



MASTS Annual Science Meeting 2025

Call for Speakers and E-Posters

Template for Abstract Submission

SPEAKER

For speaker offers, please indicate which session you are interested in:

Applied Marine Bioacoustics

Using passive acoustic monitoring to record wild porpoise behaviour around actively fishing gill nets.

Full name: Jamie Macaulay

E-mail address of lead presenter: jdjm@st-andrews.ac.uk

Organisation: Scottish Oceans Institute

Student: N

Abstract

Static nets (e.g. gill/tangle/trammel nets) are considered the largest direct cause of anthropogenic mortality in small-toothed whales globally. Despite this, very little is known about how wild animals behave around static nets and what the mechanism behind entanglement and subsequent bycatch is. This represents a significant information gap which hinders mitigation attempts.

Autonomous passive acoustic loggers are a practical and cost-effective way to monitor echolocating toothed whales around fishing nets; however, off-the-shelf devices generally only provide information on presence and acoustic behaviour (e.g. foraging/communicating). We have developed a recording system which can also track the 3D movements of echolocating toothed whales around gill nets.

The system consists of two compact 4-channel recorders which can record 384kHz data for five days (the upper end of a typical static net soak time). Each recorder has a sensor package which uses 3D motion tracking technology to accurately log orientation along with depth, temperature, and light. Recorders are attached directly to a gill net headline ~25m apart and can be deployed during normal fishing operations by a trained researcher or fisheries observer. The recordings are then analysed in PAMGuard software and positions of animals calculated using acoustic localisation methods.

The system has been deployed multiple times in UK waters to monitor harbour porpoises; we present 3D porpoise tracks around nets, showing that animals are likely interacting with static nets. We also present data from a bycatch event and discuss how our monitoring projects, moving forward, will help target and improve bycatch mitigation.

Optional - Additional Information

-

Optional - Acknowledgements

Thanks to DEFRA and the CIBBRiNA project for funding this work.

Optional - Additional Authors

Alex Coram

Allen Kingston

Rene Swift

Simon Northridge

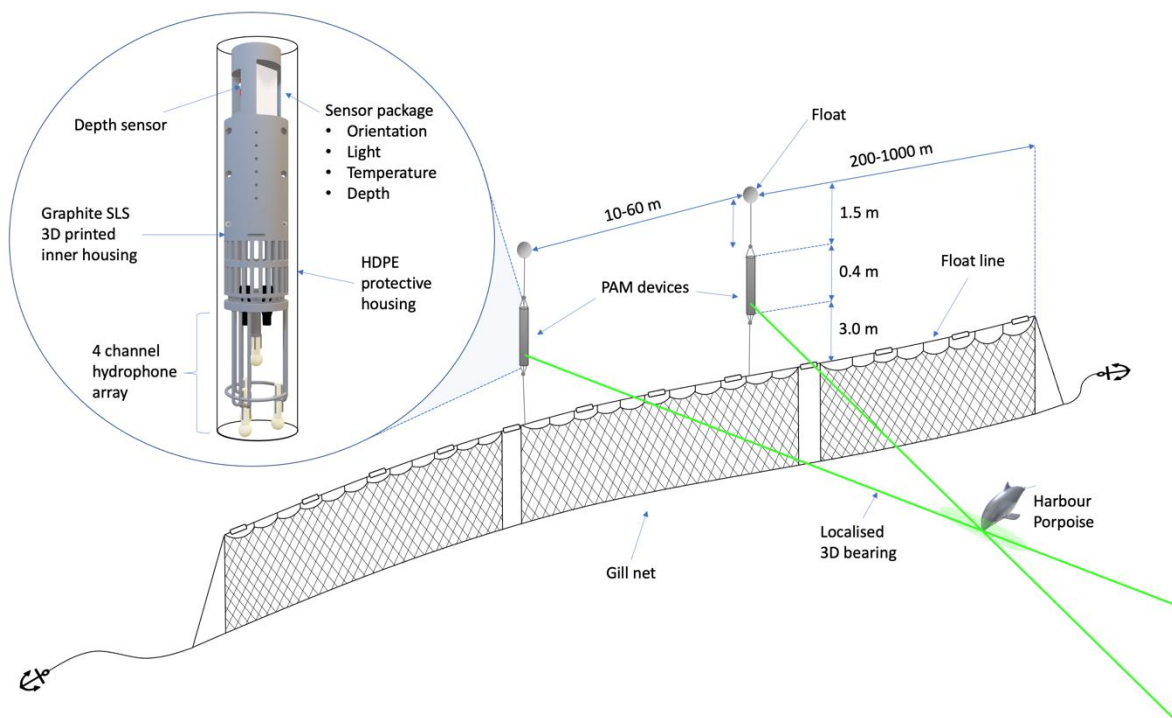


Figure 1. A diagram showing how the PAM recorders determine 3D co-ordinates of echolocating porpoises. Each device contained a tetrahedral four-element hydrophone cluster which enabled the calculation of 3D localisation vector to the source of a received sound – in this case a porpoise click. If both devices detected the same click, the point at which the two vectors intersected indicated the instantaneous 3D location of the animal. Animal movement patterns could then be inferred by interpolating these 3D locations



MASTS Annual Science Meeting 2025

Call for Speakers and E-Posters

Template for Abstract Submission

SPEAKER

For speaker offers, please indicate which session you are interested in:

Applied Marine Bioacoustics

Humpback Whale Songs as Markers of Migration in the North Atlantic

Full name: Dr Natalie Sinclair

E-mail address of lead presenter: natalie.sinclair@nature.scot

Organisation: NatureScot

Student: N

Abstract

Bioacoustics provides a powerful, non-invasive approach to studying marine mammals, with direct applications for conservation and marine management. Humpback whales undertake one of the longest migrations of any mammal, travelling around 9,000 km between high-latitude feeding grounds and low-latitude breeding areas. Understanding these connections is vital as climate change and offshore development increasingly affect whale habitats. This study focussed on population connectivity of humpback whales in the North Atlantic using song recordings from the Eastern Caribbean breeding grounds and the west coast of Scotland migratory and extended feeding grounds (2020–2021). Analysis of humpback whale songs revealed that the same song type was shared between these locations, suggesting migratory linkage. The temporal progression of song evolution indicated that individuals who updated their song in the Eastern Caribbean carried this updated song to Scotland. These findings highlight the applied value of bioacoustics as a complementary tool to photo-identification and tagging. Acoustic monitoring offers a cost-effective and scalable way to track long-distance movements, assess population exchange, and detect changes in habitat use. More broadly, this work illustrates how bioacoustic evidence can inform conservation planning and the protection of critical habitats at a time of rapid climate and industry-driven change in the marine environment.

Optional - Additional Information

Include any hyperlinked pages and documents you wish to reference. Please keep this brief.

Optional - Acknowledgements

Write down any necessary acknowledgements here, for example funding bodies. Please keep this brief.

Carnegie Trust for the Universities of Scotland

Optional - Additional Authors

Document any other individuals who need to be acknowledged here. Do not include emails or list them above.



Natalie Catherine Sinclair^{1†}, Denise Risch², Cathy Gibson and Luke Rendell¹

¹University of St Andrews, St Andrews, Scotland, United Kingdom

²Scottish Association for Marine Science (SAMS), Oban, Scotland, United Kingdom

[†]Current affiliation: NatureScot, Inverness, Scotland, United Kingdom



MASTS Annual Science Meeting 2025

Call for Speakers and E-Posters

E-POSTER

General Science Session or Marine Mammals

BLUE CONNECT: Collecting marine mammal data within the Shetland and Fair Isle Important Marine Mammal Area

Full name: Emily Hague

E-mail address of lead presenter: emily.hague@uhi.ac.uk

Organisation: UHI Shetland

Student: N

Abstract

In 2024, a number of areas around Scotland were identified as 'Important Marine Mammal Areas' (IMMAs), meaning they were identified by a team of experts (the 'Marine Mammal Protected Areas Task Force') as an area that is critically important habitat for one or more marine mammal species. The Shetland and Fair Isle IMMA was identified based largely on evidence comprised from community collected data, highlighting the area as important to some aspects of the biology, ecology or population structure (including, for example, for foraging, socialising, mating, resting) for many species, including harbour porpoise, grey and harbour seals, Risso's dolphin and minke, humpback and killer whales.

To build the evidence base in relation to these species and the IMMA, over the next three years the BLUE CONNECT project will focus on enhancing our knowledge of marine mammals in this region. By trialling new monitoring technologies, exploring innovative conservation approaches, and working closely with local communities and industries to collect new data, we aim to showcase how collaboration can lead to better understanding, protection and management of these vital marine species and their habitats. This poster will showcase the projects plans for the coming years, as well as progress so far.

Additional Information - <https://www.shetlandmarinemammals.com/> and <https://blueconnect-project.eu/>

Acknowledgements - The BLUE CONNECT project is funded by the European Union, under the Horizon Ocean Mission funding (HORIZON-MISS-2023OCEAN-01). At UHI Shetland, Rachel Shucksmith and Emily Hague are responsible for the daily running of the project. They are working closely with the wider BLUE CONNECT team, and with their local stakeholder working group, and a large number of collaborators. The Local Stakeholder Working Group includes the Shetland Cetacean Group, Shetland Wildlife, NatureScot, UHI Shetland, local community volunteer representatives, Whale and Dolphin Conservation, Salmon Scotland, Shetland Islands Council, Shetland Fishermen's Association, Seafood Shetland, Hebridean Whale and Dolphin Trust, the Scottish Government's Marine Directorate and University of Cumbria.

Additional Authors - Rachel Shucksmith – UHI Shetland



MASTS Annual Science Meeting 2025

Call for Speakers and E-Posters

Template for Abstract Submission

E-POSTER

For speaker offers, please indicate which session you are interested in:

General Science Session

Title: Ecosystem Consequences of Changes to Habitats and implications for a Net Gain Energy approach

Full name: Flora Kent

E-mail address of lead presenter: Flora.Kent@gov.scot

Organisation: Marine Directorate, Scottish Government

Student: N

Abstract

Offshore Wind Farms (OWFs) introduce hard structures that alter biodiversity, impacting the epifaunal community composition on these structures, surrounding soft-bottom habitats and mobile fauna around the foundations. However, the effects on higher trophic levels remain unclear, posing a key evidence gap in evaluating whether these changes should be considered 'good' or 'bad' for the marine environment. Given the scale of planned OWF developments, addressing this gap is crucial for understanding their role in achieving nature positive or marine net gain (MNG) requirements. This project, 'Ecosystem Consequences of Changes to Habitats and the implications for a Net Gain Energy approach' (ECOCHANGE) will assess how offshore wind farms affect food web nutrient flow by examining the functional role of marine growth.

During the first year of the three year project, epibenthos, fish, crustaceans, plankton and benthic infauna have been collected at fixed and floating wind farms using grab sampling, trawls, settlement panels and fish traps. The samples will be analysed using stable isotope analysis ($\delta^{13}\text{C}$ and $\delta^{15}\text{N}$) together with stomach content analysis to capture nutrient consumption and food web structure at selected OWFs. The project will also assess if changes in biomass and productivity extend beyond OWF sites to surrounding habitats. This research aims to provide insights into the ecological consequences of OWFs and their potential contribution to MNG goals.

Optional - Acknowledgements

ECOCHANGE is funded by The Crown Estate's Offshore Wind and Evidence Change Programme (OWEC) with part funding from the Scottish Government's Scottish Marine Energy Research (ScotMER) programme. Thanks to the skippers and crew of the Alba na Mara, Waterfall and Gaoth na Mara, particularly Jim Mair, Paul Stainer and Jonathan Archer for their help collecting the samples.



Additional Authors

Matt Newton, Kirsty Wright, Emma Beaton, Robert Watret, Alan Baudron, Jack Wilkinson, Rachel Jeffreys and Kieran Tierney



MASTS Annual Science Meeting 2025

Call for Speakers and E-Posters

Template for Abstract Submission

E-POSTER

Principles for Responsible Investment in Coastal and Marine Natural Capital

Full name: Dr Katherine Simpson

E-mail address of lead presenter: katherine.simpson@glasgow.ac.uk

Organisation: University of Glasgow

Abstract

As interest in natural capital markets grows, attention is turning to the potential role of private finance in supporting the restoration and enhancement of Scotland's marine and coastal ecosystems. While investment principles and codes have been developed for terrestrial settings, often with a strong emphasis on carbon, there is currently a gap in guidance tailored to the ecological and governance complexities of the marine environment.

This e-poster presents the outputs of a MASTS-supported cross-sector workshop that brought together researchers, practitioners and regulator to translate the Scottish Governments existing Principles for Responsible Investment in Natural Capital for the coastal and marine environment. The revised principles aim to uphold environmental integrity, equity, and legitimacy in emerging marine markets. They reflect the distinct governance landscape, based on leasing and licensing rather than ownership, and acknowledge restoration approaches that often depend on passive pressure reduction rather than active intervention. The work also challenges land-based assumptions about "community benefit" by exploring how marine investments can affect culturally significant users and offshore areas without fixed local communities.

These adapted principles can also inform emerging compliance markets, including anticipated Marine Net Gain requirements. By embedding fairness, transparency, and ecological credibility, they offer a values-led foundation for inclusive, future-ready investment. A supporting Theory of Change outlines how embedding these principles across policy and practice can support a unified Source-to-Sea approach, guiding Scotland toward a more coherent, accountable, and socially just natural capital framework.

Additional Information

Scottish Government Natural Capital Market Framework: This document sets out the broader approach the Scottish Government is taking to guide responsible private investment in Scotland's natural environment. Available at: <https://www.gov.scot/publications/natural-capital-market-framework/>



Acknowledgements

This work was developed with support from the Scotland Beyond Net Zero and MASTS.

Additional Authors

David Paterson², David Bailey¹, Laurence De Clippele¹, Jason Matthiopoulos¹, Natasha-Walker Milne¹ and Chris Leakey³ (¹ University of Glasgow, ² University of St Andrews and MASTS, ³ NatureScot)



NMASTS Annual Science Meeting 2025

E-POSTER

General Science Session / Multiple Stressors

Deep-Sea Ecotoxicology in the Age of Mining: Challenges, Knowledge Gaps, and Future Directions

Full name: Dominique M J Anderson

E-mail address of lead presenter: d.m.j.anderson@hw.ac.uk

Organisation: Heriot Watt University

Student: N

Abstract

As commercial interest in polymetallic nodule mining intensifies within the deep sea (e.g., the Clarion-Clipperton Zone of the Pacific Ocean), there is an urgent need for ecotoxicology to investigate the potential impacts on these vulnerable ecosystems. Despite regulatory requirements for environmental impact assessments, current methods fall short of capturing the unique physiological and ecological characteristics of deep-sea species, or the complex exposure scenarios expected from mining operations. Existing approaches to ecotoxicological assessment often rely on shallow-water proxies, single-contaminant exposures, and ambient-pressure laboratory conditions, which offer limited insight into the responses of deep-sea organisms exposed to complex contaminant mixtures under high-pressure, low-temperature conditions. The objective of this work was to identify and address key knowledge gaps in deep-sea ecotoxicology, with a focus on mining-related stressors. This was informed by a critical synthesis of current literature, spanning contaminant exposure pathways, biomarker development, mixture toxicity, and food web transfer. Key gaps include the lack of validated biomarkers for deep-sea species, limited mechanistic or long-term toxicity studies under deep-sea conditions, and poor understanding of cumulative or synergistic effects from contaminant mixtures and climate-driven stressors, complicating risk prediction and mitigation. The proposed framework highlights the need for: (1) in situ, multi-stressor experimental systems; (2) integrative biomarkers of cumulative stress; (3) functional endpoints linking molecular responses to ecological relevance; and (4) improved baseline contamination data with appropriate ecological, spatial and temporal resolution. This approach supports a shift toward mechanistically grounded and precautionary ecotoxicological assessments that better inform regulatory frameworks and environmental management of deep-sea mining activities.

Optional - Additional Authors

Mark G Hartl (HWU), Andrew K Sweetman (SAMS), Theodore B Henry (HWU)



MASTS Annual Science Meeting 2025

Call for Speakers and E-Posters

Template for Abstract Submission

Chloe Malinka

Applied Marine Bioacoustics

Near Real-time Passive Acoustic Mitigation Monitoring: Listening for Dolphins in a Scottish SAC throughout a Dredging Campaign

Full name: Chloe Malinka

E-mail address of lead presenter: (*TBD who from the author list will present, but please send all communications to Chloe at cm@smruconsulting.com)

Organisation: SMRU Consulting

Student: N

Abstract

Near real-time mitigation monitoring using passive acoustics is increasingly required for marine mammals surrounding industrial activities in the ocean. It is beneficial to understand where marine mammals are with respect to a given mitigation zone, as this both minimizes potential adverse impacts on the species of concern and addresses the fact that development activities are costly endeavours. In response to these needs, SMRU Consulting has developed a multi-channel autonomous passive acoustic monitoring system: the CAB Guardian (coastal acoustic buoy). CABs have an onboard acoustic processing system running PAMGuard, and provide bearing information of marine mammal sounds, alongside automated detections and classifications of echolocation clicks and whistles/moans. Two CABs were deployed in the Moray Firth, Scotland, UK during the redevelopment of Ardersier Port, which is to become a hub for the offshore green energy transition. This campaign included 4 months of both dredging and spoil disposal, in an area that partly overlaps with a Special Area of Conservation for bottlenose dolphins (*Tursiops truncatus*) under the Habitats Directive. Detections of dolphin sounds were uploaded via cell modem to a virtual computer in the cloud, accessible by the PAM operator from anywhere with an internet connection. This allowed for evaluation, in real-time, of whether mitigative actions were required, based on the position of the dolphin[s] with respect to the mitigation zone. This presentation explores a real-world case study, and provides a discussion on important considerations when customizing technology to best suit the particular opportunities and constraints of a given project and location.

Additional Information

- We guide the reader to a [brief video](#) overviewing the passive acoustic effort during the redevelopment of Ardersier Port.

Acknowledgements

We would like to acknowledge Haventus, our client on this project.



Additional Authors

Chloe Malinka, Samuel Tabbutt, Madalina Matei, Jack Clarkson, Cormac Booth, Alex Brown, Jason Wood. (All SMRU Consulting).



MASTS Annual Science Meeting 2025

SPEAKER

For speaker offers, please indicate which session you are interested in:

Applied Marine Bioacoustics

Monitoring marine mammal occurrence in Scottish shelf waters

Full name: Nienke van Geel

E-mail address of lead presenter: nienke.vangeel@sams.ac.uk

Organisation: Scottish Association for Marine Science

Student: N

Abstract

Due to costs and logistical difficulties surveying offshore waters, relatively little is known about marine mammal distribution and abundance in Scottish continental shelf waters. These data gaps make it difficult to assess the population status of offshore species and hinder designation of candidate sites for marine protected areas (MPAs) for marine mammals in the Northeast Atlantic.

Passive acoustic monitoring (PAM) is a valuable tool to investigate the long-term spatio-temporal presence of marine mammals in remote, offshore regions. In this presentation, we will present results from the SAMOSAS (Static Acoustic Monitoring of Scottish Atlantic Seas) project, during which data were collected for eleven months across ten monitoring locations west of the Outer Hebrides, western Scotland.

These recordings represent a rich dataset, containing new information on a wide variety of species, including blue whales (*Balaenoptera musculus*), sei whales (*Balaenoptera borealis*) and sperm whales (*Physeter macrocephalus*), which are rarely visually monitored in this region. Blue whale song and D-calls were detected from September/October to January with no apparent diel pattern. Sei whale downsweeps were present in October and November and showed site-specific diel patterns. Sperm whale echolocation and slow clicks were detected year-round at all three sites, although detections decreased with decreasing latitude.

It is hoped that these detections of species that are currently rarely monitored in the Northeast Atlantic, will not only help shed light on their year-round distribution but will stimulate further research which will enable informed decision-making regarding their conservation.

Additional Authors: Annaïs Soares Teixeira, Léa Leray, Denise Risch



MASTS Annual Science Meeting 2025

Call for Speakers and E-Posters

Template for Abstract Submission

SPEAKER/E-POSTER

Identification of inshore nursery areas for commercially important fish species around the Shetland Islands

Full name: Shaun Fraser

E-mail address of lead presenter: shaun.fraser@uhi.ac.uk

Organisation: UHI Shetland (University of the Highlands and Islands)

Student: N

Abstract

Coastal environments are under increasing pressure from anthropogenic developments; however, much uncertainty exists in the spatial distribution of essential habitats for commercial fish species. Coastal environments are recognised for high productivity and diversity, facilitating survival and growth of fish early-life stages. The annual Shetland Inshore Fish Survey (SIFS) provides a unique opportunity to investigate the age structure of nearshore fish populations to identify potential nursery grounds and evaluate their significance to commercial fisheries.

The age-structure of cod, haddock, whiting, and plaice populations were modelled from SIFS trawl data (2017-2024) and the relative abundance and spatial distribution of discrete age-classes was determined. The results indicate high concentrations of juvenile (age-0/1) cohorts present in the Shetland inshore environment for all species. Age-0 fish were most abundant in highly localised, shallow areas (<50m) and demonstrated persistent habitat use throughout the study period. Growth was associated with offshore movement, with a broader distribution for age-1s and increasing presence of age-2-5+ groups in deeper waters (50-150m).

These findings provide timely evidence of the presence and importance of fish nursery habitats in Shetland's coastal environment, many of which are facing unprecedented threats from new anthropogenic developments. The results highlight the value of dedicated inshore fish surveys, without which the early-life history of commercially important fish communities would remain only partially understood.

Optional - Acknowledgements

Financial support from the Regional Inshore Fisheries Group project funds from the Scottish Government is gratefully acknowledged

Optional - Additional Authors

Louise Thomason, UHI Shetland



MASTS Annual Science Meeting 2025

Call for Speakers and E-Posters

Template for Abstract Submission

E-POSTER

Investigating causes of increasing algal blooms along Vietnam's coast over the past decade

Full name: Hoa Nguyen

E-mail address of lead presenter: hoa.nguyen@hereon.de

Organisation: Helmholtz-Zentrum Hereon

Student: N

Abstract

Over the past decade, an increasing number of algal blooms have been reported along the coast of Vietnam, many of which appear unusual in both timing and location. Some of these events have been harmful, causing fish die-offs and negatively impacting tourism, indicating potential shifts in the coastal marine ecosystem. However, understanding these changes remains challenging due to the scarcity of in situ monitoring data and limited modeling efforts. This study investigates the potential of mathematical approaches—specifically Sobol' sensitivity indices and inference methods—combined with a one-dimensional physical-biogeochemical model (GOTM-ECOSMO), to address data limitations and explore the drivers of unusual and harmful algal blooms (HABs) along the Vietnamese coast. By applying Sobol' indices within the GOTM-ECOSMO framework, we demonstrate how such models can be effectively utilized in data-poor environments to enhance our understanding of marine ecosystem dynamics.

Ultimately, this research contributes to improving the applicability and robustness of marine ecosystem models in regions with limited observational data, offering insights into the causes and patterns of HABs in Vietnam.

Optional - Acknowledgements

MASTS Visiting Fellowship 2025

Optional - Additional Authors

Neil Banas, Keith Davidson



MASTS Annual Science Meeting 2025

Call for Speakers and E-Posters

Template for Abstract Submission

E-POSTER

ELASMO

Full name: Electrosensory Lab for Adaptive Species Management in the Ocean (ELASMO):
developing electromagnetic deterrents to reduce elasmobranch bycatch

E-mail address of lead presenter: Dr Sam Smith (samdgs.hav@gmail.com) & Dr Fergal Glynn (f.glynn@qub.ac.uk)

Organisation: Queen's University

Student: N

Abstract

Bycatch of sharks, skates and rays remains one of the most pressing threats to marine biodiversity, with species such as the flapper skate (*Dipturus intermedius*) classified as Critically Endangered. Current management measures, including gear modifications and time–area closures, often fail to provide effective, scalable solutions that protect vulnerable elasmobranchs while maintaining viable fisheries. This project establishes new electrophysiology and behavioural testing facilities at Queen's University Marine Laboratory to pioneer an alternative approach: harnessing elasmobranchs' sensitivity to electromagnetic fields (EMFs).

Through controlled mesocosm experiments, we are quantifying species-specific electrosensory thresholds and behavioural responses to EMF exposure. These data are being used to calibrate prototype deterrent devices for integration with commercial fishing gear. Subsequent field validation, including paired trawl trials and live video monitoring in known skate habitats, will assess the ecological effectiveness and operational feasibility of the technology.

Our approach is co-developed with fishers, managers and policymakers, ensuring that solutions are both practical and policy-relevant. By reducing incidental capture of elasmobranchs, the project directly supports international biodiversity targets (CBD 30x30, OSPAR 2030) and the Northern Ireland Elasmobranch Conservation Strategy. Beyond immediate conservation benefits, ELASMO builds long-term research capacity in sensory ecology and fisheries management, positioning Northern Ireland as a hub for innovation in sustainable marine technologies.

This work demonstrates how integrating behavioural ecology with applied technology can deliver scalable bycatch mitigation, balancing marine conservation with the socio-economic realities of commercial fisheries.



Optional - Acknowledgements

This project is supported by the DAERA Environment Fund (Nature Recovery Challenge Fund 2025–28).

Optional - Additional Authors

Dr Patrick Collins (PI), Dr Jonathan Houghton, Dr Hansjoerg Paul Kunc