Indonesia National Report to the Scientific Committee of the Indian Ocean Tuna Commission, 2019

Zulkarnaen Fahmi[1)]
Bram Setyadji[1)]
Trian Yunanda[2)]

1) Research Institute for Tuna Fisheries, Bali
2) Directorate of Fish Resources Management, Jakarta

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 2016, final data for the 2015 calendar year must be provided to the Secretariat by 30 June 2016)	YES 28/06/2019
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 2016, preliminary data for the 2015 calendar year was provided to the IOTC Secretariat by 30 June 2016). **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 2016, final data for the 2015 calendar year must be provided to the Secretariat by 30 December 2016).	YES 28/06/2019
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 571 (Malacca Strait and Andaman Sea), FMA 572 (Western Sumatera and Sunda Strait), and FMA 573 (South of Java to East Nusa Tenggara, Sawu Sea and western part of Timor 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 2018 was 326 vessels dominated by longline vessels followed by purse seine vessel. Total catch of main species of tunas in 2018 was estimated around 151,592 tons which composed of albacore (5,604 mt), bigeye tuna (20,404 mt), skipjack tuna (85,277 mt) and yellowfin tuna (40,306 mt). Nominal hook rates derived from logbook data 2018 for albacore, bigeye and yellowfin in kg/1000 hooks were 46.96, 33.10, and 65.28 respectively. Meanwhile, nominal hook rates for swordfish and blue marlin were increased compared than previous years, while hook rates for black marlin, striped marlin, indo-pacific sailfish and short-billed spearfish continued to depleted. Observer coverage 2018 was reported 3.85% 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 decreased due to shifting fishing area while interaction with marine turtle reported slightly increased from previous years, however mitigation measures for those ERS has taken in account by fishermen.

Table of Contents.

Executive Summary 3
Table of Contents. 4
1. BACKGROUND/GENERAL FISHERY INFORMATION 5
2. FLEET STRUCTURE 6
3. CATCH AND EFFORT (BY SPECIES AND GEAR) 7
3.1. Annual catch estimation at Benoa port 9
3.2. Catch and Effort from Coastal and Artisanal Fisheries 10
3.3. Catch and Effort Data from Scientific Observer Program 10
4. RECREATIONAL FISHERIES 11
5. ECOSYSTEM AND BYCATCH ISSUES 11
5.1. Sharks 11
5.2 Seabirds 12
5.3 Marine Turtles 13
5.4 Billfishes 13
5.5. Neritic Tuna 14
5.6. Other ecologically related species (e.g. marine mammals, whale sharks) 14
6. NATIONAL DATA COLLECTION AND PROCESSING SYSTEMS 15
6.1. Log sheet data collection and verification 15
6.2. Vessel Monitoring System 15
6.3. Regional Observer Program (ROP) & Regional Observer Scheme (ROS) 17
6.4. Port sampling program 19
6.5. Unloading/Transhipment 20
7. NATIONAL RESEARCH PROGRAMS 20
8. IMPLEMENTATION OF SCIENTIFIC COMMITTEE RECOMMENDATIONS AND RESOLUTIONS OF THE IOTC RELEVANT TO THE SC. 20
9. WORKING PAPERS 22
10. LITERATURE CITED 23

1. BACKGROUND/GENERAL FISHERY INFORMATION

Indonesia is an archipelagic country situated between the continents of Asia and Australia and surrounded by two major oceans, Pacific Ocean in the north and Indian Ocean in south hemisphere. It consists of approximately 17,508 islands with coast line stretched up to 81,000 km. Totally, Indonesia has 5.8 million km2 of marine waters consisting of 3.1 million km2 of territorial waters (<12 miles) and 2.7 million km2 of EEZ (12-200 miles). For fisheries management purpose, it divided into eleven Fisheries Management Areas (FMA). Three of which 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) (Figure 1a).

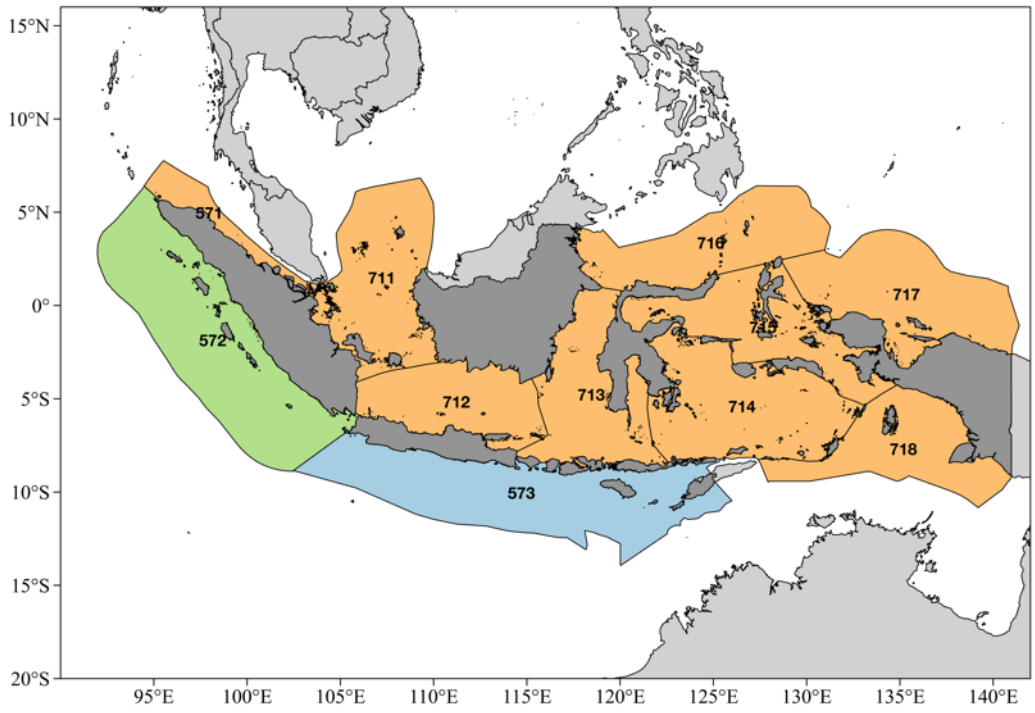


Figure 1a. The eleven of Fisheries Management Area (FMA) in Indonesian waters

Main landing sites for tuna and tuna-like species are widespread across the western of Sumatra and 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 the main tuna landing port in Indonesia.

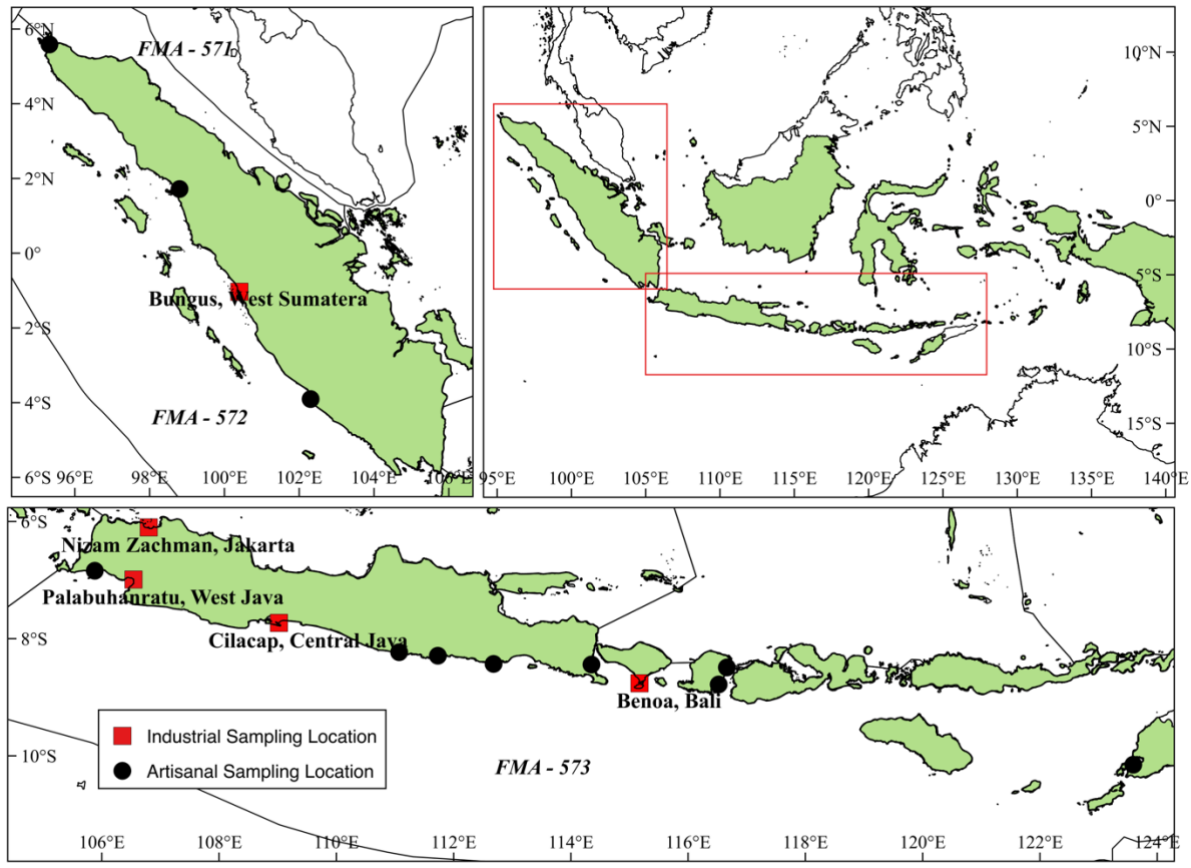


Figure 1b. Primary fishing port/landing sites the industrial (*blue label*) and artisanal (*red label*).

2. FLEET STRUCTURE

The number of active fishing vessels operated, based on grouped gross tonnage (GT) as per reported to IOTC on 13th of February, 2019 in the FMAs 572, 573 and high seas Indian Ocean were 326 fishing vessels, which consisted of longline (260), purse seine (65), and 1 carrier/cargo freezer.

Table 1. Summary of active fishing vessels by size (GT) as per reported to IOTC on 13th of February, 2019 (Source: DGCF).

Size	Longline	Purse seine	Gillnet	Carrier/Cargo Freezer	Other	Total
<50	88	nil	nil	nil	nil	88
51-100	91	1	nil	nil	nil	92
101-200	81	63	nil	1	nil	145
201-300	nil	1	nil	nil	nil	1
301-500	nil	nil	nil	nil	nil	nil
501-800	nil	nil	nil	nil	nil	nil
>800	nil	nil	nil	nil	nil	nil
Total	**260**	**65**	**nil**	**1**	**nil**	**326**

3. CATCH AND EFFORT (BY SPECIES AND GEAR)

Indonesian national statistic regularly reported the annual catch including four (4) main species such as bigeye tuna, yellowfin tuna, skipjack tuna and albacore. Total catch of main species of tunas in 2018 was 151,592 mt decreased 9.32% from previous year, which composed of albacore (5,604 mt), bigeye tuna (20,404 mt), skipjack tuna (85,277 mt) and yellowfin tuna (40,306 mt). The average catch of tunas from 2014 to 2018 was estimated 152,264 mt .The average catch estimation of tunas from 2014 to 2018 was 152,264 mt.

Table 2. Annual catch by gear and primary species of tuna (ALB, BET, SKJ and YFT) derived from Indian Ocean from 2014-2018.

Gear	Year					Average
	Species	**2014**	**2015**	**2016**	**2017**	**2018**	**(MT)**
Gillnet	ALB	nil	965	20	nil	97	361
	BET	341	938	729	1,120	1,139	853
	SKJ	3,434	7,652	12,892	6,023	6,738	7,348
	YFT	445	1,241	2,912	1,161	1,603	1,472
	Subtotal	**4,220**	**10,796**	**16,553**	**8,304**	**9,577**	**10,034**
Line	ALB	9	1,179	860	566	697	662
	BET	5,175	1,908	2,872	2,938	4,464	3,471
	SKJ	25,131	19,474	16,964	24,594	25,304	22,293
	YFT	13,465	9,645	9,276	9,034	8,928	10,070
	Subtotal	**43,780**	**32,206**	**29,972**	**37,132**	**39,393**	**36,497**
Longline	ALB	8,539	4,488	6,278	6,399	4,689	6,079
	BET	16,197	7,919	7,642	8,302	5,474	9,107
	SKJ	5,729	4,763	2,281	6,555	4,568	4,779
	YFT	12,645	10,549	10,404	10,527	9,610	10,747
	Subtotal	**43,110**	**27,719**	**26,605**	**31,783**	**24,341**	**30,712**
Other	ALB	3	662	3	nil	96	191
	BET	1,183	2,121	1,692	140	3,408	1,709
	SKJ	11,326	30,452	11,394	16,086	12,782	16,408
	YFT	3,985	10,773	3,107	7,593	7,824	6,656
	Subtotal	**16,497**	**44,008**	**16,196**	**23,819**	**24,110**	**24,964**
Purse Seine	ALB	199	7	18	29	25	56
	BET	9,516	5,779	9,199	9,445	5,919	7,972
	SKJ	26,468	18,597	28,828	43,614	35,885	30,678
	YFT	14,582	8,363	10,786	11,598	12,342	11,534
	Subtotal	**50,765**	**32,746**	**48,831**	**64,686**	**54,171**	**50,240**
Grand Total	ALB	8,750	7,301	7,179	6,994	5,604	7,166
	BET	32,412	18,665	22,134	21,945	20,404	23,112
	SKJ	72,088	80,938	72,359	96,872	85,277	81,507
	YFT	45,122	40,571	36,485	39,913	40,307	40,480
	Total	**158,372**	**147,475**	**138,157**	**165,724**	**151,592**	**152,264**

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 2018 derived from logbook data was concentrated between 5oS-15oS and 100oE-120oE. The effort used was ranged from 396 to 2700 hooks/set with average 1250 hooks/set (Figure 2). On general, the average number of hooks/set used in 2018 between 780-2184 hooks/set (~1340 hooks/set in average). the logbook data used for analysis was a subset (~20%) from all logbook submitted due to rigorous validation processes to provide high quality data.

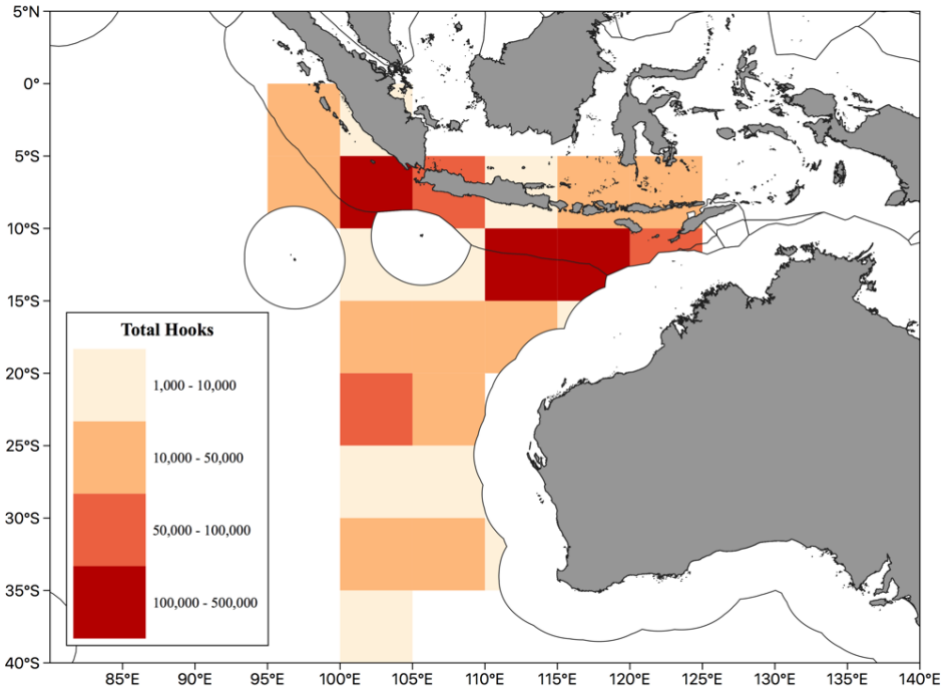


Figure 2. Map of the distribution of Indonesian tuna longline efforts year 2018 (source: Logbook data).

Reported catch in 2018 for three main species of tuna (ALB, BET and YFT) was concentrated between 10oS-15oS, except for albacore tuna which also caught below 20oS. (Figure 3).

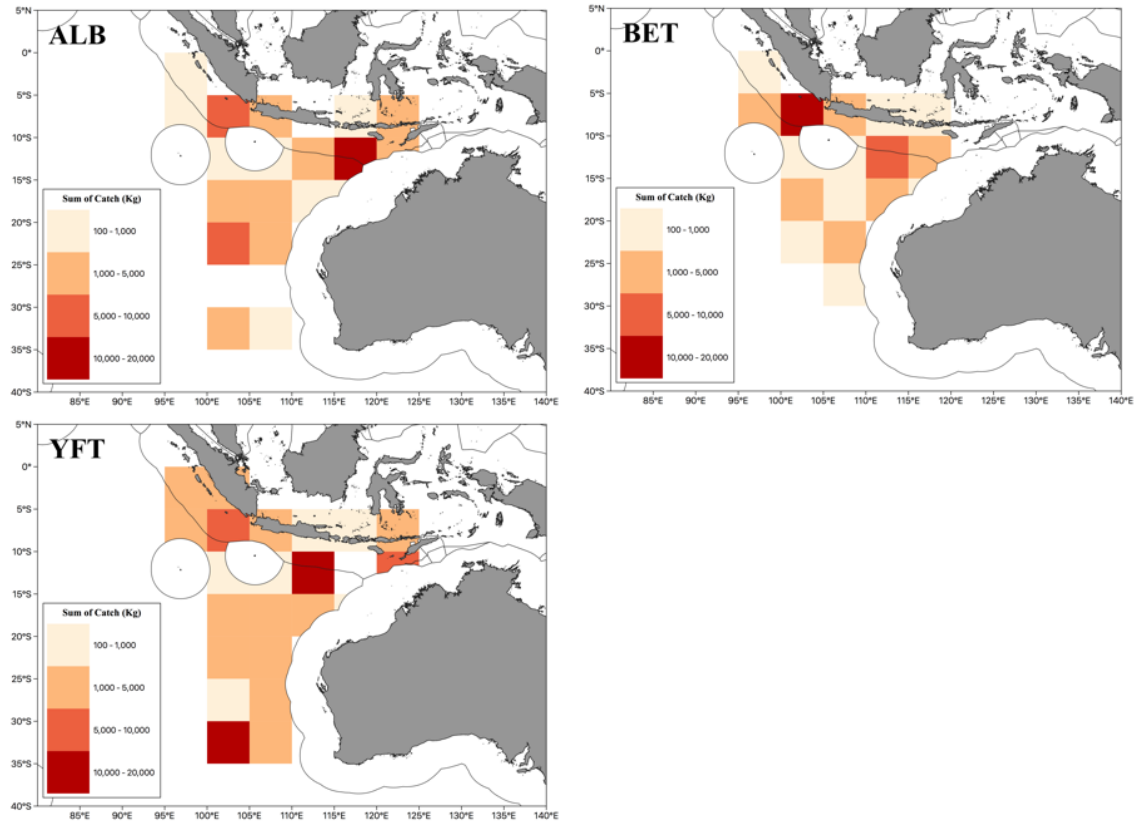


Figure 3. Map of distribution of reported catch in 2018, aggregated by species, by 5-degree blocks (source: Logbook data).

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 down to around 2,457 tons, 16% lower compared previous year and half from the average estimated catch from 2013-2018. 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 to just half (434) from 2013 observation (753) (Figure 4).

Table 3. Annual catch estimation by gear (LL) and primary species of tuna (ALB, BET and YFT) landed in Benoa Port from 2013-2018.

Year	Annual Catch Estimation (ton)			
	YFT	BET	ALB	**TOTAL**
2013	2,474	2,238	688	**5,400**
2014	2,654	2,312	687	**5,653**
2015	1,283	2,989	631	**4,903**
2016	2,562	2,385	1,584	**6,531**
2017	1,135	1,367	357	**2,859**
2018	1,362	1,095	279	**2,457**

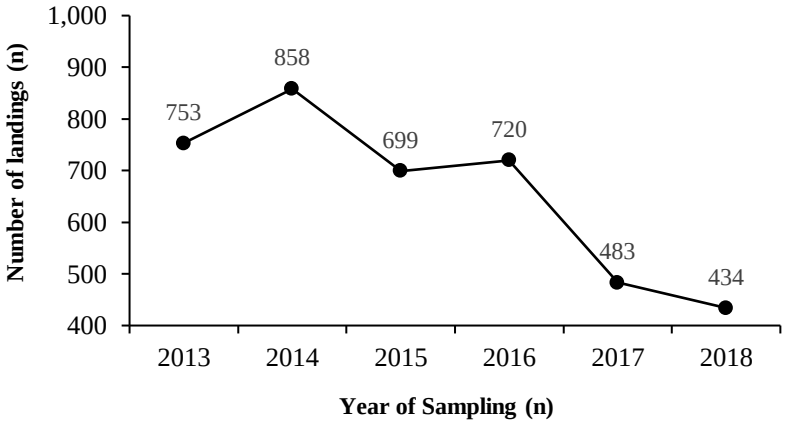


Figure 4. Total number of landing of Indonesian tuna longline vessels based in Benoa port during 2013-2018

3.2. Catch and Effort from Coastal and Artisanal Fisheries

Apart of daily monitoring on tuna landing activity in industrial scale, Research Institute of Tuna Fisheries (RITF) also conducting in small-scale fisheries since 2013. The sampling coverage was intended up to minimum 30% from total landing for each month (Table 4).

Table 4. Observed catch (kg) and effort (days) by gear from coastal and artisanal fisheries in Indonesia during 2014-2018 (Source: RITF port monitoring program)

FMA	Location	Gear	2014		2015		2016		2017		2018	
			C (mt)	L (N)	C (mt)	L (N)	C (mt)	L (N)	C (mt)	L (N)	C (mt)	L (N)
573	Labuhan Lombok	HL	198	129	96	73	307	264	467	295	269	203
573	Pacitan	HL	637	763	565	564	421	381	1,629	632	639	358
573	Pacitan	PS	1,233	335	1,852	309	944	342	1,934	361	1,052	291
572	Sibolga	PS	9,117	682	9,505	903	9,953	1641	15,753	1,681	na	na

**) 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 2005-2018 was presented in Figure 5. Both YFT and BET hook rates were relatively stable, at average 0.05/100 hooks and 0.17/100 hooks, respectively. By contrast, the hook rate of ALB was highly fluctuated over the years of observation.

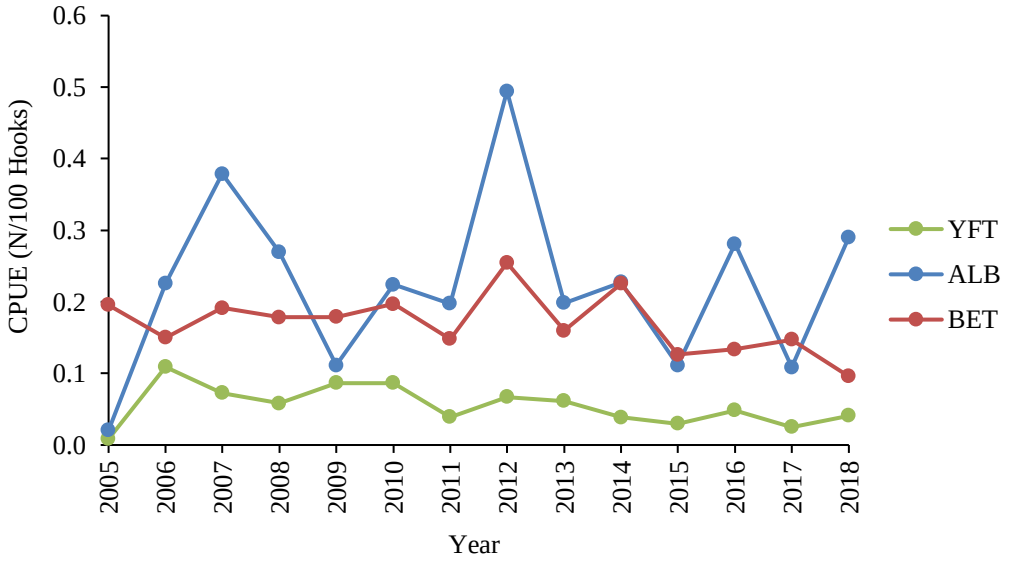


Figure 5. Nominal hook rate series (N/100 hooks) for large tuna (ALB, BET and YFT) based on RITF scientific observer data in the Indian Ocean (2005- 2018).

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). However, currently there is no update regarding 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 Decree No. 12, 2012. In detail on Chapter X which regulates a management and conservation of bycatch and ecological related species on tuna fisheries. Several activities to raise the fishers awareness on the important 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, the government through the minister of marine and fisheries has issued a ministerial regulation of marine and relevant fisheries management and use of sharks and rays in Indonesia, the latest regulations contained in the Minister of Marine and Fisheries No. 34/PERMEN-KP/2015 on the amendment of the Minister of Marine Affairs and Fisheries No. 59/PERMEN-KP/2014 concerning prohibition on the issuance of Oceanic white tip sharks (*Carcharhinus longimanus*) and hammerhead sharks (*Sphyrna* spp.) from the territory of Republic of Indonesia out of Indonesian territory. Moreover, the second National Plan of Action (NPOA) for sharks and rays for 2016-2020 are currently running and will be renewed in 5 years period.

Blue shark and crocodile shark dominated the incidental catch for sharks during 2013-2018. Most of the blue sharks were retained while crocodile sharks usually discarded dead (Table 5). A data series of nominal CPUE from 2005-2018 is presented in Annex 3.

Table 5. Total observed number of sharks, by species, released/discarded by the Indonesian tuna longline fleet in the IOTC area of competence (2014–2018).

Code	2014				2015				2016				2017				2018			
	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
PTH	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	2	2	nil	nil	2	nil	1	1
BTH	1	1	nil	nil	nil	nil	nil	nil	4	4	nil	nil	3	3	nil	nil	15	13	nil	2
CCB	17	17	nil	nil	1	1	nil	nil	3	3	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
OCS	9	8	nil	nil	4	4	nil	nil	4	4	nil	nil	4	4	nil	nil	nil	nil	nil	nil
CCL	nil	nil	nil	nil	1	1	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil
SMA	2	2	nil	nil	1	1	nil	nil	5	5	nil	nil	39	8	30	1	13	9	nil	4
LMA	2	2	nil	nil	1	1	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	5	nil	nil	5
BSH	67	62	nil	nil	nil	nil	nil	nil	105	105	nil	nil	184	160	24	nil	300	194	6	100
PSK	91	nil	nil	nil	137	137	nil	nil	174	nil	nil	174	84	17	67	nil	148	2	nil	146
SPL	nil	nil	nil	nil	108	nil	nil	108	nil	nil	nil	nil	nil	nil	nil	nil	1	nil	nil	1
TIG	nil	nil	nil	nil	1	1	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	3	2	nil	1
ISB	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	39	1	35	3	9	2	nil	7
TSK	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	nil	6	6	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
THR	2	2	nil	nil	6	6	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

5.2 Seabirds

Seabirds data collection on longline fleets are conducted by 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, supported by on 2017.

Only one interactions reported during longline operation in 2018 which was identified as great-winged petrel (Table 6). The absence of interaction in some years due to low coverage of Indonesian scientific observers in high seas (above 25$_o$S). In term of mitigation, Indonesia, through Ministry of Marine Affairs and Fisheries has released 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$_o$S (high seas). Identification card for Seabird from IOTC had been translated into Bahasa. Indonesia had developed NPOA for Seabird in 2016 and been reviewed by Birdlife South Africa. For Seabird, Indonesia has complied fully and gets the green status.

Table 6. The number of observed incidental interaction of seabirds in tuna longline fishery from 2014-2018 (Source: RITF scientific observer data)

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

5.3 Marine Turtles

In 2018, there were 12 olive-ridley turtles reported as incidental catch, 2 of them were released alive and 10 others reported dead. 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). 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.

Table 7. The number of observed incidental interaction with marine turtles in tuna longline fishery from 2013-2018 (Source: RITF scientific observer data)

Code	Species	2014	2015	2016	2017	2018
DKK	Leatherback turtle	nil	nil	nil	nil	nil
LKV	Olive-ridley turtle	12	1	15	5	12
TTH	Hawksbill turtle	nil	nil	nil	nil	nil
TUG	Green turtle	nil	nil	8	nil	nil
TTX	Marine turtles nei	nil	nil	nil	nil	nil

5.4 Billfishes

Billfishes catch contributed around 5% to total observed catch from tuna longline during 14 years of observation (2005-2018). There were 6 species of billfishes caught by Indonesian tuna longline fleets. Hook rate of swordfishes range from 0.133-0.553, the highest among others, followed by black marlin (0.066-0.317) and blue marlin (0.007-0.287) and sailfish. Striped marlin was not considered as significant contributor, as the hook rate trend constantly at low figures (Figure 6). A data series of nominal CPUE of billfishes species from 2005-2018 is presented in Annex 2.

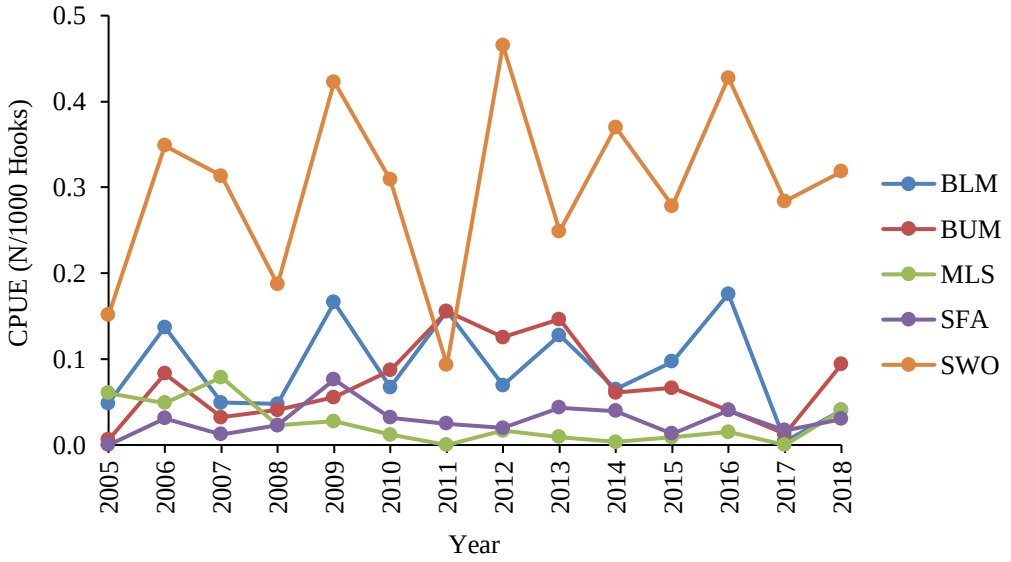


Figure 6. The nominal hook rate of known billfishes species caught by Indonesian tuna longline fisheries from 2005-2018.

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), kawa kawa (KAW) and longtail tuna (LOT).

The recent issues from 9th 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-WPNT09, 2019).

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

Pomfret, sickle pomfret, escolar and lancet fish were the most common species caught during longline operations from 2013-2018. No marine mammals or whale sharks recorded during that periods (Table 8).

Tabel 8. The number of observed catch of others ecologically related species in longline fisheries from 2013-2018 (source: RITF scientific observer data).

Code	Species	2014	2015	2016	2017	2018
BAR	Baracuda	4	5	6	nil	2
DOL	Common dolphinfish	15	7	13	32	11
DCO	Dolphin	nil	nil	nil	1	2
EIL	Brilliant pomfret	nil	nil	nil	1	1
HAR	Long nose chimaeras	3	14	46	nil	1
LEC	Escolar	666	490	353	240	613
LAG	Moon fish	29	30	60	13	57
MOX	Ocean Sunfish	3	2	1	nil	3
ALX	Long snouted lancetfish	921	739	693	796	1760
OHR	Other hairtail fish	nil	nil	nil	nil	nil

Code	Species	2014	2015	2016	2017	2018
OIL	Oilfish	58	16	8	24	19
TCR	Pomfret	90	45	62	42	nil
TRF	Tappertail ribbon fish	1	nil	nil	nil	nil
TST	Sickle pomfret	110	29	117	105	131
WAH	Wahoo	96	63	61	30	74

6. NATIONAL DATA COLLECTION AND PROCESSING SYSTEMS

6.1. Log sheet data collection and verification

For implementation of this logbook program, Ministry of Marine Affairs and Fisheries has released Regulation Number 18 Year 2010 of 5 October 2010. It is stipulated that logbook report has to be submitted to port authority prior to catch landing and mandatory to vessels above 5 GT. A total of 1,293 vessels were comply to fill and hand out the logbook to the port authority (Table 9). Despite of the declining trend over the last few years, the quality were incrementally better. Data entry and validity as well as the need for verification and validation prior to analysis are still the remaining issues. Thus, for effective implementation of this program, it is necessary to continuing introducing this program and strengthen capacity both to fishers and port officers.

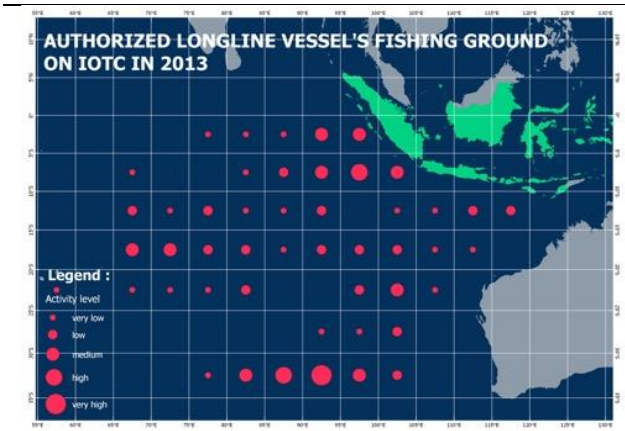
Table 9. The number of vessels submitted logbook (source: DGCF).

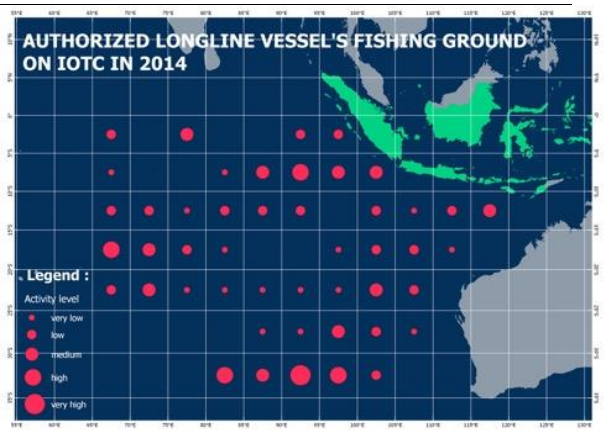
No	FMA	2013	2014	2015	2016	2017	2018
1	571	92	53	58	24	1	5
2	572	315	720	1,202	1,182	639	575
3	573	1,600	1,210	1,031	941	796	713
	Total	**2,007**	**1,983**	**2,291**	**2.147**	**1,436**	**1,293**

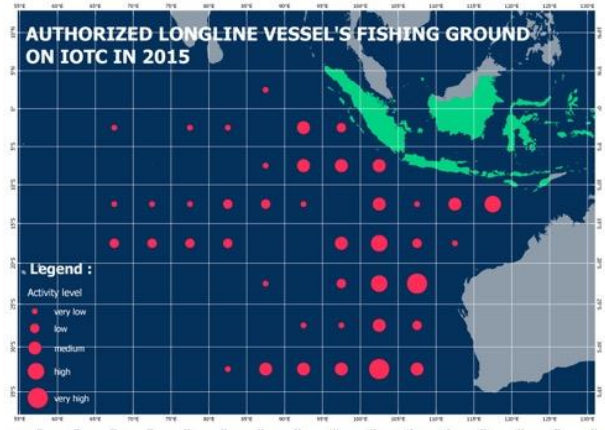
6.2. Vessel Monitoring System

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 center (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 8 showed the spatial distribution of Indonesia fleets based on VMS information.

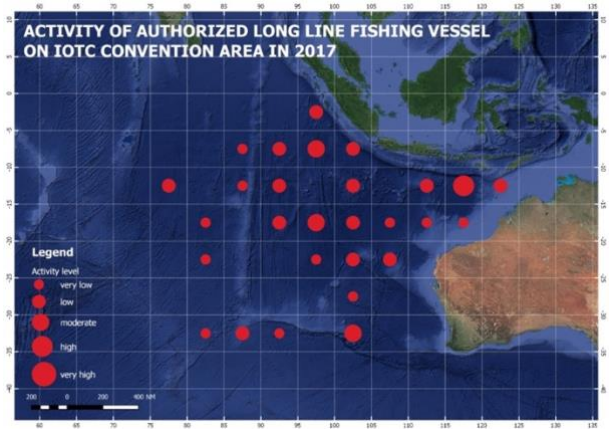
A)

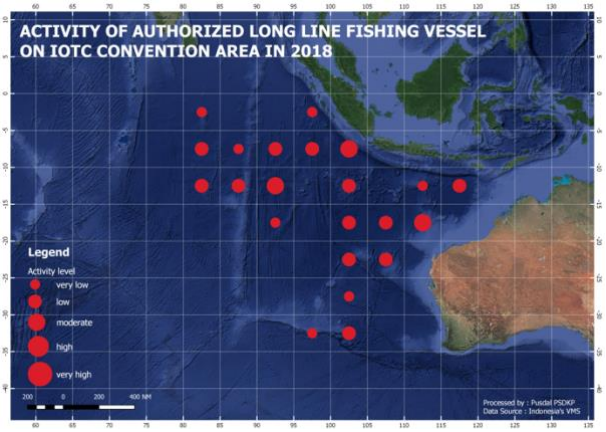

AUTHORIZED LONGLINE VESSEL'S FISHING GROUND
ON IOTC IN 2013
Legend :
Activity level
very low
low
medium
high
very high


AUTHORIZED LONGLINE VESSEL'S FISHING GROUND
ON IOTC IN 2014
Legend :
Activity level
very low
low
medium
high
very high


AUTHORIZED LONGLINE VESSEL'S FISHING GROUND
ON IOTC IN 2015
Legend :
Activity level
very low
low
medium
high
very high


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


ACTIVITY OF AUTHORIZED LONG LINE FISHING VESSEL
ON IOTC CONVENTION AREA IN 2017
Legend
Activity level
very low
low
moderate
high
very high


ACTIVITY OF AUTHORIZED LONG LINE FISHING VESSEL
ON IOTC CONVENTION AREA IN 2018
Legend
Activity level
very low
low
moderate
high
very high

B)

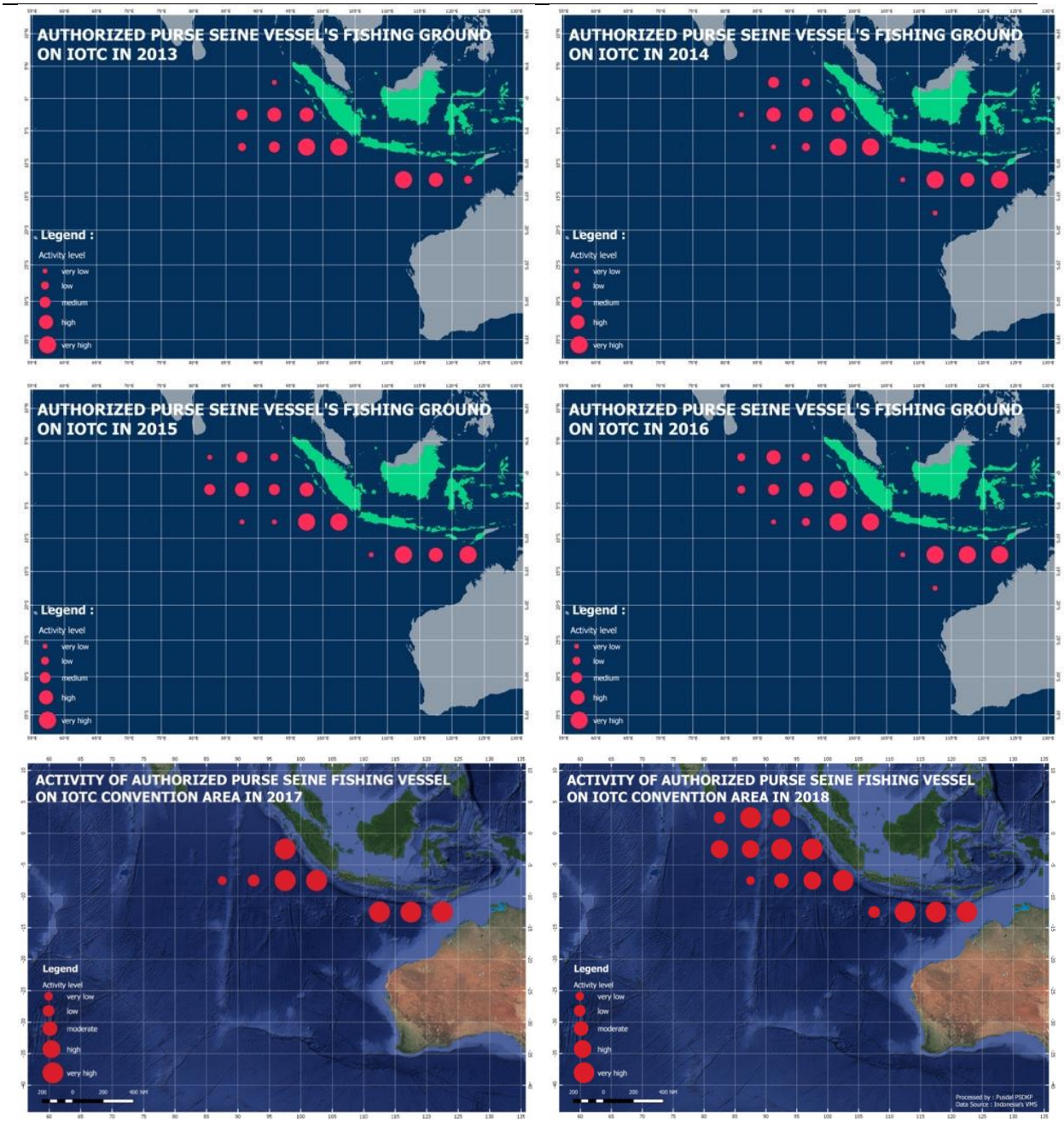


Figure 7. Map of spatial distribution of longline (A) and purse seine (B), aggregated from 2013 to 2018 based on VMS data (Source: PSDKP).

6.3. Regional Observer Program (ROP) & Regional Observer Scheme (ROS)

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 2018 was 15 observers, however the number may

decline in the future due to other arrangement among the personnels. 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 10a-d). Ministerial regulation of MMAF No. 01/2013 formally regulates national observers for fishing and carrier vessel, a positive progress to secure government budget for observer program in the future.

Table 10a. Activity summary of Indonesian observers from 2013-2018 (gear= longline).

Year	No. Of Obs	No. Of Trips	No. Of Company	Total Day at Sea	Days/Trip	Avg (d/trip)
2013	5	3	3	170	52-60	57
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

Table 10b. Activity summary of Indonesian observers from 2013-2018 (gear= purse seine).

Year	No. Of Obs	No. Of Trips	No. Of Company	Total Day at Sea	Days/Trip	Avg (d/trip)
2013	1	2	2	21	9-12	10.5
2014	3	2	2	11	1-9	1.5
2015	2	1	1	10	8-15	10.5
2016	23	18	9	1088	2-240	25.4
2017	na	na	na	na	na	na
2018	4	20	15	126	8-13	8.5

Table 10c. Activity summary of Indonesian observers from 2013-2018 (gear= hand line).

Year	No. Of Obs	No. Of Trips	No. Of Company	Total Day at Sea	Days/Trip	Avg (d/trip)
2013	1	2	2	19	9-10	9.5
2014	10	70	10	70	1	1
2015	na	na	na	na	na	na
2016	9	9	4	150	8-15	10.0
2017	24	37	2	734	10-173	10.5
2018	21	48	38	903	28-78	41

Table 10d. Activity summary of Indonesian observers from 2013-2018 (gear= gillnet).

Year	No. Of Obs	No. Of Trips	No. Of Company	Total Day at Sea	Days/Trip	Avg (d/trip)
2013	na	na	na	na	na	na
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

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 2013-2018 was above 50% (Table 11).

Table 11a. Number of individuals sampled (weight), by species and gear from daily tuna and tuna-like species monitoring based in Benoa Port 2013-2018.

Code	Species	No. of fish sampled				
		2014	2015	2016	2017	2018
ALB	Albacore	27,740	21,648	22,643	21,452	14,425
BET	Bigeye tuna	40,431	45,039	34,415	25,695	16,250
YFT	Yellowfin tuna	41,720	17,909	29,229	20,610	23,179
BUM	Blue marlin	716	780	219	216	82
BLM	Black marlin	342	120	111	48	20
MLS	Striped marlin	108	115	201	60	36
SSP	Shortbill spearfish	68	192	337	209	125
SFA	Indo-Pacific sailfish	383	546	440	391	326
SWO	Swordfish	4,177	4,336	2,966	2,318	1,221
LEC	Escolar	13,705	9,567	5,201	15,006	4,468
OIL	Oilfish	1,120	1,842	1,394	849	512
WAH	Wahoo	1,776	1,102	913	325	74
DOL	Common dolphinfish	221	359	445	921	88
BSH	Blue shark	2,058	4,732	9,148	8,404	11,444
MSO	Shortfin mako shark	83	124	166	168	227
OCS	Oceanic whitetip shark	99	153	66	20	14
TSS	Bigeye thresher shark	2	32	nil	2	nil
LAG	Moonfish	6,975	9,709	5,690	4,820	5,251
BAR	Barracuda	19	15	nil	5	nil

Table 11b. Coverage percentage of daily tuna and tuna-like species monitoring program based in Benoa port 2013-2018.

Year	No. Landed Vessel	No. Sampled Vessel	Sampling Coverage
2013	753	431	57.24%
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%

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

Since the implementation of Ministerial Decree No. 57/PERMEN/2014 concerning the banning of any transhipment at sea. DGCF reported that no Indonesian flagged vessel involved in transhipment activity inside the EEZ in 2017.

7. NATIONAL RESEARCH PROGRAMS

- *Project title*: Population structure of Tuna, Billfish and Sharks in the Indian Ocean; Project Duration: 2017-2019
- *Project title*: Tuna Harvest Strategy Implementation, Project Duration: 2016-2019.

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 12. Scientific requirements contained in Resolutions of the Commission, adopted between 2005 and 2016.

Res. No.	Resolution	Scientific requirement	CPC progress
15/01	On the recording of catch and effort by fishing vessels in the IOTC area of competence	Paragraphs 1–10	• Catch and effort data are recorded based on: • Ministerial Decree No. 48/PERMENKP/2014 on logbook • Ministerial Decree No. 1/PERMENKP/2013 on observer on board • Implementation of scientific observer on board
15/02	Mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating Non-Contracting Parties (CPCs)	Paragraphs 1–7	• Nominal catch data has been submitted • Logbook program are running and strengthened by the introduction of e-logbook • Size data from all tuna-related fleets have been submitted

Res. No.	Resolution	Scientific requirement	CPC progress
13/04	On the conservation of cetaceans	Paragraphs 7– 9	• Indonesia has been implementing Resolution 13/04 through Government Regulation No 7/1999. • Ministerial Regulation number 12/PERMENKP/2012 regarding captured fisheries fishing business on high-seas
13/05	On the conservation of whale sharks (*Rhincodon typus*)	Paragraphs 7– 9	Indonesia has issued Ministerial Decree number 18/KEPMENKP /2013 regarding conservation of whale shark in Indonesian water
13/06	On a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries	Paragraph 5–6	Indonesia has developed national plan of action (NPOA) Shark on 10 October 2010 as well as Ministerial Decree No. 12/2012 Chapter X which regulate a management and conservation of by-catch and ecological related tuna involved in tuna fisheries.
12/09	On the conservation of thresher sharks (family Alopiidae) caught in association with fisheries in the IOTC area of competence	Paragraphs 4–8	Indonesia has been implementing Ministerial Regulation number 12/PERMENKP/2012 regarding capture fisheries fishing business on high-seas
12/06	On reducing the incidental bycatch of seabirds in longline fisheries.	Paragraphs 3–7	Indonesia has been implementing Ministerial Regulation number 12/PERMENKP/2012 regarding captured fisheries fishing business on high-seas
12/04	On the conservation of marine turtles	Paragraphs 3, 4, 6–10	Indonesia has been implementing Ministerial Regulation number 12/PERMENKP/2012 regarding captured fisheries fishing business on high-seas
11/04	On a regional observer scheme	Paragraph 9	Indonesia has been implementing Ministerial Regulation number 1/PERMENKP/2013 regarding observer onboard

Res. No.	Resolution	Scientific requirement	CPC progress
05/05	Concerning the conservation of sharks caught in association with fisheries managed by IOTC	Paragraphs 1–12	- Indonesia has been implementing Ministerial Regulation number 12/PERMENKP/2012 regarding capture fisheries fishing business on high-seas - NPOA shark and ray

9. WORKING PAPERS

A total of 8 documents were submitted and presented during IOTC meetings in 2019, which belong to 5 working parties and 1 scientific committee.

9.1. WPNT09 (Working Party on Neritic Tuna), Seychelles, July 2019 (1 document)

IOTC–2019–WPNT09–11; Preliminary study of frigate tuna (*Auxis thazard*) CPUE standardization in the Indian Ocean West Sumatera (FMA 572); Ririk K. Sulistyaningsih, Prawira A.R.P. Tampubolon, Zulkarnaen Fahmi

9.2. WPB17 (Working Party on Billfish), La Réunion, September 2019 (1 document)

IOTC-2019-WPB17-16; Standardized CPUE indices for blue marlin (*Makaira nigricans*) caught by Indonesian tuna longline fishery in north eastern
Indian Ocean; Bram Setyadji, Lilis Sadiyah, Sheng-ping Wang and Zulkarnanen Fahmi

9.3. WPEB15 (Working Party on Ecosystem and By-catch), La Réunion, September 2019 (1 Document)

IOTC-2019-WPEB15-18; Standardized CPUE of blue shark (*Prionace glauca*) caught by Indonesian longline fleet in the eastern Indian Ocean; Irwan Jatmiko, Bram Setyadji, and Zulkarnaen Fahmi

9.4. WPTT21 (Working Party on Tropical Tuna), Spain, October 2019 (1 Document)

1. IOTC-2019-WPTT21-31; CPUE standardization of bigeye tuna, *Thunnus obesus* (Lowe, 1839) from Indonesian tuna longline fishery in the eastern Indian Ocean; Hety Hartaty, Bram Setyadji, Tom Nishida, Zulkarnaen Fahmi
2. IOTC-2019-WPTT21-42; Updated information on catch and effort of yellowfin tuna (*Thunnus albacares*) from Indonesian tuna longline fishery; Hety Hartaty, Bram Setyadji, Zulkarnaen Fahmi

9.5. WPTmT07 (Working Party on Temperate Tuna), Malaysia & Japan, January and July 2019 (2 Documents)

1. IOTC-2019-WPTmT07(DP)-10; Updated information on catch and effort of albacore tuna (*Thunnus alalunga*) from Indonesian tuna longline fishery; Bram Setyadji, Zulkarnaen Fahmi

2. IOTC-2019-WPTmT07(AS)-07; Standardizing CPUE of albacore tuna (*Thunnus alalunga* Bonnaterre, 1788) on tuna longline fishery in eastern Indian Ocean; Fathur Rochman, Bram Setyadji, Zulkarnaen Fahmi

9.6. SC21 (Scientific Committee), Seychelles, December 2019 (1 Document)

IOTC–2019-SC22- NR09 National Report (Indonesia)

10. LITERATURE CITED

Hartaty, H., Setyadji, B., Nishida, T., Fahmi, Z. 2019. CPUE Standardization Of Bigeye Tuna From Indonesian Tuna Longline Fishery In The Eastern Indian Ocean. IOTC-2019-WPTT21-31.

Hartaty, H., Setyadji, B., Fahmi, Z. 2019. Update Information On Catch And Effort Of Yellowfin Tuna From Indonesian Tuna Longline Fishery. IOTC-2019-WPTT21-42.

Irianto. H.E, Wudianto, A. Suman, K. Susanto, B. Nugraha, F. Satria, S.D. Retnowati. 2014. INDONESIA National Report to the Scientific Committee of the Indian Ocean Tuna Commission. IOTC-2014-SC17-NR09.

Irianto. H.E, Wudianto, B. Nugraha, A.A. Widodo, F. Satria, L. Sadiyah. 2015. INDONESIA National Report to the Scientific Committee of the Indian Ocean Tuna Commission, IOTC-2015-SC18-NR09.

Irianto. H.E, Wudianto, Z. Fahmi, B. Setyadji, F. Satria, L. Sadiyah, B. Nugraha, A.A Widodo. 2016. INDONESIA National Report to the Scientific Committee of the Indian Ocean Tuna Commission. IOTC-2016-SC19-NR09.

Jatmiko, I., Setyadji, B., Fahmi, Z. 2019. Standardized CPUE of Blue Shark Caught by Indonesian Longline Fleet in the Eastern Indian Ocean. IOTC-2019-WPEB15-18.

Rochman, F., Setyadji, B., Fahmi, Z. 2019. Standardizing CPUE of Albacore Tuna on Tuna Longline Fishery in Eastern Indian Ocean. IOTC-2019-WPTmT07AS-07.

Ruchimat, T., Fahmi, Z., Setyadji, B., Yunanda, T. 2018. INDONESIA National Report to the Scientific Committee of the Indian Ocean Tuna Commission. IOTC-2018-SC21-NR09.

Ruchimat, T., Wudianto, Fahmi, Z., Setyadji, B., Sadiya, L. 2017. INDONESIA National Report to the Scientific Committee of the Indian Ocean Tuna Commission. IOTC-2017-SC20-NR09.

Setyadji, B., Sadiyah, L., Wang, S.P., Fahmi, Z. 2019. Standardized CPUE Indices for Blue Marlin Caught by Indonesia Tuna Longline Fishery in North Eastern Indian Ocean. IOTC-2019-WPB17-16.

Sulistyaningsih, R.K., Tampubolon, P.A.R.P., Fahmi, Z. 2019. Preliminary study of frigate tuna CPUE standardization in the Indian Ocean West Sumatera. IOTC-2019-WPNT09-11.

Annex 1. Summary of average monthly CPUE of tuna (kg/1000 hooks) derived from logbook data year 2018.

Month	ALB	BET	YFT	Fishing Ground
1	17.50	42.04	71.88	Eastern Indian Ocean
2	27.47	18.06	57.79	Eastern Indian Ocean
3	24.86	28.13	45.96	Eastern Indian Ocean
4	17.25	18.42	26.25	Eastern Indian Ocean
5	32.25	8.83	23.63	Eastern Indian Ocean
6	48.34	0.00	30.18	Eastern Indian Ocean
7	32.62	64.72	27.78	Eastern Indian Ocean
8	81.29	149.66	37.26	Eastern Indian Ocean
9	96.05	50.48	83.94	Eastern Indian Ocean
10	78.19	1.38	99.14	Eastern Indian Ocean
11	56.02	14.86	112.10	Eastern Indian Ocean
12	51.69	0.67	167.42	Eastern Indian Ocean

Annex 2. Summary of nominal CPUE of billfish (N/1000 hooks) derived from observer data year 2018.

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

Annex 3. Summary of nominal CPUE of some sharks (N/1000 hooks) derived from observer data year 2018.

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

Annex 4. Number of sizes measured (length) of important IOTC species in 2014-2018 under port monitoring program (RITF & PELAGOS).

Code	2014			2015			2016			2017			2018		
	C (mt)	S (n)	P (%)	C (mt)	S (n)	P (%)	C (mt)	S (n)	P (%)	C (mt)	S (n)	P (%)	C (mt)	S (n)	P (%)
ALB	8,750	279	3.19%	7,301	630	8.63%	7,179	5,947	82.83%	3,154	2,831	89.75%	5,604	2,449	43.70%
BET	32,412	12,651	39.03%	18,665	15,650	83.85%	22,135	20,993	94.84%	74,487	21,060	28.27%	20,404	13,095	64.18%
YFT	45,122	9,109	20.19%	40,571	4,821	11.88%	36,485	11,045	30.27%	1,751	7,563	432.00%	40,306	28,599	70.95%
SKJ	72,088	4,117	5.71%	80,938	7,097	8.77%	72,359	5,055	6.99%	60,066	7,390	12.30%	85,277	10,916	12.80%
BLM	4,839	377	7.79%	3,466	477	13.76%	3,123	382	12.23%	631	607	96.17%	7,091	396	5.58%
BUM	765	408	53.33%	1,032	638	61.82%	1,426	583	40.90%	209	726	347.53%	979	589	60.17%
MLS	1,190	11	0.92%	983	7	0.71%	656	8	1.22%	257	2	0.78%	2,441	34	1.39%
SFA	4,206	253	6.02%	3,281	281	8.56%	1,948	164	8.42%	987	392	39.72%	1,845	1	0.05%
SWO	8,190	817	9.98%	5,675	607	10.70%	6,066	1,375	22.67%	792	1,012	127.79%	4,108	580	14.12%
FRI	46,690	1,110	2.38%	70,705	512	0.72%	77,205	357	0.46%	10,279	10	0.10%	16,543	235	1.42%
BLT	27,934	196	0.70%	13,429	750	5.58%	6,723	385	5.73%	17,696	385	2.18%	30,804	18,679	60.88%
KAW	43,511	1,119	2.57%	40,547	312	0.77%	34,512	50	0.14%	nil	5	0.00%	53,577	679	1.26%

C (mt) : Catch in metric tons
S (n) : Size sampled in number
P (%) : Percentage of coverage