



River Restoration Centre 25th Annual Network Conference Cynhadledd Canolfan Adfer Afonydd

Supported by **LIFE Dee River**

Including programme, abstracts, workshop & site visit information, 2024
UK River Prize finalists and notes pages

24th – 26th April 2024

Venue Cymru, Llandudno, North Wales

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Name:

Organisation:

River Restoration Centre

25th Annual Network Conference

24th – 26th April 2024, Venue Cymru, Llandudno

Sponsors



Croeso

Martin Janes

RRC Managing Director

Croeso i Gynhadledd Rwydweithio Flynyddol y Ganolfan Adfer Afonydd, 2024.



Pleser yw cael bod yng Nghymru, ar lan y môr yma yn Venue Cymru yn Llandudno, ar gyfer ein pumed cynhadledd flynyddol ar hugain – mae'r gynhadledd yn gyfle gwych i drin a thrafod popeth sy'n gysylltiedig â'r gwaith o adfer afonydd. Mae'r digwyddiad eleni yn cael ei gynnal mewn partneriaeth â phrosiect LIFE Afon Dyfrdwy Cyfoeth Naturiol Cymru – prosiect sydd werth £6.8m – a byddwn yn dathlu'r gwaith helaeth sy'n cael ei wneud ledled Cymru ac i mewn i rannau o Loegr. Cawn ddeuddeg cyflwyniad o afon Dyfrdwy ac o afonydd eraill Cymru, gydag ymweliad safle ar yr ail ddiwrnod. Ddydd Gwener, mae gennym ni ymweliad arall - un dewisol y tro hwn, a hynny dan arweiniad Tîm LIFE Afon Dyfrdwy, i weld y gwaith maen nhw wedi'i wneud.

Yn 2024, rydym yn dathlu 30 blynedd o'r Ganolfan Adfer Afonydd. Mae'r sefydliad dielw wedi bod yn hyrwyddo manteision adfer ein hafonydd trwy arddangosiadau a thystiolaeth, a hynny ers mis Mawrth 1994. Yn y cyfnod hwnnw, mae'r Ganolfan wedi creu rôl bendant, a chynyddu ei dylanwad ledled y Deyrnas Unedig. Elfen fawr o'i gwaith yw'r rhwydweithio a'r cyfnewid gwybodaeth sy'n digwydd yn y gynhadledd flynyddol hon – cyfle i gwrdd â wynebau hen a newydd, trafod syniadau, datblygiadau, canfyddiadau a chyfleoedd.

Fel bob amser, rhaid i mi ddiolch i chi i gyd am gefnogi'r Ganolfan. Heb ein haelodau a'n cefnogwyr, ni fyddem yn gallu gwneud yr hyn a wnawn. Rydym bob amser yn edrych ar sut y gallwn wneud mwy i hysbysu, grymuso, arwain, hyfforddi a chefnogi'r gymuned adfer afonydd, felly dewch i gael sgwrs â ni dros ddau ddiwrnod y gynhadledd. Rhaid rhoi diolch yr un mor fawr i'n noddwyr, sy'n helpu i dalu rhai o ffioedd y gynhadledd ar ran ymddiriedolaethau, myfyrwyr a gwirfoddolwyr - manteisiwch ar y cyfle i siarad â nhw yn y gofod arddangos. Maent yr un mor angerddol am eu rôl yn gofalu am ein hafonydd ag unrhyw un arall yn y digwyddiad hwn.

Cawsom ymateb ardderchog eto i'r gwahoddiad agored i gyflwyno eich gwaith, eich syniadau, eich pryderon a'ch profiadau – mae hyn yn caniatáu i ni lunio rhaglen ddiddorol gan gyfuno sgwrsiau yn sesiynau cyffrous, trafodaethau, gweithdai, ymweliadau safle a phosteri. Os nad ydych wedi bod i'r gynhadledd hon o'r blaen, mae'n gynhadledd 'gyfredol' - hynny yw, mae'n seiliedig ar yr hyn sy'n digwydd *nawr*, pwy sy'n gwneud beth, beth sydd angen ei wneud o hyd, a sut gallwn ni i gyd gyflawni'r hyn sydd ei angen. Ac mae'r cyfan wedi'i gyflwyno gan y bobl hynny sydd wrthi'n gwneud i bethau ddigwydd.

Bydd noson Gwobrau Afonydd y Deyrnas Unedig 2024 yn rhoi sylw i fwy o waith eithriadol. Gobeithio y byddwch yn ymuno â ni i gydnabod llwyddiannau unigol yr 'Hyrwyddwyr Afonydd' a enwebwyd eleni – pobl sy'n rhoi o'u hamser eu hunain i wella ein hafonydd. Ac, wrth gwrs, i longyfarch Cystadleuwyr Rownd Derfynol y Wobr Afonydd, a dathlu eu hymroddiad i'r gwaith o adfer gweithrediad naturiol ein hafonydd.

Mwynhewch y tridiau nesaf yn fawr.

Martin Janes, Managing Director

Welcome



Martin Janes

RRC Managing Director

Welcome to the 2024 River Restoration Centre Annual Network Conference.

It is a pleasure to be in Wales, on the sea front at Venue Cymru in Llandudno for this 25th Annual gathering of all things river restoration. This year's event is being held in partnership with the £6.8m Natural Resources Wales LIFE Dee River project to celebrate the extensive work being carried out across Wales and into England. In the programme we have twelve presentations from the Dee and other rivers in Wales, with a local site visit on day two. On Friday, we have an optional 3rd day out, guided by the LIFE Dee River team, to see the work they have done.

2024 celebrates 30 years of The River restoration Centre. Incorporated as a not-for-profit in March 1994 to promote the benefits of restoring our rivers through demonstration and evidence, RRC has built its role and influence across the UK. A major component of which is this annual networking and knowledge exchange event - meeting up with old and new faces, discussing ideas, developments, findings and opportunities.

As always, I must thank you all for supporting the RRC. Without our members and supporters, we would not be able to do what we do. We are always looking at how we can do more to inform, empower, guide, train and support the river restoration community, so come and have a chat with us over these two conference days. An equally large thank you goes to our sponsors, who help subsidise the conference fees for trusts, students and volunteers – please make the most of the opportunity to speak to them in the exhibition space. They are as passionate about their role in looking after our river landscapes as anyone else at this event.

In response to the call for abstracts we had another excellent response to this open invitation to present your work, ideas, concerns and experiences – this allows us to formulate the two-day programme and combine talks into exciting sessions, discussions, workshops, site visits and posters. If you have not been to this conference before, it really is based around 'current thinking' – what is happening now, who is doing what, what still needs to be done, and how can we all achieve what is needed – all presented by those people who are actively making it happen.

The 2024 UK River Prize Awards evening will present more exceptional work. We hope you will join us to recognising the individual achievements of this year's nominated 'River Champions' who dedicate their own time to improving our rivers. And, of course, to congratulate the River Prize Finalists, and celebrate their dedication to restoring natural functioning to our rivers.

Have a brilliant three days.

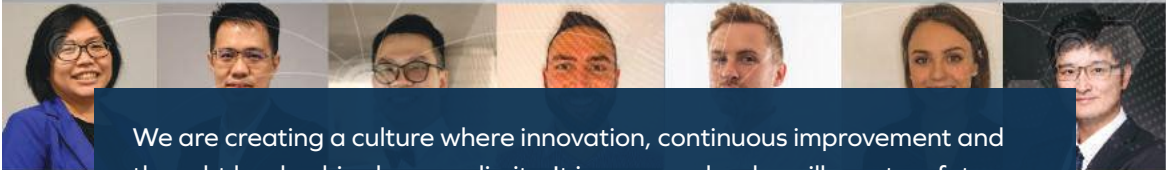
Martin Janes, Managing Director



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Our services deliver environmental protection, enhancement and restoration through ecological mitigation, habitat improvement and environmental monitoring.

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Wednesday 24th April 2024

Day 1

08:30 Registration opens

09:00 Networking and early viewing poster session 60 mins

Session 1

Arena

Chair: Martin Janes (River Restoration Centre)

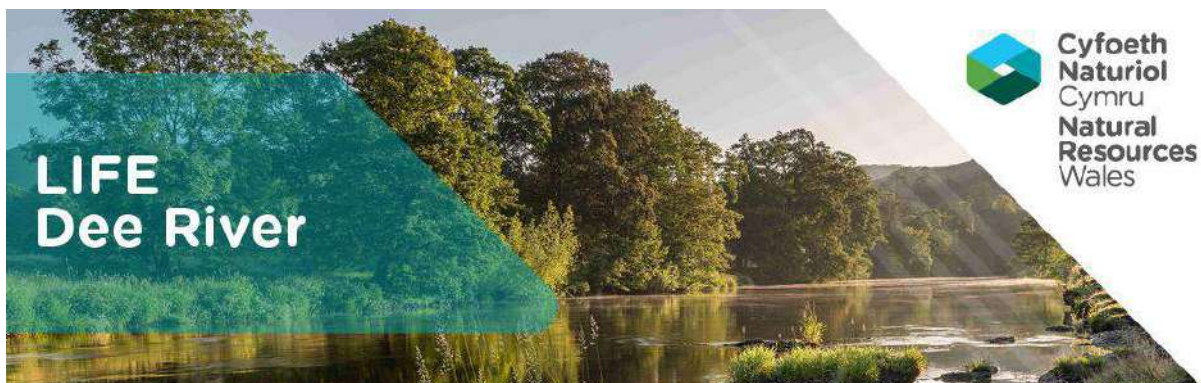
10:00 **Opening announcements** 10 mins
Martin Janes (River Restoration Centre)

10:10 **Welcome** 10 mins
Sir David Henshaw (Chair of Natural Resources Wales)
Prof. Peter Fox (Natural Resources Wales)

10:20 **LIFE Dee River project** 15 mins
Joel Rees-Jones (Natural Resources Wales)

10:35 **4 Rivers for LIFE River Restoration; successes, learning and challenges so far** 15 mins
Susie Kinghan (Natural Resources Wales)

10:50 Discussion 10 mins



Notes



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Session 1 Keynote

Arena

Keynote session

Chair: Martin Janes (River Restoration Centre)

Keynote Address

River restoration: are we there yet?

11:05



30 mins

Phil Boon

Freshwater Biological Association

11:35

Questions

10 mins

11:45

Reviewing poor restoration performance

George Heritage (Dynamic Rivers)

15 mins

12:00

Biotic and Abiotic response to system naturalisation along the Patterdale Valley

Rebecca Powell (National Trust)

15 mins

12:15

Discussion

10 mins



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Session 2

Arena		Hall A	Studio	
Landowner engagement <i>Chair: Simon Wightman (Esmée Fairbairn Foundation)</i>		Catchment-scale thinking <i>Chair: Jo Cullis (RRC)</i>	Managing gravel <i>Chair: Neil Williams (AECOM)</i>	
13:40	Working with land managers to develop resilient catchments and farm businesses Ben Eardley (National Trust)	The Wilder Frome: a catchment based approach to river conservation in the Severn Vale Liam Reynolds (Severn Rivers Trust on behalf of the Severn Vale Catchment Partnership)	Management of sediment and habitat mitigation at large dam structures: case study from the River Shin Hamish Moir (cbec eco-engineering)	15 mins
13:55	Delivering river restoration in partnership with landowners, thoughts from both sides Rob Llewellyn-Smith (Natural Resources Wales)	Uwch Conwy/ Upper Conwy catchment Sarah Aubrey (Natural Resources Wales) and Dewi Davies (National Trust)	Undoing 100 years' worth of gravel starvation Gethin Morris (Natural Resources Wales)	15 mins
14:10	Discussion	Discussion	Discussion	10 mins
14:20	Ryevitalise Landscape Partnership: enhancing, restoring & reconnecting the River Rye catchment James Caldwell & Alex Cripps (North York Moors National Park Authority)	Catchment nature-based solutions masterplan for carbon, biodiversity, water and community on the Western Rother. Jack Herriot (Binnies) & Jennifer Pollitt (Southern Water)	Weir removal using an iterative design and morphodynamic modelling process on the Bronie Burn, Scotland Kate Comins (cbec eco-engineering)	15 mins
14:35	TBA	Scaling up ambition. Restoring The River South Esk - A Nature Rich & Climate Resilient Catchment Kelly Ann Dempsey (River South Esk Catchment Partnership)	The use of passive impact plate sensors in informing and appraising river restoration Joshua Moore (APEM)	15 mins
14:50	Discussion	Discussion	Discussion	10 mins
15:00	Poster Session in Arena with tea & coffee			45 mins



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Session 3

	Arena	Hall A	Studio	
	Climate change resilience <i>Chair: Jack Herriot (Binnies)</i>	River continuity <i>Chair: Kevin Skinner (AtkinsRéalis)</i>	Citizen Science <i>Chair: Peter Powell (Welsh Dee Trust)</i>	
15:45	A natural processes toolkit for England Richard Jeffries & Oliver Grant (Environment Agency)	Removing Garlogie Dam Charles Perfect (Scottish Environment Protection Agency)	Building enough capacity to have an impact at a catchment scale Peter Powell (Welsh Dee Trust)	15 mins
16:00	Linking River Restoration and Disaster Risk Reduction Joshua Anthony (Institute for Risk and Disaster Reduction UCL)	Removing a two metre tall weir by hand... Hang on, what! Jonathan Louis (Forth Rivers Trust)	Urban Citizen's 6.3.2: monitoring Dublin's rivers and streams through citizen science Laura Ribero (Dublin City University)	15 mins
16:15	Discussion	Discussion	Discussion	10 mins
16:25	Chalk stream restoration to increase ecological resilience to climate change Judy England (Environment Agency)	'Focus on barriers to barriers – planning, designing and delivering removals' Joel Rees-Jones (Natural Resources Wales)	RiverHub - Scaling up citizen science to safeguard rivers across the Wessex catchment Simon Hunter & Tim Culmer (Bristol Avon Rivers Trust)	15 mins
16:40	Catchment Scale Initiatives in the Lower River Cuckmere and underlying Chalk Aquifer Steve Howe (South East Water)	Winning over hearts and minds when removing barriers in the Lake District Lyndon Baker (AtkinsRéalis)	Discussion	15 mins
16:45	Discussion	Discussion	Discussion	10 mins
16:55	Short break to move to Keynote Session			10 mins

Notes

Session 4

Arena

Keynote session

Chair: *Christianne Tipping (RRC Board)*

Keynote Address

River restoration in Norway: from salmon-ladders towards ecological and nature-based approaches

17:10

Anders Iversen
Norwegian Environment Agency



30 mins

Anders Iversen has coordinated implementation of the Water Framework Directive (WFD) in Norway since 2007 and initiated the Annual River Restoration Seminars in Norway in 2010. Anders Iversen represents Norway in the WFD Strategic Coordination Group (SCG), the OECD Water Governance Initiative (WGI), and the European Centre for River Restoration (ECRR).

17:40

Questions

10 mins

17:50

Final announcements

Martin Janes (River Restoration Centre)

5 mins

18:00

End of Day 1

Evening session

18:30 Drinks reception in Atrium, to sit down for dinner at 19:15

19:30 2024 UK River Prize & River Champions Awards Dinner





Thursday 25th April 2024

Day 2

08:30 Registration opens

Session 5

09:00 Choice of 1 workshop session or 1 site visit 3.5 hours

<p style="text-align: center;"><u>Arena</u> A: Scientific Advances in River Restoration Session</p>	<p style="text-align: center;"><u>Studio</u> B: Demystifying Biodiversity Net Gain (BNG): From Data Collection to Monitoring</p>
<p>Facilitator: Phil Boon (Freshwater Biological Association), Sam Austin (River Restoration Centre)</p> <p>The inaugural Scientific Advances in River Restoration (SARR) Conference was held by RRC at the University of Liverpool, 6-8th September 2023. 150 scientists and practitioners from over 30 countries came together for three days to share research and perspectives on river restoration.</p> <p>This hybrid session will involve presentations on scientific advances in river restoration and a short poster session, followed by an interactive discussion to explore opinions around the idea of science and practice working hand in hand.</p> <p>Presentations:</p> <p>Reconstruction of a former anastomosing wet woodland at Avon water, New Forest using UAV-derived structure-from-motion photogrammetry, Edward Fleming (Mott MacDonald)</p> <p>Science and River Restoration: Two recent examples to stimulate debate, David Sear (University of Southampton)</p> <p>In-stream habitat unit additions: if you build it, will they stay? Issie Barrett (Waterways Centre, University of Canterbury and Lincoln University, New Zealand)</p> <p>Chalking up the evidence - increasing ecological resilience of chalk streams to climate change, Judy England (Environment Agency)</p> <p>Working towards river science fit for new river restoration approaches, Stewart Clarke (National Trust)</p>	<p>Facilitator: Amy Lakey (WSP), Kevin Skinner & Eleanore Miles (AtkinsRéalis)</p> <p>A workshop to help understand and break down the process of watercourse BNG from the initial scoping of watercourses through to management and monitoring techniques. The workshop will touch on ways to interpret survey data to recommend appropriate enhancement measures, it will demystify the offsetting process and clarify future requirements for management and monitoring of BNG enhancements. Hear from different organisations on their experiences, learn about different tools and templates and understand how to get the maximum benefits for watercourses through BNG. This workshop will be of interest to those carrying out BNG calculations, those preparing BNG data for planning applications and those carrying out monitoring following completion of enhancements.</p> <p>Presentations:</p> <p>Achieving Biodiversity Net Gain (BNG) – River Units, Emma Ryder (Mott MacDonald)</p> <p>Chester Wetland Centre: Biodiversity Net Gain unlocking opportunities, Mark Boothroyd (Binnies)</p> <p>Biodiversity net gain: tools to identify opportunity areas, Jenny Mant (Ricardo)</p>
<p>12:30</p>	<p style="text-align: center;">Lunch in Arena</p>

60 mins

Session 5

09:00

Choice of 1 workshop session or 1 site visit

3.5 hours

Hall
C: From policy to the implementation of catchment-scale river restoration

Crafnant
D: An introduction to hydro-ecological modelling

Facilitator: Dianne Matthews (Natural England), Martin Janes (RRC)

Facilitator: Andy Davey (APEM)

This discussion session will explore:

1. Why an understanding of catchment function and process connectivity between rivers and the wider landscape critical for environmental resilience and nature recovery?
2. The government policies and the developing grant funding mechanisms in the UK that should enable the restoration of naturally functioning river catchments.
3. An example of policy and science being translated into delivery – the Wansbeck Catchment LNRS pilot project in Northumbria.

Hydro-ecological modelling is an emerging discipline that uses statistical regression modelling techniques to assess current and future impacts on river ecosystems, and appraise and evaluate the benefits of sustainable abstraction and habitat restoration schemes. This workshop will provide practitioners and managers with an accessible introduction to the theory and practice of hydro-ecological modelling, plus an overview of tools such as the Environment Agency's Hydro-Ecology (HE) Toolkit, CatchmentLife being developed under the Ofwat Innovation Fund, and others elsewhere in the UK Specifically, we will:

Together, we will try to answer:

- What do we mean by a naturally functioning catchment and how do we achieve it in practise? - How do we plan for it? Do we have all the tools we need? - How do we communicate our ambition?
- Are there changes to policies/action plans that would make delivery on the ground easier?
- What are the funding mechanisms being developed in the UK and are they the best tools to deliver the scale of change needed – complexity, better design?
- LNRS in practise – what are the challenges and do we need to do things differently to make it work?
- How do we create a green finance proposition from catchment restoration?

- explore how hydro-ecological modelling works, and how it can be used to complement existing hydro-ecological assessment methods;
- provide a demonstration of the HE Toolkit;
- look at recent real-world applications of hydro-ecological modelling; and
- discuss how hydro-ecological models can be used to support river restoration activities whichever model you are using.

12:30

Lunch in **Arena**

60 mins

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Session 5

09:00

Choice of 1 workshop session or 1 site visit

3.5 hours

Ogwen
E: Beavers in river restoration

Facilitator: Elliot McCandless (Beaver Trust)

This workshop will look at what we need to know about beavers in order to carry out successful river restoration projects. Presentations will be given by Beaver Trust and partners about beaver projects and status, and delegates will look at how we can work alongside beavers, and the tools available to them to help us efficiently restore our rivers.

Site Visit
Nant y Gwryd- Dyffryn Mymbyr

Facilitator: Sarah Aubrey (Natural Resources Wales), Dewi Davies (National Trust)

The Uwch Conwy project is a landscape scale partnership project between Natural Resources Wales and National Trust covering 3% of Wales. The overall aim of this project is to work with tenants and other partners to improve land and water management whilst providing benefits to the communities and wildlife that call this part of Eryri home.

We are working at a catchment scale to restore modified peatlands and river systems, as well as creating landscape that's more resilient to climate change and connecting habitats through woodland and hedgerow planting and meadow creation.

The site visit will focus on a section of the Nant y Gwryd – a sub catchment of Afon Conwy. Its headwater start on the Eryri massif and it flows down to the village of Capel Curig. The need to increase food production in the 1960's led to drainage of peat bogs and the line dredging of the river. The site visit will focus on the restoration work the project has undertaken at Dyffryn Mymbyr, a working sheep and beef farm in the heart of Eryri.

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AQUATIC VEGETATION MANAGEMENT - INVERTEBRATE SURVEYS - FISHERIES MANAGEMENT
INVASIVE SPECIES MANAGEMENT - ENVIRONMENTAL SURVEYS - AQUATIC HERBICIDE APPLICATION

Session 6

	Arena Restoring historical floodplains <i>Chair: Marc Naura (RRC)</i>	Hall A Urban rivers <i>Chair: Clare Rodgers (RRC Board)</i>	Studio A focus on fish <i>Chair: Joel Rees-Jones (Natural Resources Wales)</i>	
13:30	Post ice age river evolution and implications for landscape scale riverine ecosystem restoration Julian Payne (Environment Agency)	Urban Large Woody Material, Barrier Removals and Stage Zero Thomas Hartland Smith (Severn Rivers Trust)	Fisheries monitoring unlocking the benefits of river restoration Rich Cove (Natural Resources Wales)	15 mins
13:45	River Aller: Combining a Stage 0 Restoration Scheme & a Catchment Based Restoration Approach Matthew Hemsworth (JBA Consulting) & Ben Eardley (National Trust)	Putting the Trent back in Stoke-on-Trent Matthew Lawrence (Environment Agency)	DNA based methods for catchment prioritisation Chris French & Joe Huddart (NatureMetrics)	15 mins
14:00	Discussion	Discussion	Discussion	10 mins
14:10	Mud Pool Meadow Stage 0 Ben Eardley (National Trust) & Matt Pang (Environment Agency)	Salisbury River Park – Delivering river corridor improvements in the heart of the historic city Kevin Skinner (AtkinsRéalis)	Eryri Torgoch Antony Smith (North Wales Rivers Trust)	15 mins
14:25	Valley Sides and the Connectivity of Small Tributaries to Floodplain Wetlands Kieran Sheehan (JBA Consulting) & George Heritage (Dynamic Rivers)	Controlling Erosion and Scour in small urban settings Tim Martin (Greenfix)	Removing redundant gauging weirs to benefit migratory fish in Wales Rhodri Thomas (Arup) & Melissa Mahavar Snow (Natural Resources Wales)	15 mins
14:40	Discussion	Discussion	Discussion	10 mins

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Session 7

Arena

Chair: Martin Janes (River Restoration Centre)

15:00	The Long Run: Targeted Interventions to Deliver At-Scale Outcomes Rhodri Powell (Natural Resources Wales), Alex Humphreys (Binnies)	15 mins
15:15	Working with Natural Processes Evidence Directory Mary Baldwin, Jenny Broomby, Eleanor Pearson (JBA Consulting)	15 mins
15:25	Discussion	10 mins
15:35	RRC Conference Declaration: 1 year on	15 mins
15:50	Discussion	15 mins
16:05	Closing remarks & summary Chair	10 mins
16:15	End of Day 2 Coffee available	
17:00	Optional film viewing & networking	

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Optional Day 3 - Friday 26th April LIFE Dee River Catchment Tour *Limited availability!*

Join us on this tour of the river Dee catchment to see how LIFE Dee River has been working to improve this important river which supports key species such as Atlantic salmon. The LIFE Dee River team will take you to three sites across the catchment to see the issues and challenges faced, as well as projects that have been delivered by the project.

Whether you are travelling to the conference by car or train there is an option to join us on this visit through different start locations and drop-off points.

Option A (if you are travelling by train)

09:00 Depart **Llandudno** by coach

16:00 Drop-off at **Chester Train Station**

Option B (if you are travelling by car)

Delegates drive themselves to **Llangollen**

10:00 Depart **Llangollen** by coach

16:00 Arrive back to cars at **Llangollen**



Artificial Intelligence – opportunities to change the way we work

However, people are at the heart of successful river restoration. Skilled and experienced water environment specialists remain vital to understanding complex systems, working with stakeholders and restoring processes. We aim to bring the right blend of human expertise and digital technology to our projects to optimise environmental and societal benefits.



Thanks to the 2024 partners:



On Wednesday 24th April 2024, one of the shortlisted finalists will be announced as the winner of the 2024 UK River Prize.

The River Restoration Centre (RRC) awards the UK River Prize to celebrate the achievements of those individuals and organisations working to restore our rivers and catchments, and recognises the benefits to society of having a healthy natural environment. After much deliberation the judges selected the four finalists below. The overall 2024 Winner will be presented with the trophy on Wednesday evening.

The 2024 Finalists are:

River Rom, Greater London, England – ‘Rewilding the Rom’

Lead: Thames21

Upper Witham, Lincolnshire, England – ‘Upper Witham Restoration’

Lead: Environment Agency

Partners: East Mercia Rivers Trust, Wild Trout Trust, National Trust, Grantham Angling Association Fly Fishing Section, South Kesteven District Council, University of Lincoln

Ullswater, Cumbria, England – ‘Ullswater Catchment Restoration’

Lead: National Trust

Partners: Ullswater Catchment Management Community Interest Company, Environment Agency, Natural England

Horner & Aller, Somerset, England – ‘Riverlands Porlock Vale Streams’

Lead: National Trust



2024 UK River Prize Finalist- Summary Information

Rewilding the Rom

Project Summary

The River Rom has been significantly altered, losing natural flow and habitat diversity due to straightening, deepening and culverting which impacts biodiversity and floodplain connectivity. The Rewilding the Rom project aims to restore natural function, enhance flood resilience, diversify habitats, improve water quality, and engage communities. Funding from the Land of the Fanns Partnership Scheme led to the creation of two wetlands in Grenfell Park for flood protection and biodiversity. Eleven large wood structures were installed in the river to diversify flow and support aquatic life. In 2023, with match funding from the Mayor of London, Thames21 breached flood embankments at Chase LNR, creating interconnected wetlands for flood storage and biodiversity. These efforts are improving the Rom's health and resilience to climate change.

Project Partners

Thames21 leads Rewilding the Rom, supported by Thames Chase Trust, London Borough of Barking and Dagenham, London Borough of Havering, Environment Agency and Roding, Beam, and Ingrebourne Catchment Partnership. The Rewilding the Rom project is funded by the Land of Fanns Partnership, Essex & Suffolk Water, Environment Agency, Thames Water, Kusuma Trust, and the Mayor of London Rewild London Fund. The scheme was designed by cbec eco-engineering and the contractors were Hugh Pearl.

Project Construction

In 2021, Land of the Fanns Partnership Scheme funding facilitated the excavation of two seasonal wetlands (scrapes) on the Havering Side of the River Rom, in Grenfell Park to protect flood-prone properties downstream of the site. While the primary purpose of the scrapes is flood protection, they also provide habitats for flora and fauna. Flood modelling has been completed, showing that the scrapes, along with the other interventions, contribute to a reduction in flood risk to several downstream properties and the locally important Maylands Health Centre which currently serves 10% of Havering's population.

Subsequently, eleven large wood structures were installed in the River Rom, and a tributary has been realigned with the goal of diversifying the flow within the channel. By restoring sedimentary processes, different habitats are created to support fish spawning, invertebrates and other riverine species. Visual inspections of the deflectors indicate that they are improving natural processes.

In 2022, Thames21 began work on the opposite bank at the Chase LNR. These works involved breaching a large flood embankment in three locations, behind which three interconnected wetland scrapes have been excavated. In high flows, the river now floods

into this newly connected area of floodplain, creating an area of species-rich seasonal wetland.

Monitoring

As most of the major restoration works were completed by Thames21 in the spring of 2023, BEPREP research at 'time zero' in a rewilded wetland started. Sampling began in April 2023, and will continue for at least 5-years post-restoration. [The BEPREP project](#) will be studying how biodiversity changes over time in the Rewilding the Rom wetland restoration site. Specific indicators include microbiota (bacteria and fungi) changes in the water (e.g. amphibians), on the land (e.g. soil, arthropods, vegetation, micromammals, canids) and in the air (e.g. bats, birds). This research will provide crucial information on which flora, fauna and microorganisms colonise and interact in newly excavated urban wetlands and is fundamental for the sustainable management of aquatic urban environments, and for understanding their importance to human health.

In addition, Thames21 are measuring the impact of the project on the local community by the number of participants in volunteering and other nature-related activities (e.g. nature walks, discussions, nature/art workshops). The aim is to achieve meaningful points of direct contact with at least 600 people including those from underrepresented communities (ethnic minorities and low-income groups).

Wider Impact

The Rewilding the Rom project has shown a multifaceted approach that benefits various domains significantly. Installing large wood in the river channel improved local natural processes. Strategic creation of wetlands, including two offline and three online scrapes, reduced downstream flood risk by allowing controlled flooding onto the floodplain. This demonstrates a commitment to climate resilience. Moreover, the project contributes to water quality improvement and carbon sequestration, supporting global initiatives to mitigate climate change impacts. Improved habitat quality within the river and wetlands aligns with global conservation efforts, while focusing on water voles highlights the project's dedication to addressing specific conservation challenges. Addressing invasive non-native species before construction correlates with global biodiversity protection efforts. Engagement with local communities, including disadvantaged groups, fosters equitable access to natural spaces. Collaboration with UCL architecture students for site management demonstrates an innovative educational approach.

Community Impact

The River Rom restoration project engaged the community through consultations, leafleting, and open events to raise awareness and encourage participation. Regular volunteering events provided valuable insights and feedback from the community, highlighting improvements in habitat quality and new recreational opportunities. Thames21 measures the project's impact by tracking participation in volunteering and nature-related activities, aiming to reach at least 600 people, including underrepresented communities in London.

Upper Witham Restoration

UK River Prize Finalist 2024 - Summary

JOINT APPLICANTS

The Environment Agency (EA) Upper Witham Sub-Catchment Partnership coordination, project delivery, technical support and funding.

East Mercia Rivers Trust (EMRT) Witham Catchment Partnership hosts, project and engagement delivery. Leading education and citizen science through the Rivers Academy.

The Wild Trout Trust (WTT) Project delivery and technical support to all aspects of river restoration work that take place in the catchment. [Upper Witham Opportunity Mapping](#)

South Kesteven District Council (SKDC) Secured European funding to lead on a programme of urban river enhancement through Grantham as part of the Blue Green Corridor Project.

Grantham Angling Association Fly Fishing Section (GAAFFS) Manage and enhance their fisheries in a forward-thinking, sustainable manner and provide volunteers for works.

National Trust at Belton Estate (NT) A large landowner in the catchment supporting restoration and the Rivers Academy initiative.

University of Lincoln (UoL) Monitoring and modelling research activities on some of the delivered projects, involving undergraduate and postgraduate students.

BACKGROUND

Like most UK rivers the Upper Witham has been deepened, straightened and disconnected from its floodplain, impacting hydrological function and damaging habitat. Alongside serious pollution incidents, climate change and invasive species, these impacts threaten native species such as White-Clawed Crayfish, Otter, Water Vole and Brown Trout with local extinction.

Nationally, of the estimated original 2 million hectares of lowland, functional wetland floodplain, only 3000 hectares remained by 2015. The diversity and complexity of the habitat restored builds resilience to mitigate against future pollution recurrence and supports the groundwater-fed system to be far more resilient to increased rainfall intensity.

The partners have a joint ambition to restore natural processes and functional floodplains, at a landscape scale across the Upper Witham Sub-Catchment to improve water and carbon storage and to create wildlife habitat havens and corridors.

Over the last decade a variety of projects to restore and protect the river have been delivered across both urban and rural settings, with the programme co-ordinated, discussed and communicated through the Upper Witham Sub-Catchment Partnership. Although there are different leads for individual projects, this collaborative approach, has bolstered shared learning and each partner has played to their strengths and key interests.

Building on the collective knowledge gained from previous works, these long-standing relationships have enabled a wide range of restoration projects, growing in both scale and ambition and with delivery increasing year-on-year. Restored sites and other locations with good natural habitat and exemplary land management are used as demonstration sites to influence landowners and other key stakeholders.

Upper Witham Restoration

UK River Prize Finalist 2024 - Summary

PROJECTS and LEARNING

2013 - In-channel habitat improvement downstream of Grantham (EA, WTT and GAAFFS). Tree hinging & brushwood berms installed, narrowing river, creating scour pools and other much needed habitat. Reviews of work indicated the approach not always having the desired effect; linked to very resistant clay bed and banks, poor gravel supply, and a lack of floodplain connectivity. Lessons learned and subsequent landowner and flood risk engagement took place and informed future projects.

2014 – 2016 - Four large scale weir projects (EA & WTT). Aubourn (rock ramp), Great Ponton & Easton (channel restoration forming weir bypass).

2016 – 2017 - Belton Project (NT & EA) & Wyndham Park (EA & SKDC). Channel narrowing, tree hinging, imported gravels & large woody material added at Belton; worked well providing a blueprint for works in the nearby urban setting through Grantham.

2020 - 2022 - Dysart Park (EMRT) & Blue Green Corridor (SKDC). Further urban projects through the town of Grantham - gravels added, trees hinged, berms created with wildflower & wetlands introduced widely along the river.

2023 – Belton Project revisited (NT, EA & Blue Green Corridor (SKDC). Ox-bow restoration & strategic floodplain reconnection using live & dead woody material as the driver for change.

2020 – 2023:

River habitat restoration downstream of Papermill Weir (WTT, GAAFFS, & Blue Green Corridor (SKDC). Canopy lifting, flow deflectors & log jams with tree hinging across channel for high flow scouring. Reintroduction of gravels at the weir allowing the re-formation of in-channel features downstream.

Manthorpe Flood Bank Removal (WTT & EA). Lowering & removal of redundant flood embankments; floodplain reconnection; locally-sourced gravel introduction - Brown trout subsequently observed spawning.

Upper Cringle Brook 'Stage 8' (EMRT). Channelised, Limestone Beck restored with floodplain connectivity, seasonally wetted floodplain habitat, wildflower meadow & 2 large ponds.

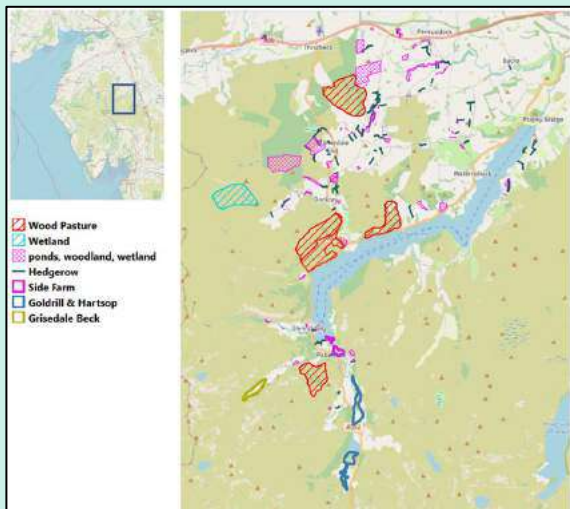
Grange Farm 'Stage 0' Restoration (EA). Pioneering this approach on a lowland UK river.

Colsterworth System Reactivation (EMRT). Floodplain lowered & local limestone gravels introduced, 2 large floodplain ponds created & wetland established, fed from groundwater springs previously ditched into the river.

SHARING KNOWLEDGE

EMRT's Rivers Academy offers curriculum and citizen science-based training courses and shares best practice with catchment partners, and the wider national Rivers Trust movement. In development with the Farming and Wildlife Group is an online hub to showcase previous projects and provide information for landowners/farmers on riparian land management and sources of funding/support.

The Ullswater Catchment Restoration project brings together the work of the Ullswater Catchment Management Community Interest Company and the National Trust. Working together and supported by the Cumbria River Restoration strategy, the partners have delivered 282 individual projects, creating and restoring habitats across a total area of 843ha.



The project area includes the headwaters, tributaries, rivers, and catchment land draining into Ullswater. These systems have been historically modified, with straightening, deepening, embanking, revetments, and width rationalisation common. The consequence has been an increased flood risk for local communities, frequent seasonal drying of main river systems, and a severely degraded water environment.

Together the partners have delivered

River restoration

13.7km of river restored; interventions include de-culverting, embankment removal, small barrier removal, stage 0 interventions, and re-meandering

Peat & wetlands

Restoration of 249ha – including 16,200 peat bunds, 12,000m of peat hag re-profiling and 21ha of sphagnum inoculation

Water storage

46ha of offline water storage areas, including creation of ponds & scrapes

Trees

16km of hedgerow & riparian corridor creation & restoration
497ha of wood pasture creation
150,000 trees planted in the catchment

Working in partnership

The greatest success has been the meaningful partnership developed with all landowners and farmers who have worked with us over the past 10 years. A relationship of trust and respect has been built through collaboration, ensuring they are treated as a true partner, can input into design, oversee construction, and take ownership of the results. The momentum of project delivery is increasing, and this can be attributed to the commitment to building and maintaining these relationships.

Monitoring & Evaluation

River area & habitat

At Hartsop Hall, the wetted channel area increased from 1850m² to 23,300m²

At Goldrill Beck, the wetted channel area increased by 21,590m²

Coarse sediment is being stored on the valley bottom; one site alone has stored more than 2000 m³ of sediment

Peat & wetlands

Peat restoration sites now display a varied and healthy fauna, including Sphagnum Spp., Bog Asphodel, Cotton Grass, and Sundews, indicating a healthy hydrology

Hydrology

There has been a mean lag time increase of 41.3 minutes at the Goldrill Beck project

Some flood events at Goldrill Beck have shown an event lag time increase of 90 minutes

Rivers are more drought-resilient, maintaining flow all year with pools & tree cover providing refuge

Flora & fauna

Hedgerows and wood pasture creation sites have shown a very swift response in earthworm numbers

Riparian & hedgerow restorations show increases in floristic diversity with species such as Vetch, Red Campion, Dog Violet, and Greater Stitchwort's now common



The restored Goldrill Beck now meanders across the floodplain



Hedgerow creation has been delivered across the catchment



Riparian planting schemes have significantly increased floristic diversity



The restoration of Kirkstone Beck stretches from Kirkstone Pass to Brothers Water

“Our aim at Holnicote is to move from drainage to habitat, giving water and wildlife space and time, whilst delivering multiple benefits to local communities and farm businesses.” Ben Eardley, Project Manager



Riverlands at Holnicote

The Holnicote Estate in West Somerset is a large National Trust land holding at the forefront of integrating farming and nature restoration at landscape scale. The Trust is pioneering approaches to develop diverse and resilient farm businesses, rich and vibrant local communities, and a landscape abundant in exciting habitat and wildlife.



The 12,500 ha Holnicote Estate contains woodland, upland common land, and a patchwork of small traditionally managed farms, 13 of which are tenanted. Together they hold much of the upper catchments of the Rivers Aller and Horner which flow down to the sea some 3 miles away. The heart of the estate lies just inland of the Atlantic coast and contains a rich landscape of high moorland, heath, steep sided valleys, broadleaved woodland, wetland, grassland, and saltmarsh influenced by its coastal position, geology, and soils. Many of these habitats are nationally important for their plants and animals and are designated. The estate meets the sea at Bossington which also contains a stretch of the popular Southwest Coast Path.

Since 2018, Holnicote has been delivering a flagship Riverlands project, taking a catchment-based, landscape scale approach to develop alternative ways of managing land and water; ensuring it is resilient and nature rich, whilst remaining productive. This has been undertaken in partnership with many local farm tenants and volunteers and with the full support of the local community.

Our work at Holnicote is underpinned by over 13 years of monitoring covering everything from water flow and quality to soil health, groundwater, ecological monitoring, and high-resolution drone imagery, helping us understand the challenges, test new ways of working and provide an evidence base to inform and to scale up efforts on a much

‘Through the Riverlands project we’ve worked with the team to help us plant new hedgerows, wood pasture, orchards and silvopasture, create ponds and break up drainage to improve water infiltration, reduce water run-off and improve grazing.’

Holly Purdey, Horner Farm



Holnicote is a rich mix of historic land use and designated landscapes. Despite having many areas of rare habitat and iconic landscapes it is under pressure from climate change, biodiversity loss and a rural community and farm businesses struggling in adverse economic conditions.



In recent years we have been working with farmers, local communities and other partners, including the Environment Agency and Natural England to address these challenges through the Trust's flagship Riverlands programme.

Wetlands and rivers are truly special environments with the ability to inspire and energize people. They are an important way of developing resilience on farms, raising groundwater levels to reduce the impact of drought conditions, and providing a diversified source of income through environmental farm payments. Developed wetlands can become true 'rainforest' type habitats, amazingly rich and abundant in wildlife, whilst also providing economic, cultural and wellbeing opportunities to the local community.

We have undertaken 'first of a kind' river restoration projects as part of our catchment wide interventions to develop connected, vibrant, and resilient habitat across the land we manage and that of our tenant farms. We've planted over one hundred thousand trees, kilometers of hedgerow, created 'pondscapes', connected miles of stream and ditch to their floodplain, planted hectares of wildflower, and worked with tenant farmers to develop grazing systems that utilize native breeds to deliver a richer mosaic of natural habitat and sought after quality produce.

Interaction with the natural world and wildlife is a proven way of helping to treat both physical and mental health issues. Our work with the local community and visitors has shown the effectiveness of connecting people with nature on the estate; from workshops and events for the local farming community on themes including regenerative agriculture and whole life pasture fed systems, through to 'sold out' beaver enclosure tours, [immersive audio experiences](#) and hands on volunteering opportunities to upskill and enable people to take action for their local environment. We've also found ways to connect with a wider audience, using digital methods including a virtual beaver and [360-degree tour of the estate](#).

"As a farming family, we have farmed at Tivington Farm for over 63 years. Through this time, we have seen the farm alter its course as the demands of agriculture both locally & nationally have impacted. In partnership with the National Trust via a Countryside Stewardship scheme, the farm is now taking a new direction and is reverting from its current role as a commercial arable operation to developing a more natural ecosystem, becoming considerably richer and more diverse in plant, animal and insect life whilst also being able to undertake less intense farming practices. The restoration of the naturally functioning river corridors will be a key area in supporting the development of the natural ecosystem and expanding the diversity of animal populations. We are looking forward to working alongside the National Trust and other farmers on the estate to see how the river functions can develop both in improving biodiversity and combating the effects of climate change."

Owen & Gina Dyer, Tivington Farm





Sustainably Managing Rivers

Society depends on our rivers and their future depends on what we do now. Whether it be developing catchment strategies, designing with nature or delivering river and wetland habitat, our water team are committed to creating a better environment for now, and for the future.





2024 River Champions

'River Champions' seeks to celebrate the outstanding efforts of individuals contributing to river restoration. Below is a brief introduction to the 2024 River Champions, more information about each will be showcased by the RRC over the next year on our website and social media platforms.

Derrick Guy

Derrick is a full time, passionate River Champion and makes a difference to the River Rib chalk stream every day. Derrick coordinates a River Watch Group of 50+ local people now involved in 'love your chalk stream' activities. He leads monthly monitoring activities, including 6 Riverfly sites, 6 water quality testing sites and regular litter picking.

James Pugh

James has volunteered as a Welsh Dee Trust citizen scientist sampling for phosphate pollution across the Dee catchment for nearly two years. In that time, he has conducted 270 pollution monitoring surveys (nearly a quarter of all surveys taken by over 40 citizen scientists) on five tributaries of the Dee including the Alyn, the Clywedog and the Gwenfro.

James Robinson

James is a well known farmer, conservationist and all round great guy, and is also the chairman of Nature Friendly farming UK who has recently even presented to parliament. Not only is James a trusted well known successful farmer within the vast UK farming networks, but also a massive conservationist and proves farming and conservation can actually work together, without either negatively impacting on the other.

John Philip Lord

Philip has been instrumental in the development and success of Ribble Rivers Trust (RRT) since it was established in 1998. As a founding Trustee and Chairman, Philip set the Trust's key priorities for: a healthier river environment, people having a better understanding and appreciation of rivers, and all of our work underpinned by science. Three aims which remain to this day.

Russ Hatchett

Russ has been closely involved with projects for the Swallowfield Fishing Club (SFC), that have promoted habitat development and the study of fish populations in the club waters. He has run the websites both for the SFC and the Loddon Fisheries and Conservation Consultative (LFCC), and has recently taken a close interest and actively encouraged the establishment of the Angling Trust Water Quality Monitoring within the Loddon catchment.

Shane Thomas

Shane is constantly striving for best practice in river restoration, especially in addressing in-stream barriers in his voluntary role with Carmarthenshire Fisheries Federation (CFF) which he held for a number of years. In this role, Shane has helped CFF to identify and deliver many environmental improvements, particularly weir removal and fish passage schemes to address declining salmonid populations in West Wales.





Meet the RRC Team

Martin Janes – Managing Director

Martin's role combines expert advice and business management. He works with our core funders to ensure RRC provide the expertise they need. He uses his restoration experience within the technical team, represents the river restoration community on steering groups, and oversees RRC management.

Marc Naura – Science & Technical Manager

Marc provides technical advice and expertise on river restoration schemes, helps develop research bids, develops decision support tools and plans training courses. He is interested in what technology and science can do to help practitioners and environmental managers in their decision-making.

Jo Cullis – River Restoration Technical Manager

Jo is part of the senior management team of RRC and can provide technical river and floodplain restoration advice on projects. Jo is responsible for project management, RRC team management and staff development, and is also involved in strategic working relationships, bids, grants and income generation.

Joshua Robins – River Restoration Adviser

Josh provides technical river restoration advice to enquiries and projects. He assists with all project stages including scoping new projects, site visits, providing best practice advice, and evaluating success. Josh manages RRC's annual events program, and plans and delivers training courses and site visits.

Alexandra Bryden – Communications & Training Officer

Alex manages RRC's social media platforms and website. Alex also coordinates the programme of training courses, planning and delivering a variety of different courses annually. Alex also helps out with advisory projects and site visits, manages technical enquiries, and edits RRC's monthly bulletin. Alex also keeps the RiverWiki up to date with projects and manages the National River Restoration Inventory (NRRI) and Reference Library.

Jackie Hinton – Accounts Technician

Jackie undertakes the management accounting functions of the business and works alongside the Managing Director and Science and Technical Manger with business planning, project management and support to the Board. Jackie carries out invoicing and purchasing tasks, as well as day to day accounts.

Sam Austin – Science & Technical Officer

Sam joined the team in January 2023, helping to support projects. Sam is an ecological geomorphologist. Her PhD focused on chalk stream habitats and their management for salmonid populations. Her previous work includes; sediment field and lab based investigations, fish population field surveys, modelling catchment sediment sources, investigating organic sediments and SOD determination and fluvial geomorphology surveys.

Jane Prady – Science & Technical Officer

Jane joined the team in January 2023, helping to support projects. Jane completed her PhD in 2010, focused on microscopic marine plankton in the North Atlantic and Arctic. Jane studied at Swansea University and conducted Arctic fieldwork onboard a British Antarctic Survey ship, in collaboration with the Scottish Association for Marine Science in Oban.

Richard Treves – Science & Technical Officer - Geomorphology

Richard supports the team with projects with a special focus on training and educational technology.

Maureen Carpenter – Accounts Assistant

Maureen supports the Accounts Technician. Maureen has 25 years experience working as an Administration Assistant at both The Open University and Cranfield University.

Maggie Townsend – Temporary Administrative Assistant

Maggie has a background in administration and secretarial support and her last job was PA to the Director of Security at Cranfield University.



the River Restoration Centre
Working to restore and enhance our rivers



River Restoration Hubs

The RRC will extend its impact by sharing knowledge through a new network of regional centres, called River Restoration Hubs

What is a Hub?

A River Restoration Hub is a third sector organisation (most likely a Rivers Trust, Wildlife Trust, Fisheries Trust, or Partnership) that will act as a regional provider of river restoration knowledge and advice. Hubs will support other third sector organisations and will receive training and mentoring from the RRC.

Introducing the first four Hubs

The RRC would like to introduce the first four Hubs and looks forward to working with them. We envisage expanding the network of Hubs in the future.

WYRE RIVERS TRUST



FORTH RIVERS TRUST



Ymddiriedolaeth
Natur
Gwent
Wildlife Trust



Want to find out more?

Email the team with your questions, or if you are interested in working with hubs or setting up as a new Hub: rrc@therrc.co.uk.

Special thanks to the Esmée Fairbairn Foundation.



the River Restoration Centre

Working to restore and enhance our rivers

RRC Training Course Series

RRC training courses are open to anyone with an interest in the topics we offer, including NGO's, wildlife and river trusts, statutory agencies, consultants, contractors, and early-stage researchers interested in linking science to practitioner's needs. These are the courses we currently offer:

Introduction to Hydromorphology (Level 1)

This practical 1-day overview course will introduce participants to hydromorphology.

Developing a Catchment-wide Restoration Plan

This course introduces participants to a methodology for developing a catchment-wide restoration plan to help identify pressures and impacts.

River Habitat Survey Certification

This is a 4-day course where surveyors are introduced to the basics of hydromorphology through fieldwork and presentations. We recently amended this course to be able to hold as a hybrid with some online modules followed by fieldwork.

Mapping for Natural Flood Management (NFM)

This course uses aerial photo interpretation, GIS, fieldwork, lab work and geomorphology to indicate historical floodplain boundaries, surface runoff pathways and demonstrate potential areas of flood storage.

Hydromorphology for River Restoration (Level 2)

This course builds on the introductory course and provides more in-depth knowledge of hydromorphological driver/process/form/pressure interaction.

Desk-based assessment for river restoration planning & catchment management

This course teaches you to find, display and interpret existing data to aid river restoration projects and catchment strategy.

Advanced Hydromorphology (Level 3)

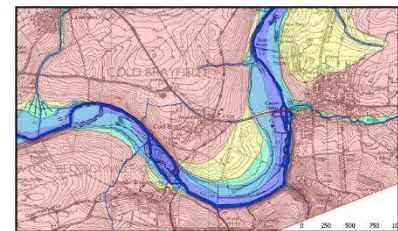
This course builds on and applies the concepts of the Level 1 & 2 courses. It involves detailed hands-on application of basic sediment transport equations and flow regime equations.

River Erosion Management

This course will provide an introduction to the types and drivers of river bed and bank erosion, techniques for monitoring erosion, and approaches to manage and control erosion in different settings.

Putting Ecology into River Restoration: An Introduction

This course provides an introduction on how ecological principles can be incorporated within river restoration strategies, with specific reference to freshwater macroinvertebrates.



Find out more about courses & register interest on the RRC website
www.therrc.co.uk/rrc-courses-and-workshops

Harnessing nature's power

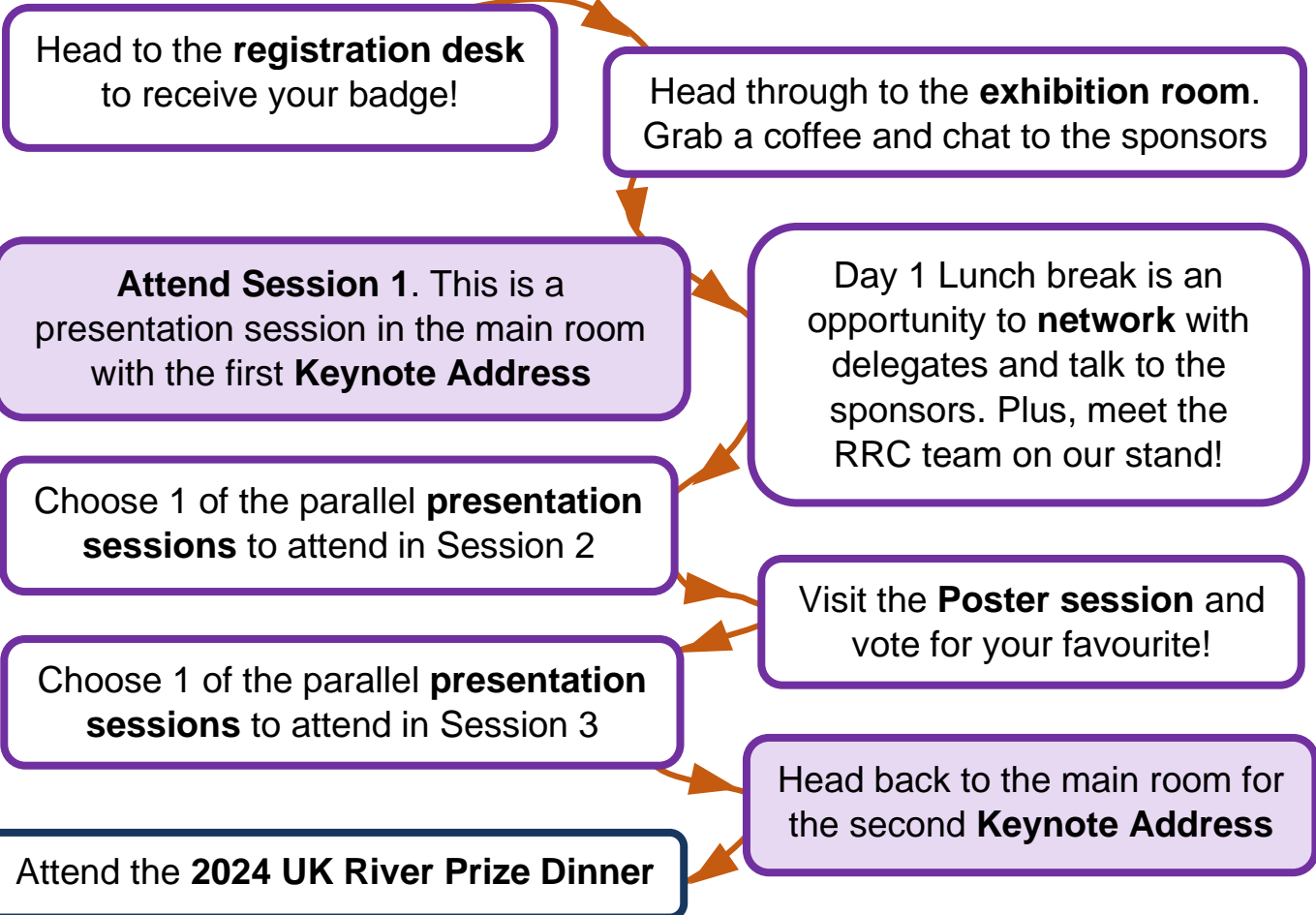
Integrating nature is at the forefront of everything we do. We work with natural processes to make river environments resilient to climate change, enhance biodiversity, and reconnect people with their local rivers. We see mandatory watercourse biodiversity net gain as more than just a metric, driving sustainable planning developments and opening opportunities to maximise benefits throughout the river corridor.

mottmac.com

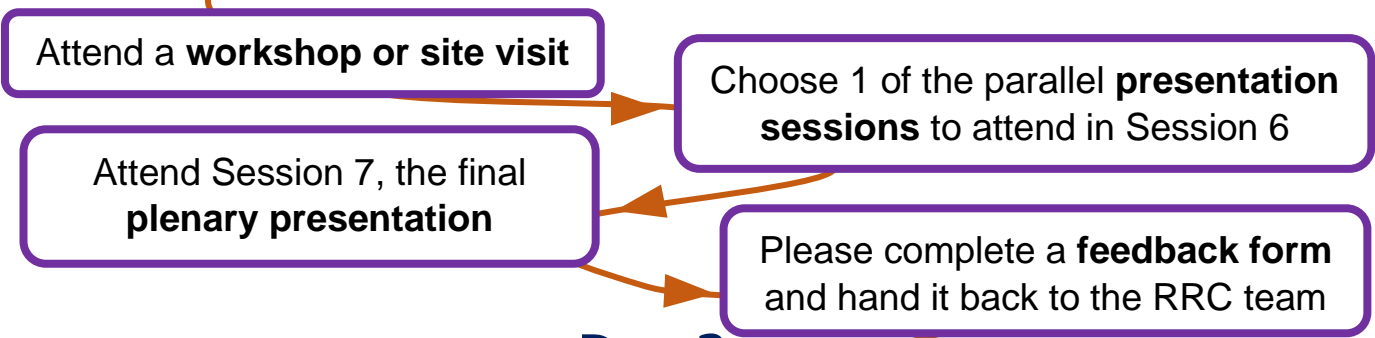


First time at the RRC Conference?

Here is a walk through of the conference and tips to get the most out of the three days!



Day 2



Day 3

If you are joining us on the tour of the River Dee catchment please check page 25 for information departure times

Safe trip home & see you next year!



Nature Driven Design

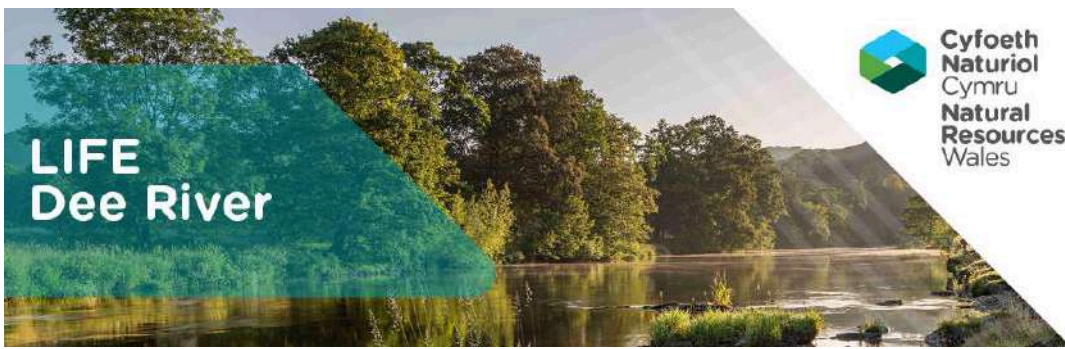
River Restoration and Wetland Design Solutions

Royal HaskoningDHV is an environmental and engineering consultancy with a strong track record in the planning, design and implementation of river restoration, fish passage enhancement and catchment management projects across the UK.

We use our 'Nature Driven Design' approach to improving the water environment through the restoration of natural processes, recognising the importance of working with natural river processes to deliver sustainable river improvements in a multi-use landscape.

Our current projects include:

- **River channel and floodplain restoration:** Design of channel restoration and gravel augmentation measures on the **River Torridge, Devon** and identification of restoration options on tributaries of the **River Nith, Dumfriesshire**.
- **Fish passage enhancement:** Design of fish passage solutions on the **Pembroke River, Pembrokeshire** and **River Wandle, Sutton**.
- **Consenting and site supervision:** Construction project management and site supervision of restoration measures on the **River Nith, Dumfriesshire** and consenting for the restoration of the **Ugbrooke Stream, Devon**.
- **Nutrient and contaminant management:** Development of a nutrient budget calculator and design of treatment wetlands to deliver nutrient neutrality in the **River Frome, River Lambourne, River Wensum, River Clun** and **River Camel**, and monitoring and design of a nature-based solution to immobilise mercury-contaminated sediments in the **North River, Surrey**.



LIFE Dee River is a £6.8m project to transform the River Dee and its catchment by restoring the river and its surroundings back to their natural state. This will bring many benefits to the environment, most notably improving the numbers of salmon, lamprey and freshwater pearl mussels to help them become more sustainable in future.

The Dee is the largest river in North Wales with a catchment area of more than 1,800 km². It is one of the most highly regulated rivers in Europe, and along with Llyn Tegid it has been designated as a Special Area of Conservation (SAC).

From its headwaters in the uplands of Eryri (Snowdonia), the Dee descends via Llyn Tegid, the largest natural lake in Wales. After flowing through a broad valley to Corwen, it tumbles eastwards through the spectacular Vale of Llangollen, under the famous Pontcysyllte Aqueduct World Heritage Site, before breaching the Welsh foothills near Bangor-on-Dee, and meandering northwards through the Cheshire plain to its tidal limit just below Chester.

The main uses of the River Dee are farming, predominantly cattle and sheep grazing; water abstraction for water supply for 2.5m people; tourism including recreational angling, canoeing and navigation; and nature conservation.

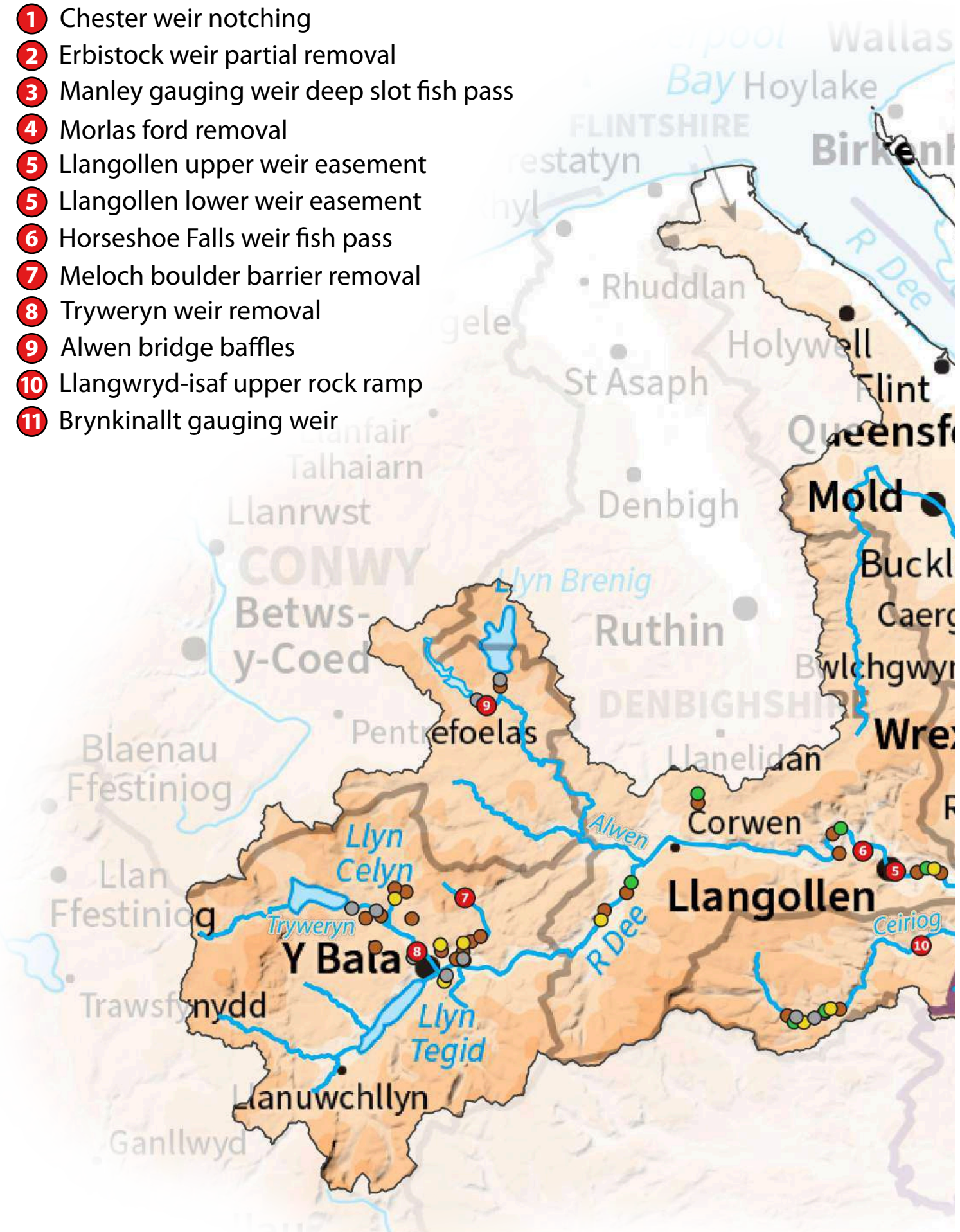
Action we're taking

- ▷ removing the constraints to fish migration and wider ecological connectivity
- ▷ restoring or improving natural riverine physical processes, features and habitats
- ▷ improving land management practices to reduce the input of nutrients and sediment
- ▷ initiating conservation management for the critically-endangered freshwater pearl mussel
- ▷ establishing and building long-term positive relationships with key stakeholders



Barrier Projects

- 1 Chester weir notching
- 2 Erbistock weir partial removal
- 3 Manley gauging weir deep slot fish pass
- 4 Morlas ford removal
- 5 Llangollen upper weir easement
- 5 Llangollen lower weir easement
- 6 Horseshoe Falls weir fish pass
- 7 Meloch boulder barrier removal
- 8 Tryweryn weir removal
- 9 Alwen bridge baffles
- 10 Llangwryd-isaf upper rock ramp
- 11 Brynkinallt gauging weir



● Gravel & Boulder Introduction

The project has improved 6km of habitat including the addition of 4,480 tonnes of gravel and 2,490 tonnes of boulders into the river.

● Fencing

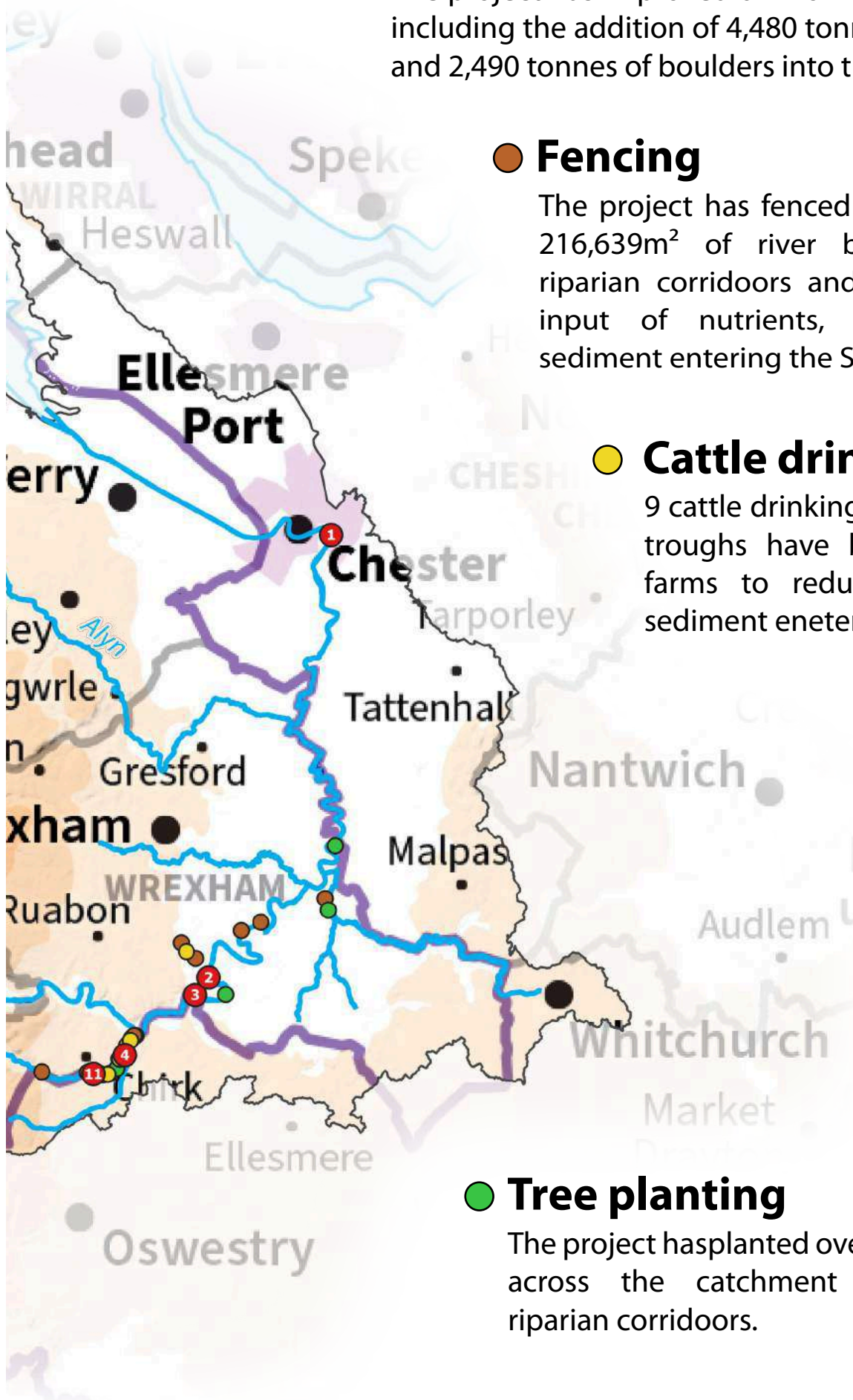
The project has fenced over 36km and 216,639m² of river bank to create riparian corridors and to reduce the input of nutrients, chemicals and sediment entering the SAC.

● Cattle drinking points

9 cattle drinking bays and 14 solar troughs have been installed on farms to reduce nutrients and sediment entering the river.

● Tree planting

The project has planted over 15,000 trees across the catchment to improve riparian corridors.





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Citation

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Image is of new channel creation on the River Stiffkey, Swanton Novers National Nature Reserve, for clients Norfolk Rivers Trust.



RRC Annual Conference 24th – 26th April 2024

Supported by
LIFE Dee River
LIFE18 NAT/UK/000743

Abstracts

Kindly sponsored by:



Providing discounted places for charities, trusts, students and volunteers

Session 1

4 RIVERS FOR LIFE RIVER RESTORATION; SUCCESSSES, LEARNING AND CHALLENGES SO FAR

S. GOTT¹ & S. KINGHAN¹

1 Natural Resources Wales

The 4 Rivers for LIFE project is a 5 year, £9.11m collaborative river restoration project, focussing on the rivers Cleddau, Teifi, Tywi and Usk in South Wales. The project uses several different strategies of river restoration.

- Tackling barriers to fish migration
- Reinstating natural features by remeandering straightened river sections, reintroducing boulders, woody debris and gravel; reconnecting floodplains
- Reducing input of sediment and nutrients to the rivers from agriculture by creating or improving riparian corridors and working with farmers to improve land management practices
- Tackling INNS within the catchments to bring down the upper limit
- Restoring habitat for FWPM and reintroducing hatchery reared juveniles

We are now 2 years into the project. This presentation will highlight the work done so far, the key challenges and learning for the future.

REVIEWING POOR RESTORATION PERFORMANCE

G. HERITAGE¹, J. ENGLAND² & D. MOULD³

1 Dynamic Rivers, 2 Environment Agency, 3 JBA Consulting

Much of the scientific literature centred around ecological response to river restoration draws negative conclusions regarding the effectiveness of many projects. This paper summarises the findings of literature reviews in 2014 and 2024 into restoration works to increase ecological resilience to high and low flows. The 2014 study concluded that scheme assessment was both patchy and, in many cases, unscientific, lacking objectives and survey design and evaluating poor and/or inappropriate data. The 2024 update reviewed a further 69 peer reviewed publications. It found that engineering focussed works aimed towards an historic reference state are being superseded by process-based projects where dynamism is anticipated as part of a natural self-sustaining process of habitat creation and evolution. Evidence of positive ecological response remains sparse principally due the recentness of more holistic schemes and the persistence of unstructured evaluative approaches.

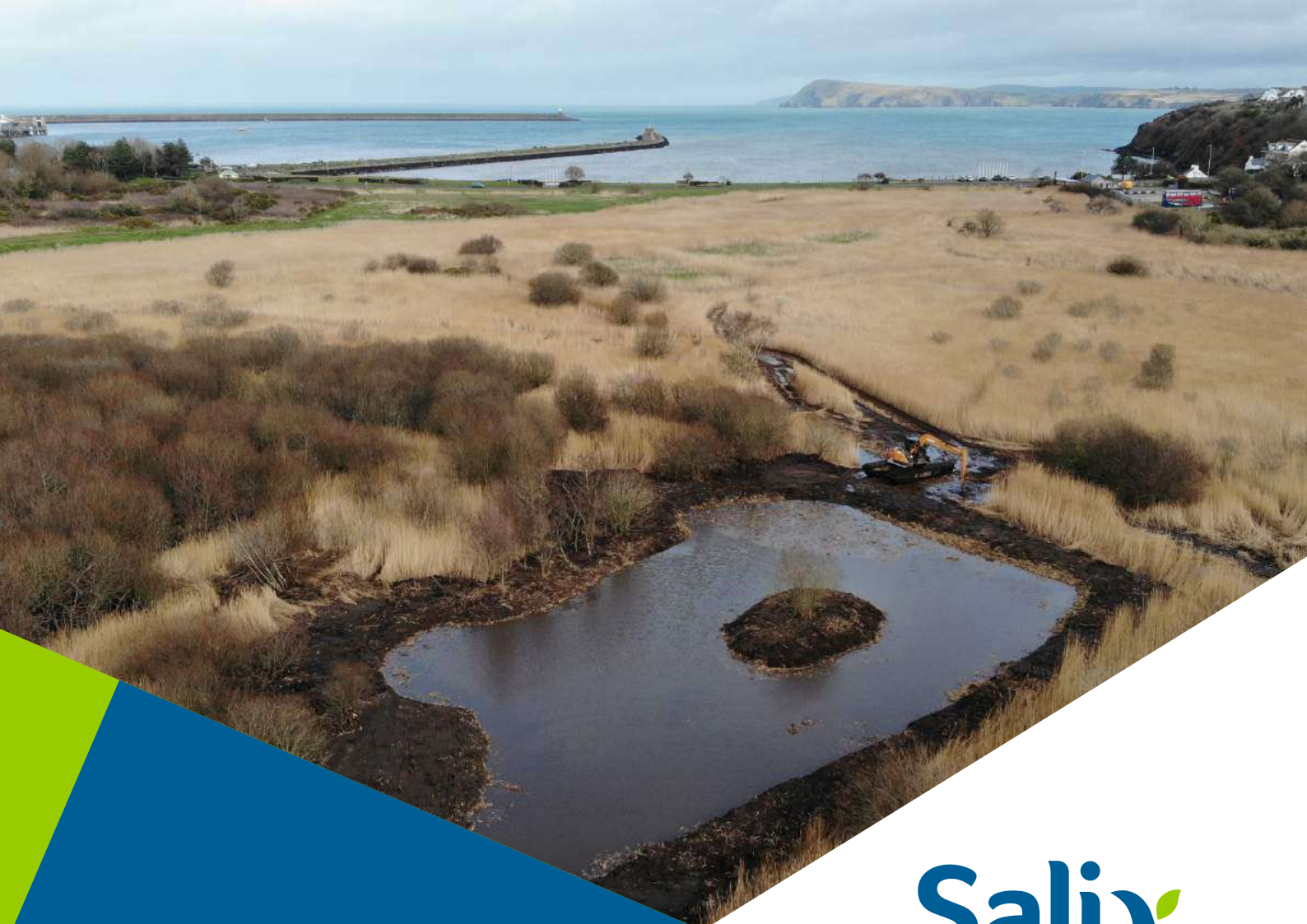
BIOTIC AND ABIOTIC RESPONSE TO SYSTEM NATURALISATION ALONG THE PATTERNDALE VALLEY

R. POWELL¹, G. HERITAGE² & M. POWELL³

1 National Trust, 2 Dynamic Rivers, 3 Ecosulis

We report on the performance of the National Trust naturalisation schemes in Patterdale completed in 2021 and 2022. The works on Goldrill Beck delivered a doubling of channel length and a quadrupling of connected floodplain area including 2.5 ha of flowing wet woodland. The works on Kirkstone Beck impacted 2.1 km of river creating a new wandering

channel and rejuvenated a flowing wetland zone approaching Brothers Water lake. Monitoring data suggests that the naturally functioning systems are flooding more frequently, in the process storing coarse and fine sediment and flood velocities and conveyance have reduced, assisted by a general valley bottom vegetative roughness development. Ecological response is occurring at a sub-morphologic unit level with distinct community development associated with a more variable morphology, sedimentology, hydrology and hydraulic regime. Non-main river interventions are also acting to restore valley bottom hydrological and ecological functioning.



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Session 2

Landowner engagement

WORKING WITH LAND MANAGERS TO DEVELOP RESILIENT CATCHMENTS AND FARM BUSINESSES

B. EARDLEY¹, H. PURDEY² & J. NEVILLE¹

1 National Trust, 2 Horner Farm

The National Trust continues to work closely with its farm tenants on the Holnicote Estate to increase natural function while increasing the resilience of local farm businesses. This includes practical works through the Riverlands programme at Holnicote and the development phase of a Landscape Recovery Scheme aimed at making space for water and wildlife - moving from drainage to habitat linked throughout the catchments. A farmers perspective to restoration and farming - how do we develop win wins.

RYEVITALISE LANDSCAPE PARTNERSHIP: ENHANCING, RESTORING & RECONNECTING THE RIVER RYE CATCHMENT

J. CALDWELL¹, A. CRIPPS¹

1 North York Moors National Park Authority

The Ryevitalise Landscape Partnership work to enhance and restore the western River Rye catchment across 413km² in North Yorkshire. We'll present on work with land managers entering long term agreements with a bespoke sliding scale funding matrix to deliver habitat restoration, such as creating resilient riparian corridors. Undertaking feasibility and expanding data gaps is central to our work ensuring targeted funding focusing on improving water quality and retention, restoring habitat connectivity, and addressing in-channel obstacles to aid natural river function.

We'll summarise citizen science survey work (including juvenile fish, riverfly and bats) and the importance of volunteer and engagement work to reconnect people to the catchment's natural and cultural heritage. From delivering farmer events, creating walking routes and school outreach programmes to telling the story of the landscape through LiDAR– this is a great example of a holistic catchment scale restoration programme.

Session 2

Catchment-scale thinking

THE WILDER FROME: A CATCHMENT BASED APPROACH TO RIVER CONSERVATION IN THE SEVERN VALE

L. REYNOLDS¹

1 Severn Rivers Trust

The Wilder Frome is the first flagship project developed by the Severn Vale Catchment Partnership - our 2030 vision for a thriving, ecologically diverse, resilient river Frome. We hope to implement a range of restoration and habitat creation measures from the river's source to the Severn estuary.

The plan includes 8 environmental priorities: removing barriers to fish movement, making space for wildlife, working in the wider landscape, cleaning up our rivers, restoring healthy flows, taking action on INNS, monitoring and data, and community engagement and partnership.

Since 2020, completed projects include Flourishing Floodplains - restoring wetland habitat in the farmed landscape, and Severn Vale Waterscapes- habitat creation, water quality improvement, and multi species fish passes.

Projects still in delivery and development include Fishier Frome, citizen science training, further fish barrier removal, Cotswolds Canals Connected, and white-clawed crayfish recovery.

UWCH CONWY/ UPPER CONWY CATCHMENT

S. AUBREY¹ & D. DAVIES²

1 Natural Resources Wales, 2 National Trust

The Uwch Conwy project is a landscape scale partnership project covering 3% of Wales. The overall aim of this project is to work with tenants and other partners to improve land and water management whilst providing benefits to the communities and wildlife that call this part of Eryri home. This is a partnership project between NRW and NT which started in 2015.

We working at a catchment scale to restore modified peatlands, river systems, as well as creating and connecting habitats through woodland and hedgerow planting and meadow creation.

The project aims to bridge the gap between people and nature through community e-bike sessions, access improvements that help link rural villages with their landscape and an education programme aimed at reconnecting local schools with climate and nature.

This talk will give examples of the restoration work we have undertaken to deliver catchment scale restoration.

CATCHMENT NATURE-BASED SOLUTIONS MASTERPLAN FOR CARBON, BIODIVERSITY, WATER AND COMMUNITY ON THE WESTERN ROTHER.

J. A. HERRIOT¹ & J. POLLITT²

1 Binnies, 2 Southern Water

Binnies is working with Southern Water to develop an NBS master plan to positively impact the Western Rother catchment. The overall project 'Western Rother Catchment Resilience Project' will identify, promote and deliver NBS options linked to SW business priorities. The current inception phase is focused on three estates to identify feasible opportunities linked to marketable benefits such as BNG and carbon. Working closely with stakeholders, Binnies will consider a range of NBS including river restoration, habitat restoration and catchment management. The presentation will detail the project's lessons learnt and demonstrate how opportunities for river restoration/NBS can be funded through layered marketable benefits.

SCALING UP AMBITION. RESTORING THE RIVER SOUTH ESK - A NATURE RICH & CLIMATE RESILIENT CATCHMENT

K. DEMPSEY¹

1 River South Esk Catchment Partnership

River South Esk Catchment Partnership members and catchment landowners have worked together to restore natural processes on the River South Esk in the Angus uplands for over a decade. Following on from the Restoration of the Rottal Burn in 2012, the successful partnership are now two years into an ambitious five-year multi-habitat project that encompasses river restoration, large-scale wetland creation, upland and riparian planting and hedgerow creation.

The project scales up action in this area of Northeast Scotland from a single restoration focus to restoring ecosystem health across the upper catchment from Cairngorm Munros to rolling floodplain farmland. A shared ambition, and diverse expertise across the small delivery group has shaped a project that truly considers the function and interaction of multiple habitats and species in supporting freshwater habitats and in addressing the climate and biodiversity crises.

Session 2

Managing gravel

MANAGEMENT OF SEDIMENT AND HABITAT MITIGATION AT LARGE DAM STRUCTURES: CASE STUDY FROM THE RIVER SHIN

H. MOIR¹, L. MUNRO², E. GILLIES¹ & K. WILLIAMS²

1 cbec eco-engineering, 2 Kyle of Sutherland Fisheries

While the full removal of barriers (dams, weirs etc) is best for physical/ ecological continuity in rivers, often this is not possible due to ongoing use of the structure (e.g. hydropower, water supply etc). An alternative option is to mitigate the impacts to river processes and habitats through the addition of lost coarse sediment, in combination with other measures to improve instream condition. A project on the River Shin used gravel augmentation and large wood structures to improve instream geomorphology downstream of a large dam, for the benefit of salmon and pearl mussel habitats. These measures were applied across four specific sites, since sediment transport modelling showed the managed hydrology was not able to redistribute sediments downstream of the dam. Since implementation, the sites have been monitored for physical change and habitat utilisation (redd mapping and electrofishing), determining that the works have been a success for geomorphic and biological condition.

WEIR REMOVAL USING AN ITERATIVE DESIGN AND MORPHODYNAMIC MODELLING PROCESS ON THE BRONIE BURN, SCOTLAND

I. JORGE¹ H. MOIR¹, E. GILLIES¹ & K. COMINS¹

1 cbec eco-engineering

A 'nature-based' design was developed to support the removal of a weir on the Bronie Burn, Scotland. The project was designed to not only benefit fish passage but also the geomorphic restoration of the study reach by reinstating natural sediment transport processes. Restoration works involved re-grading the channel bed and encouraging active meandering of the channel using Large Wood Structures (LWS) placed at key locations. Sediment transport modelling of an initial design indicated that the LWS would have no significant effect on the pattern of sediment transport with the LWS being buried by the incoming sediment supply. Modelling of a refined design in which the river bed was raised indicated a far greater continuity of sediment transport with an active meandering channel. This iterative design process demonstrates the considerable value of morphodynamic and sediment transport modelling to arrive at a stable, sustainable and successful design and to minimise any associated potential risks.

The weir removal and watercourse realignment work was successfully completed during the summer of 2022. cbec undertook an as built survey immediately following construction and further post construction monitoring in August 2023. The monitoring has shown that cbec's design delivered so much more than improvements to fish passage with significant improvements to the channel, river processes and habitat diversity, also evident at the site weeks after construction. The river is now better connected to its floodplain at smaller flood events and has a more natural channel bankfull capacity than the channel in its current form. The sinuous channel planform combined with the LWS has increased form roughness providing greater energy dissipation, channel stability and potential for sediment storage.

THE USE OF PASSIVE IMPACT PLATE SENSORS IN INFORMING AND APPRAISING RIVER RESTORATION

J. L. MOORE¹

1 APEM

River restoration and gravel augmentation schemes frequently use modelling to understand potential effects on sediment mobilization and transport, but these seldom present a complete picture, and more importantly, do not provide post-implementation validation that schemes are working as intended. We present three examples of recent work where we have used passive seismic impact plate sensors to understand sediment mobilisation in response to gravel augmentation, flow regime change and river restoration. This method has enabled us to collect in-situ sediment transport data which we have used to determine the bedload sediment transport response to natural and controlled flows in free supply and supply limited reaches, allowing us to inform restoration more effectively. We outline data collection, analysis, how we use this invaluable data to guide river restoration and appraise effectiveness, and discuss benefits over traditional methods of quantification e.g., modelling, traps.



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Session 3

Climate change resilience

A NATURAL PROCESSES TOOLKIT FOR ENGLAND

R. JEFFRIES¹, O. GRANT¹ & A. DUNCAN¹

1 Environment Agency

Despite decades of river restoration, physical modifications are still the top pressure affecting England's waterways (DEFRA 2023). The Climate Emergency and Biodiversity Crisis add to the pressure and the challenge. In response, land management policy and practice is starting to change. And we now value our natural environment more than ever – not just for the money it makes us, but for the natural processes given to us by nature. At the Environment Agency we want to encourage future catchment management that works with nature, building on Maas and Diamond's 2019 vision of letting nature do the work. To do this, we are creating a natural process toolkit. The toolkit brings together existing and new geospatial catchment data sources including stream power, natural valley form, artificial modifications in valley floors, and how river channels may respond to future climate change. These tools will help us to let nature do the work of creating healthy future catchments.

LINKING RIVER RESTORATION AND DISASTER RISK REDUCTION

J. ANTHONY¹

1 Institute for Risk and Disaster Reduction UCL

Within the growing field of ecosystem-based disaster risk reduction (eco-DRR), the management and restoration of wetland services to reduce disaster risk is a well-established concept. However, river restoration has not been separately evaluated as a DRR tool. In this presentation, a DRR framework is used to qualitatively evaluate the objectives, processes, and outcomes of river restoration— both physical (e.g., lateral mobility, longitudinal and channel-floodplain connectivity, ecological services) and social (e.g., community engagement, recreation)—and examine their impacts on hazard, vulnerability, and exposure. Comparison of the two practices reveals the benefits and challenges of using river restoration for DRR, assesses their compatibility, and produces recommendations for reconciliation—fostering better communication and project-setting by bridging gaps between different sectors, disciplines, and policies such as Climate Change Adaptation and Working with Natural Processes.

CHALK STREAM RESTORATION TO INCREASE ECOLOGICAL RESILIENCE TO CLIMATE CHANGE

J. ENGLAND¹, T. JOHNS¹, R. SARREMEJANE², R. STUBBINGTON² & J. C. WHITE³

1 Environment Agency, 2 Nottingham Trent University, 3 University of Birmingham

Chalk streams have been described as our tropical rainforests. Their gin-clear waters are internationally famous as are the ecosystems that they support. We explore how chalk streams are expected to respond to climate change, facing an increase in extreme flows and warming waters. We consider how these effects interact with existing human pressures, including physical modification. We conceptualise how river restoration can improve resilience to extreme events through creating refuge areas. We demonstrate where river

restoration, through removal of impounding weirs, has restored physical processes and longitudinal connectivity, improving habitat composition. We consider the ecological responses to the restoration, which have been largely positive, with macroinvertebrate communities reflecting transitions from lentic to lotic conditions. We review how restoring physically modified chalk streams can help increase resilience to climate change and what else we need to do to restore with more confidence to help chalk streams adapt to climate change.

CATCHMENT SCALE INITIATIVES IN THE LOWER RIVER CUCKMERE AND UNDERLYING CHALK AQUIFER

S. HOWE¹, D. WILKINSON¹ & S. LOHREY¹

1 South East Water

The lower part of the river Cuckmere flows through East Sussex from Arlington through the South Downs to Cuckmere Haven. The catchment comprises low permeability geology which results in a flashy flow regime.

South East Water operates a surface water abstraction on the Cuckmere and groundwater sources in the chalk aquifer located either side of the river. Investigating and understanding the hydrology, hydrogeology and environmental pressures has been done.

South East Water has engaged with other abstractors to develop a holistic view of the water environment. Our work with farmers to promote water efficiency and rainwater harvesting will be developed in combination with nature based solutions.

South East Water has partnered in the PROWATER project which aims to increase water retention and infiltration at the landscape level. Results show that higher soil moisture occurs at certain land uses and that changing the landscape should improve groundwater recharge and river baseflow.

Session 3

River continuity

REMOVING GARLOGIE DAM

C. PERFECT¹

1 Scottish Environment Protection Agency

Garlogie reservoir was 3HA of open water located 15KM west of Aberdeen. The dam is 6m high, more than 50m across and now has a hole in the middle big enough to drive a double decker bus through. We describe four challenges faced by the project:

- Flooding – exploring the risks and opportunities from different perspectives
- Biodiversity – ensuring the positives of fish access and restored wetland outweighed the impacts
- Heritage – recognising and mitigating the impacts of this next step in the landscape's cultural journey
- Procurement – getting good consultants, good contractors and good value

The project made a splash in the local media when it completed. But the practical tools used to overcome the challenges might be considered rather mundane. We present real world examples demonstrating the value of detailed objectives, the importance of communication, building an evidence base and applying the knowledge learned, controlling the narrative, and balancing determination with compromise.

REMOVING A TWO METRE TALL WEIR BY HAND... HANG ON, WHAT!

J. LOUIS¹, S. MUIR¹ & A. TRAGIS¹

1 Forth Rivers Trust

Find out how the Forth Rivers Trust removed a two metre tall weir, in house and by hand using skill and innovation. Morton Quarry Weir was situated in a steep gorge with little access for machinery. In this talk, we will cover our thought process behind the removal, the planning for this kind of work, understanding the skills and experience needed to carry out the removal process, coming up with innovative techniques to remove the weir, health and safety requirements, funding of the works and the benefits to the river for migratory fish and river processes.

WINNING OVER HEARTS AND MINDS WHEN REMOVING BARRIERS IN THE LAKE DISTRICT

L. BAKER¹, S. MAAS¹, W. STRINGER², M. BUCKLEY³ & G. LOVELL³

1 AtkinsRéalis, 2 Cain Bio-Engineering, 3 United Utilities

Atkins and Cain Bio-Engineering led the design for the decommissioning of three impoundments in the Lake District on behalf of United Utilities. The aim is to re-naturalise lake habitats, restore >1km of river and reconnect >3ha of floodplain. The sites have historically been artificially raised for public water supply.

The project has huge benefits to the local landscape and ecological communities, but the technical challenges are complex and conflict with existing designated sites. The designs have sought to promote natural recovery, balanced with UU's responsibility to ensure the structures are appropriately and safely decommissioned, with no increase in flood risk.

The schemes could be perceived as controversial (due to aesthetics and recreational impacts) within local communities and landowners, with some remaining sceptical.

The presentation demonstrates the approach taken to engage, adapt and overcome the complexities whilst aiming to ensure the fundamental objectives are met.

Session 3

Citizen Science

BUILDING ENOUGH CAPACITY TO HAVE AN IMPACT AT A CATCHMENT SCALE

P. POWELL¹

1 Welsh Dee Trust

I (Peter Powell) became the first full-time CEO of Welsh Dee Trust at the beginning of 2021 after working at the organisation for 1 and a half years. The specific aim of my employment was to build the capacity and strength of Welsh Dee Trust into an organisation that can make a significant impact towards the restoration of the river Dee. At the beginning of 2023 we launched a five-year strategy for the Trust setting out our proposed actions. In my presentation I will talk about the approach we took to building this strategy and the capacity required to deliver it and how we plan to monitor the impact we are having. The talk will cover many of the challenges faced by an Environmental NGO trying to build capacity to undertake river restoration including the mistakes and solutions we made along the way.

URBAN CITIZEN'S 6.3.2: MONITORING DUBLIN'S RIVERS AND STREAMS THROUGH CITIZEN SCIENCE

L. RIBERO¹, S. HEGARTY¹, F. REGAN¹ & R. CLINTON¹

1 Dublin City University

Urban Citizen's 6.3.2 is an ongoing citizen science project, monitoring rivers and streams across the UNESCO Dublin Bay Biosphere. Volunteers from the general public and community groups are trained to conduct regular surveys, that include visual observations, nutrients testing, and macroinvertebrate monitoring. In order to examine geographical and temporal patterns, the project spans over two years and involves four different catchments, that are surveyed monthly. The project aims at filling existing data gaps, detecting unnoticed issues, and ultimately creating a scalable model that can be expanded to other geographical areas for river restoration. Through training workshops, regular interactions and co-creation, volunteers are provided with background knowledge and practical monitoring skills, empowering them to become long-term river stewards. Here, we are presenting insights on the project development, current results, challenges and lessons learnt, and potential outcomes.

RIVERHUB - SCALING UP CITIZEN SCIENCE TO SAFEGUARD RIVERS ACROSS THE WESSEX CATCHMENT

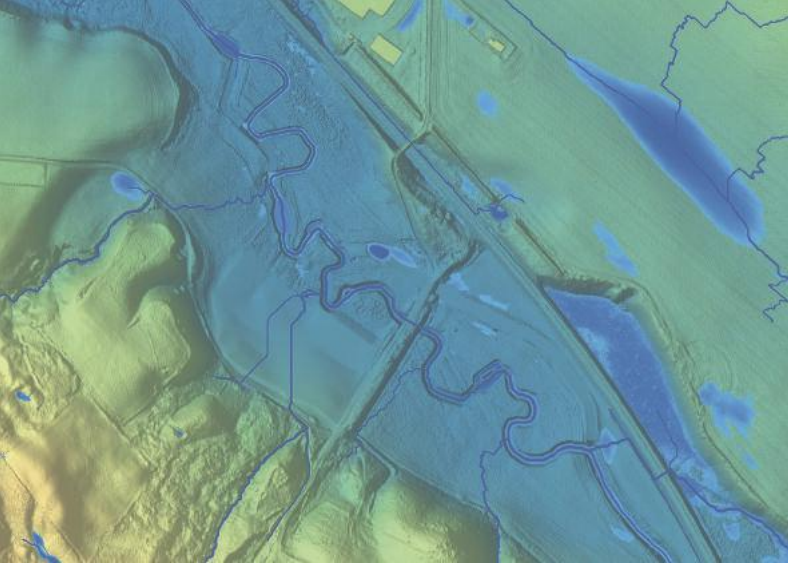
S. HUNTER¹ & T. CULMER²

1 Bristol Avon Rivers Trust, 2 Riskaware

The Bristol Avon Rivers Trust (BART) has been running citizen science campaigns since 2016 and over that time has built up a wealth of knowledge and experience. BART's latest citizen science project, RiverHub, is their most ambitious yet. With backing from Wessex Water, they are aiming to bring together all their existing citizen science data into a single dashboard, alongside real time readings from the water board's own sensors. The funding is allowing BART to greatly expand its campaigns, increasing volunteer numbers and engaging with other

local NGOs to collect data across the whole Wessex catchment. Supporting them with this project is Riskaware (a scientific software consultancy located in Bristol, UK) who is helping develop the dashboard.

The project will empower hundreds of volunteers to help protect our rivers and is serving as a demonstration catchment for the national OFWAT-funded CaSTCo project. This presentation will include details and progress of the project to date.



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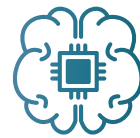
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& statistical
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Session 5

Workshop A: Scientific Advances in River Restoration Presentation Session

RECONSTRUCTION OF A FORMER ANASTOMOSING WET WOODLAND AT AVON WATER, NEW FOREST USING UAV-DERIVED STRUCTURE-FROM-MOTION PHOTOGRAMMETRY

E. FLEMING¹

1 Mott MacDonald

In recent years there have been significant technological advances in Unmanned Aerial Vehicles (UAVs). This, combined with the development of structure-from-motion (SfM) technology have provided river restoration practitioners with a new tool that can be used to give an affordable, repeatable, and objective assessment of river restoration projects. In this study, SfM photogrammetry is utilised on a section of the Avon Water, a small watercourse in the New Forest National Park. It was subjected to extensive Victorian-aged straightening and channelisation which have left the SSSI in an unfavourable ecological and morphological condition. Much of this is now being reversed by river restoration projects led by Forestry England. Whilst historic maps reveal the rivers former alignment, the straightening pre-dates these maps in places. Furthermore, even where the former route is shown, it is likely that anthropogenic modification began much earlier, and these maps may not represent the natural course of the river. High resolution orthophotos and 3D photogrammetric models of the site are created that reveal a palaeolandscape consisting of a series of anastomosing and anabranching channels. These are interpreted to represent a former anastomosing wet woodland and 'Stage Zero' of the river system. Cross-cutting relationships suggest that initial anthropogenic perturbation transformed the site into a single meandering thread. This was then followed by the most recent Victorian-aged straightening. The palaeolandscape revealed by the study could provide a template for future 'Stage Zero' river restoration in the New Forest and demonstrates the capabilities of low-cost, UAV-derived photogrammetry in river restoration research.

SCIENCE AND RIVER RESTORATION: TWO RECENT EXAMPLES TO STIMULATE DEBATE

D. SEAR¹

1 University of Southampton

The science of restoration arguably does not exist, rather it is drawn from a range of scientific disciplines. It is often seen by practitioners as remote and academic – with the 'real work' done by those who are "making a difference" on the ground. In part this reflects the differences between the values of practical conservation and the desire to improve degraded ecosystems and more pragmatically, the requirement to chase the money to preserve the posts of rapidly expanding restoration teams. At the RRC conference it seems pertinent to reflect on the goal of science and its methods. At the same time, we need to reflect on the practice of restoration and its potential value to science. Drawing on two case studies, the talk will look at how review of science can support wider policy and justification for restoration practice through the lens of carbon storage, whilst in the second case, a reflection on the wider evidence for adoption

of a popular restoration practice is challenged. The paper concludes that science, evidence, and monitoring need to be better defined and recast in terms of their specific role in supporting river restoration. Similarly, with increasing funding and opportunity for restoration driving progress on the ground, scientists should get engaged more with the restoration practitioners to better understand what support the community needs to help them deliver the resilient rivers and catchments we all ultimately are seeking to restore.

IN-STREAM HABITAT UNIT ADDITIONS: IF YOU BUILD IT, WILL THEY STAY?

I. BARRETT¹

1 Waterways Centre, University of Canterbury & Lincoln University, New Zealand

River restoration in New Zealand is often focussed on riparian planting, hoping water quality improvements will improve overall ecosystem health. These interventions are important but successful community recovery requires additional steps to improve aquatic habitat. We trialled the addition of simple, instream habitat units as a practicable restoration tool and opportunity to investigate community recovery mechanisms. Habitat units were designed to be simple to construct using sustainable, readily available materials, and optimised to create heterogeneous habitat and refugia. Here, we present the outcome of three trials: (1) a preliminary trial as a proof of concept that habitat addition can facilitate establishment of drifting invertebrate colonists; (2) a trial in streams with varying physical characteristics to identify methodological constraints; and (3) a project co-developed with local iwi (indigenous people) in NZ, demonstrating the value of indigenous knowledge in restoration.

CHALKING UP THE EVIDENCE - INCREASING ECOLOGICAL RESILIENCE OF CHALK STREAMS TO CLIMATE CHANGE

J. ENGLAND¹

1 Environment Agency

Our internationally famous biodiversity rich chalk streams will be affected by climate change, with an anticipated increase in extreme flows, warming waters and changes in intermittence patterns. Restoring physically modified chalk streams can help chalk streams adapt to climate change and increase their ecological resilience. Restoration, by removing impounding weirs, has restored physical processes and longitudinal connectivity, improving habitat composition. Ecological responses have been largely positive with macroinvertebrate communities reflecting transitions from lentic to lotic conditions. Taxonomic diversity, richness and evenness became more like communities in control sections, which acted as targets for the restoration. However, the recovery of functional diversity varied depending on the scale of observation and the presence of other pressures. By creating a body of evidence to understand the ecological response to river restoration we target restoration actions and adaptation measures more effectively.

Session 5

Workshop B: Demystifying Biodiversity Net Gain (BNG): From Data Collection to Monitoring

ACHIEVING BIODIVERSITY NET GAIN (BNG) – RIVER UNITS

E. RYDER¹

1 Mott MacDonald

As we prepare for mandatory BNG, delivering river units presents a series of new challenges for practitioners, consultants and governing bodies. Complexities include land ownership, feasibility, construction and the number of river units it delivers, all of which must factor into the costs. BNG 4.0 metric requires solutions to the bank top, bank face and in channel in order to improve the condition score for the river reach. Therefore, the creation of riparian habitat alone is not sufficient. In this presentation, we will demonstrate how through collaborative efforts with Northumbrian Water scheme, river units in both on-site and off-site locations spanning multiple catchments can be delivered. We also highlight the challenges of delivering river net gain and the solutions. This demonstrates that a multi-disciplinary approach involving a range of specialists is essential to devise solutions that not only deliver the required river units but also benefits the whole catchment.

CHESTER WETLAND CENTRE: BIODIVERSITY NET GAIN UNLOCKING OPPORTUNITIES

M. BOOTHROYD¹

1 Binnies

The Chester Wetland Centre is a community-driven project to create wetland habitat within a country park beside Chester's hospital, while improving access to green space, improving water quality, and delivering Biodiversity Net Gain (BNG). Working with local stakeholders, Binnies has taken a community group's original idea to a detailed, fundable, deliverable and sustainable design. The first step was a pre-feasibility study including a high-level assessment of potential BNG; this helped secure funding for further project development. Subsequent design development was informed by UKHabs and river condition assessments. An iterative design approach involved collaboration between Binnies' interdisciplinary team and the local authorities' Green Infrastructure team, optimising BNG benefits and aligning these to the needs of local developers. The project is embedded within the Local Nature Recovery Strategy, and BNG will be a key funding source for delivery and future management.

BIODIVERSITY NET GAIN: TOOLS TO IDENTIFY OPPORTUNITY AREAS

J. MANT¹, L. DAVID¹ & J. SAYERS¹

1 Ricardo

Providing a high-level assessment of biodiversity net gain-related opportunities that also have wider benefits requires an assessment of identifying accessible sites ideally close to development that are cost-effective and deliver benefits. Identifying potentially suitable sites prior to habitat surveys is not easy, especially at scale or where multiple sites are needed to achieve net gain. Ricardo recognised the need to develop a tool (the Potential Biodiversity Opportunity (BPO)) to assess the 'best' net gain opportunity areas. This tool was initially

devised to support local planning authorities map out Local Nature Recovery Strategy opportunities. It was then further developed to account for a wider range of benefits. Scores are assigned to a range of adaptable parameters to identify opportunity areas where outputs are converted to geospatially scored and referenced maps. It has been successfully used to support a range of organisations with biodiversity and wider ambitions.

UTILIZING BIODIVERSITY NET GAIN (BNG) ASSESSMENT AND THE WATERCOURSES MODULE TO MAKE ENHANCEMENT RECOMMENDATIONS FOR RIVER RESTORATION

P. COWLEY¹

1 AECOM

BNG Assessment is a powerful tool in quantifying watercourse and riparian conditions, and post-development scenario, for development or restoration schemes. AECOM has developed an innovative approach to utilizing the outcomes of River Condition Assessment to make appropriate enhancement recommendations to achieve BNG for watercourses. The results of Modular River Physical (MoRPh) surveys, using an Enhancement Modeler Tool, inform site-specific enhancement objectives, tailored to specific BNG objectives of the project. Enhancement options are presented for a range of projects, for example reducing vegetation management in the riparian zone, installing fencing along the riparian zone to reduce the impacts of agriculture, increasing the diversity of channel and marginal vegetation and morphotypes, enhancing channel bed and hydraulic feature richness, and others. Enhancements are tailored to particular watercourse types (rivers and streams, ditches) according to BNG trading rules.

Session 5

Workshop C: From policy to the implementation of catchment-scale river restoration

NATURAL FUNCTION IN FRESHWATER NATURE RECOVERY – LINKING THE RIVER CHANNEL TO THE CATCHMENT

A. J. POYNTER¹, D. MATTHEWS¹ & L. NIXON¹

1 Natural England

Process connectivity between rivers and the wider landscape is critical for environmental resilience and nature recovery. At landscape scale, river catchments are logical spatial units to consider water in nature recovery planning, prioritisation and monitoring. Catchments are complex areas defined by climate, land use/geology, and hydrological pathways – interaction between suites of catchment processes then defines the template for species, habitats and environmental resilience. This ‘natural ecosystem function’ should underpin restoration, from river microhabitats through to entire catchments. Restoring our rivers in this way is essential for freshwater nature recovery, but if unsupported by the rest of the catchment, there are likely to be limits to achieving ambitions toward naturalness. In exploring the interface between natural function, catchment restoration opportunities, and nature recovery mechanisms, we can ensure river habitats are healthy and resilient into the future.

RESTORING NATURALLY FUNCTIONING RIVER CATCHMENTS - POLICY DRIVERS AND FUNDING MECHANISMS

D. MATTHEWS¹, A. J. POYNTER¹, O. BURNS², J. OLD² & L. NIXON¹

1 Natural England, 2 Environment Agency

Exploration of recent policies and new funding mechanisms in England that should provide a new impetus to remedy the modification pressures on rivers and river catchments. Naturally functioning river catchments are critical in supporting healthy river habitats and wildlife. Restoring the hydrogeomorphology of rivers and their catchments is fundamental to achieve government targets for nature recovery and will also help reduce society’s vulnerability to climate change. Two key spatial plans that have potential to direct how and what nature recovery looks like for our rivers are Catchment Plans and Local Nature Recovery Strategies. But more policies and plans will not recover nature without delivery mechanisms. Defra’s revision of Countryside Stewardship aims to mainstream river, riparian and floodplain restoration, the Landscape Recovery scheme looks to deliver naturally functioning catchments co-funded by green finance and water company fines are being redirected to fund restoration.

NORTHUMBERLAND LNRS PILOT INFORMING INTEGRATED CATCHMENT DELIVERY IN THE WANSBECK CATCHMENT

L. NIXON¹, H. HARRISON², A. POYNTER¹ & D. MATTHEWS¹

1 Natural England, 2 Environment Agency

Following the Northumberland LNRS Pilot in 2020, Natural England (NE) undertook landscape scale testing of the LNRS outputs, working with Wansbeck CaBA partnership to co-create the Wansbeck Nature Recovery Plan. We utilised NE’s Habitat Network Model to create

woodland, peatland and grassland networks using national and local data sources, and integrated river and wider habitat restoration and creation opportunities with an ambition to improve catchment function. In 2022 the Partnership used the Plan to make a successful bid to the Nature Based Solutions for Climate Change programme. This project will run until March 2024, delivering 144 Ha habitat restoration and creation across 13 project sites including floodplain, woodland, peatland and grassland, monitoring carbon sequestration and exploring green finance models. An application to DEFRA's NFM Programme will build on the work already underway further supporting catchment scale delivery.

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Session 6

Restoring historical floodplains

POST ICE AGE RIVER EVOLUTION AND IMPLICATIONS FOR LANDSCAPE SCALE RIVERINE ECOSYSTEM RESTORATION

J. PAYNE¹

1 Environment Agency

The River Axe SSSI/SAC is in unfavourable condition. Ecological communities and channel geomorphological conditions are in decline in the upper catchment. Research has been carried out to explore existing theories on the evolution of the river and its floodplain since the last ice age, and to improve understanding of the downstream SSSI/SAC river. This charts conditions from a braided river type system, through to valley wide wetland, and finally to an increasingly dry and disconnected floodplain. The research reveals pressures at a landscape scale, dating back to the 15th century, that are now impacting on species declines. It demonstrates the affect of floodplain accretion over that time, which is now leading to erosion of the gravel river bed that the ecology depends on. The research also challenges stereotypes of the pool riffle sequences, requiring different interpretations of environmental damage within the SAC river.

RIVER ALLER: COMBINING A STAGE 0 RESTORATION SCHEME & A CATCHMENT BASED RESTORATION APPROACH

M. HEMSWORTH¹ & B. EARDLEY²

1 JBA Consulting, 2 National Trust

Led by the National Trust and designed by JBA Consulting with support from Wolf Water Resources, University of Nottingham, and the Environment Agency. The landmark project has transformed a 27-acre area of former arable land into a new waterscape, reconnecting the river and floodplain, increasing habitat diversity, combating flooding and drought and acting as a future carbon store. The project has seen a 1.2km section of Main River, previously straightened and deepened, reset and reconnected to the surrounding floodplain. The re-set involved moving over 4,000 tonnes of earth to fill the river channel and placing 700 tonnes of fallen timber within the floodplain to provide important 'deadwood' habitat. Taking over three years to implement, with several challenges and barriers along the way, which were overcome, lessons learnt can now be shared, alongside the early outcomes of a developed long term monitoring programme to provide a foundation for the implementation of future schemes.

MUD POOL MEADOW STAGE 0

B. EARDLEY¹, M. PANG² & P. POWERS³

1 National Trust, 2 Environment Agency, 3 USFA

National Trust working with the USFA following a knowledge trip to Oregon. The Stage 0 project was delivered autumn 2019.

Application of the Stage 0 method across 5 ha with NT staff and local contractors and GGL design from the USFA. The team had previously employed conventional in channel NFM measures such as leaky dams with scrapes and cross flow ponds.

The restoration filled 550m of watercourse and placed 100 tonnes of wood. This immediately reconnected the water with the surrounding landscape developing a mosaic of waterscapes.

Site left to develop naturally and has been grazed with pigs to develop softer ecotone with the woodland and develop hydrological and ecological diversity. Significant increase in ecosystem function and associated biodiversity and abundance.

Monitoring on the site includes hydrological, soil and ecological monitoring including high resolution drone imaging, butterfly transects, grass snake, bats, aquatic invertebrates and vegetation diversity.

VALLEY SIDES AND THE CONNECTIVITY OF SMALL TRIBUTARIES TO FLOODPLAIN WETLANDS

K. SHEEHAN¹ & G. HERITAGE²

1 JBA Consulting, 2 Dynamic Rivers

The (dis)connectivity between the floodplain, channel and large tributaries is the driver of many river restoration schemes. However, the role of small tributaries in the creation of floodplain wetlands is under-appreciated and the practice of straightening, deepening, embanking and piping these across the floodplain to the channel is frequently encountered. On many rivers, small tributaries arise from flushes high on the valley sides and, whilst their connection with the channel has been retained, their functional role in floodplain ecology has been lost. We believe that these springs once emerged and then soaked away again into the talus slopes along the edges of valleys, raising the water table before emerging again as groundwater at the break of slope, creating floodplain fens; potentially enhanced by natural levees. These fens have been lost along with the loss of groundwater. We propose that project aims should be more holistic, covering the entire floodplain and valley sides.

Session 6

Urban rivers

URBAN LARGE WOODY MATERIAL, BARRIER REMOVALS AND STAGE ZERO

T. HARTLAND-SMITH¹

1 Severn Rivers Trust

Looking at the development and delivery of several projects by the Severn Rivers Trust, which have been delivered through the Black Country Blue Networks ERDF partnership project. From Stage Zero restoration within an urban National Nature Reserve to multiple barrier removals across the river Stour catchment. Working with the local authorities to change perception on what river restoration can look like within the urban environment whilst addressing concerns over flood risk with the local community and council officers. Showcasing bankside and in-channel enhancement projects, the introduction of large wood in-channel and the lessons learnt before, during and after delivery.

PUTTING THE TRENT BACK IN STOKE-ON-TRENT

M. LAWRENCE¹ & D. CADMAN²

1 Environment Agency, 2 Staffordshire Wildlife Trust

A part of the redevelopment of Stoke City's former football ground, the River Trent was diverted into a new river channel. The project had to contend with a global pandemic, contaminated land, conflicting deadlines, funding issues and the challenges of moving a major river out of a concrete river channel without increasing flood risk and risking a major trunk road and electricity sub station.

SALISBURY RIVER PARK – DELIVERING RIVER CORRIDOR IMPROVEMENTS IN THE HEART OF THE HISTORIC CITY

K. SKINNER¹, M. VAUGHAN¹, A. CROSS¹, A. WALLIS² & M. PORTER²

1 AtkinsRéalis, 2 Environment Agency

The Environment Agency has been working in partnership with Wiltshire Council and Salisbury City Council to deliver a scheme that offers exciting improvements to the riparian corridor of the River Avon SAC within the heart of the historic city of Salisbury. AtkinsRéalis was commissioned in 2020 to develop the detailed design for Phase 1 working closely with stakeholders to ensure that the scheme met expectations of all parties. AtkinsRéalis has since been working with the Environment Agency and Kier during the construction process to ensure that the designs get fully realised. This presentation will focus on the delivery of these works which includes i) the creation of a new reach of the Summerlock Stream, and associated wetland area, in Fisherton Recreation Ground; ii) fish pass, pocket park and new river corridor along the main River Avon alongside the central car park and iii) narrowing works within the main mill stream, through instream berm creation, into the heart of Salisbury.

CONTROLLING EROSION AND SCOUR IN SMALL URBAN SETTINGS

T. MARTIN¹ & C. METCALF¹

1 Greenfix

The intention of this talk is to look at small urban and suburban waterways and ditches, with regional variations in names such as Rhyne, Reen, or Burn, as well as Streams and Brooks.

As many of these are in settings that often have intermittent flooding events followed by long periods with very little water the need to support banks and divert or create channels in both situations means that selection techniques and materials needs careful consideration.

Balancing the need for stabilising slopes over the long term with the demands of habitat creation and biodiversity can be problematical. There are design considerations around site access, installer skill levels and cost, which usually falls on the Riparian owner.

Using practical site examples, we aim to offer guidance for those advising Riparian owners, including designers, contractors, and other stakeholders, on solutions that remove the temptation to either do nothing or use a solution that offers no environmental benefit.



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- Construction supervision
- Wetland development/ enhancement
- Saltmarsh / intertidal habitat creation and enhancement'

Natural Flood Management (NFM)

- Floodplain reconnection
- Upland landuse management
- Flood hydrograph attenuation and de-synchronisation

Sustainable Nature-Based River Engineering and Management

- Large wood habitat enhancement and bank protection
- Integrated constructed wetlands and sustainable urban drainage
- Sediment management
- Asset protection through sustainable channel stabilisation

Fisheries and Barriers Management

- Habitat surveys
- Barrier assessment & fish pass screening evaluation
- Barrier management design
- Fisheries habitat enhancement design

Peatland Restoration

- Channel restoration, planning and design
- Hydrological assessment
- Field surveys

Hydropower Support

- Geomorphic and hydrological assessments
- Scoping and design of measures to mitigate impacts to physical form/ process and aquatic ecology

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Session 6

A focus on fish

DNA BASED METHODS FOR CATCHMENT PRIORITISATION

C. FRENCH¹ & J. HUDDART¹

1 NatureMetrics

NatureMetrics supported River Dee Trust, to undertake eDNA sampling of the River Dee and River Don to map population distribution of Atlantic and (invasive) Pink Salmon. Samples were taken during two different seasons along the length of both rivers with fish and invertebrate metabarcoding applied to samples. Novel eDITH models were used to map the distribution of the two species within the catchments, incorporating river flow and level data provided by the Trust. The output of this work has identified areas of river with the highest probability of each salmon species being present with implications for catchment-scale planning and prioritisation. From the same samples, freshwater invertebrate data was fed into various methodologies for assessing invertebrate health. Reasonable agreement was found between SEPA published ASPT scores and those derived from the eDNA dataset, highlighting the ability for eDNA based monitoring techniques to scale up our understanding of catchment health.

ERYRI TORGGOCH

A. SMITH¹

1 North Wales Rivers Trust

We have secured funding to protect the last remaining native Torgoch in Snowdonia. Principal fisheries officer and Torgoch specialist Antony Smith will present on his research and findings and river restoration techniques.

REMOVING REDUNDANT GAUGING WEIRS TO BENEFIT MIGRATORY FISH IN WALES

R. THOMAS¹, M. MAHAVAR SNOW² & P. SMITH¹

1 Arup, 2 Natural Resources Wales

In 2023, Natural Resources Wales removed two redundant river gauging weirs that posed significant barriers to fish movement. This talk presents the projects from conception to post-construction, including lessons learnt for future schemes.

The first project, on the Afon Honddu near Brecon opened up 20km of habitat to migratory fish. Working in a well-used public woodland and the River Usk SAC, it required close collaboration with the local council. Ash-dieback felled timber was used to stabilise the bed and banks in the restored river reach.

The second project, on the Afon Clywedog near Llanidloes opened up 4km of habitat to migratory fish. As river flows were heavily regulated by a large upstream dam, the works were co-ordinated with the reservoir releases, also allowing the demolition to take place over the closed season of an adjacent caravan park.

As well as restoring fish passage and natural processes, removing the assets reduced future maintenance and liabilities to NRW.

Restoring rivers to help nature thrive

We partner with our clients to create nature-based solutions which enhance biodiversity, restore natural processes and leave a sustainable legacy.

Contact us:

Dr Neil Williams
neil.williams@aecom.com
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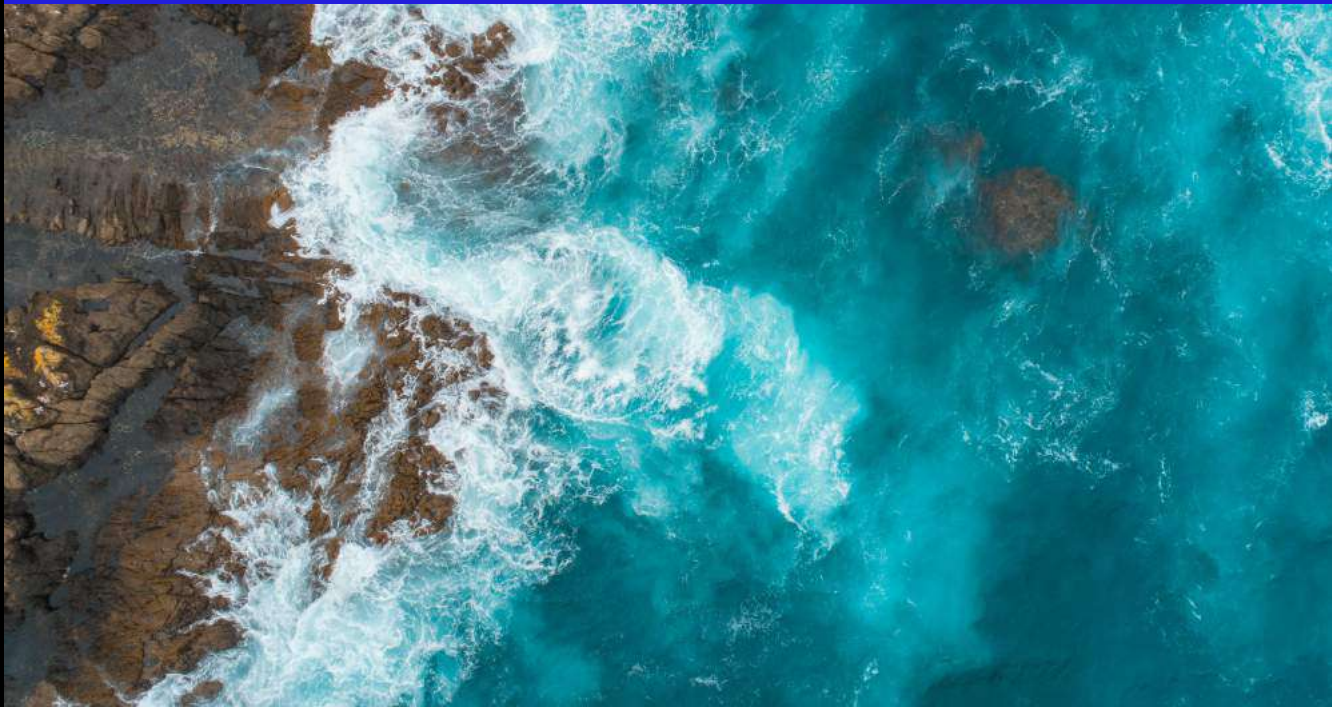
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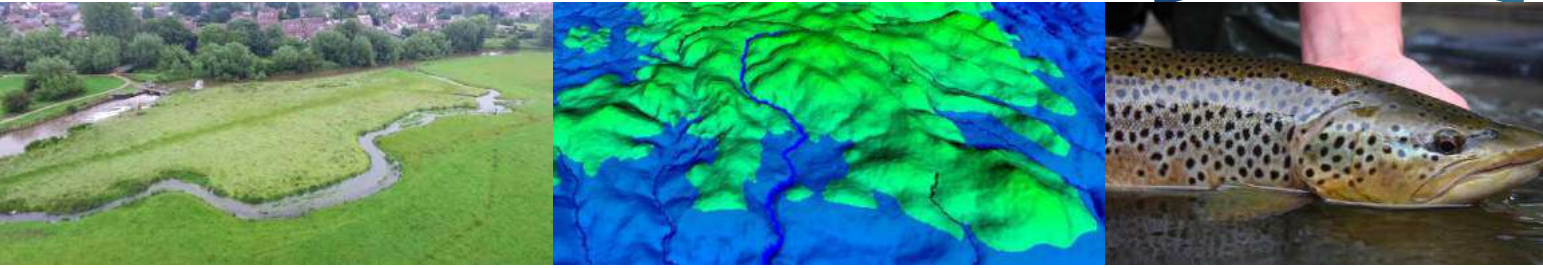
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River Restoration and Habitat Creation



Our approach

Through extensive knowledge and experience of aquatic environments, we work closely with landowners and other stakeholders to ensure the successful delivery of river restoration, Natural Flood Management (NFM) and habitat/ wetland creation projects at the reach and catchment scale, from preliminary surveys, feasibility studies and concept designs, to in-depth geomorphological surveys and detailed designs. Where possible, we aim to utilise nature based solutions that work with natural processes to provide sustainable outcomes that achieve the client's aims and objectives, whilst maximising benefits for biodiversity.

By combining our team's expertise in hydrology, geomorphology, river restoration, habitat creation, flood risk, land management, fisheries and ecology, we provide holistic advice, reports and designs, tailored to our client's brief. As well as delivering purely habitat-focused projects, we are accustomed to, and appreciate the importance of multi-use landscapes, whether rural or urban, and strive to provide solutions that ensure lasting positive relationships between our clients and stakeholders.

Leading services provided by our river restoration and habitat team include:

Feasibility, Design and Assessments

Our team can provide detailed feasibility and designs for various habitat restoration projects which can be supported by various assessments to ensure robust implementations of such projects. These include:

- **River Restoration and NFM feasibility and design**
We carry out the necessary surveys to identify opportunities for river restoration and habitat/wetland creation and assess the feasibility of the range of options. Working closely with the client we produce holistic designs that support nature's recovery, by providing improved habitat for fish, invertebrates, wading birds and amphibians. Fishtek can provide detailed hydrological and hydraulic modelling to identify and quantify impacts on flood risks (including NFM benefits); and for wetland creation projects we can assess the frequency of wetting, water depths and velocities.

Our extensive portfolio includes detailed restoration, habitat/ wetland creation and NFM designs for a number of high-profile river systems in urban and rural catchments throughout the UK. These projects have delivered a wide range of ecological, hydromorphological, water quality, and amenity benefits along with Biodiversity Net Gain (BNG) contributions and flood risk benefits.

- **Geomorphological assessments**
Our team regularly undertake rapid or detailed geomorphological assessments for projects at the reach or catchment-scale. We can provide condition assessments and highlight the potential opportunities and risks associated with river restoration schemes (including weir/structure removals), which may impact the geomorphology of rivers. This often involves specific geomorphological assessments, such as scour and sediment transport analysis for sites where a potential risk to infrastructure or aquatic communities has been identified.

Surveys

Our team can provide detailed fisheries and habitat surveys across a range of industrialised, urban and rural environments. These surveys include:

- **River Habitat Surveys (RHS)**
- **Modular River Physical Surveys (MoRPH)**
- **Fluvial Audit Surveys**
- **Phase I Habitat and UKHAB Surveys**
- **Protected Species Surveys**
- **Fish Surveys**
(e.g. electrofishing, seine netting, and eDNA surveys)
- **Fish Passage Barrier Surveys**
- **Macroinvertebrate and Macrophyte Surveys**
- **Water Quality Sampling**

We have provided our clients with data from surveys conducted to UK standard protocols, helping to accurately characterise the ecological baseline of aquatic communities, enabling pre- and post- construction comparisons, and supporting long-term geomorphological and ecological monitoring to determine the effectiveness of schemes.

For further information please contact:

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Session 7

THE LONG RUN: TARGETED INTERVENTIONS TO DELIVER AT-SCALE OUTCOMES

R. POWELL¹ & A. HUMPHREYS²

1 Natural Resources Wales, 2 Binnies

Natural Resources Wales has produced Strategic River Restoration Plans for catchments in Wales as a long-term commitment to reinstate natural conditions and biodiversity. NRW's project is funded via the Nature and Climate Emergency Fund from Welsh Government to deliver against the nature and climate emergencies. NRW looks at river restoration at whole-river scale, developing strategic restoration plans and geomorphological appraisals to assess the physical state of the rivers. We will describe how we identify and prioritise restoration measures, targeting those that will deliver at-scale outcomes across Wales. The vision can be delivered in partnership with key stakeholders. We will include case studies of projects delivered under this programme, along with designed schemes that are ready to be delivered. We will include the perspective of the key stakeholders in the continued development of project sites, and helping to raise public awareness of what a natural river looks like.

WORKING WITH NATURAL PROCESSES EVIDENCE DIRETORY

M. BALDWIN¹ J. BROOMBY¹, S. ROSE¹, E. PEARSON¹ & T. JONES²

1 JBA Consulting, 2 JBA Associate

Following the publication of the Working with Natural Processes Evidence Base in 2017, JBA Consulting have been working with the Environment Agency and its partners to update the evidence directory, reflecting on and analysing the research that has taken place in the last 5 years. The presentation will summarise the review process and key findings covering the key NFM categories; river and floodplain management; woodland management; run-off management and coast and estuary management. We will discuss the risk flood evidence and wider benefits as drawn from studies in the last five years. We will present a summary of studies looking at the effect of NFM measures used in combination, and advances in approaches to monitoring and modelling. The presentation will conclude with an overview of the newly identified and updated research gaps and recommended areas of focus required going forward.

Poster list



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- Uwch Conwy**
1 D. DAVIES¹ & S. AUBREY²
1 National Trust Cymru, 2 Natural Resources Wales

- Preparing for Beavers in Greater Manchester, Merseyside and Cheshire**
2 C. J. SEDDON¹
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- Integrating floating wetlands as a nature-based preliminary water treatment solution at Witches Oak Waters**
3 O. ROWE¹ & L. SOUTHAN¹
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- Integrating flood risk and water quality modelling through a new hydrological appraisal tool (HAT) in the Yorkshire Ouse catchment**
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- River Machno floodplain reconnection and enhancements**
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8 O. TERNDRUP¹ & L. NEAL¹
1 Shropshire Wildlife Trust

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- A collaborative approach to catchment monitoring- collective insights, evidence-based decision making and connected catchments**
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1 Environment Agency



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- 42 **Co-producing flood and climate change resilience with local communities in urban environments**
F. PELIZZA¹, S. WORONIECKI¹, S. WATKINS² & O. VAN BIERVLIET¹
1 WWT London Wetland Centre, 2 Imperial College
-
- 43 **Rivers full of LIFE. Addressing the plight of freshwater fish in European waters**
L. BARRETT¹, G. BECERRA JURADO² & M-J. ARAMBURU²
1 Elmen-EEIG, 2 CINEA – European Climate, Infrastructure and Environment Executive Agency
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- 44 **Harehope Restoration**
E. FLOYD¹
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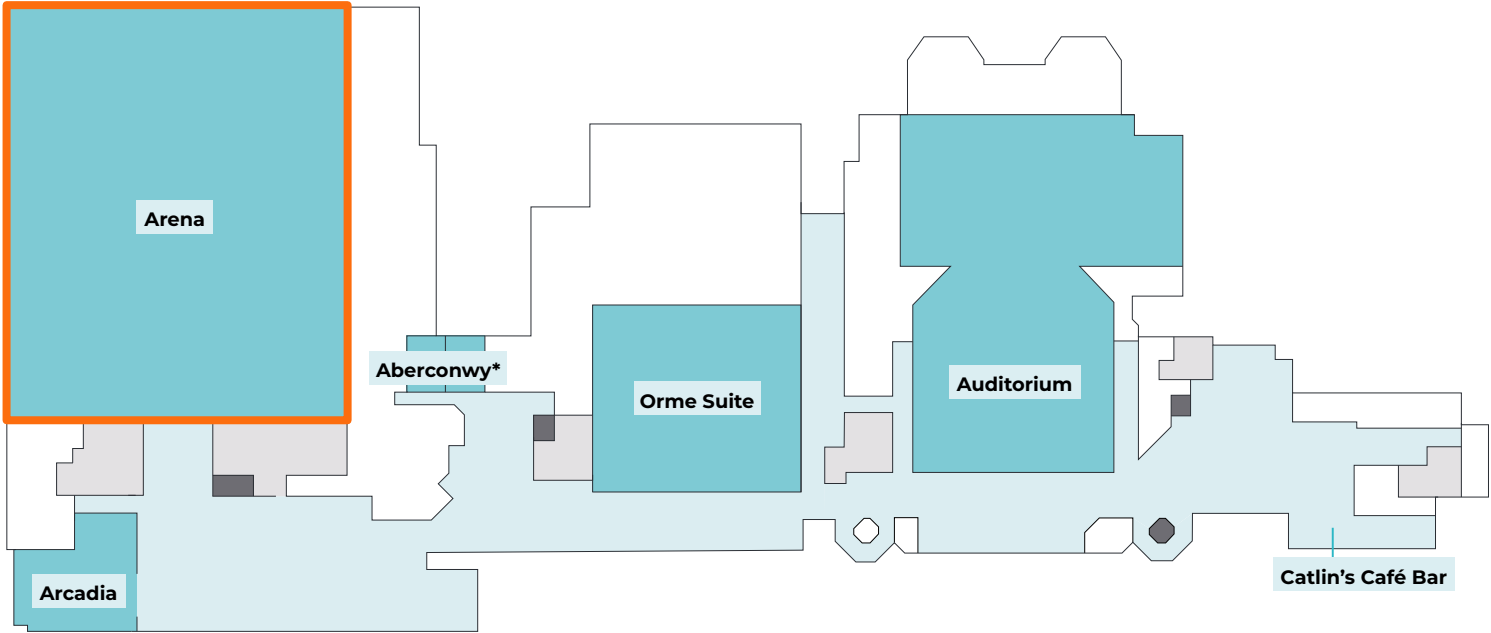
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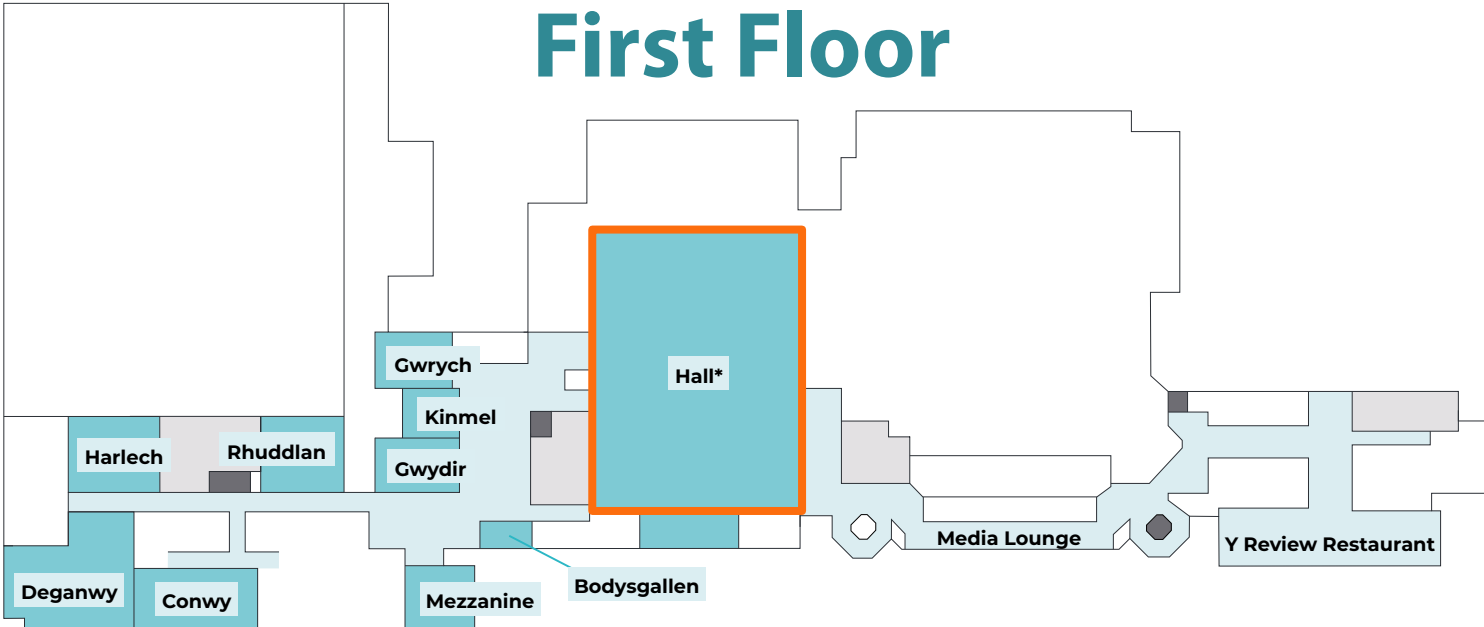
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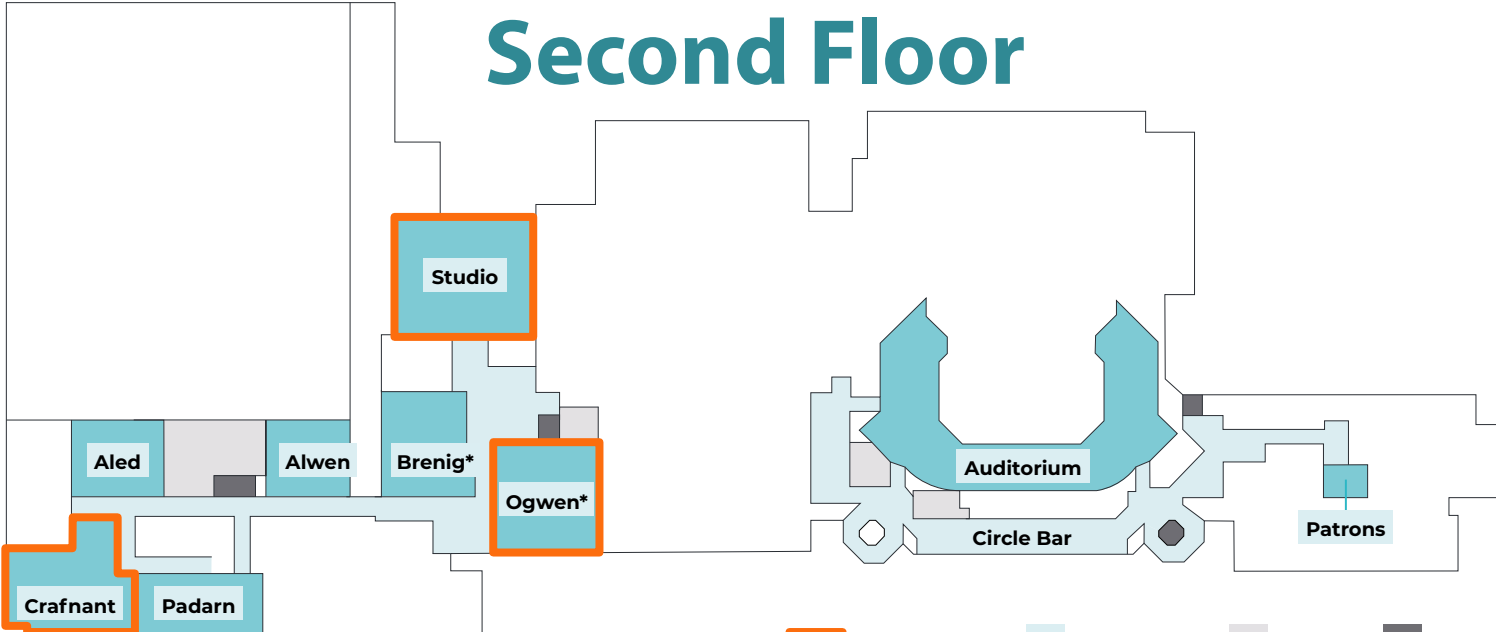
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