

SBT PORT SAMPLING – Indonesia

## The updated on daily SBT catch monitoring program in Bena port, Bali, Indonesia 2020

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## **Summary**

This paper provides updated information about the SBT monitoring program in Benoa port, Bali Indonesia 2020, presented in the CCSBT-ESC 2021 (CCSBT-ESC/1909/Info 03). The sampling coverage has fluctuated monthly; however, a decreasing trend was observed annually from 44.63% in 2019 to 36.74% in 2020. The number of observed SBT were also declined in 2020, with only 1,187 individuals compared to 2019 (1,662 individuals). The length measurement of SBT ranged between 91 and 203 cm FL indicated a smaller size were caught compared to last year (ranged from 108 to 200 cm FL).

## **Indonesian tuna monitoring program**

SBT monitoring program commenced in 1993 through the series of collaboration between Indonesia's marine fisheries research institutes<sup>1</sup> within the Ministry of Marine Affairs and Fisheries (MMAF) and Commonwealth Scientific and Industrial Research Organisation (CSIRO) (Farley et al. 2017). The development of this program occurred in mid-2002, a monitoring program in three major Ports of Indonesia Benoa (Bali), Muara Baru (Jakarta), and Cilacap (south cost Central Java) was established (Farley *et al.* 2014). The monitoring program aims to monitor the catch of all landing species and record the number of tuna longline vessel landings. Since 2011, the monitoring activities have been submitted to the Research Institute for Tuna Fisheries (RITF) as an institution specializing in research on tuna resources in the Indian Ocean.

## **Sampling methods**

### *Sampling*

The SBT data collection conducted in 2020 (January-December) by enumerators from RITF at tuna fish processing company in Benoa port. In this period, ten companies routinely organize tuna fish processing. The enumeration unit applied is the number of tuna longline vessels that perform SBT catch landings in Benoa port. The data collected, including the number of catches, fish weight, fish length, fish destination (export/reject/ bycatch), vessel name, and company name. However, given the emergency status was stated in Bali during May 2020 due to the Covid-19 pandemic, it has impacted the sampling activities in Benoa port.

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<sup>1</sup> Indonesian collaborating institutions, in chronological order: Central Research Institute for Fisheries Indonesia (CRIFI), Research Institute for Marine Fisheries (RIMF), Research Centre for Capture Fisheries (RCCF), Research Centre for Fisheries Management and Conservation (RCFMC), and currently Centre for Fisheries Research (CFR) in Jakarta, and Research Institute for Tuna Fisheries (RITF) in Bali.

The most important thing to verify is that every individual fish that represents all the fish caught from the tuna longline vessels must be recorded. If the weight per individual of tuna cannot be recorded, it is not allowed to make an estimate of the data itself. Registration of individual weights for all tuna longline vessel catches, will ensure that there is no bias in terms of sorting data by weight or by species (Jatmiko *et al.* 2017). Length measurements are conducted using calipers that have a precision of up to 0.5 cm. Length sizes are shown in order of priority according to international measurement standards. If not possible to measure the length of all fish catches, then measuring the length of the rejected fish can already be recorded as a random sampled (Jatmiko *et al.* 2017).

### *Statistical analysis*

Given that all SBT are weighted in gilled and gutted (GGT) condition, a conversion from processed to round weight was implemented by multiplying the GGT weight to 1.15 as the raising factor (IOTC, 2006). Then, the estimation of total production can be calculated using formula modification from IOTC (2002):

$$CM = LM * AVM$$

Where:

CM : Estimation of total production per month (ton)

LM : Number of landed vessels per month which landed SBT (unit)

AVM : Production from sampled vessels per month which landed SBT (ton)/number of total vessels per month per processing plant which landed SBT (unit)

The relationship between fish length and weight was obtained using a multiplicative regression model ( $y = ax^b$ ) (King 2013).

### **Registered vessels**

The tuna-catch monitoring program based in Bena port was conducted in daily basis. The total number of longline vessels landed in Bena port, sampled by RITF enumerator were 151 units in 2020 or lower than the vessel number in 2019 (183 units). These vessels landed in 10 processing plants in Bena port. A decreasing coverage of sampled vessels was observed in the current year, approximated 36.74% compare to the coverage in 2019 (43.41%). On average, the number of longline vessels sampled was about 13 ships per month (Appendix 1). The percentage resulted from calculating how many total vessels landed, either one or more divided by the number of vessels that sampled.

### **SBT catch categories**

The SBT catch of tuna longline vessels landed at Benoa port is divided into 2 categories of quality i.e., export and non-export. The monitoring program in 2020 reported that the SBT classified into the non-export category accounted for 99%, while the export SBT is 1% (Appendix 2).

### **Bycatch composition**

A total 23 species of bycatch recorded in the longline vessels monitoring program at Benoa port in 2020. The catch composition is dominated by blue shark (*Prionace glauca*) with 36.75%, followed by swordfish (*Xiphias gladius*) 22.47%, moonfish (*Lampris guttatus*) 14.43%, and escolar (*Lepidocybium* sp) 13.51%. Other bycatch species which has 1-2% composition from total weight including mako shark (*Isurus* spp), blue marlin (*Makaira mazara*), thresher shark (*Alopias* spp), oilfish (*Ruvettus pretiosus*), and wahoo (*Acanthocybium solandri*). While, 14 species were observed as a bycatch which has a portion less than 1% (Appendix 3). The bycatch composition of tuna longline vessels based on the individual number was also provided in Appendix 4.

### **SBT length frequency and length-weight relationship**

The length frequency of southern blue fin tuna (SBT) landed in Benoa port, Bali in 2020 is presented in Appendix 5. A total 1,187 SBT were measured in fork length (FL), ranged from 91 to 203 cm with the domination length is between 161 and 165 cm. The length and weight relationship of SBT was described as a power equation  $W = 1 \times 10^{-5} L^{3.1171}$  ( $R^2 = 0.8327$ ) and showed an isometric growth pattern (Appendix 6).

### **References**

- Farley, J., Nugraha, B., Proctor, C., and Preece, A. (2014) Update on the length and age distribution of SBT in the Indonesian longline catch. *CCSBT-ESC/1509/14*.
- Farley, J., Sulistyarningsih, R.K., Proctor, C., Grewe, P., and Davies, C.R. (2017) Update on the length and age distribution of SBT in the Indonesian longline catch and close-kin tissue sampling and processing. *CCSBT-ESC/1708/09*.
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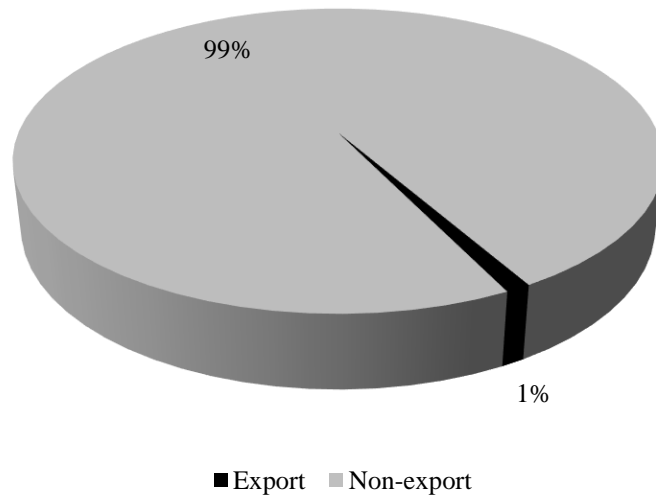
## Appendices

### Appendix 1. Number of sampled and landed vessels and its proportion at Benoa Port in 2020

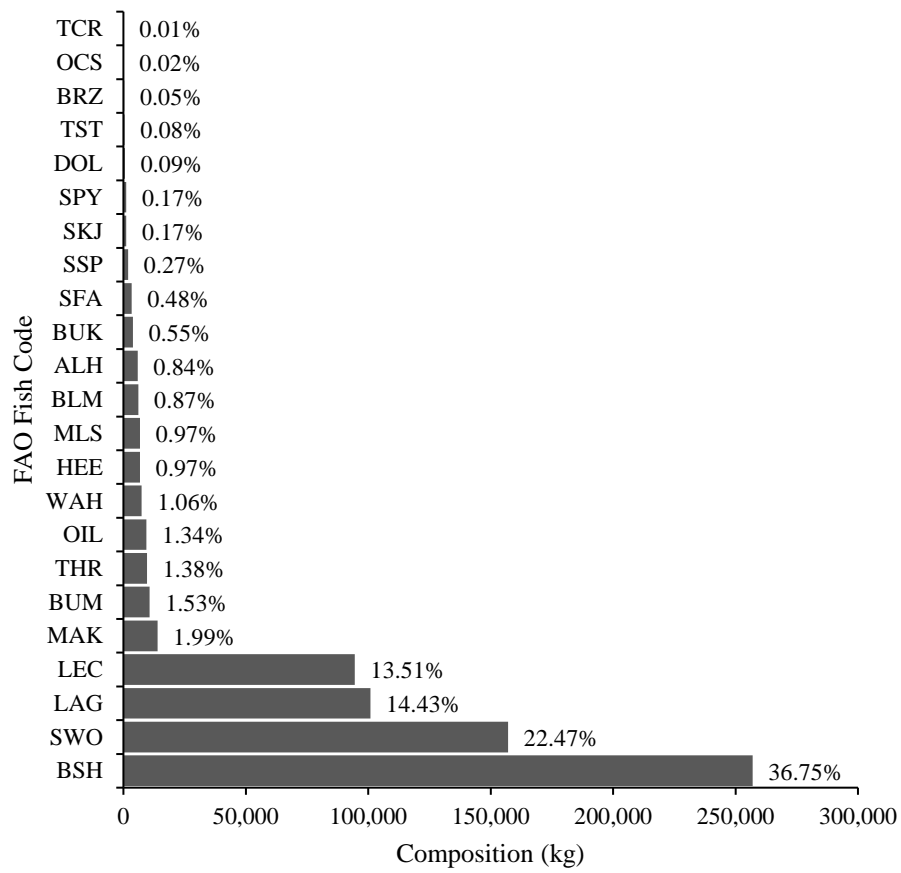
<b>Month</b>	<b>Landed</b>	<b>Sampled</b>	<b>%</b>
January	36	21	58.33
February	35	16	45.71
March	28	12	42.86
April	35	4	11.43
May <sup>1</sup>	40	0	0.00
June	37	13	35.14
July	25	18	72.00
August	36	6	16.67
September	36	17	47.22
October	31	9	29.03
November	31	15	48.39
December	41	20	48.78

<sup>1</sup>No sampling activities due to work from home policy has been implemented in Bali.

**Appendix 2.** Catch condition of SBT production landed in Benoa port, Bali in 2020



**Appendix 3.** Bycatch composition (%) based on fish weight percentage landed in Benoa port, Bali in 2020

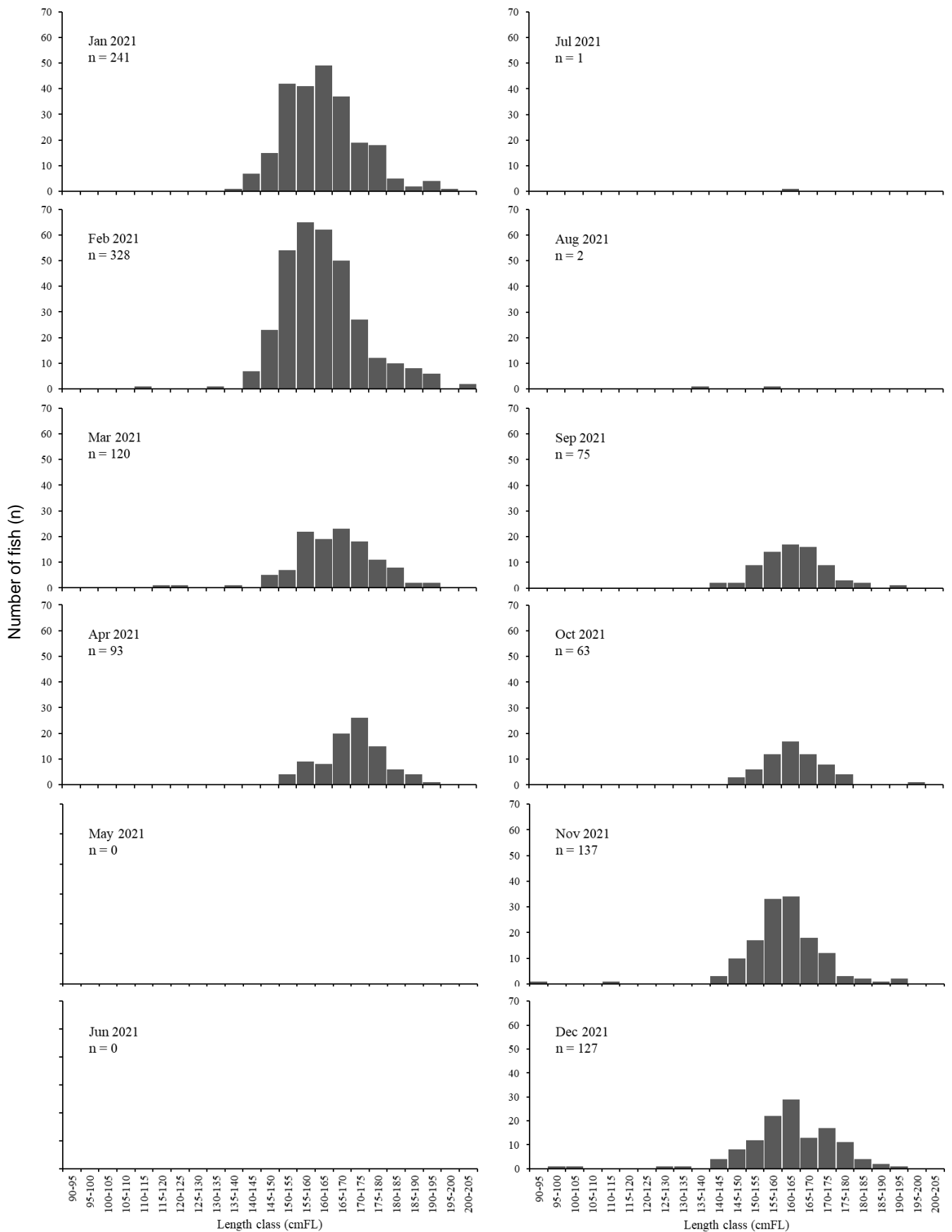




**Appendix 4. Bycatch number (in individual) of tuna longline vessels sampled at Benoa port, Bali in 2020**

Code	Local name	International name	Scientific name	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Des	Total
ALH	Gindara	Slickhead	<i>Alepocephalidae</i> sp		4				86	107	51	141	39	8	56	492
BLM	Setuhuk hitam	Black Marlin	<i>Makaira indica</i>		1	3			2	26	1	21	10	16	16	96
BRZ	Bawal lainnya	Pomfret, ocean breams nei	Bramidae		15				1			12				28
BSH	Hiu Selendang Biru	Blue shark	<i>Prionace glauca</i>	1,125	1,258	1,000			673	521	429	2,207	3,424	153	1,752	12,542
BUK	Ikan jangki	Butterfly kingfish	<i>Gasterochisma melampus</i>						44	25	21	24	14	1	2	131
BUM	Setuhuk biru	Blue marlin	<i>Makaira mazara</i>		7	5	4		2	42	5	16	19	19	20	139
DOL	Lemadang	Common dolphin fish	<i>Coryphaena hippurus</i>		33	14			14	29	11	2	3	2	5	113
HEE	Hiu monas	Snaggletooth shark	<i>Hemipristis elongata</i>	11	159				53	46	27	183	141	4	248	872
LAG	Ikan semar	Opah	<i>Lampris guttatus</i>	1	143	15			283	631	341	1,325	489	6	593	3,827
LEC	Gindara	Escolar	<i>Lepidocybium</i> sp	22	83	18			293	575	137	1,140	658	390	496	3,812
MAK	Hiu moro	Mako shark	<i>Isurus</i> spp	22	29	26			17	32	12	65	47	17	64	331
MLS	Setuhuk loreng	Striped marlin	<i>Tetrapturus audax</i>			1				43		38	45	26	25	178
OCS	Hiu koboy	Oceanic whitetip shark	<i>Carcharhinus longimanus</i>		1										1	2
OIL	Gindara kulit duri	Oilfish	<i>Ruvettus pretiosus</i>	12	33	3			88	83	28	154	83	37	131	652
SFA	Layaran	Saifish	<i>Istiophorus platypterus</i>	5	74	3			27	44	17	11	3	5	20	209
SKJ	Cakalang	Skipjack tuna	<i>Katsuwonus pelamis</i>		1					52	6	12		1	9	81
SPY	Hiu martil	Hammerhead shark	<i>Sphryna</i> spp		1	1							2	10	4	18
SSP	Today	Shortbill Spearfish	<i>Tetrapturus angustirostris</i>		13	15				35	5	28	13	2	10	121
SWO	Ikan pedang	Swordfish	<i>Xiphias gladius</i>	129	172	92	6		176	387	191	750	623	431	471	3,428
TCR	Bawal Lonjong	Knifetail pomfret	<i>Taractes rubescens</i>							1	2	3	6			12
THR	Hiu tikus	Thresher shark	<i>Alopias</i> spp	19	7	5				1	2	12	8	20	23	97
TST	Bawal Sabit / bulat	Sickle pomfret	<i>Taractichthys steindachneri</i>	11	6				11	3	3	4	8		10	56
WAH	Tenggiri	Wahoo	<i>Acanthocybium solandri</i>		2				2	117	12	106	64	39	46	388

**Appendix 5. Length frequency of southern blue fin tuna (SBT) landed in Benoa port, Bali in 2020**



**Appendix 6.** Length-weight relationship of southern blue fin tuna (SBT) landed in Benoa port, Bali in 2020

