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FISH ESCAPEMENT FROM LONGLINES AND METHODS TO STUDY ESCAPEMENT AND SURVIVAL

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INTRODUCTION

Fish escapement from longlines has a negative impact on the catch rates. Further, we must assume that a certain proportion of the lost fish will die from different injuries caused by the gear, and will such represent a hidden part of the total fishing mortality. There is little knowledge of the fish escapement and survival after escapement from longlines.

In this paper different aspects of this problem are discussed, and results from introductory experiments with hydroacoustic observations of fish escapement during hauling of longlines are given.

FISH ESCAPEMENT FROM LONGLINE GEAR

Escapement of hooked fish occurs when the fish break loose from the hook or when the gangion breaks and the fish escape with hook and gangion. This happens both at fishing depth (author´s obs.) and during retrieval of the gear. Fish escapement at the surface is easily detectable. Normally, fish that are not securely hooked will fall off the hook when it is lifted above the surface. However, most of these fishes are gaffed and brought on deck.

Escapement also occurs deeper in the water coloumn, as indicated by fish (with expanded swim bladder) floating to the surface at a distance from the vessel (author´s obs.). This type of escapement has not been investigated, but experiments with improved longlines might give an idea of its magnitude. Compared with traditional longline gear, a catch increase of 15% is obtained by use of swivels between main line and gangion and 15-20% by use of hook types that give more secure hooking (Bjordal, 1989). Less escapement is the only natural explanation of the catch increase that is obtained by the use of swivels, while the catch improvement by use of better hooks is thought to be caused both by higher hooking probability and less escapement. The combined effect of swivels and hooks that hold the fish better then indicate that escapement during hauling of traditional longline gear might be as much as 15-30% of the fish that are actually hooked.

The escapement level, however, is most likely varying from species to species, and also with hauling speed and weather conditions.

SURVIVAL OF FISH AFTER ESCAPEMENT FROM LONGLINES

Little is known about fish escapement from longlines, and even less about the survival of the escaped fish.

One category of escapement that most certainly results in fish death, is escapement of fish with heavily expanded swim bladders due to quickly reduced ambient pressure during hauling of the gear, as often is seen for species like tusk and ling. These fish are severly injured, floats to the surface and are unable to dive.

Fish that escape with moderate or no swim bladder problems, might suffer from wounds caused by the hook, which might lead to reduced chance of survival. However, fish might survive a long time after escapement from longlines, as indicated for instance by fish caught with hooks in the jaw, where the wound is completely healed and the hook more or less encapsuled by flesh (authors obs.). This give reason to believe that the healing ability from hook injures is fairly high, and that mortality from this reason might be comparable to tagging mortality caused by the tag wound - which is considered to be insignificant for codfish (tagged with Lea tags, O.R. Godø, pers. comm.).

HYDROACOUSTIC OBSERVATIONS OF ESCAPEMENT FROM LONGLINES DURING HAULING

In order to quantify escapement of fish from longlines during hauling, methods are needed to observe hooked fish as they are lifted from the fishing depth towards the surface. In an introductory methodological experiment we tried to make such observations from R/V "Fjordfangst", using a SIMRAD YE-200 echosounder with colour screen (Simrad CF-130) and colour printer (Canon Pj-1080A). The transducer was a 15x13 cm nickel transducer with an 8 (longitudinal) x 13 degrees beam. The echosounder was operated at the following settings: Long pulsmode, amplification (8), attenuation (- 15 dB), TVG (40 log R, 1.3 - 39.3 m), full effect and colourtone 5.

To simplify identification of the line, small sphaerical plastic floats (3.5 cm diam) were attached by a gangion to the mainline every 15 m, with two baited hooks evenly spaced between the floats. The lines were set at various depths between 100 and 200 m.

The hydroacoustic observations of the line during hauling showed that most parts of the line could be identified: Anchors, floats and even individual hooks and gangions, if the line was positioned in the central part of the beam. The fish caught were mainly tusk and ling, which could be identified on the echogramme, especially when swimbladder gas was released. This occured at different depths between 90 and 25 m. During hauling targets on the line were recorded as traces with an upward slope of about 45 degrees on the echogramme. Several observations were made, where individual traces changed from a upward to a downward slope. These were interpreted as fish that escaped from the line and dived towards the bottom. Examples from the echo registrations are given in Figure 1.

However, good registrations of all targets on the line (from surface to bottom) were only obtained a few times, when the line was stretched straight between the vessel and the last anchor, so that most of the line was within the beam.

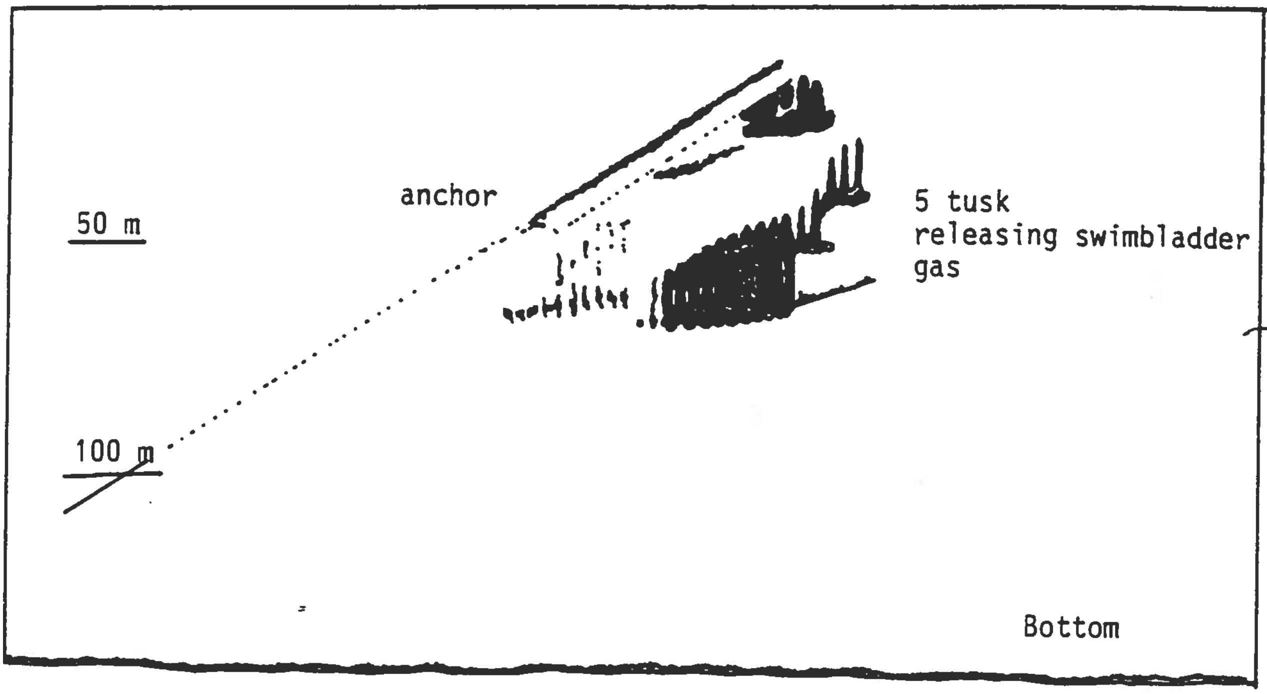
DISCUSSION

These introductory trials have shown that observation of longline by hydroacoustics might be a good method to study fish escapement from longlines. The method should also give possibilities for quantifying survival, by observing fish that descends after escapement compared with fish that has released swimbladder gas and ascends after escapement.

However, with a standard vessel mounted transducer, it is difficult to obtain continuous optimal observations of the targets on the line from the bottom to the surface. From the experiences gained during this introductory experiment, transducer equipment giving a beam as suggested in Figure 2, would be a probable solution. This could be obtained by using a battery of several transducers that can be scanned in the forward/aft direction.

REFERENCES

Bjordal, Å., 1989. Longline gear - catching performance, selectivity and conservations aspects. World Fishing, Vol 38, No. 13, Feb. 1989, p. 4-8.



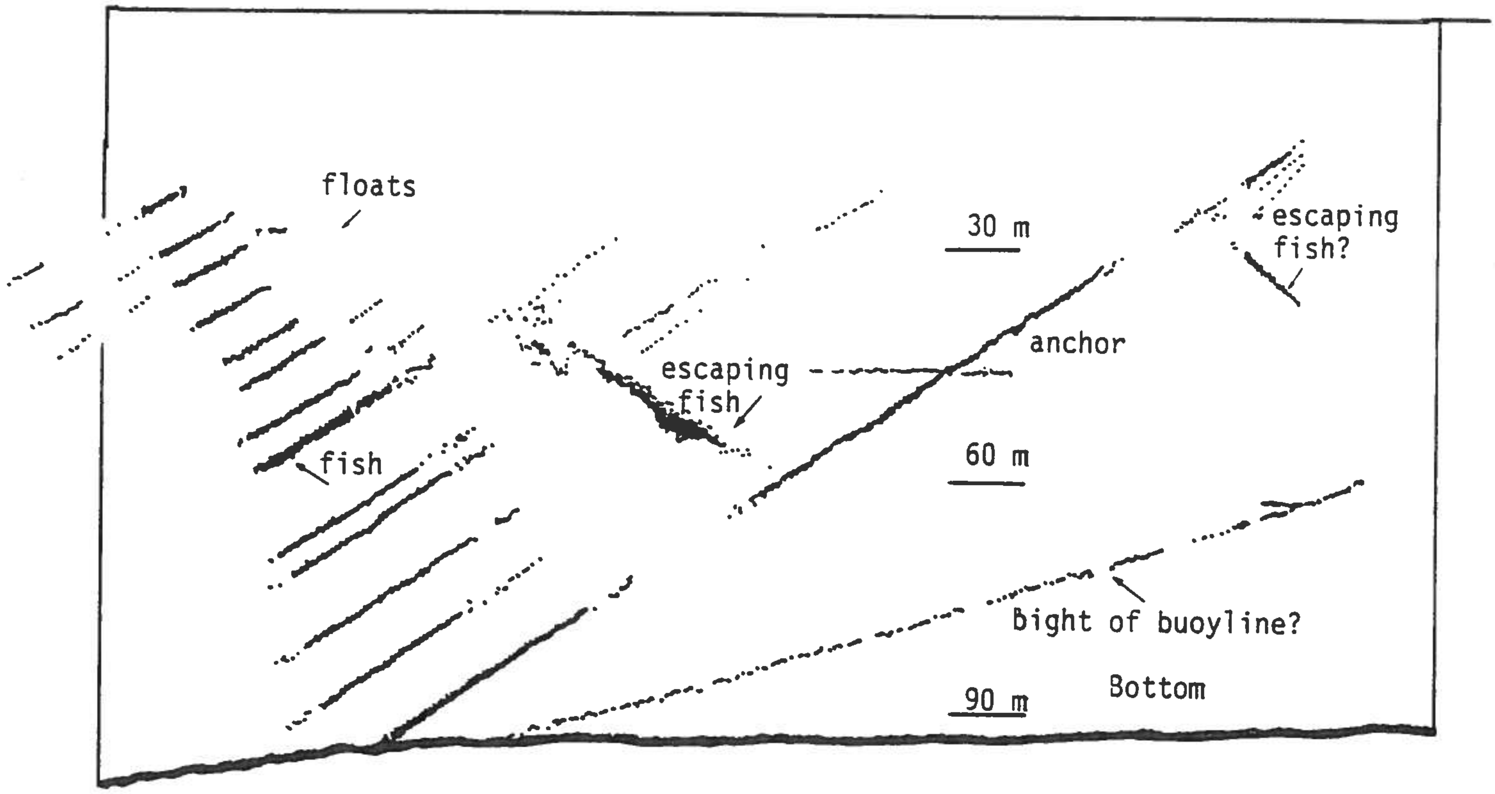
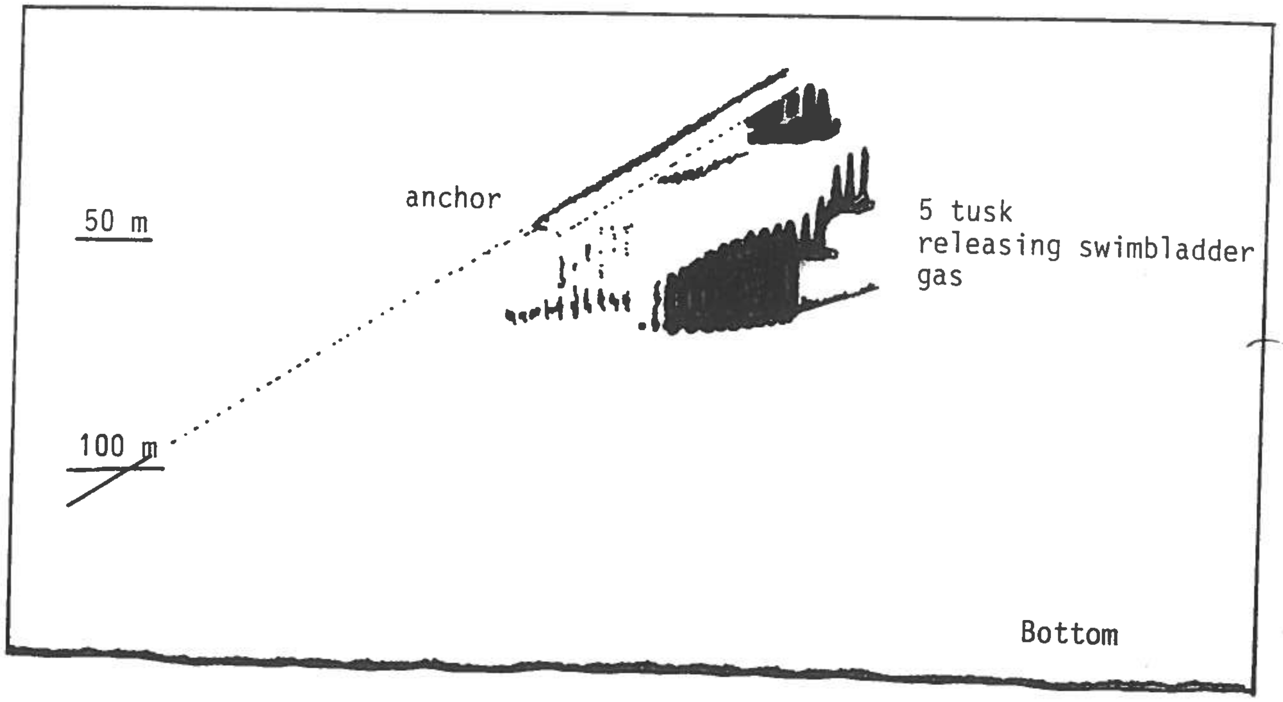
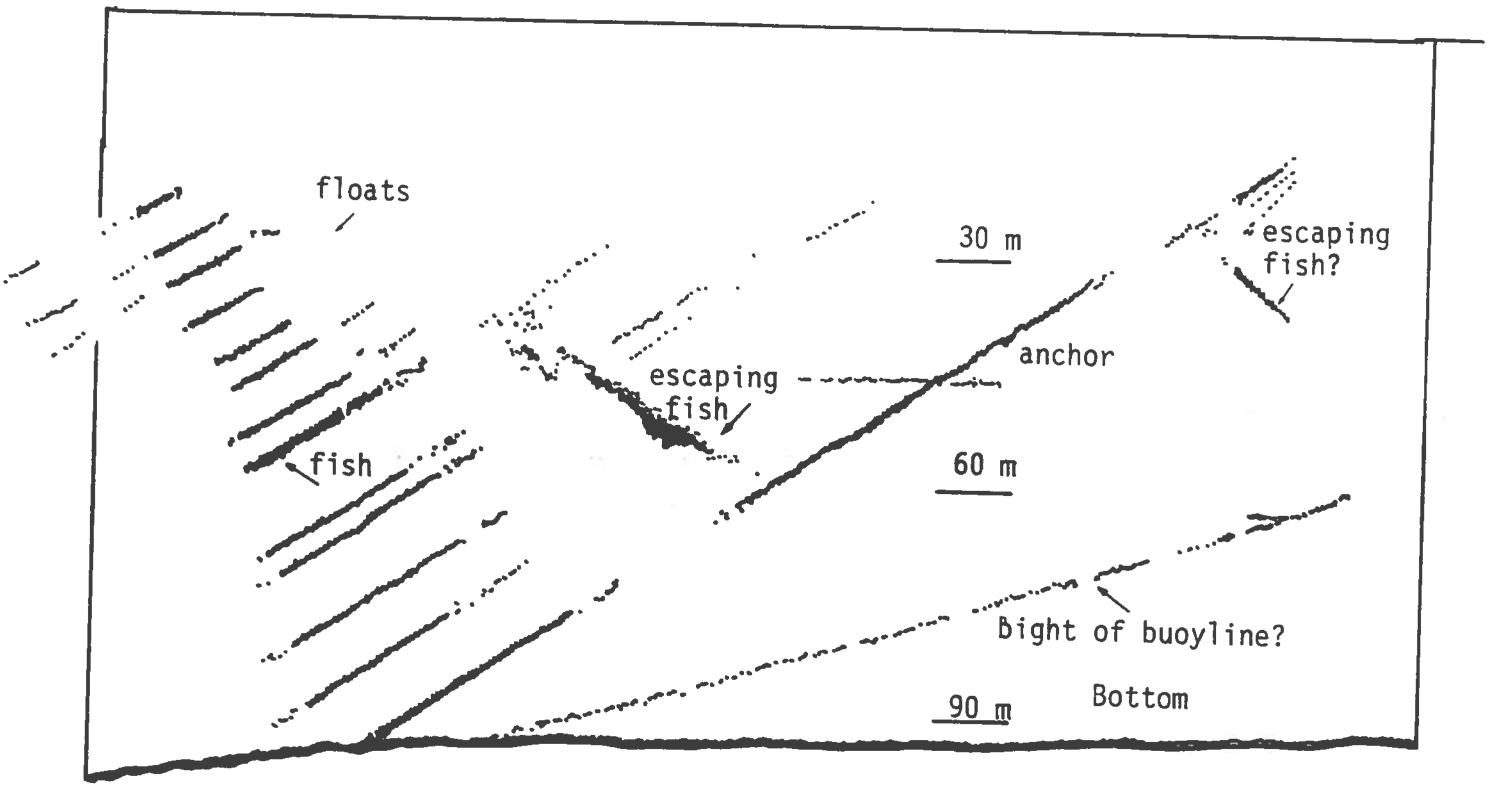


Figure 1. Examples of echoregistrations of different targets during hauling of longline





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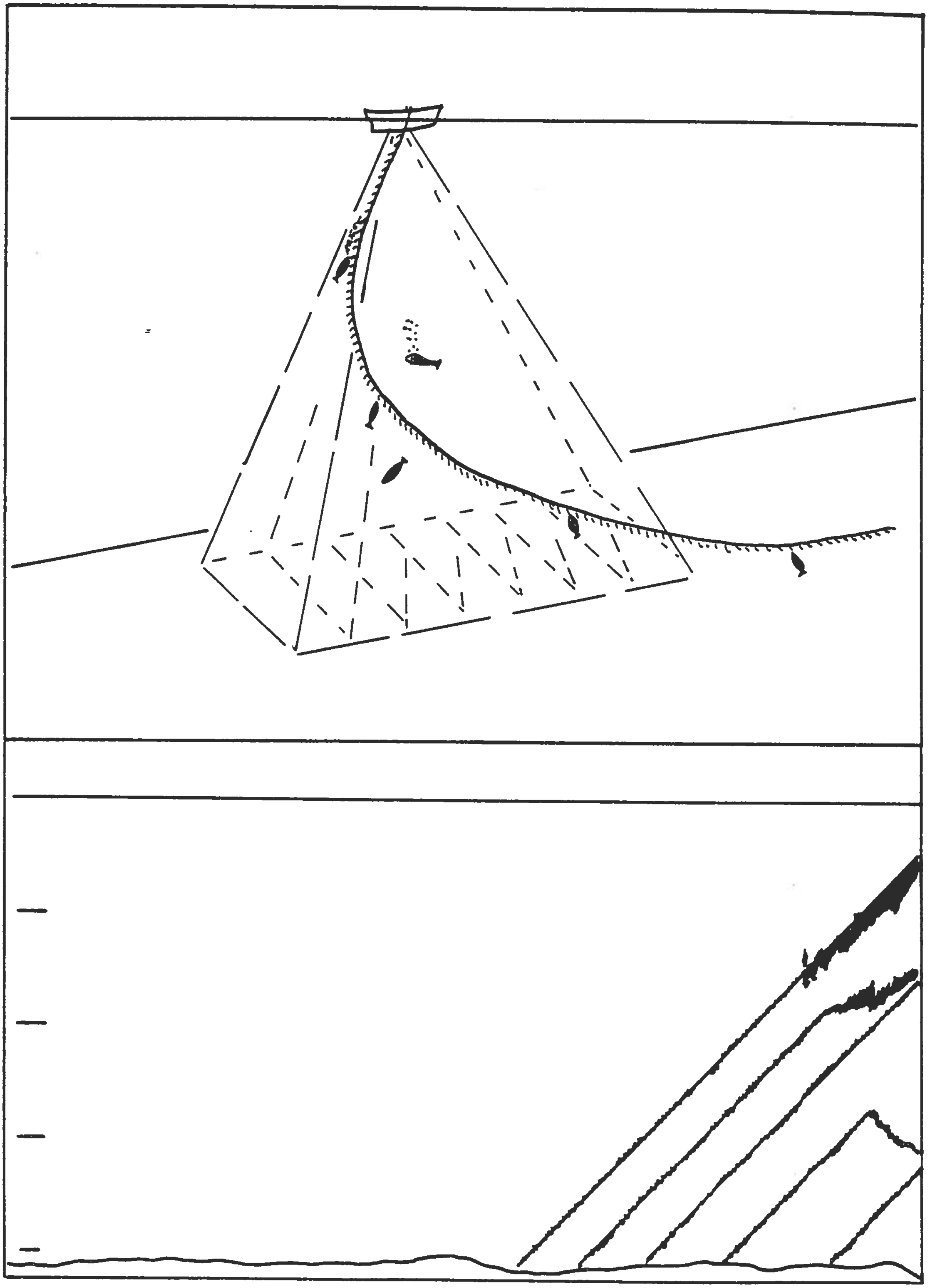

Figure 2. Suggested multibeam solution for observation of longline and hypothetical echoregistration of hooked and escaping fish.