Issue 6

Welcome to the Newsletter

A cold, snowy start to Spring 2018 around the country brought the sad news of the death of our former colleague Prof. Martin O'Grady, who retired from IFI's Research & Development (R&D) Division in 2015.

As a tribute to Martin's work with IFI on river restoration, this issue highlights some of our current research on river ecosystems, the challenges and threats that face them and the work to protect and rehabilitate rivers that IFI continues to carry out nationwide.

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

lascach Intíre Éireann

Inland Fisheries Ireland

Dr. Cathal Gallagher, Head of Research & Development

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Assessing Barriers to Fish Movement in the Barrow Catchment



At 192km in length, the River Barrow is Ireland's second longest river, draining a catchment of 3,025km². The Barrow, its estuary and many of its tributaries are designated SACs under the EU Habits Directive and protect fish species such as Atlantic salmon, sea and river lamprey and twaite shad. All of these species are migratory and must travel between river and sea to reach their spawning areas and feeding grounds. Their ability to fully utilise available habitat is greatly influenced by barriers that may obstruct river connectivity.

In 2015, IFI began assessing potential barriers in the Barrow catchment by putting 'spots-on-maps': identifying locations using ArcGIS tools with aerial images and historic maps.



Barriers: potential (left) versus confirmed (right)



The desk analysis revealed 2,928 potential barriers in the catchment. The next step was field assessment by R&D staff and their colleagues in the SERBD. The survey recorded 300 barriers, including 27 navigation weirs forming large barriers with a drop height of >1m on the Barrow. Most barriers on the tributaries were bridge aprons, culverts and weirs.

The project created a digital layer of barriers in the Barrow catchment recording their location, type, barrier height, water depth, etc. This information can be used to quantify barriers' impact on fish migration. The data gathered will now feed directly into the National Barriers Program and the AMBER project.

The IFI team from R&D and the SERBD wrapped up the final barrier assessments with a well-earned coffee just before Christmas in Carlow, in the heart of the Barrow catchment.



Barriers team (I-r): James Barry, Alan Cullagh, Amy McCollom, Declan Cullagh, Noel Power & Jimmy King



Spring 2018

National Barriers Programme — A New Challenge For IFI

Bridges, culverts and weirs that facilitate transport, hydropower and water abstraction can fragment rivers habitat for resident fish species and be a major barrier to migratory species.



Subcatchment survey status to date

The Department of Housing, Planning and Local Government has tasked IFI, as part of the overall Water Framework Directive, to develop a georeferenced database of barriers in streams and rivers. This National Barriers Programme (2018–2021) faces a major challenge, with over 70,000 river-road intersections nationwide, and approximately 10% of these possibly problematic for fish passage!

A good start has been made by individual teams in the RBDs and by projects like AMBER and RECONNECT (EPA-funded) in collecting data in specific areas. IFI is working with state agencies like the OPW, Waterways Ireland and Transport Infrastructure Ireland to identify potential sources of data on obstructions to rivers. However, a bottom line is that local knowledge and boots (and vehicles) on the ground have a huge role to play.

New Book — Sea Trout: Science & Management

Runs of sea trout returning from marine feeding grounds to spawn in rivers are an important angling resource around Ireland. In 2015, IFI held the 2nd International Sea Trout Symposium on the application of science to management of sea trout fisheries. The symposium proceedings now form the basis of *Sea Trout: Science & Management*, a new book updating scientific understanding of this species.

Contributors from IFI to this book include Paddy Gargan, Jimmy King, Willie Roche, Sam Shephard, John Coyne and Mick Millane, who co-authored chapters on sea trout feeding ecology, population genetics, mortality risk from sea lice, exploitation rate and life history.



Barrier survey training in Donegal

The IFI team in R&D will be rolling out a series of paper books containing maps and a listing of all the 'potential' barriers, in individual sub-catchments (manageable-sized portions of larger catchments). If individual teams within the RBDs commandeer some of the books and fill out information for their area then the picture will quickly start to build up. It is planned to have short training courses for staff, both to use the books for their area and also to use the barriers software on the tablet laptops.

The information generated will be of major value to IFI but will have a much wider value for Local Authority planners, the OPW for river works and flood schemes, etc. As usual, the R&D team will be looking to RBD colleagues to help in making this project a success.



Barrier survey in the Barrow catchment





From the cover of Sea Trout: Science & Management

Fish Kills In Ireland's Rivers — Past, Present & Future Trends

Fish kills in rivers occur when there is mass mortality of fish because of sudden changes in environmental conditions that reduce fish survival; the causes can be natural, anthropogenic or a combination of both, for example, due to drought conditions or pollution. At the annual meeting of Irish Freshwater Biologists on March 23rd, Ronan Matson of IFI's National Research Survey Programme (NRSP) gave a talk on trends in fish kills in Ireland's rivers.

Ronan presented data on fish kills from 1961 to 2016. The good news is that the high incidence of fish kills in the 1980s that coincided with agricultural intensification and eutrophication of rivers has declined dramatically. Fish populations can recover quickly if the cause of the kill event is mitigated. On the other hand, identifying the causes is problematic. Fish kills are often linked to agricultural, industrial or municipal discharges, but the impact of chronic pollution from diffuse sources is less well documented and needs further investigation.

Farmed Salmon in WRBD Rivers

In 2017, anglers caught suspected farmed salmon in the Bundorragha, Erriff, Dawros, Bunowen and Newport rivers in the west of Ireland. An IFI report on these escapees is now available for download at https://goo.gl/SmcMg8.

Scale analysis of suspected escapees indicated that the fish examined were farmed salmon and clearly distinguishable from wild Irish salmon. Genetic stock identification showed that the escapees examined were of Norwegian genetic ancestry, confirming that they were farmed salmon and were not from any Irish wild populations or from any Irish salmon ranching strains.

Up to 500 escaped farmed fish are thought to have entered the rivers in this period. Worryingly, morphological examination of some escapees indicated that a high proportion of these fish were sexually mature males capable of spawning. This raises concerns about a potential threat to local wild salmon populations from interbreeding and reduced genetic fitness.







Ronan and colleagues hope to use this research to project how climate change may influence the risks of fish kills in river catchments in the future. At the meeting, Lynda Connor and Rossa O'Briain of the NRSP team also gave talks on two other topics in which climate change will affect freshwater ecosystems in the future: Arctic char survival and tree cover in managing river temperatures.

Owenriff: Stock Report & Rehabilitation Plan



In 2017, IFI's National Research Survey Programme, led by Fiona Kelly, surveyed fish stocks in rivers and lakes throughout the Owenriff catchment in Galway. The study investigated whether the introduction of pike into this river system led to the decline of trout and salmon.

The stock report and a rehabilitation plan for the Owenriff are available at https://goo.gl/hDJRzx and https://goo.gl/gPumCj.



Fish ecological status classification in the Owenriff catchment

It's All About the Fish . . . and Where They Live — Developing Concepts in River Habitat

Ireland has over 74,000km of rivers and streams, which provide vital habitat for fish stocks. The importance of good water quality and adequate invertebrate prey for fish in rivers is easy to appreciate, but two research papers by Rossa O'Briain, Sam Shephard and Brian Coghlan of R&D show that aquatic vegetation and hydromorphology also provide interwoven ecological benefits in river ecosystems.

Hydromorphology—defined as the physical characteristics of waterbodies—shapes the structure of river habitat. IFI's Environmental River Enhancement Programme harnessed hydrological processes by designing in-stream works to restore riffle-and-pool habitat to drained rivers. IFI research reported last year in *Ecological Engineering* indicates that this also happens naturally: plants in shallow lowland rivers are 'ecosystem engineers', capable of restoring natural riverbeds and flow velocities by trapping sediments.



Spontaneous restoration of river channel and flow by plant growth



This interaction between hydromorphology and aquatic plants is further explored in January in *River Research and Applications*. Rossa, Sam and Brian have developed the River Vegetation Quality Metric (RVQM), a tool for river habitat assessment that integrates hydromorphological and biological variables. Interestingly, statistical modeling showed that the RVQM was most strongly correlated with physical variables, and only sites with natural morphology and hydraulic regimes scored high ecological status.

Sam, who described the RVQM at the annual meeting of Irish Freshwater Biologists on March 23rd, comments that ecological indicators must capture how natural systems change in response to human pressures and should inform conservation strategies. This research highlights the benefit of landscape-scale habitat rehabilitation of rivers as a tool for fisheries enhancement: the RVQM scores of recovering river systems will improve as the plant community grows and diversifies both in-stream and across the riparian zone.

Martin O'Grady 1950–2018

It was with great sadness that we learnt of the death of Prof. Martin O'Grady in February. Martin, who had a lifelong passion for angling, photography and all things aquatic, retired from IFI in 2015 after 40 years in the fisheries service. Martin was a brilliant fisheries scientist, as those of us who were lucky enough to have worked with him knew.

Martin was well known internationally for his work on river restoration and the conservation of salmon and brown trout. With numerous scientific publications and two books, *Brown Trout in Ireland* and *Channels and Challenges: Enhancing Salmonid Rivers*, Martin leaves a legacy that will ensure that he himself and his outstanding contribution to fisheries will not be forgotten. He will be deeply missed.



Martin O'Grady



We Hope You Enjoyed the Newsletter

Feedback is always welcome, so please get in touch if you have any comments. Contact Rory Feeney at 01 8842636 or <Rory.Feeney@fisheriesireland.ie> Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin D24 Y265 http://www.fisheriesireland.ie/Research-and-Development/fisheries-research.html

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