The "SPIDER" anti-depredation device tested on a Seychelles' semi-industrial longline vessels.

Short Note: Trip report Summary (Mission 21 November 2007 to 04 December 2007) on R/V Albacore

Background

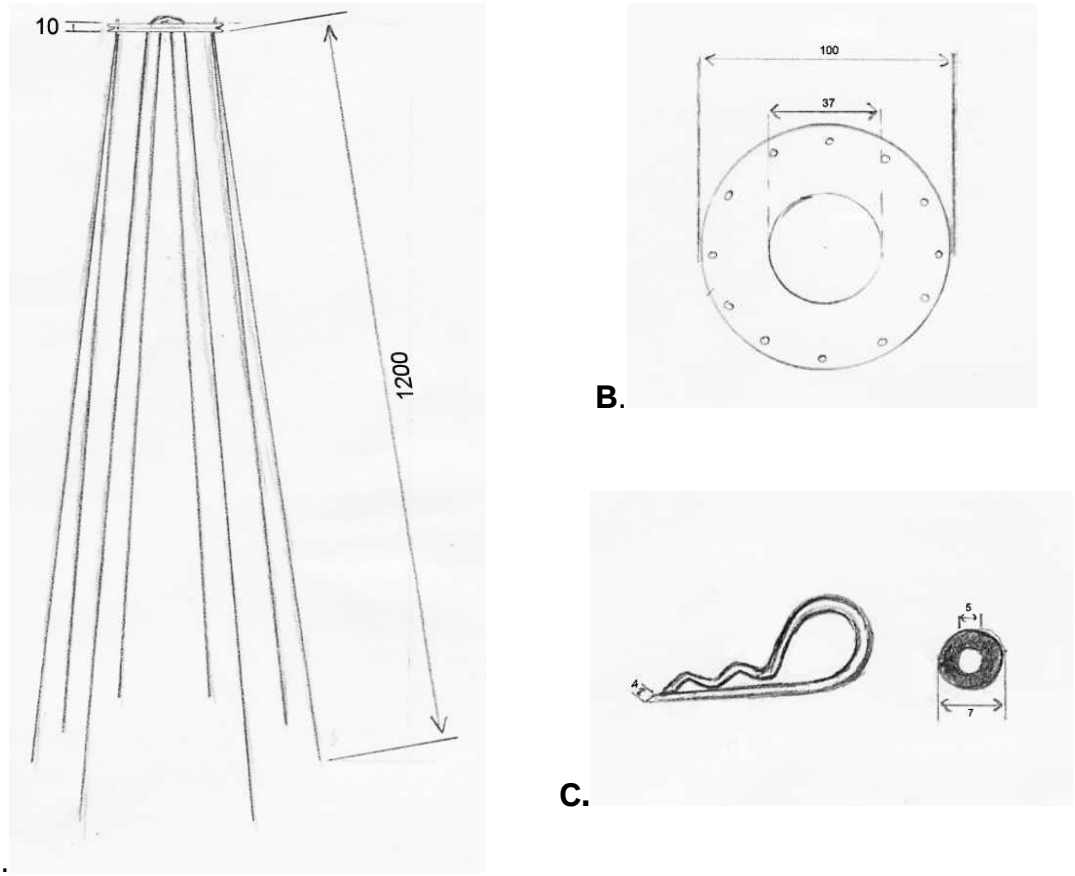
Depredation is defined as the damage or removal of fish or bait from fishing gear by predators in this case cetaceans or sharks. It occurs throughout the world and has been notably documented in several regions of the Indian Ocean. An analysis of depredation data collected by the Seychelles Fishing Authority since the onset of the semi-industrial fishery targeting swordfish and tuna in 1995 revealed that the overall depredation rate was 21% , representing 4.2 fish lost/1000 hook, and was regarded as one of the highest in the world *(Rabearisoa et al., 2007*). For swordfish only, which is the main target species, it was estimated that the economical loss was about 340 €/1000 hook set which represent an overall loss of nearly 1,000,000 € over the 1995-2006 period *(Rabearisoa et al., 2007)*. The main culprits were identified as short finned pilot whale (*Globicephala macrorhynchus*), false killer whale (*Pseudorca crassidens*) and several pelagic sharks.

Given this high depredation rate and the significant economic loss they incur, the Seychelles Fishing Authority with the assistance of two French collaborators, Dr. Christophe Guinet (CEBC – CNRS FRANCE et Dr. Olivier Adam (Lissi-iSnS, Universite Paris 12 France), prepared an action plan to mitigate and reduce the depredation rate by cetaceans on the Seychelles semi-industrial longline fishery.

In this light a research trip was conducted onboard the "FV Albacore" from the 21st November 2007 to 4th December 2007. The principal objective of this trip was to test the efficiency of the "SPIDER" (a mechanical anti depredation device designed by Dr. Christophe Guinet and Bruno Roquier) at reducing or preventing depredation on fish caught during long lining operations.

Material and Method

The system consists of a 10 mm thick plastic disc of a radius of 100m, with a 37 mm diameter opening at its centre (figure 1 (B). The disc has 16 evenly spaced holes on its outer edge, through which four 2400 mm polyester fibres are inserted. Each fibre is folded in two and ends inserted in two adjacent holes, giving the disc a total of eight 1200 mm hanging arms (figure 1 (A). The system is called “SPIDER”. The aim is that the biting of the fish will trigger this “SPIDER” to slide down the branchline and cover the fish with its 8 legs. A total of 237 “SPIDERS” and 150 triggering mechanisms were designed.



A. **B**. **C.**

Figure 1. Illustration of the “SPIDER” system **(A)** side view, **(B)** the disc view from the top and **(C)** clip and rubber band for the triggering system.

Results

The RV Albacore conducted 13 longline sets in the Northern part of the Seychelles Archipelago. Some initial adjustment was necessary in order to get the system functional. A total of 4 days was required to set it up properly.

Operational

The first problem encountered was the time it took to attach the "SPIDER" onto the branchline. The 32 seconds available for the fishermen to bait and deploy the hook was largely exceeded. The main cause of this problem was the difficulty in putting the triggering mechanism in place which required significant effort. It was therefore necessary to deploy the SPIDER every 4 hooks rather than every 2 hooks.

The second problem was encountered during hauling. The hydraulic forced generated during hauling caused the spiders to spin on itself and entangled onto the mainline. This resulted in "tangled up" situations and considerable lost of time. Placing the "SPIDERS" at a lower position on the branchline resulted in significantly less "tangled up" situations, however another problem arised. It was required to install the "SPIDER" from below (from the hook) rather than from the top (the snap). FV Albacore was using 2 types of hooks, Standard type and the Japanese type. Whilst the Japanes hook types went through the 37 mm hole in the "SPIDER" s disc, standard hooks did not. A small slot was therefore cut into disc to get the hook or branchline through.

The use of nets rather than polyester fibres legs was not as problematic. They were easier to handle and faster to set up.

Using metal wires in place of polyester fibres was very problematic. They were very difficult to handle and poses a danger to the handler.

Efficiency

87.26% of the time when a catch was present on the line the "SPIDER" was triggered.
12.74% of the time it was not triggered even if a fish was present. 9.46% time the "SPIDER" was triggered, but there was no catch.

When the spider was triggered, 79.98 % of the case it provided adequate protection for captured fish (all species). It should be noted that tunas obtained better protection from the "SPIDER" than swordfish or other billfishes given that the bill of the latter prevent the device from covering the entire fish.

Conclusion

The result shows that the “SPIDER” was not a very effective anti depredation device. However this experimental test has allowed the designers to better understand the technical parameters of this fishery. Furthermore the various modifications done in situ brought out all the constraints needed to be considered when designing future anti-depredation systems. The ease to handle the device and set up time are the 2 major points to be considered in the design.
The functioning of the device did not pose any major constraints. Its performance can be considered as adequate. Setting up the device on the branchline however required considerable force. Improvement is required in this area.
The polyester legs system failed in its dissuasive purpose. Total physical protection will therefore be required. A conical shaped net system will be considered in future design.

A trip is scheduled for October/November 2008 to test a modified version of the “SPIDER” device.

Bibliography

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