Developments in Inland Fisheries Ireland Research

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Iascach Intíre Éireann
Inland Fisheries Ireland

Welcome to the Newsletter

Evidence-based decision making is crucial in the development of fisheries management policies and in the successful implementation of projects for nature restoration. This issue highlights some of the ways in which IFI Research uses technological solutions in data collection in the field, such as portable PIT tag detectors, drones, eDNA sampling and acoustic tracking. Incorporating such advances ensures that IFI's applied research programmes deliver the best available scientific advice.

As always, we thank all IFI staff who contribute to our research programmes and to this newsletter.

Slán,

Dr. Fiona Kelly, Head of Research, Policy & Risk

In this issue

Barrier Mitigation Research Programme: Using Tech to Advance Data Collection in Rivers

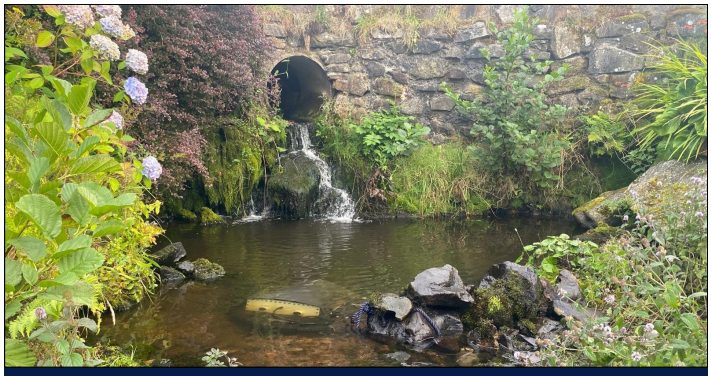
The Barrier Mitigation Research Programme (BMRP) is delivering a programme of assessment and monitoring of the environmental and biological impacts of mitigation measures for manmade barriers to river connectivity, such as weirs, culverts, fords, etc. To gather baseline data prior to mitigation works and for long-term monitoring, the BMRP team in IFI Research is using technological solutions to document environmental conditions around barriers to water flow in Ireland's rivers and their impacts on fish movements.

Drone used by the BMRP to capture high-resolution imagery of barriers

To investigate how bridge culverts impact fish movements, the BMRP team are using passive integrated transponder (PIT) tags, which are microchips with identification codes that can be injected into fish and recorded by a detector. By tagging trout on either side of a culvert, the BMRP team found that even such a small barrier can prove impassable to all but relatively few trout, with smaller fish taking longer to successfully cross the culvert. The passage of fish upstream also relied on rising water levels following a period of heavy rain. This highlights how smaller fish may not always have the swimming power necessary to pass barriers, thereby limiting the use of potentially available river habitat by fish populations.

Over the last few years, IFI Research teams have increasingly used drones to capture a bird's-eye view of rivers, and they are a core part of the BMRP team's monitoring strategy. The team flies drones equipped with high-resolution cameras in multiple passes over barrier locations to collect orthomosaic imagery that can be used to map barriers along channels and to create topographic digital elevation models. In addition, the BMRP team use a drone equipped with a LiDAR (light detection and ranging) camera, which records a 'point cloud' of GPS and distance measurements using laser pulses. This yields extremely accurate data used to create 3D models of barriers that can be explored in very high detail.

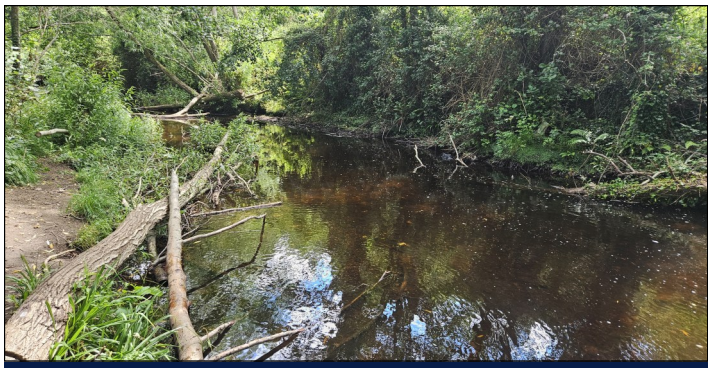
Other technologies for scientific data collection used by the BMRP team include data loggers to record water temperature, environmental DNA sampling and acoustic Doppler current profiling of water levels. Used in tandem with electrofishing surveys of fish communities, these innovative technologies enable the BMRP research team to deliver comprehensive scientific evidence that will support IFI's work to mitigate barriers and to reconnect fish populations with their habitat throughout Ireland's river systems.



PIT tag detector to track trout movement at a culvert, Cloonmore River

3D model of Bakery Weir, River Suir, generated with LiDAR data

Large Wood in Rivers as a Restoration Tool



LW felled into and anchored instream in the River Dodder, Co. Dublin

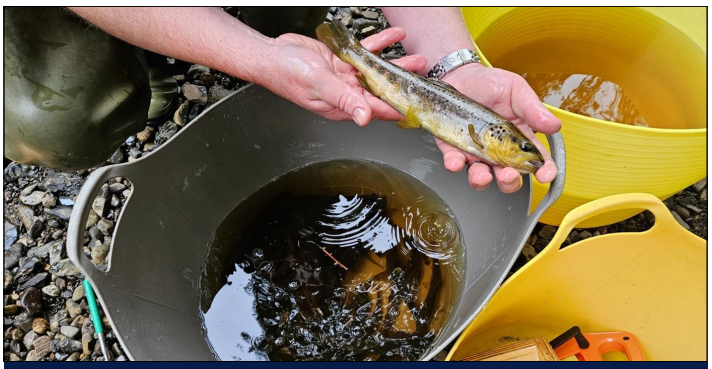
Onsite LW used in restoration works on the Garr River, Co. Kildare

Trees growing along riverbanks provide important benefits for fish in rivers, such as providing shade, buffers to adjacent agricultural land and organic inputs to food webs. Riparian woodlands also supply large wood (LW) into the channel itself, thereby directly influencing water flow, sediment patterns and instream shelter for fish. To explore the function of LW in rivers, the RiverWood project has been established in IFI Research in partnership with University College Dublin, with funding from the Environmental Protection Agency.

Placing LW into rivers is increasingly used to kick-start natural hydromorphological processes in restoration projects. An important proof-of-concept was achieved on the River Dodder at Dodder Valley Park in Tallaght, Co. Dublin. Unlike most urban rivers of European capitals, the Dodder supports populations of Atlantic salmon, sea trout, brown trout and lamprey, but fish kills and barriers for flow regulation are significant pressures in this catchment. With funding from the SSTRCPF, IFI staff worked with South Dublin County Council to anchor LW in the channel, which trapped gravels in riffles suitable for spawning and provided instream shelter for older trout. Electrofishing surveys one year later have documented higher abundances of trout and juvenile lamprey in the area.

Similarly, the Hydromorphology Research Programme team worked with IFI Eastern RBD staff and Coillte to incorporate LW in a project on the Garr River in Co. Kildare, a tributary of the River Boyne. The project used onsite LW in a soft-engineering approach to restore hydromorphological function and to improve spawning habitat for salmonids.

Socio-ecological conflicts due to public perception of LW as a flood risk is an important consideration. The RiverWood team hopes to increase awareness of the potential benefits of LW as a restoration tool through communication of scientific evidence to policymakers involved in the management of river systems.

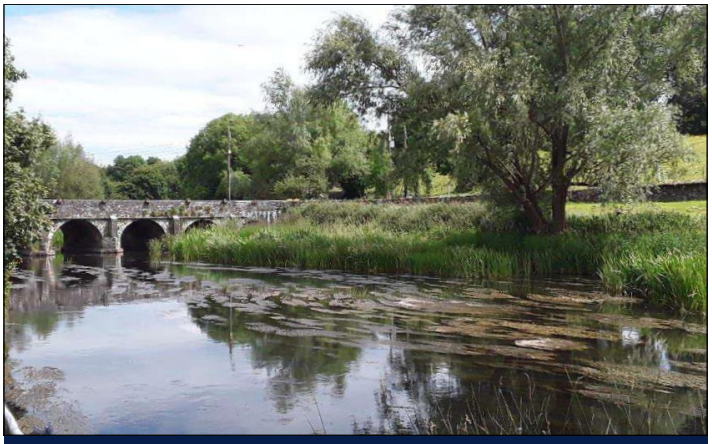


Adult brown trout from the River Dodder captured sheltering in LW

Environmental Drainage Maintenance Research Programme Update

The Office of Public Works (OPW) is required to maintain flood relief and arterial drainage schemes in rivers across the country in good condition. Over the years, the OPW has collaborated with IFI to develop guidelines for best practice to minimise environmental impacts of drainage works, and IFI's Environmental Drainage Maintenance Research Programme (EDMRP) continues this work by annually producing catchment-wide assessments of drained river systems.

The latest assessment report from the EDMRP is focused on the River Maigue, with results from electrofishing surveys of fish community ecological status at 39 sites and from river hydromorphology surveys at 28 sites around the catchment. The assessment also analyses pressures on water quality, identifies priority barriers for mitigation to improve fish passage in the catchment and recommends enhancement measures to improve river habitat on the Maigue and its tributaries. The EDMRP report on the Maigue is now available to download at https://tinyurl.com/edmrp-maigue-2024.



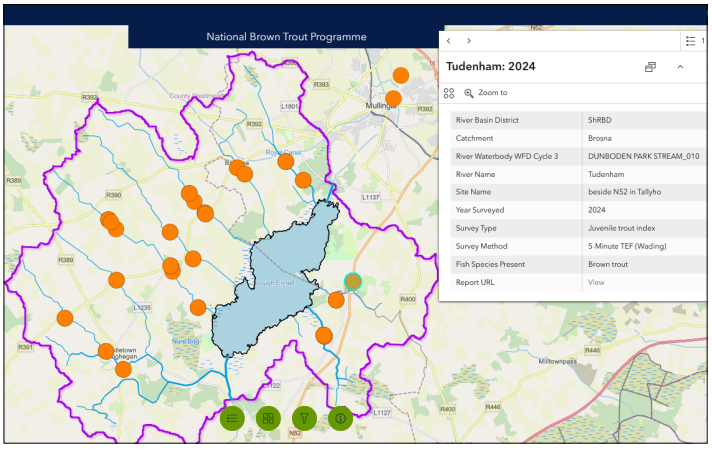
Bridge on the River Maigue at Bruree, Co. Limerick

IFI Open Data Portal Update: National Brown Trout Programme River Surveys

The IFI Open Data Portal is a cloud-based platform that fulfils IFI's obligation as a public body to make data openly available. The portal provides datasets for download in GIS-compatible formats and also provides webapps, dashboards and storymaps that allow users to explore the data and to understand its context.

The latest update to the portal is the National Brown Trout Programme (NBTP) River Surveys 2021–2024 dataset. The NBTP conducts research to improve our understanding of trout ecology and to support conservation and management of trout fisheries. This work encompasses lake surveys and electrofishing of rivers, including catchment-wide trout stock surveys, population genetics studies and an ongoing programme to model recruitment of juvenile trout in three index catchments with trout fisheries: Lough Carra, Lough Ennell and the Clodiagh (Tipperary) subcatchment of the River Suir.

The newly published dataset comprises species presence and other information for 200 surveys on 50 rivers in 8 catchments around Ireland, including links to published reports on the IFI website where available. The NBTP River Survey dataset can be explored at https://arcg.is/1a4P1T3.



Top: Juvenile brown trout; Bottom: Screenshot from the NBTP webapp

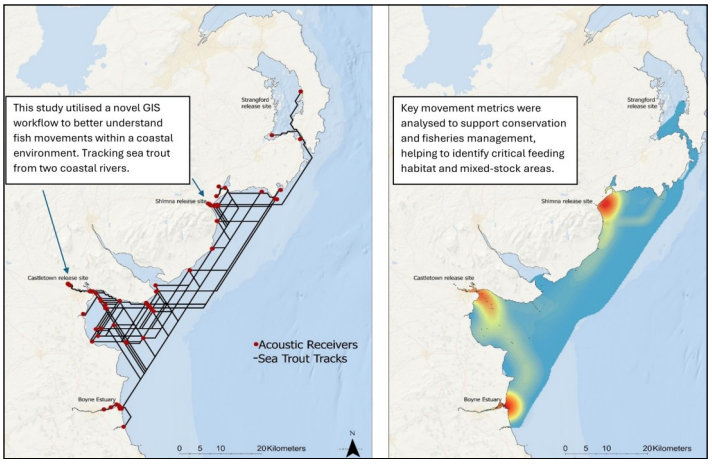
What Direction Do They Take? COMPASS Results on the Movements of Sea Trout

Some trout follow a life-history strategy in which individuals migrate to sea from the rivers where they are born. By smoltifying and migrating to coastal waters, juvenile sea trout take advantage of richer feeding opportunities to grow and reproduce successfully, but this increases their likelihood of mortality due to predation, parasites and anthropogenic pressures. Newly published results from the transnational EU-funded COMPASS programme provide insights on these movements of sea trout that will help measures to protect them.

The programme used telemetry stations along the northeast coast of Ireland to detect acoustic transmitters implanted in sea trout. In October in the *Journal of Fish Biology*, James Barry of IFI Research and colleagues reported an analysis of 134,149 location 'pings' from 255 sea trout tagged in two rivers, the Castletown in Co. Louth and the Shimna in Co. Down. There were clear differences between post-smolts newly arrived at sea, which tended to disperse widely and reside there for longer, compared with older finnocks in their first year at sea, which tended to have seasonal trends in their movements.

Sea trout from the two rivers mixed and foraged across shared coastal habitats, indicating strong connectivity of marine habitat and biologically meaningful mixed-stock zones. Restoration of marine habitats of sea trout is mandated by the EU Nature Restoration Law, and these results highlight that this will require regional scale management and cross-border cooperation.

The study's authors acknowledge the invaluable assistance of IFI Eastern RBD staff and anglers from the Dundalk & District Angling Club in capturing sea trout for tagging.



Top; a finnock; Bottom: tracking results on sea trout movements

DiadSea Update: Transnational Cooperation in Conservation Science for Diadromous Fish

Diadromous fish species migrate between rivers and the sea, using very different freshwater and saltwater environments for spawning and feeding to complete their life cycle. Diadromous fish in Ireland include species familiar to anglers, such as Atlantic salmon, sea trout, shads and grey mullets, as well as species that are less well known, such as smelt and lampreys. The migratory life history that all these species share means that they are exposed to many threats, especially in the poorly understood marine phase of their life.

Funded by EU Interreg Atlantic Area 2021–2027, the DiadSea project aims to improve transnational cooperation in the management and conservation of diadromous fish in marine habitats in the Atlantic regions of Portugal, Spain, France and Ireland. On October 14th–16th in Donabate, Co. Dublin, IFI hosted an interim project meeting of thirty-five researchers from DiadSea partner organisations working together across the Atlantic Area, who gathered to discuss progress on the project's research activities.

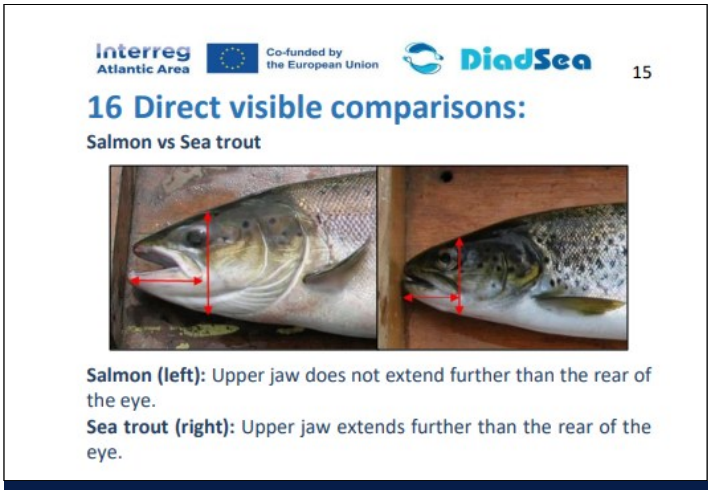
Anthony Brett of IFI Research's DiadSea team presented the meeting's attendees and project stakeholders with an overview of work on biological data collection. Historical fisheries data on diadromous species from 42 datasets, representing 468,085 fishing hauls, is being compiled into a database for modelling and distribution mapping. Analysis of data gaps found that misidentification of diadromous species in fisheries bycatch is an issue, and the team has produced an identification booklet, which is available in English at https://tinyurl.com/diadromous-id-booklet, and which has also been translated into Portuguese, Spanish and French.

DiadSea researchers gathered for a meeting in Donabate, Co. Dublin

One method being used by DiadSea researchers to fill data gaps is environmental DNA (eDNA) sampling, in which water samples collected at sea are being analysed for the presence of diadromous fish species. The IFI DiadSea team carried out eDNA sampling in Youghal Bay and Waterford Harbour, and their French colleagues carried out similar eDNA sampling in Mont-Saint-Michel Bay and the Gironde Estuary. The project partners are also working together on analysing otolith microchemistry and on creating a genetic database for both shad and sea trout covering the Atlantic Area.

A key principle of DiadSea is that a transnational, cooperative approach is essential to conserve diadromous fish and to address shared pressures across their range. At the meeting, the DiadSea researchers discussed their next steps towards key outputs for the project: an interactive web atlas of diadromous fish distribution at sea; a transnational forum in which stakeholder representatives can discuss management measures; and the development of tools to promote education and public awareness about diadromous fish.

Anthony Brett of the DiadSea project collecting an eDNA sample



Screenshot of a detail from the DiadSea identification booklet

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We Hope You Enjoyed the Newsletter

Feedback is always welcome, so please get in touch if you have any comments.
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