



Welcome to the Newsletter

One of the core values of IFI states “We are open, transparent and accountable”. This January, IFI researchers fulfilled this value by taking part in a webinar series to communicate their research and to answer questions put to them directly from the public. IFI’s web infrastructure now provides for another aspect of openness: freely accessible open data.

This issue also highlights the work of the Environmental River Enhancement Programme, a collaborative project that works with the OPW to enhance habitat in rivers maintained for drainage.

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

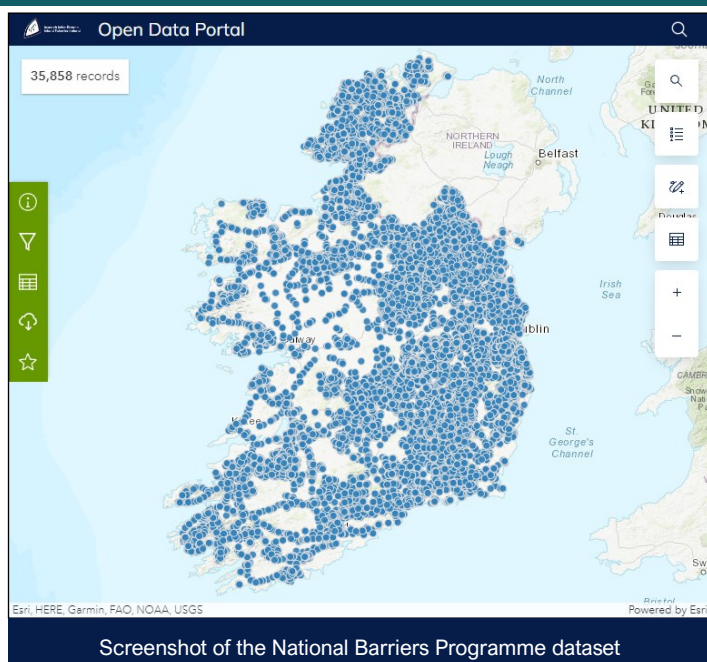
Slán,

Dr. Cathal Gallagher, Head of Research & Development

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National Barriers Programme Dataset Published to IFI's Open Data Portal



Screenshot of the National Barriers Programme dataset

Data is the raw material for building information and knowledge in this digital age. A vital source of this raw material is open data, which is data in formats that anyone can access, use and share. Using IFI’s developing capacity to publish open data, the National Barriers Programme (NBP) is providing access to a national dataset of potential barriers to fish passage.

IFI’s [Open Data Portal](#) is built on ArcGIS Hub, a cloud-based platform for exploring and downloading GIS datasets. The platform allows users to engage with IFI datasets and to

develop their own maps and apps. The datasets can also be accessed via [data.gov.ie](#), thereby aligning with government policy to publish data produced by Irish public sector agencies and organisations. Reuse of open data from state agencies increases transparency in government, promotes innovation and benefits society by enabling the development of better services for citizens.

The NBP is now using the Open Data Portal to provide access to a national dataset of instream structures that are potential barriers to fish passage and that may have an impact on river hydromorphology. Field assessments by the NBP team and regional IFI staff capture information on barrier location and whether fish can pass the barrier, as well as data on structure dimensions, photographs and drone imagery. The dataset currently contains over 35,000 records and is updated monthly as the team completes campaigns of barrier surveys in catchments around the country.

Identifying barriers is the first step in taking action to mitigate their impacts. By enabling further planning, research, and consultation, the barriers dataset will ultimately help IFI and other stakeholders to work together on the complex process of reconnecting fish migration routes through river systems. The NBP team now plan to develop ArcGIS online resources for users to explore barriers data and to learn more about the impacts of barriers on fish and habitat. The dataset can be accessed on [opendata-ifigis.hub.arcgis.com/](#) by clicking [here](#).



Road culverts are a common barrier to fish passage



Field assessment of Stackallen Weir on the Boyne, Co. Meath

Webinar: Environmental Sensor Networks to Monitor Climate Impacts on Freshwater Fish

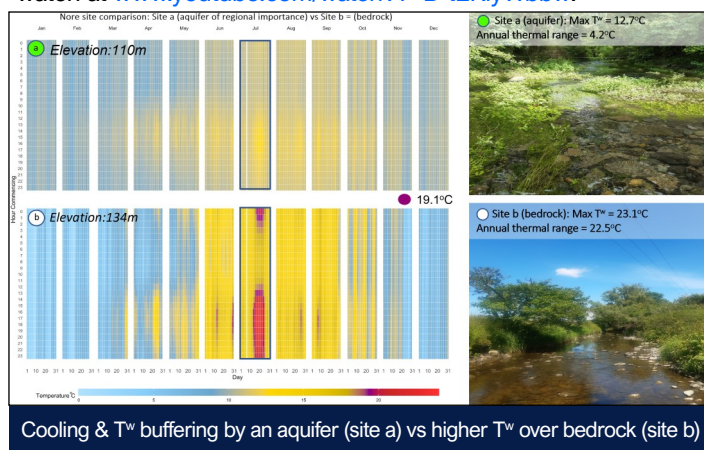
Ireland's temperate climate, which is dominated by the Atlantic Ocean, means that we typically enjoy mild summers and winters. Modelling of likely climate scenarios for Ireland indicates that in the coming decades, however, summers will probably feature more heatwaves and droughts, whereas winters will probably have more intense downpours of rain and flooding. Research projects underway in IFI are monitoring the implications of such climate changes for Ireland's freshwater fish communities and their habitats.

On January 9th, John Coyne of IFI Research presented a webinar on how the Climate Change Mitigation Research Programme (CCMRP) and OPW Climate Resilience Project are establishing a baseline to monitor climate impacts on freshwater habitat into the future. The project team has installed networks of data loggers to record water temperature in streams and lakes across 12 index catchments. The team has also set up weather stations and is collecting data on fish populations, water quality and water levels.



A key focus for the project team is the impact of climate change on Ireland's native salmonid fish: Atlantic salmon, brown trout and Arctic char. These species prefer colder water for spawning and juvenile habitat, which makes them especially vulnerable to loss of habitat due to summer droughts or winter flooding. Water temperatures over a threshold of about 20°C stress these species, impairing their growth and causing them to seek out colder water.

This research has shown that catchment-wide sensor networks can identify streams and lakes vulnerable to heatwaves and reveals how tree shade, wetlands, aquifers and deeper lakes provide vital refuges for salmonid fish. Real-time data from these networks can also inform fisheries managers when thermal conditions reach a point where reducing angling pressure will help fish to survive. The team now hopes to explore the role of landscape and hydrological connectivity in identifying fish habitats at risk. John's webinar is available to watch at www.youtube.com/watch?v=B-tEKiyWbbw.



Webinar: Hydromorphology and its Importance in a Changing Climate

Hydromorphology can be defined as the physical processes related to flowing water and sediment transport that shape river channels, as well as the influence of groundwater on rivers. These key processes are important for generating habitats used by fish, such as riffles, pools and gravel bars, but natural hydromorphological processes have been disrupted in many rivers by drainage works, flow regulation and barriers. These hydromorphological modifications are significant pressures impacting the Water Framework Directive (WFD) ecological status of Ireland's rivers.

In a webinar on January 16th, Rossa Ó'Briain of the [Hydromorphology](#) team in IFI Research described how rivers with poor hydromorphological condition tend to have artificially high temperatures that impair growth of salmonids or that even increase the risk of fish mortality. These impacts are evident in heavily modified rivers that lack adequate riparian tree cover or where barriers disrupt natural flow, which in turn impacts water temperatures.

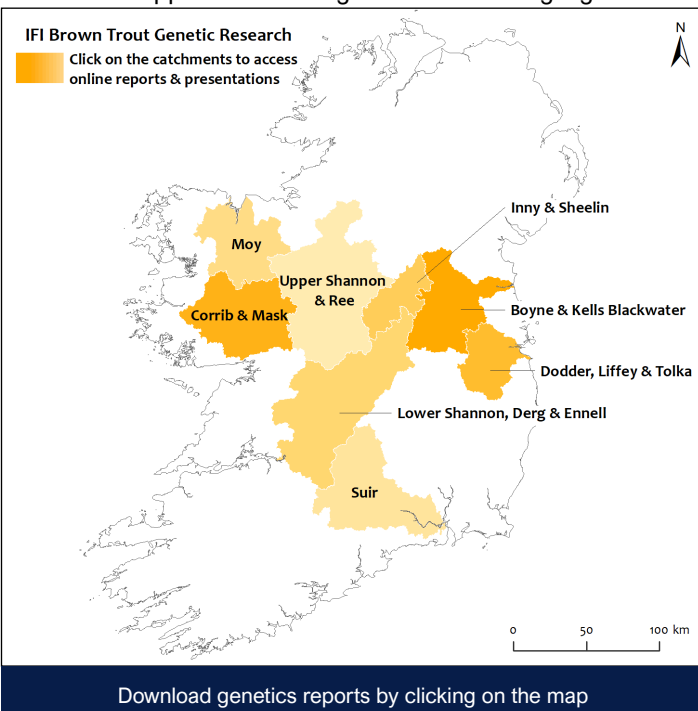
Mitigating against climate change in the future will require landscape-scale conservation measures to regulate rainfall runoff into rivers, as well as works to restore natural river features, such as woody habitat and pools to provide refuge from high temperatures. One potential approach to conserve aquatic ecosystems in regulated rivers is the use of environmental flows, which replicate the natural flow regime as part of dam releases. Rossa's webinar is available to watch at www.youtube.com/watch?v=HVal1coiPZA.



Webinar: Recent Research on Brown Trout Genetics in Ireland

Brown trout exhibit remarkable diversity and adaptability in their appearance, behaviour, ecology, movements and life history. Investigating the genetics underlying this variation is a powerful tool to provide new insights into wild trout fisheries and how they can be managed and protected.

On January 23rd, Karen Delanty of IFI Research presented a webinar how the National Brown Trout Programme (NBTP) works with genetics researchers to study the population structure of wild brown trout across Ireland. This work relies on samples from juvenile and adult brown trout gathered by IFI research staff during river and lake stock surveys, with invaluable support from IFI regional staff and angling clubs.



In general, these studies have found a high level of genetic diversity in wild brown trout throughout the catchments studied, with virtually no evidence of interbreeding with stocked hatchery fish. The adult trout stock of lakes and main rivers tended to have mixed population structures, with distinct genetic groups drawn from a number of tributaries. These studies also provide information on gene flow through trout populations and on how population structure can be influenced by barriers, water quality and habitat diversity in catchments.

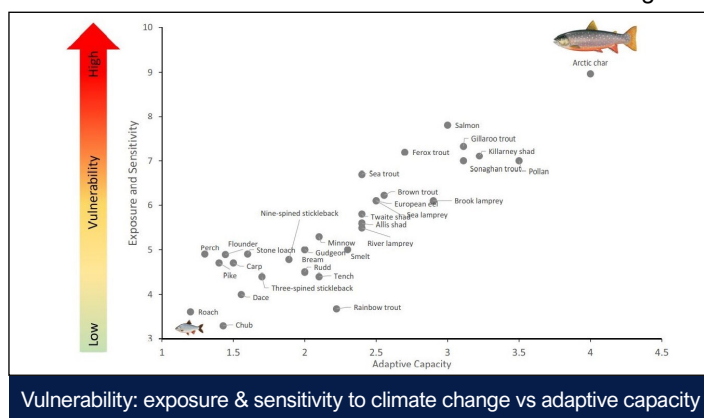
The webinar highlights how genetics research is an important element in the fisheries biologist's toolbox to help inform decision-making about the management of wild brown trout fisheries. Reports and presentations regarding trout genetics from across several major catchments, including the Lough Corrib Study and Liffey Catchment Study, can be accessed at fisheriesireland.ie/publications/?f%5B0%5D=category%3A303, and Karen's webinar on brown trout genetics is available to watch at www.youtube.com/watch?v=agCb269C_zs.

Risk Assessment of the Vulnerability of Ireland's Freshwater Fish to Climate Change

Climate change will lead to both direct impacts on fish, such as physiological stress, and indirect impacts, such as changes in fish community composition, habitat diversity and hydrological connectivity. These changes will benefit some fish species but result in population losses for others, depending on each species' life history and ecological interactions. In November in *Fisheries Management and Ecology*, James Barry of IFI Research and colleagues reported a study in which experts assessed the vulnerability of 32 fish species and subspecies in Ireland.

The experts scored each species based on their exposure to risk that climate change will affect their habitat, sensitivity to environmental change, capacity to adapt to environmental change and vulnerability to non-climatic stressors, such as water quality, habitat loss and barriers to migration. Arctic char were ranked as the most highly vulnerable, followed by Atlantic salmon, pollan, Killarney shad and trout subspecies.

Native species that prefer colder water for reproduction and growth were ranked as more vulnerable, whereas the least vulnerable were dace, roach and chub, which are classified as alien invasive species in Ireland. The study highlights the vulnerability of native species with localised distribution and will help to prioritise monitoring and conservation efforts for native fish that are most at risk from environmental change.



EREP 2018–2022 Cycle of River Enhancement Work by the OPW & IFI



Measuring a trout on an electrofishing survey

The Environmental River Enhancement Programme (EREP) is a long-term collaborative project funded by the Office of Public Works (OPW) that aims to restore, enhance or maintain fish habitat in rivers that are maintained for drainage. In 2022, the latest five-year cycle of the EREP ended with the completion of project objectives originally set out by retired Senior Research Officer (SRO) Dr. Jimmy King.

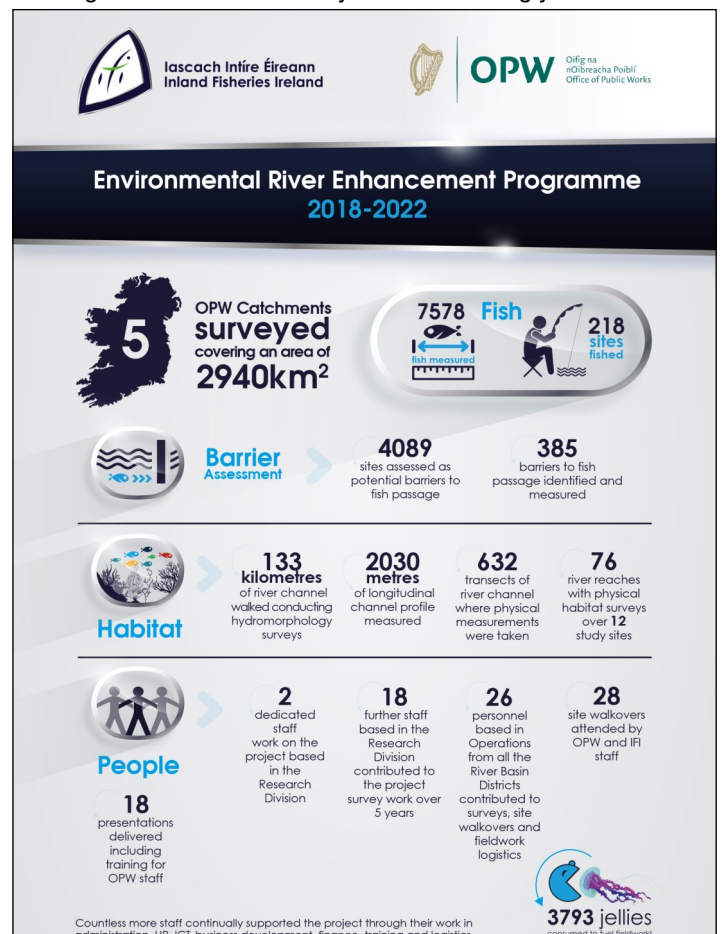
Since 2020, the EREP has been under the stewardship of Ciara O'Leary, with a core team comprising Ciara Fleming and Amy McCollom. Over the 2018–2022 cycle, one catchment-wide survey per year examining fish community, physical habitat and potential barriers to fish migration was completed in the Inny, Deel, Glyde, Kells Blackwater and Lung river catchments. The surveys included timed electrofishing, river hydromorphology assessment technique (RHAT) and the IFI Barrier Assessment and Screening Tool (I-BAST) surveys. Developed by the National Barriers Programme, I-BAST surveys capture information on barrier location, type and structural dimensions to assess instream structures that potentially obstruct the passage of migrating fish.



Survey of a potential barrier to fish migration

The EREP team also carried out scientific studies where enhancement or maintenance works were implemented by the OPW and IFI staff as part of previous EREP cycles on tributaries in the Maigue, Moy, Boyne, Inny and Brosna catchments. These studies confirmed how enhancement works, such as current deflectors, rubble mats and reprofiling the riverbed, create diversity in river channel flow, form and substrate, thereby creating habitat diversity and supporting fish populations. The studies also examined how fencing to exclude livestock allows the regrowth of aquatic vegetation in streams.

The programme has increasingly focused on broadening the scope of enhancement work with the OPW along drained rivers, such as incorporating more on-site walkovers and including unmaintained sections of channel. Catchment-wide monitoring and barriers to fish passage remain key issues, with the ultimate goal of mitigation or removal of instream structures. As with any research project in IFI, the help and knowledge of regional IFI staff in these catchments is invaluable, so the project team looks forward to continuing their work with their colleagues around the country over the coming years.



Iascach Iníre Éireann
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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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