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Shark bycatch in the pelagic longline fishery along Ninety East Ridge taken by research vessel

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Summary

Shark bycatch in the pelagic longline fishery along Ninety East Ridge in the Eastern Indian Ocean was investigated during 12 January – 12 February. 2011. Data were collected on M.V.SEAFDEC from 14 longline sets which deployed about 600 hooks per set during day time. Three types of hook (J-hook, C-hook No.14 & 18) were used in this experiment. A total of 204 individuals belonging to 17 different species were recorded. The largest proportion of catches was target species, primarily tunas (26.48%), marlin and swordfish (2.45%). Sharks (4.90% of catches) represented by Crododile shark *(Pseudocarchaias kamoharai*), Blue shark *(Prionace glauca)*, Silky shark *(Carcharhinus falciformis)* and Blacktip shark *(C. limbatus)*. All of sharks (10 individuals) were kept on board for further scientific investigations.

Circle hook No.14 exhibits the highest catch rate by 42.06 % of total catch in number, follow by circle hook No.18 (30.88%) and J-hook exhibits the lowest catch rate (26.96%). In this study, only one Blacktip shark *(C. limbatus)* was caught by J-hook.

Introduction

This study was the collaborative research survey between Department of Fisheries, Thailand and the South East Asian Fisheries Development Center (SEAFDEC/TD) during 12 January to 12 February 2011. Area of survey was in international sea of Eastern Indian Ocean (EIO). Research station was positioned from Latitude Three degree North (3°N), to Five degree South (5°S), and Eighty-eight degree and thirty minutes East (88°30′E) to Ninety-one degree and thirty minutes East (91°30′E). Area of exploration covered Ninety East Ridge with 76,800 square nautical mile. Twenty-one survey stations were programmed to conduct tuna longline fishing operations and oceanographic parameter collecting. Distance between each station was 80 to 90 nautical miles.

The fishery vessel, M.V.SEAFDEC, of the South East Asion Fisheries Development Center (SEAFDEC) was deployed in the purposed survey area throughout the survey period. The pelagic longline gear was used for the exploration of large pelagic species. The gear was composed of nylon monofilament mainline (4.0 mm diameter). The mainline was stored in a 2.0 meter-winch mainline reel which was driven by hydraulic power. The total length of the mainline stored in the reel was about 70,000 m. the branch line, which was made of 2.0 mm nylon monofilament, was attached to the mainline by stainless steel snap clip. Total

length of each branch line was 12 m. One tuna hook was attached to the branch line by aluminum sleeve at the end. One 40 g lead sinker was attached at 1.5 m above the hook. The distance between each branch line was maintained at 40 m. A PVC float (300 mm diameter) with single eye was attached to a 25 m long nylon rope (5 mm diameter) known as float line with was further attached to the mainline gear after every 20 hooks (which is called one basket). Two sets of Temperature and Depth sensors (TD sensors) were attached at the branch line No.1 and 10 in order to ascertain the actual depth of hook and the sea temperature at that depth. About 600 hooks were deployed in each pelagic longline (PLL) operation. While deploying the gear both ends of the mainline were attached with radio buoy and flag pole with radar reflector for easy searching the location of the line.

Fishing operations were started in the early morning around 0400 to 0500 hrs and hauling at noon time. Shooting time spent one and half hour for 600 hooks and hauling time took three hours for operation. Approximate immersion time was eight to nine hours. Bait for tuna longline was Round scad (*Decapterus* spp.) size 8-10 individuals per kilogram. Baitfish was hooked at the end of the skull to secure it fastened with the hook. Three types of hook (J-hook, C-hook No.14 & 18) were used during the survey operation. Line shooter speed was calculated in relation to the vessel speed in order to maintain the mainline sac at proper fishing depth. The depth of he hook and sea temperature were recorded from the temperature depth recorder (TDR)

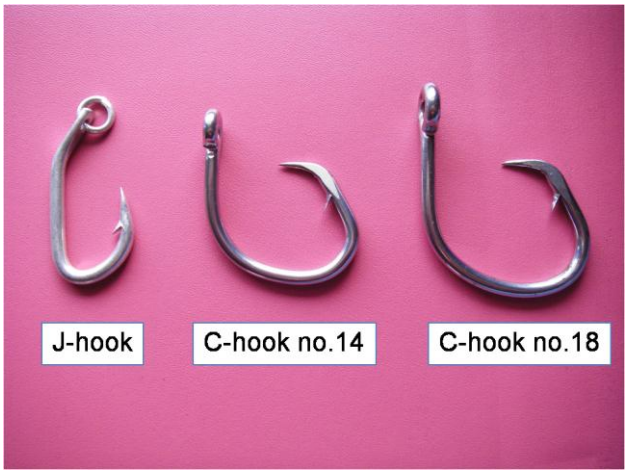

Figure 1 Three types of hook (J-hook, C-hook No.14 & 18)

After hauling the gear, the catch was identified up to specie level and the morphometric characteristics (standard length and weight) of each specimen were measured on board.

Results

The pelagic longline fishing operations could not be completely undertaken due to the unexpected severe weather condition and limitation of fuel oil. Weather started severe condition since 30th

January 2010, and effected by low atmospheric pressure covering from North of Sumatera Island to Sri-Langka. Westerly wind with force 5 condition induced the 3 to 5 m swell. The fishing operation was not safety for crews, fishing gear and oceanographic instrument thus the oceanographic survey had to terminate operation. Master of M.V. SEAFDEC decided, under the agreement of team leader of Department of Fisheries, to leave fishing ground and so 7 stations were abandoned for pelagic longline fishing operation.

Fourteen longline fishing operations were carried out during the survey. Total hook deployed on the pelagic resources survey were 8,375 hooks. TD sensors showed that the shallowest branch line was 40-80 meters and deepest branch line No.10 and 11 were 120-260 meters. Quality of bait was accepted condition.

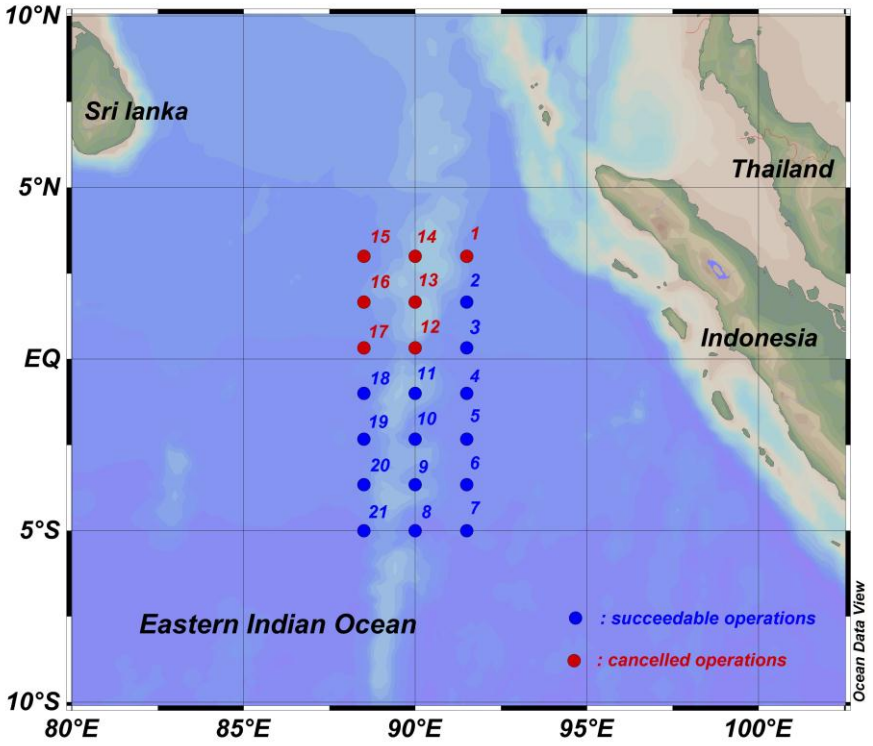

Figure 2 Map depicting the survey stations of pelagic longline .

A total of 204 individuals belonging to 17 different species were recorded (Table 1). The largest proportion of catches by number was target species, primarily tunas (26.48 %), marlin and swordfish (2.45 %). Sharks, 4.90 % of catches by number, represented by Crododile shark *(Pseudocarchaias kamoharai*), Blue shark *(Prionace glauca)*, Silky shark *(Carcharhinus falciformis)* and Blacktip shark*(C. limbatus)*. All of sharks (10 individuals) were kept on board for further scientific investigations.

Overall, targeted species represented 32.35 % of all catches and non-target species reached a proportion of 67.65 %(including sharks 4.90 %).

The total CPUE was 24.36 individuals per 1,000 hooks. For sharks, the CPUE reached 1.94 individuals per 1,000 hooks.

Regarding to the size of circle hook constructed with SEAFDEC/TD standard branch line, circle hook size C18/0 has been regularly employed on every operation. The result found that Catch per Unit Effort (CPUE) of C-hook was less than J-hook. Consequent to longline fishers did not accept the C-hook as their standard fishing gear. By this reason SEAFDEC as technical organization initiating the use of C-hook to longline fisher in SEAFDEC member countries need to investigate the size selectivity of catch related with size of circle hook.

Table 1 Fish species caught by pelagic longline

Fish species	individual
Catch species	
Yellowfin tuna (*Thunnus albacores*)	31
Bigeye tuna (*Thunnus obesus*)	21
Skipjack tuna (*katsuwonus pelamis*)	2
Swordfish (*Xiphias gladius*)	3
Blue marlin (*Makaira mazara*)	2
Great barracuda (*Sphyreana barracuda*)	1
Wahoo (*Acanthocybium solandri*)	6
Bycatch species	
Croccodile shark **(***Psudocarcharias kamoharai*)	2
Blue shark *(Prionace glauca)*	3
Silky shark *(Carcharhinus falciformis)*	3
Blacktip shark *(C. limbatus)*	2
Pelagic stingray (*Pteroplatytrygon violacea*)	9
Dolphinfish (*Coryphaena hippurus*)	2
Escolar (*Lepidocybium flavobrunneum*)	22
Snake makeral (*Gempylus serpens*)	1
Lancet fish (*Alepisaurus ferox*)	88
Sickel pomfret (*Taractichthys steindachneri*)	6
Total	204

In this survey, circle hook No.14 exhibited the highest catch rate by 42.06 % of total catch in number, follow by circle hook No.18 (30.88 %) and J-hook exhibited the lowest catch rate (26.96 %). In this study, only one Blacktip shark *(C. limbatus)* was caught by J-hook.

Table 2 Catch rate of three hook types (J-hook, C-hook No.14 & 18)

Species	Hook type		
	J- hook	C-hook No.14	C-hook No.18
Tunas	10	29	15
Marlins and swordfish	1	3	1
Sharks	1	4	5
Others	43	50	42
Total	**55**	**86**	**63**
% composition	**26.96**	**42.16**	**30.88**

Due to the unexpected severe weather condition, the obtained data were rather limited in comparison to other published studies. In addition, data were only collected from a single research vessel and so some differences of catch characteristic may vary from other vessels.

For the further research survey, daytime fishing operation, increasing number of hook line per basket and number of station in order to cover wider range of fishing depth and fishing area are suggested to ascertain the abundance of catch and bycatch in pelagic longline fishery along the Ninety East Ridge in the Eastern Indian Ocean.

References

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