

Report on Bycatch of Tuna Longline Fishing Operation Eastern Indian Ocean by SEAFDEC Research Vessels Year 2005-2011

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1) Abstract

Catch data, by three SEAFDEC research vessels namely, M.V. SEAFDEC and M.V. SEAFDEC2, recorded through fishing logbook from year 2005 to 2011, is summarized and calculated the hook rate in Catch Per Unit Effort (CPUE). Total numbers of fishing operation are 73 tuna longline operations. Total numbers of hook deployed are 38,333 hooks. Numbers of deployed hooks are ranged from 90 to 620 hooks in an operation and average in an operation is 490 hooks.

Numbers of individual bycatch were 494 individual fishes with 6940.26 kg. Distribution of CPUEs in kilogram per haul and hook rate (%) from the longline operations is 1.29 individual fish/100 hooks, 18.1 kg/100 hooks. Three dominant catch is listed; 1) Lancetfish (*Alepisaurus ferox*); 2) Big-eye Thresher Shark (*Alopias superciliosus*); and 3) Sting Ray (*Dasyatis* spp.)

2) Introduction:

Bycatch species of tuna longline fisheries i.e. shark and rays, sea turtle, marine mammal and seabird, is group of importance species concerned by international organization what increase magnitude to force the fishers on conservation issues in recently year. Since 1968, Southeast Asian Fisheries Development Center, Training Department (SEAFDEC/TD) has established for enhance human capacity on modern marine capture in Southeast Asia. Tuna longline is one of the major fishing gears appointed to train SEAFDEC trainees. Thus, tuna longline operations have been carried out every year around the fishing ground of South China Sea and Indian Ocean. For South China Sea, tuna longline fishing operations were conducted in west coast of the Philippines and Sabah-Sarawak waters. In Indian Ocean, tuna longline fishing operations were conducted around eastern part of Indian Ocean particular in Andaman Sea.

Regarding to the direction of organization what adapted after year 2000, SEAFDEC has been more focus on responsible fishing promotion and fisheries management. SEAFDEC/TD has been strengthened on the responsible marine capture, Fisheries resource research survey. By changing the role, tuna longline fishing gear has been renamed as pelagic longline and operated as sampling gear for large pelagic and meso-pelagic species i.e. tuna, swordfish marlin and etc, however there are some non-target species caught by pelagic/tuna longline regularly.

In order to initiate appropriate research works on tuna longline bycatch reduction, information collection on bycatch of tuna longline operation caught by research vessels could be supported to fisheries scientist and mitigates the impact to the pelagic resources as well as reduce the risk of overfishing and harmful to marine endanger species.

2) Term of Definition

Bycatch: non-target species and incidental catch which were caught by tuna longline gears.

Eastern Indian Ocean: Area of fishing operations where covers 29.88 million km² including the Bay of Bengal in the north, the Andaman Sea and northern part of the Malacca Straits in the east, and the waters around the west and south of Australia. The main shelf areas include those of the Bay of Bengal and the Gulf of Martaban and the narrower shelf areas on the western and southern sides of Indonesia and Australia for a total of 2.37 million km² of shelf area

Tuna Longline: Tuna longline is categorized into drifting longline. These longline are kept near the surface or at a certain depth by mean of regular space floats. Drifting longline may be of considerable length, and the snoods are usually longer and more widely space than for bottom longline.

SEAFDEC Research Vessels: The training and research vessels, namely MV SEAFDEC and MV SEAFDEC2 are used for this study

3) Materials and Methods:

3.1 Fishing Operation Information

The training and research vessels, namely MV SEAFDEC and MV SEAFDEC2 are used for this study. Fishing gear is employed both vessels is tuna longline. Both vessels have installed an automatic longline system. The system is composed with mainline spool, automatic line shooting machine and branch line setting beeper. Main line spool is made by aluminum alloy diameter 100 cm and 130 cm length. The spool is able to contain monofilament mainline, diameter 4 mm, more than 30 kilometers. The mainline shooter is made by aluminum alloy. Function of mainline shooter is, to release the mainline from spool with accurate shooting rate in order to control the depth of branch line in the sea. While the controller wants to emergency stop the mainline shooter, mainline spool must be instantly stopped as well. Setting speed of mainline shooter needs to compatible control with the speed of vessel. M.V. SEAFDEC2 is shooting with speed around 6-8 knots and setting mainline shooter at speed around 7-8 knots. In order to control speed of mainline shooter SEAFDEC/TD technician develop the computer software to command the shooting of branch line and float, as well as counting length of mainline and number of branch line.

Complete set of tuna longline is composed by mainline, branch line and buoy line. Mainline is made from Nylon monofilament diameter 4 mm. Branch line is made by Nylon monofilament diameter 2.0 mm length 11 m. Twenty (20) hooks are set between float intervals. Temperature and Depth sensors (TD sensors) 2 sets, were attached at the branch line No.1 and 10 in order to check the actual depth of hook. TD sensors have shown that the shallowest branch line was 30 to 70 m and deepest branch line No.10 and 11 was 150 to 300 m., from the surface (SEAFDEC, 2007)

Fishing area of M.V. SEAFDEC is in the Indian Ocean from Latitude 18°N to 10°S and Longitude 88° to 96°E, radiating around the Ninety East Ridge. The fishing periods were from October to March of

following year. Fishing area of M.V. SEAFDEC2 is in Andaman Sea from Latitude 18°N to 10°S and Longitude 88° to 96°E. The fishing periods were from October to March of following year.



M.V. SEAFDEC (1998 – Present)



M.V. SEAFDEC2 (2004 – Present)

Figure 1 shows SEAFDEC research vessels; MV. SEAFDEC and M.V. SEAFDEC2

3.2 Data Collection and Analysis

Review secondary data on tuna longline fishing operation by SEAFDEC research vessels, i.e. M.V. SEAFDEC and M.V. SEAFDEC2, from 2005 to April 2011, all species caught in each operation were recorded and measured for both length and weight. CPUEs are in term of number of fish and total weight of catch. Catching efficiency of tuna longline was also presented in term of Hook Rate Ratio (%). Catching depth was measured by Depth sensor.

4) Results and Discussion

4.1 Longline Fishing Operation

Within a period from February 2005 to January 2011, M.V. SEAFDEC and M.V. SEAFDEC2 operated tuna longline in the Eastern Indian Ocean 73 operations. Forty (40) operations, 20,753 hooks of these were in the Andaman Sea within the EEZ of Thailand and Myanmar under the national collaborative of large pelagic survey by tuna longline. Others 33 operations, 17,580 hooks were in Bay of Bengal and Eastern Indian Ocean (Southern hemisphere). Total numbers of hooks deployed were 38,333 hooks. Numbers of hook deployed is ranged from 90 to 682 hooks in an operation and average in an operation is 525 hooks. In additional, standardization of hook settings by SEAFDEC research vessels, since year 2004, has been five hundred (500) hooks in minimum for a fishing operation.

4.2 CPUE and Hook Rate (1000 hooks of Longline)

Bycatch species is shown in Figure 3. Numbers of individual bycatch were 494 individual fishes with 6940.26 kg. Distribution of CPUEs in kilogram per haul and hook rate (%) from the longline operations is 1.29 individual fish/100 hooks, 18.1 kg/100 hooks. Hook rate of bycatch species from longline is 1.38 individual fish/100 hooks, 11.0 kg/100 hooks in the Eastern Indian Ocean and is 0.4 individual fish/100 hooks, 20.8 kg/100 hooks in the Andaman Sea.



Figure 2 shows area of operation in Andaman Sea, Bay of Bengal and Eastern Indian Ocean

4.3 Species composition

Table 1 Figure 3 and Figure 4 shows bycatch results from tuna longline found in areas, Eastern Indian Ocean, Bay of Bengal and Andaman Sea. In this report, Bycatch found by longline mainly were sharks namely Bigeye thresher shark, Blue Shark, White-tipped shark, Spottail shark, Crocodile shark, Silky Shark and Sting Ray. In addition, others bycatch were Lancet fish, Escolar, Snake mackerel, Great barracuda, Oilfish, Common Dolphinfish, Sickle pomfret and Wahoo. From SEAFDEC survey year 2005-2011, none of sea turtles were found as bycatch.

Species composition of bycatch results from tuna longline by SEAFDEC research vessels from 2005 to 2011 is dominant by Lancetfish (*Alepisaurus ferox*); 106 samples, Bigeye thresher shark (*Alopias superciliosus*); 80 samples, unidentified string ray (further classification is appeared Pelagic String Ray, *Dasyatis violacea*); 74 samples and Snake mackerel (*Gempylus serpen*); 54 samples. Focus on group of catch, Sharks and Rays is shown highest number, 227 individual samples. Result of Shark and Ray shows highest in individual number and weight, there are seven (17) shark and ray species are able to identified. Bigeye thresher shark (*Alopias superciliosus*) is the most dominant species caught by longline and second dominant species is unidentified string ray (further classification is appeared Pelagic String Ray, *Dasyatis violacea*). Other important species is Pelagic thresher shark (*Alopias pelagicus*), Silky shark (*Carcharhinus falciformis*) and Sharpnose seven-gill shark (*Heptanchias perlo*)

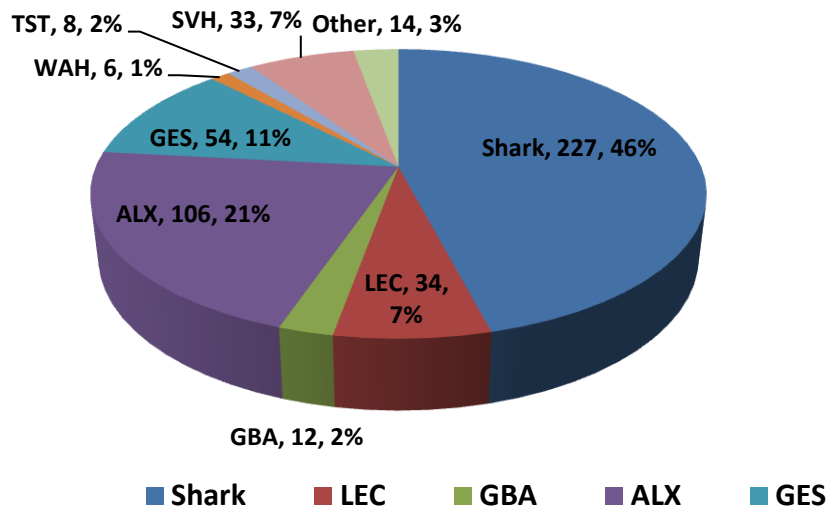


Figure 3 shows bycatch results from tuna longline

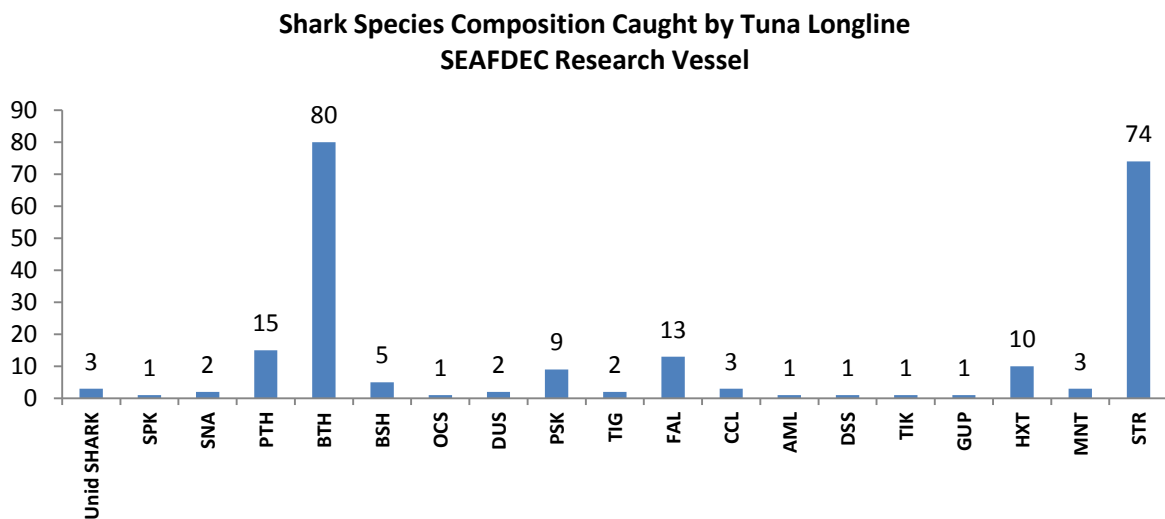


Figure 4 shows group of shark and rays results from tuna longline

5) Recommendation

In order to promote the responsible fishing through fishing technology selectivity, SEAFDEC/TD has attempted to reduce numbers of unwanted catch/bycatch, caught by tuna longline fishing operation. Fishing gear design and fishing practices has been applied in tuna longline operating, however it is not able to definitely mitigate the catch of these species in pelagic longline fishing operation by SEAFDEC training vessels. Furthermore hook rate of unwanted catches seem higher than the past. It may be caused by development of fishing gear material, i.e. monofilament for branch line and deck machineries, i.e. main line storage system, etc. It is, however, recognized that fishing capacity of research vessel is less than commercial tuna longliners, it is unable to precisely estimate that catch on bycatch by commercial tuna longliners but presumes much higher than

research vessel. Refer to *Praulei Nuotmorn et.,al*, in <http://www.fisheries.go.th/mf-afdec/site/> (access on 1 October 2011) reports number of total landing catch during year 1994 to 2003, at Port of Phuket has been appeared since 1-2% of miscellaneous species i.e. Shark, *Lepidocybium* spp., *Coryphaena* spp., *Molar* spp., *Ruretllus pretiosus*, *Sphyrna* spp. and *Taractichtis* spp. Landing weight of these miscellaneous species is calculated as 6 to 50 mts/year during 1994 to 2004. In addition, it is doubtfully that fishers always discard some unutilized bycatch e.g. Lancet fish, Snake-like mackerel and etc. Thus, record of bycatch landing by commercial vessel may not be adequate to pelagic resource management. By this rational, information collection on bycatch caught by research vessel could be supported to fisheries manager on the status of bycatch in tuna longline fisheries. It is in order to enhance sustainable fisheries on pelagic resources in tuna longline fisheries and reduce risky on some endangered species, e.g. Shark, Sea turtle and etc finally.

Species			Individual	Weight(kg)
Unidentified Shark		UnidSHK	3	17.70
Great hammerhead	<i>(Sphyrna mokarran)</i>	SPK	1	80.00
Shortfin mako	<i>(Isurus oxyrinchus)</i>	SNA	2	195.00
Pelagic thresher	<i>(Alopias pelagicus)</i>	PTH	15	383.00
Bigeye thresher	<i>(Alopias superciliosus)</i>	BTH	80	4311.20
Blue Shark	<i>(Prionace glauca)</i>	BSH	5	110.50
Oceanic whitetip shark	<i>(Carcharhinus longimanus)</i>	OCS	1	27.00
Dusky shark	<i>(Carcharhinus obscurus)</i>	DUS	2	105.00
Crocodile shark	<i>(Pseudocarcharias kamoharai)</i>	PSK	9	47.10
Tiger Shark	<i>(Galeocerdo cuvier)</i>	TIG	2	62.00
Silky shark	<i>(Carcharhinus falciformis)</i>	FAL	13	145.50
Blacktip shark	<i>(Carcharhinus limbatus)</i>	CCL	3	43.90
Grey reef shark	<i>(Carcharhinus amblyrhynchos)</i>	AML	1	39.00
Deepsea shark/ Lantern Shark	<i>(Etmopterus sp.)</i>	DSS	1	2.20
Longnose hound shark	<i>Iago spp.</i>	TIK	1	2.10
Gulper shark	<i>(Centroprorus granulatus)</i>	GUP	1	5.80
Sharpnose sevengill shark	<i>(Hepttranchias perlo)</i>	HXT	10	37.70
Devil Ray	<i>(Mobula spp.)</i>	MNT	3	160.00
Sting ray	<i>(Dasyatis spp.)</i>	STR	74	334
Escolar	<i>(Lepidocybium flavobrunneum)</i>	LEC	34	213.35
Great barracuda	<i>(Sphyrna barracuda)</i>	GBA	12	64.60
Lancet fish	<i>(Alepisaurus ferox)</i>	ALX	106	187.67
Snake mackerel	<i>(Gempylus serpen)</i>	GES	54	65.64
Wahoo	<i>(Acanthcybium solandri)</i>	WAH	6	43.10
Sickle pomfret	<i>(Taractichthys steindachneri)</i>	TST	8	48.50
Savalani hairtail	<i>(Lepturacanthus savala)</i>	SVH	33	49.20
Deep Sea Fish	<i>(Coryphaehoides pectoralis)</i>	DSF	5	22.00
Common dolphinfish	<i>(Coryphaena hippurus)</i>	DOL	4	6.10
Giant travally	<i>Caranx ignobilis</i>	GTV	2	15.60
Oilfish	<i>(Ruvettus pretiosus)</i>	OIL	2	16.30
Sunfish	<i>(Mola mola)</i>	MOX	1	100.00
Total			494	6940.26

Table 1 bycatch results from tuna longline by SEAFDEC research vessels from 2005 to 2011

6) Acknowledgement

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