Assessment of the extent and impact of obstacles on freshwater hydromorphology and connectivity in Ireland

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Reconnect

Reconnect is an Environmental Protection Agency (EPA)-funded project being undertaken by a team of researchers from University College Dublin. The overall objective of the project is to harness the scientific knowledge base for developing a validated methodology for prioritising a selection of river obstacles for modification or removal to improve hydromorphology and connectivity in Irish freshwater systems. In the context of this project, an obstacle is defined as a physical structure within the river channel, either natural (e.g. waterfall) or manmade (e.g. weir, bridge apron, culvert), which has the potential to disrupt the continuity of a river by preventing or delaying the up- or down-stream movement of aquatic organisms, organic and inorganic material.

Fig. 1. European eel (*Anguilla anguilla).* River obstacles can prevent the upstream movement of endangered fish species, like the eel pictured above.

How can you help?

Mapping the locations of river obstacles is not a simple task. Ireland has a vast river network (74,000 km) and it is suspected that there are hundreds of obstacles in most major rivers. The Reconnect project has linked up with the UK River Obstacles project to use their mobile phone app to allow anyone near a river to record the location and type of man-made and natural obstacles they see. We encourage all citizens who have an interest in the health of Ireland's rivers to download the app and use it to record any river obstacles that they may encounter. The river obstacles app can be downloaded for free from Google Play and the iTunes App Store.

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Project Objectives

Assessment of desk-based mapping techniques to locate obstacles. In addition, we will map and characterise obstacles in a number of catchments and produce a geo-referenced map layer.

Assessment of the impact of obstacles on fish & macroinvertebrates

Testing the feasibility of using environmental DNA (eDNA) to assess the potential impact of obstacles on fish and invertebrate movement

Characterisation of the hydromorphological context for obstacle emplacement & evaluation of tools to predict the effects of obstacles on hydromorphology

Economic analysis of the impact of obstacle removal

Production of a validated multi-criteria decision-support tool for prioritising the selection of obstacles for modification or removal

Locating River Obstacles

We are using satellite imagery, discovery series maps and historic maps to locate river obstacles. The mapping methodology was designed by Inland Fisheries Ireland, and tested against field data from the Nore and Dodder catchments by the Reconnect team. The desk study is an efficient and effective method of locating river obstacles. Over 85% of the obstacles located in the field were successfully identified via the desk study.

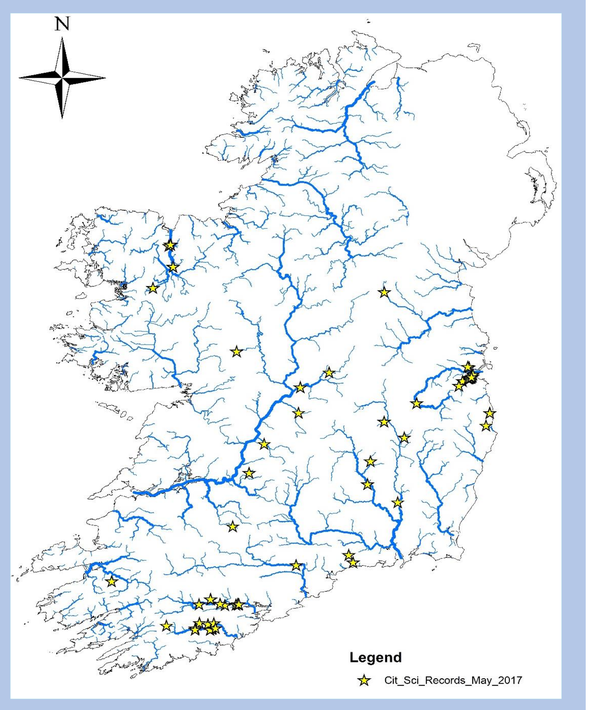
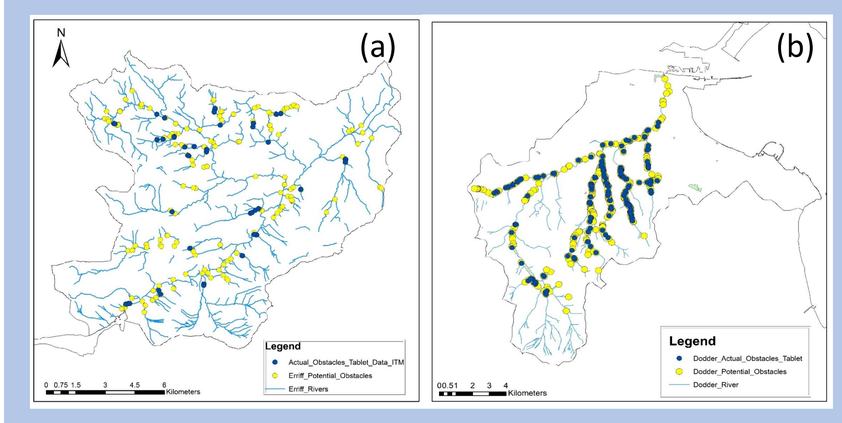


Fig. 2. Map showing the locations of river obstacles recorded by citizen scientists via the River Obstacles app. (n= 76)



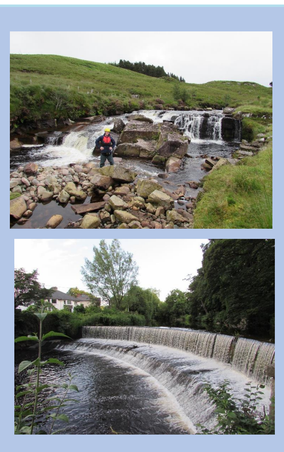


Fig. 3. Map showing the locations of potential and actual river obstacles in the (a) Erriff and (b) Dodder catchments. The pictures on the right show a natural waterfall in the Erriff (top) and one of the many weirs on the Dodder (bottom).

Fig. 4. Large brown trout (*Salmo trutta*) captured during an electrofishing survey upstream of a weir.

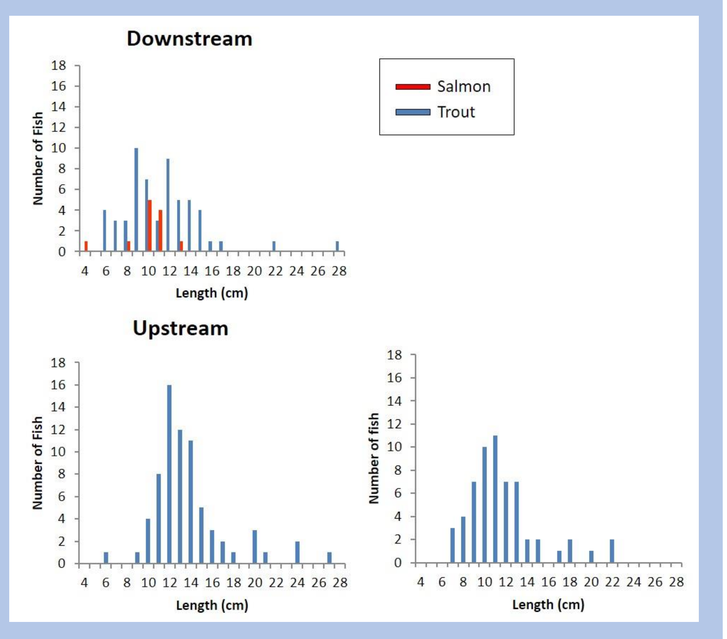


Fig. 5. Graph showing the length frequency distribution of salmon and trout upstream and downstream of a ford in a tributary of the Slaney river. Trout were present both upstream and downstream of the ford, while salmon were only found downstream.

eDNA as a tool to evaluate the impact of river obstacles

Environmental DNA (eDNA) samples have been taken upstream and downstream of river obstacles. These are simply water samples that contain DNA from organisms inhabiting the river. They can be used to detect the presence and relative abundance of target species. Primers and qPCR probes have been previously developed and deployed for Atlantic salmon (*Salmo salar)*, brown trout (*S. trutta*), freshwater pearl mussel (*Margaritifera margaritifera*), and sea lamprey (*Petromyzon marinus*). As part of Reconnect, primers for twaite and allis shad (*Alosa fallax*, and *A. alosa*), and for the white clawed crayfish (*Austropotamobius pallipes*) have been developed, and will be deployed in selected rivers.

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