Underwater setting methods to minimise the accidental and incidental capture of seabirds by surface longliners

Report on a prototype device developed by MS Engineering

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Abstract

In response to the Department of Conservation's concerns regarding the accidental capture of seabirds by surface longliners, several concepts of bait placement devices were evaluated by MS Engineering. Two methods were selected for further in-depth evaluation.

The first concept was a towed paravane with an endless cable employed to transport and release the bait at the depth to which the paravane is set. Although practical bait carrying devices were designed, the ability to retrieve the endless cable and paravane proved problematical, and the concept was abandoned.

The second concept was a transportation capsule which clamps the baited snood until the capsule reaches its determined depth. At this point the carry-over action of the capsule and retrieval action releases the bait. This design concept proved worthy of construction and trial. Sea trials of this device proved successful with a 100% bait release rate achieved.

1. Introduction

From information provided by the Department of Conservation and consultation with local longline fishermen, development and trials of bait setting devices were initiated and completed to meet the objectives set down in Section 2.

2. Objectives

1. Design a device for use on surface longliners which enables the bait to be set underwater.
2. Build a working prototype.
3. Fit the device to a surface longline vessel and undertake sea trials.
4. Refine the device where possible to overcome any difficulties identified during sea trials.

3. Design concepts

3.1 FIRST CONCEPT

The first concept involved the use of a towed paravane attached to the stern of the vessel by way of an endless cable running through a pulley system mounted on the top side of the paravane and driven by way of a hydraulically powered pulley to be mounted on the stern of the vessel. Attached to the cable, at even spaced intervals, were snood clamping units which would transport the baited hook down to the paravane. As the clamping unit passed over the pulley the clamp would open and release the snood.

Conclusion:

Although this concept for transportation showed merit and would achieve the objective, the after-use retrieval proved to be problematical due to the necessity of rewinding an endless cable without entanglement. This concept was abandoned without further development.

3.2 SECOND CONCEPT

The second concept uses a weighted capsule with a triggered release mechanism. This unit is attached to a single cable for release and retrieval by way of a hydraulically-powered winch.

4. Design description

The bait capsule consists of a fibreglass tube (500 mm long, 100 mm diameter) with a tapered access slot located on the top side. A spring loaded nose cone is attached to the front end of the tube, while the other end is open. This tube is bonded to a weighted keel, and passing through the keel is a 20 mm diameter rod which operates the opening device and is the connecting link for the tow weight (8 kg) and 20 m retrieval cable (see Fig. 1).

4.1 OPERATING PRINCIPLE

The bait is placed inside the tube through the open end and the snood is run along the access slot and clamped between the nose cone and the tube end. When the winch is released the capsule dives into the water assisted by a weight attached to the front of the capsule. Once the unit reaches the desired depth the cable is winched in, and as this action takes place the nose cone trips open assisted by the pressure of the water passing through the capsule. As a result the bait is left at the depth at which retrieval commences. During

retrieval the nose cone remains open, reducing water resistance, and the weighted keel assists capsule orientation. On reaching the resting position the nose cone returns to its original state assisted by a spring located on the trigger-attachment rod.

5. First trial of the capsule design concept

A trial was carried out using a 30 m snood baited with squid on a 28 m longliner cruising at approximately nine knots.

The operator loaded the bait through the access slot and activated the release of the capsule then retrieved the device ready for the next bait drop. This sequence was repeated 50 times and deficiencies were identified.

6. Deficiencies and refinements

6.1 DEFICIENCY NUMBER 1

The tow weight was drifting either side of the propeller wash.

Refinement: Attach an additional 50% of weight to the tow cable (final tow weight 12 kg).

6.2 DEFICIENCY NUMBER 2

Pre release of the bait.

Refinements:

1. Shift the position of stops on the operating rod.
2. A spring added to assist the nose cone clamping action.

6.3 DEFICIENCY NUMBER 3

Retrieval orientation.

Refinement: Adjust speed of retrieval.

7. Second trial and results

A further 50 bait drops were executed at a cruising speed of 9 knots and at intervals of approximately every 10 seconds.

The result achieved was a 100% bait drop, with a 98% correct orientation of the capsule on retrieval.

8. Recommendations

Further refinements to this device would include, but not be limited to:

1. The tow weight being included within the capsule construction.
2. A multisheave cable release - retrieval system.
3. A fixed angle launching platform.
4. Retrieval cable to be kevlar or similar.
5. Reduction of moving parts within the mechanics of the capsule unit.

9. Conclusions

It is visualised that implementation of the recommended improvements would result in a highly efficient, user-friendly unit suitable for all surface longline fishing vessels, and fulfilling the objectives set down.

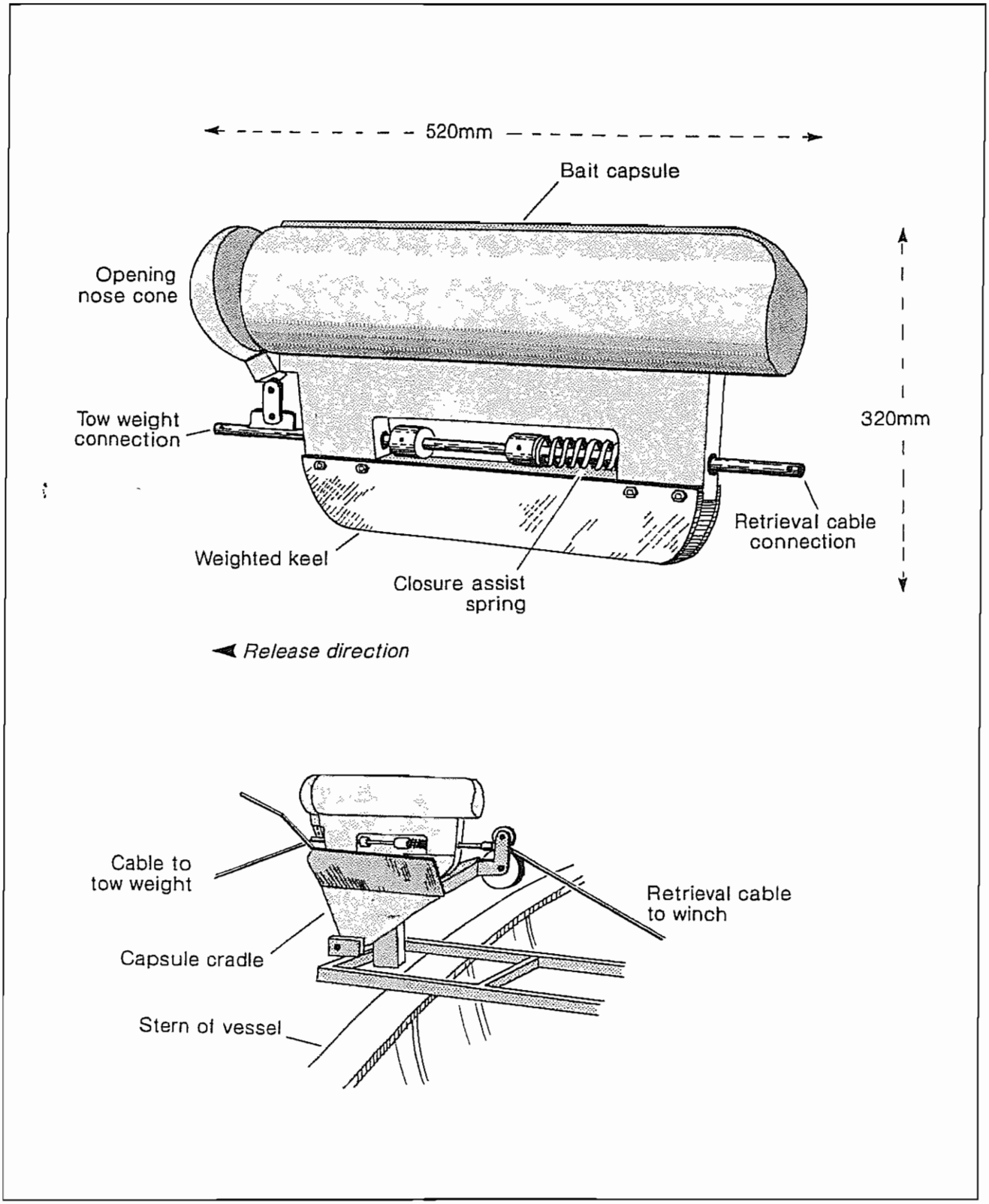

FIGURE 1. DIAGRAM OF BAIT SETTING CAPSULE.

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