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Trials of sinking groundline in the Scottish creel fishery to reduce entanglement risk to marine megafauna: an interim update

Susannah Calderan, Bianca Cisternino, Russell Leaper, Alistair Philp

TRIALS OF SINKING GROUNDLINE IN THE SCOTTISH CREEL FISHERY TO REDUCE ENTANGLEMENT RISK TO MARINE MEGAFAUNA: AN INTERIM UPDATE

Susannah Calderan[1], Bianca Cisternino[1], Russell Leaper[2], Alistair Philp[3]
[1]Whale and Dolphin Conservation, Wiltshire, SN15 1LJ, UK
[2]International Fund for Animal Welfare London SE1 8NL, UK
[3]Scottish Creel Fishermen's Federation, Inveraray, PA32 8XX, UK

Abstract

In response to the Scottish Entanglement Alliance report on the entanglement risk to whales and other megafauna from floating groundline in the Scottish static pot/trap fishery, the use of sinking groundline is being trialled. The trial comprises a collaboration with fishers on Scotland's west coast, who are re-rigging gear with sinking line to assess its practicality, understand any difficulties that might arise from its use, and suggest possible solutions. The trial is currently underway, and here we provide an interim report into work carried out to date.

Background

In Scotland, entanglement of large whales in static pots/traps (known locally as 'creels') was investigated by the Scottish Entanglement Alliance (SEA) (MacLennan et al. 2021; Leaper et al. 2022). Results from that project, which included reports from strandings, live disentanglements, and interviews with Scottish inshore creel fishers, indicated that entanglement of minke and humpback whales was a more serious problem than had previously been recognised. Estimates were that six humpback whales and 30 minke whales become entangled each year (Leaper et al. 2022). The project also found that that 83% of minke and 50% of humpback whales (where entanglement type was reported) were caught in groundlines (the rope running between creels). The Scottish creel fishery generally uses buoyant polypropylene rope for the groundline and stoppers (the short leg-ropes joining each creel to the groundline), with the result that arches of rope, often several metres high, can float in the water column and entangle whales, usually by the mouth, tail or flipper (Johnson et al. 2005). For a typical 12m inshore vessel in Scotland a string of creels (a 'fleet') with a configuration of 55-60 creels and 14-15m spacing between creels and 2m stoppers, might have arches up to 9m above the seabed between each creel.

An outcome from the SEA project was a suggestion from fishers to trial the use of sinking groundline, which would lie on the seabed and therefore substantially reduce entanglement risk. Following discussion at SC68d, the Committee recommended that 'Given the apparent success of the South African initiative to switch to sinking ground lines in the octopus fishery, and following its previous recommendation that the work of the Scottish Entanglement Alliance should continue, the Committee recommends trials using sinking ground line in Scottish creel fisheries' (IWC, 2022). Following this recommendation a proposal was submitted by Whale and Dolphin Conservation (WDC) to the Scottish Government's Nature Restoration Fund (managed by NatureScot) for a trial of sinking groundline, comprising a collaboration between WDC and creel fishers from the Scottish Creel Fishermen's Federation (SCFF) on the west coast of Scotland, to assess the practicality of fishing with sinking line. This proposal was accepted and the project began in autumn 2022, and will run until March 2024. It is assumed that sinking groundline will also reduce entanglement risk to other marine fauna such as sharks, in particular basking sharks which are also predominantly entangled in groundline. Here we provide a description of the project aims and scope, and a brief summary of the work carried out thus far.

Previous use of sinking line to reduce entanglement risks

Sinking line has been implemented in pot fisheries elsewhere in the world to address whale entanglement. In South Africa, where Bryde's whales were becoming entangled in lines associated with the octopus fishery, implementation was straightforward and successfully mitigated the problem (Segre et al., 2021). On the US east coast, sinking line was introduced in the late 1990s as part of a range of measures aimed at reducing North Atlantic right whale entanglement (Laist, 2017). A number of issues were encountered, particularly in Maine, where the coastline is characterised by rocks, boulders and ledges, with strong tides and currents, which can make non-floating rope harder to use due to chafing and catching under rocks, resulting in a greater risk of gear loss (Ludwig et al. 2016). Other problems reported were that it handles poorly on deck, snags more often and therefore increases tension when hauling, has reduced stretch under tension, is noisy on the hauler, and is difficult to assess for signs that it is nearing the end of its operational life (Ludwig et al. 2016). In much of Massachusetts the seabed is less rocky, and there were fewer problems and a more successful implementation.

Methods used for trials in Scotland

Given the reports from other areas, the aim of our project was to trial sinking groundline in the Scottish creel fishery under a range of operational conditions to identify where it might cause problems, and look at how those issues might be resolved. The trial is small-scale and focused, both temporally and spatially, and there is no attempt to assess whether changing to sinking line in the limited number of fleets being re-rigged has an impact on megafauna bycatch rates.

At the outset of the project, a test fleet re-rigged with different types of sinking line was shot and surveyed using an ROV to enable decisions to be made about what ropes to use in the main trial. The test fleet also indicated that it would not be sufficient to simply replace buoyant stoppers with sinking stoppers and allow the buoyant groundline to remain, as the buoyant groundline pulled the sinking stoppers off the seabed. It was decided to use Polysteel (a blend of polypropylene and polyethylene which is stronger and more abrasion resistant than polypropylene on its own) and variants thereof, which have one or two threads of beaded lead through the weave. Densities of rope varied between 1.2 and 1.6g.cm^{-3} compared to 1.025 g.cm^{-3} for seawater and between 0.90 and 0.96 for different polymers of polypropylene and polyethylene.

Fifteen skippers from the inshore fleet in the Inner Sound/Skye area of the west of Scotland were recruited. Their vessels range between 7m to 12m in length, are both hand and self-shooting, have a variety of hauler types, and fish in a range of environments in terms of exposure, tidal flow, depth and bottom type. Most fishers are trialling two fleets ranging from 40 to 60 creels per fleet targeting *Nephrops norvegicus* (known locally as 'prawns') and 20-30 creels per fleet for crabs. Fleets generally comprise 12mm groundline with 10mm stoppers or, for the smaller vessels, 10mm groundline with 8mm stoppers. The first fleets to be trialled (n=29) were fishers targeting prawns. The prawn fishery accounts for a large proportion of entanglements (53% of minke whales and 45% of humpback whales reported during the SEA project) (MacLennan et al. 2021). For initial trials of sinking groundline it therefore made sense to start with vessels targeting prawns, as it is a high-risk fishery. Furthermore, prawns generally inhabit seabeds with soft substrate. Experience from the US suggests that soft substrate is less problematic for sinking groundline implementation. As of April 2022, crab fishing vessels (12 fleets) which fish on harder ground, are being brought in the trial. The lobster fishery is not a priority for this trial, as the SEA project data suggested it was lower risk, as it takes place primarily in shallow, very coastal waters.

The project relies on close collaboration between partners and making the most of the experience and expertise of the inshore creel fishers involved in the trial. Fishers involved in the trial receive a small amount of financial compensation for each fleet that they re-rig. This covers both re-rigging, and their time throughout the project, including providing regular feedback on their experiences of using the sinking rope. Fishers are requested to log each time they haul their fleet(s) with sinking line with the date, time, positions and depth, and any comments. These observations can be communicated to the project manager one-by-one or in monthly batches by any means convenient.

Underwater surveys and gear movement measurements

Video images from an ROV (Fifish V6 for up to 80m depth and Deep Trekker for 80 to 180m depth) will be used to provide qualitative data on how fleets of creels look on the seabed with sinking and buoyant line, and in different tidal conditions. These observations will also be used to assess for impacts on the seabed.

Tilt and accelerometer sensors (Star-Oddi DST Tilt) will be deployed at various points on fleets to record the depth and movement of lines. Sensors will be deployed on both positively and negatively buoyant line to measure the height of the loops in the positively buoyant line and any movement on the seabed of the negatively buoyant line.

Reducing entanglement risk from end lines

Current gear marking regulations in Scotland require a surface marker at each end of the fleet. These are usually close to spherical buoys (e.g. Polyform A series) which can have a high drag in fast currents or rough sea conditions. The drag can be compensated for by longer end lines (typically 1.5 times the water depth) to reduce the angle of pull on the fleet. The project will trial low drag buoys (Polyform HL series) to assess whether they enable end lines to be shortened and thus entanglement risk reduced. The tilt sensors will also be used to measure the movement of the creels that are closest to the endline.

Trial progress to date

The trial is clearly still in its early stages, but thus far, the following observations can be made:

i) Ropes were not duly onerous to splice when re-rigging the fleet
ii) No reports of ropes becoming fast on the seabed, even on hard ground
iii) Rope lays well on deck and is quiet in hauler
iv) Ropes have less tendency to tangle than buoyant line
v) Concerns that ropes would sink into the soft muddy substrates and arrive the hauler covered in mud appear unfounded.

It is important to recognise that, even on the trial's completion, it will have had limited temporal and spatial scope, the former being a particular issue in relation to whether leaded rope abrades more than buoyant rope over time. Based on the results of this project, therefore, there will be a requirement for continued monitoring, with a view to a wider roll-out, particularly in high-risk areas.

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