Annual Meeting of the
Irish Freshwater Sciences Association

Book of abstracts

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University College Dublin

Session 1: ***Management of freshwaters towards meeting the 2027 WFD targets*** (talks = **12 minutes** + questions) – Mary Kelly-Quinn (Chair)	
10:00	**Shane O'Boyle** Environmental Protection Agency **Title:** ***WFD status, pressures and the next RBMP*** The EU Water Framework Directive is implemented through a series of river basin management plans and Ireland's latest plan is under preparation. The talk will outline the status of Ireland's surface water and groundwater resource and highlight recent trends in water quality. The talk will also present the latest characterisation information on the impacts of different human activities on water quality and highlight some of the measures which are being put in place to address these impacts. The talk will also present the key features of Ireland's third-cycle river basin management plan.
10:15	**Fran Igoe** The Local Authority Waters Programme (LAWPRO) **Title:** ***River Basin Management Planning: Learnings from the 2nd cycle – preparing for the 3rd cycle.*** River Basin Management Plans (RBMP) set out the "water quality management" road maps for EU Member states in accordance with the EU Water Framework Directive (WFD). As we move into the 3rd six-year cycle of the WFD, planning is underway for the time period spanning 2022 to 2027. This includes a public consultation which closes at the end of March 2022. The Local Authority Waters Programme is a shared service which supports all Local Authorities, the lead Department (DHLGH) and implementing bodies (e.g., DAFM, EPA, IFI, SFPA, IW etc) in the implementation of the RBMP objectives. This presentation will give a summery overview of key learnings from the period (2015 to 2021) and outline some of the challenges and preparations being put in place, as we move into the (2022 to 2027) period.
10:30	**Cormac McConigley** LAWPRO Blue Dot Scientist & Bernadette White LAWPRO Blue Dot Manager **Title:** ***The Blue Dot Catchment Programme*** Ireland has a high percentage of its waters achieving high status relative to many European countries. However, there has been a large decline in the numbers of high-status water bodies in recent decades. To address this decline as part of the implementation phase of the River Basin Management Plan for Ireland 2018 – 2021, a set of principal actions were outlined which included the development and coordination of a Blue Dot Catchments Programme to protect and restore Irelands high status waters. This programme aims to ensure that high status waters are prioritised for the implementation of supporting measures and funding. The presentation will give an overview of this programme, water bodies with a high ecological status objective in Ireland and outline significant pressures impacting on these waters. An overview of work which is being undertaken by the Local Authority Waters Programme in Prioritised Areas for Action with high status objective water bodies will also be presented. The Blue Dot Catchments Programme represents an opportunity to inform policy and practice to protect and restore these sensitive waterbodies.
10:45	**Mike O' Connor,** Project Scientist & Michael Morrissey, Project Agri-environmental Specialist **Title: Duhallow Farming for Blue Dot Catchments EIP-Agri Project – Working with farmers towards high water quality status** Traditional prescription-based agri-environmental schemes have proved insufficient towards protecting sensitive ecosystems, including high-status waterbodies. Results-based schemes place a high value on the delivery of ecosystem services by farmers and are becoming increasingly recognised as a potential solution to the current agroecological crisis. Coordinated by rural development company, IRD Duhallow, the Duhallow Farming for Blue Dot Catchments project is funded by EIP-Agri, a partnership that strives to foster more sustainable and competitive agriculture and forestry in Europe. The project works alongside the farming community of an ecologically sensitive catchment in the south of Ireland, using a results-based approach, to protect high-status rivers, and to inform future agri-environmental policy and practice. Participating farmers select a suite of farm-specific actions designed to prevent nutrient enrichment of rivers, and enhance the river ecosystem, and are financially rewarded to reflect the success of their efforts. Fostering IRD Duhallow's four pillars of sustainable rural development (social, economic, cultural, and environmental), the project integrates the community in project actions and collaborates with industry and with environmental organizations to trial novel mitigation strategies. Emphasis is placed on knowledge transfer to ensure that stakeholder farmers are properly informed and involved in the monitoring of the project. The presentation will give an overview of the project's approach to the management of waterbodies towards high (blue dot) status will detail the farmer-orientated project actions designed to mitigate threats to water quality and improve biodiversity.

11:00	**Daire Ó hUallacháin**[1], Nikki Baggaley[2], Fabiola Barros Costa[1], Allan Lilly[2], Mark Wilkinson[2], Marc Stutter[2], [1]Teagasc, Wexford, Ireland [2]The James Hutton Institute, Craigiebuckler, Aberdeen, UK **Title: Suite Sixteen: Expert evaluation of environmental effectiveness of riparian mitigation measures T**he pollution of surface and ground waters represents one of the primary environmental challenges facing agri-ecosystems. There is an urgent need to halt declining water quality and habitat condition in farmed landscapes and the riparian interface between land activities and the water environment is a key location for management. Riparian buffer zones are patches of land adjacent to rivers, streams and drains, removed from intensive production. Coupled with benefits for water quality, these areas can provide a variety of environmental and ecological services, including a habitat for biodiversity, alleviating flood threat, greenhouse gas exchanges and aesthetic and recreational services. Riparian mitigation measures have been widely incorporated in European agri-environment schemes. However, despite their widespread implementation, uncertainties remain in relation to the multi-functional effectiveness of riparian mitigation measures. This study reports on a preliminary assessment of the effectiveness of sixteen riparian management measures to maintain and enhance water quality and additional ecosystem services. We employed an expert-based process of generating effectiveness and confidence estimates, undertaken with academics and practitioners. It is anticipated that information gleaned from this study (i.e. SMARTER_BufferZ) will facilitate policy-makers to target the most cost-effective riparian management measures to support the delivery of multiple ecosystem services and in particular help surface waters achieve Water Framework Directive targets.
11:15	**Fiona Regan**[1 3], Joyce O'Grady[1 3], Lisa Cronin[1 3] and Nigel Kent[2 3] [1] School of Chemical Sciences, Dublin City University [2] School of Electronic Engineering, Dublin City University [3] DCU Water Institute **Title**: **Demonstration of a novel phosphate optical sensing system for surface water monitoring in Ireland** Catchment monitoring with an emphasis on water quality is a growing area of importance in recent years. Monitoring water quality is a local and global interest and is driven by legislation such as the WFD in Europe, the Water Act in Canada, the Australian Water Act and the US Clean Water Act. In order to obtain more information about a catchment, water monitoring and sampling must be carried out as frequently as possible. The effective monitoring of water quality parameters has a profound impact on the overall quality of a catchment area. A number of aquatic systems and planktonic organisms are dependent on the quality of the water for survival. Water quality monitoring within catchments is essential to maintain the structure and functioning of the land, water bodies and aquatic ecosystem that inhabit the catchment. The demand for rapid detection methods that provide real-time or near real time quantification of phosphate levels in freshwater is recognised by both government and legislative bodies. In this paper, we demonstrate the use of a novel centrifugal microfluidic optical sensor for the measurement of phosphate in a catchment setting.
11:30	**COFFEE BREAK**
Session 1 cont'd.: ***Management of freshwaters towards meeting the 2027 WFD targets*** (talks = **12 minutes** + questions) – Daire Ó hUallacháin (Chair)	
12:00	M**ary Kelly-Quinn** and Siobhan Atkinson School of Biology and Environmental Science, University College Dublin **Title**: **The potential impacts of low-head barriers on aquatic biota in Irish rivers – insights from the Reconnect project** *Reconnect* aimed to advance knowledge on the impact of barriers on connectivity in Irish rivers in terms of sediment dynamics and ecology in studies undertaken between 2016 and 2020, and to develop a methodology for prioritising selection of low-head barriers for modification or removal to improve hydromorphology and connectivity. In addition to mapping barriers in 10 sub-catchments detailed investigations on fish, macroinvertebrates, macrophytes, hydromorphology and eDNA were carried out in four core study areas on the Duag, Browns Beck Brook, Dalligan and Burren Rivers which each contained a significant barrier. These included monitoring responses to removal of the ford on Browns Beck Brook. Specific investigations were carried out at 35 other locations across 12 river/ stream systems. The fish studies highlighted issues with upstream fish migration in the Dalligan River where there is a vertical barrier (2.3 m high) about 2 km from the sea. In the other catchments brown trout and Atlantic salmon fry and salmon parr were absent or in low abundances in the impounded reaches, and the impounded reaches did not always hold the highest density

	of 1+ and older fish. Impacts on macroinvertebrate communities largely related to the change in habitat due to impoundment behind the barriers creating elongated pool habitat.
12:15	**Jonathan Turner** School of Geography, University College Dublin **Title: Monitoring sediment connectivity and channel adjustment: experiences form the Reconnect barrier project** This talk presents highlights from hydromorphological investigations carried out under the EPA Reconnect Project (2015-W-LS-8). A sediment tracer study employing radio frequency identification (RFID) technology showed that all bed size fractions can pass over barrier structures. Barrier impoundments may, therefore, never reach their maximum sediment storage capacity. However, hydrosedimentary disruption can lead to temporary storage, resulting in bed sediment coarsening downstream that could lead to altered habitat potential. Using continuous turbidity monitoring as a surrogate for suspended sediment revealed the importance of the impoundment as a secondary source of fine sediment during storm events. An implied amplification of sediment supply extremes may have implications for sediment-sensitive biota downstream. A BACI study of morphodynamics carried out at a single study site captured post-removal geomorphic adjustments characterised by both incision and bank erosion. Channel bed reorganization was relatively rapid, with the channel reverting to the pre-barrier gradient in less than two years. However, bed instability also resulted in the loss of instream macrophytes and a temporary decline in some physical habitat indicators of stream health. Lateral adjustments while localised, were ongoing and emphasised the potential need for 'freedom-space' to accommodate channel adjustments following restoration. Assessment of post-removal response to barrier removal should also consider existing hydromorphological pressures and trajectories outside of the barrier emplacement
12:30	Seán Kelly, James Barry, John Coyne, Fiona L. Kelly Inland Fisheries Ireland **Title: Implications of Climate Change for Irish Freshwater Fish** A knowledge gap currently exists in Ireland regarding the vulnerability of freshwater ecosystems and cold-water fish populations to climate change. Notably, there is an urgent need to identify the most acutely at-risk fishery habitat to resourcefully focus potential climate resilience measures. This requires the utilisation of a multi-scale framework to assess regional- and local-scale climate impacts as well as the potential for climate change to compound pre-existing non-climate stressors. Here the primary pathways through which climate change may directly affect and interact with additional anthropogenic stressors in Irish freshwater fish habitat are reviewed and results presented from a trait-based assessment showcasing the climate vulnerability of Ireland's freshwater fish species. A national stream and lake monitoring network, initiated by Inland Fisheries Ireland for the purpose of understanding spatial and temporal response of fish thermal habitat to climate variability, is presented and preliminary results from select index catchments shown. Both local- and regional-scale differences in the thermal response of freshwater systems to climate variability are apparent. This has clear fishery management applications, as combined with information on species climate vulnerability and magnitude of pre-existing stressors, it allows the identification of highly susceptible freshwater fish populations at both the national and sub-catchment scale.
12:45	J. O'Connor[1], S. Murphy[1], A-M. Mahon[1], I. O'Connor[1], R. Nash[1], J. O'Sullivan[2], M. Bruen[2], L. Heerey[2], A. Koelmans[3] and **Heather Lally**[1] [1]Marine and Freshwater Research Centre, Galway-Mayo Institute of Technology, Dublin Road, Galway, H91 T8NW, Ireland. [2]UCD School of Civil Engineering, UCD Earth Institute & UCD Dooge Centre for Water Resources Research, Belfield, Dublin 4, Ireland. [3]Aquatic Ecology and Water Quality Management, Department of Environmental Science, Wageningen University & Research Centre, P.O. Box 47 6700 AA Wageningen, Netherlands. **Title: Benthic macroinvertebrates show potential to act as a biological assessment tool for monitoring microplastic pollution in Irish river systems** Microplastics (MPs) are synthetic polymers less than 5 mm in size and globally are ubiquitous within freshwater ecosystems. Despite this, data on microplastic pollution levels within river waters and biota in Ireland is currently limited. This research set out to explore the abundance and characteristics of microplastics in benthic macroinvertebrate communities along the River Slaney. Not surprisingly, microplastics were recorded at all sampling sites in both sampling years (2017 and 2018). Mean concentrations of 0.47 ± 0.08 MPs m^{-3} (± SE) and 104.7 ± 9.5 MPs g^{-1} (73% prevalence) were recorded in surface waters and macroinvertebrate samples respectively. Overall, Ephemeroptera and Plecoptera had

	significantly higher microplastic concentrations than many other taxa while at family level, Neumouridae, Chloroperlidae and Heptageniidae were found to contain some of the highest concentrations. Although no clear trends were determined over years. The microplastic levels observed suggest benthic macroinvertebrates may be suitable as a monitoring tool for freshwater microplastic pollution. However further work is needed to determine associations between microplastic pollution levels in macroinvertebrate communities and those of their surrounding environments, allowing for a better indication as to the applicability of macroinvertebrates for monitoring.
13:00	**Simon Harrison,** Tim Sullivan and Brendan McSorley School of Biological, Earth and Environmental Sciences, University College Cork **The Citizen Science Stream Index – a novel, simple, biomonitoring protocol for non-experts** Despite several decades of the EU Nitrates and Water Framework Directives, inputs of nutrient-rich organic matter of both agricultural and municipal origin continue to pollute many waterways in Ireland, most of which are not routinely monitored in terms of water quality. This lack of data hampers our efforts to improve water quality. A spatially-extensive biomonitoring programme by non-expert citizens would provide valuable data on how - and where - streams are being polluted. It would also give citizens a much greater stake in the quality and health of their local streams. Current biomonitoring protocols – even those targeted at non-experts – tend to require advanced levels of taxonomic expertise, which are likely to discourage citizens from engaging in the important issue of local stream water quality. Here we report on the development of a Citizen Science Stream Index (CSSI) – a simplified macroinvertebrate biomonitoring protocol, based on a small number of commonly occurring, easily identifiable and distinct taxa that are strong indicators of clean or polluted waters. We show that despite the basic nature of the protocol, it relates well to other more complex and established schemes, demonstrating that the CSSI can be a practical and important tool in the effort to improve water quality in Ireland.
13:15 – 14.15 LUNCH	
Session 2: *Ongoing Projects* (talks = **7 minutes** + questions) – Hugh Feeley (Chair)	
14.15	**Kevin Atcheson[a*],** Per-Erik Mellander[b], Rachel Cassidy[c], Sally Cook[a], Stewart Floyd[c], Colin McRoberts[c], Phoebe A. Morton[c], Phil Jordan[a] [a]School of Geography and Environmental Sciences, Ulster University [b]Agricultural Catchments Programme, Teagasc, Johnstown Castle, Wexford [c]Agri-Environment Branch, Agri-Food and Biosciences Institute, Belfast **Title**: Characterisation of catchment scale MCPA loading and transport dynamics using high resolution water quality datasets Detections of the acid herbicide MCPA are increasing in Irish freshwaters as a result of extensive use on grassland agriculture. Despite this, loading rates and the hydrological transport characteristics of MCPA along the soil-water continuum are still poorly understood. To address this knowledge gap, enhanced MCPA concentration and discharge datasets were collected in the River Derg (384km^2), a catchment used for drinking water abstraction, during a typical spraying season. Data were continuously collected on a seven-hourly basis and supplemented by 1 hour storm event data. Estimations of total MCPA loads were calculated using a mass balance approach while two, time-series flow and load separation techniques were used to estimate contributions in hydrological pathway. A calculated MCPA load of 85kg (0.22 kg km^{-2}) was exported from the catchment over a seven-month period—approximately 10% of an estimated annual input. Most of the MCPA load was lost in faster, quickflow pathways (72%) while over 12% of the load was lost in slower deep baseflow pathways, indicating a chronic presence in flowing water. The MCPA loads and conceptual hydrological pathway contributions determined in this study provide a basis for how MCPA losses from grassland agriculture should be mitigated, and future research priorities.
14.25	**Jan-Robert Baars** School of Biology and Environmental Science, University College Dublin **Title**: **The Quagga mussel in Ireland – distribution, spread and its potential impact** The Quagga mussel, *Dreissena rostriformis bugensis* a high impact alien invasive species has been expected to arrive in Ireland as it had been spreading west wards across Europe. In 2021 the mussel was discovered for the first time in parts of the Shannon River system. Subsequent surveys indicated its distribution seems restricted in the Shannon occurring in Lough Ree and downstream to the Parteen Reservoir. High densities (4000-5000m^2) were recorded in Lough Ree, and the Quagga mussel made up ~60-70% of the dreissenids outcompeting Zebra mussels in most of the southern parts of the lake. Densities are spatially still very variable in the Shannon and are typically lower anywhere downstream of Lough Ree. The mussel has been found to a depth of 34m but densities at present decrease with depth, probably because of its recent arrival. Quagga

	mussels are expected to tolerate deeper habitats thus extending the range of dreissenids, and can colonise soft sediments. The population profile in Lough Ree and Lough Derg suggests it is likely to have arrived before 2018. The Quagga mussel resembles the zebra mussel and as a result has been undetected for some time. Surveys conducted over the winter months in 2021/22 highlight the likely spread of the Quagga mussel further up the Shannon River requiring corporation and vigilance from the public.
14.35	**Irene O'Callaghan**[a,b]*, Dara Fitzpatrick[b] and Timothy Sullivan[a,c,d] [a] School of Biological, Earth & Environmental Sciences (BEES), University College Cork [b] School of Chemistry, University College Cork [c] UNEP GEMS/Water Capacity Development Centre (CDC), University College Cork [d] Environmental Research Institute (ERI), University College Cork **Title: A Metric for the Relative Accumulation of Metals in Benthic Fauna** The uptake and accumulation of metallic pollutants by freshwater fauna is a well-documented process with far-reaching consequences. Beyond the direct toxic effects to exposed fauna, this phenomenon results in contaminant migration through trophic transfer. For this reason, accurate estimation of accumulated contaminant flux is ecologically vital. Many questions remain pertaining to the processes of bioaccumulation. We have determined a novel connection between the chemical property of Thiophilicity and the relative accumulation potential of metallic pollutants. Chemical analysis of field samples throughout and beyond a single catchment, with varying land use and macroinvertebrate assemblages, provides experimental validation of this theory. This finding offers a new *a priori* approach to predicting the fate of different classes of environmental pollutant, with the added potential for informing sampling and analysis projects.
14.45	**Giovanni Cappelli**[1], Emma Gray[1], Martin Gammell[1], Cillian Roden[2] and Heather Lally[1] [1] Marine and Freshwater Research Centre (MFRC), Galway-Mayo Institute of Technology, Dublin Road, Galway City, Ireland. [2] Roden Ecology, Kinvara, Co. Galway **Title: Physico-chemical characterisation of protected oligotrophic lakes in Ireland** Oligotrophic (3110) and dystrophic (3160) lakes are widespread freshwater habitats in Ireland. Despite being protected under Annex I of the EU Habitat Directive their conservation status is bad across all Atlantic region. This is partially due to limited data on and understanding of their reference conditions, preventing accurate definition, clear mapping and specific conservation objectives and efforts from being developed. We tested water chemistry parameters as an assessment and monitoring method for these lakes, to distinguish key parameters and explore the range in which these habitat types exist in Ireland. Over ten water chemistry parameters were monitored monthly for one year (Mar 21 – Feb 22) in 24 lakes and ponds across peatland regions in counties Galway and Mayo. As expected, preliminary findings indicate lake habitats are acidic with very low levels of conductivity and alkalinity, while annual mean of total phosphorus and chlorophyll-a confirm their low nutrient status. Principal component analysis highlighted key patterns of variation, revealing strong regional differences mainly driven by conductivity, organic matter and colour. Further analysis is now required but this is a necessary first step in better understanding these protected lake habitats and designing monitoring methods and assessment tools which will enhance their conservation status.
14.55	**Marcin Penk** (TCD/UCD) ESDecide decision support tool for Prognosing River Ecosystem Services: ProgRES **Title: ESDecide decision support tool for Prognosing River Ecosystem Services: ProgRES** Many rivers in Ireland continue to be impacted by numerous environmental stressors from diffuse and point sources. These stressors usually result in deterioration of riverine biodiversity, ecological conditions and related ecosystem services/NCP. In order to reverse detrimental trends, river ecosystem management is required to reduce the pressures and associated stressors. The ProgRES app has been developed to assist the estimation of particular responses of riverine biology and related ecosystem services/NCP to river management. ProgRES is an interactive online tool, that allows a user to estimate the *probability* of changes in particular biological responses and related ecosystem services/NCP to changes in environmental conditions. ProgRES can assist both the identification of detrimental responses to environmental pressures as well as the estimation of beneficial effects after pressure/stressor reductions. The tool specifically addresses practitioners in river management, who want to identify suitable restoration options. ProgRES is meant to support decisions, but not to take them. The final decisions on most suitable management options to achieve the targeted conditions belongs to the expert or practitioner responsible for improving riverine conditions. These decisions may further depend on combinations of pressures/stressors and responses not yet covered by ProgRES.

15.05	**Ricardo Leonel Marroquín Paíz**[1] , Eleanor Jennings[1] , Valerie McCarthy[1] Triona McGrath[2] [1]Centre for Freshwater and Environmental Studies, Dundalk Institute of Technology, Dundalk, Co. Louth; [2]An Fóram Uisce – The Water Forum, Nenagh, Co. Tipperary. **Title**: **A modelling forecasting framework to support decision making on the precursors and formation of Trihalomethanes (THMs) in Ireland** Water disinfection is an essential treatment phase for safeguarding drinking water quality. Harmful pathogens in water are eliminated by the use of disinfectants. However, some naturally occurring organic matter can contribute to the formation of disinfection by-products (DBPs) through chemical reactions. In Ireland, Trihalomethanes (THMs) are one of the most prevailing DBPs and are formed when chlorine compounds react with organic matter following drinking water pre-treatment. Certain catchment characteristics in combination with water management procedures have resulted in high levels of THMs in Ireland. However, the country is tackling THMs issues with programs at both local and national scales. Some of these programs focus on river basins and ecosystems which aim for an improvement of raw water quality. Others focus on water treatment with an emphasis on upgrading infrastructure and water treatment methods. However, a lack of coordination within programs often arises due to different implementation timelines. High-frequency monitoring with sensors and forecasting tools can gain relevance as adaptation strategies to fill coordination gaps and support decision-making within the drinking water cycle. These have been assessed as cost effective methods that not only improve water management but also offer other potential economic benefits. Keywords: drinking water, disinfection by-products, drinking water treatment, water management, water quality
Session 3: ***Ongoing*** (**7 minutes** + questions) ***and new research*** (**2 minutes** elevator pitch) - Eleanor Jennings (Chair)	
15.15	**Martin Gammell[1],** Heather Lally[1], Conor Graham[1], Lynda Weekes[2], Valerie Kendall[1] [1]Galway-Mayo Institute of Technology; [2]Munster Technological University **Title: Biological tools to measure the impact of flow on ecology in Irish rivers** When assessing river water quality, it is important to take hydromorphology into account. There is an increasing number of biomonitoring tools available for measuring the effects of changes in hydromorphology, and flow in particular, on river ecology. This project aims to adapt some of these biomonitoring tools for use in river monitoring programmes in Ireland, thereby providing additional information when assessing ecological status of Irish rivers. Water flow is an important determinant of the biological community at a site, while morphological features, such as substrate composition and channel structure, also have an important role to play, and may mediate the influence of flow on the biological community in various ways. This project will examine the relationship between river flow and three major groups of aquatic organisms: macroinvertebrates, fish and macrophytes. The aims of this project are: to test a range of macroinvertebrate and macrophyte flow indices using historical and current data, and develop appropriate flow indices for use in Irish river monitoring programmes; to use statistical modelling approaches and historical electrofishing data to determine optimal flow conditions for sensitive fish species; and to provide recommendations on the use of biomonitoring tools for flow in Irish river monitoring programmes.
15.25	Elvira de Eyto[1], Colin Guilfoyle[1,2], Mary Dillane[1], Heather Lally[2], Conor Graham[2], Sue Callaghan[3], Sam Birch[3] [1] Marine Institute; [2]GMIT; [3]NPWS **Title: Baseline characterisation of the aquatic ecosystems of the Nephin Forest** The Nephin forest is a vast tract of Coillte land in North Mayo(~4000 hectares), the management of which has been recently transferred to NPWS. A conversion plan for Nephin Forest is currently being drafted, with the aim of restoring habitats and improving connectivity with Wild Nephin National Park. Here, we outline plans for collating long term and historical aquatic data to inform this process, to provide a robust baseline against which restoration measures can be assessed in the future.
15.35	**Darragh Murphy**, Simon Harrison and John Weatherill School of Biological, Earth and Environmental Sciences, University College Cork **Title:** The Effectiveness of Nature-based Catchment Solutions on a farm in Co. Cork Ireland continues to face the growing challenges of sub-optimal water quality, the effects of climate change, and meeting the requirements of the Water Framework Directive [WFD] (2000/60/EC). As these challenges become both more substantial and immediate, it is vital that efforts to overcome them are performed with an appropriate level of urgency and understanding of the scientific and social principles at play in our catchments. To this end, the central concept of the upcoming 3rd cycle of the River Basin Management Plan (RBMP) is "the right measure, in the right place". As part of the SloWaters Programme, research is being conducted on farms in Co. Wexford and Co. Cork, in which we are aiming to demonstrate the effectiveness

	of a suite of Nature-based Catchment Solutions (NbCS) to hydrological and water quality issues in agricultural catchements. These NbCSS have been developed through rigorous environmental monitoring, review of academic literature and landowner collaboration, and have the potential to address several of the themes of the next RBMP. I will discuss one of these NbCSs, a Runoff Attenuation Feature on a pasture field, which has been designed to attenuate flood peaks and entrained water quality pressures from an adjacent 2nd order stream. Preliminary results indicate that loadings of in-stream water quality pressures, such as suspended solids and dissolved organic carbon, are substantially higher during flood flows than baseline flows, and that retention of flood-peak waters within the RAF can markedly attenuate these water quality pressures.
15.45	**Cilian Roden,** *Paul Murphy , James Ryan and Áine O"Connor* *[1] Kinvara Galway; [2]Eireco, Co. Clare; [3]Blackrock, Dublin; [4]NPWS* **Title**: **Are lakes with *Najas flexilis* unusual and are they under threat?** Najas flexilis is an uncommon water plant in Ireland and Scotland and is protected by the EU Habitats Directive. In order to establish its present conservation status , a survey of 40 lakes was undertaken, using snorkel technique,. We established that *Najas flexilis* is only found in lakes of intermediate alkalinity (15-70 mg/l) with a distinctive flora including both oligotrophic and eutrophic species. These lakes have a characteristic deep water community, only found when vegetation depth exceeds 3 m. It is in this community *Najas* largely occurs. Such lakes differ in vegetation both from typical Isoetid lakes and naturally eutrophic water bodies. The community is threatened by a reduction in water transparency. While algal blooms due to excessive phosphorus is an established threat, here we also note the damage caused by water colour, often due to peat drainage. Clear water mesotrophic lakes are now rare in Ireland and many are threatened by excess colour or phosphorus. Lough Leane Co. Kerry has deteriorated dramatically since 2013 with once abundant *Najas* populations now almost extinct. Some of the best remaining *Najas* lakes (e.g. Knocka Lough Co. Clare and Ballynakill Lough Connemara) have no conservation designations.
15.55	**Hugh Feeley** Environmental Protection Agency **Title**: **An update on Ephemeroptera (mayflies) and Plecoptera (stoneflies) in Ireland** In the last number of years our knowledge of mayflies and stoneflies across the island has improved. However, there is a need to communicate the latest findings and to continue to further our knowledge of these two vital freshwater insect groups. For example, the recent discovery of the mayfly *Baetis atlanticus* (Soldán & Godunko, 2006) at numerous locations and the rediscovery of stonefly *Protonemura praecox* (Morton, 1894) in the Dublin/Wicklow mountains highlights that there is a need for on-going work and collaboration across the island. This talk will also discuss the recent Plecoptera Red List and highlight forthcoming publications and research needs.
16.05	**Eibhlín Vaughan[1],** John O'Sullivan[1], Mary Kelly-Quinn[2], Jonathan Turner[3], Fiachra O'Loughlin[1], Brian Tobin[4], Joe Harrington[5], Rodhraí Crowley[5] [1] School of Civil Engineering, University College Dublin [2] School of Biology and Environmental Science, University College Dublin [3] School of Geography, University College Dublin [4] UCD Forestry, University College Dublin [5] School of Building and Civil Engineering, Munster Technological University **Title**: **HydroSED – Assessing the Hydrological and Sediment Impacts of Forest Operations** In Ireland, the second cycle River Basin Management Plan highlights 1,460 water bodies that are failing to meet their WFD objectives. Forestry is a recognised pressure in this regard, impacting 238 waterbodies nationally and being a primary pressure in 51 (40%) of the 127 'at risk' waterbodies with a 'high ecological status' objective. Soil erosion from forest blocks following land/surface disturbance from licensed operations (harvesting, windrowing etc) is generally associated with high sediment export that has the potential for elevating levels of sediment input to adjacent or nearby freshwater systems – an issue that is compounded when lands are saturated and/or when sediment mitigation measures are compromised. Excessive fine sediment input to rivers and streams is a well-recognised environmental stressor that adversely impacts the ecological status of freshwater systems. Here we present the DAFM-Funded HydroSED project (www.ucd.ie/hydrosed), a field-based research programme that is exploring these hydrological and sediment impacts of forest operations across sites underlain by peat, peaty-mineral and mineral soils in different topographical and hydrological settings.

	The project aims to relate suspended and deposited sediment data to changes in hydromorphology and aquatic community health, with sediment fingerprinting and modelling being proposed for disentangling forestry operation impacts from other catchment pressures.
16.07	Michael Bruen School of Civil Engineering, University College Dublin **Title**: **Introducing the WaterFutures research project** We live in a dynamic world where changes in climate, population demographics, food preferences and policy can be expected to change the Irish landscape. The WaterFutures project will investigate how to predict the impacts these changes will have on the quality of Irish water bodies. It is a four year, EPA and DAFM co-funded, multidisciplinary, research project which started in April 2021. The project, which has Irish and one international partners, is gathering information and producing tools to model the effects of climate change and demographic/social change on water quality in Ireland and will either develop new models or adapt appropriate existing useful models to be incorporated into systems for use by the EPA in responding to the requirements of the Water Framework Directive. The project has 21 senior investigators (from UCD, NUIM, ESRI, TCD, Marine Institute, Teagasc, Sligo IT, MTU, IFI and Rothamsted Research), working with up to 8 post-docs and they will collaborate closely with the EPA's Catchment and Climate Change units to ensure the knowledge and tools being developed address the current needs of these units. Primarily a model-focussed project, the most up to date predictions of changes in climate, demographics and food preferences will inform models of changes in rural and urban hydrological fluxes and water quality and the effects of all these on river morphology and aquatic biodiversity. The implications for karst and wetland systems are included in the project scope, as well as the likely effects on water quality in estuaries.
16.09	Joe Caffrey, **Ronan Matson** & Rossa O'Briain Inland Fisheries Ireland **Title: A photographic guide to Ireland's freshwater and riparian plants** The *photographic guide to Ireland's freshwater and riparian plants* was originally intended as a small guide for Inland Fisheries Ireland (IFI) staff, to identify aquatic and riparian plant species while conducting fish and habitat surveys. Since then, we have seen potential in creating something more comprehensive and have received lots of encouragement from colleagues, universities, ecologists, and others to 'fill this very obvious gap'. So, throughout the intervening years, we have collected thousands of relevant plant photographs that offer a perspective, often missing from conventional diagrams. While, combined, we have nearly 90 years of experience working in aquatic systems, we have reached out for help from experts on specific plant groups, including the algae and bryophytes. Our book is aimed at the non-specialist (although the specialist will find it very useful) and is designed to help those working in and around water (or with a keen interest), to accurately identify species without having to consult numerous complex botanical resources. To assist the user, we take a habitat-based approach to categorise aquatic plants and minimise the use of specialised botanical terms. We include approximately 250 species/taxon profiles, with information on their distribution and ecology, along with a suite of high-quality photographs showing key diagnostic features important to that particular species or plant group. This presentation shows the results from our work to date and provides some samples from our up-coming book, which will be published in 2022.
16:11	**COFFEE BREAK**
16:30 – OPEN DISCUSSION & Annual General Meeting of IFSA – Pascal Sweeney (Chair)	
17:00	**FINISH**