GB ROW CHALLENGE 2022 – TEAM ALL SYSTEMS ROW – SCIENCE IMPACT REPORT

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GB Row Challenge 2022 Team All Systems Row. *From left to right:* ***Fiona Jamie, Stephanie Toogood, Charlie Cooper, Andrea Harwood, Jessica Plail and Lia Evans.***

Executive summary

Introduction

The GB Row Challenge provided **Team All Systems Row** with an opportunity to collect multiple types of environmental data during their journey around Great Britain. The resulting dataset combines measurements of **plastic pollution and marine biodiversity**, providing complementary perspectives on the state of the marine environment.

Microplastics

Sampling **more than 300 litres of seawater** across **9 hours of sampling**, Team All Systems Row collected **3 microplastics samples** which have been stored for future analysis.

Biodiversity

eDNA sampling detected **43 marine vertebrate taxa** across **17 samples**, with individual sampling locations containing **between 0 and 19 detected taxa**. Species detected included **the commercial black seabream and European sprat and the keystone species harbour porpoise**. The detection of fish, birds and mammals demonstrates the ability of eDNA sampling to provide broad biodiversity information.

Conclusions

Taken together, the data collected by Team All Systems Row demonstrate the value of **citizen-led and expedition-based environmental monitoring**. A single vessel travelling around Great Britain was able to collect **tens of measurements across a wide geographical area**, generating data that can complement established scientific monitoring programmes and provide additional information about the **chemical and biological characteristics of UK coastal waters**.

Introduction

Team All Systems Row participated in **GB Row Challenge 2022**, comprising **Skipper Jessica Plail, First Mate Stephanie Toogood, and Crew Members Fiona Jamie, Charlie Cooper, Andrea Harwood and Lia Evans**.



Team All Systems Row completed a **supported, partial circumnavigation of Great Britain,** departing Tower Bridge on the River Thames on **12 June 2022** and withdrawing in the Celtic Sea on **25 June 2022.** They spent **13 days at sea** and covered **over 500 nautical miles**.

The team rowed aboard **GB Row Intrepid**, which was equipped with **a seawater sampling pump**. During their row, the team collected data on **microplastics** and **environmental DNA (eDNA)**.

Together, these observations provide a unique picture of the marine environment around Great Britain, combining measurements of **pollution** and **marine biodiversity**.

Microplastics

Microplastics are small plastic particles generally defined as being less than 5 mm in size. They can be intentionally manufactured at small sizes, for example as industrial resin pellets, or can form when larger plastic objects break down in the environment. Fibres released from textiles and other manufactured materials are another important source.

Microplastics are now **widespread** throughout the marine environment. They can be ingested by marine organisms and may interact with other contaminants in the marine environment. Despite their widespread occurrence, there remain important gaps in our understanding of the distribution and composition of microplastics in UK waters.

Team All Systems Row collected **3 seawater samples for microplastic analysis**, filtering **more than 300 litres of seawater** over approximately **9 hours of sampling**.

The team's microplastics samples have been stored for later analysis.

The data will provide a snapshot of the types, concentrations and characteristics of microplastics encountered along the team's route around Great Britain.

Biodiversity

Biodiversity is an important indicator of the health and resilience of marine ecosystems. A diverse community of organisms supports complex food webs and ecosystem processes, and provides benefits to people through fisheries, coastal protection, recreation and other ecosystem services. Changes in the number and distribution of species can also provide important information about how marine ecosystems are responding to pressures such as climate change, pollution and human activity. Monitoring biodiversity is therefore an important part of understanding and protecting the health of our seas.

Team All Systems Row collected seawater samples for **environmental DNA (eDNA) analysis**. eDNA sampling works by filtering seawater to capture biological material released by organisms into the surrounding environment. DNA extracted from these samples can then be analysed to identify the taxa whose DNA was detected at each sampling location.

This approach allows biodiversity to be investigated over a large geographical area without requiring organisms themselves to be directly observed or captured.

For this analysis, the focus was on **marine vertebrates**, including birds, fishes and mammals.

Team All Systems Row collected **17 eDNA samples**. Across these samples, DNA from **43 taxa of marine birds, bony fishes and mammals** was detected.

Taxonomic group	Scientific name	Common name
Bird	*Anser anser*	Greylag goose
Bird	*Larus* sp.	Seagull species
Bony fish	*Anguilla anguilla*	European eel
Bony fish	Congridae sp.	Conger eel species
Bony fish	*Atherina presbyter*	Sand smelt
Bony fish	*Belone belone*	Garfish
Bony fish	*Clupea harengus*	Atlantic herring
Bony fish	*Sardina pilchardus*	European pilchard
Bony fish	*Sprattus sprattus*	European sprat
Bony fish	*Engraulis encrasicolus*	European anchovy
Bony fish	*Rutilus rutilus*	Common roach
Bony fish	*Pollachius pollachius*	Pollack
Bony fish	*Trisopterus* sp.	Small cod species
Bony fish	*Ciliata mustela*	Five-bearded rockling
Bony fish	*Apletodon dentatus*	Small-headed clingfish
Bony fish	*Lepadogaster* sp.	Clingfish species
Bony fish	*Chelon* sp.	Mullet species
Bony fish	*Ammodytes* sp.	Sandeel species
Bony fish	*Gymnammodytes semisquamatus*	Smooth sandeel
Bony fish	*Hyperoplus immaculatus*	Corbin's sandeel
Bony fish	*Hyperoplus lanceolatus*	Greater sandeel
Bony fish	*Blennius ocellaris*	Butterfly blenny
Bony fish	*Lipophrys pholis*	Shanny
Bony fish	*Parablennius gattorugine*	Tompot blenny
Bony fish	*Callionymus lyra*	Common dragonet

Taxonomic group	Scientific name	Common name
Bony fish	*Aphia minuta*	Transparent goby
Bony fish	*Gobius niger*	Black goby
Bony fish	*Pomatoschistus flavescens*	Yellow goby
Bony fish	*Pomatoschistus microps*	Common goby
Bony fish	*Ctenolabrus rupestris*	Goldsinny wrasse
Bony fish	*Labrus bergylta*	Ballan wrasse
Bony fish	*Symphodus melops*	Cuckoo wrasse
Bony fish	*Dicentrarchus labrax*	European seabass
Bony fish	*Perca fluviatilis*	European perch
Bony fish	*Sparus aurata*	Gilthead seabream
Bony fish	*Spondyliosoma cantharus*	Black seabream
Bony fish	*Echiichthys vipera*	Lesser weever
Bony fish	Pleuronectidae sp.	Flounder species
Bony fish	*Solea solea*	Common sole
Bony fish	*Salmo salar*	Atlantic salmon
Bony fish	Cottidae sp.	Sculpin species
Bony fish	*Liparis* sp.	Snailfish species
Mammal	*Phocoena phocoena*	Harbour porpoise

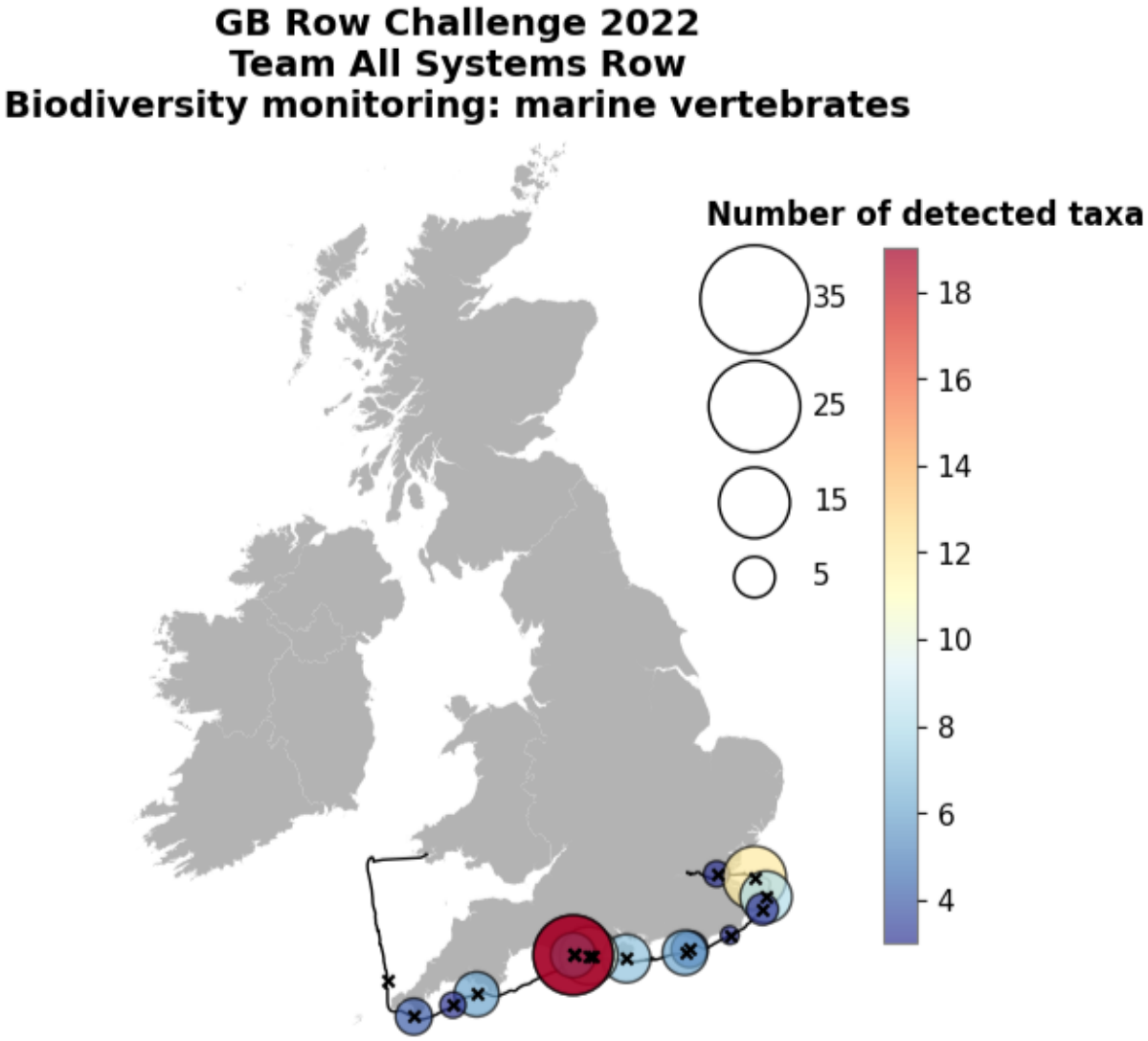
The detected taxa included species of **ecological and commercial interest**, including **the commercial black seabream, the keystone species harbour porpoise, and the highly commercial European sprat**.



Black seabream **Harbour porpoise** **European sprat**



Biodiversity varied considerably between sampling locations. The number of marine vertebrate taxa detected at individual sampling sites **ranged from 0 to 19 taxa**.



This spatial variation demonstrates the value of collecting samples at many locations during a single expedition: the expedition captured differences in the biodiversity detected across different parts of the British coastline.

Our Partners

This work would not have been possible without the contributions and support of many:

The wider scientific team at the University of Portsmouth:

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Simply Sustainable develops sustainability solutions and support to drive meaningful change across the value chain.

Cleaner Seas Group develops microplastic filtration solutions for domestic and commercial markets globally, helping tackle microplastic and microfibre pollution at source.

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Data support:

The Crown Estate's Marine Data Exchange is one of the world's largest collections of marine industry data. Marine data collected by GB Row Challenge teams each year will be hosted by the MDE, where it will be openly accessible to scientists, industries and the public to enable informed decision making. This is an important element of The Crown Estate's Nature Recovery Ambition and will contribute to a better understanding of how we can protect and restore our precious marine environment.