Indonesia already developed NPOA for Seabird back in 2016 and has been reviewed by Birdlife South Africa, with full compliance remarks and obtained the green status.

Table 8. The number of observed incidental interactions of seabirds in tuna longline fishery from 2014-2020 (Source: RITF scientific observer data)

Code	Species	2014	2015	2016	2017	2018	2019	2020
DCU	Shy albatross	nil	nil	nil	1	nil	nil	nil
PDM	Great-winged petrel	nil	nil	nil	18	1	nil	nil
PTZ	Petrels nei	nil	nil	nil	nil	nil	5	nil
PHU	Sooty albatross	nil	nil	nil	1	nil	nil	nil
PFC	Flesh-footed Shearwater	nil	nil	nil	nil	nil	nil	2
USB	Other seabirds	1	7	nil	nil	nil	nil	nil

5.3. Marine Turtles

Six out of 7 world's marine turtles are known to inhabit Indonesian waters. Since 1999, they have been nationally protected species following the latest regulation from the Ministry of Environment and Forestry Decree No. P.106/2018. Any catch and direct use are prohibited. In 2020 there was no marine turtle observed as the incidental catch from the tuna longline fleet (Table 9). Olive ridley turtle, loggerhead, and leatherback turtles are classified as vulnerable. At the same time, green turtles are endangered, and even hawksbill in a state is highly endangered. Indonesia established the National Plan of Action for marine turtles 2016-2020 through the Directorate of Conservation of Marine Biodiversity (KKHL), Ministry of Marine Affairs and Fisheries (MMAF). Indonesia also developed cooperation with Coral Triangle countries like Malaysia, The Philippines, the Solomon Islands, Papua New Guinea, and Timor Leste through Coral Triangle Initiatives on Coral Reefs, Fish, and Food Security (CTI CFF) platform to protect threatened migratory species, including marine turtles. The CTI CFF is now underway to develop a 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. The 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 are also currently developing a web-based information system for priority species that may be found at https://bit.ly/ARCGIS-jenisikanterancampunah-dilindungi.

Table 9. The number of observed incidental interactions with marine turtles in tuna longline fishery from 2014-2020 (Source: RITF scientific observer data)

Code	Species	2014	2015	2016	2017	2018	2019	2020
DKK	Leatherback turtle	nil	nil	nil	nil	nil	nil	nil
LKV	Olive-ridley turtle	12	1	15	5	12	2	nil
TTH	Hawksbill turtle	nil	nil	nil	nil	nil	nil	nil
TUG	Green turtle	nil	nil	nil	nil	nil	1	nil
TTX	Marine turtles nei	nil	nil	nil	nil	nil	nil	nil

5.4. Billfishes

Billfishes catch contributed around 5% to the total catch of tuna longline during 14 years of observation (2005-2018). There were six 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 insignificant contributors (Figure 6). A data series of nominal CPUE from 2006-2020 is presented in Annex 2.

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

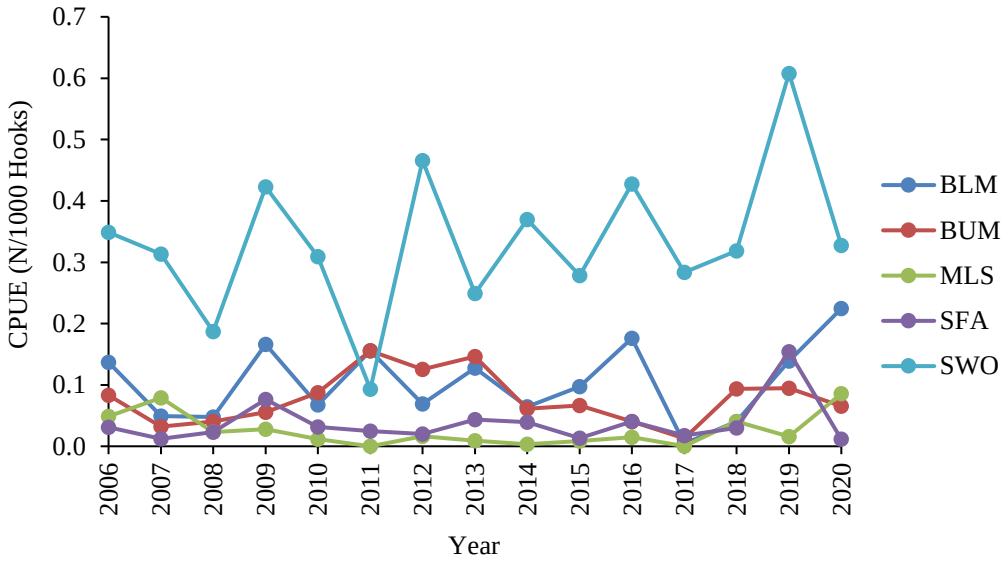


Figure 6. The nominal hook rate of known billfishes species caught by Indonesian tuna longline fisheries from 2006-2020.

5.5. Neritic Tuna

The recent issue from the 11th Working Party on Neritic Tunas is to keep developing stock status indicators for neritic tunas in the Indian Ocean through CPUE standardization. The purpose of this work is to create a robust stock assessment. However, the lack of available data and the uncertainty over total catch estimation were still the main issues. The species highlighted by the IOTC for Indonesia are Kawakawa, Bullet tuna, and Frigate tuna (IOTC-WPNT11, 2021). Catch and effort data for neritic tunas species has been reported to the IOTC Secretariat (Form 3CE) and the size-frequency data (Resolution 15/02) for 2020, 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 in 2014-2020. Neither marine mammals nor whale sharks were reported to be incidentally caught during that period (Table 10).

Tabel 10. The number of the observed catch of others ecologically related species in longline fisheries from 2014-2020 (source: RITF scientific port sampling data).

Code	Species	2014	2015	2016	2017	2018	2019	2020
BAR	Baracuda	4	5	6	nil	2	15	nil
DOL	Common dolphinfish	15	7	13	32	11	29	4
DCO	Dolphin	nil	nil	nil	1	2	nil	nil
EIL	Brilliant pomfret	nil	nil	nil	1	1	nil	nil
HAR	Longnose chimaeras	3	14	46	nil	1	nil	nil
LEC	Escolar	666	490	353	240	613	550	253
LAG	Moonfish	29	30	60	13	57	38	57
MOX	Ocean Sunfish	3	2	1	nil	3	2	1

Code	Species	2014	2015	2016	2017	2018	2019	2020
ALX	Long snouted lancetfish	921	739	693	796	1760	613	690
OHR	Other hairtail fish	nil	nil	nil	nil	nil	nil	nil
OIL	Oilfish	58	16	8	24	19	20	5
TCR	Pomfret	90	45	62	42	nil	11	5
TRF	Tappertail ribbon fish	1	nil	nil	nil	nil	nil	nil
TST	Sickle pomfret	110	29	117	105	131	25	18
WAH	Wahoo	96	63	61	30	74	61	23

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 complied to fill and hand out the logbook to the port authorities (Table 11). There was a noticeable 21% increase compared to last year's submission, including e-logbook e-logbook format. Although data entry and validity and the need for verification and validation before analysis are still the remaining issues, the data quality is incrementally improving every year. Hence, for effective implementation of this program, it is necessary to keep introducing and strengthening its capacity to fishers and port officers.

Table 11. The number of vessels submitted logbook (source: DGCF).

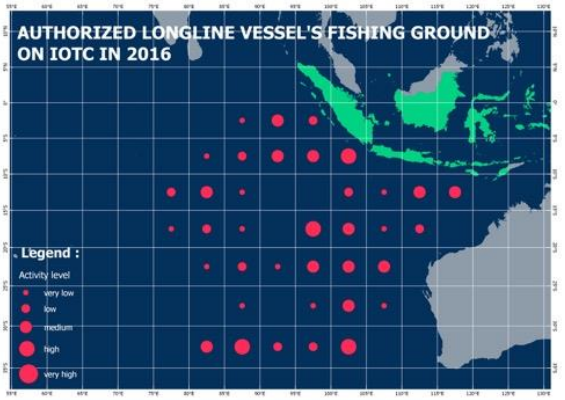
No	FMA	2014	2015	2016	2017	2018	2019	2020
1	571	53	58	24	1	5	115	313
2	572	720	1,202	1,182	639	575	921	903
3	573	1,210	1,031	941	796	713	821	1,144
Total		**1,983**	**2,291**	**2,147**	**1,436**	**1,293**	**1,857**	**2,362**

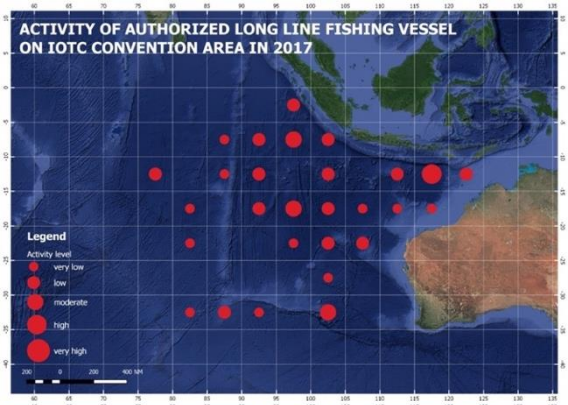
6.2. Vessel Monitoring System

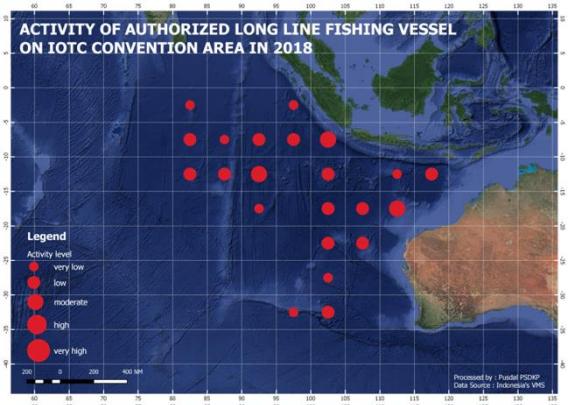
The Vessel Monitoring System (VMS) was started to be implemented in Indonesia in 2003. Through Ministerial Regulation No. 42/2015 about fisheries vessel monitoring system, all fishing vessels above 30 GT or operating in high seas are mandatory to be equipped with a VMS transmitter. Without a VMS transmitter on board, the fishing vessel will not get permission to leave the fishing port for their fishing operations. The fishing monitoring centre (FMC) for Indonesia's VMS is based in Jakarta. To fight against illegal, unreported, and unregulated (IUU) Fishing, Indonesia has started implementing Database Sharing Systems for Fisheries Management. The system is developed to integrate several databases, including the licensing, logbook, and VMS databases. The Minister of Marine Affairs and Fisheries has recently launched the system application on 19 November 2013 in Jakarta. Such a system will be applied to 45 fishing ports of Indonesia and can be accessed at http://dkpvms.dkp.go.id. Interactive VMS data visualization can also be accessed at http://globalfishingwatch.org/map/, which shows a strong statement from the Indonesian government in response to fisheries

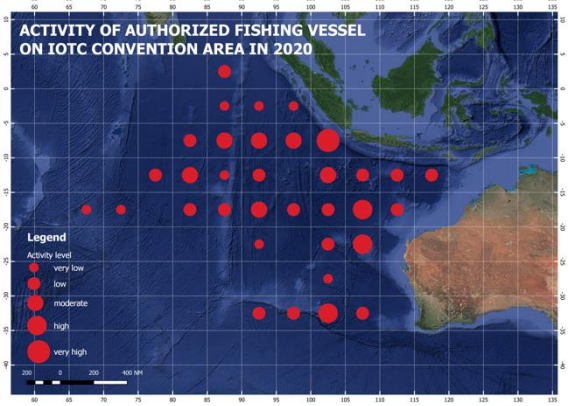
transparency. Figure 7 shows the spatial distribution of Indonesia fleets based on VMS information.

A)

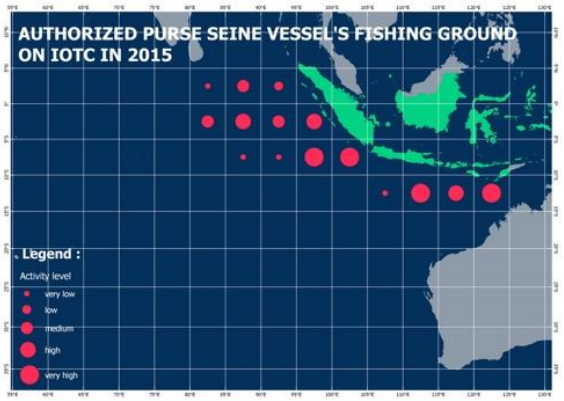


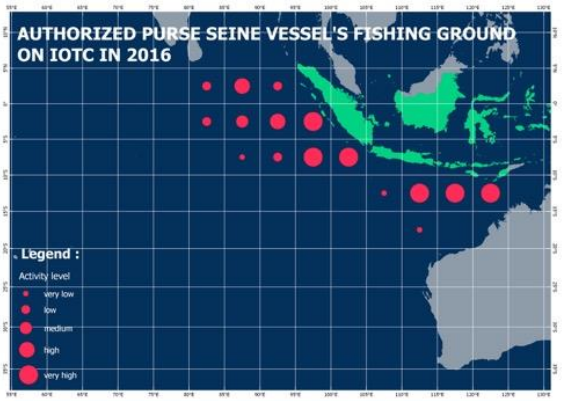






B)





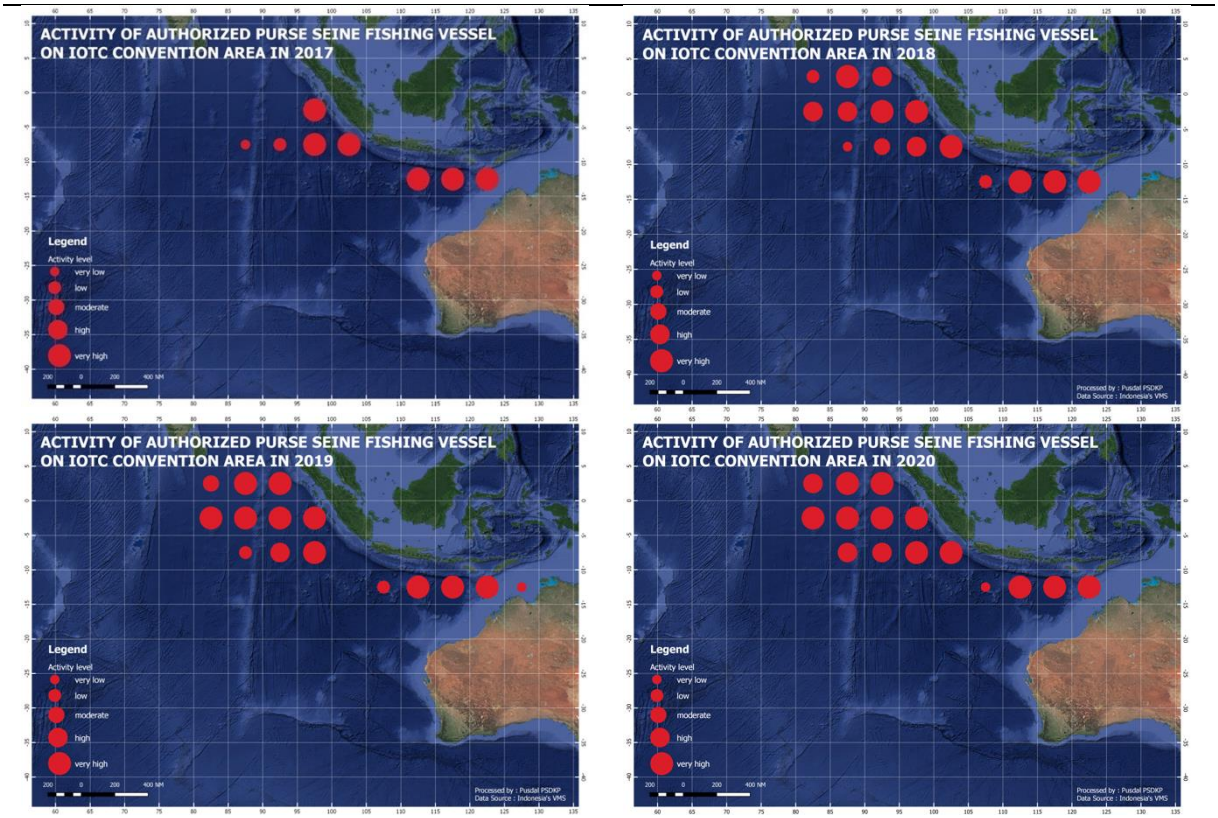


Figure 7. Map of the spatial distribution of longline (A) and purse seine (B), aggregated from 2015 to 2020 based on VMS data (Source: PSDKP).

6.3. Observer Scheme

Indonesia has joined Regional Observer Program (ROP) for Transhipment at Sea since 2009 under Resolution 11/05 and Resolution 12/05 (previously IOTC Resolution No. 08/02) concerning establishing a program for transhipment of large-scale fishing vessels. It clearly stated that "Each CPC shall ensure that all carrier vessels transhipping at sea have on board an IOTC observer." Indonesia also established a scientific observer program according to IOTC resolution 11/04 related to the Regional Observer Scheme (ROS). The number of scientific observers recorded until 2020 was 15 observers. However, the number may decline in the future due to other arrangements among the personnel. New recruitment is imminent for the continuation of the program. Since 2014 the deployment of observers has been extended to other gears, such as small-scale purse seine, coastal drifting gillnet, and troll line/hand line (Table 12a-d). Ministerial Regulation No. 1/PERMEN-KP/2013 formally regulates national observers for fishing and carrier vessels, positive progress to secure government budget for observer program in the future.

Table 12a. Activity summary of Indonesian ROS from 2014-2020 (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
2020	6	6	6	257	22-104	48

Table 12b. Activity summary of Indonesian ROS from 2014-2020 (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
2020	5	5	5	446	57-116	89

Table 12c. Activity summary of Indonesian ROS from 2014-2020 (gear= handline).

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
2020	2	2	2	51	10-41	26

Table 12d. Activity summary of Indonesian ROS from 2014-2020 (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
2020	na	na	na	na	na	na

6.4. Port sampling program

The Port sampling program was conducted regularly at Benoa Port to represent Indonesia's main industrial fishing ports. The minimum sampling activity requirement is at least 30% of all landings at each processing plant (IOTC, 2002). However, the last two years' coverage was below 50% due to changing personnel and restrictions related to the Covid-19 pandemic (Table 13). The latter reason also substantially affected the number of fish sampled, for around 30% loss on average across all species.

Table 13. Coverage percentage of daily tuna and tuna-like species monitoring program based in Benoa port 2014-2020.

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%
2020	411	150	37.67%

Table 14. Some weighted samples by species and gear from daily tuna and tuna-like species monitoring based in Benoa Port 2014-2020.

Code	Species	No. fish sampled						
		2014	2015	2016	2017	2018	2019	2020
ALB	Albacore	27,740	21,648	22,643	21,452	7,641	13,812	9,255
BET	Bigeye tuna	40,431	45,039	34,415	25,695	16,247	16,210	11,729
YFT	Yellowfin tuna	41,720	17,909	29,229	20,610	22,998	13,147	5,654
BUM	Blue marlin	716	780	219	216	82	60	138
BLM	Black marlin	342	120	111	48	20	20	96
MLS	Striped marlin	108	115	201	60	36	54	178
SSP	Short bill spearfish	68	192	337	209	125	1,020	121
SFA	Indo-Pacific sailfish	383	546	440	391	325	108	209
SWO	Swordfish	4,177	4,336	2,966	2,318	1,198	2	3,387
LEC	Escolar	13,705	9,567	5,201	15,006	1,603	8	3,812
OIL	Oilfish	1,120	1,842	1,394	849	349	349	652
WAH	Wahoo	1,776	1,102	913	325	47	229	388
DOL	Common dolphinfish	221	359	445	921	42	459	112
BSH	Blue shark	2,058	4,732	9,148	8,404	10,055	10,483	12,542
MAK	Mako sharks nei	83	124	166	168	227	154	331
OCS	Oceanic whitetip shark	99	153	66	20	14	1	2
THR	Thresher sharks nei	2	32	nil	2	nil	2	97
LAG	Moonfish	6,795	9,709	5,690	4,820	2,970	4,653	3,827
BAR	Barracuda	19	15	nil	5	nil	nil	nil

6.5. Unloading/Transhipment of flag vessels

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

- The possession of VMS (Vessel Monitoring System) and CCTV (Closed Circuit Television) are mandatory and must be installed onboard
- 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 on the 18th of August 2020; however, it was extended until the 31st of January 2021 by issuing 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 logbooks, 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 11-d). Despite low coverage, continuity is still the main priority. In addition, scientific port sampling on the gillnet fishery has been conducted since as early as 2012, with Cilacap as the leading monitoring site. Unfortunately, no observation was completed in 2020 due to the Covid-19 outbreak. Nowadays, gillnet targeting tuna is no longer considered an economical option for fishers. Most of them decided to convert to handline, utilize FADs, and upgrade the storage with refrigerated-type chiller for better quality products (Novianto et al., 2019).

6.8. Sampling plans for mobulid rays

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

7. NATIONAL RESEARCH PROGRAMS

Research on tuna-like species, billfishes, sharks, and rays in the Indian Ocean has been a national research priority mandated in Indonesia NPOA Tuna. Most of the national research programs were conducted by Research Institute for Tuna Fisheries, Bali, and several research activities were run by local universities and NGOs.

7.1. National research programs on blue shark

Research title: Study of the effectiveness of shark conservation policies implementation.
Population structure of tuna, billfishes, and sharks in Indonesian EEZ 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 sharks in Indonesian EEZ and high seas area.

7.3. National research programs on sharks

Research title: Study of the effectiveness of shark conservation policies implementation.
Population structure of tuna, billfishes, and sharks in Indonesian EEZ 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 continues to monitor catch and effort of tuna and other ecologically related species to implement scientific Committee Recommendation.

Table 13. Scientific requirements contained in Resolutions of the Commission, adopted between 2012 and 2020

Res. No.	Resolution	Scientific requirement	CPC progress
11/04	On a regional observer scheme	Paragraph 9	Indonesia's 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 a 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, mainly marine turtles, is governed through Ministerial Regulation No. 12/PERMEN-KP/2012.

Res. No.	Resolution	Scientific requirement	CPC progress
			Data submission related ERS data 2019 had been submitted to IOTC on 29th June 2020 Indonesia had NPOA for marine Turtles 2016-2020 and is 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, significantly reducing incidental bycatch of seabirds, is governed through Ministerial Regulation No. 12/PERMEN-KP/2012. Indonesia had NPOA for Seabird Mitigation Measures since late 2016 and implemented in 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. Report of ERS interaction monitored through ROS reported through a national report to SC-IOTC annually
13/04	On the conservation of cetaceans	Paragraphs 7– 9	Conservation and protection of ecologically related species, mainly 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 into a national report to SC-IOTC annually.

Res. No.	Resolution	Scientific requirement	CPC progress
			However, no incident occurred related to cetacean interaction with tuna fishery
13/05	On the conservation of whale sharks (*Rhincodon typus*)	Paragraphs 7– 9	Whale sharks (*Rhincodon typus*) are fully protected under Ministerial Decree No. 18/KEPMEN-KP/2013. Report of whale sharks interaction monitored through ROS reported into a national report to SC-IOTC annually. However, there are no incidents that occurred related to 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 the period 2016-2020, is currently running. Report of sharks' interaction monitored through ROS, Port Sampling Program and logbook Fishing vessel and reported through a 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 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 records

Res. No.	Resolution	Scientific requirement	CPC progress
			commercial fisheries operation onboard. All mandatory data reporting has 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 accordingly.
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 the period 2016-2020, is currently running. Data submission related to sharks' data 2020 had been submitted to IOTC on 29th June 2021.
18/02	On management measures for the conservation of blue shark caught in association with IOTC fisheries	Paragraphs 2-5	No specific management measure for blue sharks is 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 to blue sharks 2020 had been submitted to IOTC on 29th June 2021 and reported through a national report to SC-IOTC

Res. No.	Resolution	Scientific requirement	CPC progress
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 is specific for billfishes: striped marlin, black marlin, blue marlin, and Indo-Pacific sailfish. However, the catches are closely monitored through a scientific 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. Improvement of data quality conducted by national validation data workshop twice a year and refreshment program for data field officers conducted annually.
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 some gillnet fisheries being very limited and operated in the 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 into a national report to SC-IOTC annually. However, no incident occurred related to mobulid interaction with tuna fishery.

9. WORKING PAPERS

A total of six documents were submitted and presented during IOTC online meetings in 2021, which belong to 5 working parties and one scientific committee.

- **WPNT11 (Working Party on Neritic Tuna), July 2021 (1 document)**
  IOTC-2021-WPNT11-14; Length-length and Length-weight relationship of bullet tuna (*Auxis rochei*) and frigate tuna (*Auxis thazard*) from the coast of West Sumatra, Indonesia; Tampubolon PARP, Sulistyaningsih RK, Agustina M.
- **WPB19 (Working Party on Billfish), September 2021 (1 document)**
  IOTC-2021-WPB19-17; Update on CPUE Standardization of Black Marlin (*Makaira indica*) from Indonesian Tuna Longline Fleets 2006-2020; Setyadji B, Parker D, Wang S-P, Sulistyaningsih R
- **WPEB17-DP (Working Party on Ecosystem and By-catch: Data Preparatory Meeting), April 2021 (1 Document)**
  IOTC-2021-WPEB17(DP)-06; Updated on the CPUE standardization of the blue shark (*Prionace glauca*) caught by Indonesian tuna longline in the eastern Indian Ocean; Wujdi A, Setyadji B, Fahmi Z
- **WPTT22 (Working Party on Tropical Tuna), May and October 2021 (1 Document)**
  1. IOTC-2021-WPTT23(DP)-09; Reproductive biology of yellowfin tuna (*Thunnus albacares* Bonnaterre, 1788) from the southern part of Indonesian waters and its application as a limit reference point (Lm_{50}); Setyadji B, Hartaty H
  2. IOTC-2021-WPTT23-19; Estimating the size at sexual maturity of bigeye tuna (*Thunnus obesus*) in the eastern Indian Ocean; Hartaty H, Setyadji B, Arnenda GL, Sulistyaningsih R
- **SC23 (Scientific Committee), December 2020 (1 Document)**
  IOTC–2021-SC24- NR09 National Report (Indonesia)

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Novianto, D., Ilham, Nainggolan, C., Syamsuddin, S., Efendi, A., Halim, S., Krisnafi, Y., Handri, M., Basith, A., Yusrizal, Nugraha, E., Nugroho, S. C., & Setyadji, B. (2019). Developing an Abundance Index of Skipjack Tuna (*Katsuwonus pelamis*) from a Coastal Drifting Gillnet Fishery in the Southern Waters of Indonesia. *Fishes*, *4*(1), 1–11. https://doi.org/10.3390/fishes4010010

Annex 1. Summary of average monthly CPUE of tuna (kg/1000 hooks) derived from logbook data year 2020 (gear = longline).

Month	ALB	BET	YFT	Fishing Ground
1	4.71	2.95	6.17	Eastern Indian Ocean
2	3.59	2.97	4.20	Eastern Indian Ocean
3	4.25	2.62	5.16	Eastern Indian Ocean
4	6.25	3.64	4.15	Eastern Indian Ocean
5	6.43	6.16	6.32	Eastern Indian Ocean
6	6.71	4.23	5.22	Eastern Indian Ocean
7	7.07	4.73	4.66	Eastern Indian Ocean
8	6.25	4.74	5.66	Eastern Indian Ocean
9	4.75	4.19	5.90	Eastern Indian Ocean
10	6.41	4.62	4.92	Eastern Indian Ocean
11	9.68	4.23	7.00	Eastern Indian Ocean
12	5.77	5.73	5.19	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
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
2020	0.7%	0.22	0.07	0.09	0.01	0.04	0.33	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
2006	1.6%	1.62	0.06	Eastern Indian Ocean
2007	1.3%	1.21	0.02	Eastern Indian Ocean
2008	1.4%	0.94	0.00	Eastern Indian Ocean
2009	1.3%	0.75	0.03	Eastern Indian Ocean
2010	0.8%	0.77	0.07	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	0.15	Eastern Indian Ocean
2016	3.4%	0.01	0.00	Eastern Indian Ocean
2017	6.9%	0.10	0.01	Eastern Indian Ocean
2018	1.9%	1.68	0.05	Eastern Indian Ocean
2019	6.2%	0.98	0.05	Eastern Indian Ocean
2020	0.7%	1.22	0.00	Eastern Indian Ocean