

Recommendations for the implementation of negatively buoyant groundline in Scottish creel fisheries



Scottish Entanglement Alliance, 2026

Executive summary

The Scottish Entanglement Alliance (SEA) has developed a practical, evidence-based framework to support the uptake of negatively buoyant groundline in Scottish creel fisheries which addresses the risk of entanglement to cetaceans and basking sharks while remaining compatible with the operational and economic realities of small-scale coastal fishing.

The measure targets the main conservation issue associated with an otherwise low-impact fishery. Interview data indicate that 83% of minke whale and 76% of basking shark entanglements involve groundlines. Negatively buoyant rope removes floating loops in the water column, directly reducing this risk without requiring major changes to fishing practices. This mechanism is consistent with findings from other fisheries, and aligns with conservation advice. For example, the Scientific Committee of the International Whaling Commission has recognised that eliminating floating groundline loops reduces entanglement risk (IWC, 2022).

SEA recommends a voluntary, nationally available subsidy that makes negatively buoyant rope around 10% cheaper than floating alternatives, combined with targeted engagement in higher entanglement risk areas. This approach avoids the costs and resistance associated with mandatory measures and is expected to achieve uptake above 80% where conditions allow. Overall, the framework shows that iterative, evidence-led, and collaborative approaches can deliver meaningful reductions in entanglement risk while maintaining the viability of coastal fishing communities.

Wider implementation of negatively buoyant rope would also support several existing policy commitments. It aligns with requirements under Habitat Regulations, and with Fisheries Act (2020) objectives on minimising bycatch of sensitive species. It contributes to Good Environmental Status under the UK Marine Strategy Regulations, Future Catching Policy, and supports Joint Fisheries Statement principles on proportionate mitigation developed with industry. It would also assist delivery of conservation objectives for the Sea of the Hebrides and Southern Trench MPAs, and strengthen UK reporting, including to the International Whaling Commission, and the US in relation to the Marine Mammal Protection Act.

Estimated costs are modest relative to the environmental benefits and the value of a transferable, fisher-led model. The framework recognises that negatively buoyant groundline is not suitable everywhere. Around 10% of fishers, typically operating in areas with specific seabed types or tidal conditions, are unlikely to be able to use it effectively; however these are areas which generally present lower entanglement risk. The measure also does not address endline entanglements, which account for roughly 20% of incidents, although SEA is continuing work on best-practice endline configurations. Subsidised groundline uptake is expected to occur over 5–8 years as rope is replaced through normal wear, balancing slower implementation against cost and waste reduction. This timescale will also enable further development of disposal and end of life procedures for negatively buoyant rope.

The project has been based on collaboration between fishers, scientists, and conservation organisations. Nearly 120 vessels across a wide range of Scottish coastal environments are now participating, with fishers directly involved in shaping how the rope is trialled and used.

Early engagement identified a certain level of scepticism among fishers, focused on anticipated difficulties with handling, snagging, abrasion, and sediment accumulation. For this reason, the programme placed strong emphasis on practical, vessel-based trials. Feedback from participating skippers shows that in most cases negatively buoyant rope performs at least as well as floating rope and, in some cases, offers operational advantages. The majority of predicted issues have not arisen, particularly in deepwater Nephrops fisheries, which are also the areas of greatest entanglement risk. The transition from initial scepticism to broad support underlines the value of enabling fishers to evaluate new gear under normal working conditions before considering wider uptake.

Developed through collaboration and engagement with industry, scientists, and conservation organisations across all major Scottish coastal fisheries, **The Scottish Entanglement Alliance recommends** the following pathway to Scotland-wide implementation of negatively buoyant groundline to reduce entanglements in creel fisheries:

1. Establish a nationally available subsidy fund

The Scottish Government should establish a dedicated fund to make negatively buoyant rope available to all Scottish creel fishers at approximately 10% below the cost of its floating equivalent.

Workshop data indicate that this price differential could be sufficient to shift voluntary uptake from 14% to over 80% of fishers. Estimated first-year costs are in the region of £450,000 (inclusive of administration and engagement); the estimated total discounted cost over ten years for the rope subsidy is approximately £3.3 million. Governance arrangements, eligibility criteria, and fund duration would require formal agreement at the point of establishment.

2. Implement a digital subsidy delivery mechanism

An online platform should be established through which registered fishers may order rope at the subsidised price, with suppliers reclaiming the difference directly from the fund.

The administrative burden on individual fishers must be carefully managed to avoid acting as a barrier to uptake. This would also act as a monitoring and reporting framework, and information on rope use could serve as the primary proxy for assessing reduction in entanglement risk.

3. Adopt a phased, waste-minimising roll-out including end-of-life gear disposal

Fishers should be supported to transition at natural gear replacement rates, avoiding additional labour costs and unnecessary disposal of serviceable rope.

This approach is estimated to achieve broad uptake within 5–8 years. Although options for the recycling and disposal of any end-of-life gear, both negatively buoyant and buoyant rope, are currently limited, there are opportunities for development of rope recycling infrastructure.

4. Target engagement in identified high-risk areas

A programme of continued face-to-face engagement should focus on fisheries and coastal areas with the highest co-occurrence of creel gear and cetacean and basking shark distributions.

Although a Scotland-wide scheme is recommended, entanglement risk is highest in deeper-water and especially Nephrops fisheries where negatively buoyant rope has also been found to perform most effectively. Direct personal engagement is the most effective way to encourage uptake.

5. Consider implementation of management-based incentives for the longer term

Beyond the initial subsidy period, wider inshore fisheries management measures, for example preferential access, creel limits, and area-based provisions, could offer a potential mechanism to encourage uptake without ongoing direct subsidy.

Fishers have expressed general support for such incentives in principle.

Introduction and context

Bycatch from entanglement in fishing gear is the primary welfare and conservation concern resulting in direct mortality of cetaceans in Scotland. As knowledge on the scope of the problem has been lacking, the Scottish Entanglement Alliance (SEA) was formed in 2018 to increase understanding of the issue, and investigate how risks could be reduced. SEA is a collaborative partnership, with representation and active involvement from the fishing industry, researchers, NGOs, and a Statutory Nature Conservation body, promoting a participatory, bottom-up approach to reducing entanglement risk in fisheries. The Alliance members are Scottish Creel Fishermen's Federation (SCFF), Scottish Marine Animal Strandings Scheme (SMASS), NatureScot, Scottish Association for Marine Science (SAMS), Hebridean Whale and Dolphin Trust (HWDT), Whale and Dolphin Conservation (WDC), British Divers Marine Life Rescue (BDMLR), and International Fund for Animal Welfare (IFAW).

A key element of SEA's early work (MacLennan et al. 2021) was to interview Scottish creel fishers about their experiences of marine megafauna entanglement (although bycatch and entanglement in Scottish waters are by no means limited to the creel fishery). Previous data on entanglement relied on strandings and reports of at-sea entanglements, with some additional photographic data on scarring. The interviews – asking creel fishers about their experiences of entanglement – were key to future work. In combination with other datasets, these were published in Leaper et al. (2022), with the assessment that “considerably more whale entanglements occur in the Scottish creel fishery than previously thought based on strandings alone, with estimates of six humpback whales (*Megaptera novaeangliae*) and 30 minke whales (*Balaenoptera acutorostrata*) becoming entangled each year. Where entanglement type was reported, 83% of minke and 50% of humpback whales were caught in groundlines between creels.” For basking sharks (*Cetorhinus maximus*), the numbers of entanglements (average 29 a year) and location of entanglements within the gear (76% in groundline) were very similar to those for minke whales (Appendix 4).

These data from fishers made clear that part of the gear on which to focus for maximum entanglement risk reduction was the groundline, where loops of floating polypropylene rope form arches in the water column between pots on the seabed, entangling whales and basking sharks by the pectoral fins, mouths or tails. Some of the fishers interviewed suggested negatively buoyant rope as an option, as it lies on the seabed rather than floats (this type of rope can also be known as ‘sinking’ or ‘leaded’). The rope has a thin line of lead in the weave (about 3.5kg of lead per 100m of 12mm diameter rope), which is just sufficient for it to lay lightly on the seabed, without causing impact on the substrate. The potential for this measure was huge: negatively buoyant rope is already in manufacture and commercially available in the UK, indeed some creel fishers already use it to keep their gear in place on the seabed and so decrease gear loss. Although it is more expensive than floating rope – a key and important difference – it offers the possibility that fishers may largely be able to carry on fishing as normal, whilst substantially reducing entanglement risk. Given that entanglement is the key problem in an otherwise relatively low environmental impact fishery, resolving it is a priority in promoting sustainable fisheries in Scotland, for the fishers themselves, for public perceptions of the fishery, and for wider Scottish and UK environmental policy objectives.

Trials of gear modifications and workshop outcomes

Initial negatively buoyant rope trials in Scottish creel fisheries

An unknown was how practical negatively buoyant rope would be in the inshore fisheries environment where target species, gear, seabed type, tide and depth are very variable. It was unlikely that the rope would perform in the same way everywhere, and SEA needed to make sure that any suggestions for gear modifications would work for fishers as well as whales. Consistent with SEA's core aims, this first trial of negatively buoyant rope, funded by NatureScot's Nature Restoration Fund (NRF), was a collaborative partnership with 15 fishers in the Nephrops (langoustine) and crab fisheries of the Inner Sound area of northwest Scotland. A description and the results of the trial are available in Calderan et al (2025), and were broadly that negatively buoyant rope is very similar to use to floating rope, and in some instances, it was preferred. Issues such as rope snagging, abrading and picking up sediment which had been anticipated largely did not occur. The study also demonstrated, through the use of ROV and underwater movement sensors, that negatively buoyant rope did not impact the seabed.

Wider trials around Scotland

As negatively buoyant rope was demonstrated to be practical in this small trial, the next step was broadening our scope to all Scottish coastal areas. This commenced in early 2025 and is still ongoing. The project has comprised:

1. Workshops to discuss gear-based solutions to entanglement issues with fishers and other stakeholders
2. The opportunity for fishers to trial negatively buoyant rope for themselves
3. Workshops to discuss fishers' experience of using negatively buoyant rope and their suggestions for implementation options (see Appendix 1).

Workshops and meetings have been held in the Western Isles, Shetland, Orkney, the east coast, northwest and southwest mainland, Clyde, Solway Firth and the Argyll Islands. Where fishers have been unable to attend workshops, we have held a number of one-to-one meetings with them instead. The first phase of these workshops and trials in early 2025 was funded by the Scottish Government Marine Fund Scotland, the second since autumn 2025 by the Nature Restoration Fund. The emphasis has been on both outreach to fishers and gathering experience of the rope across a wide range of situations, with fishers encouraged to use their expertise to suggest what any future implementation might look like. In initial workshops, information was also collected on the amount of rope currently in use in Scottish fisheries. Workshops later in 2025 focused on fishers' experiences of the rope: where it is and isn't effective, and the sort of implementation scheme that fishers would be likely to support. To date (early 2026), there are nearly 120 vessels trialing rope all around the Scottish coast, with more joining the project all the time as they become aware of it (see Appendix 1). The home ports of those fishers are distributed around the Scottish coast (Figure 1). The face-to-face meetings, and intensive liaison have been crucial to the success of the work thus far, and there is a high degree of trust and collaborative goodwill between SEA and Scottish creel fishers. Some fishers have personally experienced entanglement, and others have not. But there has been general acknowledgement that the issue should be addressed due to changes in the marine environment and for the reputation of the industry.

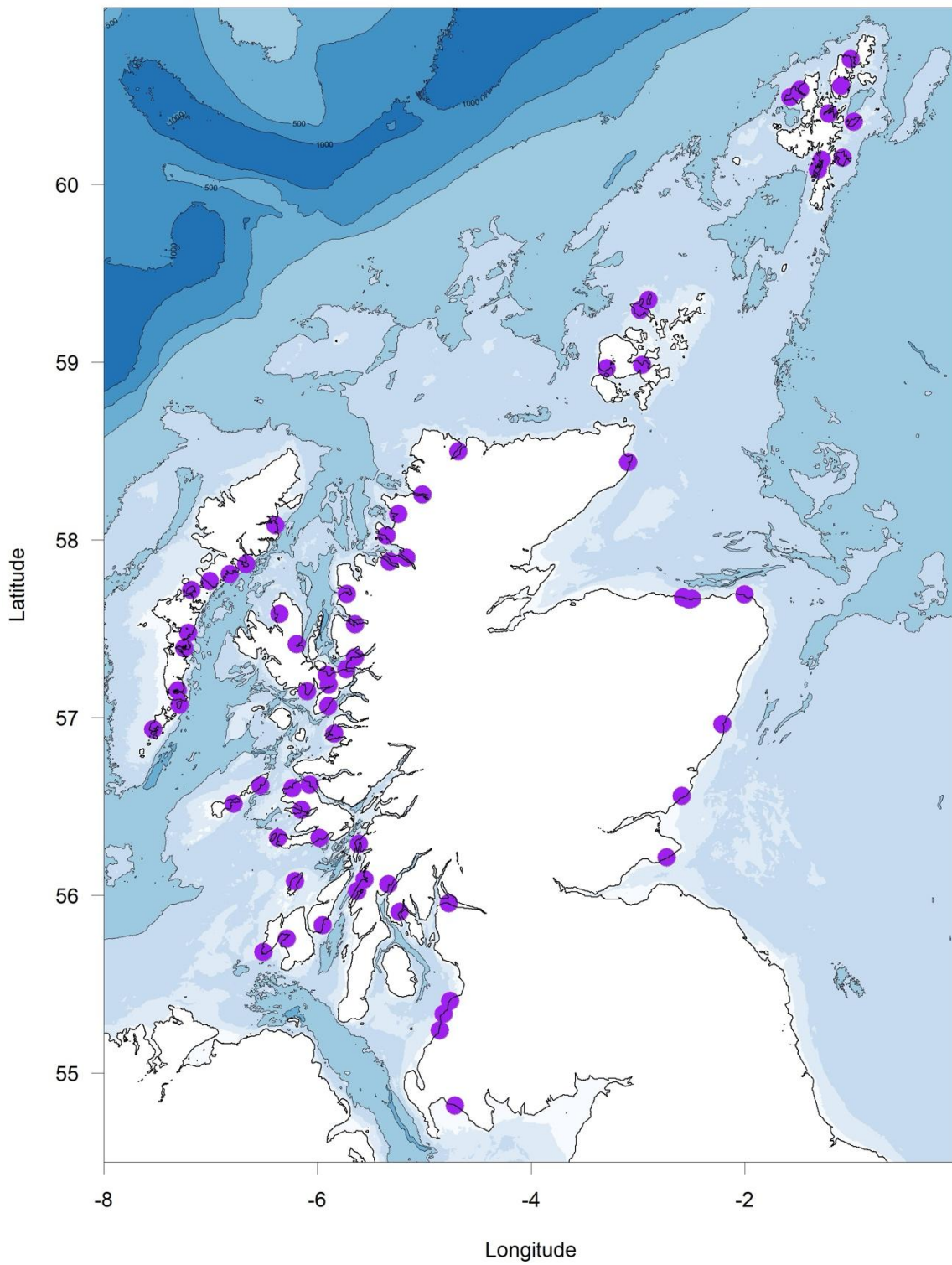


Figure 1. Home ports of fishers trialing negatively buoyant rope (as of March 2026)

2025 workshop outcomes

The programme of workshops and trials had two questions to answer: is negatively buoyant rope practical, and how would any implementation work in terms of cost, roll-out time and reporting obligations. Firstly, the practicality. This was a prerequisite to establish, and the rope trials have broadly shown that it is practical in most areas, consistent with the results from the Inner Sound. However, negatively buoyant rope did not work for some individuals, the main issues being rope coming fast and/or abrading. The specific circumstances that result in negatively buoyant rope not performing well for some individual fishers appear to be associated with a combination of seabed characteristics, tide, and fishing style (Appendix 1).

Secondly, fishers' preferences on implementation. The primary concern from almost everyone in the project was about the greater cost of negatively buoyant rope compared to floating rope. The basic cost of negatively buoyant rope, with no associated scheme to financially incentivise uptake, is approximately twice the price of floating rope. This assumes that the rope wears at the same rate, and that it is only changed out when worn out. When asked if they would change to negatively buoyant rope if it was its current cost, only 14% of fishers we spoke to said they would voluntarily do so, even though they were happy with its operational practicality. If cost issues could be overcome then the proportion who responded positively about switching, rose to over 80%. However, there were about 10% of fishers who would not be willing to switch regardless of cost (Figure 2). This includes fishers who had tried the rope and found it didn't work for them and some who had concerns but had not yet tried it. Other issues on which fishers we spoke to had concerns were any compulsory element to implementation, the timescale over which it would occur, and whether it would apply to everyone, or just certain areas/fisheries. Support for this range of implementation options and other issues discussed with fishers is described in Appendix 1, together with detailed costings for scenarios. A brief summary of support for potential subsidy options is shown in Figure 2.

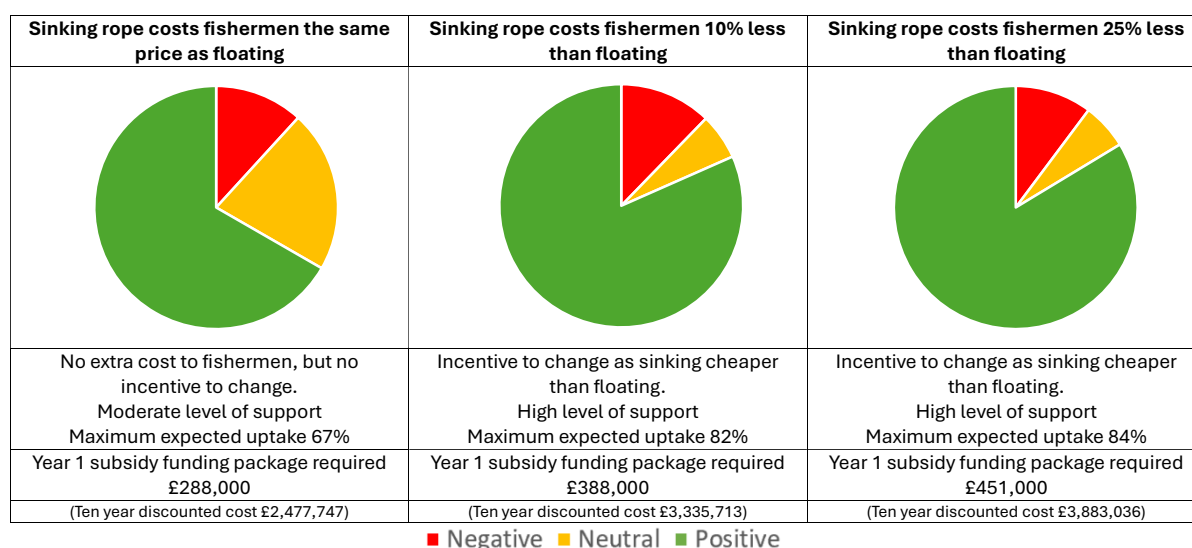


Figure 2. Pie charts show level of support from fishers who attended the workshops for different subsidy options. The SEA recommendation is to make the cost of negatively buoyant rope to fishers 10% less than its floating equivalent (middle option).

Implementation

Recommended framework

The result of this collaborative process is the framework of an implementation scheme for negatively buoyant rope in Scottish creel fisheries which is set out here, followed by recommendations for how this advice could be endorsed and enacted. The recommendations are based on a socio-economic analysis which reflects how successful subsidy schemes have been implemented in other areas, and is fully costed (see Appendix 2). It is based on the key principles emphasised by fishers for successful implementation: that (1) negatively buoyant rope use should not be made mandatory, that (2) it does not financially disadvantage fishers in the short or long term, and that (3) any scheme should apply to all Scottish fishers. We have assessed these recommendations under the widely-used PESTLE (Political, Economic, Social, Technological, Legal and Environmental) framework (see Appendix 3). The consensus recommendations from SEA do have cost implications, but our assessment is that the approach we are recommending would ultimately be the cheapest and most effective. We also consider that it represents a large environmental benefit for a relatively small cost and so represents excellent value for money.

Avoiding the need for mandating the use of negatively buoyant rope in Scottish creel fisheries; problems associated with mandating use

There are a number of considerations that make any mandatory requirement to use negatively buoyant rope problematic and our assessment is that it would ultimately result in lower uptake and greater public expenditure, as well as loss of goodwill:

- a. Although small, around 10%, there is a proportion of fishers for whom negatively buoyant line was not practical for their fishing grounds or methods (see Appendix 1)
- b. For fishers who target both Nephrops and crab/lobster, the most practicable option that still addresses entanglement risk might be a combination of negatively buoyant in deeper water/softer ground and floating rope in shallower areas of low entanglement risk
- c. Any measure that is not voluntarily supported by the majority of fishers will likely necessitate substantial public expenditure to consult and draft regulations and address any legal challenges
- d. Creel gear is rarely brought ashore and so any enforcement would have to involve at-sea inspections which would be prohibitively expensive and impractical
- e. Mandatory use in certain areas would require designation of areas which would need to take into account the complexities of coastline, depth, seabed type etc. Specifying such areas would be a substantial piece of work and it would then be difficult to respond in a timely way to changes in distribution of sensitive species (see section 3). Requiring use in some areas could also result in more gear using floating set along the boundaries which would be problematic.

Instead of a mandatory scheme, we recommend a universal government subsidy to incentivise use, so that it is a business decision for creel fishers rather than regulatory enforcement. This means that all those who can will use it, because it will be cheaper. But those who really cannot use it will not have to. Our recommendation to encourage early uptake of negatively buoyant rope in the highest priority areas would be through targeted outreach to fishers in those areas. Such targeted outreach could also allow for a much more rapid response to changes in whale and basking shark distribution. Shifts in megafauna distribution due to climate change and higher sea temperatures can result in new areas becoming high entanglement risk. For example, in the Inner Sound area of northwest Scotland, until recently whales were rarely sighted. Although the pilot trials of negatively buoyant rope took place there (Calderan et al, 2025), fishers did not consider the area to be high risk. However, in the last two years, there has been a high presence of humpback whales there, including several entanglements. At a SEA meeting with fishers in that area in summer 2025, they noted that they were pleased to already be taking proactive steps to reduce entanglement risk, and unanimously supported a complete switch to negatively buoyant line as soon as practicable if financial support could be provided.

The recommended way forward is ensuring that fishers use negatively buoyant rope by creating a system where it makes sense to them in terms of price, future management incentives and fishing practices, rather than because they are required to do so by government. A mandate would be particularly unpopular, given that the success of the trial so far and SEA's work in general is based on collaborative, bottom-up, consensus-based approaches, taking the advice of working fishers based on their expertise. A mandate without a subsidy would disproportionately affect a vulnerable fishery with implications for coastal communities. Even a mandate with a subsidy would be highly problematic for those fishers who find negatively buoyant rope to be impractical. From the perspective of the fishers' representatives, there is nothing to be gained and much to be lost by requiring fishers to use impractical gear.

Most of the fishers we have been working with who have not had good experiences with the rope have been either on the east coast, or the west coast of the Western Isles, where it is likely that particular interactions of depth/current and rough seabed cause the rope to snag, abrade and pick up sediment. Fortunately, these areas have less suitable habitat and therefore have fewer whales and basking sharks and so lower entanglement risk. There are safety concerns with rope coming fast on the seabed, about which several fishers have legitimate concerns. Interestingly, this is by no means all fishers in certain areas. So there clearly are differences in how people fish which, on some grounds, might make the difference between the rope being practical and not practical. We are not in a position to address many of these differences, however some modifications – such as using floating rope from the endline weight to the first creel which alleviates abrasion at the seabed section of the riser – can be suggested as part of best practice. However, the important point to note is that it is not always predictable for whom the rope will and won't work. Whilst in some fisheries management, a top-down legislative approach is necessary or preferable, in small-scale, inshore fisheries, collaborative bottom-up, consensual change stands the best chance of success. This is a strong argument against a mandate given the overall aim of the highest level of uptake and minimising public expenditure.

Avoiding financially disadvantaging fishers

There are a number of areas where the use of negatively buoyant rope might become more economically attractive in the future, such as benefits from fisheries management measures, accreditation schemes and reduced gear loss. Negatively buoyant rope in creel fisheries is not a new idea, but has hitherto not been used as an entanglement mitigation. However, as it is primarily used to keep gear on the ground and thus prevent gear loss, in time, it might pay for itself. This has been reported to us as being the case by those fishers we have spoken to who use it (including fishers from Islay, Shetland and Orkney). However, it will only pay for itself in areas where gear loss due to strong currents or sea conditions is an issue, and in order to stimulate initial uptake, the only realistic option is a financial subsidy. As part of the project therefore, the cost, and how varying subsidies could work, was calculated by first estimating how much rope is in the water, through information provided by workshop participants and Scottish Government fisheries data. Various subsidy scenarios were then investigated, and discussed with fishers. Detailed description of this process is provided in Appendix 1. However, the approach which suggested a high level of uptake was a subsidy which made negatively buoyant rope 10% cheaper to buy than floating rope. With negatively buoyant rope 10% cheaper the maximum expected uptake was 82% compared to 67% if there was no difference in cost (Figure 2 and Appendix 1). The estimated cost in the first year of rope subsidy for this option with the maximum expected uptake would be £388,000 with an estimated total 10-year discounted cost of £3,335,713 (see Appendix 2).

Regional or Scotland-wide subsidy scheme?

Why not a regional implementation/subsidy, based on high-risk areas when considering a subsidy scheme? We have previously outlined the challenges with designating any areas if mandatory use was being considered. The issues associated with offering a subsidy on a regional basis are rather similar.

Firstly, although survey data do indicate the presence of high risk areas in Scottish coastal waters (see Appendix 4, basking shark distribution; Appendix 5, minke whale distribution), these may not be stable areas as the marine environment changes, examples of which are the recent year-round increase in common dolphins (Hartny-Mills et al. 2024), and the increased numbers of humpback whales (Leaper et al. 2022), many of those being found in inshore areas during the winter. A move to negatively buoyant rope to reduce entanglement risk would need to be future-proofed as much as possible. Another disadvantage of a regional approach is how those boundaries would be drawn, with implications for fishers working both within and outwith priority areas. Providing subsidy/requiring implementation from some fishers and not others would be administratively burdensome. Finally, prioritising some areas over others risks causing divisions amongst fishers who might feel that the process was unfair. In addition to being problematic for fishers a spatially restricted approach could also be less effective mitigation approach due to potential for higher risk gear being set along boundaries. However, this does not exclude the option of focusing outreach to encourage uptake in areas which are currently considered high-risk. Our outreach and meeting work so far has demonstrated that many fishers can be sceptical about using negatively buoyant rope, with preconceived ideas about the problems, and limited knowledge of the advantages. However, once we have spoken to them, and once they have trialled it, they tend to be pleasantly surprised. So, whilst a mandate or restriction of subsidy to certain areas would probably be counter-productive, emphasis on more

outreach, continuing to give people the opportunity to trial rope before committing in the areas considered high-priority, could be very beneficial.

An additional positive outcome of the negatively buoyant rope trials is that it has been demonstrated to work best in the areas of highest entanglement risk, namely deeper water fisheries (>30m). These are higher risk, as they have higher co-occurrence of creels and cetacean distribution than shallow, very coastal areas. Deeper water creel fisheries are largely for Nephrops (and brown crab), and the seabed is usually quite soft mud or sand, which means that negatively buoyant rope does not snag or abrade. Shallower, very coastal grounds which tend to be for lobster, some brown crab, and velvet swimming crabs can be less suitable for negatively buoyant rope, as the ground can be very rough and/or characterised by ledges and boulders on which rope can get caught. However, these areas are much lower risk for entanglement. So, if the subsidy was offered to everyone, those fishers would be less likely to take it up, but it would be of minimal consequence. Accordingly, there would be little need to promote it to them. There will not be 100% industry buy-in/uptake, but this is not required for significant risk reduction.

Timeline and end of life gear

We also talked to fishers about the timescale for implementation. The consensus was for a roll-out whereby floating rope was replaced with negatively buoyant rope as it wore out. This would avoid the costs of extra fisher time, waste of rope, and a sudden influx of rope for disposal. Our estimates of the overall cost of the scheme show that if fishers' time is fully costed for the extra work of replacing rope that would not otherwise need replaced then this would represent the major cost of any implementation scheme. Replacing rope only when it is needed results in a slower implementation (5 to 8 years) but avoids these extra costs plus any extra public authority costs associated with gear disposal. The proposed implementation scenarios will not increase the volume of end-of-life rope requiring disposal. However, we are aware that current options for the safe disposal of rope (both with and without lead) are limited. The lack of facilities for end-of-life fishing gear containing lead are an issue for many UK static gear fisheries (creels, gill nets, hook and line), as they all use lead already. End-of-life negatively buoyant rope in creel fisheries is an issue that will be addressed as part of the wider implementation strategy, and we are already liaising with a number of recycling facilities and relevant stakeholders. Potential options will be informed by reviews of similar requirements internationally (e.g. OSPAR, 2020; FAO/IMO, 2023) and outcomes of recent and ongoing projects including the 2025 'Guidelines on Good Management Practices for EOL fishing gear' from the EU and UKRI funded SEARCULAR project (Ruohomäki and España, 2025). In the short term, rope disposal facilities should allow the separation of floating and negatively buoyant rope to enable them to be recycled separately. Negatively buoyant rope is typically 30-45% lead by weight; for 12mm rope it is about 3.5kg of lead for a 100m length. The proportion by weight is a little less than an average lead-acid battery (~60% lead). Many lead-acid batteries also have a polypropylene casing and so the materials needing to be recycled are very similar to those in rope and facilities already exist for environmentally safe recycling of large quantities of lead-acid batteries. Extended Producer Responsibility (EPR) schemes have a key role to play in future rope manufacture and recycling, and we would welcome Government involvement and commitments in this area.

Phased roll-out would also avoid a sudden demand for negatively buoyant rope. Most UK rope suppliers stock both floating and negatively buoyant rope, with the leaded versions retailing at approximately twice the price of their floating equivalents. During the trials, we have experienced some issues with rope supply, but this is because we suddenly increased demand. With a well-trailed, phased, national scheme coming in, suppliers would have sufficient opportunity to increase their supply if they received sufficient notification. There is also a good chance that increased uptake of negatively buoyant rope will reduce its price.

Establishment and practicalities of implementation fund

In order for the roll-out of an implementation scheme to start, a fund would need to be established to enable rope subsidies, administration and continued engagement and monitoring. The expected costs of the fund are detailed in Appendix 2, but in its initial year would be in the region of £450,000. The duration, governance and monitoring of the fund would need to be agreed upon on its establishment.

In terms of the fishers' access to the fund, an electronic ordering system for fishers could be set up. Whilst the detail of this would need to be resolved once a fund was confirmed this could be based on other similar schemes operating in Scotland. All fishers and rope suppliers would be registered on an online platform. Fishers would request rope and pay the subsidised price, then rope suppliers would claim the difference back. This system could contain additional fields for fishers to fill out on their rope use to enable monitoring of the scheme. This administrative burden would need to be carefully assessed so that it was not a barrier to uptake.

Metrics of success

We have recommended an implementation scheme that is voluntary, subsidised, national and phased. It is clear that any subsidy would need to have demonstrable success outcomes. Initially, SEA only became aware of the extent of marine animal entanglements through interviews with fishers, as strandings data and public reporting only account for a small proportion of entanglement records. The rope trials we have been running were always envisaged as an investigation into rope practicality rather than whether it reduced entanglements. Therefore, demonstrating a decrease in entanglements is unlikely to be straightforward. However, if we accept that whales and basking sharks which are currently becoming entangled in loops of floating rope will not be able to get entangled if the loops are not there, a demonstrated increase in negatively buoyant rope uptake is a proxy for decreased entanglement risk. This principle is reflected in the recommendations from the Scientific Committee of the International Whaling Commission which has reviewed the use of negatively buoyant rope. The reduced entanglement risk has already been demonstrated in other fisheries (e.g. the South African octopus fishery reported by Segre et al., 2022). Fishers involved in the SEA project indicated their willingness to report on their changeover to/use of negatively buoyant rope, and a monitoring scheme to track the progress of implementation would be required.

Future Management options

As part of our workshop discussions, we have also been discussing support for management incentives, which could provide an alternative to a financial subsidy in the future, by giving preferential management-based opportunities for fishers using negatively buoyant rope. We

asked fishers for their views on possible management incentives involving numbers of creels, quota and preferential access to certain areas once vessel tracking is in place. Fishers at workshops expressed general support in principle for such future management incentives.

Negatively buoyant rope within a wider national and global policy fisheries management context

The use of negatively buoyant rope in pot/creel fisheries has the potential to reduce entanglement risks in many areas of the world. Negatively buoyant rope has been used in the US in fisheries off the east coast for many years primarily in order to reduce entanglement risks to critically endangered North Atlantic right whales (*Eubalaena glacialis*). The requirements for negatively buoyant rope in these US fisheries have been controversial (Laist, 2017), but many of the problems that have arisen in the US have been avoided in Scotland through the more collaborative approach, with the first step of supporting fishers to trial the rope to ensure that it is practicable to fish with. The work in Scotland has been internationally recognised as a successful way to address the problem, and continuation of the collaborative approach leading to widespread implementation would provide a model for other regions that would demonstrate Scottish leadership on the issue.

Measures to reduce entanglement are needed to meet with requirements of Habitat Regulations with respect to cetacean bycatch, and the objectives of the Fisheries Act (2020) to minimise and where possible eliminate bycatch of sensitive species. Measures will also contribute to achieving Good Environmental Status under the UK Marine Strategy Regulations (2010). Our recommendations for implementation of negatively buoyant rope align with the Joint Fisheries Statement which notes that fisheries policy authorities will achieve the goals of the ecosystem and bycatch initiatives by ‘developing and adopting effective mitigation measures’ and ‘supporting fishers to implement mitigation measures’. The uptake of negatively buoyant rope would also be a possible candidate for an ‘operational target’ to demonstrate progress within the Marine Strategy Regulations and could be relatively straightforward to achieve compared to other measures. A report in 2025 to the Office of Environmental Protection (MarFishEco., 2025) noted that ‘The UK must take decisive actions to ensure the effectiveness of its bycatch mitigation strategies, including; Encourage Collaboration and Innovation: Partner with fishers, NGOs, and policymakers to co-design practical, scalable mitigation measures supported by financial incentives and innovative technologies’. Our recommendations to address entanglement follow these principles.

In addition, the Scottish Government’s 2022 consultation on Scotland’s Future Catching Policy noted that measures may be required to reduce instances of entanglements and accidental bycatch of other marine species for the pots and creels sector. With this recognition, the Scottish Government’s consultation on selectivity proposals under the Future Catching Policy, published in February 2026, cites negatively buoyant rope as a potential measure for reducing entanglement risk. Fisheries Management Plans (FMP) being developed by the end of 2026, as part of Scotland’s fisheries management strategy 2020-2030, will also include West coast of Scotland and North Sea Nephrops.

The approach we are recommending would support implementation of the measures within the Sea of the Hebrides MPA for both minke whale and basking sharks and in the Southern Trench MPA for minke whales, as recommended by NatureScot (2025a, b); ‘to further develop and adopt best practice to reduce or limit the risk of entanglements in creel ropes’. It would also align with the Marine Directorate Inshore Fisheries Management Improvement Programme which provides opportunities for more responsive management¹.

The UK reports incidents of large whale entanglements to the IWC and has made good progress in implementing IWC recommendations regarding the use of negatively buoyant groundline. Demonstrating further progress leading to widespread implementation would further enhance the reputation of UK fisheries and the UK’s standing on this issue internationally. In addition, the UK was granted a comparability finding for all fisheries under the import regulations of the US Marine Mammal Protection Act, based on UK regulations which include the requirement to report marine mammal bycatch and entanglements and bycatch mitigation measures. One of the measures stated in the submission was that the pot/trap fishery ‘utilized sinking groundline’ to reduce bycatch of minke and humpback whales. Continued progress on the implementation of negatively buoyant (sinking) groundline is needed to achieve this.

Non-groundline entanglements

Just as bycatch and entanglements occur in Scottish fisheries other than the creel fishery, so the interview data also demonstrate that entanglements in creel fishery rope are not only in the groundline. Endline entanglement occurs in around 20% of basking shark and minke whale entanglements, around 50% of humpback whale entanglements, and is also the commonest location in the gear for dolphin species and turtle entanglement. We should also bear in mind the recent increase in common dolphins year-round in the inshore, which may result in more endline entanglements of this species. On-demand/ropeless technology is being developed and implemented elsewhere, for example on the east coast of the US to attempt to reduce North Atlantic right whale entanglement. At this point in time, SEA is not recommending this option be pursued in Scottish creel fisheries. On-demand gear is still in development and requires substantial changes in fishery practices, development of methods for information sharing between fisheries sectors, extra time, expense, and the risk of gear loss, which are not justified by the current level of endline entanglements. However, SEA is currently concluding a project experimenting with different endline settings (length of riser, type of rope, type of buoys) to enable us to make best practice guidelines which minimise the endline length whilst not resulting in problems with gear. These guidelines will be circulated amongst creel fishers as part of SEA’s ongoing outreach work. Meanwhile, SEA’s primary focus will remain on negatively buoyant groundline, as it is the best value for money in terms of risk reduction, and the simplest to implement.

¹ <https://consult.gov.scot/marine-scotland/ifmi-programme/>

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