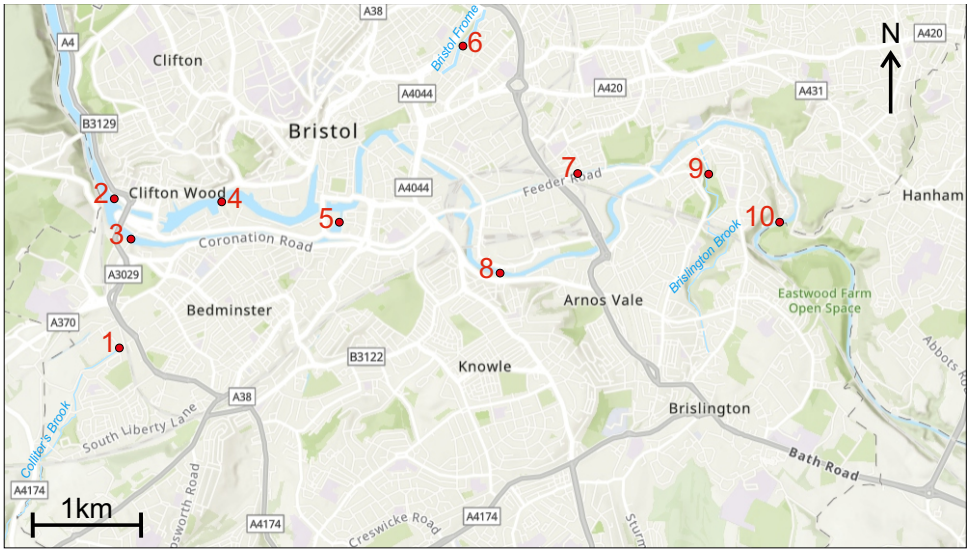
eDNA Fish assessment: Bristol Floating Harbour & associated waters

Report Summary

Bristol Avon Rivers Trust (BART), in partnership with Bristol City Council, have carried out a pilot study of species and communities of fish in Bristol's Floating Harbour and the lower course of the River Avon, using environmental DNA (eDNA) – a cutting edge technique for biomonitoring rare and difficult-to-observe species. eDNA is genetic material of an organism that can be obtained from its environment; sources include dead skin cells, mucus, faeces and saliva, which have been shed by the organism into its surroundings. The presence of eDNA, even at very low concentrations, can indicate which species exist in specific habitats, including waterbodies, and the relative abundance of these species between sampling sites.

Sampling methodology

10 sites within Bristol's Floating Harbour were sampled in February, June and July 2022.



Credit: BART Rivers Services Ltd

Water samples were obtained using a sterile collection bag. Water from the bag was drawn up through a syringe attached to a filter. As the water passes out through the syringe, eDNA is collected on the filter. The filter is then sent to a laboratory to be analysed using DNA sequencing – a way of identifying which species the DNA belongs to.

The methodology utilised during this project provides a novel, useful, and relatively economical tool for future monitoring and for aiding prioritisation of future river improvements.

Credit: Bristol Avon Rivers Trust

Summary of key findings:

1. eDNA surveying and analysis has provided an effective approach for collecting data on the presence and absence of fish, particularly important in an area that has not been recently surveyed by traditional methods, if at all.

2. The eDNA survey has indicated the presence of the following species of note in the lower reaches of the Bristol Avon and Floating Harbour:

- European Eel
- Atlantic Herring,
- Atlantic Salmon,
- European Plaice,
- Brown Trout,
- Atlantic Mackerel,
- Dover Sole and
- Sea Lamprey.

All of which have been identified as priority species under the UK Biodiversity Action Plan, meaning they are threatened species and require conservation.

European Eel

Atlantic Salmon

Eurasian Carp

3. eDNA data has provided indication of three fish species which are on the International Union for Conservation of Nature (IUCN) Red List of Threatened Species, a list which evaluates the extinction risk of thousands of species.

- European Eel (IUCN Red List – critically endangered)
- Atlantic Salmon (IUCN Red List – vulnerable) and
- Eurasian Carp (IUCN Red List – vulnerable)

4. The data also indicates areas within the Floating Harbour and the Bristol Avon which would benefit from protection, rehabilitation, and improvement of aquatic habitat. A Bristol City Council project that aims to improve freshwater habitat through the installation of floating habitat in the Floating Harbour has recently been successful in its application to the West of England's Combined Authority's Green Recovery Fund. A recent blog from the Mayor also makes reference to the eDNA survey: https://thebristolmayor.com/tag/communities/

Why and What Next?

The eDNA survey has provided a valuable dataset for the distribution of fish species in Bristol's Floating Harbour. Prior to this study no historical fish surveys appear to have been completed at the area investigated, so there is little record of the abundance and diversity of fish populations within this inner-city area of the Bristol Avon or Floating Harbour. The Environment Agency began collecting limited data on fish species in the Wider Bristol Avon in 1964, but there is scant knowledge of the species that historically existed in these waters before this date.

The eDNA dataset has provided a snapshot of species presence in the project area and helped improve our understanding of which fish species are frequenting the Bristol Avon. This data will help inform decision making that impacts on the water environment, including development in and around the harbour and recreational use of the harbour, and it will be used to help prioritise future habitat improvement and fish passage works as part of the Bristol Avon Fish Recovery Strategy.

Future eDNA analysis of this area will show species changes to abundance and distribution over time. With luck this will reflect positive changes, including improved fish passage through the Bristol Avon catchment, and consequently a greater abundance of the fish species in these waters.