Annual Meeting of the
Irish Freshwater Sciences Association 2025

Hosted by Ulster Museum & CEDaR

Friday, 21st March 2025

Venue: Museum Lecture Hall, Ulster Museum, Belfast

Book of Abstracts

(In order of speaker presentations)

Table of Contents

SESSION 1a (12 MINUTE TALKS)

Matthew O'Hare – CBEC

Where there's a will, there's a way

Dr Matthew O'Hare.
(CBEC Europe, RSK Dublin, Bluebell Business Centre, Old Naas Road Dublin 12 D12 TN30)

CBEC staff have been restoring freshwater systems for over 30 years. Along the way we have encountered many challenges and created effective solutions with measurable improvements in habitat quality for freshwater biota. This talk will go through some of the key lessons learnt, including the importance of working with, rather than against natural processes; effectively testing designs and the importance of building relationships with others to deliver projects; from researchers to regulators, from contractors to the local community. As Ireland aspires to accelerate restoration the big lesson from our experiences is where there's a will, there's a way, and that success breeds success. Examples will be provided including the UNESCO Ecohydrology Demonstration site on the Eddleston Water and recent innovative work in Ireland.

Emily Rick - University College Dublin

Spatial approaches for restoring lateral processes in small lowland stream corridors with competing land uses

Emily Rick[1,2] & Jonathan Turner[1], Per-Erik Mellander[2]
([1] University College Dublin
[2]Teagasc Agricultural Catchments Programme)

Over the past 200 years, human interventions such as channelisation, over-deepening, and flood protection have laterally constrained lowland stream corridors. Modern river restoration frameworks now emphasise restoring lateral hydromorphological processes rather than designing specific river forms. Achieving restoration of lateral geomorphological processes in constrained channels requires reclaiming floodplain space—potentially up to the width of the valley floor—yet competing land uses, particularly agriculture, present challenges to achieving these objectives. Practical, evidence-based tools and frameworks can help practitioners navigate these trade-offs and support decision-making on the extent and nature of restoration as it relates to hydromorphological objectives. This paper contributes to this discussion by 1) Exploring the relationship between lateral processes and space in river corridors where there are land-use pressures, 2) Developing a series of restoration scenarios that utilise varying amounts of floodplain space, and 3) Examining how different spatial restoration approaches may apply to two intensively farmed Irish lowland catchments.

Peter Glanville -SLR Consulting Ireland Ltd

Hydromorphology: River Channels and Floodplains the importance of Physical Processes and Nature-Based Solutions in the restoration of our river's biodiversity.

Dr. Peter Glanville (PGeo. EurGeol)
(SLR Consulting Ireland Ltd., Dundrum Business Park, Windy Arbour, Dublin 14)

River hydromorphology, including river channels and floodplains, provides vital nature-based solutions for our society via a range of ecosystem services. Hydromorphology includes the hydrology, flooding and sediment erosion, transport and deposition, which are natural river processes; these processes underpin and provides the physical structure for aquatic and riverine habitats and biodiversity.

In the past c. 130 years changes in economic activity and the implementation of policy measures have resulted in river channels and floodplains being degraded in terms of their hydromorphology, habitat and biodiversity.

Rivers in Ireland have been modified in the past for various reasons including power generation, to facilitate peat extraction, for navigation, water supply, to mitigate flooding impacts and also for land drainage purposes. At present approximately 16,000 km of rivers in the Republic of Ireland have been modified under various drainage schemes and acts which are designed primarily to improve land for agriculture.

The EU Restoration Law is going to set mandatory targets for biodiversity which can only be met through active restoration. This will require a fundamental shift in how we approach our environment from protection to restoration.

Key words: Hydromorphology, river channel, floodplain, Nature-based Solutions (NbS), river restoration, biodiversity, EU Nature Restoration Law.

Ellen Dolan - School of Biological Sciences, Queens University Belfast

Riverine barrier removals could proliferate biological invasions

Ellen Dolan[1], Ismael Soto[2], Jaimie T.A. Dick[1], Fengzhi He[3], Ross N. Cuthbert[1]
([1] Institute for Global Food Security, School of Biological Sciences, Queen's University Belfast, Belfast, BT9 5DL United Kingdom
[2] University of South Bohemia in České Budějovice, Faculty of Fisheries and Protection of Waters, South Bohemian Research Center of Aquaculture and Biodiversity of Hydrocenoses, Zátiší 728/II, 389 25 Vodňany, Czech Republic
[3] State Key Laboratory of Black Soils Conservation and Utilization, Key Laboratory of Wetland Ecology and Environment, Northeast Institute of Geography and Agroecology, Chinese Academy of Sciences, Changchun, China)

Multiple stressors, such as invasive species and fragmentation threaten global ecosystems, of which freshwater ecosystems are disproportionately impacted. Artificial barriers, such as dams and weirs, are long-standing features of global landscapes, with a divergence of views on their benefits and disbenefits in recent years. Recognition of the negative impacts of barriers on the river continuum and native biota, particularly for migratory aquatic species, has led to a rapid rate of barrier removals in recent decades, especially in North America and Europe. However, since the rise in riverine barrier construction centuries ago, global biological invasion rates have concurrently surged. Artificial barriers can paradoxically slow the spread of aquatic invasive species, and barrier removal efforts thus risk proliferating invasive species that disperse rapidly through connected habitats. This presents a 'connectivity conundrum': the removal of barriers intuitively addresses the issues of native species migrations and dispersals but could perversely exacerbate the spread of invasive species. Despite well-intended plans for river restoration, the subsequent spread and colonisation of invasive species have been largely overlooked. Basin-scale data collection around the short- and long-term impacts on invasive species will help to underpin future restoration projects and maximise the potential beneficial outcomes of barrier removals for native species.

SESSION 1b (12 MINUTE TALKS)

Faith Wilson - East Wicklow Rivers Trust

Removing a Barrier to Fish Migration - the Installation of a Rock Ramp at Ballinglen Bridge

Faith Wilson[1] and Luke Drea[2]
([1] East Wicklow Rivers Trust
[2] LAWPRO -Local Authority Waters Programme)

In 2012 Inland Fisheries Ireland completed a survey of barriers to fish migration on rivers in County Wicklow. The scale of the problem was highlighted in the Avoca Catchment where fish migration is partially or fully blocked approximately in c.50% of the catchment by man-made structures. One of these barriers was at Ballinglen Bridge. In 2021 the East Wicklow Rivers Trust received funding from the IFI Salmon & Sea Trout Rehabilitation, Conservation & Protection Fund and engaged RIVUS Ecological Engineering to design a fish and lamprey/eel pass and complete the appropriate studies and reports for the project to progress to actual capital works. We received further funding from IFI and appointed RIVUS Ecological Engineering to construct a rock ramp at the site in 2024. This project is one small step in the restoration of river habitat for a suite of protected species and assists Ireland in meeting our commitments under the EU Water Framework and Habitats Directives. It is also a great example of collaboration between NGOs, private enterprise and state agencies in delivering the type of projects envisaged for rivers under the EU Nature Restoration Law.

Faith Wilson and Luke Drea are founding members of the East Wicklow Rivers Trust (EWRT) which was established in 2019. The EWRT was set up to conserve, protect, rehabilitate and encourage the improvement of catchments in the rivers, streams, watercourses, lakes and groundwaters of East Wicklow.

Barry Walls - Trinity College Dublin

Ireland's Freshwater Pearl Mussel Catchments and the EU Nature Restoration Law: the development of a damage index to evaluate historical wetland change.

Dr Barry Walls
(Trinity College Dublin)

Wetland quality loss is a key driver of Freshwater Pearl Mussel (FPM) population decline in peaty catchments. GIS techniques were used to determine wetland cover in 1834 and 2023, in eight peaty FPM catchments in Ireland, based on historical Ordnance Survey (1834) and Irish National Land Cover (NLC) (2023) mapping. Historical catchment wetland change ranged between a net loss of 7.03% to 29.96%. The wetland coverage in 2023 varied between 53.85% and 83.53%. In 1834, that coverage ranged from 59.72% to 89.85%.

The Hydromusindex (HDi) was developed to evaluate catchment-scaled historical wetland change, which for each of the catchments studied was a net loss. This damage index was based on the ratio of the 2023 catchment wetland coverage in proportion to the 1834 baseline scenario, and the catchment proportional coverage of each wetland cover type weighted by their potential contribution towards water storage.

The HDi can be used to assess catchment restoration design and to rank FPM catchments for restoration, under the Nature Restoration Law. Measurable targets for catchment-scaled restoration have been produced.

An estimated 41.06% of Ireland’s plantation forestry is located on peatlands and peat soils, thereby highlighting considerable opportunities in terms of the EU Nature Restoration Law’s targets.

Cilian Roden - Atlantic Technical University

Is egg box weathered rock around Irish marl lakes, a sign of oligotrophy? An underwater perspective.

Cilian Roden[1] and Philip Doddy[2]
([1] ATU Galway
[2] Woodrow Environmental Sligo)

Based on underwater observations we propose that egg box weathering of limestone in marl lakes can be explained by cyanobacterial bioerosion. In all Irish marl lakes with low phosphorus and colour a lime enriched cyanobacterial crust dominated by Schizothrix species covers nearly all exposed rock surfaces to a depth of 2 m. Rock below the rigid crust is frequently found to be partially or completely eroded leaving only water filled hollows, showing the erosive power of cyanobacteria. In some lakes the crust overlays egg box weathered rock with extremely sharp pinnacles and edges indicating active erosion. We propose that egg box weathering seen above water level is indicative of formerly higher lake levels. Cyanobacterial crust is only found in marl lakes with high alkalinity and charophyte dominated vegetation. We note that egg box weathering does not occur on limestone bedrock in lower alkalinity lakes such as Lough Leane, Melvin or Eske. It follows that egg box weathering indicates low nutrient high alkalinity conditions. Such weathering around Lough Derg may indicate that this now eutrophicated lake was formerly nutrient poor.

Helen M. Barber- James - National Museums Northern Ireland

Conservation first – finding hotspots of freshwater biodiversity for targeting conservation priorities

Helen M. Barber-James[1], Georgia P. Miles[2] and Amy E. Weir[1,2]
([1]National Museums Northern Ireland, Belfast, Northern Ireland
[2]Queens University, Belfast, Northern Ireland)

Despite the growing pressures on freshwater ecosystems around the world, accurate assessments of the species occurring in many of these are still lacking. The January 2025 IUCN Red List of Threatened Species reports that 24% of the world's Red Listed freshwater species are at high risk of extinction. This useful metric provides alarming insights into trends, but conclusions are based on only a few taxa, and indicator species such as Ephemeroptera, Plecoptera and Trichoptera (EPT) are not included. In many parts of the world, many species remain undocumented. For example, recent work in Angola produced 71 mayfly species, where only one had previously been recorded. What of Ireland? Focusing on EPT taxa, we see periods of focused recording, but there are still many gaps, especially in Northern Ireland. For example, Northern Ireland makes up 16.7% of the total land area of Ireland, but accounts for 5.2% of Irish mayfly records. Ongoing work by the Ulster Museum team and associates is contributing to expanding our baseline knowledge on the diversity and distribution of these important freshwater indicator species, which is foundational for conservation strategies. By further refining freshwater species diversity hot spots, targeted action to prevent further extinctions can be developed.

SESSION 2a (7 MINUTE TALKS)

Patsy Ryan - Local Authority Waters Programme

Local Catchment Assessment in the upper River Finn, County Donegal

Aisling Reilly[1], Patrick Rafferty[1] and Patsy Ryan[1]
([1]LAWPRO - Local Authority Waters Programme)

The Local Authority Waters Programme (LAWPRO) work on behalf of all thirty-one local authorities to co-ordinate efforts to achieve Irelands Water Framework Directive objectives of good or high water quality in all waterbodies. Catchment Scientists conduct Local Catchment Assessment (LCA) in waterbodies that are at risk of not achieving their objective to further understand why. The River Finn is a cross-border catchment that is a priority area for LAWPRO as eighteen out of twenty-four waterbodies are at moderate ecological status or less (status assessment 2016-2021). This talk will give an overview of the findings of LCA conducted in the upper reaches of the River Finn in Summer 2024. Which includes the results of biological assessments (kick sampling etc.) and water chemistry analysis. A particular focus will be on the presence and origin of the insecticide Cypermethrin and the impact on macroinvertebrates.

Elaine Mitchell - CEDaR

Recording Northern Ireland's Wildlife

Dr Elaine Mitchell[1], Amy Laird, Rory Wilson, Chloe Craig, Niamh Carmichael, Kate Moodey, Dr Damian McFerran.
([1]CEDaR- Centre for Environmental Data and Recording, National Museums Northern Ireland)

Centre for Environmental Data and Recording (CEDaR) is the Local Environmental Records Centre (LERC) for Northern Ireland and its coastal waters, providing the digital infrastructure to enable the collection, collation, management and dissemination of circa 4 million spatial environmental records and data sets for terrestrial, freshwater and marine species. CEDaR is a partnership between National Museums NI, Northern Ireland Environment Agency (NIEA), Department of Agriculture, Environment and Rural Affairs (DAERA) and the recording community of Northern Ireland (Environmental Recorders' Group).
As a definitive source of high quality, local, capture-resolution biodiversity data, CEDaR works to ensure environmental information, is reliable and robust. The data sets collated by CEDaR are available to a range of stakeholders, from the public to researchers, developers, decision- and policy-makers and other statutory bodies, such as NIEA and DAERA. These data are of vital importance to conservation across the UK and Ireland as they underpin and inform conservation decision making, policy, legislative requirements, planning and research. CEDaR objectives are:

- Greater mobilisation of policy relevant environmental data.
- Long-term sustainable provision of necessary knowledge and skill required to deliver service.
- Further developing citizen science and environmental recording.
- Delivery of agreed projects and core legislative requirements.
- Provision of improved communications.

Alex Okolocha - Department of Zoology, Nnamdi Azikiwe University, Nigeria

Emerging contaminants, Perfluoroalkyl and polyfluoroalkyl — PFAS under changing climatic variability: Insights from a preliminary survey in Agulu Lake, Anambra State, Nigeria

Dr. Anthony Okoye[1] & Alex Okolocha[1]
([1]Department of Zoology, Nnamdi Azikiwe University, Nigeria)

Emerging contaminants, including poly-fluoroalkyl substances—PFAS, remain among the greatest threats to freshwater ecosystems worldwide. Despite the increasing recognition of their effects on freshwater integrity, monitoring these contaminants in Africa, including Nigeria, remains scarce. We provide a preliminary insight into the presence and distribution of PFAS under varying climatic conditions in Agulu Lake, Anambra State, Nigeria. We sampled 10 Perfluorinated Carboxylic Acids (PFCAs), 5 Perfluorosulfonic Acids (PFSAs), 5 Fluorotelomers, 5 Perfluoroalkyl Sulfonamides (FASAs), and 3 Perfluoroalkyl Sulfonyl Amide Acetates in eight sites across the dry, wet and harmattan seasons between 2022 and 2023. Sites were also selected to reflect varying land-uses, including agriculture, informal settlements and industry. Results showed that all analysed PFAs were detected in all sites. The concentrations of PFAS detected ranged from 0.05–2.21µg/L across the sites and seasons. Seasons were more influential in shaping the distribution of PFAS in the study area than sites. The informal settlement has higher concentrations (2.22µg/L) of PFAS than agriculture. The highest concentration of PFAS was Perfluorohexanesulfonic Acid (PFCAs—1.99 µg/L), followed by Perfluorohexanesulfonic Acid (PFHxA) (0.30µg/L), and Perfluorooctanesulfonic Acid (PFOS) (0.22µg/L). The findings of this study provided baseline data and can contribute towards developing an effective regional strategy for managing PFAS influence in freshwater ecosystems in Nigeria

Michaela Hogan - Aquamonitrix Ltd

In-Situ Nitrite and Nitrate Monitoring: Using Aquamonitrix® Technology Towards Conservation of Freshwater and Estuarine Ecosystems

Michaela Hogan[1,2] and Eoin Murray[1,2]
([1] Research & Development, Aquamonitrix Ltd.
[2] Research & Development, T.E. Laboratories Ltd.)

Effective surface water management requires accurate and continuous monitoring of nitrogen compounds - particularly nitrite and nitrate, which are key indicators of water quality. Traditional monitoring methods face challenges in dynamic environments with fluctuating salinity, turbidity and interference from organic matter. This study presents the deployment of the Aquamonitrix® nitrite and nitrate analyser, a fully automated ion chromatography (IC) system employing UV-LED detection for high-frequency *in-situ* monitoring of riverine and estuarine waters.

The Aquamonitrix® analyser achieves >95% accuracy, and eliminates measurement drift and interference, even in conditions of varying salinity. The system was successfully deployed for remote river water monitoring in Wexford and Cork, providing real-time data on nitrate and nitrite fluctuations. This approach enabled early detection of pollution events, such as a nitrite pulse persisting for 1 km downstream, and lead to the identification of an agricultural contamination source.

These findings highlight the critical role of real-time, high-resolution nutrient monitoring in freshwater conservation and restoration efforts. This study demonstrates how next-generation analytical technologies can improve nutrient source tracking, support regulatory compliance and enhance ecosystem resilience in the face of anthropogenic pressures.

Chukwunonso Nnajide - Ulster University

Investigation of Potential Surrogate Materials for Sediment-Based Monitoring of Antimicrobial Resistance in River Systems

Nnajide, C.U[1], Arnscheidt, J.[1], Dooley, J.[2]
([1] School of Geography and Environmental Sciences, Ulster University
[2] School of Biomedical Sciences, Ulster University)
E-mail: nnajide-c@ulster.ac.uk

Antibiotic resistance (AMR) is one of the biggest public health threats of the 21st century. While research has shown that rivers form a unifying pathway for the transmission of AMR, there is still the need for suitable monitoring systems for resistant genes and resistant bacteria in water environments. The main objective of the present study is to identify and test potential surrogate materials for a sediment-based monitoring of AMR in the Ballysally Blagh, a second-order stream in Northern Ireland. Three potential surrogate materials (carbon filter foam, glass microfibre filter, and balsa wood chips) were selected for this study. In four sampling campaigns between May and December 2024, the three surrogate materials were deployed in the Ballysally Blagh for 21 – 28 days, embedded in aluminum U-channels and fixed to the streambed. Three sampling sites along the Ballysally Blagh were selected: one site upstream from a wastewater pumping station, and two sites downstream. The surrogate materials were taken out every 7th day for DNA extraction. Highest DNA yields (>15ng/µl) were obtained between the second and third weeks. High-quality DNA will be analysed by shotgun sequencing using MinION portable sequencer, as a means of investigating ARG abundance and diversity in the catchment.

Yanika Rhule - School of Biology and Environmental Science, University College Dublin

Assessing the Influence of Forestry Operations on Deposited Sediment Levels in Irish Headwater Streams

Yanika A. Rhule[1,2], Mary Kelly-Quinn[1] & Jonathan Turner[2]
([1]School of Biology and Environmental Science, University College Dublin, Belfield, D04
[2]School of Geography, University College Dublin, Belfield, D04)
E-mail: yanika.rhule@ucdconnect.ie

Plantation forestry has been identified as one of the principal catchment pressures in Ireland, largely because of associated landscape disturbance during forestry operations leading to the delivery of elevated fine sediment to surface waters. Fine particulate sediment is regarded as a master stressor on aquatic ecosystems, particularly when these sediments accumulate in riverbed substrate. However, relatively little research has been conducted in relation to the retention and storage of fine sediment on the channel bed due to forestry operations and the knock-on effects on aquatic biota. We introduce here a research project that aims to address this knowledge gap for small streams in Ireland, through a detailed spatiotemporal programme of monitoring at three core sites in Co. Wicklow and the Irish Midlands. These sites were selected to represent different geological settings and soil types, with the aim of establishing where and how much fine sediment is deposited and retained in the riverbed before and after forestry operations and the corresponding ecological impacts on macroinvertebrates and diatom communities. In addition, this project aims to quantify baseline sediment levels in small streams, which are needed to support the development of deposited sediment thresholds for catchment management, through a comparative study of impacted and unimpacted “reference” sites. Some preliminary results from the core site monitoring show significant seasonal deposited sediment fluctuations within and between reaches at the monitoring sites. Initial results from the baseline investigations of reference streams, show no significant difference between sediment levels under different geologies, but a marked difference in organic carbon levels. These results and implications for this ongoing research will be discussed.

Emma Drohan - Inland Fisheries Ireland

The RESTORE project - Detecting Change and Assessing the Effectiveness of Measures to Protect and Restore High Status Objective River Waterbodies

Dr. Fiona Kelly[1], Dr. Mary Kelly-Quinn[2], Dr. Jonathan Turner[2], Dr. John O'Sullivan[2], Dr. Md Salauddin[2], and Emma Drohan[1].
([1] Inland Fisheries Ireland
[2] University College Dublin)

Deterioration of water quality from point and diffuse nutrient pollution, together with habitat degradation, is reflected in Irish catchments through the decline of high-status objective (HSO) waterbodies from 31.6% to 18.4% in the periods from 1987-1990 and 2019-2021, respectively. Highlighting potential drivers of degradation, together with monitoring the impacts of pressures and associated stressors on aquatic systems, remains critical for the management of river waterbodies. In partnership with the Waters of Life Project (WoL) the EPA funded RESTORE project is currently providing detailed baseline data across six HSO catchments in Ireland. The RESTORE project will utilise baseline data alongside existing catchment and stream condition data to develop a bespoke multi-disciplinary monitoring programme based on the pressure-stressor response framework to detect change and assess the effectiveness of mitigation measures implemented in five demonstration catchments. Baseline monitoring sites were selected using a search sampling (above and below watersheds) approach to pinpoint watersheds contributing to failures in water quality status and those requiring protection. Here, we present results from the first phase of baseline monitoring (macroinvertebrates and fish) and supporting elements (deposited and suspended sediment, water chemistry).

Heather Lally - Atlantic Technical University

Characterising Acid Oligotrophic Lake Habitat (3160) in Ireland

Heather T. Lally[1], Emma Gray[1], Giovanni Cappelli[1,2], Martin Gammell[1] and Cilian Roden[3]
([1]Atlantic Technological University (ATU),
[2]Inland Fisheries Ireland,
[3]Roden Ecology)

Acid oligotrophic lake habitat is a protected freshwater habitat in Ireland and characterised using the presence of aquatic plant communities. However, other organisms, such as algae and macroinvertebrates, show potential for characterising this lake habitat and could aid in assessing their conservation condition. This research aimed to investigate this potential through characterising the plant and animal communities of acid oligotrophic lake habitats. We assessed data from plant communities including macrophytes, algal communities including desmids, and invertebrate communities such as dragonflies, damselflies and beetles from 24 waterbodies within Atlantic blanket bog landscapes in western Ireland. We found sparse and species poor plant communities that showed no distinct vegetation zonation patterns. Desmids were the most species-rich group in the waterbodies sampled and were deemed important refuges for rare and vulnerable desmid species. In addition, the application of the desmid Nature Conservation Value metric proved a useful monitoring tool highlighting the conservation value of the surveyed waterbodies. Predatory beetles (Family Gyrinidae) were the dominant macroinvertebrates found within the surveyed waterbodies. These findings support the monitoring of favourable conservation conditions in acid oligotrophic lake habitat under the EU Habitats Directive and are important for the conservation of small waterbodies within Irish peatland landscapes.

SESSION 2b – (7 MINUTE TALKS)

Aaron Gaffney - Invasive Ecology Laboratory, University College Dublin

Invasives know no bounds: A review of the Asian Clam population in the River Erne

Aaron Gaffney[1], Dr. Jan-Robert Baars[1]
([1]Invasive Ecology Laboratory, School of Biology and Environmental Science, University College Dublin (UCD), Dublin, Ireland)

The Asian Clam is one of Ireland's most damaging aquatic invasive species. This high-risk ecosystem engineer is expanding rapidly both within and between catchments in Ireland but its impact and spread is poorly monitored. Since its discovery in the River Barrow in 2010, it now occurs in most of the Shannon catchment as well as the Foyle and the Erne. A small localised population of the Asian Clam was recorded in the River Erne near Belturbet in 2016. This study monitored the subsequent spread of the clam further downstream and into Northern Ireland. Dredge samples were collected over a 25 km stretch and Van Veen grab samples were collected at 6 sites to determine its distribution, relative abundance, density, biomass and population structure. The clam has spread 10km downstream since 2016. The densities and biomass were variable and relatively low towards the leading edge of the invasion, but reached estimated densities of 2420 individuals/m2 and an estimated biomass of 8806 g/m2. 5 year groups are estimated to be present within this population. This study highlights the need to better understand the impact these filter feeders have on our aquatic ecosystems and the cross-border concerns around invasive species.

Martin Gammell - Atlantic Technical University

New hydroecological macroinvertebrate indices for monitoring Irish rivers

Martin Gammell[1], Heather Lally[1], Conor Graham[1], Andres Peredo Arce[1], Lynda Weekes[2], Chris Westwood[3], Mike Dunbar[4], Chris Extence[4]
([1]Atlantic Technological University
[2]Munster Technological University
[3]Environmental Research Associates UK
[4]Environment Agency)

Three British macroinvertebrate hydroecological indices were investigated to determine if they had potential for application in Ireland. The three indices were the Lotic-invertebrate Index for Flow Evaluation (LIFE) index which measures effects of changes in flow on river macroinvertebrate communities, the Drought Effect of Habitat Loss on Invertebrates (DEHLI) index which measures effects of drought conditions, and the Empirically-weighted Proportion of Sediment-sensitive Invertebrates (E-PSI) index which measures effects of sedimentation. The indices were adjusted where necessary so that they could be used appropriately in an Irish context, and so that they could be calculated using standard macroinvertebrate data collected by the Environmental Protection Agency (EPA) as part of their river monitoring programmes. Flow statistics calculated for Irish rivers were generally positive predictors of scores calculated with all three indices, as would be expected if the indices provided useful information about flow, and some other hydromorphological conditions, in Irish rivers. Because of the work that was carried out to adjust the indices for Ireland, they can now be easily incorporated into Irish river monitoring programmes. An online dashboard was developed to allow anyone to calculate the indices using their own macroinvertebrate data.

Craig McCoubrey - Queens University Belfast

Tracing teeth to the wounds beneath… Assessing Pike strike injuries on migrating silver eels

Craig Mccoubrey[1], Dr Derek Evans[2] , Prof Jaimie T.A Dick[1]
([1]Queen's University Belfast, 19 Chlorine Gardens, Belfast BT9 5DL, UK
[2]Fisheries and Aquatic Ecosystems Branch, Agri-Food and Bioscience Institute, Newforge Lane, Belfast BT9 5PX, UK)

The Pike (*Esox lucius*) is the largest apex piscivorous predator to reside in Irish freshwaters. Opportunistic hunters, their foraging manner reflects movement and behaviour of prey fish. The European Eel (*Anguilla, anguilla*), in its final life stage as a Silver Eel, makes a seawards migration through freshwaters at the beginning of their journey to the Sargasso Sea during lunar darks and high flow. As part of a new PhD project studying the re-emergence of Pike in Lough Neagh, external injuries were noted on silver eels with causation linked to Pike after these strike marks were identified by matching wounds to Pike's dentary structures. Such injuries were recorded from silver eels migrating from Loughs Neagh (N=5, Developing Pike population) and Erne (N= 70, Established Pike population) during (Oct-Feb). Strike location was also recorded using a novel index, which indicated such injuries were more often noted immediately posterior to the eel head and pectoral fins (N=41), suggesting a developed behaviour for preferred attack location. Future work aims to model pike size, based on gape width parameters through the development of a gape width to length/weight relationship from current sampling biometry.

Simon Harrison - University College Cork

What is the best way to monitor an urban stream so as to detect pollution inputs?

Simon Harrison, Capucine Sourit and Adam Ward-O'Halloran
(University College Cork)

River monitoring in Ireland is usually done to assess the overall chemical or ecological state of a river or stream, typically at a single, or small number of points. However, monitoring may be done in an investigative manner, encompassing many sample points within a single river system (eg within an urban catchment), in order to detect specific point-source pollution inputs. Such inputs include direct sewage inputs and domestic misconnections to the surface drainage network. This investigative monitoring can involve measuring various water chemistry parameters (eg conductivity dissolved oxygen, ammonium, SRP) and/or biological metrics -typically macroinvertebrate communities. In this case study of the Glen river, Cork city – a heavily polluted urban stream - we show the relative strengths and weaknesses of the various parameters and metrics in detecting inputs. We conclude that measuring tryptophan-like fluorescence (associated with the presence of organic wastes from sewage and animal faeces) may provide the most cost-effective way to rapidly and easily detect point-source inputs in an urban stream.

Niamh Heatly - Queens University Belfast

Head Shape Bimodality in European Eel: Consequential Impact on Fat Accumulation, Gonadal Development and Spawning Likelihood across the Broadhead Ecotype

Niamh Heatley[1], Dr. Derek Evans[2], Prof. Jaimie Dick[1]
([1] Queen's University Belfast School of Biological Sciences, 19 Chlorine Gardens, Belfast BT9 5DL
[2] Fisheries and Aquatic Ecosystems Branch, Agri-Food and Bioscience Institute, Newforge Lane, Belfast BT9 5PX)

The European eel (*Anguilla anguilla*) is a valuable component of Irish freshwater systems with a complex catadromous lifecycle. Spawning in the Sargasso Sea, larvae are carried by the Gulf Stream to the European continental shelf where they metamorphose into glass eels and then elvers, making their way into brackish lagoons or freshwater bodies. They can grow in freshwater for up to several decades before undergoing the "silvering" process and beginning their transatlantic spawning migration back to the Sargasso. Following a sharp recruitment decline in the early 1980s, eel have been declared critically endangered by the IUCN, with local recruitment remaining <10% of pre-1980s levels. The eel displays great phenotypic plasticity in continental habitat choice and diet, with the yellow freshwater stage known to exist as two distinct ecotypes; narrowhead (primarily insectivorous, high fat content) and broadhead (primarily piscivorous, visibly developed jaw musculature, low fat content). Fat content is essential to trigger the "silvering" metamorphosis, and it is unknown whether the broadhead, due to its high protein diet, ever accumulates enough fat to successfully silver, migrate and spawn. As such, broadhead contribution to the overall reproductive population has been questioned, with implications for local management targets and Europe-wide stock recovery efforts.

Pascal Sweeney - Sweeney Consultancy

Nais communis in an unexpected microhabitat

In recent years, *Nais communis* has been something of an enigma, with confusion over its identification and distribution in Ireland. Following the chance finding of a specimen of this small worm within the case wall of a caddis larva, further investigations revealed that this is not an uncommon occurrence and that *N. communis* is more widely distributed than thought. However, questions still remain to be answered.

Nick Stewart – Botanical Society of Britain & Ireland

The changing aquatic flora in Northern Ireland

The Northern Ireland Lough Survey of 1988-1992 provided a remarkable baseline of the aquatic flora of the region. Since that time there have been considerable changes to the flora, principally due to nutrient enrichment. Changes to Lough Neagh have been well publicised but there are similar changes occurring in many smaller loughs. Some surveys have been undertaken in the 45 years since that survey, particularly by Northern Ireland Environment Agency, University College London (ENSIS) and members of the Botanical Society of Britain and Ireland but this information is patchy. This presentation looks at the available data to look at trends in species changes and whether there is a need for further targeted surveys to provide better evidence of the degree of change.

SESSION 3 (2 MINUTE ELEVATOR PITCH)

Caoimhe Murray* - University of Ulster

A monitoring approach to identify possible locations where waste water is transferred into streams by using streambed sediment as a record of episodic pollution

Caoimhe Murray[1] and Joerg Arnscheidt [1]
([1] University of Ulster, Cromore Road, Coleraine, County Derry, BT52 1SA)

Wastewater transfers put substantial environmental pressure on waterbodies of the entire island of Ireland, as wastewater treatment plant (WWTP) effluents or as transfers from combined sewer overflows (CSOs). This typically episodic pollution is associated with bacteria, whose numbers can indicate the level of faecal pollution in receiving waterbodies. Intermittent transfers of faecal pollution are easily missed in surveillance monitoring solely relying on water samples, while bacterial deposition in stream sediments can provide a time-integrated signal. Therefore, this study investigated if sediment analysis could provide evidence for faecal transfers from an intermittent WWTP outflow in Co. Donegal (RoI) by comparing upstream and downstream sediments <1mm of five transects each for enterococci, loss on ignition and grainsize parameters. Mann-Whitney U-tests confirmed significant differences of enterococci numbers per sediment dry mass and sediment uniformity. Sediments <1mm were more uniform downstream, and there was no significant difference between loss on ignition as proxy for organic content. This assessment suggests that sediment surveillance monitoring of faecal bacteria can identify intermittent pollution sources like the investigated WWTP whose effluents had a significant impact on downstream sediments.

*Entered into the award for best student elevator pitch

Kelly Macken* - Invasive Ecology Laboratory, University College Dublin

How effective is the invasive quagga mussel at colonising the deep lake habitats in Ireland?

Kelly Macken[1] and Jan-Robert Baars[1]
([1]Invasive Ecology Laboratory, School of Biology and Environmental Science, University College Dublin (UCD), Dublin, Ireland)

The invasive aquatic filter-feeding bivalve *Dreissena rostriformis bugensis*, the quagga mussel (QM), is rapidly invading Ireland. It is displacing the zebra mussel on hard substrates but can also survive on soft sediments. This previously unoccupied niche could lead to greater filter-feeding impacts on Irish freshwaters as the QM will occupy more littoral and profundal habitats. This study assessed how the QM is colonising deep, soft sediments in lake and river habitats. QM densities and biomass were monitored at two sites in Lough Ree (LR) and four sites along the River Shannon (RS) from 2022-2024. Sites at 5m depth intervals (5-20m) were sampled using a Van Veen grad. Collected samples were sorted and processed in a laboratory in UCD. QM densities decrease with depth in LR, with a mean density of 4,048.4 per m2 at 5m compared to 123.0 per m2 at 20m. Substrates below 10m appear less suitable for the QM, possibly due to sediment shifting caused by lake currents inhibiting long term survival. QM mean densities in RS sites ranged between 17,201.9 per m2 to 240.7 per m2 in 2024. During these early invasion stages the QM is settling on soft sediments in both lake and river habitats and will likely further impact Irish aquatic ecosystems. Efforts limiting QM expansion in Ireland are urgently needed.

*Entered into the award for best student elevator pitch

Isac Brander* - University College Dublin

Studies on ecological resilience using a new experimental mesocosm system

Isac Brander
(School of Biology and Environmental Science, University College Dublin)

Ecosystems seldom endure periods of stability. A frequent exposure to perturbations, both natural and anthropogenic, can lead to the ecosystem collapsing. The stability is dependent on the continued operation of other ecosystem functions. One of the key functions is ecological resilience; the system's ability to absorb stress. It has become one of the most discussed topics in ecology. Promoting resilience could make managed or restored ecosystems more resistant to perturbations. However, many questions remain about the drivers and mechanisms of this function.

A new mesocosm system, called ExOPond, has been constructed at UCD Rosemount Environmental Research Station. It consists of 24 isolated freshwater ponds, each with a volume 1,125L. The system will be used to undertake studies on the drivers of ecological resilience, with a focus on functional redundancy and ecosystem connectivity. The current plan is to run two separate experiments in the span of two years. The first experiment will test the effect of functional redundant predation on ecological resilience. The second experiment will instead study the effect of aquatic-terrestrial connectivity, using built in terrestrial modules.

*Entered into the award for best student elevator pitch

Emily Rick - Inland Fisheries Ireland

National Barrier Mitigation Programme

Emily Rick[1] and Hazel King[1]
([1]Inland Fisheries Ireland, National Barrier Mitigation Programme)

Fish species such as Atlantic salmon, lamprey and the European eel are threatened species and Inland Fisheries Ireland (IFI) is mandated to protect them under law. The aim of the National Barrier Mitigation Programme is to improve river hydromorphology and connectivity in Irish catchments by strategically targeting significant barriers to fish passage and structures degrading river form, flow and function. Removing barriers will open up habitat to various species in an era where habitat loss is impacting severely on biodiversity both nationally and internationally. These actions are supported by the Water Framework Directive (WFD) and the EU Biodiversity Strategy 2023 which jointly prioritise the restoration of river processes and the free movement of aquatic species. The Water Action Plan 2024 assigned IFI to develop a river restoration programme, with pilot projects targeting significant barriers at the Annacotty Weir, the River Dodder, and the River Slaney. The new Barrier Mitigation Division in IFI that has been set up to address these key actions. With a potential investment of over €100 million over the next 3 years, the team aims to mitigate 257 barriers nationwide.

Frances Lucy - Atlantic Technical University

Horizon GUARDIAS project

Hannah Mulcahy - NPWS

Turlough Ecologist with National Parks and Wildlife Service