Developments in Inland Fisheries Ireland Research

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Iascach Intíre Éireann
Inland Fisheries Ireland

Welcome to the Newsletter

Spring 2017 brings news of a major change for the Research and Development (R&D) Division: our move to new research laboratories in Citywest Business Campus. Our stories on glass eels and ICP-MS show how some R&D programmes are using these new facilities.

This issue also highlights the importance of collaborative research for IFI, from participating in international projects with the national research organisations of other countries to citizen science partnerships with Irish eel fishermen.

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

We've Moved. . . The National Logistics & Research Centre

Castle House: IFI's National Logistics & Research Centre

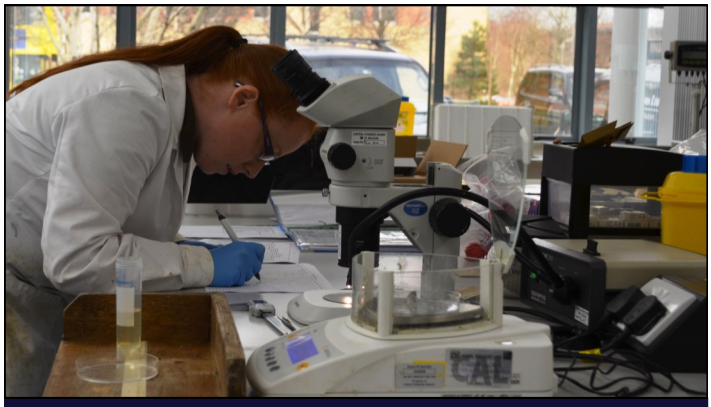
Last year, the R&D Division packed up their laboratories in Swords to move to Castle House, a large warehouse facility located just 800 metres from the IFI HQ and IFI Dublin offices in Citywest Business Campus. Castle House is currently undergoing a refit into IFI's National Logistics & Research Centre, which will also house a logistics warehouse and ICT infrastructure for data backup and disaster recovery. After unpacking and setting up their equipment again, R&D Division staff are now working in Castle House on a number of projects.

IFI's research facilities have been re-established in three new laboratories: the wet lab, the dry lab and the chemistry lab. Sample processing is carried out in the wet lab, where the Pike Research Programme is currently processing stomach content samples from pike. The work involves identifying prey items and taking morphometric measurements of any fish found.

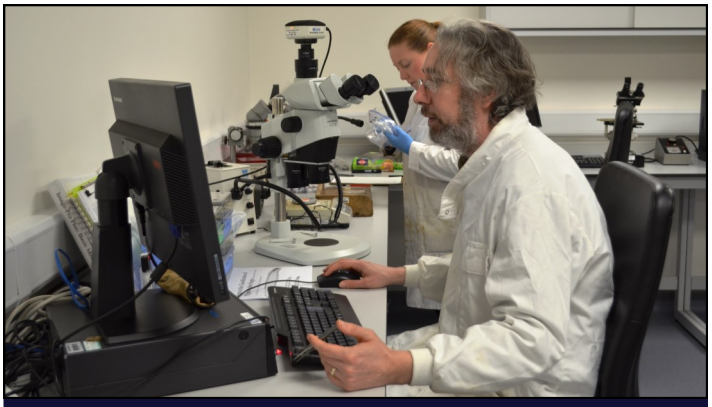
The dry lab is principally used for microscopy work. At the moment, the Eel Monitoring Programme is working there on pigmentation patterns in glass eels. The chemistry lab is used for calibrating equipment and for storing chemical supplies. The main research activity in the chemistry lab is inductively coupled plasma mass spectrometry (ICP-MS), which reveals the chemical composition of samples.

Castle House also features an archive for IFI's collection of fish scale samples. This collection, which has been gathered by IFI staff with the help of anglers over decades, will now be stored in a temperature and humidity controlled room, thereby preserving a valuable resource for future research, such as genetics and ICP-MS studies.

Phase 2 of the Castle House refit will complete the logistics warehouse, thereby integrating the IFI's research laboratories and national logistics facilities in one location.



Wet lab: Sinead O'Reilly working on the Pike Research Programme



Dry lab: Rob Cruikshanks & Sarah Healy at work on glass eels

Monitoring Ireland's Glass Eel Recruitment

From December to May, eel larvae arrive on the Irish coast to begin the briefest phase of their complex life cycle: the glass eel. Glass eels are a transitional stage in which the leaf-shaped, transparent marine larvae transform as they migrate up estuaries into fully pigmented juvenile eels called elvers, some of which then make their way up rivers to spend most of their adult life in freshwater.

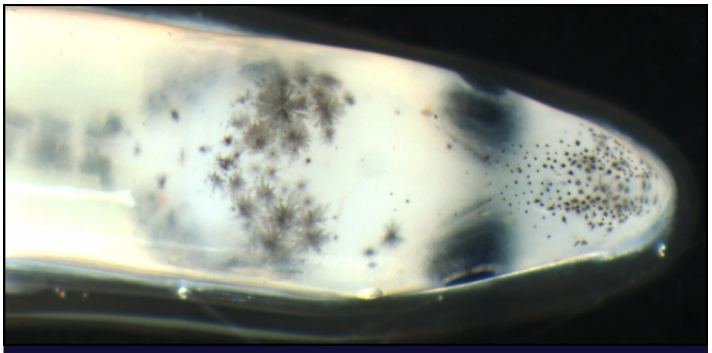
Unlike other European countries, Ireland has never had a commercial glass eel fishery, with associated records of glass eel stocks. Ireland's glass eel populations were first surveyed in the 1990s in the Shannon Estuary by the ESB and Shannon Regional Fisheries Board. This winter, IFI's Eel Monitoring Programme selected one of these sites, Latoon Creek near Ennis, for a new pilot study. The pilot is part of the Scientific Eel Fishery (see below), and IFI is being assisted by Herbie Power, an experienced eel fisherman who participated in the earlier glass eel research.

Emptying a plankton net

The catch: a glass eel from the Shannon Estuary

Every month during early mornings at high tides, cone-shaped plankton nets are lowered into the creek to capture glass eels as they swim upstream. Depth and volume of water sampled are measured, and the catch is weighed and released. A small subsample is retained for microscopy at the dry lab, where analysis of the glass eels' pigmentation shows how long they have spent in the estuary.

The pilot will deliver a new survey protocol to monitor trends in glass eel populations. The Eel Monitoring Programme also hopes that the study will provide insights into environmental cues that influence glass eel migration.



Under the microscope: pigmentation patterns on a glass eel

Scientific Eel Fishery—A Citizen Science Partnership for IFI Research

In 2008, the IUCN declared the European eel critically endangered, leading to a ban in Ireland on all eel fishing. To gather data on Ireland's eel populations for conservation assessments, IFI engaged some of the former commercial eel fishermen to use their traditional fishing skills and local knowledge to conduct scientific surveys for eels in key rivers, lakes and estuaries around the country that have been selected as index catchments.

On March 22nd, the eel fishermen met in Athlone for an update on the results of the Scientific Eel Fishery presented by Ciara O'Leary from the Eel Monitoring Programme and her colleagues. The IFI researchers also gave presentations on topics such as citizen science, eel biology, changes to the eel stock structure of our lakes and the alien invasive parasitic roundworm *Anguillicola*.

The meeting gave IFI an opportunity to celebrate the eel fishermen's invaluable contribution to the Scientific Eel Fishery. This partnership will improve our knowledge of the status of Ireland's eel population and the prospects of their recovery and conservation into the future.

Scientific Eel Fishery partners: R&D staff and eel fishermen

LiceTrack—Advancing Understanding of Sea Lice Dispersal

Sea lice and their impact on wild salmon and sea trout populations enjoyed by anglers is an important research topic for IFI. Sea lice are parasitic crustaceans that can attach to and damage fish. A growing body of research is exploring sea lice infection of wild sea trout and its relationship with marine aquaculture, where sea lice are also a major problem for the production of farmed salmon. This year, IFI will build on this ongoing research with the launch of a new project to model the dispersal of sea lice.

Since the 1980s, IFI has monitored salmon and sea trout at the River Erriff. On December 29th, the journal Aquaculture Environmental Interactions featured a study co-authored by Paddy Gargan, Fiona Kelly and Sam Shephard of IFI that reported dramatic changes in some population parameters for sea trout in the five-year period immediately after salmon farming started in Killary Harbour. Furthermore, there was a significant relationship between lice levels in a local salmon farm and lice abundance on wild sea trout in the Erriff and Delphi Rivers.

Adult sea lice

NASCO LiceTrack workshop at IFI Citywest

This year, sea lice in Killary Harbour will become the focus of LiceTrack—a NASCO-funded project with partner organisations in Ireland, Norway and Scotland. LiceTrack got underway with a workshop on March 7th at IFI Citywest. Experts from the Norwegian Institute for Nature Research, the Institute of Marine Research Norway, Marine Scotland Science and NUI Galway met to share knowledge of modelling tools developed in Norway and Scotland.

LiceTrack will deliver a model that integrates data on current hydrodynamics, environmental conditions and larval sea lice. The model will simulate the dispersal of sea lice and predict their distribution on a site-specific basis. Field trials to validate the model will use sentinel cages, which will be deployed to monitor salmon exposed to the environmental conditions and lice levels in Killary Harbour.

Ultimately, LiceTrack will support both the sustainable development of salmon aquaculture and the conservation of wild salmon and sea trout stocks.

From Celtic Sea Trout to COMPASS—The Next Step for IFI in Interregional Marine Research

Protecting highly mobile migratory species that can cross international boundaries at sea is a challenge for fisheries conservation. On January 27th, this was highlighted with the release of the Celtic Sea Trout Project technical report. This trans-national study with partner organisations and universities in Ireland and Wales discovered that some sea trout travel up to 300km from their native rivers as they forage for food at sea. IFI will soon help develop more cross-border capacity for environmental monitoring and modelling as a partner in the COMPASS project.

COMPASS will establish a network of buoys with oceanographic sensors and telemetry receivers to monitor environmental conditions, marine life and ambient noise in the coastal seas around the Republic of Ireland, Northern Ireland and western Scotland. The project will include monitoring of salmon and sea trout migrations from 2018.

Partly funded by INTERREG VA, the COMPASS project aims to build cross-border environmental modelling capacity for marine monitoring. Ultimately, this will develop expertise and management strategies for understanding and protecting marine biodiversity, including migratory fish species, in the seas around Ireland.

Report launch: Willie Roche, Minister Seán Kyne TD & Cathal Gallagher

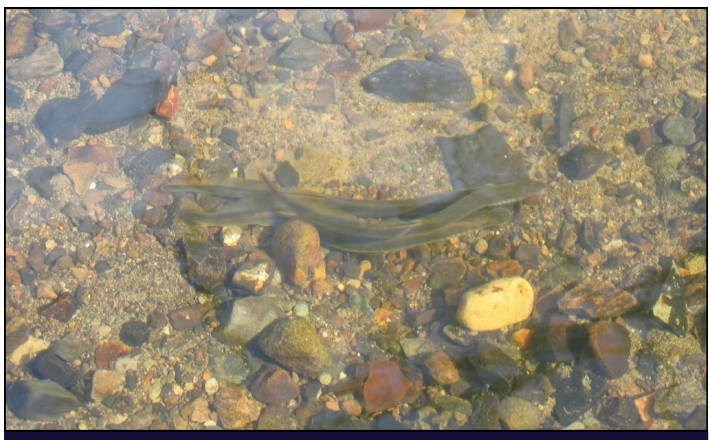
Have You Seen Spawning Lamprey? Please Let Us Know!

Lamprey are ancient, fascinating and somewhat bizarre fish. Lamprey are a group of jawless fish with a sucker-like mouth—a body plan that has remained largely unaltered for 360 million years. Three species are found in Ireland: brook lamprey (*Lampetra planeri*), river lamprey (*Lampetra fluviatilis*) and sea lamprey (*Petromyzon marinus*).

Sea lamprey grasping stones on the riverbed

After hatching, all three species live as filter-feeding larvae called ammocoetes, which live buried in silt in riverbeds. River and sea lamprey share an anadromous life cycle: after transforming from ammocoetes, the adults migrate downstream to feed at sea as parasites on fish and return to freshwater to spawn. In contrast, brook lamprey spend their entire lifecycle in freshwater and do not feed at all when they are adults.

Lamprey excavate redds for spawning, usually in stony or gravel riverbeds in areas of flowing water. Lamprey grasp stones with their mouths and pull them up to form a gravelly depression in which they spawn. Redds measure from a few centimetres for brook lamprey up to a metre across for sea lamprey. Brook and river lamprey spawn in March–April, often in the same location, whereas sea lamprey spawn in May–June. Videos of sea lamprey and brook lamprey spawning can be viewed on the IFI website.



Adult brook lamprey resting on their spawning redd

The unusual life cycle of lamprey means that they are vulnerable to several threats: barriers to migration, such as weirs; loss of spawning and nursery habitat; and pollution or changes in water quality. Lamprey are listed in Annex II of the Habitats Directive, and the Habitats Directive team at IFI monitor the conservation status of lamprey species. As well as conducting catchment-wide electrofishing surveys for larval lamprey, the Habitats Directive team collate information on lamprey spawning.

Redd examples: river lamprey (top) and sea lamprey (bottom)

The team would love to hear from you if you come across lamprey spawning sites. Signs to watch out for include:

- Light stony areas of riverbed cleared by lamprey.
- Depressions with piles of stone on downstream side.
- Lamprey actively excavating redds or resting in them.

Please read the box below to find out how you can help.

Can you help us?

Have you seen lamprey spawning? If so, please:

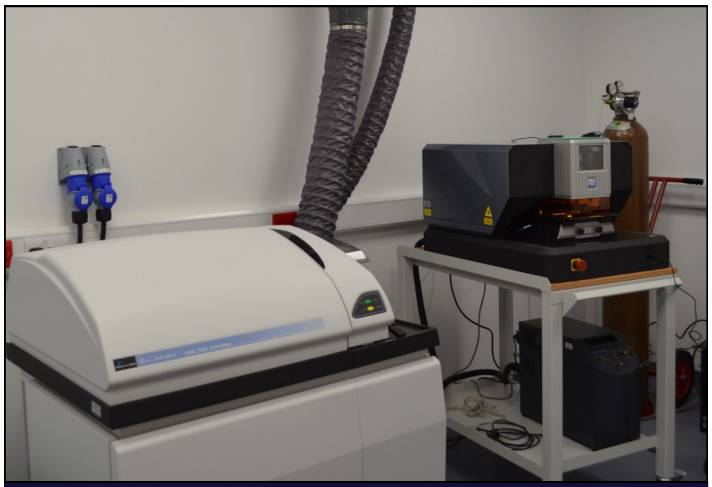
- **Record as much information as possible:**
  - **What species**
  - **Number of redds**
  - **Number of spawning lamprey**
  - **Precise location (GPS co-ordinates if possible)**
  - **Photographs and water temperature (if possible)**
- **Contact us:**
  - **Tara Gallagher: <Tara.Gallagher@fisheriesireland.ie>**

For more information, please visit www.fisheriesireland.ie/Projects/habitats-directive-and-red-data-book-fish-species.

IFI Research CHASES the Potential of ICP-MS

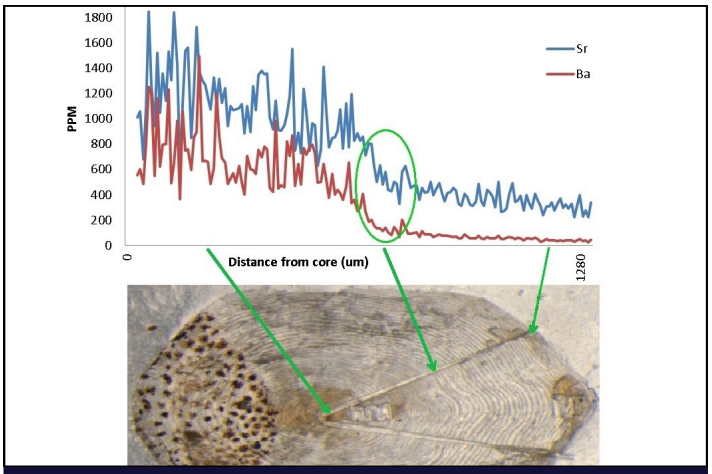
Mass spectrometry studies are an incredibly useful method in fisheries sciences. Fish absorb trace metals from their environment and diet, incorporating them into calcified tissues over their lifetime, such as scales and otoliths. The composition of trace metals in fish tissues varies over time depending on these elements' proportions in the environment, which vary from place to place. Microchemical analysis of scale and otolith samples therefore gives fisheries scientists biogeochemical clues to interpret the life history of a fish as it grows, moves to new areas and uses different habitats and food sources.

The method that IFI uses for chemical composition analysis is laser ablation inductively coupled plasma mass spectrometry (ICP-MS). A laser beam targeted with a microscope burns out tiny specks of material from a sample with pinpoint accuracy. These subsamples are then vaporised into ionised atoms in extremely hot plasma and bombarded with an electron beam that detects and measures their content of trace metals.



From the left: ICP-MS machine and laser ablation instrument

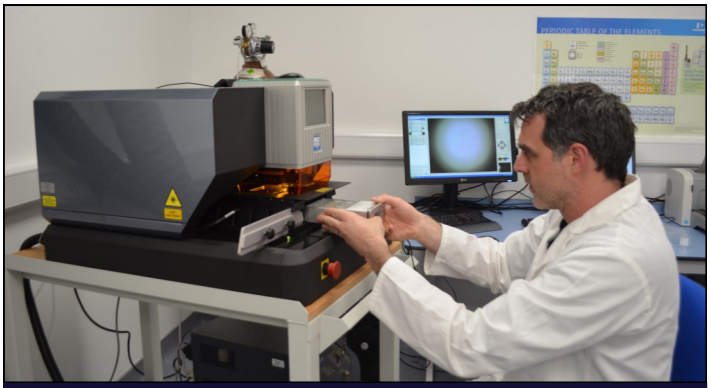
At IFI's chemistry lab, the Bass Conservation Programme is using ICP-MS to investigate how juvenile bass use estuaries as nursery habitat until they are mature enough to migrate to offshore spawning grounds. In December in Estuarine, Coastal and Shelf Science, Diarmuid Ryan, Ciara Wögerbauer and Willie Roche reported that geochemical markers could be used to assign a cohort of 0+ bass to their nursery estuary. This research will allow IFI to track this generation of bass into the future, and ultimately, the Bass Conservation Programme hopes to identify the nursery estuaries for adult stocks around the coast.



A Lough Mask trout scale reveals a likely move from river to lake

ICP-MS also helps IFI to explore the biogeochemical relationship between trout and the streams in which they are born. Last year in the Journal of Fish Biology, Diarmuid, Sam Shephard and Fiona Kelly of IFI reported that ICP-MS of trout scales could reliably identify the most likely stream in which adult trout residing in Lough Mask were born for up to three years after they move to the lake. This application of ICP-MS potentially provides a way to identify important spawning habitat for brown trout.

So what next for ICP-MS at IFI? This year, IFI will join partners from Canada, Denmark and Norway for a project called CHASES—Consequences of land-use change and human activity on anadromous salmonids and the ecosystem services that they provide. Diarmuid and Willie will work with CHASES to explore the effect of human activities on the growth and movements of sea trout in their marine habitat. As well as using the chemistry lab's ICP-MS facilities, the CHASES project will make use of the fish scale archive at IFI's National Logistics & Research Centre.



Diarmuid Ryan working on the laser ablation instrument

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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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http://www.fisheriesireland.ie/Research-and-Development/fisheries-research.html

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