

Shark bycatch by dropline gear in the North Coast of Mozambique: Results of the acoustic/dropline survey conducted from 25th October to 07th November 2012Rui J. Mutombene¹¹ **Instituto Nacional de Investigação Pesqueira**Av. Mao Tsé Tung, nr.389, P.O.Box 4603. Maputo, Mozambique

Abstract

The dropline gear, original from Seychelles, for targeting slope demersal fish species was tested during the implementation of the acoustic survey aimed to estimate the abundance and distribution of these fishes in the slopes of North Coast of Mozambique. The primary role of the dropline was to bring the species assemblage in the surveyed area. An associated objective of the survey was also to evaluate the gear performance in order to consider the possibility of introducing a dropline fishery. A total of 19 fishing stations were sampled covering the area between the latitudes 14°50'S and 12°00'S at depth's contour of 100 to 400m. Each station was composed by a set of three droplines with a soak time of 30 minutes. Each dropline gear was composed of 45 Mustard tuna circle hooks (sizes 11/0, 12/0 or 13/0) baited with mackerel and squid. The total number of target species (snappers and blueskin seabream) caught during the survey was 12 (30Kg), while the number of sharks was 14. Shark species captured in the area were Shortnose spurdog *Squalus megalops* and Smallfin gulper shark *Centrophorus moluccensis* that were measured and released. One shark depredation episode on target species was recorded. The gear structure was significantly affected during the fishing operations with 10 % of hooks lost. High proportion of bycatch composed by shark species coupled by the loss of significant amount of hooks raised the necessity of more investigations on gear efficiency and impacts in ecosystem before recommend the implementation of a dropline fishery in the area.

Introduction

This report summarizes the implementation of acoustic and dropline survey undertaken in the northern section of Mozambique coast. The report emphasizes on the potential impacts, on the ecosystem, of the experimental dropline gear employed to target slope demersal fishes in the area.

The aim of the survey was to provide quantitative information on fish species composition and distribution on the slopes of the North coast of Mozambique for assessment their stock status.

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The survey was implemented from 25 October to 07 November using the fishing vessel MV ROBERTO. During the implementation period, Day and Night acoustic transects were performed throughout the area 1 (14°50'S - 14°27'S) , area 2 (14°08'S - 12°58'S) , area 3 (12°37'S - 12°16'S) and around St. Lazarus Bank (12°06'00" S to 12°17'00" S and 41°25'32" E to 41°26'00" E) (figure 1) covering a significant extension of Nampula and Cabo Delgado Provinces. Dropline sets were made in a total of 19 different fishing stations only during the day time.



Figure 1. Northern section of Mozambique coast. Red lines represent areas planned to be covered by this survey. The numbers represent the areas surveyed. Note that instead of covering the northernmost area (due to the continuing threat of pirate activity), the survey was moved to Saint Lazarus bank.

Survey details

The survey was organized by the SWIOFP with the support of the Ministry of Fisheries of Mozambique and particularly with support of IIP.

The survey was conducted with the Kenyan flagged MV ROBERTO, a stern trawler built in the former Soviet Union in 1992. This vessel has following nominal characteristics:

MV ROBERTO CHARACTERISTICS

LOA (m)	22,80
Breadth(m)	6,80
Draft(m)	3,0
GRT/NRT (tons)	117 T / 30 T
Speed(knots)	10 knots
Main engine(type)	SKL
Engine power/RPM	295kW at 750 rpm continuous rating
Crew n°	8
Scientific crew n°	9

Gear specifications

The fishing gear used for the survey is dropline, also often referred to as vertical longline. The dropline specifications recommended for this survey was taken from the Seychelles model, which was modified from dropline gear developed in the Pacific for targeting deep slope snappers and groupers as illustrated in the figure below.

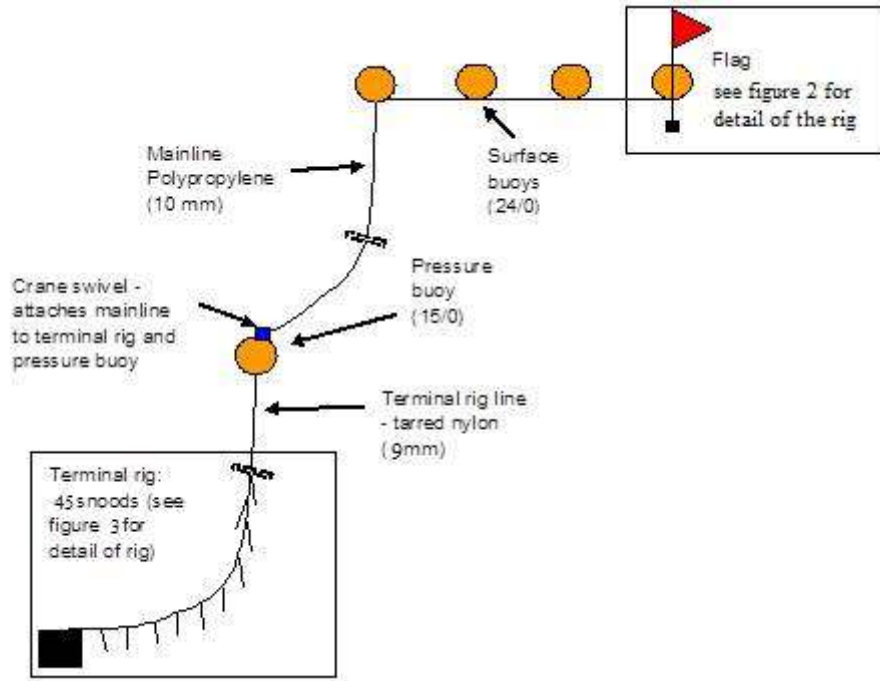


Figure 1: Schematic of a dropline illustrating primary gear specifications

The gear consists of a surface buoyed (4 buoys: 24/0) and flagged mainline (10 mm polypropylene) that is attached to a weighted terminal rig (Figure 1). A crane swivel connects the terminal rig to the mainline, where a pressure buoy (15/0) is mounted to maintain the terminal rig in the water column. The length of the mainline is adjusted for depth, whereby 30% extra line is added for the targeted depth to compensate for current drag on the line, after accounting for the length of the terminal rig (30 m).

Flagged unit consists of a 3 m PVC pole, installed on a perforate surface buoy (65 cm of the pole should be under water) carrying a flag at its upper extremity and a 3/4 kg weight at its lower extremity (Figure 2).

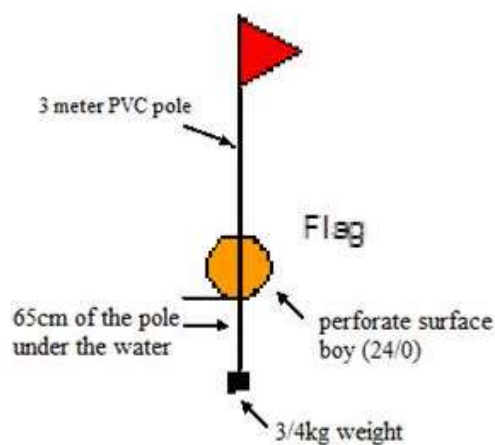


Figure 2: Illustration of flag unit used on droplines

The terminal rig line is constructed from tarred nylon rope (9 mm) to the end of which is attached a 10-12 kg weight (block or chain). At intervals of every 15 snoods on the terminal rig line, crane swivels (9/0) are placed to allow for rotation of the line. There are 45 snoods composed of (30cm length) monofilament (1.8 mm) lines that are set at 45 cm intervals along the terminal rig (Figure 3).

Snoods are attached to the terminal rig line using crane swivels (8/0; 50 kg tested), that are prevented from slipping down the line by the introduction of simple knots either side of the swivel, and end in tuna circle hook (Mustad).

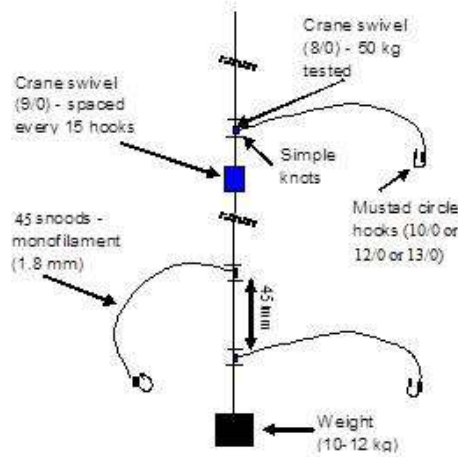


Figure 3: Schematic and details of the dropline terminal rig

Summary of fishing strategy

Each fishing station was designed to consist of a set of 3 different droplines plus a CTD cast in one of the three strata, shallow (75-200 m), mid (200-300 m) and deep (300-425 m). Each dropline rig was equipped with different Mustad tuna circle hooks: 10, 12 and 13.

Wherever possible, three fishing stations were sampled at random locations on each acoustic survey day. This means a deployment of total 405 hooks per day in normal conditions. No fishing was conducted during the night.

Two bait types (squid and mackerel) were used alternately from one day to another.

Operations Summary

Total N° of days in the fishing area 11 Days	Total number of days on which fishing took place 10 Days	Days lost: 2 days	Days spent in Transit 1 Day
Target species Demersal fish	Total number of stations sampled 19	Total time acoustic survey (day) 28.3 Hr	Total time acoustic survey (night) 46.6 Hr

Summary of incidental catches

During the survey the gear caught incidentally two shark species, Shortnose spurdog (*Squalus megalops*) and Smallfin gulper shark (*Centrophorus moluccensis*). Those were immediately released back into the water alive. A total of 14 sharks were recorded.

Released & discarded Species¹	N°	Comments
<i>Squalus megalops</i>	8	Caught released. Total length recorded in 7 individuals
<i>Centrophorus moluccensis</i>	6	Caught and released. Total length recorded for all 6 individuals

Size composition (total length) in cm of shark species impacted by dropline gear during the survey in slopes of the north cost of Mozambique is presented below.

<i>Squalus megalops</i>	<i>Centrophorus moluccensis</i>
73 cm TL	84 cm TL
76 cm TL	93 cm TL
77 cm TL	94 cm TL
79 cm TL	94 cm TL
82 cm TL	95 cm TL
85 cm TL	145 cm TL
87 cm TL	

¹ Finfish, sharks, rays, marine mammals, turtles and others;. When of TED capture fill in Incidental catch summary.

Retained species were composed by deep water snappers and blueskin seabream. Table below summarizes the catch composition of target species found during the survey.

Retained Species	Weight (Kg)	N°
<i>Etelis carbunculus</i>	23.95	8
<i>Pristipomoides typus</i>	3.35	2
<i>Polysteganus coeruleopunctatus</i>	2.8	2
Total	30.1	12

Depredation

One shark depredation episode on target species was recorded during the survey.

Gear Lost

- 30th October 14:50 a dropline/CTD station produced several fish and this was repeated, starting at 16:50. The first haul of this second dropline set was hauled at dusk. The second dropline went under the vessel during hauling and this took over an hour to clear. The third was left to be recovered at first light (05:45) on 31 October, and came with three dead sharks and one with several injures.
- 05th November 14:00 three droplines were set but only 2 were hulled before 15:00. The third dropline was not located (lost) and the vessel sailed to St. Lazarus Bank. It is likely that this caused a ghost fishing and similarly had impacted on these two species of shark.
- On 06th November another three droplines were set at 08:00 but the first line was hauled with only the top section of 15 hooks. The Swivel connecting top and mid-section of the line was broken (bottom and mid sections lost).

On total it was estimated 10% of the hooks lost during the implementation of survey which may have securely promoted a ghost fishing and mortality of sharks in the area.

Final remarks

In the surveyed area there are two shark species, *Squalus megalops* and *Centrophorus moluccensis*, which were potentially impacted by the use of dropline. They were impacted by active fishing (but release of alive individuals were made) and by ghost fishing caused by lost hooks.

In other hand, catch rates of target demersal fishes was not satisfactory in this survey and shark depredation on target species was also a matter of concern.

This was the first time that dropline was tested in northern Mozambique marine waters and all crew on-board was composed by persons with no or very low practical experience of operating the gear, so it's believed that catch rates on target species can be

increased and the loose of lines can be minimized as experience of operating the gear is gained. Thereby, there is necessity of more investigations on gear efficiency and impacts in ecosystem before recommend the implementation of a dropline fishery in the area.