Developments in Inland Fisheries Ireland Research

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Iascach Intíre Éireann
Inland Fisheries Ireland

Welcome to the Newsletter

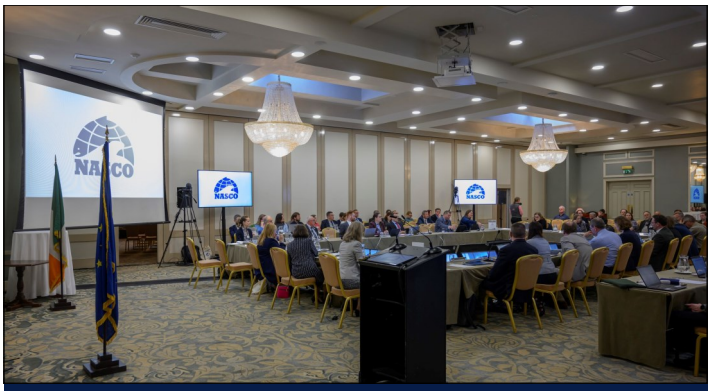
IFI works at the forefront of international initiatives in wild Atlantic salmon conservation, contributing scientific advice and cooperating with other countries on fisheries management. As well as a dedicated salmonid research station on the Erriff, IFI runs research projects on issues such as fish movements, barriers and restoring free-flowing rivers that help us to build knowledge and to protect salmon and other migratory fish.
This issue also highlights some of the open data that can be explored and downloaded on the IFI Open Data Portal.

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

In this issue

Knowledge of Salmon — IFI Hosts NASCO's Forty-First Annual Meeting

A migrating salmon fights its way upstream



NASCO delegates attending the Forty-First Annual Meeting in Westport

Unbounded by borders, and esteemed by cultures wherever they range, wild Atlantic salmon are iconic for the vast scale of their migration from tiny streams around North America and Northern Europe where they spawn to marine feeding grounds across the North Atlantic Ocean. In recent decades, salmon abundance has declined catastrophically everywhere, with the numbers of adults returning to Ireland falling from a peak of around 1,760,000 in 1975 to 171,700 in 2022.

This crisis for wild Atlantic salmon needed an international response: in 1982, the Convention for the Conservation of Salmon in the North Atlantic Ocean introduced restrictions of fishing activities targeting salmon outside of national fisheries jurisdictions across a huge area of the North Atlantic Ocean. The North Atlantic Salmon Conservation Organisation (NASCO) was established in 1984 to implement the convention, and this remit has broadened to include protection and restoration of salmon habitat, management of aquaculture and stockings, etc.

NASCO brings together salmon experts from different countries to share their knowledge and to cooperate on research. NASCO-sponsored projects in which IFI are currently participating include SMOLTRACK, which is investigating survival of salmon smolts as they migrate to sea, and PINKTrack, which is using eDNA sampling of rivers to monitor invasion by non-native pink salmon.

On 3rd–7th June 2024 in Westport, Co. Mayo, approximately 100 fisheries managers and scientists gathered for the Forty-First Annual Meeting of NASCO. The busy agenda included presentations on implementation plans and annual progress reports, negotiations on the management of salmon fisheries, as well as special sessions on a strategy for NASCO in the future era of climatic change and on invasive pink salmon and their potential impact on wild Atlantic salmon.

As a conclusion to the week of meetings, the delegates enjoyed a tour to Killary Harbour and the River Erriff to visit IFI's research station at Aasleagh Falls on the National Salmonid Index Catchment. The visit highlighted IFI's research to monitor wild Atlantic salmon stocks and to address knowledge gaps on salmon migration. This important work will better inform both fisheries management in Ireland and international scientific advice for salmon conservation.

What is NASCO?

The North Atlantic Salmon Conservation Organisation (NASCO) is an inter-governmental organisation that aims to conserve, restore, enhance and rationally manage Atlantic salmon though international co-operation, taking account of best available scientific information.
Parties comprise Canada, Denmark (represents Faroe Islands & Greenland), EU, Iceland, Norway, Russia, UK and USA; observers include France (represents St. Pierre & Miquelon).

Barrier Mitigation Research Programme: Reconnecting Ireland's Fragmented Rivers

River connectivity is vital for the life cycle of fish, allowing them to move freely between spawning areas and habitat with shelter and feeding for juveniles and adults. Ireland's rivers are highly fragmented, however: IFI's National Barriers Programme (NBP) research team has mapped 73,382 potential barriers in Irish rivers, and 4,283 instream structures assessed so far, such as culverts and weirs, have been confirmed as representing a potential barrier to fish passage.

To tackle this issue, IFI is setting up a Barriers Mitigation Division, which is developing projects for 2024–2027 to improve the hydromorphology and connectivity of Irish rivers. This work will be supported by a new research team, the Barrier Mitigation Research Programme (BMRP), which will provide data focused on the effects of barrier mitigation to support the conservation of migratory fish and their habitats.

The BMRP research team will establish baseline datasets prior to barrier mitigation and monitor ecosystem responses to mitigation works using a Before-After-Control-Impact survey design. An important element of the teams's strategy will be using multiple tiers of survey intensity to efficiently deploy resources in capturing the optimal level of detail required for study sites.

Top: survey at Askeaton Weir. Bottom: mitigation works at Hanover Weir.

National Barriers Programme: Sharing the Story Behind the Data

IFI's National Barriers Programme (NBP) research team maps the location of barriers and assesses their impact on fish passage in Ireland's river network, compiling a geo-referenced database of their surveys. The story behind the data gathered by the NBP is now showcased on the IFI Open Data Portal at https://opendata-ifigeo.hub.arcgis.com/.

IFI's Open Data Portal is built on ArcGIS Hub, a cloud platform for sharing data based on geographic information systems (GIS). As well as providing open access to raw data, the portal has tools to provide context, including storymaps, which are educational resources that integrate text, maps, images and video. The portal aims to make IFI research data publicly accessible and to fulfil government policy to publish open data produced by Ireland's public sector agencies.

The NBP StoryMap contains detailed descriptions, maps and photographs outlining the impacts of barriers on fish passage, different types of barriers and the national and international legislation relevant to fish passage, migratory species, biodiversity and maintaining good ecological status in rivers. Strategies to improve hydrological connectivity of rivers and fish passage at barriers are illustrated with real-world examples of mitigation works.

The data story also integrates a webmap with information about the location of barriers and an assessment of their impact on fish passage, as well as a dashboard that provides key statistics from the programme. The NBP StoryMap can be accessed on the IFI Open Data Portal at: https://arcg.is/1KDuyb0.

Aerial view of Tarmonbarry Weir on the River Shannon

Barrier survey at Waterworks Weir on the River Lee

Survival of Atlantic Salmon Smolts on Their Migration To Sea

Juvenile Atlantic salmon transform into silvery smolts and swim downstream in springtime from their nursery habitat in rivers out to sea, where they migrate for thousands of kilometres to oceanic feeding grounds to grow into adults. During this challenging phase of their life cycle, the young salmon must adapt to strong environmental changes as they transition through estuaries from freshwater to marine conditions. Furthermore, estuaries are high-risk zones for smolts, where they must run a gauntlet of waiting predators.

In January in *Fisheries Management and Ecology*, James Barry of IFI Research and colleagues reported an acoustic telemetry study carried out over three years as part of the COMPASS project. With the help of citizen-scientist anglers, 186 smolts were captured, tagged with acoustic transmitters and tracked by receiver stations as they travelled from a release site in freshwater on the River Boyne down through tidal habitat in its estuary and out into the Irish Sea.

Releasing smolts tagged with transmitters as part of COMPASS project

A salmon smolt

Migration success varied from year to year, ranging from 47% to 81%. Smolts that migrated successfully tended to swim rapidly downstream through the estuary over a single day, usually preferring to move on ebb tides. Smolts tended to move through the estuary at nighttime — a behaviour which is thought to help them to avoid predators.

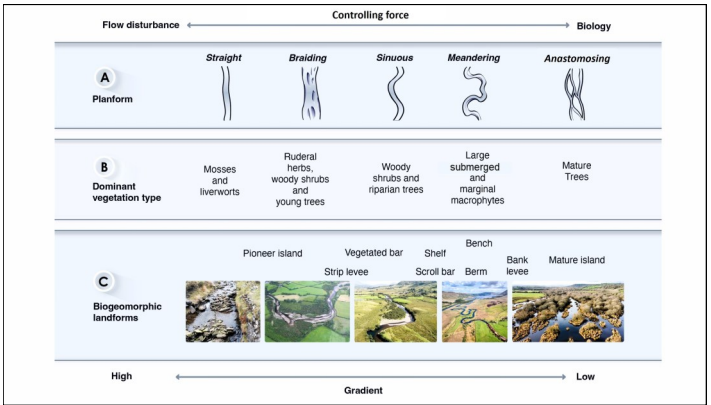
The tracking data indicated that 26.3% of smolts were lost to an unknown fate, possibly due to death after release or predation by piscivorous birds or terrestrial predators. Temperature data and final location from some tags indicated that 5.4% of smolts were eaten by marine mammals, most probably seals. Interestingly, the study found evidence that individual predators were responsible for multiple predation events, indicating that some individuals may be specialists that target migrating smolts. Overall, the study shows that estuaries are survival bottlenecks for smolts where significant mortality may occur.

Biogeomorphic River Restoration: The Role of Vegetation as a Driver of Recovery

Until recently, strategies for river restoration have given little consideration to vegetation beyond its stabilising effect. In May in a special issue of *River Research and Applications* on fluvial biogeomorphology, Rossa O'Briain of IFI Research and colleagues advance the concept that if river restoration is to reverse long-standing declines in river functions, it is critical to recognise the influence of ecological processes on hydrogeomorphic processes and re-envisage what it means to restore a river. This entails shifting the focus of river restoration from designing and constructing measures that mimic stable channel features to a focus on re-initiating and aligning the natural processes that create dynamic habitat.

This approach can be defined as biogeomorphic restoration. This concept recognises that engineer plants species are important controls, along with flowing water and transported sediments, on river morphology and physical habitat development. The paper illustrates the potential for vegetation to affect recovery of degraded rivers with several case studies from across Europe and North America.

Biogeomorphic river restoration can be advanced by principles that support a closer synthesis of the hydrogeomorphic and ecological sciences. Holistic strategies for river restoration must consider likely vegetation communities under undisturbed conditions, restoration of natural vegetation dynamics and promoting colonisation by engineer plants as agents of recovery. Restoration planning must anticipate the dynamics between flow, sediment and plants over time to be successful.



Interaction of channel form, vegetation and biogeomorphic river features

Marine Sportfish Tagging Programme: Conservation Status of the (un) Common Skate

Despite its name, the common skate is no longer common. Once abundant in the northeast Atlantic Ocean, common skates were brought to the brink of extinction by commercial fisheries and are now classified as critically endangered. To help conserve these vulnerable fish, IFI's Marine Sportfish Tagging Programme (MSTP) is tracking common skates with the help of citizen-scientist sea anglers and charter skippers.

Since 2010, scientists have recognized that fish historically identified as common skates are actually comprised of two separate but very similar species: blue skate, *Dipturus batis*, and flapper skate, *Dipturus intermedius*. Flapper skate are considerably larger than blue skate as fully grown adults and tend to inhabit more inshore waters. Historical catch statistics generally have not differentiated between the two species, however, and fisheries scientists currently group them as a common-skate species complex.

The flapper skate is the largest skate in the world, reaching lengths of up to 285 cm; the Irish record is 100.2 kg, caught in Ballycotton in 1913, but such giants are now rare. Like other skates and rays, common skates have broad, wing-like fins along its body, with a strong mouth underneath its pointed snout, and a narrow, spiny tail. Common skates are active predators, hunting fish and other prey along the seabed and up through the water column.

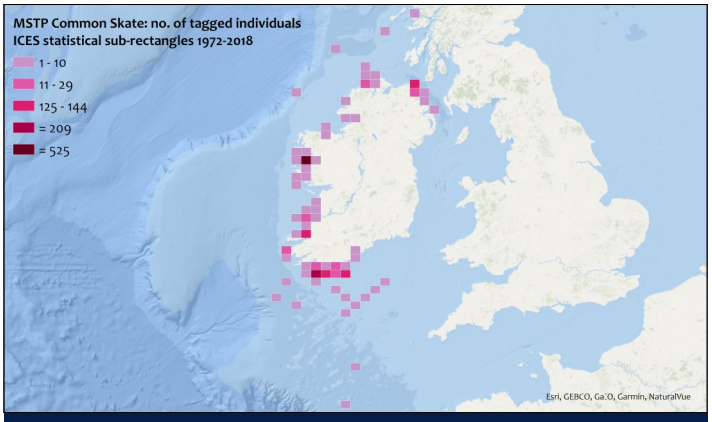
Indeed, their size and power provide a tough fight for anglers lucky enough to catch one of these remarkable fish. Anglers and charter skippers who catch and tag skates for the MSTP handle them carefully so that all fish swim away fully recovered. Anglers should always catch-&-release elasmobranchs (sharks, skates & rays) to protect these especially vulnerable species.

Common skate onboard a charter boat (image courtesy of Mark Gannon)

Common skates are estimated to reach ages of up to 50 years old. The females lay mermaids' purses, which are oblong and leathery egg cases, with horns projecting from each corner. The young gestate in these for months before emerging at around 20–30 cm in length; empty mermaids' purses can sometimes be seen washed up on beaches. This long-lived, slow-growing life strategy, with a low rate of reproduction and large size of juveniles, means that common skates are especially vulnerable to mortality as fisheries by-catch, even from a young age, and it is challenging for the species to rebuild its populations.

Tagging data from the MSTP shows that strongholds for the common-skate species complex around Ireland include Clew Bay, Co. Mayo; Tralee Bay, Co. Kerry; between Courtmacsherry Bay and off Baltimore, Co. Cork; and around Rathlin Island and Ballycastle Bay, Co. Antrim. The distribution of common skates, as well as other species tagged by the MSTP, can be explored on the IFI open data portal at https://arcg.is/TnWHn.

Releasing a small common skate (image courtesy of Mark Gannon)



Common skate MSTP tagging numbers from IFI's open data portal

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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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