Developments in Inland Fisheries Ireland Research

Issue 9 Spring 2019

Iascach Intíre Éireann
Inland Fisheries Ireland

Welcome to the Newsletter

The opening of the salmon season in Spring 2019 also marks the start of the International Year of the Salmon, an initiative to raise awareness, to inspire action and to promote outreach, collaboration and research that will help ensure the resilience of salmon stocks into the future.
This issue also reports new publications on the impacts of climate change and new projects that highlight the commitment of IFI Research to investigating how climate change will affect fish communities in Ireland.

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

International Year of the Salmon at IFI Research — the National Salmon Scale Project

NSSP launch: Cathal Gallagher, Paddy Gargan and Shane O'Reilly

Angler releasing a salmon (photo courtesy of Christine Breuker)

The salmon is vitality incarnate during its extraordinary life cycle, migrating from streams far out into the North Atlantic, escaping marine predators and prodigiously leaping obstacles on its upstream journey to spawn. Despite this iconic image, salmon stocks are declining: 240,000 salmon returned to Ireland in 2017, in contrast to 1,800,000 salmon at a peak in the 1970s. This year is the International Year of the Salmon (IYS), and IFI Research's salmon projects include a new initiative in which anglers can gather evidence to help research on the challenges facing salmon today.

On February 13th, IFI Research held a meeting for SMOLTRACK, an international project in which juvenile salmon were tracked with tiny transmitters on their seaward migration in several key salmon index rivers around Europe. In Ireland, this research was carried out on the Erriff, IFI's National Salmonid Index Catchment. Salmon experts reported that survival of smolts in their river migration phase is unexpectedly low. By directly tracking individual fish, SMOLTRACK has yielded an important result for salmon fisheries managers around Europe.

Luckily for fisheries scientists, every salmon records the story of its life. Under magnification, fish scales have increments that show growth rate, much like tree rings. Furthermore, as fish grow, they deposit chemical isotopes in their scales, providing evidence on the environment in which they were feeding. Finally, scales are tough, calcified structures that package this information safely for decades when stored properly. IFI Research preserves thousands of scale samples in its National Salmon Scale Archive, providing material for stock analysis, as well as genetic and isotope studies.

Anglers are now invited to contribute to the IYS by collecting salmon scales in special envelopes to add to the archive. The National Salmon Scale Project (NSSP) will provide information that is vital for assessing salmon stocks and will enable anglers to make a practical and valuable contribution to salmon conservation.

Read more about the IYS at **http://tinyurl.com/iys-at-ifi**, and please visit **http://tinyurl.com/ifi-scale-project** for information about collecting salmon scale samples.

Scale from a salmon grilse showing freshwater and marine growth

Introducing LARC — the Lagarosiphon Research Corrib Project

Lagarosiphon major, or curly leaved waterweed, is a highly invasive non-native plant that was first recorded in Lough Corrib in 2005. The plant is now widespread in the lake, where it out-competes native plants, alters ecosystem processes and spoils the amenity value of shallow bays, thereby posing a significant threat to the local environment and economy. The CAISIE project (2009–2013) developed effective sampling techniques and control measures, but understanding why *Lagarosiphon* is thriving in some locations and not others in Lough Corrib remains a challenge hindering its management today.

Dense growth of *Lagarosiphon major*

LAgarosiphon **R**esearch **C**orrib (LARC) is a new research project that is applying cutting-edge technologies, ecological sampling and statistical modelling to address this challenge. The project is currently trialling the use of aerial drones, subaquatic remotely operated vehicles, underwater cameras and hydroacoustic equipment. Sampling of 200 randomly selected sites commenced in October 2018 to assess the effect of environmental factors on the plant and to map its distribution in Lough Corrib.

The influence of local climate conditions on *Lagarosiphon* is being monitored by data loggers that have continually recorded temperature at 36 sites since December 2018. Intensive surveys of three bays will continually monitor plant communities alongside temperature and light conditions over 6 months. Ultimately, the LARC project will increase the efficiency of *Lagarosiphon* control by IFI. Read more about LARC at **http://tinyurl.com/ifi-larc-corrib**.

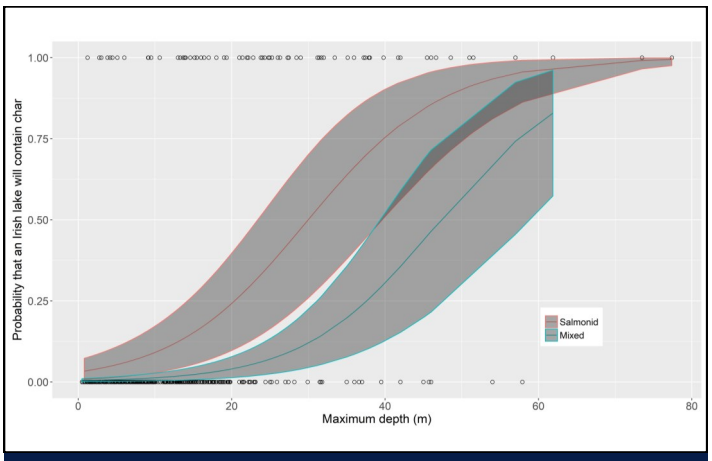
Climate Change & Fish — Research Update on Impacts on Salmonids

Fish species differ in the range of water temperature in which they prefer to live. Freshwater temperature is influenced at a broad scale by climate but also locally by the physical characteristics of habitats. New papers from IFI Research shed light on how climate change will have complex impacts on fish communities that will allow some fish to thrive while others will struggle to survive.

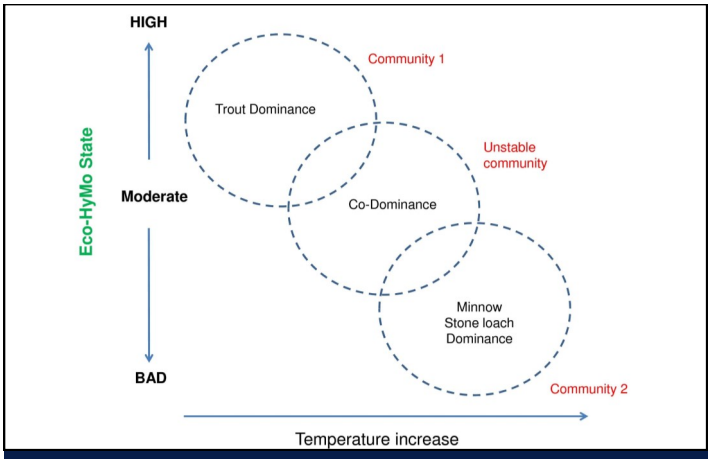
Arctic char prefer to live in the colder waters of deep lakes. In January in *Fisheries Management and Ecology*, Lynda Connor and colleagues of IFI Research reported Bayesian modelling of Arctic char's persistence in lakes of different depths and its coexistence with salmonid versus mixed fish communities. A risk analysis showed that upland Irish lakes will continue to provide a thermal refuge for Arctic char and should be the focus of char conservation efforts.

Physical modification of rivers affects their temperature regime, with knock-on impacts on fish communities. In January in *Fisheries Management and Ecology*, Rossa O'Briain and colleagues of IFI Research reported that higher stream temperatures exacerbated by habitat degradation reduces climate resilience of brown trout, leading to fish communities dominated by species with higher temperature tolerance, including stone loach and minnow. Rossa and colleagues conclude that strategies to protect rivers from climate change should focus on conserving riparian zones and hydromorphological processes that create habitat complexity and buffer stream temperature.

To watch a video overview of climate research at IFI, please visit **https://youtu.be/8oCL2_g08fc**.



Arctic char survival: an interaction of depth and fish community



Model of fish community response to temperature–habitat interaction

DiadES — New Initiative on Diadromous Fish & Ecosystem Services

On April 8th, IFI hosted a meeting of research partners from Ireland, the UK, France, Spain and Portugal to launch the DiadES project, which aims to promote international action and cooperation to conserve vulnerable migratory fish. DiadES will focus on diadromous species, which travel between freshwater and salt waters to reproduce or feed. These species, which include shads, lampreys, salmon, trout and mullet, are expected to continue to come under pressure as a result of human activity and climate change.

Led by the French environmental research institute Irstea, DiadES will involve 30 partners around Europe. In Ireland, DiadES will be focused on the Southeast coast, Waterford Harbour and the Barrow and Suir estuaries. IFI Research will work with a network of associate partners that will provide local support and expertise: the Angling Council of Ireland, the Federation of Sea Anglers, Port of Waterford, the Sea Fisheries Protection Authority, the Southeast Regional Inshore Fishermen's Forum and Dingle Aquarium.

DiadES will focus on ecosystem services: the role that diadromous species play in ecological processes and the economic, recreational and cultural benefits that they provide. The project will map the current distribution of diadromous fish and assess whether this may potentially change in response to climate change. DiadES will also develop a platform to allow stakeholders to explore different management strategies.

DiadES research partners at the project launch

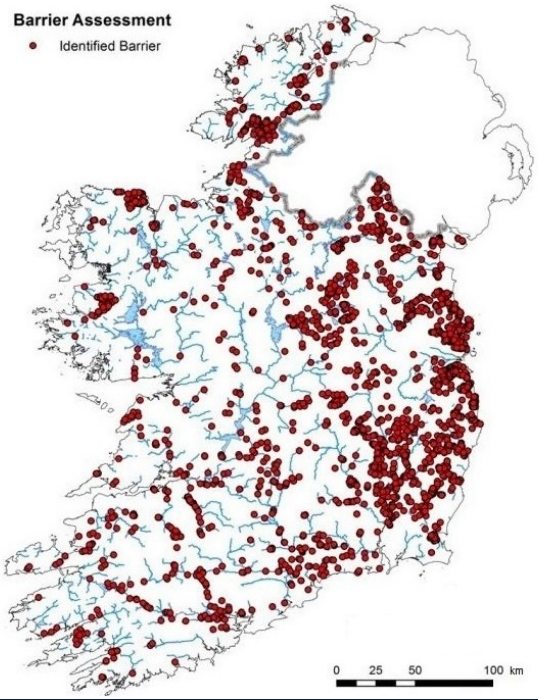
Project Update — the National Barriers Programme

To fulfil its remit to produce a georeferenced database of barriers to fish passage on the Irish river network, the National Barriers Programme (NBP) team has performed a desk-based survey to identify potential barriers at a national scale, collating significant volumes of geospatial data from state agencies, such as the OPW, OSi, TII, Waterways Ireland, and Irish Rail, as well as historic IFI barrier surveys. This has produced a geodatabase of 72,560 potential barriers, which are being assessed using field surveys and desk-based analysis photographs or video of barrier sites.

In the field, the NBP uses two methods for barrier assessment: the IFI barrier form, which is applied by IFI staff using tablets in the field, and the SNIFFER barrier assessment protocol, which comprises more detailed survey of barriers' physical parameters and flow characteristics and which is used by IFI in situations where barrier mitigations are proposed. From 2017 to date, two-person teams have conducted on-site surveys of 6,528 structures, and it is projected that the NBP will continue as a 4-year campaign of desk studies and field surveys to collect and validate data.

In 2018, the NBP undertook 40 SNIFFER surveys on large rivers, focusing on Special Area of Conservation (SAC) catchments: the Boyne, Slaney, Barrow, Nore, Suir and Munster Blackwater. In 2019, the NBP will complete barrier surveys in these catchments and undertake SNIFFER surveys on the main channel of the River Shannon.

To watch a video overview of the NBP, please visit **https://youtu.be/u-Vo8CAm_xs**.



Potential barriers to fish passage identified on the Irish river network

Barriers Countdown:

- **72,560** potential barriers recorded in the NBP geodatabase
- **12,541** structures assessed using remote data and site visits
  - **5,827** data supplied by other state agencies
  - **186** historically assessed by IFI
  - **95** SNIFFER assessments
  - **1,425** IFI tablet barrier assessment
  - **5,008** on-site field survey
- **8,651** classified as not a barrier
- **3,890** classified as a potential barrier

In Need of a Guardian Angel — Conservation Status of the Angel Shark

The angel shark (*Squatina squatina*), also known as monkfish, was historically a common summertime visitor to Ireland and was widely distributed in the coastal waters and seas around Europe. Since the 1990s, angel shark populations have declined to the point that they are now categorized as critically endangered by the International Union for the Conservation of Nature. In March in *Endangered Species Research*, Sam Shephard of IFI Research and colleagues reported how citizen science by charter skippers and anglers has helped to track the severe decline of angel shark populations in Irish waters.

Angel shark tagged and released in the Irish Sea by FV *Eblana*, 2016

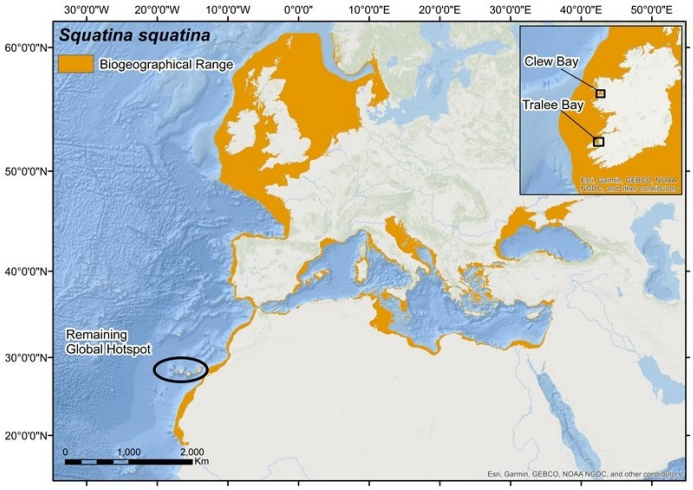
Flattened like a skate, this unusual looking shark can grow to a length of 2.4 metres and has broad, wing-like pectoral fins. The angel shark is a benthic predator, gliding along or partially burying itself on sandy and muddy seabeds and ambushing flatfish and crabs with a burst of speed from its powerful tail. The angel shark reproduces slowly and is ovoviviparous, gestating for 10 months before giving birth to litters of live 'pups'. These feeding and reproductive behaviours make angel sharks vulnerable to mortality as by-catch in commercial fisheries.

Since 1970, charter boat skippers have tagged and released sharks, skates and rays caught by anglers in Irish coastal waters for IFI's Marine Sportfish Tagging (MST) programme. Sam and colleagues also analysed records of angel sharks submitted to the Irish Specimen Fish Committee by anglers, as well as voluntarily collected catch data and logbooks, giving a total of 1,261 records from Irish waters from 1958 to 2016. Eighty-six percent of individuals were captured in Tralee Bay and a further 9% in Clew Bay, confirming the importance of these bays as habitat for angel sharks.

Angel shark caught and released at Fenit, Co. Kerry, 2013

Worryingly, there has been a clear collapse in numbers in both Tralee Bay and Clew Bay since circa 1990, with only one individual tagged since 2011. There was also a general decline in the numbers of larger angel sharks over this long-term time-series dataset. Willie Roche, who leads the MST programme in IFI, points out that citizen science by charter skippers and anglers can contribute important information on rarer shark species that fisheries research surveys may otherwise not adequately detect.

Sam and colleagues conclude that management of fisheries in Tralee Bay and Clew Bay can potentially contribute to international efforts to conserve this unique shark species, which now has extant populations in only a few hotspots, such as the Canary Islands and Cardigan Bay in Wales. For more information about the MST programme and its results on angel sharks, please visit **http://tinyurl.com/ifi-tagging-angelshark**.



Angel shark range showing population hotspots

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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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