UNIVERSITY OF PORTSMOUTH

GB ROW CHALLENGE
ROW WITH A PURPOSE

GB Row 2024
Science Impact Report

The University of Portsmouth and GB Row Challenge partnership pairs science and sport

In 2024, the endurance rowers of Teams Coastal Odyssey and Sea Change battled winds and tides in a race around the British coastline. At the same time, they were gathering scientific data and samples including temperature, underwater sound, microplastics and biodiversity. Scientists at the University of Portsmouth have analysed and interpreted that data. This report presents our findings.

Unfortunately, due to adverse weather conditions, Team Sea Change were unable to complete the challenge, however the samples they collected along the South Coast are still a valuable contribution to the multiparameter dataset being compiled to provide a desperately needed baseline on the health of our seas. Team Coastal Odyssey did finish the race and in doing so set a Guinness World Record for fastest mixed team whilst collecting data on temperature, salinity, biodiversity, microplastics and underwater sounds. They completed the challenge in 49 days, 1 hour, 29 minutes. Congratulations Team Coastal Odyssey on your induction into the book of Guinness World Records!

L-R: William de Laszlo, Adam Ravenscroft, Hannah Davies, Patrick Deacon (Skipper), Daisy Lucker, Joe Benson, Lia Evans, Jim Bastin

Scientific data from the 2024 GB Row Challenge race

Professor Fay Couceiro and Laura Fantuzzi

This report has been a team effort, and what a team. Professor Fay Couceiro led the science section of the partnership with Will de Laszlo leading the Challenge with Purpose.

Laura Fantuzzi analysed all 2023 and 2024 samples and data. Anita Carey analysed 2022 microplastics samples. Dr James Trayford, Professor Andy Lundgren and Dr Ronaldas Macas guided sound analysis with additional work by Leah Weatherup. Professor Alex Ford and Dr Kat Bruce helped with biodiversity and eDNA. Jon Churchill and Alex Mair provided vital engineering skills. Huge thanks are also due to the teams who collected the samples – and to the GB Row Challenge team, especially Operations Director Jim Bastin.

Find out where in the UK the water was warmest. Discover where we detected at-risk marine species. And learn how many microplastics are in the sea near you...

BACKGROUND

GB Row Challenge began in 2005 as the ultima rowing challenge, in which crews attempt to ro continuously around the coastline of Great Brit a distance of over 2,000 miles. This requires m more than just strength, stamina and endurance To successfully circumnavigate Great Britain, te need to understand navigation and the sea's ti flow. Tactical ability, and the capability to make the most of weather and sea conditions, can be as important as the crew's rowing strength.

In 2022, GB Row Challenge teamed up with the University of Portsmouth, aiming to combine the physical challenge with a scientific purpose. Our team of scientists first needed to devise a sampling strategy that did not impact on the speed of the boat – we had to remember that the rowers are already taking on enough of a physical challenge!

We agreed to focus on three main areas: microplasti underwater sound and biodiversity, as well as collect data on temperature and salinity for environmental context. The initial aim was to collect these datasets for each GB Row Challenge event between 2022 through to 2025.

We are delighted that the programme has been extended to 2028 with continued philanthropic funding, alongside a new environmental data partnership with The Crown Estate, which is supporting this year's challenge.

These reports provide a high-level overview of the work undertaken each year. However, The Crown Estate's Marine Data Exchange - one of the world's largest collections of marine industry data - will host the full, open-source datasets from all GB Row Challenge races, including data collected in previous years, once available. This represents a significant benefit not only to our team, but also to the wider marine science and policy community, who will be able to access and use this unique longitudinal dataset.

The reports for the 2022 and 2023 GB Row Challenges can be accessed via the links, and this document presents the report for the 2024 GB Row Challenge.

In 2024, two teams took on the challenge to row unsupported around Great Britain whilst collecting essential scientific data, Teams Sea Change and Coastal Odyssey.

Sea Change L-R: Chrissy Durkin, Madeline McSherry, Dr Kat Bruce (Skipper), Jess Mc Iver, Aoife Luscombe, Lorena Nichols

2024 team routes

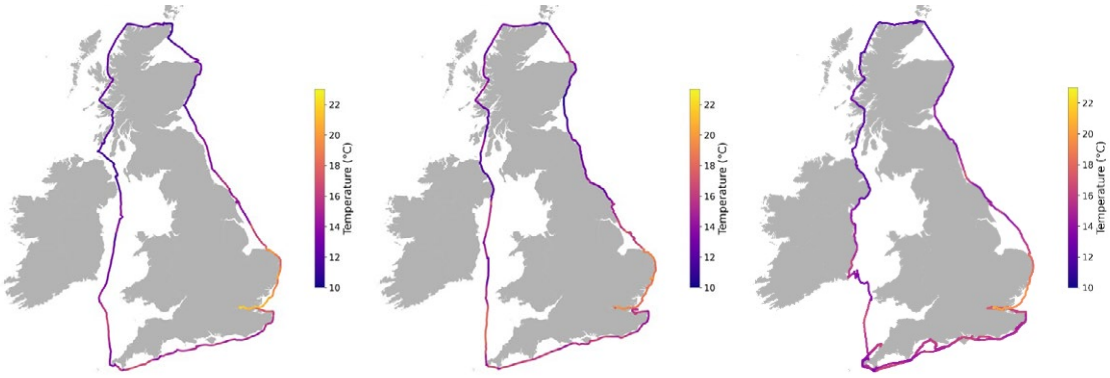
In 2024 two teams set off from Tower Bridge in London on Sunday 9 June. Team Sea change were forced to withdraw from the race due to bad weather after 500 nautical miles of rowing. Team Coastal Odyssey found shelter from the weather along the east coast of Ireland and Northern Ireland allowing them to complete the circumnavigation of Great Britain unaided. The routes the teams took are shown here.

Due to a technical issue no underwater sound was collected by Team Coastal Odyssey. Power restrictions also applied for the final leg of their journey resulting from prolonged overcast conditions, limiting solar panel charging preventing the use of the microplastics and eDNA pumps. The area impacted is shown by the black box.

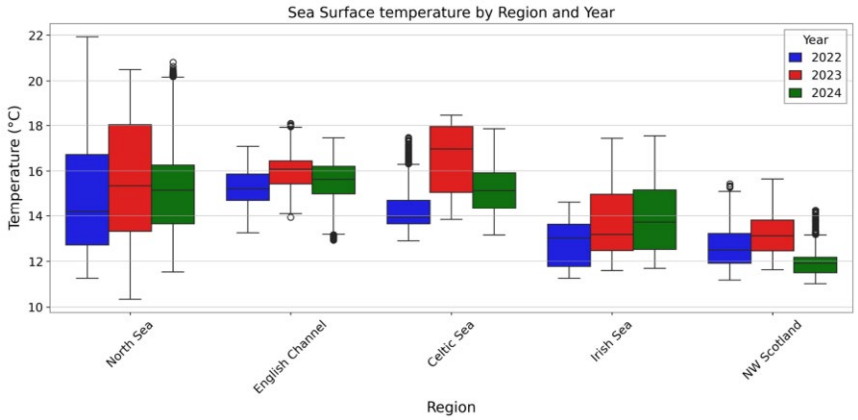
Ocean temperature

The long-term increase on sea surface temperature (SST) has already shown a global impact on ecosystems. Scientists have observed the spread of warm water species poleward, where waters have warmed enough to become habitable. A consequence of this is migrating commercial fish stocks, with impacts on local fisheries. Warming oceans also increase the rate of sea level rise, worsening coastal flooding and coastal erosion. There are many locations around the coastline where in situ monitoring is lacking and GB Row data is providing much needed coverage.

It takes decades to be able to confidently identify trends amongst the interannual normal fluctuations but in 2023 we observed a marine heat wave and we can compare the 2022 and 2024 data to that much warmer period. The average summer temperature for UK coastal seas was 14.26°C in 2022, 15.20°C in 2023 and 15.15°C in 2024. Locally changes of over 2oC were observed in some areas.



Temperature data collected by GB Row Challenge boats circumnavigating Great Britain in June/July 2024.



MICROPLASTICS

7,618L of sea water filtered for microplastic analysis in 2024

What are microplastics?

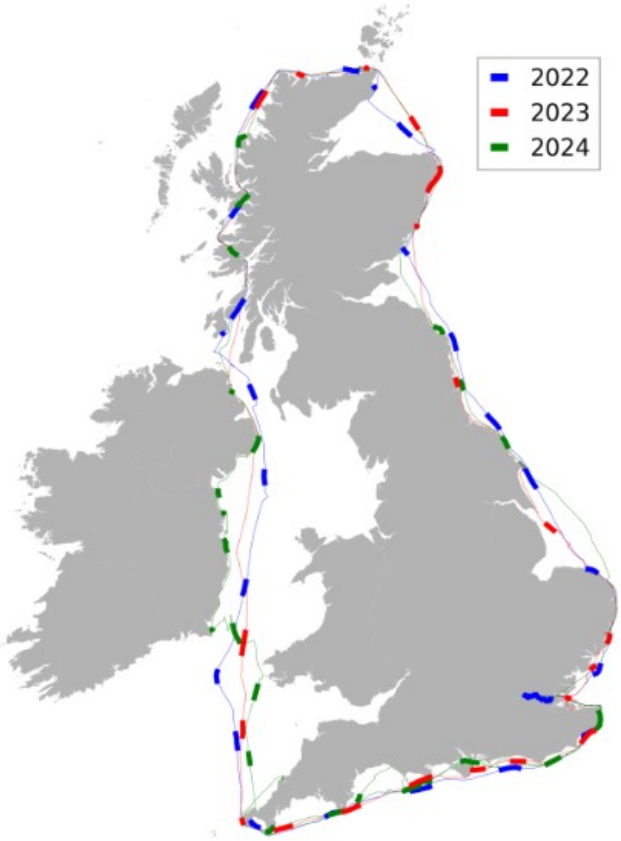
Microplastics are pieces of plastics smaller than 5mm. They may be plastics made that size on purpose (e.g. nurdles) or small pieces of plastic that have broken off from larger pieces (e.g. fragments or fibres). Scientists began to notice “small” plastics in the oceans almost 50 years ago. Since then, methods for detecting them have improved and studies have been conducted to determine if they are harmful. Most of these studies have taken place in sea animals and, unfortunately, the results are troubling. In many species, eating large numbers of microplastics has negative impacts ranging from reduced growth, to aberrant development, to cell toxicity.

What has changed since the 2022 and 2023 impact reports?

Samples were collected as described in the 2022 impact report with a slightly longer pump run time than 2022 and a slightly faster speed than 2023, to increase the volume of seawater filtered per sample. Briefly, sea water was pumped through a filter with a pore size of 0.04mm for 3.5 hours per day. The volume of water pumped was logged and the filters changed and stored each day. In 2024, an average of 217L was filtered for each sample (the highest average volume collected so far), and samples with less than 50L filtered were not analysed. Material collected on the filters was digested and density separated before analysis by microRaman spectroscopy.

In 2024, 23 microplastic samples were analysed and no samples were collected south of the Humber due to power restrictions on the boat.

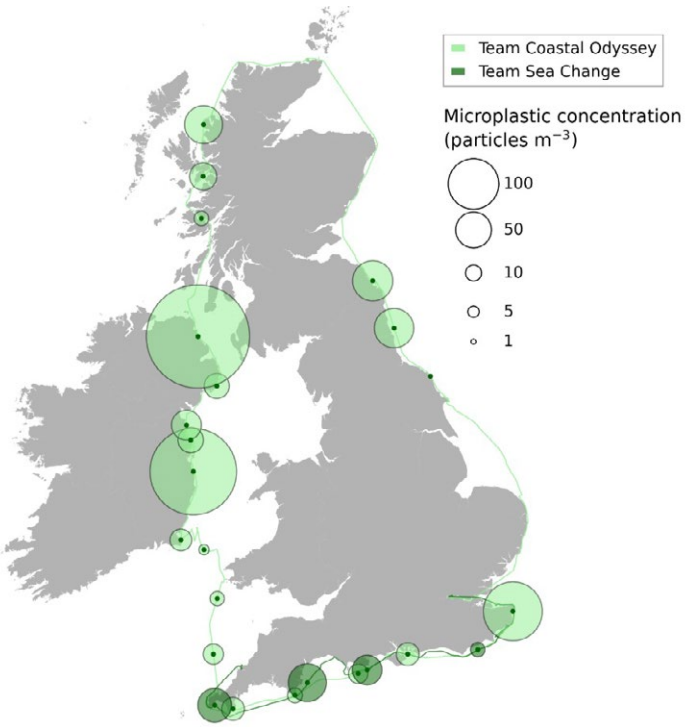
GB Row 2022/23/24
Microplastics sampling transects



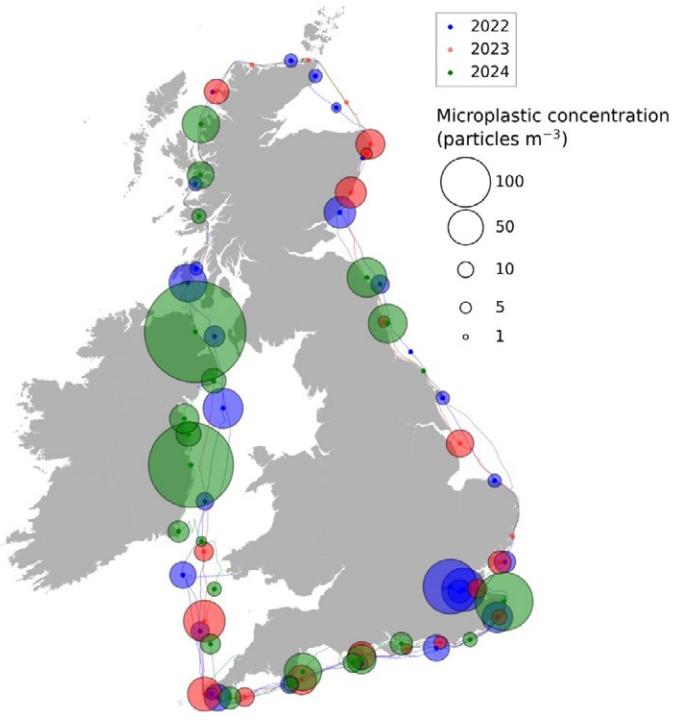
Routes with locations of microplastic samples for all year’s samples analysed. 2024 samples are in green.

University of Portsmouth PhD student Laura Fantuzzi analysing the data

Microplastic concentrations in 2024



Microplastic concentrations between 2022 and 2024

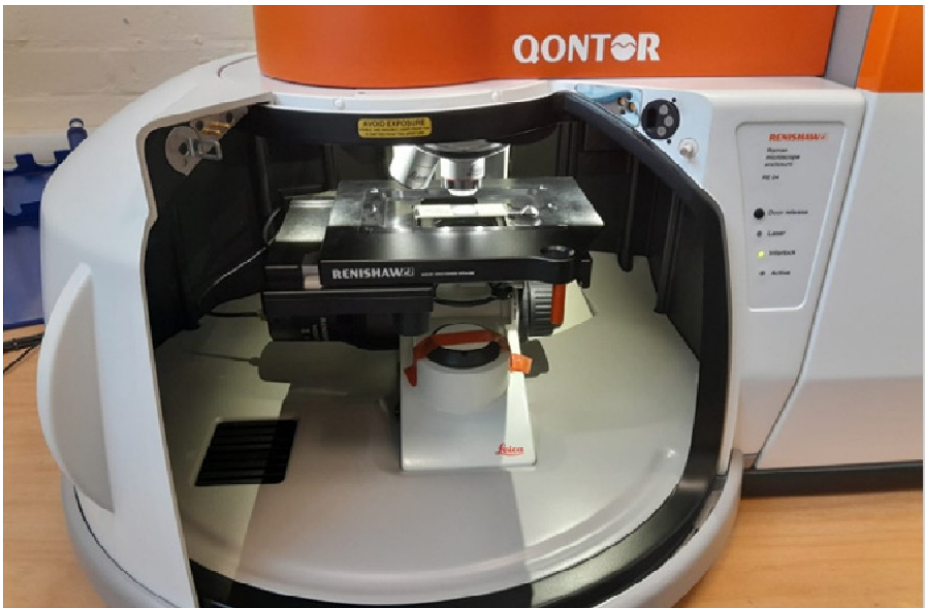


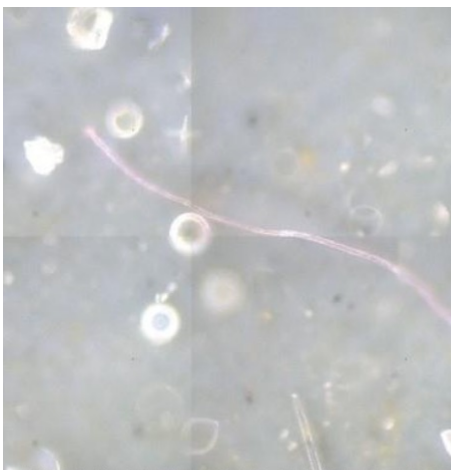
In 2024 we analysed microplastics samples from 23 sites

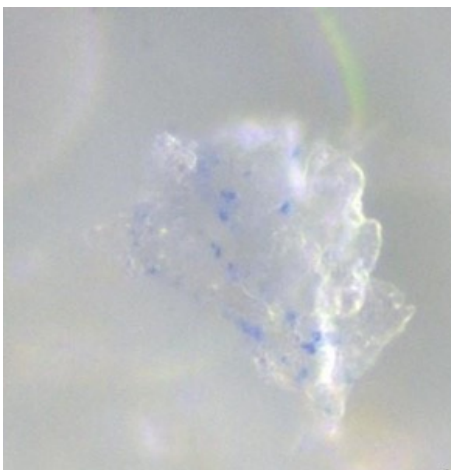
The average concentration of microplastics collected was 59 pieces per cubic metre of sea water (59 MP/m^3) – this is more than double that seen in 2022 and 2023 (23 and 20 MP/m^3 respectively). While the distribution of microplastics change between the years depending on the exact sample locations, trends are starting to emerge.

High concentrations are consistently found around the Thames and the Irish Sea/North Channel while concentrations in the north east of Scotland and on the east coast of England, south of Newcastle and north of Hull, show consistently low concentrations. Further work is ongoing to determine potential weather effects impacting concentrations in different years, and water circulation patterns that may increase accumulation in the Irish Sea and North Channel (the stretch of water between Northern Ireland and Scotland).

In 2024 the highest concentration of microplastics, 418 MP/m^3, was found in the Irish Sea. This the highest concentration we have seen anywhere over the 3 years of data collected and partly explains the much higher average for this year. It is not the only reason though with multiple sites seeing greater concentrations than previous years. The lowest was concentration was again 0 MP/m^3 observed on the east coast of England between Newcastle and Hull. No samples were analysed in the north east of Scotland in 2024 where we have also traditionally seen samples with no microplastics in them.







Images clockwise: The microRamen machine used for microplastics analysis, PhD student Laura Fantuzzi, examples of types of microplastics found in 2024: some spotted blue Teflon, a green paint fleck and a long pink PET fibre

Why are we monitoring underwater sound?

Sound travels much further in water than in air. As it travels so well, sound is used by many marine species to communicate, hunt, find a mate and avoid predators. Probably the most famous example is dolphins using echolocation to navigate or find food, but many fish also use sound to communicate. Listening to these sounds underwater can help us determine where "noisy" species are in our waters.

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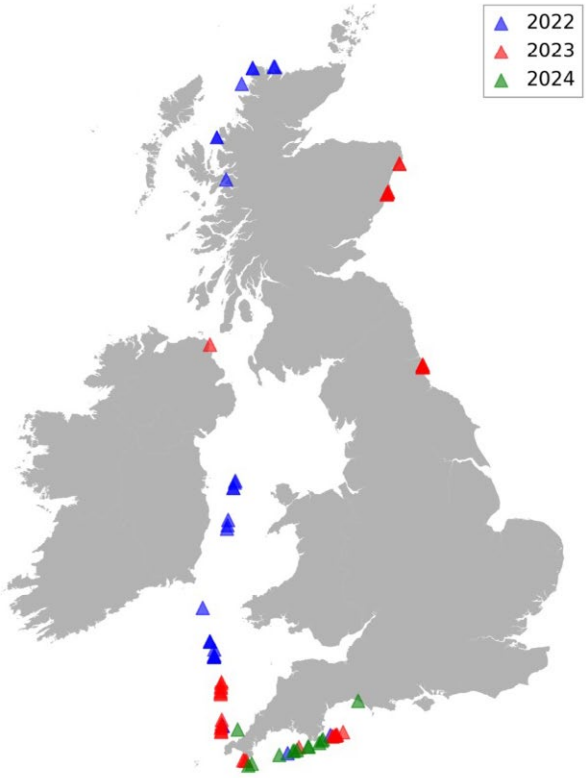
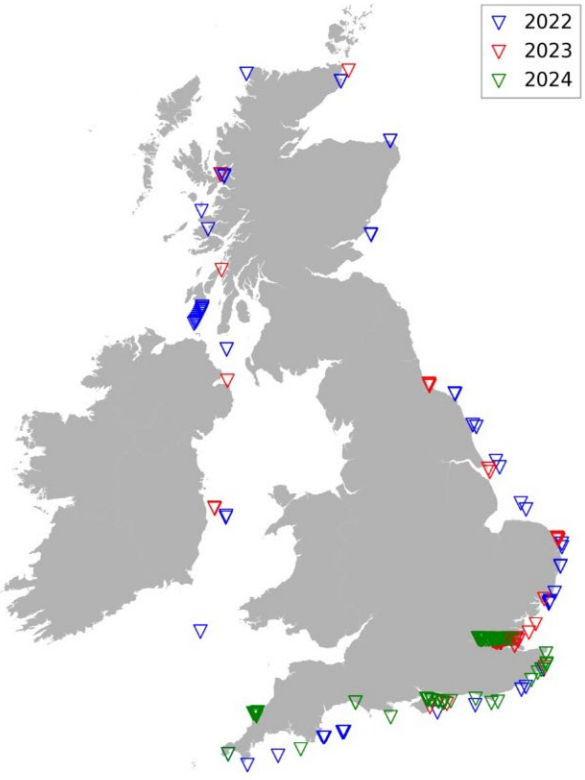
Locations of engine noise and dolphins along the south coast in 2024

What we heard and where we heard it over the years

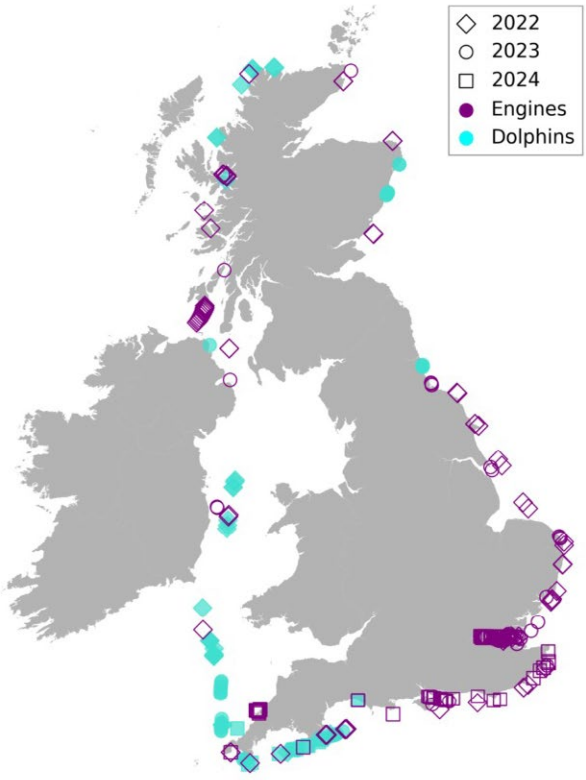
Despite dolphins being regularly observed around ships with engines – many of which are used for dolphin and whale spotting, there is a clear contras in the locations where we hear cetacean sounds and engine sounds.

Partly this can be attributed to the species natural habitat and range, but it begs the question of how many cetaceans are out there and are undetected as they dor go where we are and where the engine sounds are? We hope the data from GB Row can help fill in the gaps for these usually unmonitored locations.





Locations of occurrences of boat engines, in 2022, 2023 and 2024.

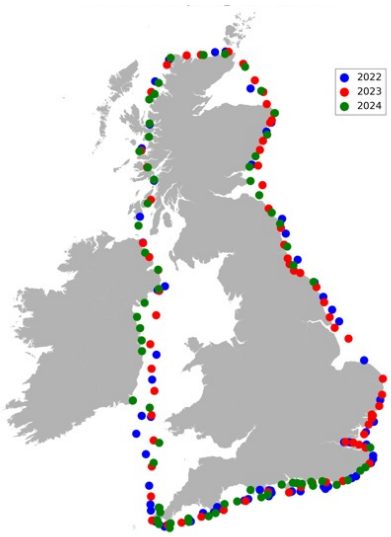


Cetacean and boat engine occurrences between 2022 and 2024.

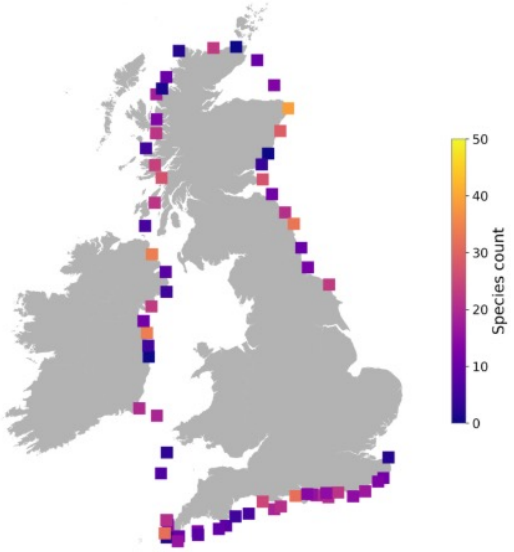
BIODIVERSITY

We're on track to provide comprehensive eDNA biodiversity data for UK waters

A key goal of our collaboration is to provide one of the most detailed baselines of British coastal biodiversity available for marine vertebrates (fish, mammals and birds) using environmental DNA (eDNA) analysis. The teams participating in the challenge collect samples as they circumnavigate the UK, rowing unassisted. Here you can see the location of the 216 samples collected over the years so far, and some of the species detected during the 2024 challenge. This data provides a unique look at the life beneath our waves.



UK coverage of eDNA samples collected by GB Row Challenge in 2022, 2023 and 2024.

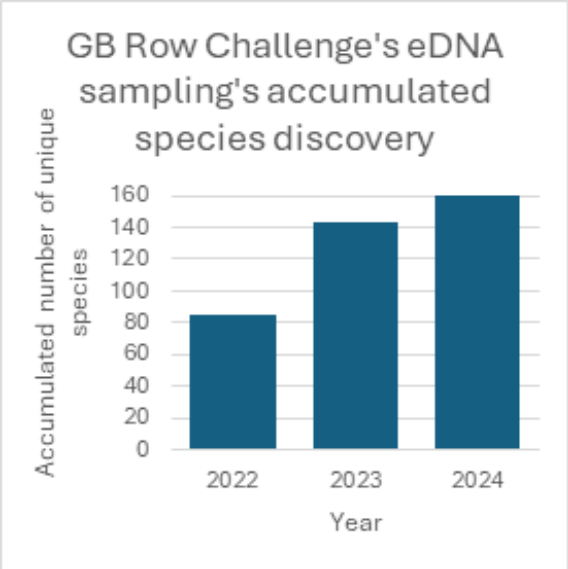


Number of marine vertebrate species found at each sampling location for 2024. Samples were not collected south of Hull.

GB Row increases the number of species detected year on year

We detected 115 species in 2024 across 68 eDNA samples collected by GB Row Challenge. We have now detected 151 different species in our water over the 3 years we have been working together.

Each year we find species we didn't see before allowing us to build up a truly comprehensive baseline of the biodiversity currently in our UK seas.



IMPORTANCE

At risk species

We are in the midst of a global biodiversity crisis, both on land and in the oceans. From the data collected by GB Row Challenge in 2022 and 2023 alone, at risk species can be found all around our coastline. Protecting the health of our waters is therefore more crucial than ever.

There could be more rare species out there, but we haven't captured the eDNA – yet. This is why continuing datasets are so important.

GB Row Endangered Species list:

CRITICALLY ENDANGERED

- European eel, "Anguilla anguilla"

ENDANGERED

- Atlantic puffin, "Fratercula arctica"

VULNERABLE

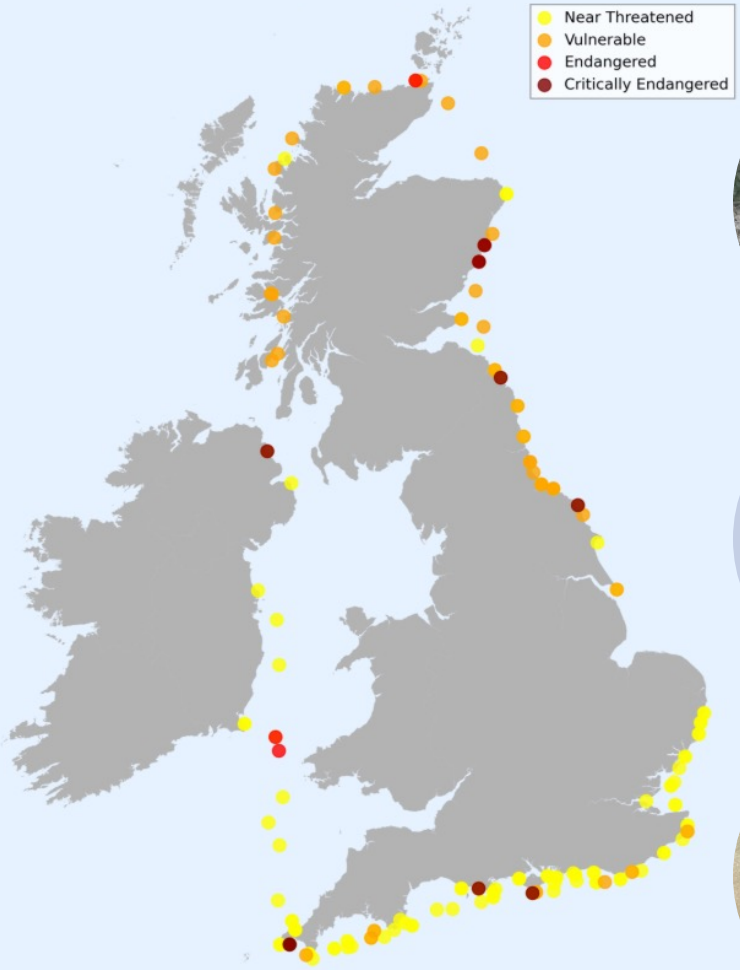
- Northern fulmar "Fulmarus glacialis",
- Atlantic salmon "Salmo salar",
- Turbot "Scophthalmus maximus"

NEAR THREATENED

- Red legged partridge "Alectoris rufa",
- Golden grey mullet "Chelon auratus",
- Lumpfish "Cyclopterus lumpus",
- European seabass "Dicentrarchus labrax",
- Eurasian coot "Fulica atra",
- European river lamprey "Lampetra fluviatilis",
- Blackspot seabream "Pagellus bogaraveo",
- Undulate ray "Raja undulata",
- European pilchard "Sardina pilchardus"

DATA DEFICIENT

- Ocean Sunfish "Mola mola"



Locations of at-risk species detected in the eDNA collected during the 2022, 2023 and 2024 and GB Row Challenges.

BRINGING IT ALL TOGETHER

The real strength of a project like this is how we combine these data sets going forward

The results you've seen so far are just the tip of the iceberg. We will be spending the next three years not only collecting more data but also combining the data sets.

Laura Fantuzzi has been diligently working on this data set for the last 3 years and a detailed report will be released in 2026 after the submission of Laura's PhD thesis. Good luck Laura!

This is not the end of the data collection and analysis though. A new PhD student Leah Weatherup will continue working up the current data, mining it to better understand our protected marine areas, as well as continuing the sample analysis.

All data collected throughout GB Row Challenge races will be made openly accessible on The Crown Estate's Marine Date Exchange, a world-leading database of offshore marine industry data, research, and evidence. The data will enable scientists, industries and the public to make informed decisions and help build understanding of how we can protect and restore our precious marine environment.

Data collected from The GB Row Challenge can be found on the Marine Data Exchange website.

THE CROWN ESTATE | Marine Data Exchange

Laura Fantuzzi (right) and Leah Weatherup (left) prepping the hydrophone for testing.

SPONSORS

A huge thank you to all the sponsors who have made this project possible:

Lead Environmental Data Partner

THE CROWN ESTATE

Thank you to The Crown Estate for sponsoring Coastal Odyssey in 2024 and partnering with GB Row Challenge in 2026 to ensure our data is openly accessible to scientists, industries and the public.

Lead Technical Partner

HARWiN

Thank you to all the Team at Harwin who rose to the challenge to create a system that works in the harshest environments.

Lead Science Partner

UNIVERSITY OF PORTSMOUTH

Thank you to the team of scientists at the University of Portsmouth for your support and guidance in order to create robust data sets.

Acoustics Partner

RS AQUA

Thank you to RS Aqua for the time devoted to designing the bespoke acoustic recording system for the GB Row Challenge boats.

Filtration Partner

porvair filtration group

Thank you to Porvair Plc and especially to Jon Churchill for his tireless work and energy in leading the filtration project.

Environmental DNA Partner

NATURE METRICS
DNA-BASED MONITORING

Thank you to NatureMetrics for their time and expertise in the eDNA analysis.

LEAD CORPORATE SPONSOR FOR 2024

SIMPLY SUSTAINABLE®

In 2023 we welcomed Simply Sustainable as Lead Corporate Sponsor for 2024

Founded in 2010, Simply Sustainable is a leading consultancy firm with a mission to help clients achieve their Environmental, Social and Governance (ESG), net zero and sustainability goals.

Simply Sustainable's CEO, Nicola Stopps, said: "GB Row Challenge is an extraordinary venture and test of physical and mental strength. I am so proud that Simply Sustainable partnered with GB Row as our commitments to sustainability and wanting change in human behaviours align. Our purpose is to make businesses report, take ownership and react to environmental concerns with transparent strategies. The data gathered will be fascinating to learn from and prompt the responsible change required."

PHILANTHROPIC SUPPORT

This research is only possible thanks to the generosity of our community. Every donation of any size helps carry this work forward, tackle marine pollution and protect our seas. To support this vital work please visit The GB Row Challenge donation page hosted by the University of Portsmouth.

DONATE TO SUPPORT THE GB ROW CHALLENGE TODAY.

Every gift helps protect our oceans.

A grateful thank you to an anonymous donor

We would like to extend our heartfelt thanks to a generous anonymous donor for their incredible support of the GB Row Challenge and University of Portsmouth's pioneering environmental research.

Your contribution is making a real difference — helping us collect vital data on microplastics, eDNA, water temperature, and salinity from some of the most challenging waters around the UK. This research is driving forward our understanding of climate change and supporting world-class science at a time when it is urgently needed.

Your quiet generosity speaks volumes, and we hope your example inspires others to follow suit in backing this crucial work — for the health of our oceans and the future of our planet.

With sincere gratitude, **The GB Row Challenge Team and University of Portsmouth**

We are deeply grateful to the funders who have supported this work and made this research possible. Thank you to The Robert and MeiLi Hefner Foundation and the A.G. Leventis Foundation for your continued support, enabling this work to continue.

GB ROW CHALLENGE
ANONYMOUS DONOR
THINK ABOUT DOING YOUR PART

Robert & MeiLi Hefner FOUNDATION

THE A. G. LEVENTIS FOUNDATION

We have two teams taking on the challenge this year collecting a whole new set of environmental data

Teams Nautilus and Rowmads are busy preparing to take on the GB Row Challenge in 2026, which starts at Tower Bridge, London, on Sunday 14 June.

On behalf of the scientific community and GB Row Challenge, thank you to everyone who has taken on this epic adventure, and to those who will do so in the future, for collecting invaluable data that deepens our understanding of the natural world.

Top right: Rowmads
Bottom right: Nautilus

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