

The use of light cables to modify the behaviour of fish in the mouth of demersal trawls

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Keith Summerbell and Finbarr G O' Neill*

Marine Scotland Science

Marine Laboratory, PO Box 101, 375 Victoria Road, Aberdeen, AB11 9DB

*b.oneill@marlab.ac.uk

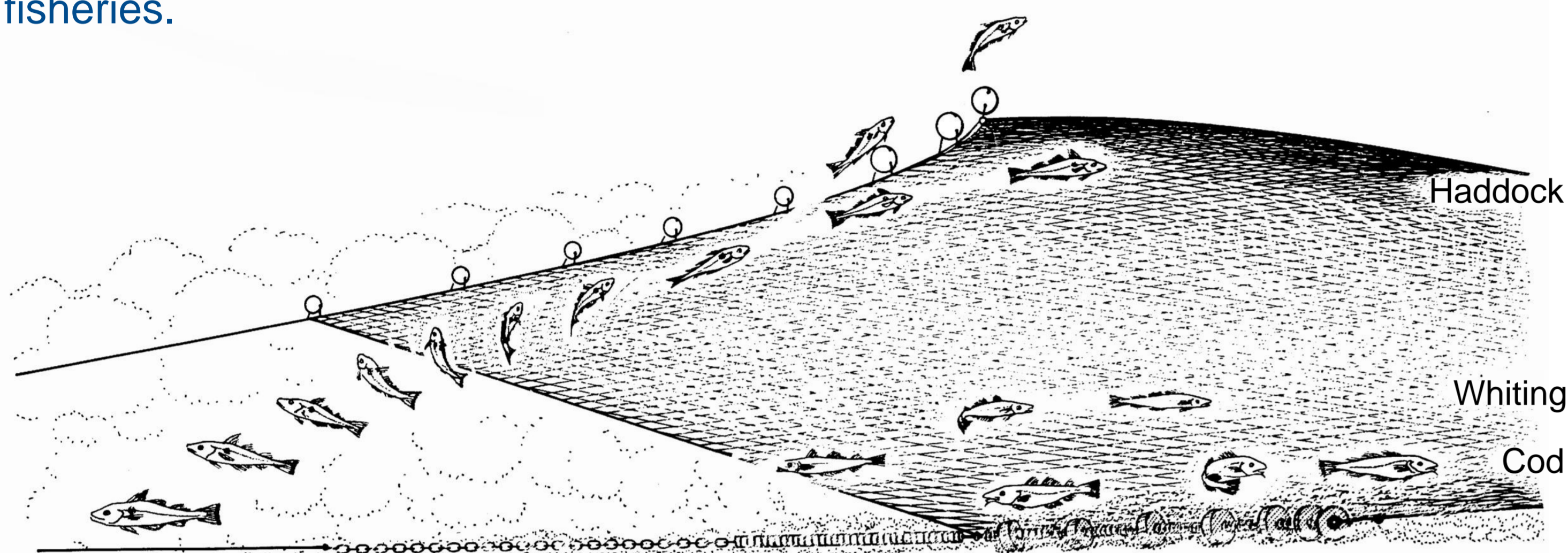


INTRODUCTION

The development of selective gears is a key objective of the fishing industry.

How different fish react to towed fishing gears has often been used to select between species in trawl fisheries.

The behaviour of fish at the trawl mouth and in particular the height at which they enter the fishing gear has been used to separate fish in a number of trawl fisheries.



Typical behaviour of haddock, whiting and cod swimming in the mouth of a towed fishing gear

Fish are also known to react to light and recent trials on the west coast of the USA have shown how light can influence the capture of fish in shrimp trawls.

Here we investigate further how light can modify the behaviour of a range of species at the mouth of demersal trawls using fibre optic cables on the fishing line and on the leading edge of a horizontal separator panel

SEA TRIALS

Two sets of fishing trials took place on the RV Alba na Mara on fishing grounds east of the Orkney Islands.

A prawn trawl with a separator panel was fished and side emitting fibre optic light cables were attached to the fishing line and to the leading edge of the horizontal separator panel. Fish that went above the panel were caught in the upper codend and fish that went below the panel were caught in the lower codend.

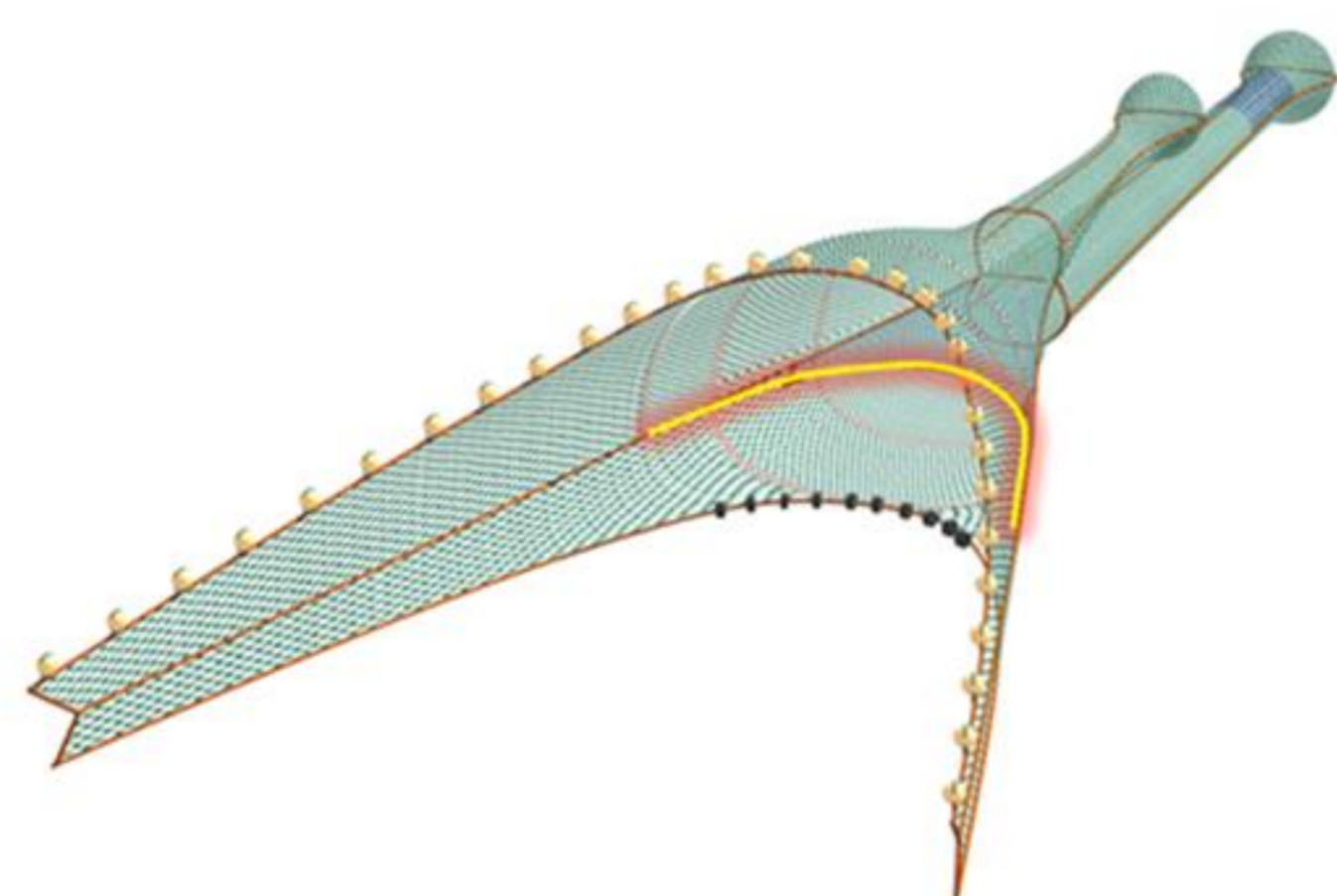
The fibre optic cable was illuminated by a Photosynergy Ltd green LED which was powered by a 12V DC supply.

The first set of trials took place in September 2014 during daylight hours when 34 fishing tows took place. Two different panel heights (approximately 20 and 60 cm) were tested, both with and without a light cable attached to the leading edge of the panel

The second set of trials took place in March 2015 during the night and 26 fishing tows took place. During these trials the influence of a light cable on the separator panel and the fishing line were tested.

Haddock, whiting, cod, lemon sole, plaice, gurnards, common dab and long rough dabs were caught and measured.

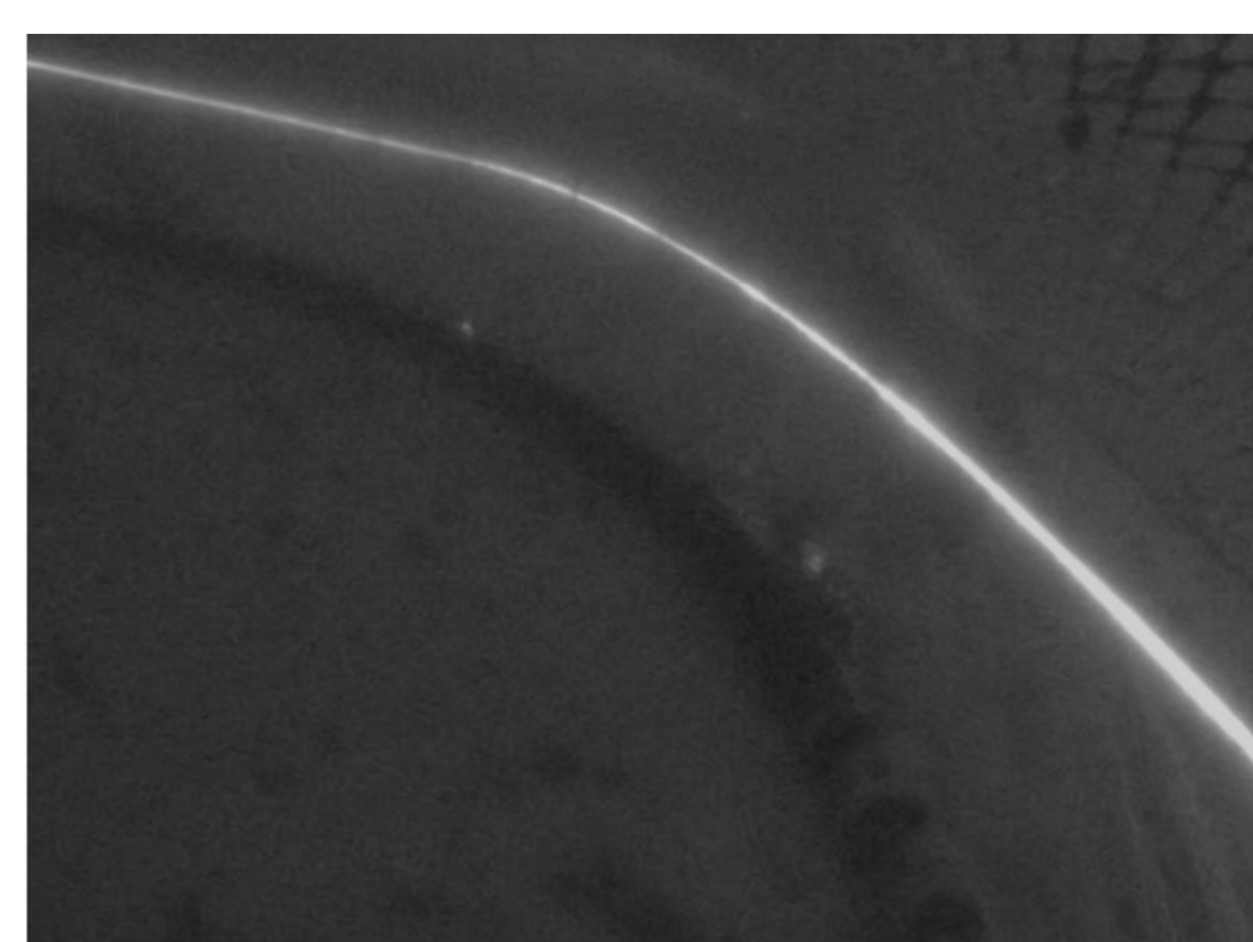
For each of these species the proportion of fish entering the top codend was analysed with respect to fish length, panel height and whether there was a light line on the panel, the fishing line or if there was no light line at all.



Separator panel in a trawl gear with a light cable on leading edge of panel



The Photosynergy Ltd light pod with side emitting fibre optic cable



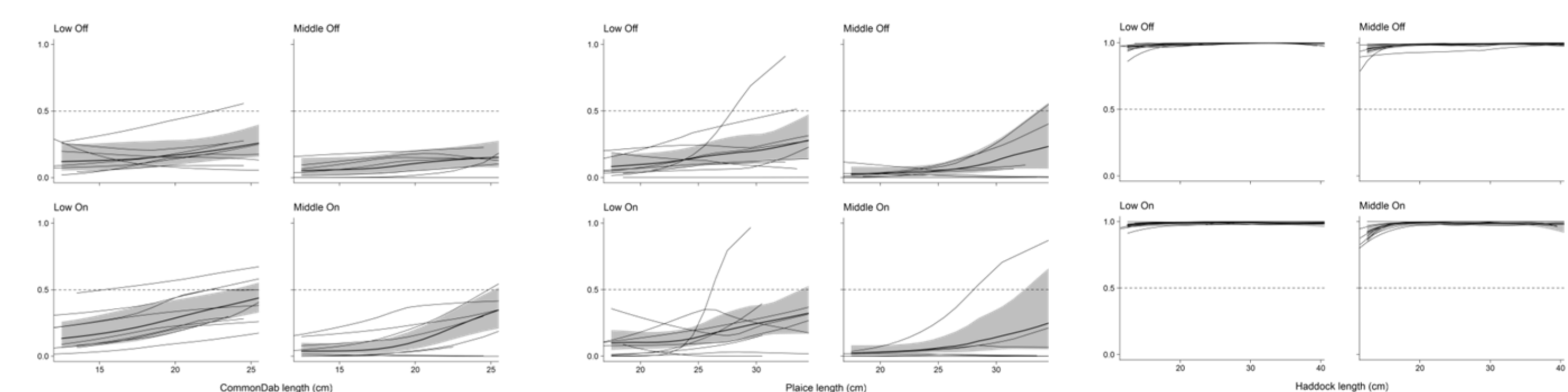
The light cable attached to the leading edge of the horizontal separator panel

FISHING DURING DAYLIGHT HOURS - SEPTEMBER RESULTS

Common dab was the only species that demonstrated a significant effect of the light cable during the September trials, which took place during daylight hours. More common dab went above the separator panel when the light cable was on than did when it was off.

More lemon sole, plaice, gurnards, common dab and long rough dabs went into the top panel when it was lower down than when it was higher up.

The panel height and the light lines did not influence the proportion of cod, haddock and whiting that entered above or below the panel. Nearly all haddock and whiting entered above the separator panel.



The proportion of common dab, plaice and haddock in the top codend of the separator trawl. 'Low' and 'middle' refer to panel heights of 20 and 60 cm respectively and 'Off' and 'On' whether the light cable is switched off or on.

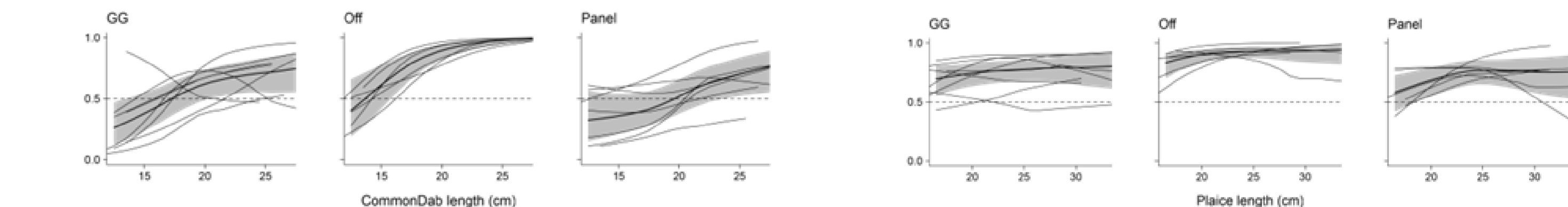
FISHING DURING THE NIGHT - MARCH RESULTS

The light cables had a significant influence on the separation of haddock, whiting, gurnard, plaice and common dab during the night-time tows in March.

When the lights were on the leading edge of the panel, significantly more of these five species went below the separator panel into the lower codend.

When the lights were on the fishing line, significantly more haddock, gurnard and common dab went below the separator panel into the lower codend.

There was no significant difference between the light cable being on the fishing line or the separator panel for any species.



The proportion of fish in the top codend of the separator trawl. 'GG' and 'Panel' refer to when the light cable is attached to the fishing line or the leading edge of the separator panel; and 'Off' refers to when there is no light cable.

CONCLUSIONS

The light cables only seemed to affect behaviour (except maybe for common dab) when used during the night.

Fewer fish enter the upper codend during night time tows with the light cable switched on.

It is not clear whether the fish are reacting directly to the light cable or perhaps to something associated with the additional illumination provided by the light cable.

More directed research needs to be carried out to fully appreciate the potential of using light in trawl fisheries and, in particular, to examine issues such as wavelength, intensity, and flash rate.

Acknowledgements

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