

# UNITED KINGDOM AND ARCTIC COUNCIL WORKING GROUPS RESEARCH AND ENGAGEMENT SCHEME 2024–25

## Project Summaries



*Photo: Dr Karen Cameron*



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# BACKGROUND

This publication shares details of new work from UK-based research teams - funded by the UK Government over 2024–25 - to support the scientific priorities of the Arctic Council Working Groups.

The Arctic Council is the leading intergovernmental forum promoting cooperation in the Arctic. As the Arctic Council Chair, Norway is actively pursuing an ambitious programme for their Chairship which runs from 2023 to 2025.

The United Kingdom has been an Observer to the Arctic Council since 1998. Researchers based in the UK have contributed extensively to the work of the six Working Groups and associated Expert Groups and Taskforces over many years, sharing expertise, working in partnership, collaborating on new data sources and conducting important analysis.

In recognition of the importance of the work of the Arctic Council, and the potential for increased engagement by researchers based in the United Kingdom, the Department for Science, Innovation and Technology and the Foreign and Commonwealth and Development Office provided funding for the 'UK-Arctic Council Working Groups Research and Engagement Scheme 2024–25'. This funding is to support UK-based researchers in practical engagement with the priorities and initiatives of the

Norwegian Chairship of the Arctic Council and the re-established work programmes of the six Arctic Council Working Groups which are:

- Arctic Contaminants Action Program - ACAP
- Arctic Monitoring and Assessment Programme - AMAP
- Conservation of Arctic Flora and Fauna - CAFF
- Emergency Prevention, Preparedness and Response - EPPR
- Protection of the Arctic Marine Environment - PAME
- Sustainable Development Working Group - SDWG

The scheme has been delivered in active partnership with the NERC Arctic Office and the UK Science Innovation Network. Eleven bursaries have been funded and a summary of these are included in this booklet.



Further information about the Arctic Council can be found here:  
<https://arctic-council.org/>



Further information about the work of the NERC Arctic Office can be found here:  
[www.arctic.ac.uk](http://www.arctic.ac.uk)

## Project Summaries:

PI Name	PI Institution	Project Title	Relevant ACWG
Dr Lauren McWhinnie	Heriot-Watt University	Mapping whale watching activities in Arctic Waters	PAME
Dr Ishfaq Hussain Malik	University of Leeds	ARCWISE: Arctic Resilience, Climate Adaptation, and Indigenous Wisdom for Sustainable Ecosystems	AMAP
Dr Philippe Blondel	University of Bath	SHIMASU: Shipping and Human Impacts for Marine Arctic Sustainability	PAME
Dr Karen Cameron	University of Glasgow	GECO-21: Glacial Ecology through the 21st Century	AMAP & CAFF
Prof Helen Findlay	Plymouth Marine Laboratory	ACE Impacts: Arctic Council Engagement – enhancing understanding of climate impacts	AMAP
Dr Clare Webster	University of St Andrews	The impacts of climate-driven changes in the zooplankton community on bowhead whales in Disko Bay, Greenland	CAFF
Prof John Iwan Jones	Queen Mary University of London	Establishing the extent of the pink salmon, <i>Oncorhynchus gorbuscha</i> , invasion of the Arctic	CAFF
Dr Helen Wheeler	Anglia Ruskin University	Societal impacts of borealisation of the Arctic: Understanding interlinkages between ecological and social impacts	CAFF & AMAP
Dr Jeremy Wilkinson	British Antarctic Survey	Supporting the SAON ROADS process: Advancing the Sea Ice Shared Arctic Variable and Expert Panel Equity	AMAP
Dr Cath Waller	University of Hull	Threats and Risks to Arctic Habitats- Watching Plastic Litter (TRAWL)	PAME
Dr Liam Kelleher	Birmingham University	POLARSENSE: Polar Online Airborne Nano and Microplastic Sensing and Environmental Monitoring	AMAP

Photo: Getty Images



## Mapping whale watching activities in Arctic Waters

**Principal Investigator:** Dr Lauren McWhinnie, Heriot-Watt University

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**Co-Investigators:** Dr Kate Gormley, Research Fellow, Aberdeen University, [kate.gormley@abdn.ac.uk](mailto:kate.gormley@abdn.ac.uk)

Emily Hague, PhD Researcher, Heriot-Watt University, [elh2001@hw.ac.uk](mailto:elh2001@hw.ac.uk)

**International partners:**  
Hjalti Hreinsson, PAME,  
Drummond Fraser, Transport Canada

**Relevant Arctic Council Working Group:** Protection of the Arctic Marine Environment (PAME)

**Research locations:** Pan-Arctic

### Project overview:

Shipboard visitors to the Arctic are routinely rewarded with sightings of whales. However, careful management and dedicated research are needed to ensure that the growing Arctic marine tourism industry does not inadvertently harm these unique northern populations, many of which are still recovering from heavy exploitation from historic commercial whaling and having to cope with climate driven changes to their habitats. Therefore the aim of this work is to compile the first information on whale watching tourism for the Arctic using PAME's Arctic Ship Traffic Data (ASTD) System in conjunction with industry engagement and a review of online information to better understand the recent development of this sector and identify gaps in data.

### Project highlights:

Analysis of the spatio-temporal trends in Arctic marine tourism based on information in the ASTD system, including supplementary information with respect to

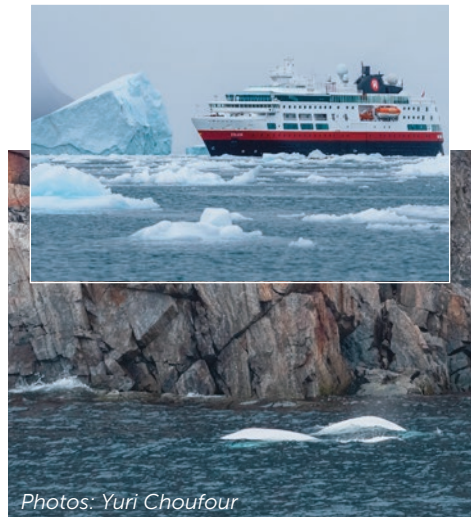
the number of cruise ships, their size and whether they offer whale watching excursions as part of their itinerary.

- Identification of Arctic Ports and Harbours where whale watching operations take place and an inventory of operators and their fleet.
- Maps showing likely areas of whale watching activities within Arctic waters.

### Next steps:

The team have submitted an official project proposal to the Arctic Council to undertake this work in partnership with PAME and led by Canadian collaborators.

The team are also working on a spin-off project with Arctic expedition operators HX Hurtigruten to undertake whale and vessel surveys onboard their ships operating in the Arctic for the next 5 years. This will allow the team to gather further information on the nature of the interactions between whales and vessels in Arctic waters and better understand where these types of ships are encountering whales.



Photos: Yuri Choufour

# ARCWISE: Arctic Resilience, Climate Adaptation, and Indigenous Wisdom for Sustainable Ecosystems

## Principal Investigator:

Dr Ishfaq Hussain Malik, School of Geography, University of Leeds

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<https://environment.leeds.ac.uk/geography/staff/11717/dr-ishfaq-hussain-malik>

**Co-Investigator:** Prof. James D. Ford, School of Geography, University of Leeds

## International partners:

Arctic Monitoring and Assessment Programme (AMAP)

## Relevant Arctic Council Working

**Group:** Arctic Monitoring and Assessment Programme (AMAP)

**Research locations:** Nunatsiavut, Northern Labrador, Canada

## Project highlights:

### ● Fieldwork in Arctic Indigenous communities:

The project has successfully conducted extensive fieldwork in Indigenous communities of the Arctic, providing critical insights into the impacts of climate change and exploring adaptation strategies to address these challenges.

### ● Partnerships and collaborations with Inuit communities:

The project has fostered meaningful partnerships and collaborations with Inuit communities, emphasising capacity sharing and shared learning. These partnerships have been pivotal in co-developing culturally informed approaches to research and climate adaptation.

### ● Contributions through publications:

The project has resulted in two significant publications:

Understanding the Impacts of Arctic Climate Change Through the Lens of Political Ecology <https://wires.onlinelibrary.wiley.com/doi/full/10.1002/wcc.927> : This work introduces an Arctic Political Ecology framework to understand the socio-political dimensions of climate change.

Climate Change, Mass Casualty Incidents, and Emergency Response in the Arctic <https://iopscience.iop.org/article/10.1088/2634-4505/ad8fcc/meta>: This publication examines emergency response capacities in the Arctic, with a focus on search and rescue operations, highlighting opportunities for enhancing emergency response as part of broader climate adaptation efforts.

## Project Overview:

The project focuses on examining the social, cultural, and political dimensions of climate change, adaptation, and resilience of Indigenous Peoples in the Arctic. It focuses on five Inuit communities in Nunatsiavut, Canada. The project provides a comprehensive understanding of how climate change is understood and responded to in the Arctic, with a particular focus on Indigenous communities' vulnerability, resilience, adaptation strategies, and governance. The research provides a deeper understanding on how the risks associated with climate change may exacerbate economic, political, and social challenges by affecting the socio-economic activities of Indigenous Peoples.



### Next steps:

The bursary will support the next phase of the project, which includes conducting fieldwork in the Arctic in winter to gain deeper insights into seasonal variations and their impact on Indigenous communities. It will support some future

research publications which are under review. Additionally, the bursary will facilitate attendance at the Arctic Science Summit Week in the United States, providing opportunities to share findings, network with experts, and foster collaborations for future research.

# SHIMASU: Shipping and Human Impacts for Marine Arctic Sustainability

**Principal Investigator:**

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**Co-Investigator:** Jonathan Cleverly, University of Bath, PGRA

**Relevant Arctic Council Working**

**Group:** Protection of the Arctic Marine Environment (PAME)

**Research locations:** University of Bath  
– Office-based

## Project Overview:

Shipping is the largest contributor to underwater sound pollution, directly affecting biodiversity. This is amplified by the physical conditions in the warming Arctic ocean, where shipping and offshore activities are already increasing. The Arctic Ship Traffic Database (ATSD) monitors larger vessels, equipped with transponders, but these transponders can stop working (intentionally or not). Smaller vessels are more numerous and do not have transponders but arguably make less noise underwater. How do the impacts of transponder-using ships compare with those of other ships? Can this guide future Arctic regulations?

The team will compare ATSD data with long-term underwater sound measurements at different observatories (ice-covered North Pole, deep-water Chukchi Sea and shallow-water Canadian Arctic). This will quantify the different contributions of larger and smaller vessels, in deeper and shallower waters with different levels of ice cover. From past work, we already know the European Marine Strategy Framework Directive and its criteria for Good Environmental Status (related to third-octave bands centred on 63 Hz and 125 Hz) are not adapted to Arctic conditions and the presence of seasonal or permanent ice cover. ATSD data is essential field-based evidence for future Arctic regulations on sound impacts and Maritime Spatial Planning, contributing to Arctic Council objectives.

## Project highlights:

- Quantify the current and past amounts of AIS-tracked shipping in the different areas of study: this will concern ships large enough to have Automatic Identification Systems and complying with their use.
- Matching known, large-enough and compliant shipping with underwater sound levels, we can identify the optimal frequency bands to monitor, and assess the acoustic impacts of any non-AIS shipping, like smaller vessels.
- This matching of shipping activity with sound levels and frequencies will be used to inform future observations in the Arctic and to guide the drafting of environmental regulations for the introduction of underwater sound energy in these environments.

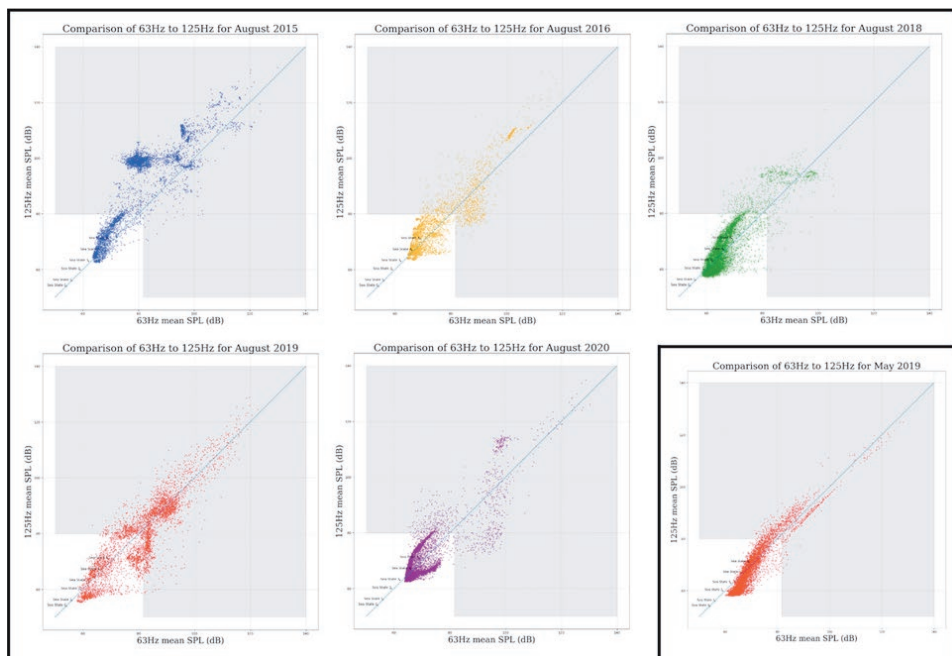


## Next steps:

These will include links with PAME members and partners, including the International Maritime Organization. This will also strengthen collaborations with Canadian and Norwegian members of the International Quiet Ocean Experiment, <https://iqoe.org/> whose Arctic working group is chaired by the PI. The PI plans to leverage this project for collaborations with Ocean Networks Canada, participating in the development of the emerging Canadian Arctic programmes.

Presentation of the results will also showcase UK-funded contributions to future policy documents, and they will inform the discussion of future ISO/BSI standards on underwater sounds.

Blondel, Ph., J. Davidge; "Shipping and ice-covered waters – how accurate are the MSFD "shipping bands"?", Proc. UACE-2023 (Kalamata, Greece), [https://www.uaconferences.org/media/breezingforms/uploads/2023papers/1943\\_Blondel\\_2023\\_05\\_26\\_11\\_52\\_04.pdf](https://www.uaconferences.org/media/breezingforms/uploads/2023papers/1943_Blondel_2023_05_26_11_52_04.pdf), 2023



*Photo: The EU Marine Strategy Framework Directive recommends monitoring the sound impacts of shipping by monitoring frequency bands centred on 63 Hz and 125 Hz. Here, we show how these "shipping bands" vary with the years (and seasons) at Cambridge Bay, Nunavut (Canada), using measurements from Ocean Networks Canada. From Blondel and Davidge (2023). SHIMASU analyses extend these analyses, in particular by looking at all frequency bands available.*

## GECO-21: Glacial Ecology through the 21st Century

**Principal Investigator:** Dr Karen Cameron, University of Glasgow

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**Co-Investigators:** Dr Sebastian Mutz, University of Glasgow, Project co-lead (climate modelling);

Dr Arwyn Edwards and Professor Andrew Mitchell, Aberystwyth University, Project co-leads (fieldwork and geochemical analyses)

**Relevant Arctic Council Working Group:** Arctic Monitoring and Assessment Programme (AMAP) and Conservation of Arctic Flora and Fauna (CAFF)

**Research locations:** Ny-Ålesund, Svalbard

### Project overview:

By the end of the century, at least 50% of our glaciers will have disappeared due to climate warming. In the wake of this ongoing environmental disaster, lies an overlooked ecological problem: How will glacial environments function when the glaciers are gone? Glaciers are rich in microorganisms that are specialised to the challenging conditions that they live in; they have crucial roles to play in local nutrient cycling, and global atmospheric and oceanic processes; but almost nothing is known about what happens to glacial microorganisms when they are flushed downstream. Through a two-stepped approach, this programme of research will be the first to embark on this important area of study. Firstly, the viability, activity and nutrient cycling of supraglacial microorganisms, subjected to current and future environmental conditions akin to adjoining subglacial, soil and coastal environments, will be tested. Secondly, empirical relationships between ecological

responses and 21st century climatic boundary conditions will be explored and modelled. Together, this research will help to shape our understanding of the ecological consequences of climate warming, allowing us to predict how these fragile environments will change over the coming decades, and what the wider-scale implications of this may be.

### Project highlights:

Three main highlights are expected from this project. The research has been designed to test whether:

- A portion of supraglacial microbial communities will be viable and active under changed environmental conditions.
- Communities will change from net carbon dioxide consuming, to net carbon dioxide or methane producing with changing environmental conditions.
- 21st century climate change will impact the regional environmental conditions, and therefore determine microbial community activity and survival.

### Next steps:

It is hoped that the results of this study will provide proof of concept results to develop future larger research projects.



Photo: Dr Karen Cameron

## ACE Impacts: Arctic Council Engagement – enhancing understanding of climate impacts

**Principal Investigator:**

Prof Helen Findlay, Plymouth Marine Laboratory

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**Co-Investigator:** Dr Rachel Coppock, Plymouth Marine Laboratory

**International partners:**

Richard Bellerby, NIVA, Norway

**Relevant Arctic Council Working**

**Group:** Arctic Monitoring and Assessment Programme (AMAP)

**Research locations:** Pan-Arctic/  
Atlantic-Arctic focus

trends and emerging properties, and investigate key species vulnerabilities to acidification, warming, and salinity and oxygen changes. The second task is to contribute new monitoring and data via assisting with the establishment of climate change, acidification and biological sampling on the 10 year Ocean Warrior mission. The Ocean Warrior mission will sail from Svalbard to Canada, via UK, Iceland, Greenland and return, every year between June and October. The crew will be trained as citizen scientists, resulting in improved ocean literacy, shared knowledge of Arctic issues, and a decade of ocean climate change data.

**Project overview:**

The Arctic Council working group “Arctic Monitoring and Assessment Programme” (AMAP) works to measure and monitor pollutants and climate change effects on ecosystems and human health in the Arctic. Ocean acidification has been a key component of their assessments since 2013, but more recently has been combined with climate change to ensure that multiple drivers are being assessed together. This project will add to the AMAP goal via two tasks. The first task involves analysing new dataset of downscaled Earth System Models that is now available for the Pan-Arctic region, and was commissioned by AMAP. The data will be analysed by a small group to evaluate

**Project highlights:**

- Produce a technical report on the utility of the downscale model product, with regards to trends and emerging properties in the physiochemistry, but also its use for assessing the vulnerability of key species and the implications for human societies.
- Help to establish a 10-year citizen science based monitoring programme in the Atlantic-sector of the Arctic and especially around Greenland.

**Next steps:**

Continued research on the 10-year monitoring – subject to funding and collaborations.

# The impacts of climate-driven changes in the zooplankton community on bowhead whales in Disko Bay, Greenland

**Principal Investigator:** Dr Clare Webster, University of St Andrews, UK

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**Co-Investigators:** Hayley McLennan, University of St Andrews (PhD candidate, field team)

Jacqui Glencross, University of St Andrews (PhD candidate, field team)

**International partners:**

Caroline Bouchard, Université Laval (previously Greenland Institute of Natural Resources) Myriam Patry, Université Laval

**Relevant Arctic Council Working Group:**

Conservation of Arctic Flora and Fauna (CAFF)

**Research locations:** Disko Bay, Greenland

society, and have been traditionally and sustainably hunted from Qeqertarsuaq (in Disko Bay) for millennia. This project will conduct direct acoustic-trawl surveys of the zooplankton prey of bowhead whales in Disko Bay. We will conduct preliminary interviews and consultation in the community of Qeqertarsuaq in 2024, and use the results to plan a field expedition in 2025. We will use scientific echosounding to reveal the distribution and biomass of zooplankton. The data will enable investigation of predator-prey dynamics and ecosystem conditions that support feeding whales, and serve in predicting the possible impacts of reduced sea ice on bowhead whale populations. Disko Bay is an important feeding ground for East Canada – West Greenland (ECWG) bowhead whales, especially mature females. Our research group is currently participating in a project with Canadian researchers on ECWG bowhead whales feeding in Cumberland Sound, and collecting comparative data in Disko Bay will further illuminate the foraging ecology of this population as a whole, helping us to predict the species' response to climate changes.

## Project overview:

Bowhead whales (arfivik in Greenlandic) are a critical part of Arctic marine food chains. As long-lived, slow-maturing animals, they are threatened by environmental change. Bowhead whales have a significant role in Greenland

*Photo: Hayley McLennan*





*Photo: Hayley McLennan*

### Project highlights:

- In September 2024 Hayley McLennan travelled to the University of Copenhagen Arktisk Station in Qeqertarsuaq, Greenland, to make connections with the local community and researchers and lay the groundwork for planned fieldwork in spring 2025, when the bowhead whales are usually foraging in Disko Bay. The project has obtained a license for the utilisation of genetic resources from the Government of Greenland and planning for fieldwork is well underway.
- Hayley McLennan, Jacqui Glencross and Myriam Patry will travel to Disko Bay in spring 2025 to conduct five days of boat-based fieldwork comprising an acoustic survey and zooplankton bongo net sampling.

### Next steps:

Fieldwork will be carried out in 2025 and the team hope to obtain additional funding to return to Greenland to disseminate the results of their research. As a small scale pilot project the team would like to take this further into longer term monitoring, perhaps using technology such as moorings or gliders for autonomous data collection.

## Establishing the extent of the pink salmon, *Oncorhynchus gorbuscha*, invasion of the Arctic

**Principal Investigator:** Prof John Iwan Jones, Queen Mary University of London, UK

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**Co-Investigator:** Michał Edward Skóra, Queen Mary University of London, Research Assistant

**International partners:** Jaakko Erkinaro, Natural Resources Institute, Finland; Karl Øystein Gjelland, Norwegian Institute for Nature Research, Norway; Guðni Guðbergsson, Marine and Freshwater Research Institute, Hafnarfjörður, Iceland; Rasmus Lauridsen, Six Rivers Foundation, Iceland; Rasmus Nygaard, Greenland Institute of Natural Resources, Greenland

**Relevant Arctic Council Working Group:** Conservation of Arctic Flora and Fauna (CAFF)

**Research locations:** Svalbard, Greenland, NE and SW Iceland, Northern Norway and Finland

restricted to the rivers of Russia/Scandinavia. Our recent work has confirmed reproductive populations in Scotland and Southwestern Iceland, suggesting a high degree of plasticity and highlighting the potential for the species to become established across the Arctic region. The extent of reproduction in the Arctic is not known, but the risk to native species pronounced. By trapping pink salmon juveniles, we will determine if the species is established in Greenland, Svalbard, and Northeastern Iceland. We will also determine the influence of latitude on pink salmon feeding in freshwater, and hence potential competition with native species. Management of this rapidly expanding invasive species is dependent on preventing recruitment: determining where recruitment is occurring is the first step in establishing monitoring and management protocols.

### Project overview:

Invasive pink salmon, *Oncorhynchus gorbuscha*, are rapidly spreading through the North Atlantic and Arctic. Given their dominant role in their native Pacific, it is likely that the invasion of the Arctic by pink salmon will be accompanied by catastrophic demographic and spatial shifts in many native species both marine and freshwater, with knock-on social and economic impacts. Although adults have been reported accessing rivers in Greenland, Svalbard, and Iceland, it was thought that that reproduction was



*Pink salmon juveniles* Photo: M. Skora  
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Photo: M. Skora

Traps for pink salmon juveniles near Kuummiit, Greenland. Photo: M. Skora

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### Project highlights:

- The team has confirmed for the first time that pink salmon are becoming established in Northeastern Iceland.
- The team aim to determine potential competition with native species in Arctic freshwaters from pink salmon juveniles.

### Next steps:

The team aim to source further funding to continue exploring the spread and impact of invasive pink salmon on native Arctic species.

# Societal impacts of borealisation of the Arctic: Understanding interlinkages between ecological and social impacts

**Principal Investigator:** Dr Helen Wheeler, Anglia Ruskin University.

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**Co-Investigators:** Kate Baker, School of Life Sciences, Anglia Ruskin University, research assistant  
Jennifer Ramsay, School of Life Sciences, Anglia Ruskin University, research assistant

**International partners:** Vera Hausner, UiT, the Arctic University, Norway, collaborator/coinvestigator

**Relevant Arctic Council Working Group:** Conservation of Arctic Flora and Fauna (CAFF) and Arctic Monitoring and Assessment Programme (AMAP)

**Research locations:** The research is a pan-Arctic synthesis.

## Project overview:

As climate rapidly warms, one pervasive impact is the “borealisation” of the Arctic. Here the species, communities and ecological processes of the Arctic transform to resemble that of more boreal lower latitudes. Such change is likely to have profound impacts on the diverse local communities and cultures of the Arctic. Some of these impacts are starting to be documented, however this evidence has not been synthesised systematically.

The team’s research focuses on systematic mapping to document the interlinkages between ecological and societal impacts of borealisation of the Arctic. In this interdisciplinary project, the team are bringing together natural and social scientific information answer the question: “What evidence exists on the interlinkages between ecological

and societal impacts of borealisation of the Arctic?”. To do this the team are systematically coding relevant information and metadata in existing papers to create a database on the topic. In addressing this question and relevant knowledge gaps the team hope to also provide recommendations for interdisciplinary work for more comprehensive understanding of interlinkages between ecological and social changes. This will provide direct information suitable for two key Arctic Council reports and we are engaging with these processes to maximise synergies.

## Project highlights:

- The team have developed and submitted a systematic mapping protocol for publication which details a process for assessing interlinkages between ecological and societal impacts of borealisation in the existing research literature. This requires taking new approaches to data synthesis to bring together evidence sources from diverse disciplines.
- We are creating a database of studies with extensive metadata on the distribution and characteristics of studies that address ecological and societal impacts of borealisation, this will allow us to identify key impacts and interlinkages and current gaps in the literature on this topic.

## Next steps:

As part of our research, the team have started to connect with the Nordic Borealization Network (NordBorN), a network focusing on borealisation from the natural sciences perspective. We aim to explore ways in which research on societal impacts of borealisation can interface with their research.



## Supporting the SAON ROADS process: Advancing the Sea Ice Shared Arctic Variable and Expert Panel Equity

**Principal Investigator:** Dr Jeremy Wilkinson, British Antarctic Survey

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**Co-Investigators:** Talia Wells, AINA/University of Calgary, Canada, Cecilia Blitz, University of Washington, USA, Jackie Dawson, University of Ottawa, Canada, Rowenna Gryba, Inuit Circumpolar Council, Canada, Craig Lee, University of Washington, USA, Maribeth Murray, AINA/University of Calgary, Canada, Chantelle Verhy, GCRC/Carleton University, Canada

### **Relevant Arctic Council Working**

**Groups:** Arctic Monitoring and Assessment Programme (AMAP) via the Sustaining Arctic Observing Networks' (SAON) Roadmap for Arctic Observing and Data Systems (ROADS) process.

**Research locations:** UK and Arctic Council countries excluding Russia in particular Canada, USA and Denmark (Greenland)

### **Project overview:**

This work offers the potential for a longer-term contribution to the work of the Arctic Council (AC) as it lays out a pathway to identify critical shared observing variables that are repeatable and improve the flow of information and data from the Arctic Observing System to the Arctic Council Working Groups. In particular, the team's effort enhances the UK's links with the AMAP Working Group, by supporting a new concept within the Roadmap for Arctic Observing and Data Systems (ROADS) framework, Shared Arctic Variables (SAVs). Establishing a SAV is an inclusive four phase process that serves a combination of Indigenous-led benefit identification and observing system

implementation, regionally identified science and decision-making needs, and essential variables of global observing networks. The project focuses on allowing UK researchers and others to work with the Expert Panel (EP) to move Sea Ice SAV through the different phases. Taken as a whole this project enhances the UK's commitment of being an active Observer to the AC.

### **Project highlights:**

**Highlight 1:** The establishment of sea ice EP consisting of representatives from different Indigenous communities and organisations, research institutions, government, safety, ice services and the shipping sectors in order to move the sea ice SAVs process forward and complete Phase 2 of the ROADS process.

**Highlight 2:** Facilitate the sea ice EP to develop in a timely fashion and inclusive way a suite of shared variables relevant for sea ice that when observed can provide data and information useful to local communities for adapting to and managing challenges resulting from sea ice decline.

**Highlight 3:** To actively promote and support the fundamental work of the Working Groups, as well as longer-term contribution to the common objectives of the AC.

### **Next steps:**

The team's work on the sea ice SAV has already been included in a multimillion-dollar proposal to Nordforsk (Nordic and North American funding) called 'Sustainable Human Use of the Arctic Marine Environment (SustainME)'. The PI is Jackie Dawson (Canada). In addition, the team aims to include their work in upcoming EU Horizon calls associated with the Arctic.

## Threats and Risks to Arctic Habitats- Watching Plastic Litter (TRAWL)

**Principal Investigator:** Dr Cath Waller, Hull University

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**Co-Investigators:** Dr Charlotte Hopkins, Dr Andy Richardson, University of Hull.

**International partners: Iceland:**

Dr Audrey Matthews and Dr Ásta Asmundsdóttir: University of Akureyri. Jessica Aquino from Holar, Örvir from Icelandic Seal Center and Worldwide Friends, Húnaþing vestra.

**Greenland:** Anne Andreasen, Uummannaq Polar Institute, Hunters and Trappers Ittoqqortoormiit and Tasiilaq

**Relevant Arctic Council Working**

**Group:** Protection of the Arctic Marine Environment (PAME)

**Research locations:** Iceland & Greenland we hope to extend this into Canada (Pond Inlet)

remote sensing using drone footage and machine learning AI algorithms to quantify macro litter across a range of ecosystems. We envisage these methods eventually being used across multiple ecological compartments (e.g. beaches, nearshore marine, lakes, rivers, and terrestrial habitats). We have also extended the bursary to evaluate both the threat of plastics (macro- and micro-) in the environment (water and local nearshore areas), assess the risk to local key fish species and quantify plastic abundance in the stomach of key local food sources consumed by these communities, including fish and marine higher predators and to quantify benthic and demersal habitats and ecological communities.

### Project overview:

This project aims to develop citizen science materials for communities across the Arctic Region to monitor plastic pollution and non-native species on local beaches and aquatic habitats. The project is designed to be inclusive and will give local communities the tools and information needed to design a specific monitoring project relevant to their own location and local interests. It also aims to develop methods and tools for larger scale



Photo: Cath Waller



*PONANT Photo Ambassador,  
Cindy Miller Hopkins*

### Project Highlights:

The team will have provided sampling tools and training to at least two groups of citizen scientists in Iceland and one in Greenland to continue plastic monitoring and left equipment with them to continue to monitor in the future.

The team have started developing an AI model which they will train to identify macro-plastic litter. The team will collect more data and by the end of the project hope to have a model that can analyse remote sensed footage.

The team will have successfully completed benthic and demersal surveys of locations on the West/ East Coasts of Greenland and evaluated risks to top predators in key areas.

### Next steps:

The team have applied for EU POLARIN funding to continue the ecosystem assessments and higher predator work in Svalbard and are waiting for a decision.

They have also contacted representatives of local communities in Canada (our main one being Pond Inlet) that they hope to work with to increase their microplastic and top predator work with. The team are currently in conversation with them to see how they can progress this further.

# POLARSENSE: Polar Online Airborne Nano and Microplastic Sensing and Environmental Monitoring

## Principal Investigator:

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University of Birmingham

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**Co-Investigators:** Steve Allen, Healthy Earth, Co-Investigator, expertise airborne microplastics, Gijsbert Breedveld, University in Svalbard, Co-Investigator, expertise in environmental contaminants (PFAS), Stefan Krause, University of Birmingham, Co-Investigator, expertise in microplastics biogeochemistry, Dusan Materic, Helmholtz Centre for Environmental Engineering, Co-Investigator, expertise in nanoplastic analysis

## International partners:

Gijsbert Breedveld, University in Svalbard, Dusan Materic, Helmholtz Centre for Environmental Engineering

## Relevant Arctic Council Working

**Group:** Arctic Monitoring and Assessment Programme (AMAP)

**Research locations:** Ny-Ålesund, with a station based in the field (wind and solar powered sampling), and one at the research base (mains powered and automated sampling)

## Project overview:

This study addresses the urgent global concern of Nano and Microplastics (NMP) by enhancing understanding of their distribution and transport mechanisms in the Arctic. Three primary objectives guide the research: 1. establishing and evaluating automated monitoring stations; 2. refining methodologies (sampling station function) over a 6-month period; 3. systematically collecting and analysing nanoplastics, microplastics, and associated chemicals like polyfluoroalkyl substances (PFAS).



First day fieldsite setup for power. L-R, Liam Kelleher, Steve Allen. Photo: Steve Allen

The project develops the first 'online' continually airborne particle collection system, which is an extension of a harmonised manual sampling methodology for airborne NMP measurements. By extending the temporal and spatial scope of atmospheric deposition studies, utilizing pyrolysis gas chromatography mass spectrometry (pyGCMS) and Raman spectroscopy for analysis, the study aims to comprehend pollution transport across varying seasons

and weather conditions. Back-trajectory and dispersion modelling will be applied to the dataset allowing for detailed understanding of NMP transport into the Arctic. The findings offer critical insights into NMP pollution transport and its potential impact, contributing significantly to polar research. This research underscores the significance of addressing NMP pollution in the Arctic and highlights the importance of continued monitoring and research in this area.



*Remote field site setup - final Checks, L-R Steve Allen, Liam Kelleher. Photo: Laura Gaiger*



### Project Highlights:

Our highlights are directly linked to the 3 outlined objectives, all contributing to the improved knowledge of what plastic pollution is as a baseline into the Arctic region. At the end of the project, we will have generated a new technology and knowledge to share with the community.

1. The use and technology refinement of the first automated remote monitoring systems for airborne NMP and associated chemicals. (Objective 1 and 2)
2. Generation of new knowledge NMP and associated chemical samples over spatial and temporal scales in the Arctic. (Objective 3)
3. Modelling particle trajectories to understand the global flux of NMP into and out of the Arctic region.

### Next steps:

The collection systems created by the bursary will be used for other atmospheric studies, however, these are still to be confirmed. We are also planning to store the remote sensing station at the Harland-Cox station whilst we secure funding to carry out extended monitoring in areas surround the Ny-Ålesund research base.





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NATURAL ENVIRONMENT  
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