Species composition and size distribution of billfish caught by Indonesian tuna long-line vessels operating in the Indian Ocean

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BACK GROUND

- Billfish is generally considered as by-product in Indonesian tuna long line fleets.
- Issues : the catch of billfish is often poorly recorded, being lumped together in to single category, misidentified or the fish is discarded..
- To improves data and information of tuna fisheries and tuna like (including billfish), since middle of 2002 Indonesia introduced of the new Catch Monitoring Program tuna fisheries in Jakarta, Benoa and Cilacap. Then since 2005 observer program is implemented..
- This paper informs the species composition and size distribution of billfish result of the port sampling and onboard onboard observer program activities base in Benoa. 2010.

MATERIAL AND METHODS

(1) The data and information presented in this paper was obtained mainly from:

- Fisheries statistic reports published by DGCF year of 2010 particularly information on annual billfish catch.

- Port sampling and observer program activity in Benoa-Bali year of 2010.
  Port sampling on billfish fishery is as apart of tuna landing sampling program. Samplers record every day the names of the longliners unloading catches and the processing plants through which the catches unloaded go. The data record covered species and size (PFL) of billfirh. In the year 2010

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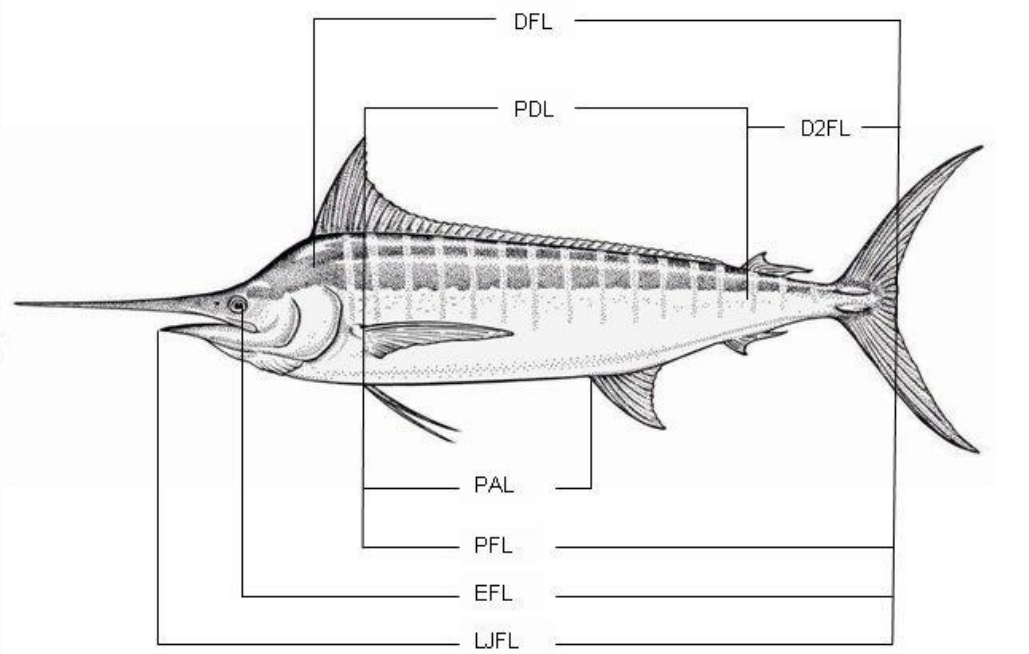
- Onboard observer program activity is conducted 6 trips in 2010. The data record covered include fishing tactic, position of fishing ground, hook number, number of catch, catch species and size (LJJF) of fish..

(2) The data and information is compiled and then presented in the table and graphs.



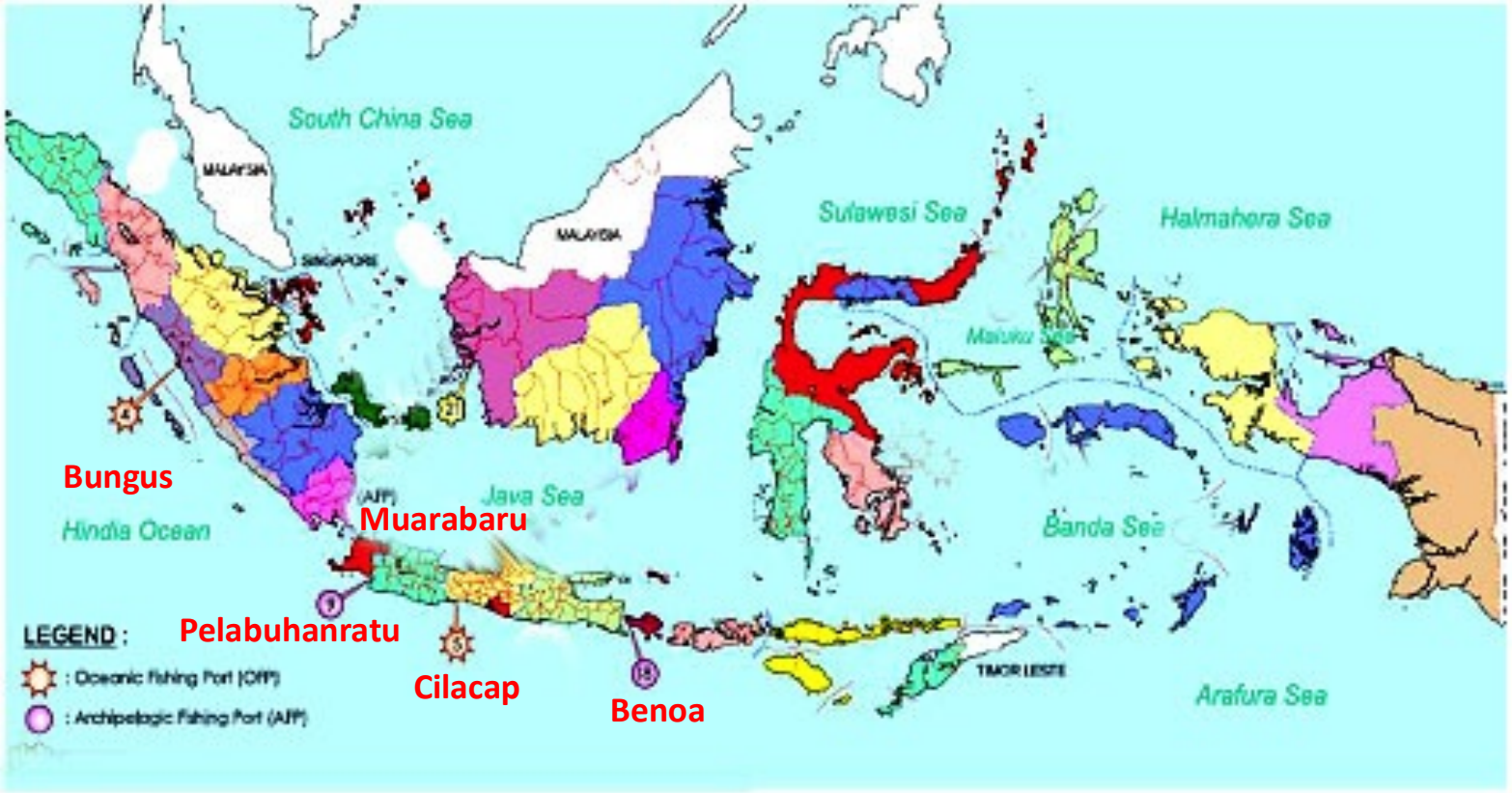
PFL : Pectoral Fork Length
LJFL : Lower Jaw Fork Length

RESULTS

Tuna Long Line Fleet :

Indonesia's tuna longline fleets operating in the Indian Ocean have grown dramatically in the past 20 years. The number of long line tuna fleets registered by DGCF 871 vessels in 2010. Fishing bases spread in Benoa, Cilacap, Jakarta and Bungus fishing port as well as in some smaller fishing port include Pelabuhanratu (Figure 1).

Figure 1 :



Production of Billfish

Base on Capture Fisheries Statistics of Indonesia 2009 that the trend of national production of billfish was increased year by year. Before 2008, Capture Fisheries Statistics of Indonesia records production of billfish as single category as well as it was not break down by fishing area (Table1). Break down by species is done since 2008 and black marlin was dominant species of billfish. On the Table 1 also presents production of billfish caught in Indian Ocean. In this case the production of Indian Ocean was part of billfish production of all Indonesia waters. The share of billfish production of Indian Ocean was about 64% in 2008 and 56% in 2009 to the national billfish production of all Indonesian waters

Tabel 1 :

Species	Production of all Indonesian waters (MT)						Production of Indian Ocean (MT)*)	
	2004	2005	2006	2007	2008	2009	2008	2009
Sailfish	nd	nd	nd	nd	3956	6696	1202	1754
Black marlin	nd	nd	nd	nd	8118	9212	6887	7500
Blue Marlin	nd	nd	nd	nd	447	248	419	175
Striped Marlin	nd	nd	nd	nd	709	1188	428	280
Swordfish	nd	nd	nd	nd	2902	4480	1363	2504
Total Billfish	6273	6774	6596	9783	16132	21824	10299	12213

Production of Billfish ...(cont.)

Based on the data of Indonesian Tuna Longline Association (Indonesia: Asosiasi Tuna Longline Indonesia-ATLI) the production of billfishes landed in Port of Benoa-Bali during 2005 – 2010, were likely to increase which swordfish was the common commodity up to more than 3,000 ton in 2008 followed by group of marlins and sailfish were about 1,500 ton in 2010 (Table 2) .

The share of billfish production of Benoa port was about 56% in 2008 and 52% in 2009 to the billfish production of Indian Ocean

Table 2 :

Species	Production of Billfish (MT)					
	2005	2006	2007	2008	2009	2010
Swordfish	813.6	1613.6	2315.9	3016.6	2978.3	1253.6
Sailfish	753.6	1661.9	1162.6	1162.6	1593.9	394.7
Marlin	513.4	613.6	752.7	1594.6	1735.8	1395.5
Total Billfish	2080.6	3889.1	4231.3	5773.9	6308.1	3043.8

Source :ATLI (2011)

Production of Billfish...(cont.)

Result of observer program activity year 2005-2010 show that the total hook rate of billfish fluctuates every year. Total hook rate of billfish ranged between 0,032 and 0.123. The highest of total hook rate occurred in 2009 and detail of each species hook rate presented on Table 3.

Table 3 :

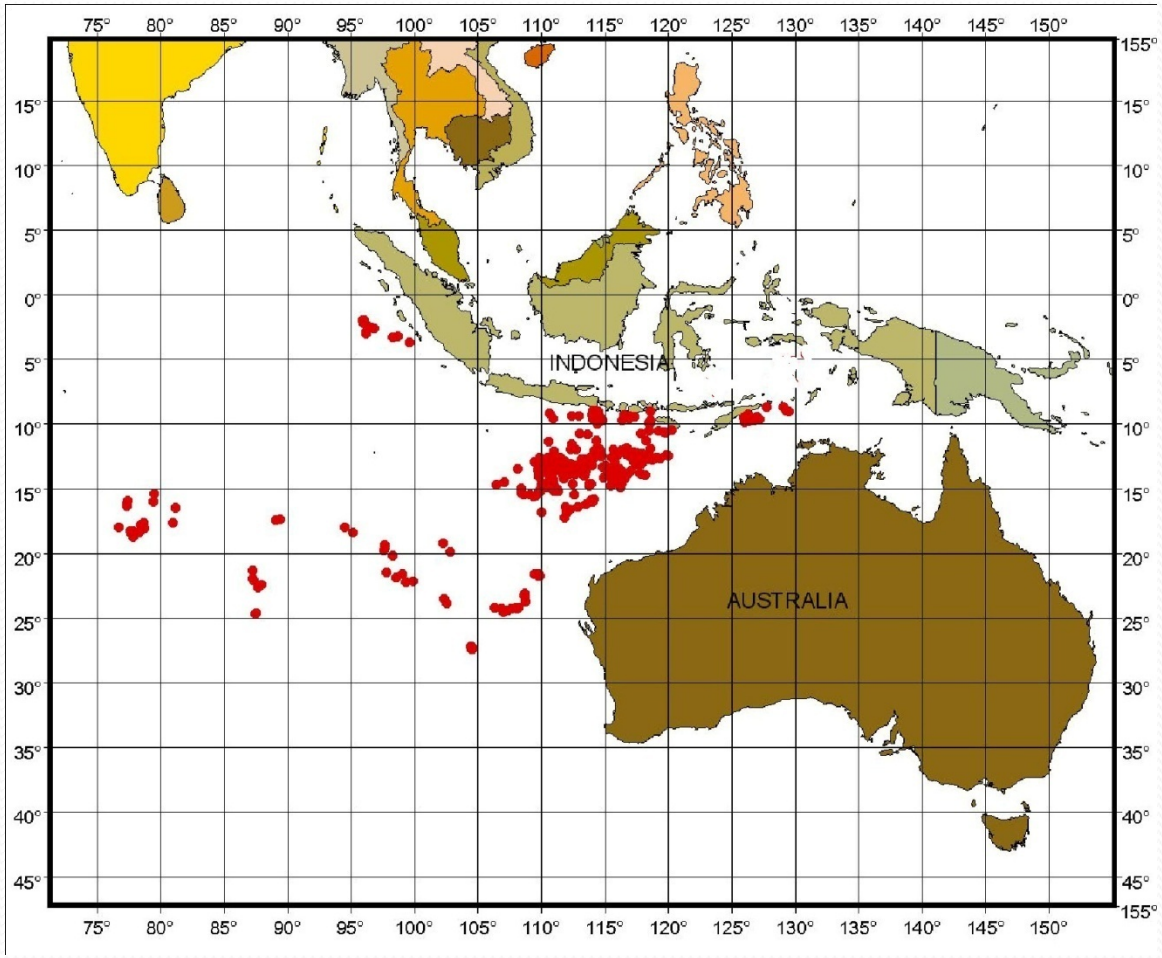
Year	Hook Rate (fish/100 hook)						
	SWO	BLZ	BLM	SFA	SSP	MLS	TOTAL
2005	0.019	0.001	0.006	0	0	0.007	0.032
2006	0.039	0.008	0.014	0.003	0.011	0.006	0.081
2007	0.038	0.003	0.006	0.001	0.012	0.008	0.068
2008	0.022	0.005	0.006	0.003	0.016	0.002	0.054
2009	0.074	0.008	0.024	0.013	0.002	0.003	0.123
2010	0.018	0.007	0.004	0.004	0.007	0	0.041
Total	0.209	0.032	0.059	0.023	0.049	0.026	0.399
Average	0.035	0.005	0.01	0.004	0.008	0.004	0.066

SWO = Swordfish, BLZ = Blue marlin, BLM = Black marlin, SFA = Sailfish, SSP = Shortbill Spearfish, MLS = Striped marlin

Fishing area :

Result of observer program activity year 2010, the fishing ground of Indonesian tuna long line is as presented on Figure 2. As being explained previous that billfish was by-product of tuna long line fishery, It is also explain that fishing ground of billfish was same with tuna fishing ground.

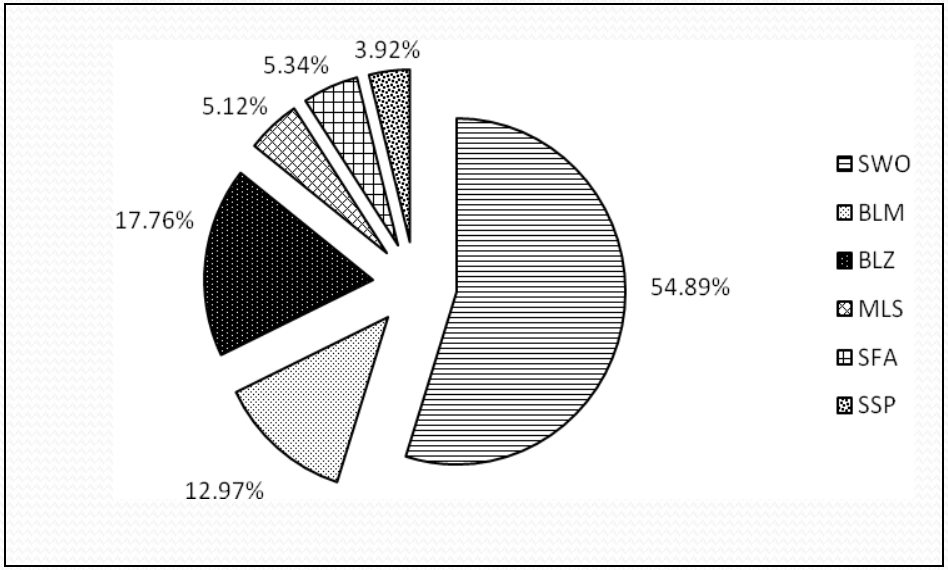
Figure 2 :



Catch Composition

Five species of billfishes have been identified from the tuna long line unloading in Benoa Fishing Port. The five of billfish species includes 3 species of marlins; black marlin (BLM) (*Makaira indica*), blue marlin (BLZ) (*Makaira mazara),* striped marlin (MLZ) *(Tetrapturus audax*), two species non-marlin species are the sailfish *(Istiophorus platypterus)* and the swordfish *(Xiphias gladius).* The average species composition of billfish caught by tuna long line based in Benoa Fishing Port during the year of 2010 through port sampling program is shown in Figure 3. Swordfish (*Xiphias gladius*) dominated the catch making about 54.89% of the total catch of billfish followed by blue marlin (*Makaira mazara*) 17.76% and black marlin (*Makaira indica*) 12.97%. The other billfish species that also caught consist of striped marlin (*Tetrapturus* audax), sailfish (*Istiophorus platypterus*) and shortbill spearfish (*Tetrapturus angustirostris*). See Figure 3.

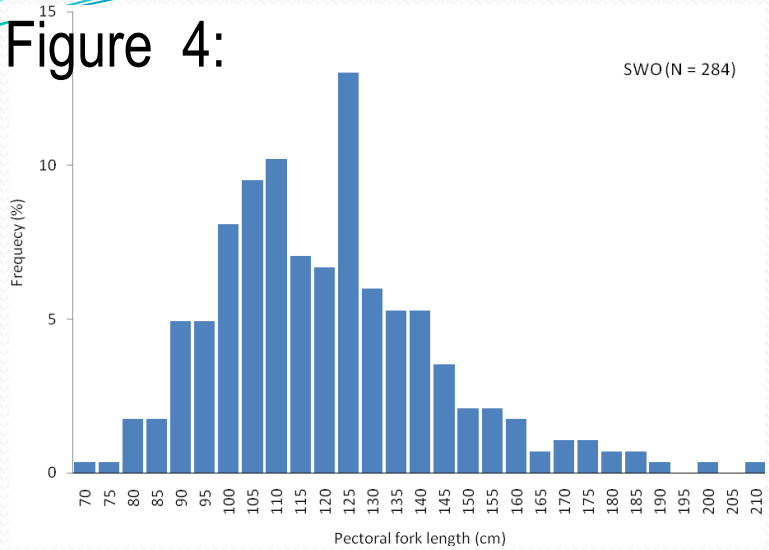
Figure 3:

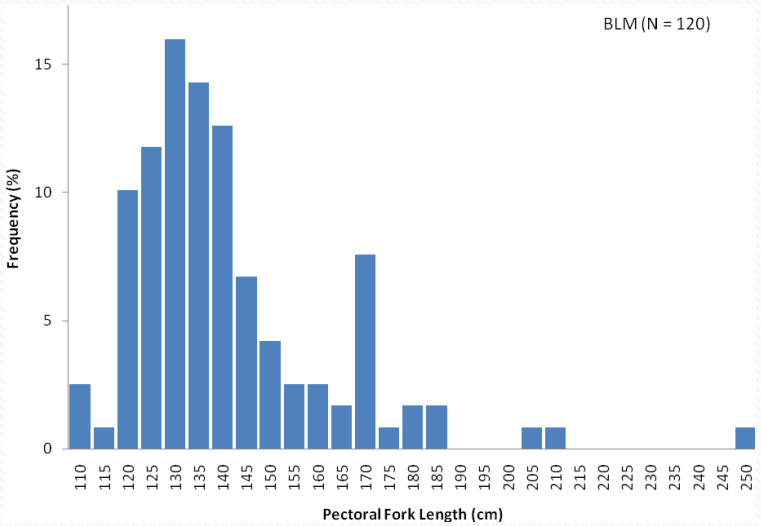


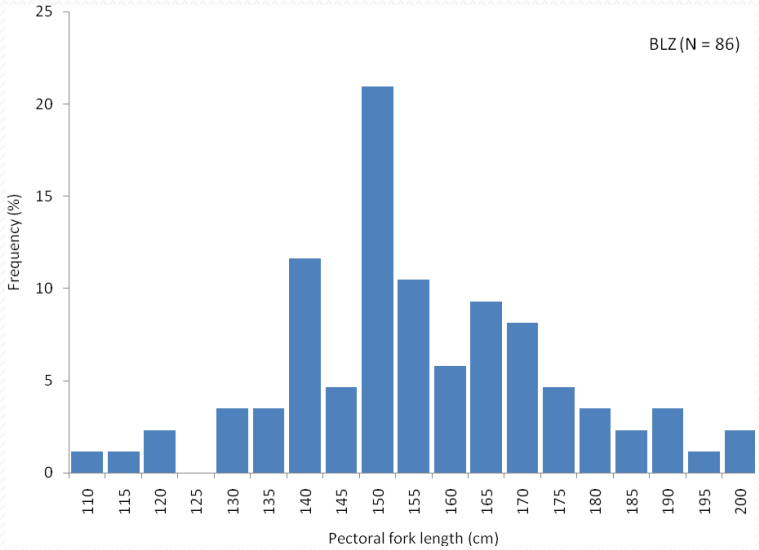
Catch Size Distribution

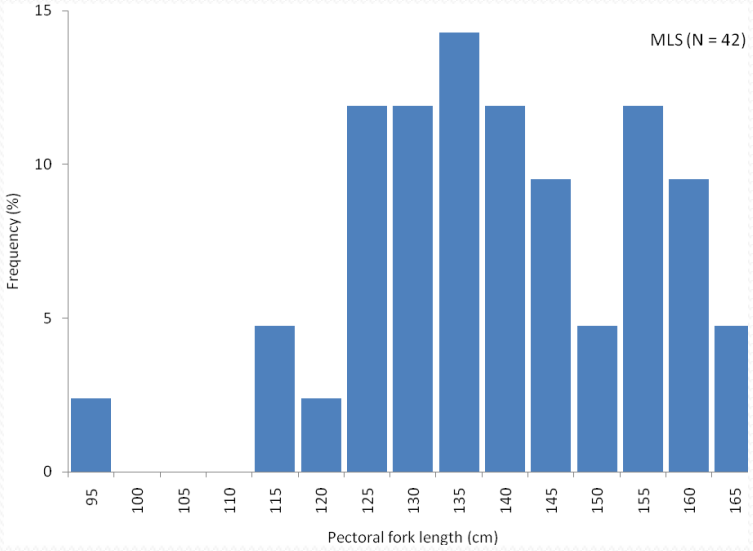
Length frequency data sampled from Benoa fishing port year 2010 of each billfish species is presented in Figure 4. The length of billfishes range 68–206 cm, swordfish 67–197 cm, black marlin and blue marlin 108–206 cm, striped marlin 95 – 158 cm, sailfish 114–175 cm and shortbill spearfish 124–127cm. Compared to the result of port sampling activity Benoa Fishing Port year of 2007 (Mahiswara et al., 2009) show that the size of billfish year of 2010 generally was decreased. Length data sampled of each species of billfish from Benoa fishing port year of 2007 as follow minimum length of black marlin, blue marlin and swordfish sampled in Benoa are 111 cm, 96 cm and 70 cm and maximum length are 235 cm,230 cm and 245 cm respectively (Figure 4).

Figure 4:


SWO (N = 284)
Frequecy (%)
Pectoral fork length (cm)


BLM (N = 120)
Frequency (%)
Pectoral Fork Length (cm)


BLZ (N = 86)
Frequency (%)
Pectoral fork length (cm)


MLS (N = 42)
Frequency (%)
Pectoral fork length (cm)

CONCLUTION

Catch composition of billfish caught by tuna long line fleets were swordfish 54.89%, blue marlin 17.76% and black marlin 12.97% respectively, followed by small amount of striped marlin, sailfish, and shortbill spearfish. The length size distribution of swordfish 68–197 cm, black marlin and blue marlin 108–206 cm, striped marlin 95 – 158 cm, sailfish 114–175 cm and shortbill spearfish 124–127cm. Compared to the result of port sampling activity in Benoa Fishing Port year 2007 show that the size of billfish year of 2010 was decreased.

Thank You

TERIMA KASIH